Review Article

The Effect of Yoga Practice on Labor Pain: A Systematic Review and Meta-Analysis

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Abstract

Background: Labor pain management is a critical aspect of midwifery care and an essential purpose of childbirth-related care. There is a need for comprehensive results on relevant non-therapeutic methods of reducing labor pain. This systematic review and meta-analysis study was conducted to investigate the effect of yoga practice on labor pain. **Material and Methods:** We performed a systematic literature search from SCOPUS, PubMed, Web of Science, and Science Direct for relevant studies from January 1, 1990 to June 2, 2022. We selected published quasi-randomized and randomized controlled trial studies that evaluated the effect of yoga practice on labor pain. Quality research was applied. We pooled the Standardized Mean Dfference (SMD) of labor pain in pregnant women with and without yoga practice during pregnancy using a random-effects model at 95% Confidence Intervals (CIs). **Results:** Nine studies including 660 women were included in the meta-analysis. Pregnant women in the yoga practice group experienced statistically significantly low labor pain at the beginning of the active phase compared to the control group (SMD: -1.10, 95% CI: -1.61, -0.58, $p < 0.001$; I2 = 89%). Yoga interventions also reduced the intensity of labor pain in active (SMD: -1.32, 95% CI: -2.03, -0.60, $p < 0.001$; I2 = 92%) and transition (SMD: -1.93, 95% CI: -2.87, -0.99, $p < 0.001$; I2 = 92%) phases compared to the control group, respectively. **Conclusions:** The results of the study showed that yoga practice during pregnancy reduces the intensity of labor pain in different labor phases. However, these findings should be considered cautiously due to the substantial heterogeneity between studies.

Keywords: *Labor pain, muscle stretching exercises, pregnant women, yoga*

Introduction

Pain experienced during childbirth is a complex, multi-dimensional, and subjective phenomenon.[1] Labor pain management leads to a pleasant delivery, emotional recovery of the mother and baby, and a reduction in the need for analgesic drugs and the rate of cesarean section.[2,3] Most mothers demand the use of pain relief techniques in labor.[4] Labor pain management is a critical aspect of midwifery care and an essential aim of childbirth-related care.[5] Numerous pharmacological[6] and non-pharmacological methods are available to manage labor pain.[7,8] Pharmacological methods to reduce pain are usually associated with adverse effects such as prolonged labor, abnormal fetal rate heart, and the use of instruments for childbirth.[9] The use of non-pharmacological methods is recommended due to no side effects or a few side effects.[10] Also, non-pharmacological methods allow pregnant women to experience delivery in a natural way.[11] Effective non-drug methods in relieving pain in labor include breathing techniques,[12] music therapy,[13] massage and heat therapy,[14] aromatherapy virtual reality glass,[15] perinatal education,[16] and yoga.[17]

Historically, people do practiced yoga for about 4000 years to improve their health.[18] Yoga is a comprehensive method for health and personal growth and integrates physical exercise and meditation.[18] Yoga practice improves blood circulation, oxygen uptake, and hormonal system functions, and relaxation and meditation in yoga stabilize the autonomic nervous system.[19] The combination of these practices can reduce anxiety and stress,[20] empower mothers in this process, and reduce the severity of labor pain.[21] It also prepares the mother for childbirth with strength determination. Evidence illustrated that yoga practice

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during pregnancy is pleasant, feasible, safe, and useful for both the mental and physical health of pregnant women.[22,23]

The results of some clinical trial studies show that yoga practice during pregnancy reduces the severity of pain in labor.[3,20,24-29] Several systematic review and meta-analysis studies have been conducted on the role of yoga practice on psychological effects in pregnant women[30-32] and outcome pregnancy such as labor length, low birth weight, intra-uterine growth restriction, and preterm labor.[33] However, a systematic review and meta-analysis study was performed in connection with the effect of yoga practice on labor pain in English, Randomized Control Trial (RCT)-design articles.[17] Authors have suggested that more articles are needed for a more comprehensive conclusion. This systematic review and meta-analysis study was carried out to investigate the impact of yoga practice on labor pain.

Materials and Methods

We carried out a systematic review and meta-analysis based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[34] We performed the systematic literature research from Scopus, PubMed, Web of Science, and Science Direct with the following search terms: "Yoga" OR "Muscle Stretching Exercises" OR mindfulness OR "mind concentration" OR "relaxation techniques" OR meditation AND "labor pain". Two authors (M.D., E.J.) independently conducted an initial search and screening for related articles via title and abstract. Disagreements were resolved by the discretion of the third author (MN). Duplicated studies were removed, and the rest were evaluated according to inclusion and exclusion criteria. The literature search was applied between January 1, 1990 and June 2, 2022, without geographic and language limitations.

Studies were considered in our review if they fulfilled the following criteria: (I) the study was an RCT in parallel or crossover design and quasi-experimental, (II) the intervention was administration of yoga practice, (III) the control group was any other routine prenatal care such as mental or physical care, (IV) the outcome of interest was intensity of labor pain through visual analog index (10 cm), and (V) the population of interest was healthy and nulliparous pregnant women. Studies were excluded if those were (I) evaluated exercise without meditation and also evaluated other pre-natal outcomes such as labor length, comfort, fear, and anxiety of mother; (II) case-control, case series, cross-sectional, animal, or cell culture studies; (III) did not report adequate details of study methodology or results; and (IV) presented only as abstracts, conference paper, and letters to the editor and editorials. The visual analog index[35] is commonly used to measure pain intensity. The number "0" indicates painless, and the number "10" indicates the worse pain. Intensity of labor pain at three phases of childbirth was assessed: 1. The beginning of the active phase (3–4 cm of cervix dilatation); 2. Active phase (5–8 cm of cervix dilatation); 3. Transitional phase (8–10 cm of cervix dilatation).

Two investigators (MN, MF) extracted and evaluated the essential data independently. These data entered into standardized data extraction forms and then were mutually checked for completeness and accuracy. Disagreements were solved by consulting with the expert investigator (MS). The characteristics of the studies (the name of researchers, year of publication, study location, and setting), participants (amount of participants, average or age rang, gestational age), interventions (study design, the instrument used for measurement, characteristics of yoga intervention, duration and frequency of yoga intervention, number of withdrawal, and reasons for withdrawal), and outcomes (mean and standard deviation of labor pain intensity in the intervention and control groups at three time) were assessed. Quality research of RCT and semi-intervention studies were applied with a checklist for RCTs and quasi-experimental (Critical Appraisal tools for use in JBI Systematic Reviews).[36] The checklist for RCT contains 13 items. All RCT studies independently were scored based on these 13 items. These items are related to "assignment and allocation of participants in the groups; blindness of participants in groups, and outcomes assessors; the similarity groups at the baseline; were those delivering treatment blind to treatment assignment; fallow up in the groups; The process of outcomes assessment in the groups and Statistical analysis methods". The checklist for quasi-experimental has seven items. In this tool, the following items are checked: is it clear what is the 'cause' and what is the 'effect'; were the participants included in any comparisons similar; were the participants included in any comparisons receiving similar treatment/care; was there a control group; were there multiple measurements of the outcome both pre and post the intervention/exposure; was follow-up complete; were the outcomes of participants included in any comparisons measured in the same way; were outcomes measured in a reliable way; was appropriate statistical analysis used? Answers were scored as 'yes' (one), 'no', and unclear (zero). Two reviewers (MN, MF) independently assessed the quality studies, and disagreements were solved by consulting with the expert investigator (MS).

The effect size of labor pain in pregnant women with and without yoga practice was measured as the Standardized Mean Difference (SMDs) with corresponding 95% Confidence Intervals (CIs). The pooled SMD of labor pain in pregnant women with and without yoga practice during pregnancy at the three phases was estimated using DerSimonian and Laird Random-Effects Model (REM). The heterogeneity of the studies was assessed graphically with forest plots and statistically by Chi-square-based Q statistic and I^2 value. Heterogeneity was considered significant at a P value of < 0.10 in Q-test or $I^2 > 40\%$. Statistical analyses

were performed using Stata software (Version 17.0) (Stata Corp, College Station, Texas) and Review Manager Software (v 5.4; Cochrane Collaboration).

Ethical considerations

This manuscript has no plagiarism. Ethical approval was not required due to the design of this study. This study is registered in the PROSPERO (Number: 336923).

Results

Characteristics of included studies

The first using the search terms, we identified 3970 studies that at the end, 9 studies with 660 samples selected for meta-analysis [Figure 1]. These studies were from five countries (Iran, Korean, India, Thailand, and Indonesia). Eight of studies were RCT, and one study was quasi-experimental design. Six of the studies were written in English, two in Persian, and one in Korean language. The authors and country name, main study characteristics, and intensity of labor pain in the three phases in pregnant women illustrated in these nine studies are given in Table 1.

Quality assessment

Table 2 shows studies' quality score. Out of eight studies with RCT design, six studies received scores of 7, 8, and 9, and two other studies received 10 and 11 out of 13 total scores. A study with a quasi-experimental design also received 6 out of 9 total scores [Table 3].

Intensity of labor pain in the pregnant women

Pregnant women in the yoga practice group experienced statistically significantly less labor pain at the beginning of the active phase compared to the control group (SMD: -1.10, 95% CI: -1.61, -0.58, $p < 0.001$; $I^2 = 89\%$; Figure 2). Yoga interventions also reduced intensity of labor pain in active (SMD: -1.32, 95% CI: -2.03, -0.60, $p < 0.001$; $I^2 = 92\%$; Figure 3) and transition (SMD: -1.93, 95% CI: -2.87, -0.99, $p < 0.001$; $I^2 = 92\%$; Figure 4) phases compared to the control group, respectively.

Discussion

This systematic review and meta-analysis were performed to determine the effect of yoga during pregnancy on the intensity of labor pain in pregnant women. The results of a review of 9 clinical trial articles and 660 samples showed that yoga practice reduces the severity of pain in the active phase of labor and the transitional phase.

The results of this study are in line with the study of Riawati (2021) *et al.* In that meta-analysis, where five studies evaluated the effect of yoga exercise on pain intensity, yoga reduced the severity of labor pain in pregnant women compared to pregnant women with routine care.[17] The results were also in line with the studies of Babbar, *et al.*[37] and Kathryn Curtis *et al.*[33]

There are different mechanisms for reducing the severity of labor pain in women who practice yoga during pregnancy. These mechanisms include proper breathing techniques, increased concentration of mind, reduced stress and anxiety, increased flexibility of the perinea, vaginal and sphincter muscles,[3] gate control theory of pain,[30] and increased blood serotonin and endorphins.[38] Yoga practice emphasizes correct breathing, relaxation, and meditation of the mother's body and mind so that the mother can exercise control over pain.[17] Yoga exercises during pregnancy include several phases: pranayama, asana, relaxation, and meditation techniques.[39] Pranayama is a technique (regular manipulation of breathing) by which the mother practices during pregnancy as well as childbirth to feel relaxed. Relaxation of the body can affect oxygen uptake and ATP secretion for the uterine contraction process so that the cervix opens faster.[39] By regulating inhaling and exhaling, breathing techniques in yoga deliver enough oxygen to the neurons in the brain, and prolonged exhalation reduces exposure to carbon dioxide and other harmful gases, activates the parasympathetic system, and intensifies anxiety and relaxation, thereby reducing pain perception.[40]

Relaxation techniques help enhance self-awareness, concentration, and energy retention and reduce tension during contractions. Meditation calms the mind to focus on the body.[17] In a qualitative study (2020), women's perceptions of yoga practice during pregnancy were divided into three categories: "benefits of yoga practice", "self-knowledge, autonomy and self-care", and "empowerment for the moment of delivery".[41] Yoga is associated with physical and psycho-social benefits for pregnant women, including the strengthened pelvic floor, relieved pain, improved breathing, reduced stress and anxiety, boosted confidence, self-esteem, and independence in managing pregnancy and self-care.[41] In various studies, yoga exercises reduced stress, anxiety, and fatigue[30,31] in pregnant women. The results of a study by I-Hui Lin *et al.* (2022) showed that practicing yoga reduces stress in pregnant women with and without depression.[31] Also, in a systematic review of 3591 people in 51 studies, Mohammadi *et al.* (2021) showed that relaxation (meditation) reduces stress and anxiety in people.[42] However, Schlegel R, Richard N, *et al.* (2020) reported in their review that there is no strong evidence that yoga exercises relieve maternal stress and anxiety during pregnancy.[43] By regulating heart rate and blood pressure, meditation increases alpha brain waves[44] and strengthens the parts of the brain that are related to emotions,[45] which causes happiness and relaxation, and some researchers believe that meditation reduces mental rumination as well as anxiety and stress.[46]

During prenatal yoga practice, Asana techniques increase spinal flexibility and cerebrospinal fluid circulation[25] and facilitate labor by increasing the flexibility of the perineal, vaginal, and sphincter muscles.[43] Yoga exercises help strengthen the muscles of the back, abdomen, and buttocks

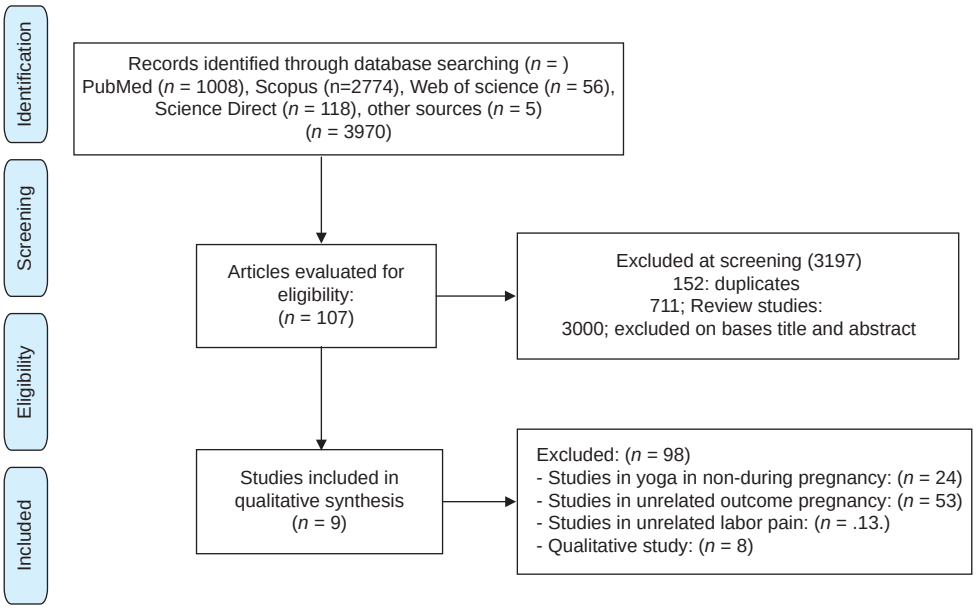

Figure 1: Flow chart of the systematic literature review

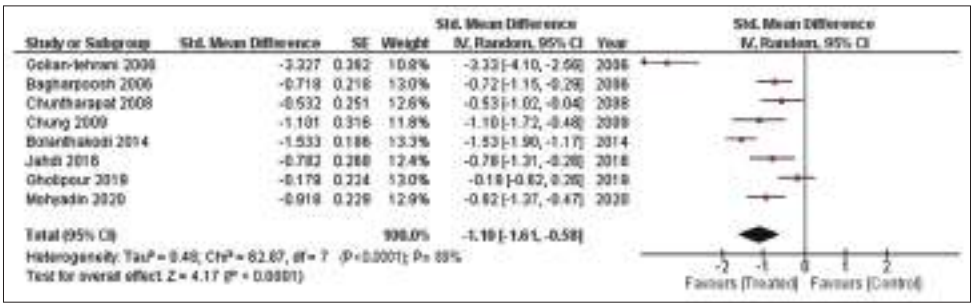

Figure 2: Forest plot for intensity of labor pain at the beginning of the active phase in pregnant women

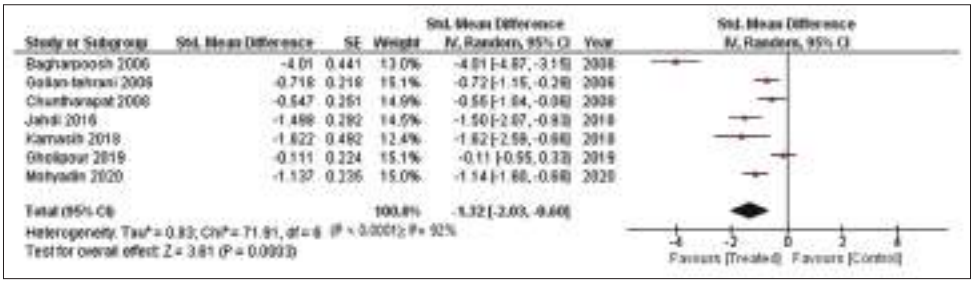

Figure 3: Forest plot for intensity of labor pain at the active phase in pregnant women

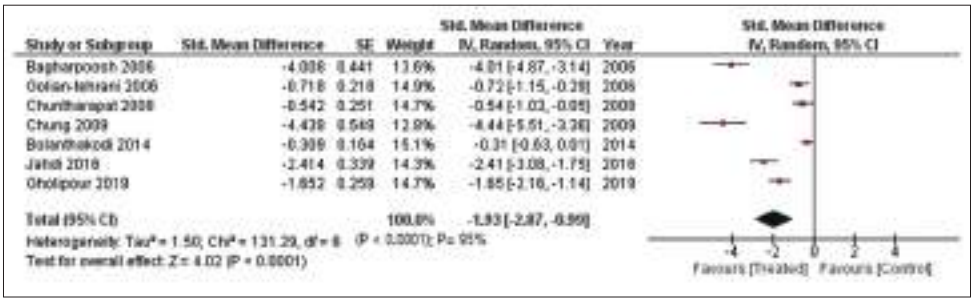

Figure 4: Forest plot for intensity of labor pain at the transition phase in pregnant women

and increase the woman's strength.[27] Yoga connects the body, mind, and soul. Increasing awareness of the pelvic floor can help the individual gain new insights into how the body moves, how to improve posture, and how to

Table 1: Characteristics of selected studies

n	Author. Year	Place	Sample	Age (Years) Mean (SD)/rang	Design	Instrument	Yoga practice	Labor Pain Experimental/Control	*P*
1	Jahdi *et al.* (2016)	Iran	60	27.44 (4.37)	Single blinded RCT	VAS	Yoga asanas, chanting om, breathing awareness, yoga Nidra, Dhyana	Dil 3-4 cm: 2.63 (0.90)/3.55 (1.40)**	0.01
								2 h late: 3.58 (0.90)/6.0 (2.10)	0.000*
								4 h late: 3.90 (1.09)/8.4 (2.40)	0.000*
2	Karnasih IGA *et al*. (2018)	Indonesia	22	27.44	Pre-experimental	NPS	Mattresses, aroma therapies, audio visual/ relaxation music and yoga vcd)	Active Phase: 6.82 (1,53(/8.91) 0.99)	<0.05
3	Chuntharapat S *et al*. (2008)	Tilaned	66	NA/18-35	Single blinded RCT	VASPS	Yoga asanas, chanting om, breathing awareness, yoga Nidra, Dhyana	Dil 3-4 cm: 51.79 (10.46)/57.91 (12.83)	<0.05
								2 h late: 67.24 (9.41)/71.91 (7.70)	<0.05
								4 h late: 83.48 (8.89)/88.03 (8.05)	<0.05
4	BolanthnKodi Ch *et al*. (2014)	India	150	23.71 (3.40)	Single blinded RCT	NPS	Yoga asanas, chanting om, breathing awareness, yoga Nidra, Dhyana	Dil 3-4 cm: 6.43 (1.05)/7.95 (0.93)	<0.001
								Dil 8 cm: 9.43 (0.61)/9.62 (0.62)	0.089
5	Chung Sin Sh *et al*. (2009)	Korean	46	32.6 (3.80)	A quasi experimental study	VAS	Based on posture, full body relaxation and abdominal breathing, and education for pregnant women	Active Phase: 3.73 (0.75)/5.60 (1.03)	<0.001
								Dil 8 cm: 5.21 (0.99)/8.43 (0.27)	<0.001
6	Gholipour Sh *et al*. (2019)	Iran	80	29.75 (7.00)	Single blinded RCT	VAS	Yoga asanas, chanting om, breathing awareness, yoga Nidra, Dhyana	Dil 4-6 cm: 4.0 (5.46)/5.10 (5.70)	<0.001
								Dil 6-8 cm: 6.10 (7.45)/7.10 (10.33)	<0.001
								Dil 8-10 cm: 8.10 (75.51)/9.10 (4.04)	<0.001
7	Mohyadin *et al*. (2020)	Iran	84	24.75 (4.22)	RCT	VAS	Physical postures (Asana) accompanied with breathing ex-excises (pranayama) followed by meditation	Dil 4-5 cm: 4.03 (1.99(/5.77 (1.89)	0.001
								2 h late: 6.17 (1.64)/8.14 (1.82)	<0.001
8	Bagharpoosh M *et al*. (2006)	Iran	62	NA/20-30	RCT	VAS	Relaxing the toes and feet and then ankles, calves, knees, thighs, lower abdomen, upper abdomen (or chest), shoulders, arms, hand and fingers, neck, face and heads.	Dil 3-4 cm: 4.50 (2.50/6.25 (2.50)	<0.001
								Dil 6-8 cm: 7.03 (3.66(/9.12 (3.66)	<0.001
								Dil 10 cm: 6.96 (2.50)/9.64 (2.50)	<0.001
9	Golian Tehrani Sh *et al*. (2006)	Iran	90	NA/20-35	RCT	VAS		Dil 3-4 cm: 4.0 (4.18)/7.0 (4.18)	<0.001
								1 h late: 7.0 (3.07)/8.0 (3.07)	<0.001
								2 h late: 7.0 (3.07)/10.0 (3.07)	<0.001

**Mean (Standard Deviation)/Mean (Standard Deviation)

Table 2: Quality assessment of the effect of prenatal yoga on labor pain (RCT*)

n	Author. Year	1	2	3	4	5	6	7	8	9	10	11	12	13	Total score
1	Jahdi *et al*. (2016)	1	1	1	0	0	1	1	1	1	1	1	1	1	11
2	Karnasih *et al*. (2018)	1	0	0	0	0	0	1	1	1	1	1	0	0	6
3	Chuntharapat *et al*. (2008)	1	0	1	0	1	1	1	1	1	1	1	0	0	9
4	Bolanthn Kodi *et al*. (2014)	1	0	1	0	1	1	1	1	1	1	1	1	0	10
5	Gholipour *et al*. (2019)	0	0	1	1	0	1	1	1	1	1	1	0	0	8
6	Golian Tehrani *et al*. (2006)	0	0	1	1	0	1	1	1	1	1	1	0	0	8
7	Mohyadin *et al*. (2020)	0	1	1	1	0	1	1	1	1	1	1	0	0	9
8	Bagharpoosh *et al*. (2006)	0	1	1	1	0	0	1	1	1	1	1	0	0	8

Ranodaized Clinical Trial (RCT)

Table 3: Quality assessment of the effect of prenatal yoga on labor pain (quasi experimental study)

n	Author. Year	1	2	3	4	5	6	7	8	9	Total score
1	Chung Sin *et al* (2009)	1	1	1	1	0	1	1	0	0	6

improve strength and flexibility. Practicing yoga raises the threshold for perceived pain during childbirth and leads to increased secretion of endorphins and serotonin.[38] In the study by Karimi *et al.* (2018), yoga exercises elevated serotonin in pregnant women.[38] Also in the study of Sri Sumarni (2022), yoga exercises increased beta-endorphin levels and decreased dysmenorrhea in adolescents.[47] Studies selected of this review were systematic, conducted in 5 Asian countries (Taiwan, India, Iran, Indonesia, and Thailand). Clinical trial studies in countries with different cultures could give a better interpretation of the results, and the study limitations could be identified.

Conclusion

The results of studies showed that yoga practice during pregnancy reduces the intensity of labor pain in different labor phases. Therefore, maternal yoga practice can be used during pregnancy to reduce the severity of labor pain. Considering the benefits of yoga during pregnancy, it has increasingly been accepted as a self-care activity during pregnancy and in preparation for childbirth. In pregnancy care planning, holding yoga classes seems useful to help the mother to have both physical and psychological preparation for childbirth. Also, using different yoga techniques by reducing the severity of labor will be effective in promoting vaginal delivery and reducing cesarean section. Mothers who practice yoga regularly during pregnancy experience a healthy, comfortable pregnancy and delivery, low labor pains, and mental well-being.

Acknowledgments

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Conflicts of interest

Nothing to declare.

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Review Article

The Association between Post-Partum Depression and Nutrition and Dietary Patterns: Systematic Review

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Abstract

Background: Postpartum Depression (PPD) is a common illness with long-term effects on mother and child. Nutrition is a crucial factor in mental health, but research findings on its connection to PPD are inconsistent. This review aims to explore the correlation between PPD and dietary patterns. **Materials and Methods:** We conducted a comprehensive search of several databases including PubMed/MEDLINE, Embase, ISI and ISI/Web of Science (WOS), Scopus, and Iranian databases such as Magiran, Scientific Information Database (SID), and IRANDOC from 2003 to 2020. Our search was based on the keywords "postpartum depression" and "nutrition, vitamin D, Folic acid, iron, zinc, and vitamins." We applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist to select articles based on inclusion/exclusion criteria. Of the 100 articles identified, only 24 articles met our criteria and were selected for further analysis. **Results:** Research suggests that low levels of vitamin D, iron, folate, and carbohydrates, and an unhealthy diet lacking in vegetables are potential causes of PPD. However, the impact of zinc, omega-3 essential fatty acids, and other nutrients such as antioxidants, vitamin E, and vitamin C on PPD is unclear due to conflicting information. Additionally, limited research has been conducted on the association between group B vitamins and PPD. **Conclusions:** In conclusion, we can lower the risk of PPD by providing dietary guidance and working with healthcare providers. It is important to pay attention to our diet and make sure we are consuming enough vitamins and nutrients to support our mental health.

Keywords: *Depression, diet healthy, diet, food, nutrition, postpartum*

Introduction

Postpartum Depression (PPD) is a prevalent and severe mental health disorder that can have enduring effects on both the mother and the baby.[1] Depressed mothers experience feelings of sadness, fatigue, guilt, worthlessness, and anxiety as they take on the parental role, and may even have thoughts of harming themselves or the baby.[2] Sadly, many depressed mothers do not seek medical attention in time due to the stigma surrounding mental illness.[3] Therefore, early diagnosis and treatment can be challenging.

PPD prevalence ranges from 0.5% to 60.8% globally.[4] In Iran, about one-third of mothers experience PPD.[5] Risk factors include lack of support from a spouse, economic and social factors, previous psychiatric disorders, pregnancy complications, and domestic violence.[6-8] Inadequate nutrition may also contribute to major depression.[9] There is a hypothesis that nutritional deficiencies, which may occur during pregnancy and lactation, may increase the susceptibility to PPD due to hormonal changes.[1] Studies have been conducted on the relationship between the role of food and PPD,[8] but further research is needed to evaluate the role of nutrition in PPD.[10] Discovering nutritional risk factors could be a potential option for helping reduce the incidence of PPD. This systematic review aimed to investigate the association of PPD with nutrition and diet patterns.

Materials and Methods

This systematic review study is a part of the results of the doctoral dissertation on reproductive health (design and psychometrics predictive tool for PPD) that was supported by the Isfahan University of Medical Sciences and conducted in 2016. In this systematic review, we evaluated all

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studies in English and Persian according to the checklist. We used electronic search databases of PubMed/MEDLINE, Embase, ISI and ISI/Web of Science (WOS), Scopus, and Iranian databases such as Magiran, Scientific Information Database (SID), and IRANDOC from 2003 to 2020. Searching in the databases was made using keywords "Post-Partum depression" and "nutrition" or "vitamin D" or "Folic acid" or "iron" or "zinc" or "vitamins" or "carbohydrate" or "vitamin B." Keywords were selected by the MeSH system for assessing in the PubMed database.

We screened studies based on the inclusion criteria of investigating PPD within the first year after delivery, excluding studies on postpartum psychosis or bipolar affective disorders. Our systematic review was reported by the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) guidelines.[11]

The quantitative studies were assessed for relevance, appropriateness, clarity, and methodology using the Mirza and Jenkins checklist[12] and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement checklist.[13] The quality of the reviews was evaluated based on the assessment criteria in Smith *et al*.'s study.[14]

The initial search yielded 100 abstracts, which were evaluated by two researchers. We conducted content analysis and categorization of the results. Of the 100 articles identified, we included a total of 24 "good-quality studies" of various designs [Please refer to Figure 1].

We followed the standard procedure for data extraction and recorded the relevant information in Table 1. Two researchers independently examined full texts to determine which publications should proceed to the data extraction stage. The researchers compared their findings and resolved any discrepancies through discussion. Ultimately, we identified 24 papers that met our criteria.

To ensure the quality of the studies, we assessed the clarity of their objectives and information using the STROBE statement checklist, which includes items required for reporting observational studies. This assessment helped reduce the risk of bias due to insufficient information. Additionally, we evaluated the data summary forms and the qualifications of studies selected for the systematic review.

Ethical considerations

This study received approval from the Isfahan University of Medical Sciences Research Committee and Ethics Committee (Grant Number: 394313). All stages of the study were conducted with adherence to research ethics, honesty, and transparency principles.

Results

Of the 100 articles that were retrieved, only 24 studies met the inclusion criteria for the systematic review [Table 2]. Among those, 17 studies revealed that perinatal depression is associated with lower levels of folate, vitamin D, vitamin B, iron, Se, and Zn.[1,2,9,15-28] However, only two studies

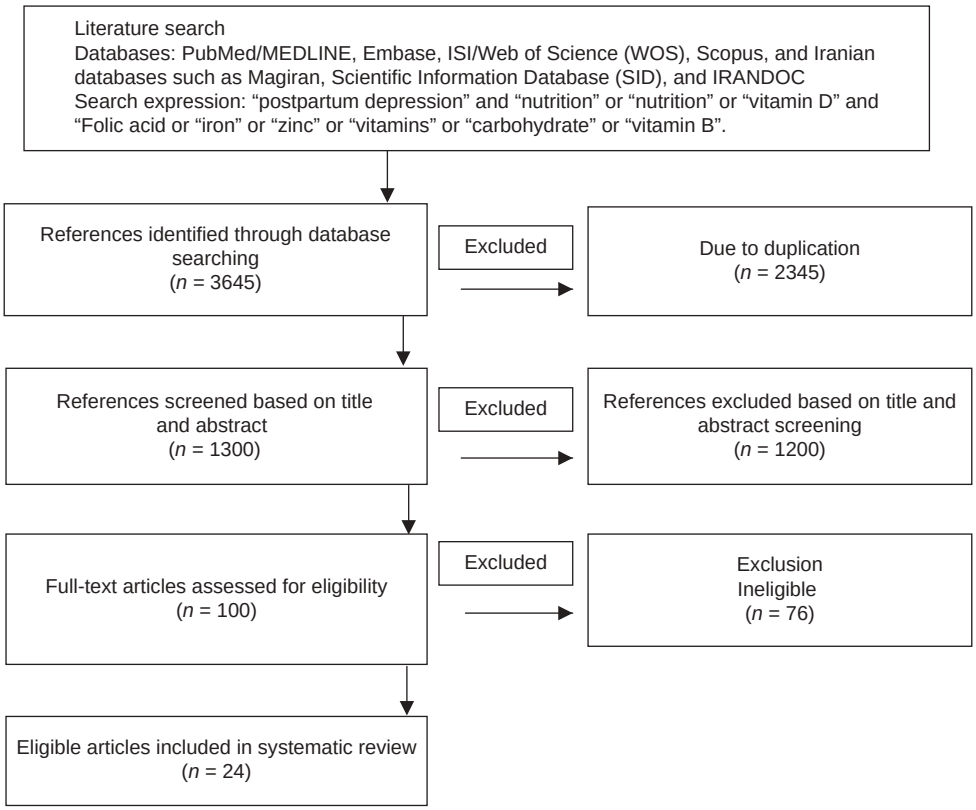

Figure 1: PRISMA flow diagram

Table 1: Literature search strategy for systematic review of the evidence on Post-partum depression and nutrition and dietary patterns

Database	Search terms	Yield
PubMed/MEDLINE	"postpartum depression" and "nutrition" or "healthy nutrition" or "vitamin D" and "Folic acid" or "iron" or	9281
ISI/Web of Science (WOS)	"Zinc" or "vitamins" or "carbohydrate" or "vitamin B." "postpartum depression" and "nutrition" or "healthy."	7665
Scopus	"nutrition" or "vitamin D" and "Folic acid" or "iron" or "zinc" or "vitamins" or "carbohydrate" or "vitamin B."	834
Scientific Information Database (SID)	"postpartum depression" and "nutrition" or "healthy nutrition" or "vitamin D" and "Folic acid" or "iron" or "zinc" or "vitamins" or "carbohydrate" or "vitamin B."	134
IranMedex databases	"postpartum depression" and "nutrition" or "healthy nutrition" or "vitamin D" and "Folic acid" or "iron" or "zinc" or "vitamins" or "carbohydrate" or "vitamin B."	173

found no link between group B vitamins and PPD,[2,29] and three studies failed to find a link between omega-3 and PPD.[9,30,31] Moreover, only two studies discovered a connection between healthy eating patterns, including fruits, vegetables, seafood, grains, and PPD.[10,24] One study found a link between PPD and lower levels of insulin,[32] while two studies found no link between zinc vitamins and PPD.[33,34]

Vitamins

Vitamin D

Vitamin D deficiency is a common issue in many countries due to insufficient sunlight. This vitamin is not naturally found in many foods, except for fish, egg yolk and milk are enriched with it.[35] Studies have shown that low levels of vitamin D are associated with PPD.[25,36,37] One study in Iran found that women with low vitamin D levels had a greater risk of depression 6–8 weeks after delivery.[15] Another study found that taking 2,000 units of vitamin D daily in the last 2 weeks of pregnancy and the first 8 weeks after delivery could reduce the risk of PPD.[38] A meta-analysis study showed that low levels of vitamin D (less than 50 nmol/l) were associated with a 3.67-fold risk of PPD.[22] A clinical study also found that taking a dose of 2000 IU/d of vitamin D can reduce depressive symptoms.[27]

However, findings from cohort studies suggest that vitamin D deficiency is related to the incidence of PPD, and vitamin D may play a significant role in the recovery of women with PPD. The mechanism of this action is unclear.[29]

Group B vitamins

Limited evidence suggests that group B vitamins have no direct influence on PPD, as it does not affect the immune system or the hypothalamic–pituitary–adrenal axis.[2] While some studies have explored their relationship, none provide convincing evidence of a link.[2]

Vitamin B1 or thiamine

Thiamine is a water-soluble vitamin that is not stored in the body[19] and must be consumed daily from sources such as beef, chicken, cereals, nuts, and beans.[39] Its daily requirement is 1.1–1.2 mg for adults and 1.4 mg for pregnant and breastfeeding women.[40] It is essential for neurotransmitter synthesis and energy production, and its deficiency can cause brainstem changes and depressive symptoms.[41] Supplementation with thiamine can improve these symptoms.[42]

Vitamin B2 or riboflavin

Riboflavin is commonly found in dairy products, lean meats, liver, green leafy vegetables, and yeasts,[18] while few studies have analyzed the link between low vitamin B2 and PPD.[18,43] However, a cohort study suggests that moderate intake of vitamin B2 can help reduce the risk of PPD.[43]

Vitamin B6 or pyridoxine

Vitamin B6 or pyridoxine can be sourced from meat, poultry, fish, eggs, white potatoes, and starchy vegetables.[44] This vitamin is vital for the biosynthesis of essential neurotransmitters such as serotonin and dopamine, which are known to improve mood and cognitive function.[45] Patients with depression usually have high homocysteine levels and low levels of folate and vitamin B6.[46] Homocysteine is a non-essential sulfur amino acid that can be toxic to blood vessels and cause oxidative stress and cell death.[47] A study has shown that taking vitamin B6 can independently reduce the incidence of PPD.[43]

Vitamin B12

Normal levels of vitamin B in the blood range from 147.6 to 664.2 pmol/L. Anything above this range is considered toxic.[16] Vitamin B12 deficiency leads to an increase in homocysteine levels and a decrease in the efficiency of folate and B12 due to its trapping in the 5-methyltetrahydrofolate cycle instead of the active form of tetrahydrofolate.[16] Folate and vitamin B12 play a vital role in several metabolic pathways in the central nervous system. Elevated serum homocysteine levels indicate a deficiency of vitamin B12 and folate, and are seen in depressed patients.[48] However, a systematic review found

Table 2: Included studies for literature review

Authors and year conducted	Design type	Number of papers included (date range)	Participants	Outcome	Country	Sample	Tools	Quality level
Sparling (2017)[1]	Systematic review	24 (1996-2016)	14262	In all, 14 studies found associations of perinatal depression with lower levels of folate, vitamin D, Fe, Se, Zn, fats, and fatty acids, while two studies found associations between perinatal depression and higher nutrient levels. Eight studies found no evidence of an association.	Germany	-	-	High
Ellsworth-Bowers (2012)[2]	Critical review	13 (unknown)	4443	Findings suggest that while n-3 PUFA levels have been shown to vary inversely with PPD and link with psychoneuroimmunology, there is mixed evidence regarding the ability of n-3 PUFA to prevent or treat PPD. B vitamin status is not linked to PPD, even though it seems to vary inversely with depression in non-perinatal populations and may have an impact on immunity. Vitamin D and the trace minerals Zn and Se are linked to PPD and psychoneuroimmunology.	USA	-	-	Medium
Opie (2020)[10]	Systematic review	6 (1835-2020)	Unknown	A balanced maternal diet with an emphasis on fruits, vegetables, fish, grains, legumes, and herbs could be a potential option for helping reduce the incidence of PPD.	Australia	-	-	High
Zhao (2020)[24]	Review of systematic reviews and meta-analyses	48 (since inception until 2019)	Unknown	Greater seafood consumption, healthy dietary patterns, multivitamin supplementation, fish and PUFA intake, calcium, vitamin D, zinc, and possibly selenium are protective factors.	China	-	-	High
Abedi (2018)[15]	Case–control study	-	120	There is a significant relationship between a low level of vitamin D and PPD.	Iran	60 women with and 60 without PPD	Beck Depression Scale	High
Wang (2018)[22]	Systematic review and meta-analysis	9 (2012-2016)	8470	Serum 25 (OH) D levels <50 nmol/l were associated with 2.67 times (OR 3.67; 95% CI 1.72–7.85) increased risk of postpartum depression.	China	-	-	High
Lin (2019)[18]	Cross-sectional study	-	-	Plasma vitamin B2 levels and erythrocyte FA composition might have a major effect on PPD development. Our results suggest that the moderate consumption of riboflavin and n-3 FA could have protective effects on PPDS.	Taiwan	344 women	EPDS*	High
Swardfager (2013)[50]	Systematic reviews and meta-analyses	17 (1984-2010)	2447	Depression is associated with a lower concentration of zinc in peripheral blood.	Canada	-	-	High
Goshtasebi (2013)[51]	Longitudinal study	-	-	Treatment of physiologic factors, especially anemia, would reduce the risk of PPD.	Iran	254 participants	EPDS	High

Contd...

Table 2: Contd...

Authors and year conducted	Design type	Number of papers included (date range)	Participants	Outcome	Country	Sample	Tools	Quality level
Wassef (2019)[28]	Review	17 (up to 2017)		Anemia and/or iron deficiency may contribute to PPD in at-risk women.	Canada	-	-	High
Yan (2017)[52]	Cohort study	-	-	Prolonged folic acid (FA) supplementation during pregnancy was associated with a decreased risk of PPD.	China	1592 participants	CSS**	High
Armony (2012)[53]	Observational study			There was no relationship between maternal iron status and PPD.	China	Pilot sample 137 and confirmatory 567	EPDS	High
Xu (2018)[23]	Cohort study	2001-2010	-	Depression was associated with anemia in women before and after birth.	New South Wales (NSW)	Population-based 649210	The APDC*** is a routinely collected census	High
Levant (2016)[56]	Review	14 (2002-2010)	Unknown	Particularly, decreased DHA is associated with both non-puerperal and PPD.	USA	-	-	High
Llorente (2003)[31]	Clinical trial	-	-	No correlation between docosahexaenoic (omega-3 fatty acid) acid and depression.	USA	200 participants	Current depression symptoms	High
Browne (2006)[30]	Case–control	-	-	There was no association between postnatal depression and either fish consumption in early pregnancy or omega-3 status after birth.	New Zealand	80 participants and 39 in the control group	Diagnostic interview	High
Mougharbel (2015)[56]	Systematic review	17 (2002-2014)	56601	The significant positive association between n-3 PUFA intake and PPD.	USA	-	-	High
Baines (2007)[26]	Cross-sectional			Vegetarian's 21–22% reporting depression compared with 15% of non-vegetarians (P<0.001). Low iron levels and menstrual symptoms were also more common in both vegetarian groups.	Australia	9113 women	SF-36 ****	High
Mirghafourvand (2017)[59]	Double-blind randomized controlled			Orange peel essential oil did not reduce PPD and anxiety.	Iran	96 women	EPDS and STAI	High
Amini (2019)[25]	Systematic review	7 (1975-2017)	4771	Vitamin D deficiency is related to the incidence of PPD and vitamin D may play a significant role in the recovery of women with PPD.	Iran	-	-	High
Murphy (2010)[36]	Exploratory descriptive study	-	-	Vitamin D may play a significant role in PPD.	USA	97 women	EPDS	High
Tiderencel (2019)[27]	A review of current literature	3 (2002-2018)	Unknown	Vitamin D may play a role in reducing PPD.	USA	-	-	Medium

Contd...

Table 2: Contd...

Authors and year conducted	Design type	Number of papers included (date range)	Participants	Outcome	Country	Sample	Tools	Quality level
Kurniati (2020)[34]	Cross-sectional	-	-	No correlation between serum zinc level and postpartum blues syndrome.	Indonesia	70 women	EPDS	High
Fard (2017)[33]	Clinical trial	-	-	Magnesium and zinc did not reduce postpartum anxiety and depressive symptoms.	Iran	A randomized clinical trial	EPDS and STAI *****	High

*Edinburgh Postpartum Depression Scale (EPDS). **The Chinese version of the Self-Rating Depression Scale (CSS). ***Admitted Patient Data Collection (APDC). ****Short FormHealth Survey (SF-36). ***** Spielberger State-Trait Anxiety Inventory (STAI)

no association between serum levels of vitamin B12, folate, ferritin, and the risk of PPD.[37]

Zinc

Zinc is a rare metal ion and the second most abundant element in the human body, after calcium. It plays a crucial role in both the immune and endocrine systems.[49] Zinc is responsible for stimulating and inhibiting chemical mediators in the central nervous system.[49] According to a comprehensive meta-analysis, depressed women had lower blood zinc levels (1.85 μmoll/L) than non-depressed women.[50] Additionally, a systematic review found that low zinc levels are linked to a higher risk of PPD.[1] However, several studies have shown no correlation between serum zinc levels and postpartum blues syndrome.[34] Moreover, a clinical trial found that zinc did not have a significant effect on reducing postpartum anxiety and depressive symptoms.[33]

Iron

Various studies have indicated that women with anemia tend to experience more significant PPD as compared to other mothers.[9] The diagnosis and treatment of anemia during pregnancy can help reduce the risk of PPD.[51] Additionally, low ferritin levels during the postpartum period can also contribute to PPD.[28] A cohort study in China involving 1,592 women showed that consuming iron for over 6 months, which began during pregnancy, helped reduce the risk of depression 6 and 12 months after delivery.[52] However, another study found no association between maternal serum iron and postpartum depressive symptoms.[53] A quality cohort study conducted on 649121 samples over 10 years showed that there is a significant association between anemia and depression during the first year after delivery.[23] Foods such as red meat, liver, seeds, beans, and oysters are rich sources of iron.[54]

Folate

Folate is an essential component in the synthesis of chemical mediators such as serotonin, dopamine, and norepinephrine. Studies have shown a link between folate levels and cognitive function.[42,43] Folate is required in the synthesis of S-Adenosyl Methionine (SAM) from Homocysteine (HCY), which is essential for neurotransmitter production. Furthermore, a deficiency in folate can halt the production of HCY to cysteine. However, several studies have revealed that elevated HCY levels are associated with PPD.[21,52] A cohort study of 1,592 Chinese pregnant women followed up for up to 6 months postpartum found that taking folic acid for more than 6 months reduced the risk of PPD.[55]

Essential fatty acids

Essential unsaturated fatty acids, also known as Polyunsaturated Fatty Acids (PUFAs), are divided into two

main categories: linoleic acid (n-6) and á-linolenic acid (n-3). Omega-3, which is derived from three fat groups, namely Alpha-Linolenic Acid (ALA), Eicosapentaenoic Acid (EPA), and Docosahexaenoic Acid (DHA), is a type of linolenic acid.[17] The significant positive association between n-3 PUFAs intake and PPD.[56]

Studies have shown that there is a link between low levels of omega-3 fatty acids and higher levels of PPD.[17] Among these, the role of the DHA is more pronounced. Pregnancy and lactation naturally decrease DHA levels.[28,57] However, the connection between DHA and PPD is inconsistent. In an interventional study, even with a daily intake of 200 mg of DHA in women with lowered serum levels, there was no change in the prevalence of PPD in the first 4 months after delivery.[31] Nonetheless, some studies have found no correlation between fish intake or omega-3 supplementation and PPD.[30,58] In general, systematic reviews have been unable to establish an effective relationship between omega-3 fatty acids and PPD.[59] However, the prevalence of PPD is higher in vegetarian diets than in omnivorous diets.[26]

Carbohydrates

Carbohydrates play a crucial role in energy production and can impact mood. Although a few studies have been conducted on the relationship between carbohydrates and the risk of PPD,[29,60,61] research has shown that pregnancy leads to insulin resistance,[60] which can make women more susceptible to depression and impaired glucose tolerance.[61] A cohort study has found that women with gestational diabetes are at a significantly higher risk of developing PPD during pregnancy and the postpartum period.[62] Additionally, it has been hypothesized that decreased insulin levels after delivery can lower serotonin levels and cause depression.[32] Fluctuations in blood sugar levels can also lead to the secretion of inflammatory and adipokine markers such as interleukin 6, which have been linked to PPD.[63,64] However, one cohort study found no association between glycemic index and PPD.[30] Finally, low-carbohydrate diets tend to increase the risk of depression because they reduce the production of serotonin in the brain. Carbohydrate-rich foods, however, promote the feeling of well-being by triggering the production of tryptophan.[65]

Antioxidants

Vitamin C plays a crucial role in preventing oxidative stress. It also acts as a cofactor for a group of enzymes that are responsible for regulating and synthesizing important functions throughout the body.[55] A study has indicated that a high dose of vitamin C (3 g/day) can reduce the severity of PPD.[9] However, another study has found that compressed drops of orange peel do not have any effect on PPD or anxiety.[59] There was no significant association found between vitamin E or carotenoids and PPD.[9]

Healthy diet pattern

Eating a well-balanced diet includes fruits, vegetables, fish, and seafood.[8] This diet reduces postpartum anxiety and depression.[31,57] Several studies have shown that consuming whole grains, fruits, vegetables, and fish can effectively lower the prevalence and protect against PPD.[10,24]

Additionally, a study has found that not consuming enough vegetables is more likely to increase the likelihood of PPD than not eating enough meat.[66]

Discussion

This study is a systematic review that aims to explore the relationship between PPD and nutrition, particularly a healthy diet pattern. Nutrients play a vital role in the brain by providing structural substrates and acting as cofactors in many biological reactions. Many nutrients have been shown to have a role in normal function.

Research shows that healthy eating patterns can significantly reduce the risk of PPD by preventing mental health disorders and regulating neurotransmitter synthesis and brain functions associated with depression.[67] The study also reveals that some nutritional deficiencies, such as a lack of vitamins D, iron, and folate, are linked to a higher risk of PPD. Additionally, vitamin D at a dosage of 2000 IU/d can reduce the incidence of depressive symptoms, as found in this review.[68]

It is important to note that the majority of pregnant women have below-optimal levels of vitamin D, highlighting the need for prenatal education on the importance of this nutrient. Additionally, the relationship between low iron levels and PPD has been well-established.[69]

Anemia, which can be caused by a reduction of inflammatory cytokines, such as interleukin 2, can be a contributing factor in depression.[70] Correction of pregnancy anemia, therefore, is crucial. Poor dietary quality has also been associated with PPD in some studies,[71] emphasizing the importance of healthy eating patterns. In line with these findings, iron, along with other nutrients, plays an essential role in maintaining mental health and improving brain function. Foods rich in iron include meat, poultry, fish, eggs, dried beans, and fortified cereals. The form of iron found in meat products, called heme, is more easily absorbed.

Maintaining healthy eating patterns that include vegetables is crucial for good health. The results of a recent study suggest that iron, among other essential nutrients, plays a critical role in maintaining mental health and improving brain function.[71]

There is conflicting information about the role of omega-3 essential fatty acids and other nutritional factors such as vitamin E or vitamin C in mental health. A large cohort

study showed no substantial evidence of an association between omega-3 and PPD in an adjusted model.[72] Some studies have reported a strong relationship between PPD and vitamin B,[43] but this was not found in this study or some others.[2] Despite the varying results, it is clear that nutrition has a significant impact on mental health, and some nutritional deficiencies contribute to the development of PPD.[73] One limitation of the study was the lack of clinical trial articles, and the wide variety of working methods used in different studies may affect the results.

Conclusion

Nutrition plays a crucial role in mental health, particularly with regard to depression. A lack of vitamin D, iron, folate, carbohydrates, and a healthy diet pattern (with an emphasis on vegetables) increases the risk of PPD. Depletion of nutrient reserves during pregnancy can also increase the risk of maternal depression. Eating vegetables and adopting a healthy eating pattern can help reduce the risk of PPD. Further evidence is needed to guide clinical practice on nutritional biomarkers.

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Conflicts of interest

Nothing to declare.

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Review Article

Association between Vitamin D Levels During Pregnancy and Postpartum Depression: A Narrative Reviews

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Abstract

Background: Postpartum Depression (PPD) is a serious depression that develops in the first year, with unknown explained reasons. Many studies evaluated the impact of Vitamin D (VD) levels on depression during pregnancy and postnatal. This narrative review aims to review any association between serum VD levels during pregnancy and the development of PPD. **Materials and Methods:** PPD data from published trials and research articles (period from 2012 to 2022) were assessed through PubMed, Scopus, Science Direct, and Google Scholar using the following terms: Depression, pregnancy, 25-hydroxyvitamin D (25OH VD), vitamin D deficiency (VDD) and postpartum (PP). Articles were selected manually and with careful tracking to avoid duplication. Articles that investigated any association between VD levels during pregnancy and PPD in the time frame were included in the study, while articles investigating VD levels of PP without depression were excluded. **Results:** In this narrative review, five out of seven studies showed an association between PPD and VDD during pregnancy. Danish National Birth Cohort (DNBC), Edinburgh Postnatal Depression Scale (EPDS) and Center for Epidemiologic Studies Depression Scale (CES-D) enrolled among different studies from 3 days to 1 year PP to assess PPD. **Conclusions:** Pregnant women with VDD are significantly associated with PPD. Longitudinal follow-up studies are needed to evaluate the association between VDD with PPD. Screening VD levels among pre-postnatal mothers may be essential for awareness programs that can be implemented to promote remission of postnatal depression.

Keywords: *25-hydroxyvitamin D, depression, pregnancy, vitamin D deficiency*

Introduction

Postpartum Depression (PPD) is one of the most serious depression subtypes that is considered a major public health issue.[1] It is a nonpsychotic depressive event that develops following childbirth and progresses in the first year following delivery.[2,3] Worldwide, up to 20% of women have PPD within the first year following childbirth.[4,5] The prevalence of PPD varies between different countries[6] and has been estimated between 100 and 150 per 1000 births varied according to cultural and societal factors.[7] According to epidemiological statistics, the prevalence was predicted around 8.5% in Canada, 5–13.4% in Denmark, 13–19% in the USA, and 13.4–36% in Brazil and Chile.[7,8] In the Middle East, PPD is common (27%), and bad economy and problems related to pregnancy, low educational levels, unplanned pregnancy, and lack of social support[9] represent significant risk factors.

Features of PPD disorder include contemplative ruminations, panic attacks,[10] emotional instability, tearfulness, lack of appetite, sleeping problems, poor focus, exhaustion, impatience, melancholy, thoughts of suicide, and a sense of blame. Also includes moods of insufficiency and the inability to care for the newborn.[7,11] These signs may last from a few weeks to more than 6 months.[12] Depression negatively influences women's lives, their families, and the baby's cognitive and behavioral development.[13,14] The definite cause of PPD is unknown,[15] even though multiple biological, genetic, socioeconomic, and physiological variables pool to cause this condition.[13,16] PPD development is prone to a number of risk factors, which include depression during pregnancy,[17,18] high stress levels, an absence of financial support, a poor education, and challenging

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birth experience,[18,19] and dietary factors like Vitamin D Deficiency (VDD) and polyunsaturated fatty acids.[1] Many self-report tests can be used to check for PPD such as the Edinburgh Postnatal Depression Scale (EPDS),[20] but a clinical interview is the standard method for its diagnoses.[21]

Although the cause of PPD is unclear, publications showed that it may be associated with a psycho-neuro-immune component,[7,22] and three hypotheses were developed: The first one, PPD has been linked to a decrease in the brain's production of monoamine neurotransmitters, one of these monoamines is serotonin.[23] Biological estrogens estradiol and estriol are released by the placenta and increase during pregnancy. Serotonin function is increased by estradiol and is significantly linked to mood disorders, estradiol levels increase significantly throughout pregnancy and drop abruptly after delivery, this fast decline in estradiol level may be a factor in complicated PPD.[10,24] The second one, is that stress triggers the hypothalamus to rerelease Corticotrophin-Releasing Hormone (CRH),, that triggers the release of corticotrophins from pituitary, and generate cortisol. PPD is caused by a malfunction in the hypothalamic-pituitary-adrenal alignment and involves many abnormalities, including the increase in cortisol levels during pregnancy and subsequent sharp decline after delivery.[24,25] The third one is the association between the development of PPD and some cytokines like interleukin-6 and tumor necrosis factor.[7,25] Therefore, the association between Vitamin D (VD) and PPD development must be intensely understood through *in vitro* and *in vivo* studies. This will offer treatment guidance with simple and low coastlines.

VD is a steroid hormone that is produced by our bodies after being exposed to ultraviolet B radiation through the skin,[26] it can also be acquired from food like fish, egg yolk, liver oil, beef liver, portabella mushrooms, fortified foods such as breakfast cereal and milk.[27–29] Ultraviolet light converts 7-dehydrocholesterol to pre- VD, which is convert to cholecalciferol (VD3),[24] that exhibits no biological activity within the body. Then it passes through two hydroxylation steps to be activated, the first one in the liver to produce 25hydroxy vitamin D (25(OH)D), which is the predominant vitamin form in our blood,[30] and the second hydroxylation occur mainly inside the kidney, brain, and immune system by 1alpha-hydroxylase using specialized cells to produce the functional form of VD, which is called calcitriol. Serum 25(OH)D levels lower than 25 nmol/L (10 ng/mL) are considered as VDD, serum VD lower than 50 nmol/L (20 ng/mL) is considered as VD insufficiency, while VD higher than 100 nmol/L (40 ng/mL) is defined as vitamin sufficiency.[31]

Vitamin D Receptor (VDR) has hormone-binding and DNA-binding domains.[1,18] VDR are widely distributed among nearly all human tissues and cells and perform many functions[4,32]; VD functions *via* endocrine (calcemic), keeps the calcium homeostasis, and autocrine (non-calcemic) functions.[1,33] VD is also involved in bone metabolism,[34] neuromuscular, and immune function that reduces inflammation associated with multiple sclerosis, autoimmune disorders, respiratory disease, and cancer.[27,35]

VD is an exceptional neuro-steroid hormone,[36,37] and its receptors were widely distributed throughout several areas of the brain including the basal ganglia, hypothalamus, thalamus cingulate, cortex, and hippocampus, which might influence the etiology of depression.[38,39] VDR and the enzyme responsible for producing the active version of the hormone 1alpha-hydroxylase both exist in the human brain and the hypothalamic-pituitary-adrenal alignment that may explain the association between VDD and depression.[40] The mechanism of how a low VD concentration may lead to depression includes a few suggestions correlated with the neurotransmission and neurogenesis functions of VD and the production of brain tryptophan hydroxylase2.[4] This influences the production of serotonin, which is highly connected with social behavior.[1,4] Another suggestion is that VD prevents the hypermethylation of gene promoters, which are crucial for Gamma-amino butyric acid-ergic neuron function. This clarifies the association between the reduction in the quantity of GABA-ergic neurons and depression.[4,41] Many studies evaluate the influence of VD supplements in improving depressive symptoms and decreasing their severity.[3,42] Increased circulating 25(OH)D concentrations following 8-week VD supplementation (50,000 IU) resulted in a significant decrease in Beck Depression Inventory-II (BDI-II) scores in patients with mild-to-moderate depression.[42] The relationship between VD levels and PPD is controversial; few studies revealed the association between VD level and PPD,[7,13,29,43] while others showed no association.[7] This study aims to review the studies concerning the association between 25(OH)D levels during pregnancy and PPD development.

Materials and Methods

Literature review used PubMed, Scopus, Science Direct, and Google Scholar for studies (July 1912 to May 2022). Keywords featuring a combination of depression, VD, pregnancy, PP, and antepartum were selected for search. This study reviewed the previous studies regarding the association between VD levels during pregnancy and PPD. Studies were enrolled only if they were published in the English language and if VD serum level was measured before the day of delivery (during the gestation period). Although more than 100 publications (case-control, prospective cohort, and longitudinal cohort) were fully checked, only seven were valid by the inclusion criteria [Figure 1]. Articles were selected manually and with careful tracking for inclusion criteria. All articles that investigated the relationship between VD level during

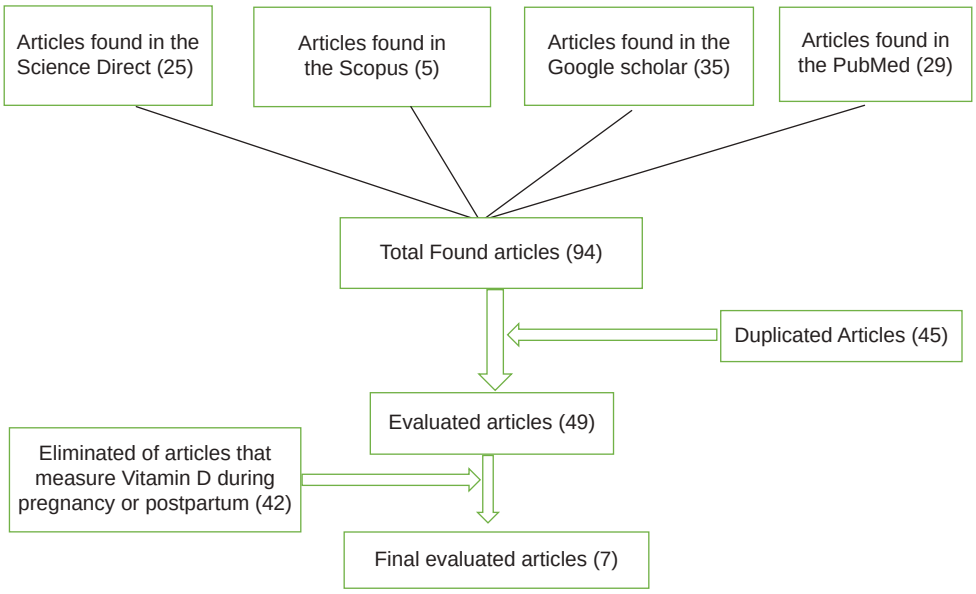

Figure 1: The flowchart for the selection process of the articles

pregnancy and PPD were enrolled in this study. All articles that investigated VD levels of PP were excluded. Data collected from the enrolled studies must include publication year, authors, sample size, phase for serum sample collection, PPD assessment method, and full results description. [Table 1]. The authors tried to act in an unbiased way while analyzing the retrieved data from the enrolled articles. For ethical considerations, the researchers avoided plagiarism in any form and avoided redundant publication. In the current study, ethical principles have been considered, and if the study results were utilized, the studies were referenced.

Ethical considerations

This study was approved by the Ethical Committee (IRB) at the Hashemite University, Zarqa, Jordan (IRB/12-2/2022).

Results

Only seven published articles from the literature reviewed using PubMed, Scopus, Science Direct, and Google Scholar search engine, keywords selected a combination of depression, VD, pregnancy, postpartum (PP), and antepartum showed an association between VD level and PPD throughout pregnancy period [Table 1]. The firstborn one is by Nielsen *et al*.,[43] who examined the association between PPD and VD levels. Participants (605 cases, 875 control) were selected from the Danish National Birth Cohort (DNBC). Blood samples were selected within week 25 of pregnancy, and the study used Liquid chromatography-Tandem Mass Spectrometry (LCTMS) for measuring VD levels. VD concentration was categorized into groups (less than 6 ng/mL, 6–9.6 ng/mL, 10–19.6 ng/mL, 20–31.7 ng/mL, 32–39.7 ng/mL, more than 40 ng/mL). VD 20–31.7 ng/mL were designated as a reference. DNBC were used in depression assessment. Nielsen *et al*.[43] showed no significant association between VD levels and the risk of PPD ($p = 0.08$). Conversely, they showed that high VD concentrations were associated with a higher risk of PPD.

The second study was a prospective cohort that was carried out by Robinson *et al*.[28] They enrolled 706 Caucasian women within the middle of the gestational period. 25(OH)D concentrations were measured using immunoassay and tandem mass spectrometry. VD concentrations are classified as less than 19 ng/mL, 19–23 ng/mL, 24–28 ng/mL, more than 28 ng/mL, and normal concentration was 20–50 ng/mL. Three days following delivery, PP's mood disturbance was assessed using EPDS, which includes worrying, dejection, variation in mood, weeping, appetite variations, and sleep irregularities. Every item was given a 4-point scale ranging from 0 to 3 indicating a mood disturbance. The results of this study showed that the lowest quartile VD levels were significantly correlated to increased PPD symptoms ($p = 0.017$), while no significant association between the highest quartile VD and increased PPD symptoms.

Another community cohort study was carried out by Gur *et al*.[44] in Turkey that examined 179 pregnant mothers in mid-pregnancy (between 24 and 28 weeks gestation). The study enrolled married women who planned to get pregnant, women with a body mass index of 20–30 kg/m^2, women with an educational level of 8 years minimum, and an income greater than or equal to $4500 per year, which were aged between 18 and 40 years. This study excluded women with high-risk PPD, including any previous depression, depression in pregnancy and anxiety, stressful life, undesired pregnancy, inadequate marriage relations and inadequate social care, low socioeconomic status,

Table 1: Association between vitamin D level during pregnancy and postpartum depression between 2012 and 2022

Study, year, design, country	Sample number and collection time	Vitamin D measuring (mean) method and grouping	PPD(*) assessment	Results
Nielsen, 2013,[43] case-control, Denmark	605 cases: 875 control (serum obtained at week 25 of pregnancy)	Method: Liquid chromatography-tandem mass spectrometry groups: 6 levels (<6 ng/mL, 6–9.6 ng/mL, 10–19.6 ng/mL, 20–31.7 ng/mL, 32–39.7 ng/mL, ≥40 ng/mL)	DNBC(**)/1 year postpartum	No correlation between decreased gestational vitamin D levels and the incidence of PPD (p=0.08) and a high risk of PPD at a high level of vitamin D
Robinson, 2014,[28] prospective cohort, Australia	706 cases: Blood samples were obtained in the middle of the gestational period (18 weeks)	Method: Enzyme immunoassay kit and isotope-dilution liquid chromatography-tandem mass spectrometry groups: Four quartiles <19 ng/mL, 19–23 ng/mL, 24–28 ng/mL, >28 ng/mL	EPDS(***)/3 days after delivery	Significant relation between the lower level of vitamin D (women in the west quartile) and increased PPD symptoms (p=0.017), and no significant correlation between higher levels of vitamin D (women in the highest quartile) and increased PPD symptoms
Gur. 2014,[44] cohort, Turkey	179 cases: Blood samples were obtained in the middle of pregnancy (between 24 and 28 weeks of gestation)	Method: Enzyme-linked immunosorbent assay (ELISA) groups: <10 ng/mL (severely deficient), 20 ng/mL (mildly deficient), and >20 ng/mL (sufficient)	EPDS/1 week, 6 weeks, and 6 months after delivery	VDD(****) can be related to increases in the risk of PPD symptoms in the 1 week, 6 weeks, and 6 months after delivery (p=0.003, 0.004, and <0.001, respectively)
Accortt, 2016,[45] prospective cohort, USA	91 cases: Blood samples were obtained in the first trimester	Method: competitive chemiluminescence immunoassay platform	EPDS/4–6 weeks postpartum	An inverse association between prenatal log 25(OH)D and PPD symptomatology (β=−0.209, p=0.058)
Lamb, 2018[46] longitudinal, cohort, USA (Southern California)	125 cases: Blood samples were obtained at 3 different times, Time 1 (T1) early in gestation (mean=14 weeks), Time 2 (T2) in the third trimester (mean=32 weeks), and Time 3 (T3) at 6 weeks postpartum	Method: 25(OH)D concentrations were measured using liquid chromatography-mass spectrometry	EPDS/12–14 weeks of pregnancy, 32 weeks of pregnancy, and at 10 weeks after delivery with PPD=EPDS ≥10	Significant inverse association between depressive symptoms and vitamin concentrations (T1= −0.18, p=0.024; T2=−0.27,p=0.009; T3 = −0.22, p=0.019)
Accortt, 2021,[2] prospective cohort, USA (Los Angeles)	89 cases: Blood samples were obtained in the second trimester (18–20 weeks gestation)	Plasma vitamin D metabolite ratio (VMR)(*****) was measured by coupling reverse-phase liquid chromatography and mass spectrometry (LC-MS/MS).	(CES-D)($)/6–10 weeks postpartum	A significant relationship between PPD risk and lower VMR (p=0.007)
King, 2022,[47] prospective cohort, South Carolina (USA)	105 cases: Blood samples were obtained at four different times, weeks 8–12 of pregnancy, weeks 24–28 of pregnancy, 6–8 weeks after delivery and 10–12 weeks after delivery	Method: plasma vitamin D levels were measured by radioimmunoassay	EPDS	Women with vitamin D deficiency may have EPDS scores more than or equal to 10, but without statistical significance (OR: 2.40; 95% CI 0.92–6.27)

*Postpartum depression (PPD).**Danish Register of Medicinal Product Statistics (DNBC). ***Edinburgh Postnatal Depression Scale (EDPS).

****Vitamin D deficiency (VDD).*****Vitamin D metabolite ratio (VMR). $Center for Epidemiologic Studies Depression (CES-D)

overweight, smoking, alcohol, and several pregnancies. This study excluded the women after delivery who had intrauterine death of the fetus, neonatal infant demise, newborn with the anomaly, infant brought to neonatal critical care unit, and difficult delivery. Blood samples were drawn in mid-pregnancy (24–28 weeks), and an enzyme-linked immunosorbent assay was used for VD determination. VD classified: Less than 10 ng/mL as severely deficient, 20 ng/mL as mildly deficient, and more than 20 ng/mL as sufficient. PPD was scored *via* the EPDS system 1 week after delivery, 6 weeks following delivery, and 6 months following delivery. If the mother's score on the EPDS scoring system is ≥12, then listed as PPD. They demonstrated that VDD is associated with increased PPD risk in the 1 week, 6 weeks, and 6 months following delivery (p = 0.003, 0.004, and <0.001; respectively).

Another prospective study in the USA was performed by Accortt *et al*.,[45] who enrolled 91 African women to

evaluate the relationship between low VD with prenatal PPD symptoms. VD concentration was measured *via* a competitive chemiluminescence immunoassay in the first trimester. The symptoms of PPD were determined by the EPDS questionnaire 4–6 weeks PP. Accortt *et al*.[45] found a negative association between prenatal log 25(OH)D and PPD symptoms.

A longitudinal cohort study was carried out by Lamb *et al*.[46] and enrolled 125 women from Southern California. Study eligibility criteria included women with a minimum of 18 years old with gestational age less than 25 weeks and getting maternal care at the medical centers. Mothers with parathyroid illness or any serious psychological illness besides depression were excluded. Blood samples were obtained at three different times; Time 1 (T1) early in gestation (mean = 14 weeks), Time 2 (T2) in the third trimester (mean = 32 weeks), and Time 3 (T3) at 6 weeks PP. Measuring of 25(OH)D levels was performed using liquid mass spectrometry and PPD symptoms were evaluated using the EPDS during 12–14 weeks of pregnancy, around 32 weeks of pregnancy, and 10 weeks after delivery with EPDS ≥10. An opposite association was found between VD level and PPD symptoms. They also showed that VD may be a significant biomarker for depressed pregnant and PP women.

Another prospective cohort study was carried out in the USA by Accortt *et al*.,[2] 89 women were enrolled according to the following criteria: Gave birth to live babies, speak English or Spanish, the mother is pregnant with a single fetus inside her uterus, and were less than 20 weeks gestation. VD level was determined in the second trimester (18–20 weeks gestation), and plasma vitamin D metabolite ratio (VMR) was determined by $24,25(OH)_2/25(OH)D$. PPD symptoms were evaluated at 6–10 weeks PP using the Center for Epidemiologic Studies Depression Scale (CES-D) with ≥16 representing the risk for PPD. The range of CES-D scores is 0–60, with more symptoms at the higher scores. This study found that 34% of the participants were at risk for PPD and demonstrated that lower prenatal VD levels can predict PPD risk.

Finally, a prospective cohort study carried out by King *et al*.,[47] enrolled 105 women and excluded women with less than 18 years old, over 12 weeks of pregnancy, or not being able to provide informed consent. Blood samples were drawn at four different times; weeks 8–12 of pregnancy, weeks 24–28 of pregnancy, 6–8 weeks after delivery, and 10–12 weeks after delivery, and plasma VD levels were measured by radioimmunoassay. PPD symptoms were assessed by EPDS, with scores more or equal to 12 mean presences of depressive symptoms, and scores more or equal to 10 mean presence of minor depressive symptoms need more medical observations. Results showed deficient VD levels were associated with higher depression risk at the follow-up evaluation.

There is biological evidence for the association of VD and depression development, but more studies are needed to support the scarce literature that links VD level and depression outside of the prenatal period.[4,8,11,12] Longitudinal follow-up studies are needed to evaluate the impact of pre-postnatal VD level and PPD on both mother and infant health at different seasons, among different ethnic populations and among different socioeconomic groups.

Discussion

This study reviewed previous studies concerning the association between 25(OH)D and VD levels during pregnancy and PPD development. Many studies showed the relationship between VD levels and depression development,[4] VD and PPD during pregnancy.[36] The association between 25(OH)D concentration and depression risk may be explained by the influence of VD on the hypothalamic-pituitary-adrenal axis and excessive activity of the sympatho-adrenal system.[8,36] This may be due to the distribution of VDR in the brain. In addition, an abrupt decline in estrogen levels occurring after delivery may alter gonadotropin-releasing hormone (GnRH) by the hypophyseal portal system and thus influence neuronal activity and PPD.[4,8] Another justification may be related to the VD impact on the hemostat the calcium level in tissue and its effect on the prevention of PPD.[48] This review discussed seven publications that studied the association between gestational VD levels and PPD [Table 1].

According to this study, observational studies may be inadequate and inconclusive, regarding the association between serum VD level and PPD,[2,28,44,45,46] while other studies showed a non-significant association or no association.[43,45] Multiple methodological variations among different studies including insufficiency of a confounders' adjustment especially season, which is the main element that affects VD concentration.[11] In addition, measuring serum VD at different intervals gestational intervals. Also, variations may be due to differences in the study group population, differences in social status, ignoring the PP medical care in some studies, and self-reporting methods used to assess depression in some cases.[47] So, studies are needed to determine the correlation between PPD and pregnant VD status among different groups with larger sample sizes.

Many studies were performed that evaluate the role of VDD measured after delivery and a probable PPD threat. A case-control study enrolled 60 women from Iran by Abedi *et al*.,[17] evaluated the relationship between low VD levels and PPD postnatally. They demonstrated a significant association between VD level and PPD postnatally. Another study by Pillai *et al*.,[13] evaluated the same relationship postnatally by EPDS; that were measured at 6 weeks PP. They showed a strong relationship between low-level bioavailable 25(OH)D and the risk of PPD postnatally.

Results of these studies showed that serum VD was significantly lower in women with PPD, and severe VDD were twice more likely to have PPD.[17] Consequently, health policymakers have to pay attention to the VD level among pregnant women to be treated.

Although there is strong support for the role of VD potential in depression development, more studies are needed to examine the role of VD in the pathophysiology, prevention, and treatment of PPD. VD supplement is available and inexpensive, and it is recommended for pregnant women, to significantly decrease PPD symptoms.[49] Nevertheless, more studies are required to understand the relationship between VD level, depression development and remission postnatally.

In the PP period, self-care is usually ignored by mothers and can be a critical psychological component, which influences the well-being of mothers and infants. So, screening VD levels among pre-postnatal mothers may be essential in numerous awareness programs that can be implemented to promote psychological health. These actions can prevent psychological problems that support good quality of life.

Limitations of the study include small sample size, socioeconomic status, and inadequate information about the seasonal variation that affects VD concentration. In addition, differences in methods used for serum VD measurement at different gestational intervals with ignorance of differences among different prenatal caring systems.[46] In addition, assessing depression by self-reporting methods and cultural-ethnic variation. Studies with larger sample sizes and a range of socioeconomic situations ought to be included, for these reasons. Studies show the association between VD levels during various phases of pregnancy and the PP period are also needed. Studies about the role of early intervention, monitoring, and VD supplements in the development of PPD are also important for decoding VD in PPD at the molecular level.

Conclusion

Although there are complex associations between VD levels during pregnancy and the risk for PPD, this review showed a significant association between low VD levels and PPD development. Health policymakers must pay attention to measuring VD levels among pregnant women and recommend vitamin supplements during pregnancy to decrease PPD.

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Conflicts of interest

Nothing to declare.

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Original Article

Effectiveness of Logotherapy on the Organization-Based Self-Esteem and Job Satisfaction of Employed Midwives

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Abstract

Background: Midwives as one of the most effective members of the health systems play a key role in delivering health services to mothers and children who are vulnerable groups of the society. This research aimed to investigate the effect of Logotherapy on job satisfaction and Organization-Based Self-Esteem (OBSE) of employed midwives. **Materials and Methods:** This is a quasi-experimental study with the pretest and posttest design and a control group from all midwives employed in the public hospital of Rasht City in Iran. Fifty-six midwives fulfilling the inclusion criteria were selected and randomly divided into two groups of intervention and control. They filled job satisfaction, OBSE questionnaires, and demographic information checklist, and then, the intervention group attended Logotherapy for six sessions/90 minutes. Finally, both groups answered the instruments as posttest. **Results:** Results showed that the mean difference between OBSE ($F_{6,83} = 27$, $p < 0.05$) and job satisfaction ($t_{2,62} = 27$, $p < 0.01$) scores before and after the sessions in the intervention group was significantly more than the control group. **Conclusions:** Group Logotherapy increased job satisfaction and OBSE among midwives. It can be recommended for use in the clinical settings for healthcare providers.

Keywords: *Iran, job satisfaction, logotherapy, midwifery, organizations, self-concept*

Introduction

Midwives play an important role in the health of the family and society. They provide health and medical services during pregnancy, postpartum, puberty, and menopause.[1] Therefore, increasing their job satisfaction will increase the quality of care. Job satisfaction increases occupational achievement and productivity.[2] Job characteristics,[3] environmental and individual factors such as personality, age, marital status,[4] work context, and social and cultural factors[5] affect satisfaction or dissatisfaction. Low job satisfaction leads to poor services and weak production, dissemination of malicious rumors, employees' absenteeism, and their recurrent turnover.[6,7]

Self-esteem is a personal characteristic that influences behaviors in the workplace. If it is properly formed and satisfied, then it will have positive consequences such as a sense of worth, ability, power, competence, and adequacy in life. It is a basic element of mental health that affects job performance.[8] Self-esteem has different dimensions: (general, social, family, and educational)[9] as well as organization-based self-esteem. Organization-Based Self-Esteem (OBSE) affects organizational commitment and job satisfaction.[10] It means a sense of worth, importance, and capability about oneself in the organization[11] creates a positive relationship between (organizational) self-esteem and job satisfaction.[12]

Meaning salience increased the job satisfaction[13] and self-esteem[14] via the reframing of employees' internal perspectives regarding their work environment helping to psychological growth besides the unchangeable conditions.[15,16] Logotherapy (meaning therapy) is a philosophical approach to people to deal with important themes and issues of life such as the meaning of suffering, existential emptiness, life and death, freedom and responsibility to oneself and others, discovery of meaning, and coping with meaninglessness. This approach makes people look beyond the problems and events of everyday life. With attention

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to the effects of meaning, life goals, and motivations on self-esteem and job satisfaction,[17] the present study aimed to investigate the effect of Logotherapy on job satisfaction and Organization-Based Self-Esteem (OBSE) of the employed midwives.

Materials and Methods

The present study was a quasi-experimental intervention with a pretest and posttest design and a control group. This study was performed for three months, from January to March 2019, on the midwives working in Al-Zahra Hospital, Rasht, Iran. The sample size was obtained based on Cohen's table for quasi-experimental studies, the effect size of 0.4, the study power of 80%, and the significance level of 5%, as the minimum of 25 people in each group. Regarding a 10-percent dropout probability, the samples in each group were 28 people (N = 56 in total).[18] Inclusion criteria included working in the mentioned hospital, having at least an associate degree (2 years) in midwifery, at least one year of experience in a midwifery job, and not taking any psychiatric medication. Exclusion criteria were unwillingness to continue the study and being absent in two sessions or more. With simple random sampling, the midwives working in Al-Zahra Hospital (N = 56) were divided into two groups of intervention and control according to even and odd numbers allocated to them.

Data collection was conducted using three instruments: the demographic questionnaire, job descriptive index questionnaire (JDI), and OBSE scale. The demographic information checklist included age, educational level, marital status, and work experience. JDI with 70 items was developed by Smith, Kendall, and Hulin (1969) and is one of the most common and accurate tools for measuring job satisfaction.[19] The Persian version's validity and reliability were 0.94 and 0.96, respectively.[20] Its domains include coworkers, the work itself, pay, and opportunities for promotion, supervision, and working condition with five-point Likert scale. A score below 50% was considered low satisfaction, a score between 50% and 70% was considered moderate satisfaction, and a score above 70% was considered high satisfaction.[21] The Organization-Based self-Esteem Scale (OBSE) was developed by Pierce *et al.* in 1989.[22] The 10-item questionnaire measures employees' beliefs and their values in the organization. This questionnaire is based on a 5-point Likert. In the context of the Persian language, Sadeghian *et al*. (2010) adopted OBSE with alpha >0.8.[6]

The trained researcher (master of counseling in midwifery under the supervision of a faculty member who was Ph.D. in health psychology) was always available to answer any questions that might arise for the midwives. Midwives of the intervention group participated in six Logotherapy sessions, which lasted one hour and a half/week for one month. Logotherapy is a method in which members carry out a journey of self-discovery with the aim of self-development to gain the ability to be with their true self, expand their view of themselves, and the world around them, and clarify what is related to their current and future lives. The content of the sessions was prepared based on the theoretical principles and techniques available in the meaning therapy method from the point of view of Dr. Victor Frankel and other Logotherapists.[23] Before and after the last sessions, the midwives in both groups filled the pretest and posttest. IMB SPSS-21 (PASW) was used to analyze the results. The Shapiro–Wilk, Fisher's exact, and Chi-square tests were used for descriptive analysis and paired t test and Wilcoxon test were used for comparisons between groups.

Ethical considerations

This research project was approved by the Ethics Committee of Kerman University of Medical Sciences, Kerman, Iran (IR.KMU.REC.1397.282). After explaining the study objectives, informed consent was taken from the participants, and they were assured about the information confidentiality and anonymity. Participants could quit the study at any time that they wanted. Women in the control group could request to receive the same intervention after filling the posttest.

Results

Demographic factors can be seen in Table 1. The mean score of OBSE showed no statistically significant difference between the two groups *before* the intervention (p = 0.59). After the intervention, the *mean score* was nonsignificantly different between the two groups (p = 0.29) but the intervention group's pre- and postintervention *mean difference* was more than that in the control group $F_{6,83} = 27$ (p = 0.01) [Table 2].

The mean score of job satisfaction showed no statistically significant difference between the two groups before the intervention (p = 0.53). After the intervention, the mean score was different between the two groups, but it was not statistically significant (p = 0.18). However, a paired t test showed that the pre- and postintervention *mean difference* in the intervention group was more than that in the control group $t_{2,62} = 27$ (p = 0.01) [Table 3].

Discussion

Job satisfaction and OBSE are two valuable factors for motivating midwives toward the betterment of health services.[24] The present study aimed to address the effect of Logotherapy on the self-esteem and job satisfaction of midwives. Results showed the positive effectiveness of Logotherapy in promoting OBSE. Consistent with this study, group Logotherapy could be an effective treatment in increasing the self-esteem and psychological well-being of female students with love trauma syndrome.[16] Forgiveness and hope played a mediating role between the meaningfulness of life and mental well-being.[25]

Table 1: Frequency distribution of demographic variables in two groups

Variables	Intervention (*n*=28) *n* (%)	Control (*n*=28) *n* (%)	Total (*n*=56) *n* (%)	*p*
Variables				
<30	11 (39.30)	8 (28.60)	19 (33.90)	0.28*
30–40	8 (28.60)	14 (50)	22 (39.30)	
40–50	8 (28.60)	4 (14.30)	12 (21.40)	
>50	1 (3.60)	2 (7.10)	3 (5.40)	
Marital status				
Single	7 (25)	4 (14.30)	11 (19.60)	0.50**
Married	21 (75)	24 (85.70)	45 (80.40)	
The age of the last children				
0	15 (53.60)	8 (28.60)	23 (41.10)	0.14*
2–7	6 (21.40)	11 (39.30)	17 (30.40)	
>7	7 (25)	9 (32.10)	16 (28.60)	
Education				
Associate	1 (3.60)	0	1 (1.80)	0.60*
Bachelor's	25 (89.30)	26 (92.90)	51 (91.10)	
Master's	2 (7.10)	2 (7.10)	4 (7.10)	
Work experience				
<10	13 (46.40)	14 (50.00)	27 (48.20)	0.61*
10–20	7 (25.00)	9 (32.10)	16 (28.60)	
>20	8 (28.60)	5 (17.90)	13 (23.20)	
Spouse job				
Others	9 (32.1)	6 (14.42)	18 (24.72)	0.29*
Self-employed	6 (21.40)	9 (32.10)	15 (26.80)	
Employed	13 (46.40)	10 (35.70)	23 (41.40)	
Retired	0	3 (10.70)	3 (5.40)	
Employment type				
Committed***	10 (35.70)	8 (28.60)	18 (32.10)	0.84*
Contract****	1 (3.60)	1 (3.60)	2 (3.60)	
Hired	17 (60.70)	19 (67.90)	36 (64.30)	
Shift work				
Fixed morning	9 (32.10)	7 (25.00)	16 (28.60)	0.47*
Fixed night	1 (3.60)	0	1 (1.80)	
Rotating	18 (64.30)	21 (75.00)	39 (69.60)	
Chronic physical disorder				
Yes	3 (10.70)	7 (25.00)	10 (17.90)	0.29**
No	25 (89.30)	21 (75.00)	46 (82.10)	
Working ward				
Infirmary	5 (17.90)	4 (14.30)	9 (16.10)	0.48*
Delivery	6 (21.40)	12 (42.90)	18 (32.10)	
Postpartum	5 (17.90)	5 (17.90)	10 (17.90)	
Gynecology	10 (35.70)	6 (21.40)	16 (28.60)	
Clerical	2 (7.10)	1 (3.60)	3 (5.40)	

*Chi-square test. **Fisher's exact test. ***It is obligatory to work for the government for the first two years at a lower rate of pay.
****Annually contracted with payment less than hired nurses

Logotherapy creates a more stable experience of existential satisfaction and provides a deeper sense of mental health.[26] Therefore, self-esteem can be improved. Low self-esteem is associated with negative emotions such as depression, anxiety, anger, and aggressive behaviors.[27] Depression also reduces happiness.[28]

Job satisfaction of midwives working in the hospital was improved in this study. Logotherapy calls people for effort and activity by considering the existence of human beings instead of pessimism and isolation. In this school, each human being ultimately takes control of their destiny.[29] Seligman well-being education as a positive psychology approach to improve well-being and happiness could improve midwives' job satisfaction working in hospitals.[30] Cognitive-behavioral intervention increased nurses' job satisfaction.[31] But, CBT is a long-duration therapy, and because hospital staff work in

Table 2: Comparison of the mean scores of Organization-Based self-Esteem Scale (OBSE) between the two groups before and after the intervention

Organization-based self-esteem	Before Mean (SD)	After Mean (SD)	Statistical test *Z* or *t*	*p*, *t* test
Intervention	39.64 (5.74)	43.46 (4.71)	−6.83 (df=27****)	0.001*
Control	41.11 (7.20)	41.36 (7.07)	−2.11	0.014**
Statistical test (*Z*)	−0.535	−1.128		
p	0.593***	0.259***		

*Paired-sample *t*-test. **Wilcoxon. ***Mann–Whitney. ****df=Degree of Freedom

Table 3: Comparison of the mean scores of job satisfaction between the two groups before and after the intervention

Job satisfaction	Before Mean (SD)	After Mean (SD)	Statistical test *t* (df)	*p*, *t*-test
Intervention	3.00 (0.40)	3.26 (0.43)	−2.62 (27)	0.01*
Control	3.07 (0.49)	3.09 (0.49)	−2.62 (27)	0.014*
Statistical test (df)	−0.62 (54)	1.34 (54)		
p	0.53**	0.18**		

*Paired-sample *t*-test. **Independent-sample *t*-test

different shifts, it will be very difficult to coordinate and conduct long-term interventions. Therefore, short-term methods such as what we used are more acceptable. Consistent with other studies, significant relationships were found between some sub-dimensions of meaningful work and job satisfaction.[32] The experience of job-related meaningfulness through meaning-centered Logotherapy and counseling could be a resource to prevent emotional exhaustion.[33]

The limitation of this study was the finite number of permitted midwives and the limited number of counseling sessions. In addition, in this study only the mean difference between the two groups was significant and not the mean of the total scores of the two variables.

It is proposed that more research be performed in this field to investigate the long-term effect of education or counseling on different populations to promote their OBSE and job satisfaction.

Conclusion

The present study results showed that group Logotherapy-based counseling sessions with the aid of subjects could increase their self-esteem and job satisfaction by discovering their true selves, choosing personal values, and finding the meaning of their lives. Regarding the importance of OBSE and job satisfaction in clinical settings for the improvement of health services, Logotherapy can be recommended to hold for medical staff.

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Conflicts of interest

Nothing to declare.

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Original Article

The Process of Professional Ethics Development in Midwifery Students: A Grounded Theory Study

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Abstract

Background: Midwives are faced with important ethical issues in their professional lives; therefore, becoming a midwife is not only the acquisition of knowledge and skills but also includes acquiring moral values that cause fundamental changes in their attitudes toward their professional responsibilities. The aim of this study was to explore the process of professional ethics development in midwifery students. **Materials and Methods:** This grounded theory study was conducted from 2020 to 2022 at Mashhad University of Medical Sciences, Mashhad, Iran. The participants included 17 midwifery students and 14 key informants. They were selected through purposeful and theoretical sampling. Data were collected using semi-structured in-depth interviews, field notes, and theoretical notes until theoretical saturation was achieved. Data collection and data analysis were performed simultaneously. Data were analyzed based on the grounded theory presented by Corbin and Strauss (2014) using MAXQDA Analytics Pro 2020. **Results:** The core category was "interactive-cognitive learning in a two-way reasoning path" which addressed the participants' main issue of moral numbness. Moral distress, interactive-cognitive learning, moral reasoning, and moral hopelessness were the midwifery students' strategies that led to a spectrum of moral internalization to moral burnout. The improper context of moral development was the context theme of this study. **Conclusions:** The theory of "interactive-cognitive learning in the two-way path of reasoning" creates a deep understanding of the process of formation of professional ethics in midwifery students and it can be used in the effective training of students with the aim of promoting professional ethics in midwifery.

Keywords: *Education, ethics, grounded theory, midwifery, professional, qualitative research*

Introduction

Midwives are responsible for high-quality and non-judgmental care without discrimination in women's health, respecting human rights, and treating individuals.[1] Midwives face important ethical issues in their professional activities and must work according to ethical principles.[2] The most common ethical issues in midwifery are confidentiality in cases of sexually transmitted diseases, conscientious refusal to help other health care professionals in abortion, dealing with abortion requests in conservative contexts in which it is legally prohibited and punishable by law, and conflicting notions of moral obligations in emergencies in which both the mother's and baby's life are in jeopardy.[3,4]

Considering the nature of the midwifery profession, one should accept that becoming a midwife is not only the acquisition of knowledge and skills but also includes the acquisition of certain professional and moral values.[5] However, evidence shows that midwifery students often experience a stressful learning environment that may affect their ability to make ethical decisions.[6]

Many researchers agree on the challenges in professional ethics education. Li *et al*.[7] (2023) introduced some challenges, like insufficient education in fundamental medical ethics, lack of effective guidance in clinical research, and absence of stricter ethical supervision in the medical education system in India. Furthermore, in a study with a qualitative approach in Brazil, medical students identified major deficiencies related to teaching medical ethics, pointing to the need to change the current medical education model.[8] In addition, the results of content analysis in Iran showed that the education of medical ethics is in crisis because the main purposes of medical education have been ignored,

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and this has led to unexpected outcomes that do not follow ethics-based education.[9] Another qualitative study in Iran reported that medical educators, in general, and medical ethics teachers, in particular, have not been efficient enough in the moral development of students.[10] However, these previous studies do not provide an in-depth understanding of professional ethics education and how professional ethics develops during student life.

The development of professional ethics is a multifaceted phenomenon, and it is rooted in the culture, religion, beliefs, and values of a nation.[11] By using grounded theory, we can deeply understand this phenomenon according to our social interactions and communication. Moreover, we can develop theories that are based on interviews and observations with real subjects in real situations. Therefore, in the current study, we aimed to explore the process of professional ethics development in midwifery students using grounded theory.

Materials and Methods

This grounded theory study was performed during December 2020 and March 2022 based on the structuralism paradigm because the evolution of professional ethics is a subjective reality. It is interpreted and experienced by individuals in interaction with each other and with the wider social system. It is rooted in mental beliefs and values, and people determine its meaning in specific social and cultural contexts. Moreover, the grounded theory presented by Corbin and Strauss, with the philosophical assumptions of symbolic interactionism and pragmatism, has been chosen as the most appropriate approach as Grounded Theory examines social phenomena and the social processes existing in human interactions.[12] Moral evolution occurs in the form and intellectual structure of each person and is influenced by the interactions of different people with each other in specific circumstances.[13]

In this study, the School of Nursing and Midwifery of Mashhad University of Medical Sciences, Mashhad, Iran, was considered as the research setting. The inclusion criteria were being Iranian, studying in the field of midwifery, attending a clinical internship for at least one academic semester. The participants were initially selected based on purposeful sampling, then entered into theoretical sampling based on the maximum diversity strategy.

Data were collected through semi-structured interviews, field notes, theoretical notes, and recording of non-verbal behaviors. The main data collection method was individualized, in-depth, face-to-face (n = 19) and online (n = 12) interviews. Interviews with students were started with a general and open-ended question (When you are in doubt between right and wrong in your professional work, how do you decide?). They were asked to share their experiences in this field and the next questions were asked based on the participants' explanations and the interview guide. All interviews were conducted in Persian, which is the participants' native language, and each interview lasted between 25 and 100 minutes, with the average duration being 67.3 minutes. All interviews were conducted by the first author and were audio-recorded and transcribed anonymously.

Data analysis was performed simultaneously with data collection. A constant comparison technique was employed throughout the analysis stage. Data were analyzed according to the method presented by Corbin and Strauss (2014),[12] which includes the following main steps: (1) open coding: identifying concepts; (2) developing concepts in terms of their properties and dimensions; (3) analyzing data for context; (4) bringing the process into the analysis; and (5) integrating categories. MAXQDA Analytics Pro 2020 software (version 20.4; VERBI Software GmbH, Berlin, Germany) was used to manage and organize the data.

In this study, the criteria of Lincoln and Guba[14] were used to evaluate the trustworthiness of data. Credibility was assured via member checking, prolonged engagement, comprehensive field notes, audio recording, verbatim transcription, saturation of data, transcription rigor, Intercoder Reliability (ICR) checks, negative case analysis, peer review, and reflexivity. Dependability was assured through careful documentation and member checking. Confirmability of the data was maintained by audit trail, ICR checks, and peer review. Transferability was assured through data saturation, thick description, and comprehensive field notes, and authenticity was assured through reflexivity, prolonged engagement, audio recording, and verbatim transcription.

Ethical considerations

The study was approved by the ethics committee of Mashhad University of Medical Sciences with the ethical license number R.MUMS.NURSE.REC.1398.025. All methods were conducted in accordance with the ethical standards of the Declaration of Helsinki. The researcher explained the purpose of the study and the anonymity and confidentiality of the collected data to all participants. All participants were informed that they were free to withdraw from the study at any time. All participants signed the informed consent forms.

Results

The participants were 17 midwifery students in different educational stages and 14 key informants (midwifery teachers, specialists in medical ethics, people with experience as educational assistants, cultural-student assistants, and members of the ethics committee of the university, midwives with experience working in hospitals and health centers, educational supervisors of the hospital, and teachers of public ethics. A summary of the demographic information of the participants is presented in Table 1.

In the data analysis process, 2284 open codes were obtained, from which 84 concepts, 14 subcategories, and five main categories emerged after the data reduction process. From our data, five main categories [Table 2] were extracted, enabling us to develop a conceptual map [Figure 1] utilizing

the "interactive-cognitive learning in the two-way path of reasoning" theory to explain the process of professional ethics development in midwifery students.

Moral numbness

Moral numbness was extracted as the main issue of the participants. Moral numbness was caused when most of the students experienced low moral sensitivity among professionals and low organizational sensitivity to professional ethics learning. Moral numbness emerged because most students understood that medical ethics education is taken lightly. Although much importance is given to the education of students' specialized topics, the development of their moral character is not given much attention. Moreover, from the point of view of students, moral sensitivity is not high among professionals, there is a low level of understanding of professional ethics concepts, and they do not pay much attention to compliance or non-compliance with professional ethics standards in practice. Furthermore, failure to demand compliance with professional ethics standards and neglect of professional ethics violations by organizations also caused the emergence of the concept of low organizational sensitivity to the promotion of professional ethics in the analysis process. One midwifery student said: *"For example, the charter of patient's rights is only like a catalog on the walls, we read that a mother has a series of rights, but it has no importance in practice, neither for midwives nor for the officials"* (sixth-semester midwifery student/BSc).

Interactive-cognitive learning in the two-way path of reasoning

This category includes strategies that midwifery students use in response to the main concern of "moral numbness."

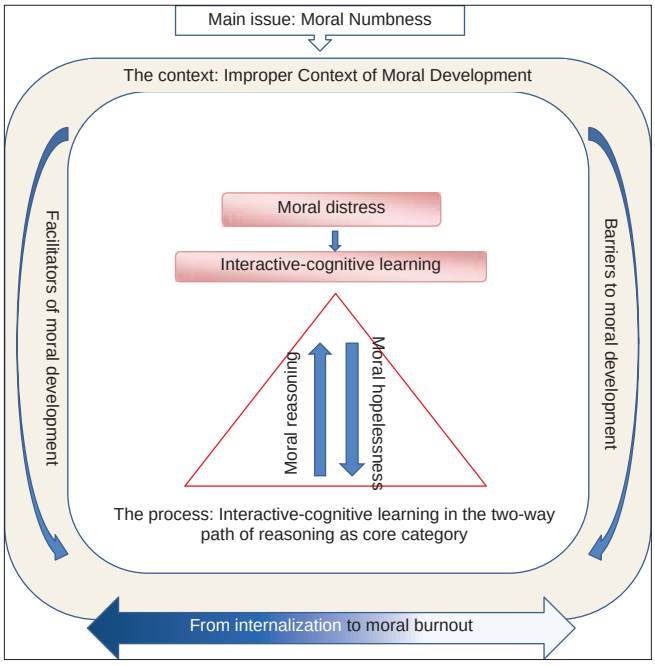

Figure 1: The theory of "interactive-cognitive learning in the two-way path of reasoning"

The process of "interactive-cognitive learning in the two-way path of reasoning" includes the four subcategories of moral distress, interactive-cognitive learning, moral reasoning, and moral hopelessness.

Moral distress

Moral distress is the first emotional action that students express in response to moral numbness. They experience a set of negative emotions and suffer from the inability to act morally. One midwifery student said: *"When I go to the hospital and see that the patient is not treated properly, I feel upset. I feel sorry. They do not explain what they want to do for her. Even privacy, which is the most common human right, is not respected"* (sixth-semester midwifery student/BSc).

Interactive-cognitive learning

Interactive-cognitive learning has two subcategories: interactive learning and activation of the cognitive process. In the interactive learning stage, the students are influenced by the learning environment and learn from the social interactions within it. "Interactive learning" is composed of two stages: passive compliance and modeling. Some students stated that at the beginning of their internship, they only followed the behavior of midwives in the learning environment without having full knowledge of its rightness or wrongness (passive compliance). Little by little, with the passage of time, the students began to look for the right behavioral models to follow and model the behavior of these models (modeling). In the cognitive learning stage, the student's cognitive processes are activated. This means that students do not imitate blindly but pay attention to professional behaviors, think about the rightness or wrongness, compare the results of behaviors, and finally, acquire the ability to make moral decisions. A medical ethics specialist said: *"The professional environment plays a very important role. A midwifery student first looks around and acts based on what she receives, regardless of whether it is right or wrong, bit by bit she compares and notices the wrongs and tries to find the right actions"* (University professor/medical ethics specialist).

In the beginning, the students are under the influence of the learning environment, but, by activation of cognitive processes or cognitive learning, they make the decision by themselves whether to enter the path of moral reasoning or moral hopelessness; so, it was called as two-way reasoning path students of moral reasoning or moral hopelessness.

Moral reasoning

Some students use the moral reasoning strategy in the process of developing professional ethics. Some of them show more moral sensitivity against moral insensitivity (in the path of moral reasoning), while some others (those in the path of moral hopelessness) have little sensitivity (do not care). They strive for moral self-empowerment. They earn more moral courage and more ability in moral decision-making.

Table 1: The demographic profile of participants

Students group				
Interview number	**Age (year)**	**Academic level**	**Marital status**	**Interest in studying midwifery (Likert scale of 1-10)**
1	21	BSc, sixth semester	Married	5
2	22	BSc, eighth semester	Married	8
3	37	MSc	Married	8
4	31	PhD	Single	7
5	26	BSc (New graduate in midwifery)	Married	10
6	49	PhD	Married	10
8	24	MSc	Single	6
9	30	BSc, sixth semester	Married	10
10	27	PhD	Married	9
11	22	BSc, sixth semester	Single	9
12	22	BSc, eighth semester	Single	7
13	23	BSc, eighth semester	Single	7
14	31	BSc, sixth semester	Married	5
17	30	PhD	Married	8
23	30	BSc (new graduate in midwifery)	Married	8
24	22	BSc, sixth semester (withdrawing from midwifery education)	Single	2
29	19	BSc, fourth semester	Single	5-6
Key informants' group				
Interview number	**Age (year)**	**Employment**	**Field of study**	**Work experience (year)**
7	53	Midwife working in the maternity hospital	BSc in Midwifery	26
15	41	The head of the maternity hospital	BSc in Midwifery	17
16	51	Working in the Ministry of Health and Medical Education	Specialist in medical ethics	23
18	39	Educational supervisor of the hospital	MSc in Community Health	17
19	48	Faculty member with the experience of being an educational assistant	PhD in Nursing	20
20	47	Faculty member with the experience of being a student-cultural assistant	PhD in Nursing	22
21	60	The head of the hospital and member of the ethics committees	Gynecologist	28
22	62	Retired from the faculty of midwifery	MSc in Midwifery	31
25	50	Lecturer of the public ethics course	MSc in Religion	27
26	60	Director of Student Affairs of the university	Epidemiologist	Over 30
27	58	Member of the midwifery board	PhD in Reproductive Health	29
28	65	Faculty member and member of the ethics committees	PhD in theology/author of books on medical ethics	Over 30
30	30	Member of the student disciplinary committee	MSc in clinical psychology	7
31	48	Director of midwifery	MSc in Midwifery	27

One midwife said: *"Maybe during my bachelor's degree, I would hide the non-sterilization of the urinary catheter out of fear of my superiors or out of fear of a bad grade, and would use it for the patient. Now, I try to find the correct way, and if I make a moral mistake, I definitely tell my superiors or the supervisor so that they can correct it if possible"* (second-semester midwifery student/MSc).

Moral hopelessness

Some students use the moral hopelessness strategy in the process of developing professional ethics. Students who choose the moral hopelessness strategy have low moral sensitivity. They do not have enough motivation to comply with ethical standards. In cases where they violate the standards of professional ethics, they do not accept their mistake but try to justify their professional mistake. Finally, these students' moral nature changes and the observance of moral standards becomes symbolic and dramatic to them. One student said: "*I myself used to take care of my patients much more before. one important reason is that I am tired.*

Table 2: Summary of categories and subcategories of "interactive-cognitive learning in the two-way path of reasoning"

Core category	Categories	Subcategories
Interactive-cognitive learning in the two-way path of reasoning	Moral numbness (main issue)	Low moral sensitivity among professionals
		Low organizational sensitivity for professional ethics learning
	Interactive-cognitive learning in the two-way path of reasoning (process category)	Moral distress
		Interactive-cognitive learning
		Moral reasoning
		Moral hopelessness
	From internalization to moral burnout (outcome category)	Normalization of the dominant behaviors in the learning environment
		Internalization of moral values
		Moral burnout
	Improper context of moral development (context category)	Damaged socio-cultural-political context (macro level)
		Professional challenges in midwifery (meso-level)
		Inappropriate cognitive-motivational context (micro level)
	Barriers and facilitators of moral development	Barriers to moral development
		Facilitators of moral development

I do not have the patience to resist the immoral norms formed in the environment. I do not get anything for the good work I am doing. it is not visible at all. so why should I do it?" (PhD student of reproductive health/27 years old).

Internalization of moral burnout

The data analysis showed that the strategies used by students have resulted in the spectrum of "from internalization to moral burnout." This category has three subcategories: (1) normalization of the dominant behaviors in the learning environment, (2) internalization of moral values, and (3) moral burnout.

Normalization of the dominant behaviors in the learning environment

Normalization is placed at the center of the spectrum and is a consequence of the process of professional ethics evolution, following the influence of the environment. The normalization of the dominant behaviors in the learning environment means that, over time, the behaviors of the environment become normal for students. Normalization is usually experienced following modeling and frequent observations, and the tendency to be like ones' peers. Normalization will include both ethical and unethical behaviors; that is, if a student observes professional ethics standards in the work environment, ethical behaviors become normal for her, and if she is placed in an environment in which she does not observe professional ethics standards, unethical behaviors become normal for her. One Ph.D. student said: *"When I was a student, whenever I would see an unethical behavior in the clinical setting. I would say to myself: "I will not behave like that. It is not possible for me to become like that.". Now that I have come to this work environment, it has become normal for me. I did not realize when., but I became just like them."* (Ph.D. student of reproductive health).

Internalization of moral values

From this point on, if normalization continues in the process of moral reasoning, it leads the student to the internalization of moral values. Internalization happens when ethical values are maintained. They stay in the mind and become a part of one's inner values. One midwifery student said: *"Unknowingly, many behaviors become valuable. We have repeated the behavior many times, and so, the behavior stays with us. when a teacher does something that is valuable to him, I then realize that it must be a valuable event… of course, and I think this happens automatically in our mind."* (eighth-semester midwifery student/BSc/22 years old).

Moral burnout

If normalization continues in the process of moral hopelessness, the result will be moral burnout. In other words, the students forget their moral findings, and thus, lose moral sensitivity. Their moral values become weak, and they do not feel good about their moral character. A retired midwifery faculty member said: *"She was our student, and she followed everything very well when she was a student, but now that she has entered work, she has become a completely different person. She does not have the previous sensitivities. She behaves badly. She is non-committal and she has forgotten everything we taught her."* (MSc in Midwifery/Retired from the faculty of midwifery/62 years old).

Improper context of moral development

The concept of "improper context of moral development," as a context category in this grounded theory, includes damaged socio-cultural-political context (macro level), professional challenges in the midwifery profession (meso level), and inappropriate cognitive and motivational context (micro level). One midwife said: *"In poor economic conditions, people are trapped… and in a hospital where the rights of patients are not respected and there are so many challenges between midwives and gynecologists, the observance of ethical standards is no longer given much importance. Now, if there is no interest in midwifery, the circumstances are even worse"* (Midwife/38 years old).

Barriers and facilitators of moral development

The barriers to moral development were the weakness of the educational system. These barriers include failure to implement the rules of professional ethics, and the lack of facilities to comply with the standards of professional ethics. The facilitators of moral evolution were access to a moral-oriented model, moral-oriented education, and advancement of educational level from bachelor's degree to master's degree or PhD. One midwifery professor said: *"Sometimes, a student wants to observe moral standards, but she has not received training or there are no facilities for her to do so. so if the conditions are prepared for her and the right behavioral models are available to her, she may observe them better than us."* (Midwifery professor/17 years of experience*)*

Discussion

This study investigated the development of professional ethics in midwifery students and proposed the "Interactive-cognitive learning in the two-way path of reasoning" theory.

Moral numbness as the main concern in this theory is formed in the "improper context of moral development" that is influenced by political, social, cultural, organizational, and personal factors. The strategies that students use to deal with moral numbness include moral distress, interactive-cognitive learning, moral reasoning, and moral hopelessness, which cause a wide range of consequences ranging from moral internalization to moral burnout.

"Interactive-cognitive learning in the two-way path of reasoning" has some conceptual similarities with Piaget's theory of moral development. According to Piaget[15] (2011), the development of ethics in children occurs in two stages: heteronomous morality and autonomous morality. Similarly, in interactive-cognitive learning, the students first experience imitation and modeling and then make moral decisions based on the cognitive processes in their own mind.

The study findings also have conceptual parallels with some levels of Kohlberg's Theory of Moral Development. "Pre-conventional morality" is the first level of this theory; children act at this level to avoid punishment or receive a reward.[13] In this study, students pretended to follow ethical standards while suffering from moral hopelessness, and this pretense was not for the sake of moral values but to gain privileges or due to fear of losing personal interests.

Kohlberg also argues that those who have reached the third stage of moral development, which is based on the internalization of ethical standards, make decisions based on their principles and uphold them under all circumstances.[13] In this regard, the results of the present study show that during their progression toward moral reasoning, students reach a stage in moral development that has the internalization of moral principles as its outcome. In other words, students develop a heartfelt sense of their own righteousness, establish moral behavior, and realize that they are always obligated to render devoted services.

Despite some similarities, distinguishing between the levels of moral development stages and placing people in a certain level forever in Kohlberg's theory[16] is not supported by the data resulting from our study. This is because students actively and based on the conditions decide to move in the direction of moral reasoning or use passive solutions in the direction of moral despair. This issue explains the differences in the moral development of students in a common learning environment and even the differences in the moral decision-making of a student in different decision-making situations.

The theory proposed in this study and James Rost's model share the concept of moral sensitivity. In fact, moral sensitivity is the cognitive dimension of James Rost's model and one of the influential components in moral behavior.[17] Based on the "interactive-cognitive learning in the two-way path of reasoning" theory, moral sensitivity is one of the factors contributing to the development of professional ethics. Accordingly, moral sensitivity is promoted in the learning environment when students follow the path of moral reasoning, but it is lost when students follow the path of moral despair.

Based on the theory proposed in this study, the development of professional ethics in midwifery students is considered a type of interactive-cognitive learning; therefore, it is consistent with Bandura's theory, which contends that moral development is a result of a combination of social and cognitive factors.[18] Both these theories share the concept of modeling. According to Bandura's theory, almost all behaviors can be learned through observation of other people's behavior and its effects rather than through direct experience.[19] The theory proposed in this study also indicates that students emulate and follow the behaviors of professionals around them in comparable circumstances. The role of modeling in moral learning is so important that the Exemplarist Moral Theory of Zagzebski vigorously corroborates the claim that moral exemplars are essential to moral theory and practice.[20]

Considering the importance of modeling in the process of developing students' professional ethics, attention should be paid to the availability of correct behavioral models in the students' education system. Moreover, professors, midwives, and gynecologists in educational environments should be aware of their exemplary role and be familiar with the concept of indirect education or hidden curriculum.

Cognitive learning is another concept discussed in this study that refers to the important role of cognitive processes and students' understanding of what they observe in the environment. In this regard, Levin believes that situations do not necessarily consist of objective and tangible environmental factors and elements, but the individual's

understanding and perception of that situation is decisive and should be taken into account.[21] Furthermore, according to the professional ethics model of Bartels, social interactions are the domain in which moral judgment occurs.[19] According to these findings, in addition to providing a suitable educational environment, students' moral recognition skills and moral thinking should be strengthened.

There are some limitations in this research. The coincidence of sampling in this study with the COVID-19 pandemic caused us to use the online method in 12 interviews and made it impossible for us to observe the participants in the natural fields of educational settings. In addition, the participants in our study were students, and they were asked to share their experiences of professional ethics in their educational environment; thus, sometimes, the researcher was forced to use direct questions due to the students' low understanding of the concepts and provide them with examples of moral concepts.

Furthermore, observing the principle of maximum diversity in the selection of participants, carefully conducting the analysis process, and using a team of specialists for analysis were the strengths of the present study.

Conclusion

The theory of "interactive-cognitive learning in the two-way path of reasoning" explains the process of professional ethics development in midwifery students with the main concern of "moral numbness." Moral distress, interactive-cognitive learning, moral reasoning, and moral hopelessness were the midwifery students' strategies to address their main concern that led to the spectrum of moral internalization to moral burnout.

Paying attention to the concepts of this theory can create a deep understanding of the process of formation of professional ethics in students, and it can be used in the direction of the effective training of students with the aim of promoting professional ethics in midwifery.

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Conflicts of interest

Nothing to declare.

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Original Article

Maternal Complications during Pregnancy and Risk Factors for Stunting

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Abstract

Background: Stunting can be prevented by early detection when the mother is pregnant. Early detection can be carried out by looking for risk factors of stunting during pregnancy so that interventions can be early detected. This study aims to assess complications during pregnancy (disease and infection) and risk factors associated with stunting. **Materials and Methods:** The type of research was observational analytic with a case-control design on 450 mothers who were selected with simple random sampling (150 mothers who have stunting babies aged 0–2 months and 300 mothers who have not stunting babies aged 0–2 months in Malang Regency, Indonesia. This study used secondary data by looking at medical records, namely, laboratory examinations in the mother's book and cohort records at the public health center. This study was conducted from December 2021 to August 2022. Bivariate analysis with Chi-square and multivariate logistic regression was carried out to determine the variables that most influenced the incidence of stunting. **Results:** The results of multivariate analysis with logistic regression of maternal complications during pregnancy, which are a risk as a factor causing stunting, are Sexually Transmitted Infections (STIs) (Odds Ratio [OR]: 6.36; 95% Confidence Interval [CI]: 2.97–13.62), coronavirus disease 2019 (COVID-19) accompanied by pneumonia (OR: 5.12; 95% CI: 1.87–14.052), human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) (OR: 4.63; 95% CI: 1.10–19.59), hepatitis B (OR: 3.97; 95% CI: 1.253–12.565), pre-eclampsia (OR: 3.88; 95% CI: 1.81–8.30), and heart disease (OR: 3.373; 95% CI: 0.99–11.40). **Conclusions:** After recognizing the maternal factors that cause stunting, intervention should immediately be carried out on pregnant women with diseases (pre-eclampsia and heart disease) and infections (STI, COVID-19 + pneumonia, HIV/AIDS, and hepatitis B) to prevent stunting early.

Keywords: *COVID-19, heart disease, pre-eclampsia, pregnant women, risk factors, sexually transmitted disease*

Introduction

Malnutrition happens when the baby is in the uterus and in the early days after birth. However, stunting conditions only appear after the baby is two years old. Furthermore, secondary prevention is needed through early detection so that stunting can be detected early.[1] Stunting occurs when the fetus is still in the uterus and is only detected after the child is two years old (the first 1,000 days of life). Thus, the most influential early detection of short toddlers is at first 1,000 days of life.[2]

The research was conducted in Madagascar to examine risk factors for stunting: dietary patterns during pregnancy, history of Antenatal Care (ANC) examinations, and history of multiple pregnancies.[3] Another study examined the risk factors for stunting, which were only associated with Body Mass Index (BMI), age of the pregnant woman, mother's height, and mother's smoking habit[4–6] There were not many studies that specifically examined maternal complications that can cause stunting. Several studies that examine maternal complications that cause stunting include malaria in pregnancy,[7] pre-eclampsia,[8] syphilis,[9] and anemia.[10,11] Therefore, it is necessary to conduct research on more complex maternal complications.

People can start early detection of stunting in early pregnancy by exploring the factors during pregnancy that can cause stunting. This study looks at the risk factors for stunting as a primary ingredient, namely the risk factors for stunting from the World Health Organization (WHO)[12] and United Nations Children's Fund (UNICEF) concept of stunting causes[13] and risk factors according to several experts[7,8,9–11,14–28] and

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obtained maternal factors, namely, infection (hepatitis B, coronavirus disease 2019 (COVID-19), Tuberculosis (TBC), Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), and Sexually Transmitted Infections [STIs]), as well as pregnancy-related diseases (hypertension, diabetes mellitus, pre-eclampsia, and heart disease). Previous studies in Indonesia[29-31] risk factors for stunting during pregnancy only focused on anemia and nutritional status during pregnancy. As a result, further research is required not only to assess anemia during pregnancy but also to examine other maternal complications that are risk factors for stunting. Based on the above-mentioned data, it is necessary to look for the causes of stunting, which start with pregnancy, especially pregnancy complications, so that stunting prevention can be carried out starting earlier. This research is expected to contribute to the development of midwifery service standards for stunting prevention. This study aims to assess maternal complications during pregnancy (disease and infection) and risk factors associated with stunting.

Materials and Methods

The type of research was observational analytic with a case-control design. This was conducted in December 2021–August 2022. This study design used a case-control to study the causes of stunting during pregnancy. The number of samples involved 150 cases, and 300 control cases were selected by simple random sampling to control confounding variables, with inclusion and exclusion criteria. Inclusion criteria in this study were pregnant women taking iron (Fe) tablets regularly, relative socio-economic poverty, normal BMI, maternal height >145 cm, and birth length at the time of data collection ≤2SD for cases and birth length ≥2SD for control. The exclusion criteria were babies born prematurely. In this study, the researchers used a sample size of the formula from Stanley Lemeshow. The minimum sample size was calculated using the formula for case-control research, according to Lemeshow.[32] Sample size was calculated according to power analysis with $P_1 = 0.42$ (case), $P_2 = 0.21$ (control), Q1 = 0.574, Q2 = 0.788, Q = 0.681, Z_α = *level of significance*, 0.05 = 1.96, and Z_β = *power of the test* (80%) = 0.84.

The comparison of case controls was 1:2, in which 150 mothers had stunted babies (case) and 300 mothers had babies who were not stunted (control). The sampling technique in this study was that the sample was selected by simple random sampling for both the case and control groups. The case group involved mothers with a stunting baby, and the control group was mothers with a normal baby. Identification of stunting toddlers based on indicators of height/age according to WHO Multicenter Growth Reference Study (MGRS) standards was calculated if the z-score was ≤2SD and stated to be severe stunting if the z-score was ≤3SD.[33] The dependent variable was the incidence of stunting (birth length<48 cm). The independent variables were infection during pregnancy (TBC, hepatitis B, COVID-19, HIV/AIDS, and STIs) and disease during pregnancy (high blood pressure, pre-eclampsia, diabetes mellitus, and heart disease).

The research instrument in this study employed secondary data by looking at medical records, namely, laboratory examinations in the mother's book and cohort records at the public health center. Data collection was carried out from December 2021 to August 2022 in the work area of the public health center in Malang district, East Java, Indonesia. Data selection of respondents according to the inclusion and exclusion criteria was done with the help of village cadres and midwives. Laboratory examinations were carried out in the public health center laboratory through the integrated ANC program. The results of the laboratory examinations included Bakteri Tahan Asam (BTA) for TBC examination, Hepatitis B Surface Antigen (HBsAg) for examination (hepatitis B), Treponema Pallidum Hemagglutination (TPHA)/Rapid Plasma Reagin (RPR) serology results, HIV examination, swab/Polymerase Chain Reaction (PCR) results, blood pressure, sugar levels, urine protein, and Electrocardiograph (ECG) recording results. The analytical method used was univariate, bivariate with Chi-square, and multivariable using regression logistics.

Ethical considerations

Ethical approval was obtained from the Ethics Committee of Airlangga University, Faculty of Medicine (Reference Number: 627/HRECC.FODM/V/2022). Before data collection, respondents were provided with informed consent. Respondents participating in the research were based on their own free will and without coercion, and they could leave the research at any stage without penalty. Respondents were explained that their data were guaranteed confidentiality and would only be used for the research objective.

Results

The results from Table 1 show that the three most common maternal complications were hypertension (19.30%), STIs (8.20%), and pre-eclampsia (7.80%).

The Chi-square test results in Table 2 showed that maternal complications affecting the incidence of stunting were tuberculosis, hepatitis B, STIs, HIV/AIDS, COVID-19, high blood pressure, and pre-eclampsia.

Table 3 of the multivariate logistic regression analysis shows that the most dominant maternal complication risk factor causing stunting was STI with 1.849 (odds ratio [OR]: 6.36; 95% confidence interval [CI]: 2.97–13.62).

Discussion

This study evaluates maternal complications, including infections and diseases during pregnancy, which can be

risk factors for stunting. The most dominant maternal complication risk factor causing stunting was STI, which means that STI during pregnancy has six times the risk of giving birth to a stunted baby. The second maternal complication that causes stunting is COVID-19, accompanied by pneumonia means that COVID-19, accompanied by pneumonia during pregnancy five times, gives birth to stunting. The third maternal complication that causes stunting is HIV/AIDS. It means that pregnant women with HIV/AIDS have four times of giving birth with stunting and pregnant women with hepatitis B or pre-eclampsia or heart disease, means that pregnant women with hepatitis B, pre-eclampsia, and heart disease have three times of giving birth with stunting.

Table 1: Maternal complications

Risk factor	Category	*n* (%)
TBC***	Negative	440 (97.77)
	Positive	10 (2.23)
Hepatitis B	Negative	433 (96.22)
	Positive	17 (3.78)
STIs*	Negative	413 (91.77)
	Positive	37 (8.23)
HIV**	Negative	440 (97.77)
	Positive	10 (2.23)
COVID-19	Negative	427 (94.88)
	Positive	23 (5.12)
High blood pressure	No	363 (80.66)
	Yes	87 (19.34)
****DM	Normal	427 (94.88)
	Abnormal	23 (5.12)
Pre-eclampsia	No	415 (92.22)
	Yes	35 (7.78)
Heart disease	No	437 (97.11)
	Yes	13 (2.89)

*STIs=sexually transmitted infections; ** HIV=human immunodeficiency virus;*** TBC=tuberculosis; **** DM=diabetes mellitus

There are still very few studies to assess maternal complications and risk for stunting, and several studies assess maternal complications with Low Birth Weight (LBW) conditions. Infections in mothers during pregnancy related to tuberculosis, HIV/AIDS, STIs, hepatitis B, COVID-19, and other conditions can lead to Intrauterine Growth Restriction (IUGR) and premature birth and are at risk of causing LBW. The presence of infectious diseases for a long time affects body weight and has an impact on linear growth.[27,28,34–36]

Research shows that exposure to an abnormal intrauterine environment caused by disease during pregnancy affects anthropometric, metabolic, and mental development, leading to an increased risk of disease later.[8] The results of other studies state that cardiac output is one of the main factors affecting the optimal growth and development of the fetus.[37]

Maternal complications during pregnancy can be prevented by early detection. However, this has not become a significant concern for health workers who carry out antenatal checks.[38] They prevent pregnancy complications through early detection and carry out examinations according to schedule and quality examinations.[39] Early detection is one of the existing programs at the public health center in Indonesia, with integrated ANC examination and high-risk pregnancy detection because all pregnancies are at risk and early intervention is essential for all pregnant women.[40]

Table 2: Relationship between risk factor maternal complications and stunting

Maternal complications	Category	Control group *n* (%)	Case group (stunting) *n* (%)	*p*
TBC*	Negative	298 (99.33)	142 (94.66)	0.003
	Positive	2 (0.67)	8 (5.34)	
Hepatitis B	Negative	295 (98.33)	138 (92)	0.001
	Positive	5 (1.67)	12 (8)	
STIs**	Negative	289 (96.33)	124 (82.66)	<0.001
	Positive	11 (3.67)	26 (17.34)	
HIV***	Negative	297 (99)	143 (95.33)	0.019
	Positive	3 (1)	7 (4.67)	
COVID-19	Negative	294 (98)	133 (88.66)	0.001
	Positive	6 (2)	17 (11.34)	
High blood pressure	No	253 (84.33)	110 (73.33)	0.005
	Yes	47 (15.67)	40 (26.67)	
DM****	Normal	288 (96)	139 (92.66)	0.130
	Abnormal	12 (4)	11 (7.34)	
Pre-eclampsia	No	287 (95.66)	128 (85.33)	0.001
	Yes	13 (4.34)	22 (14.67)	
Heart disease	No	295 (98.33)	142 (94.66)	0.124
	Yes	5 (1.67)	8 (5.34)	

*TBC=tuberculosis; **STIs=sexually transmitted infections; *** HIV=human immunodeficiency virus; **** DM=diabetes mellitus

Table 3: Logistics regression results

Risk factors	B*	*p*	OR** (95% CI)
Hepatitis B	1.38	0.019	3.97 (1.25–12.57)
STIs***	1.8	0.001	6.36 (2.97–13.62)
HIV****	1.5	0.038	4.625 (1.09–19.59)
COVID-19	1.63	0.002	5.119 (1.86–14.05)
Pre-eclampsia	1.36	0.001	3.877 (1.81–8.30)
Heart disease	1.22	0.050	3.373 (0.99–11.39)

*B=beta, **OR=odds ratio. ***STIs=sexually transmitted infections; ****HIV=human immunodeficiency virus

Several research results also assess the incidence of stunting with sociocultural practices in society that are carried out by mothers during pregnancy. Therefore, it is possible to reduce stunting and examine sociocultural practices that can harm the mother and fetus.[33] In the future, it is recommended to assess sociocultural practices during pregnancy and what can cause stunting. All pregnant women must check laboratory examinations, including BTA examination, HBsAg examination, TPHA/RPR (STI), HIV examination, swab/PCR, blood pressure, sugar levels, urine protein, and ECG recording results, even without any indication. The results of this study can be used in the early prediction of stunting during pregnancy, which can predict the incidence of stunting during pregnancy so that prevention can be done immediately. The limitation of this study is that laboratory results use secondary data and only cover one district area. Suggestions for future researchers are to use primary data by directly checking laboratory results and using several different districts.

Conclusion

Maternal complications that are at risk as factors causing stunting are STIs, COVID-19 accompanied by pneumonia, HIV/AIDS, hepatitis B, pre-eclampsia, and heart disease. Suggestions for health services and pregnant women who do the first ANC must be examined completely including STIs, COVID-19, hepatitis B, urine protein, and ECG examinations so that stunting prevention can start early in pregnancy.

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Conflicts of interest

Nothing to declare.

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Original Article

Fear of COVID-19, Health Anxiety and Work-Family Conflict in Nurses Working in the COVID-19 Ward

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Abstract

Background: COVID-19 is an example of an epidemic and sudden crisis that has affected many aspects of life and work and identifying the factors that contribute to its impact can help prevent similar crises in the future. The purpose of this study was to investigate fear of COVID-19, health anxiety, and work–family conflict in nurses working in COVID-19 wards in hospitals affiliated with the Tehran University of Medical Sciences (TUMS). **Materials and Methods:** This descriptive-analytical study used a census method to survey 226 nurses working in eight hospitals affiliated with TUMS. Demographics information and three questionnaires including; the Fear of COVID-19 Scale, Short Health Anxiety Inventory, and Work–Family Conflict Scale were completed online. Data were analyzed using descriptive statistics and analytical statistics, and a significance level of $p < 0.05$ was considered. **Results:** Structural equation modeling test showed that work–family conflict had an effect on health anxiety, and health anxiety had an effect on fear of COVID-19 ($p < 0.05$). The severity of the effect of work–family conflict on health anxiety was 0.73, and the severity of the effect of health anxiety on fear of COVID-19 was 0.46. Work–family conflict had an indirect effect on fear of COVID-19 mediated only by health anxiety ($p < 0.05$) and the severity of the indirect effect was 0.33. **Conclusions:** Health anxiety plays a mediating role in the relationship between work–family conflict and fear of COVID-19. Workplaces should provide more support to their employees during a crisis such as the COVID-19 pandemic, and prevention programs should be implemented to decrease anxiety.

Keywords: *COVID-19, fear of COVID-19, health anxiety, nurses, work–family conflict*

Introduction

The COVID-19 disease is the third type of coronavirus to emerge in the 21st century, following the SARS and MERS epidemics.[1] Epidemics have occurred in the past and are likely to occur in the future.[2] Coronavirus has caused widespread concern and fears around the world, leading to adverse psychological effects on public health and disrupting many people's activities, including business and travel.[3] Research on past pandemics has shown increased anxiety in people.[4] The meta-analysis of data from 91 studies from 36 countries found that fear of COVID-19 is associated with various mental health-related factors. The results suggest that fear of COVID-19 contributes to mental health problems such as depression, anxiety, stress, sleep problems, mental health-related factors, and impaired mental well-being.[5]

Healthcare workers and caregivers are on the front lines during pandemics and are responsible for treating and caring for them. However, they are also at risk of infection and face challenges, such as fear of contagion, transmission to family, friends and colleagues, distress, and mental health problems. Studies have shown that these individuals experience anxiety, depression, fear and despair, panic attacks, psychotic symptoms, delirium, and even suicide.[1,3] Factors such as lack of personal protective equipment, heavy workload, and medication shortages, media exposure, and lack of support from officials can worsen the situation.[6] Concerns about the mental health of healthcare workers treating COVID-19 patients are on the rise,

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and timely diagnosis and care are essential.[7,8] In a study by Li, over 50.7% of the 1,563 treatment staff surveyed reported symptoms of depression, 44.7% reported anxiety, and 36.1% reported sleep disorders.[9]

Fear of COVID-19 is a new construct related to the pandemic and an important mental health variable strongly associated with functional impairment and psychological distress. Studies indicate that fear of COVID-19 plays a significant role in people's mental health, and research in this area is still in its early stages. For example, during the pandemic, many Americans turned to drugs to cope with stress and anxiety caused by the coronavirus, and requests for anti-anxiety drugs increased by 34.1% from mid-February to mid-March 2020.[10] Fear of COVID-19 has been linked to symptoms such as depression, general anxiety, hopelessness, suicidal thoughts, dysfunction, and even suicide.[5,11,12] Research on past pandemics has shown that anxiety about diseases is associated with symptoms of health anxiety and obsessive–compulsive disorder.[13] In some individuals, this anxiety can manifest as constant checking for symptoms, fear of contracting the disease, avoiding medical centers due to the fear of being diagnosed with the disease, and obtaining health insurance.[3] Work–family conflict is an important concept in pandemics such as COVID-19.[14] It refers to a situation where there is a lack of compatibility between a person's work and family life. Work–family conflict arises when work responsibilities consume a person's time, energy, and commitment, thus reducing their ability to fulfill family roles.[15,16] Nurses, due to the nature of their work, are particularly vulnerable to work–family conflict.[17] Work–family conflict can have a significant impact on their mental and psychological conditions, as well as their quality of life, which in turn can affect their ability to provide effective care.[18] The quality of nurses' professional lives and perception of working conditions in relation to their personal lives can have a significant impact on their attitude toward work and the quality of care they provide to patients.[18,19] Achieving a balance between work and personal life is crucial in strengthening the psychological foundation of nurses, improving the safety and satisfaction of patients, and increasing family cohesion.[20] As an important member of the healthcare system, nurses' mental health is a crucial factor that affects the quality of care they provide.[19] Therefore, this study aims to investigate fear of COVID-19, health anxiety, and work–family conflict among nurses working in COVID-19 wards in hospitals affiliated with the Tehran University of Medical Sciences and identify related factors.

Materials and Methods

This descriptive–analytical study was conducted on nurse staff working in corona wards including emergency room, COVID-19 inpatient wards, and COVID-19 intensive care units, in eight government hospitals affiliated with the Tehran University of Medical Sciences. These hospitals included Imam Khomeini Hospital Complex, Dr. Shariati Hospital, Bharlo Hospital, Medical Center, Heart Center, Amir Alam Hospital, Ziyaian Hospital, and Sina Hospital in August 2020. The census method was used for sampling, and informed consent was obtained online before their participation in the study. The participants were provided with an online questionnaire that included demographic characteristics and three separate questionnaires: Fear of COVID-19 Scale, Short Health Anxiety Inventory, and Work–Family Conflict Scale. The link to the questionnaire was sent to the participants to access and complete at their convenience. All scales were standardized in Iran.[21,22,23]

The data collected in this study were analyzed using descriptive and analytical statistics, including *t*-test, analysis of variance, equality of means test, and Spearman's correlation coefficient. Additionally, a structural equation model was employed to analyze the data. The statistical analyses were conducted using SPSS (version 27) and Amos software.

Ethical considerations

This study received ethics approval from the Ethics Committee of the Tehran University of Medical Sciences (IR.TUMS.MEDICINE.REC.1400.036). Before conducting the study, the researchers explained the study's aims and procedures to the participants, and written informed consent was obtained from all participants.

Results

Results of the study showed that 226 nurses responded, representing a response rate of 20% from the target population. Of the participants, 188 (83.20%) were female, and 77 (31.40%) were single, whereas 155 (68.60%) were married. In terms of parenthood, 115 (50.90%) were childless, 107 (47.30%) had one child, and 4 (1.80%) had two children. The majority of participants were in the age range of 30–39 years [Table 1]. The average fear of COVID-19 score for the entire sample of nurses working in COVID-19 wards was 16.19. Comparing this average with the cutoff of 21 revealed that the fear of COVID-19 score of participants was significantly lower than the cutoff ($t_{225} = 12.14$, $p < 0.001$).

Additionally, the average health anxiety score for nurses working in COVID-19 wards was 15.39, and comparing this average with the cutoff score of 18 showed that the health anxiety score of participants was significantly lower than the cutoff ($t_{225} = 5.95$, $p < 0.001$). The average score of work–family conflict among nurses working in COVID-19 wards was 50.21. Comparing this average with the cutoff of 54 revealed that the work–family conflict of participants was significantly lower than the cutoff ($t_{225} = 4.18$, $p < 0.001$). In this study, there was no significant relationship found between fear of COVID-19 and gender, age, education, marital status, living arrangements, and history of physical and mental illness, employment status, type of ward, work

Table 1: Demographic characteristics of participants

Variables	*n* (%)
Gender	
Female	188 (83.20)
Male	38 (16.80)
Age group	
20–29	55 (24.30)
30–39	103 (45.60)
40–49	56 (24.80)
50–59	12 (5.30)
Education	
High school diploma	11 (4.80)
Bachelor of Nursing	192 (85.00)
Master of Nursing	23 (10.20)
Marital status	
Single	71 (31.40)
Married	155 (68.60)
Employment status	
Contract	130 (57.50)
Official	96 (42.50)
Number of children	
Childless	115 (50.90)
One child	107 (47.30)
Two children	4 (1.80)
Organizational position	
Supervisor	7 (3.10)
Head nurse	19 (8.40)
Nurse	189 (83.50)
Nurse aide	11 (4.80)
Shift work	
Morning	30 (13.30)
Evening	4 (1.80)
Night	31 (13.70)
Both morning and evening	37 (16.40)
Circulation	124 (4590)
Work experience	
11 months (less than a year)	41 (18.10)
1–4 years and 11 months	82 (36.30)
5–9 years and 11 months	50 (22.10)
10–14 years and 11 months	39 (17.30)
15–19 years and 11 months	11 (4.90)
20–24 years and 11 months	3 (1.30)
Ward	
COVID-19 inpatient wards	86 (38.10)
COVID-19 ICU	81 (35.80)
Emergency room	59 (26.10)
History of physical illness	
Yes	27 (11.90)
No	199 (88.10)
History of mental illness	
Yes	16 (7.10)
No	210 (92.90)
Living arrangements	
Living with parents	43 (19.00)
Living with a spouse and children	147 (65.00)
Alone	27 (11.90)
Living with a roommate	9 (4.00)

Contd...

Table 1: Contd...

experience, shift work, organizational position ($p < 0.5$). Among the demographic characteristics, no statistically significant difference was found between having a child and fear of COVID-19 ($t_{225} = 1.91$, $p = 0.05$), and health anxiety with gender ($t_{225} = 1.93$, $p = 0.05$). However, a significant relationship was observed between age group ($p = 0.02$) and work experience ($p = 0.01$) with health anxiety score.

The results of the one-way analysis of variance indicated a statistically significant difference between the health anxiety scores of nurses in the four age groups ($F_4 = 3.76$, $p = 0.012$). Tukey's *post hoc* test revealed that the age group of 50 to 59 years had the lowest health anxiety score and was placed in a homogeneous group, whereas the 20 to 29-year-old group had the highest health anxiety and was placed in another homogeneous group. The other age groups were placed between these two groups and formed the third homogeneous group. The study found a significant difference in work–family conflict among the four age groups of nurses ($F_4 = 4.47$, $p = 0.003$). Further analysis using Tukey's test and Spearman's correlation coefficient ($p = 0.002$, $r = -0.24$) showed that work–family conflict decreased as nurses' age increased. Additionally, the *t*-test of two independent samples revealed a statistically significant difference in the work–family conflict scores between nurses who had a history of mental illness and those who did not ($t_{0.86} = 1.98$, $p < 0.049$). The research model was tested using the structural equation modeling technique (SEM) with the Amos software. Figure 1 displays the model with standard coefficients, whereas Figure 2 shows the model with non-standard coefficients. This study had 15 observable variables and a sample size of 226 participants, which allowed for the "*r*" use of structural equation modeling. The covariance-oriented approach was employed with Amos software. The results indicated that the data met the necessary conditions for the modeling test. These conditions included the normality of both observable and latent variables, satisfactory validity and reliability of measurement items, and appropriate fit indices. These conditions included the normality of both observable and latent variables, satisfactory validity and reliability of measurement items, and appropriate fit indices [Table 2].

The results of the structural equation modeling test are presented in Table 3. The test confirmed two out of three relationships in the model ($p < 0.05$). Additionally, the determination coefficient of the model was 0.40, indicating that the independent variables in the model could explain 40% of the variance in the dependent variable of fear of COVID-19. The results of the structural equation modeling test indicate that the effect of family–work

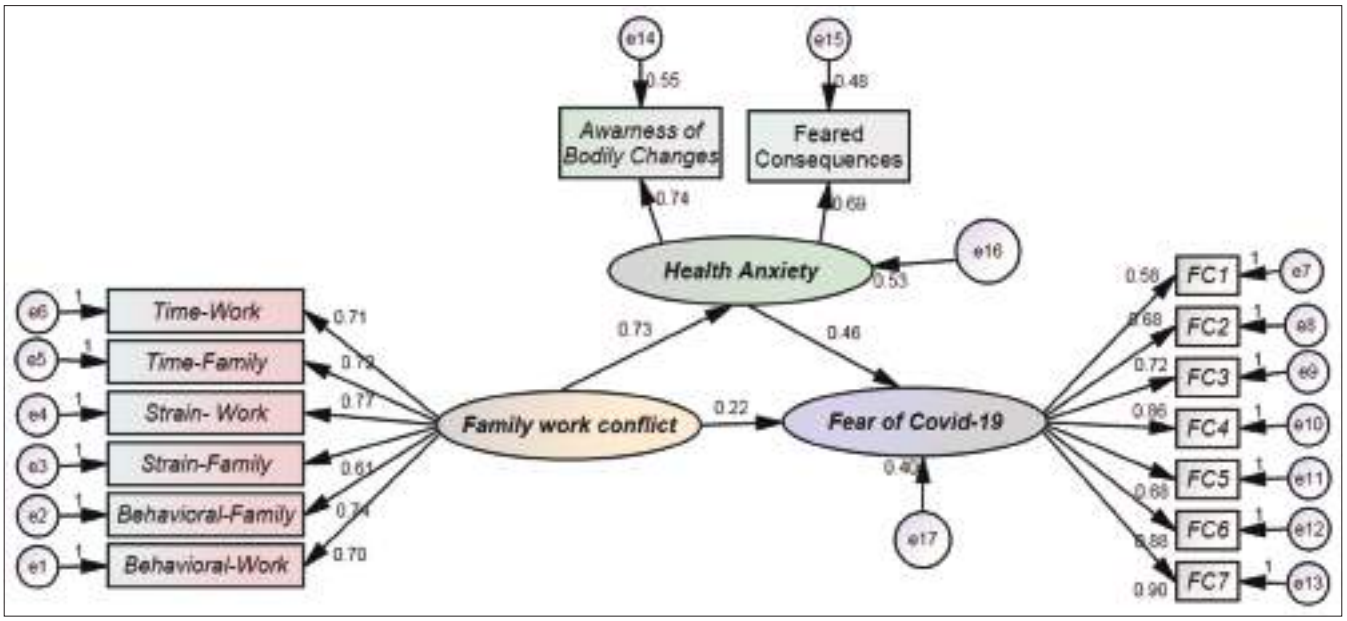

Figure 1: Experimental model of the study in the case of standard path coefficients

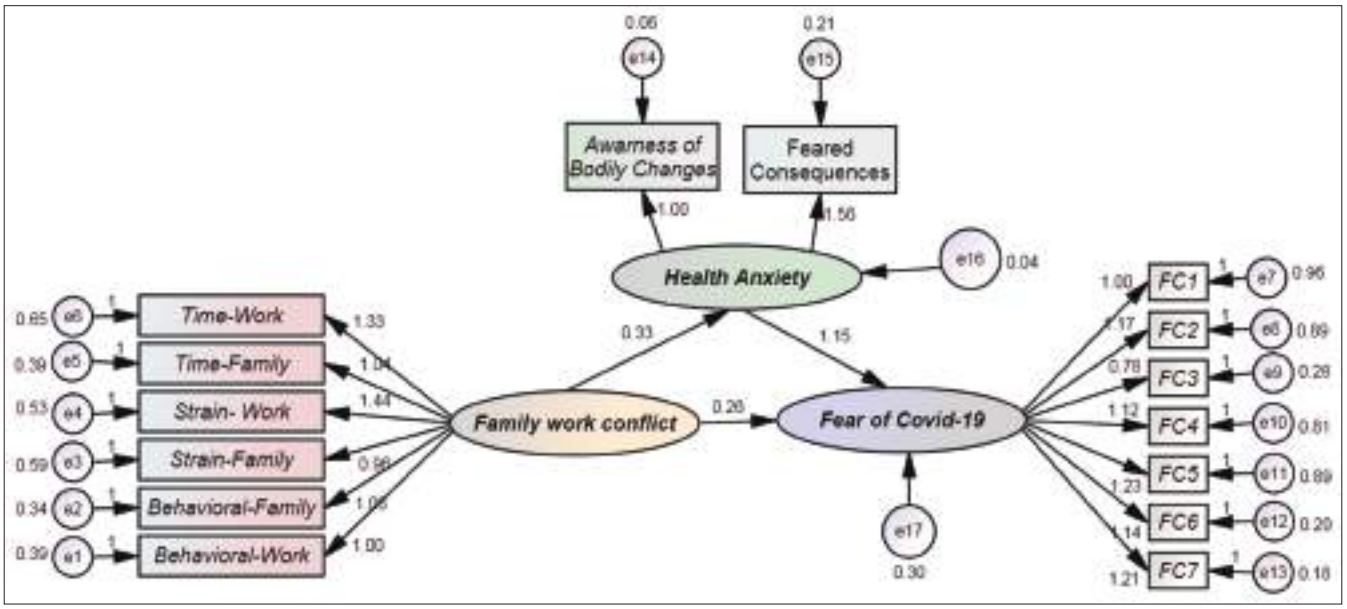

Figure 2: Experimental model of the study in the case of non-standard path coefficients

Table 2: Fit indices of the research model

Fit Indices	Acceptable result	Result of the study	Interpretation
Goodness of Fit (GFI)	>0.90	0.92	The fit is acceptable
The Root Mean Square Error of Approximation (RMSEA)	<0.08	0.063	The fit is acceptable
The Comparative Fit Index (CFI)	>0.90	0.92	The fit is acceptable
The Normed Fit Index (NFI)	>0.90	0.89	The fit is moderate
The Incremental Fit Index (IFI)	>0.90	0.91	The fit is acceptable
The (Adjusted) Goodness of Fit (AGFI)	>0.70	0.72	The fit is acceptable
Parsimony-Adjusted Measures Index (PNFI)	>0.70	0.76	The fit is acceptable
df Chi-square	Between 1 and 5	2.56	The fit is acceptable

conflict on health anxiety (p = 0.001) and the effect of health anxiety on fear of COVID-19 (p = 0.002) were confirmed. Moreover, both effects were found to be positive, indicating that an increase in family–work conflict

Table 3: The results of the structural equation modeling test (table of coefficients)

Relationships	Standard coefficient	Non-Standard coefficient	Standard error	*t*	*p*
Family work conflict -> health anxiety	0.73	0.33	0.04	7.55	>0.001
Family work conflict -> fear of corona	0.22	0.25	0.14	1.73	0.083
Health anxiety -> fear of corona	0.46	1.51	0.37	3.12	>0.002

leads to an increase in health anxiety, and an increase in health anxiety leads to an increase in fear of COVID-19. The impact of family–work conflict on health anxiety was found to be strong and significant with an intensity of 0.73. Similarly, the impact of health anxiety on fear of COVID-19 was found to be moderate with an intensity of 0.46. However, the direct effect of work–family conflict on fear of COVID-19 was not confirmed ($p = 0.083$). Instead, the results suggest that work–family conflict has an indirect effect on fear of COVID-19 through the mediation of health anxiety ($p < 0.05$).

Discussion

The results of the study on fear of COVID-19 and its influencing factors showed that the average fear of COVID-19 score in the research samples was below the cutoff of 21. However, 20% of the samples had a fear of COVID-19 scores higher than 21. The study found no significant relationship between fear of COVID-19 and gender, age, education, marital status, living arrangements, and history of mental illness. However, there was a significant relationship between having children and the level of fear of COVID-19, which may be due to the fear of death or transmitting the disease to their children. This finding was consistent with the results of the study by Lai *et al.*, which found that the nurses working in the COVID-19 wards were concerned about the health of their families and the possibility of transmitting the disease to them.[6]

The results of the present study revealed that the average health anxiety score among participants was below the cutoff of 18. However, 26% of the samples had a health anxiety score higher than 18. The study also found a significant relationship between gender, age group, and work experience with health anxiety score. A higher health anxiety score was observed among female nurses compared to their male counterparts. These findings are consistent with those of a study conducted by Sarboozi *et al*.,[24] which also reported higher anxiety and stress scores among female nurses. Moreover, a study conducted in Wuhan, China, on physicians and nurses showed that women in direct contact with COVID-19 patients had a higher level of stress and anxiety. Long-term studies show that women experience higher levels of depression, anxiety, and loneliness than men due to gender differences. Women's emotions are more fragile and they are more vulnerable to feelings of loneliness, anxiety, and depression.[25,26]

Our study revealed that nurses between the age of 20–29 years had the highest health anxiety scores, whereas those in the 50–59 age group had the lowest scores. Additionally, nurses with less than 1 year of work experience had higher health anxiety scores, which was consistent with the findings of Yuang's study. This could be because as nurses gain more experience and age, they develop better skills to adapt to their working conditions.[27] Our study also found that nurses with less than 1 year of work experience experienced a higher level of work–family conflict, which aligns with the results of AlAzzam *et al*.'s[15] study in Jordan. They found that young nurses experienced higher levels of work–family conflict, which may be due to their lack of experience in balancing work and personal life.

Our study found that the mean work–family conflict score was below the cutoff of 54, although 36.7% of the participants had scores above this cutoff. We observed a significant relationship between age, history of mental illness, work experience, and work–family conflict. Specifically, as age increased, the level of work–family conflict decreased, which is consistent with the findings of Al-Azam's study that showed higher levels of work–family conflict in younger nurses. This may be because older nurses have better skills to adapt to their environment. We also found that a history of mental illness and the use of neuropsychiatric drugs increased work–family conflict, which is consistent with Biyabani *et al*.'[20] findings. Their study showed that a history of mental illness increases tension and conflicts in the family environment, leading to higher levels of work–family conflict in nurses. Our study also revealed that contract nurses experienced more work–family conflict. Previous studies have shown that contract nurses experience more stress and anxiety,[20,24,27] possibly due to their increased responsibility for night shifts, weekends, and holidays. The scheduling of nurses' presence and activities at inappropriate times can create a situation prone to work–family conflict.

One limitation of our study was that online questionnaires were used, which limited access to the target community. To conduct a more comprehensive review in future studies, we recommend using clinical interviews.

Conclusion

This study offers new insights into the relationship between work–family conflict, health anxiety and fear of COVID-19. Our findings suggest that health anxiety plays a mediating role on the relationship between work–family conflict and fear of COVID-19. Therefore, it is important for workplaces to provide support and assistance to their employees during crises such as the COVID-19 pandemic, particularly during lockdowns. Prevention programs should

also be implemented to decrease stress and anxiety levels among employees. Based on our results, it is clear that work–family conflict can have a significant impact on employees' mental health and their ability to cope with the fear of COVID-19. Therefore, it is crucial for employers to recognize the importance of work–life balance and implement measures that help employees balance their work and personal lives.

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Conflicts of interest

Nothing to declare.

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Original Article

"Growth under pressure": The Experience of COVID-19 ICU Nurses - A Qualitative Study

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Abstract

Background: As an epidemic, COVID-19 has brought a new shock to the world's healthcare system. The crisis caused by this disease and the prolonged involvement of communities and healthcare systems have intensified the duties and psychological burden of nurses. The current study aimed to explain the experience of ICU nurses during the COVID-19 crisis. **Materials and Methods:** The present study was conducted using conventional content analysis in 2021. Twenty nurses of the COVID-19 ICU of Ahvaz hospitals were selected by purposive sampling. The main method of data collection was semistructured interview. The process of data analysis was done based on Granheim and Lundman's approach using MAXQDA-2020. For the scientific rigor of the findings, Guba and Lincoln's four criteria were abided by. The COREQ (Consolidated Criteria for Reporting Qualitative Research) checklist was used to ensure the study met the recommended standards of qualitative data reporting. **Results:** After data analysis, 22 subcategories, eight categories, and one theme (growth under pressure) were extracted. The eight main categories included (psychological crisis, physical exhaustion, family conflicts, complex care, professional development, expertise, life enrichment, and full support). **Conclusions:** Despite the pressures that ICU nurses faced during the COVID-19 pandemic, they were able to grow by benefiting from positive experiences. These findings can lead to the development and implementation of effective interventions to improve adaptation strategies of nurses, especially those working in the intensive care unit, during the COVID-19 and other future crises.

Keywords: *COVID-19, growth, ICU, nurses, pressure*

Introduction

As an epidemic, COVID-19 brought a new shock to the world's healthcare systems, and Iran is no exception.[1] Many nurses were involved in providing services at the bedside of COVID-19 patients, and the nursing profession needs to be aware of what ICU nurses went through while doing clinical work and caring for the COVID-19 patients amid the COVID-19 pandemic.[2] There is a data gap as regards the experiences of ICU nurses in providing care during the pandemic. There were numerous challenges due to the COVID-19 pandemic that nurses in intensive care units faced and might be facing in the future.[3] For a society to have an efficient health system, the treatment teams' concerns and demands should be well understood, and supporting strategies should be formulated to reduce their physical and mental stress.[4]

Meneguin *et al*.[5] investigated the burnout and quality of life of nursing personnel during the COVID-19 period. They found that nurses experienced high burnout and reduced quality of life, especially in relation to their physical activities. Peng *et al*.[6] adopted a phenomenological approach to study the psychological experiences of nurses taking care of COVID-19 patients. They identified four main themes regarding the psychological state of nurses, namely, negative emotions in the early stages, self-control styles, growth under stress, and positive emotions along with negative emotions. According to Levi *et al*., COVID-19 created multifaceted physical, psychological, and professional conflicts for the medical staff, especially the nurses.[7] Kim *et al*.[8] studied the nurses' experience of caring for patients with MERS syndrome (a type of coronavirus) in South Korea. They showed that these nurses feel as if they are thrown into the danger zone and experience immense pressure due to the virus.

The experiences of nursing staff, who took care of COVID-19 patients, are of particular importance for designing action plans.[9]

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However, limited research has so far been conducted to explore the experiences of COVID-19 ICU nurses in Ahvaz, Iran. Moreover, the experiences of nurses in each cultural context could be different. It is important to note that ICU COVID-19 nurses have the most contact with COVID-19 patients and have richer experiences. In this regard, experience-based research, such as qualitative research, is the most appropriate approach to examining the experience of ICU nurses during the COVID-19 epidemic. A rich understanding of these experiences can be beneficial to improve the working conditions of nurses, ensure better crisis management, and ultimately improve the quality of patient care.

The present study is the first phase of a larger study explaining the adaptation process of ICU nurses to the COVID-19 crisis with a grounded theory approach. The grounded theory approach is a qualitative research methodology that attempts to unravel the meanings of people's interactions, social actions, and experiences. The adaptation process of ICU nurses to the COVID-19 crisis has been variable, relative, dynamic, and contextual. Adaptation is an abstract concept and is formed in an interactive process; therefore, the grounded theory is a proper research approach to investigate the adaptation process of ICU nurses to the COVID-19 crisis. The current study aimed to explain the experience of ICU nurses in caring for patients with COVID-19. In fact, the results of this study can serve as the basis for discovering the adaptation process of ICU nurses to the COVID-19 crisis.

Materials and Methods

This study is extracted from a Ph.D. dissertation on nursing titled: "Explaining the adaptation process of ICU nurses to the COVID-19 crisis" which was conducted using grounded theory. The current study was conducted using conventional content analysis during 2021–2022. Twenty nurses were selected by purposeful sampling method from among the nurses of the ICUs of university hospitals affiliated with Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Inclusion criteria were: having at least one year of useful work experience in the COVID-19 ICU, having at least a bachelor's degree in nursing, and willingness to participate in the study and share experiences. The maximum variation sampling technique was used to capture various backgrounds and work experiences as well as differences in age, gender, and educational attainment. Sampling continued until data saturation.

The main method of data collection was semistructured interview, and the length of the interviews was 20 to 40 minutes. First, a phone call was made to the nurses to explain the objectives of the study, and then, the time and place of the interviews were arranged at their convenience. Seventeen nurses were interviewed once; three nurses were interviewed twice. The reason why some of the interviewees were interviewed more than once was because after analyzing the interview transcripts of some of the participants, we realized that the obtained data were inadequate, and in some cases, were not completely clear to us. Therefore, since each of these cases of ambiguity could have a profound contribution to our results and since we had access to all participants, we reinterviewed some of the nurses.

The interviews were conducted in the office of the head of the intensive care unit, which was a quiet room. Of course, the head of the ICU was not present at the time of the interviews. The interviews were conducted by the first author (VS), who is a Ph.D. student in nursing. He had already passed advanced courses on qualitative research methods in his Ph.D. program and had conducted several interviews in partial fulfillment of those courses. In addition, he conducted the first interview in this study under the supervision of his supervisor (i.e. the corresponding author of the present study). After his qualification to conduct qualitative interviews was verified by the supervisor, he proceeded to perform the subsequent interviews.

The interview questions focused on the nurses' work experiences during the COVID-19 crisis. First, they were asked a general question: e.g., "Please tell me about the ICU nursing experience during the COVID-19." The interview was then guided based on the answers of the participants. To elicit more information and clarify the nurses' answers, exploratory and follow-up questions were also asked, and answers to these questions led to the formation of further questions. During the interviews, the participants were asked to cite specific examples to describe the issue raised. All interviews were digitally recorded and immediately transcribed verbatim. To immerse in the data, the researcher listened to the interviewees several times and reviewed their transcription repeatedly. Data collection continued until no new data were added to the existing data (i.e. data saturation was reached). It is important to note that no new data were obtained in the last three interviews.

The data were analyzed using conventional content analysis following the five steps of Granheim and Lundman.[10] In the first step, the interviews were recorded and immediately transcribed verbatim, and the transcription was used as the primary data of the research. In the second step, the audio file was listened to several times, the transcriptions were reviewed repeatedly, and decisions were made to divide the text into meaning units. The words, sentences, and paragraphs of the participants' statements that contained important points related to the research topic were considered as meaning units. Notes were written in the margins of the text along with coding. In initial coding, the participants' own words and the researcher's impressions of their statements were used. The third step involved the abstracting of semantic units and the selection of codes. According to the experiences of the participants, manifest and latent contents were extracted from the sentences or paragraphs based on their words and denoting codes, and then coding and summarization

were done. In the fourth step, based on the continuous comparison of similarities, differences, and relevance, the codes that indicated a single topic were placed in one category, and in this way, subcategories, categories, and codes were formed. Cases of ambiguity that needed further attention were resolved by referring to the participants and checking them in subsequent interviews to make sure that they were resolved, and the position of the codes in each category was fully determined. In the fifth step, at the interpretation level, the categories were summarized and the central concept of each category was identified. Then, the central and abstract concepts were extracted. The concepts were determined based on the description of the internal themes in the text, and these internal themes were reviewed according to the entire data.[10] Interviews continued until the main categories were identified and data saturation was reached. In all steps, an attempt was made to mitigate the potentially deleterious effects of the researchers' preconceptions that might have tainted the process of data analysis. Data analysis was done using MAXQDA version 2020. We used Guba and Lincoln's criteria (including credibility, transferability, conformability, and dependability) to guarantee trustworthiness and rigor.[11] The credibility of the data was increased by using a maximum variation sampling technique to capture various backgrounds and work experiences as well as differences in age, gender, and educational attainment. Credibility promotion methods (member check and peer check) were used to resolve any ambiguity in the codes. As far as member check was concerned, parts of the interviews and codes were returned to the participants to check for accuracy and resonance of their experiences. With regard to peer check, two faculty members were asked to compare the level of similarity between the extracted categories and the experiences of the participants. Conformability was ensured by regularly collecting data (audit trial), accurately recording and writing the steps and process of the research, observing impartiality, and obtaining the agreement of ICU nurses on the interviews, codes, and classification of similar codes and categories (comparing what the researcher perceived with what the participants meant). Dependability was confirmed by immediately transcribing the interviews, seeking the opinions of three colleagues who are experts in qualitative research (external check), and re-reading the entire data. Finally, by interviewing participants with maximum diversity and providing direct quotes and examples, transferability was confirmed. The COREQ (Consolidated Criteria for Reporting Qualitative Research) checklist was used to ensure the study met the recommended standards of qualitative data reporting.

Ethical considerations

The study was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences (Ref. ID: IR.AJUMS.REC.1400.266). Written informed consent was obtained from the participants. The participants were assured that participation in the study was voluntary, the interviews would be recorded anonymously, their information would remain confidential, they could withdraw from the study at any stage, and that they have the right to be aware of the general results of the study and receive the audio file of their interview. They were also notified that they may be referred to again to complete the discussions just in case. The study accepted and followed the ethical standards outlined in the Declaration of Helsinki.

Results

In this study, 20 participants (14 women and 6 men) aged between 27 and 45 years were interviewed. The mean age of the participants was 32.3 years. In terms of marital status, nine were married and 11 were single. Seventeen had a bachelor's degree in nursing, while the other three had a master's degree. The range of work experience in the ICU was between 1 and 13 years (mean: 4.7). Table 1 shows the participant characteristics. Table 2 present the codes, subcategories, categories, and themes extracted from the experience of ICU nurses during the COVID-19 pandemic. After data analysis, 94 codes, 22 subcategories, eight categories (psychological crisis, physical exhaustion, family conflicts, complex care, professional development, expertise, life enrichment, and full support), and one theme (Growth under pressure) were extracted.

Category 1. Psychological crisis: According to the experiences of the participants in this study, the ICU environment is stressful, and the nature of the COVID-19 disease was described as very terrible. In fact, ICU nurses experienced many psychological crises during the period of COVID-19. This category included two subcategories, namely, "Negative emotions" and "Psychological disturbance." To exemplify these experiences, quotes from the participants are given below. It should be noted that after each quote, the participant's profile is written according to the following pattern (Number: Age. Sex. ICU work experience).

1-1. **Negative emotions:** ICU nurses who dealt with or were exposed to patients with COVID-19 may have experienced symptoms of anxiety, depression, and suicidal thoughts. Anxiety and stress can have negative effects on patient care as well as nurses' mental health. The nurses stated various reasons for their anxiety, including stressful environment, fear of being infected, and being stressed about an unfortunate situation. *"It was very difficult for us to manage the patient; we were highly stressed, so was the patient who came there. We had difficulty having contact with the patient. We were worried for our health and our family's."* (P8: 31y.F.5y)

2-1. **Psychological disturbance:** ICU nurses were very exposed to mental pressure caused by the COVID-19, and due to more frequent and longer contact with COVID-19 patients, they were likely to suffer from psychological problems and lasting symptoms more often

Table 1: Participant Characteristics

Participant number	Gender	Age (year)	Marital status	Nurse/head nurse	Degree	ICU Work experience (year)	Interview duration (min)
1	Female	28	Married	nurse	Bachelor	1	55**
2	Female	29	Married	Nurse	Bachelor	3	40
3	Female	37	Married	Head nurse	Master	11	38
4	Female	32	Single	Nurse	Bachelor	5	40
5	Female	24	Single	Nurse	Master	2	40
6	Female	37	Married	Head Nurse	Bachelor	11	35
7	Female	32	Single	Nurse	Bachelor	5	40
8	Female	31	Married	Nurse	Bachelor	5	60**
9	Male	28	Single	Nurse	Bachelor	3	40
10	Female	27	Single	Nurse	Bachelor	3	28
11	Male	36	Single	Nurse	Bachelor	4	32
12	Female	30	Single	Nurse	Bachelor	2	30
13	Female	45	Married	Head nurse	Bachelor	13	60**
14	Female	32	Married	Nurse	Master	5	30
15	Male	35	Single	Nurse	Bachelor	5	30
16	Female	37	Married	Head nurse	Bachelor	11	35
17	Male	28	Married	Nurse	Bachelor	2	27
18	Male	28	Single	Nurse	Bachelor	3	28
19	Male	28	Single	Nurse	Bachelor	3	20
20	Female	29	Single	Nurse	Bachelor	3	31

**Interviews were conducted twice

Table 2: Subcategories, categories, and theme

Subcategories	Categories	Theme
Negative emotions	Psychological crisis	Growth under pressure
Psychological disturbance		
Progressive physical breakdown	Physical exhaustion	
Physical injury caused by personal protective equipment		
Disruption in daily family life	Family conflicts	
Family tension		
Equipment challenge	Complex care	
Human forces challenge		
Inefficient organizational management		
pandemic confusion		
Excessive workload		
professional growth	Professional development	
professional relationship growth		
Strengthening the nursing status and identity		
Gradual adaptation	Expertise	
Cultivating creativity and learning		
Personal growth	Life enrichment	
Change in lifestyle		
Positive emotions		
Sense of gratitude	Full support	
Support umbrella		
Management support		

than other healthcare workers. *"Sometimes, I used to cry all along the road from here to Ramhormuz; I couldn't help it; one by one the patients came to my mind."* (P4:32y.F.5y).

Category 2. Physical exhaustion: The ICU nurses participating in this study stated that they suffered from physical exhaustion during the COVID-19 pandemic and were physically depleted. ICU nurses experienced extensive physical complications that disrupted their daily lives. This category included two subcategories, namely, "Progressive physical breakdown" and " Physical damage caused by personal protective equipment."

1-2. **Progressive physical breakdown:** The participants stated that working during the COVID-19 crisis brought them many physical problems, which became more severe with the passage of time. *"At times, my sleep and appetite were disturbed. For example, if a patient to whom I was very close expired, I would be sleepless for a day or two, and my whole body would break down."* (P10:27y.F.3y).

2-2. **Physical damage caused by personal protective equipment:** The participants in this study stated that most of the time they went through heavy and long shifts due to the lack of manpower and the large number of patients, and due to the continuous and prolonged use of personal protective equipment, they suffered numerous physical injuries. *"Masks, shields and other clothes were worn for hours. After the shift, we would notice that there was sore rash where the mask had contact with the skin"* (P1:28y.F.1y).

Category 3. Family conflicts: Being away from their family due to the fear of transmission of infection was among the main challenging experiences of the nurses participating in this study. Family members' opposition to the presence of nurses in the hospital environment

at the beginning of the disease outbreak and increasing conflicts with family members were other experiences of nurses. This category included two subcategories, namely, "Disruption in daily family life" and "Family tension."

1-3. **Disruption in daily family life:** ICU nurses in this study stated that the restrictions that the COVID-19 crisis created for them disrupted their daily lives with their families. *"At first, I tried not to go home very often because everyone was afraid of me. One or two months later when I went home, my father would seat two or three meters away from me."* (P17:28y.M.2y).

2-3. **Family tensions:** The participants in this study stated that during the COVID-19 crisis, their family tensions escalated, which created many challenges for them. One of their major challenges was family pressure to quit their jobs. *"I called my brother and told him that I wanted to go to the Covid-19 ward. He was very upset and argued with me and said: 'you have no right to go there! Come here to our city to work for me!' I told him: 'I would go, just don't tell mom'"* (P20:29y.F.3y).

Category 4. **Complex care:** The main obstacle that ICU nurses faced during the COVID-19 crisis was the complex, unknown, unpredictable, and stressful working conditions. The lack of equipment and manpower made it difficult for them to take care of patients. This category included five subcategories, namely, "Equipment challenge," "Human force challenge," "Inefficient organizational management," " Pandemic confusion," and "Excessive workload."

1-4. **Equipment challenge:** ICU nurses stated that during the COVID-19 crisis, they faced a severe shortage of equipment and tools needed for the safe care of patients. In addition, they stated that the protective clothing provided for them did not meet the required standards. *"Our supplies and equipment were limited. We were short of protective equipment; the masks they gave us were not standard."* (P6:37y.F.11y)

2-4. **Human force challenge:** According to the participants, the challenges related to human resources that they were dealing with included: lack of specialized and trained personnel, inefficiency of human resources, and attempts of nurses to quit their jobs. *"We were only two nurses and one anesthesia technician, and there were 12 patients. How is it possible for three people to set up Ambu bags for 12 patients?"* (P12:30y.F.2y).

3-4. **Inefficient organizational management:** One of the important factors that the ICU nurses stated was the poor management at different levels during the COVID-19 crisis, which caused them to be demotivated and frustrated, and ultimately led to a negative impact on their performance and quality of work. *"Unfortunately, the hospital manager was more interested in trivial matters and showing off than in solving problems"* (P11:36y.M.4y).

3-4. **pandemic confusion:** ICU nurses stated that due to the sudden spread of the disease, inadequate knowledge about COVID-19 and its complexity, and lack of knowledge about how to care for COVID-19 patients, they were confused and ultimately helpless. *"I couldn't figure out at all that a disease could be so dangerous and threaten people's lives so much. It was not known at all how it was transmitted. It was a very unknown disease"* (P9:28y.M.3y).

4-4. **Excessive workload:** The participants stated that during the COVID-19 crisis, ICU nurses were faced with a high workload due to the double work pressure, high patient mortality rate, psychological pressure caused by the patient's companions, and the unsuitable physical conditions of the work environment. They stated that these conditions were unbearable for them and affected their performance. *"One of our patients was a female teacher who was very sick. We did CPR three times until the morning, but she expired at 4:00 a.m. I was under a lot of pressure."* (P16:37y.F.11y).

Category 5. **Professional development:** Despite all the hardships faced by nurses during the course of COVID-19, this crisis made the nursing community more cohesive and united. Also, the nursing profession was more highlighted in this period, the status of nurses was improved, and finally, their professional development was established. This category included three subcategories, namely, "Professional growth," " Professional relationship growth," and" Strengthening the nursing status and identity."

0.1-5. **Professional growth:** One of the important factors that led to the better and more frequent adaptation of ICU nurses to the COVID-19 crisis was professional growth. Professional growth took place, thanks to cooperation and integration, mutual support, interest in work, and continuous training. *"When one of the colleagues couldn't come to work, for example, we would say that the patient is not only hers; the patient is ours. I mean the crisis made us be more cooperative"* (p14:32y.F.5y).

2-5. **Professional relationship growth:** Effective communication is a prerequisite for success in any profession. Proper communication in the COVID-19 crisis was doubly important for reasons such as the unknown nature of the disease, the use of multiple personal protective equipment, the morbidity and mortality of the disease, and the lack of manpower and equipment. This communication was not limited only to nurses but included all the treatment staff, and it even involved patients and their relatives. *"One of the ways is communication with the patient. I even used to play songs for the patients. I established a very good relationship with the patients"* (p18:28y. M.3y).

3-5. **Strengthening the nursing status and identity:** One of the significant changes that was made to the nursing community during the COVID-19 crisis was the strengthening of the nursing profession, position, and

identity. This positive event alleviated the hardships and the overwhelming problems of the COVID-19 crisis. Despite all the challenges it created for nurses, the COVID-19 crisis managed to bring the nursing community closer to its original and praiseworthy position. *"I was very happy that the social capacity and status of nursing was enhanced and made nurses more visible"* (P13:45y.F.13y).

Category 6. **Expertise:** The participants stated that despite the hardships of the COVID-19 crisis period, they were able to achieve an acceptable level of expertise and skill in managing such crises. The reasons given by the ICU nurses for this issue included practicing to tolerate hardships, experiencing teamwork, increasing awareness and skills, strengthening the sense of creativity, and learning new issues. This category included two subcategories, namely, "Gradual adaptation" and "Cultivating creativity and learning."

1-6. **Gradual adaptation:** ICU nurses were under a considerable amount of stress at the outset of the outbreak of COVID-19, and it was difficult for them to cope with the existing critical conditions. However, gradually over time, a gradual adaptation was developed in them. The reasons that led to the gradual adaptation of ICU nurses included familiarity with the disease and its treatment process, gaining experience and skills, and learning new problems. *"As days passed, I got more used to the ward, and about a week to ten days later, I was getting adapted. Gradually, it became normal, and I was acclimated"* (P4:32y.F.5y).

2-6. **Cultivating creativity and learning:** In spite of the challenges the ICU nurses were experiencing during the pandemic, the outbreak of COVID-19 and the difficulties associated with it brought them awareness, creativity, skills, and valuable experiences. Over time, these nurses became more knowledgeable about the care of COVID-19 and their creativity blossomed. *"Little by little, our awareness increased, our patients became more and more involved, and we had to deal with it like a normal disease, and we learned a lot and were able to manage* it" (P2:29y.F.3y).

Category 7. **Life enrichment:** Because the COVID-19 crisis affected all aspects of people's personal lives, both physically and psychosocially, ICU nurses tried to enrich their lives by using value-laden behaviors. They tried to cope with the new conditions by not only strengthening their individual capacities and strengths but also making fundamental changes in their daily lives.

1-7. **Personal growth:** Individual growth of ICU nurses took place, thanks to their high commitment, personal interest in work, conscientiousness, resistance, self-sacrifice, self-confidence, courage, and hope. If it were not for their sacrifice and dedication, it would have been impossible to overcome the critical conditions of COVID-19. Another strength of the nurses was their courage and self-confidence, which ultimately led to their perseverance and hope. *"I am a responsible person. I have never left in the middle of a shift. Even though I was under a lot of pressure, the shifts were heavy, or I was treated badly, I never left."* (P19:28y.M.3y).

2-7. **Change in lifestyle:** The onset of COVID-19 brought about many changes in the working conditions and personal lives of ICU nurses. To cope with these changes, nurses had to make changes in their lifestyles. These changes included listening to music, changing the environment, doing physical activity, using supplements, studying, having short-term rests, and resorting to traditional medicine. This lifestyle change as a strategy helped the nurses to adapt to the critical situation and continue to provide their services. *"During the Covid-19 days, I used to take supplements and do exercise occasionally. I tried to change the songs I used to listen to; I started listening to happy music and stopped listening to sad songs."* (P15:35y.M.5y).

3-7. **Positive emotions:** Despite the presence of negative emotions, ICU nurses also experienced positive emotions. The participants stated that their positive emotions during this period included observing ethical considerations, philanthropic feelings, and sympathy for patients. "*We are doing many things, none of which are in my job description. Everything you do has a moral value such as caring for humanity and sympathy for patients*" (P15:35y. M.5y).

Category 8. **Full support:** Following the nurses' encounter with the COVID-19 crisis, they tried to optimally use all support resources at their disposal to cope with the situation. The comprehensive support perceived by nurses from various sources made smoother and more bearable the winding and difficult road of fighting the COVID-19 crisis. Certainly, benefiting from multiple support sources created a positive synergy and was a helping hand for ICU nurses amid this arduous path. This category included three subcategories, namely "Sense of gratitude,"" Support umbrella" and "Management support."

1-8. **Sense of gratitude:** The COVID-19 crisis had created difficult and exhausting conditions for ICU nurses, but receiving a sense of gratitude from patients and their companions served as a soothing and comforting factor. The fact that the ICU nurses understood that their continuous efforts were seen and appreciated by the patients and their companions doubled their energy and ability to continue. *"There was a patient's relative whose mother had passed away, but the next week she came with a bouquet of flowers to thank me. This was really strange and beautiful. She said: 'I saw how hard you worked, and I'm grateful to you'."* (P1:28y.F.1y).

2-8. **Support umbrella:** Support sources for ICU nurses included private, government, and even military companies, family, society, and the media. Extensive support from various sides acted as a protective umbrella for nurses and made the continuation of the fight against COVID-19 smoother for them. *"Some companies outside the hospital,*

such as the steel and pipe company, supported us. This had a great impact on our spirits." (P7:32y.F.5y).

3-8. **Management support:** According to the participants, benefiting from management support helped the ICU nurses in their difficult and laborious path of fighting COVID-19. The feeling of receiving management support at different levels assisted the nurses in adapting to the critical situation and continue to provide services. *"The head nurses' support was good at times of crises. They often worked alongside other nurses. It's very good when you see your supervisor is working with you. It gives you a good morale."* (P3:37y.F.11y).

Theme: Growth under pressure

In this study, ICU nurses experienced multiple pressures following the onset of COVID-19, including psychological crisis, physical exhaustion, family tension, and complex caregiving. However, they had positive experiences such as professional development, expertise, life enrichment, and full support. This showed that ICU nurses were able to achieve personal and professional growth despite enduring many pressures.

Discussion

The aim of the current study was to explain the experience of ICU nurses during the COVID-19 crisis. From the data analysis, eight categories, including "psychological crisis," "physical exhaustion," "family conflicts," "complex care," "professional development," "expertise," "life enrichment" and "full support," were achieved. The theme of "Growth under pressure" was obtained as the main theme of the present study. In the following, these findings are discussed in more detail and in separate sections.

In Ariapooran *et al*.'s[12] study, it was found that the prevalence of secondary traumatic stress (STS) during the outbreak of COVID-19 in nurses was 51.11%. The average STS in ICU/CCU nurses was higher than that of nurses in other departments. Another study reported suicide attempts among nurses during the COVID-19 period.[13] Pasay-An *et al*. found that nurses were rejected by the community during the COVID-19 pandemic and were isolated in one way or another.[14] In Nelson *et al*.,[15] it was found that COVID-19 had long-lasting negative effects on the mental health of nurses. In line with these studies, the results of the present study confirmed psychological crises, including stress and anxiety, depression, aggression, isolation and negative thoughts during the outbreak of COVID-19. This highlights the role of psychiatric nurses in identifying the problem and providing counseling and supportive care services for the nurses involved in departments related to COVID-19.

Sikaras *et al*.[16] found that nurses, who took care of COVID-19 patients, experienced more fatigue and burnout than their colleagues who worked in other departments. According to Moradi *et al*.,[17] long-term care of COVID-19 patients led to physical complications such as physical fatigue, spots, dermopathy, and hormonal disorders in ICU nurses. In Gordon *et al*.,[18] ICU nurses mentioned headache and shortness of breath as unpleasant consequences of caring for COVID-19 patients. Nurses, who provide care for these patients, experience high levels of fatigue and burnout. Therefore, there is an urgent need to address this problem by both taking organizational measures such as managing the promotion of staffing and implementing supportive interventions.

According to Nilsson *et al*.,[19] the most stressful factor with regard to the work in the COVID-19 ICU was that it was such a grueling experience that nurses did not have the energy to devote themselves to their families as they wanted. Çelik *et al*.[20] reported that nurses suffer from the collapse of family relationships and the inability to maintain balance within their family. Such family conflicts were also evident in the present study due to the limited family visits and their pressure to leave work. The work–family balance for nurses dealing directly with COVID-19 patients changed during the pandemic. Reducing the rate of these conflicts, providing family and organizational support, and teaching nurses how to deal with crises are effective measures in this respect.

In Sampe *et al*.,[21] nurses complained about the lack of equipment, such as N95 masks, gloves, etc., Deldar *et al*.[22] reported that nursing managers, who had experience of caring for COVID-19 patients, mentioned the "lack of experienced and reliable staff" as one of their most important challenges. To reduce the workload on their staff during the pandemic, nursing managers were forced to use nurses from other departments or hospitals who volunteered to join the COVID-19 wards. However, the new personnel had little, if any, knowledge and experience working with monitoring devices or ventilators. In Pazokian *et al*.,[23] the nurses stated that the workload in the COVID-19 ward is really heavy and exhausting. Yosefi *et al*.[24] estimated that the average workload and its dimensions among nurses working in the COVID-19 ward were at a high level. In the current study, the reasons for the heavy workload of ICU nurses during the COVID-19 crisis included stressful work environment, hectic work schedule, negative and bad news, high expectations, lack of rest time, mismatch between the number of nurses and patients, and overcrowding of the ward. Nursing managers should carry out the necessary interventions, especially with regard to increasing the number of nurses, training specialist nurses, establishing a proportionate ratio of nurses to patients, providing equipment, and preparing for crises.

Moradi *et al*.[17] reported that insufficient support, lack of personnel incentives, and lack of financial support by the hospital explain the weak organizational support for ICU nurses. In Guttormson *et al*.,[25] ICU nurses perceived the

insufficient leadership support and inequality in the healthcare team, which is consistent with the results of the present study. Continuing education about disaster management, ethical decision making, and effective leadership in daily practices help nurse managers develop the necessary skills to better direct their teams in times of crisis. In a crisis like COVID-19, nursing managers at all managerial levels must be involved in the decisions made in health institutions. In Podgorica *et al*.,[26] the nurses pointed out the following factors: limited information about the COVID-19 virus, inadequate preparation for the COVID-19 tsunami, lack of practical skills in caring for COVID-19 patients, etc., which is in line with the results of the present study. Therefore, it is necessary to hold regular theoretical and practical courses on the knowledge and the necessary risks needed to deal with large-scale health emergencies such as COVID-19.

The ICU nurses interviewed in the current study mentioned the COVID-19 crisis as a positive factor contributing to their professional development. Most nurses reported that during the outbreak of COVID-19, their work and emotional relationships at work changed for the better, and they loved and helped each other more than they used to.[27] Training and informing nurses based on the latest findings about the COVID-19 epidemic was one of the effective strategies in Varaei *et al*.[28] Zamanzade *et al*.[29] acknowledged the increase in the social acceptance of nursing during the coronavirus epidemic. Lee *et al*.[30] found that the outbreak of COVID-19 has caused the development and empowerment of the sense of professional identity among nurses. In this regard, Sun *et al*.[31] also mentioned the development of professional responsibility and self-reflection. According to Kim *et al*.,[32] during the COVID-19 pandemic, nurses learned the meaning of nursing at work, recognized the professionalism of nursing, and were proud to be nurses. Although nurses have suffered hardships during the COVID-19 pandemic, this crisis can be an opportunity for their professional development and rebuilding their professional identity. In fact, this pandemic can provide a stronger voice for informing the nursing profession and influencing healthcare policies and future nursing practices.

Participants in Han *et al*.[33] reported that over time, as they adapted to the ICU environment and entered the treatment setting, their abilities improved significantly. In Mansour *et al*.,[34] the last theme emerging from their data was maturation during the crisis. Danielis *et al*.[35] found that in their attempts to cope with the challenging environment by filling knowledge gaps, the nurses fortified their efforts in self-directed learning by accessing online courses and reading scientific articles. Expertise is one of the important adaptation strategies of ICU nurses in the present study which empowered them in their job position. The reasons given by the ICU nurses for the adoption of this strategy included practicing how to tolerate hardships, experiencing teamwork, increasing awareness and skills, strengthening the sense of creativity, and learning new issues. Finally, the ICU nurses stated that all the bitter-and-sweet experiences of the COVID-19 crisis contributed to their expertise and skillfulness.

In Kackin *et al*.,[36] nurses who took care of COVID-19 patients resorted to exercise, gratitude, watching movies and TV series, cooking, painting, listening to music, reading books, feeding animals, and taking positive notes to cope with and better adapt to the COVID-19 pandemic. Ahmadidarrehsima *et al*.[37] stated that to reduce their stress, the participants in their study used strategies such as eliminating negative thoughts, going for a walk, reading books, relaxation techniques, and keeping trust in God. Several participants in Podgorica *et al*.'s[26] study used humor in their professional teams. In the current study, ICU nurses tried to effectively compromise with the COVID-19 crisis through personal development. Also, due to the special conditions that COVID-19 had created for their personal and career lives, the participants tried to adapt to the existing conditions by changing their lifestyles. Finally, by enriching their lives, they tried to cope with the difficult conditions of COVID-19 and continue providing services to patients.

In Bartzik *et al*.,[38] the studied nurses confirmed their sense of humor and the perceived appreciation of the community, and they regarded patients as a buffer of negative effects related to the epidemic. In Gordon *et al*.,[18] ICU nurses who cared for patients with COVID-19 stated that they used short-term coping strategies including peer support and family support. Varaei *et al*.[28] reported that financial encouragement of nurses against hard work over time was one of the supportive actions of nursing managers. In the present study, ICU nurses sought to cope with the situation by taking advantage of multiple sources of support. These supports included support from organizations and companies, society, family, media, and incentive packages. In fact, one of the main reasons for nurses to stay in the COVID-19 ward was this multilateral support.

The main theme of this study was "Growth under pressure." In Kim's study, over time, participants felt they were growing as they became familiar with the tasks involved in caring for COVID-19 patients.[32] Emergency nurses in Jiang's study during the COVID-19 crisis experienced three periods of stress, adaptation, and growth, respectively.[39] In Nayon Lee's study, nurses ultimately grew by discovering the value and meaning of their work while receiving social support from the community.[30] This issue is very similar to posttraumatic growth. The positive growth and transformation that results from experiencing difficult and painful human conditions. In fact, it can be said that ICU nurses grew after fighting the frontline battle against an infectious disease epidemic.

Conclusion

In the present study, a clear and comprehensive picture of the experience of ICU nurses during the COVID-19 pandemic crisis was depicted. Despite the pressures ICU

nurses faced during the COVID-19 pandemic, they were able to grow by benefiting from positive experiences. The information obtained from the findings of this study may help nurses to effectively cope with the challenges posed by COVID-19 and else emerging crises. These findings can help to develop and implement effective interventions to improve the coping strategies of nurses, especially those working in the intensive care unit during the COVID-19 pandemic. Considering the important role of nurses in similar crises, the following measures seem to be necessary to reduce the mental and psychological workplace pressures in the nursing profession. These include primary nursing care training for emerging infectious diseases, making nurses satisfied with their profession, paying attention to the professional demands of nurses, popularizing a fair portrayal of the important role of the nursing profession in the cultural milieu of the society, and adopting special support policies. Such strategies will make future crises more controllable and manageable for the nursing community, especially ICU nurses, to deal with.

Although the critical phase of COVID-19 is over, there is still the disease of COVID-19. In fact, the end of the crisis is a good opportunity to conduct more extensive qualitative research to discover the rich and new experiences of nurses involved in this epidemic. Although qualitative studies are not often intended to generalize the results, it is recommended that similar studies be conducted in other areas to make the results more generalizable. In addition, to identify current and future challenges and adopt appropriate coping strategies, longitudinal studies with long-term engagement with participants can provide more valuable results. However, our study was conducted within a limited period of time.

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Conflicts of interest

Nothing to declare.

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Identifies Current Trends in Vaginal Birth after Cesarean Section in IRAN: A Qualitative Study

Abstract

Background: The growing prevalence of Cesarean Sections (CS), particularly repeated CS, is a major issue in contemporary midwifery. This study seeks to gain a comprehensive understanding of the experiences of pregnant women and specialists with vaginal delivery after CS, as well as the obstacles that may arise. **Materials and Methods:** From March 2020 to May 2021, 10 women, 12 midwives, and 8 obstetricians and obstetricians affiliated with Qom University of Medical Sciences were interviewed to investigate the experiences and challenges associated with Vaginal Birth After Cesarean section (VBAC). We used the content analysis method, and the sampling was purposive. Semi-structured interviews were conducted to collect data, which were then analyzed using qualitative content analysis based on conventional content analysis. **Results:** The results show that subcategories "individual aspects of VBAC" and "family-social aspects of VBAC" formed "positive aspects of VBAC." Subcategories "self-efficacy" and "decision-making participation" formed the "empowerment for the woman." Subcategories "technical team challenges" and "woman's challenges" formed the main category of "upcoming challenges." **Conclusions:** Positive relationships, choice-making ability, and self-confidence impact a woman's decision to choose VBAC. Informing women of alternative delivery options after a CS and pursuing their dreams increases the likelihood of successful VBAC.

Keywords: *Challenges, content analysis, vaginal birth after cesarean, women's experiences*

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Introduction

In recent years, there has been an increase in the rate of Cesarean Section (CS), which is now higher than the recommended threshold. However, there is little evidence to support the benefits of CS for both mother and child, and it has been linked to negative consequences.[1]

A study of 230,870 women from across the country, conducted between 2019 and 2021, found that the rate of CS has risen from 16.7% in 1998 to 21.5% in 2023.[2] This trend is projected to continue, with CS rates expected to reach nearly one-third (29%) of all births by 2030.[3] In Iran, systematic reviews have shown that the prevalence of CS is as high as 48%.[4]

Recurrent CS is becoming more common in midwifery, with over half of all CS being repeat procedures.[5] This trend has been associated with negative outcomes for both mother and child, as well as a significant financial impact on the healthcare system.[6] To address these issues, Vaginal Birth after Cesarean section (VBAC) has been proposed as an alternative to recurrent CS.[7] In many communities, VBAC has gained popularity as a means of reducing the risks associated with repeated CS.[8]

However, more research is needed to fully support the use of VBAC. This research should focus on the experiences of specialists and pregnant women, as well as evidence-based information on both risks and benefits. It should also take into account the varying outcomes associated with different maternity centers and countries.[9]

In 2016, the Ministry of Health, Treatment, and Medical Education in Iran released clinical guidelines for VBAC, in line with international standards.[10] Despite the high rates of CS in Iran, the rate of VBAC in 2018 was reported as less than 1%.[11] This rate is significantly lower compared to countries like Ireland, Germany, Netherlands, Sweden, and

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Finland, where VBAC rates range from 29% to 55%.[12] In Iran, the average rate of CS was 53%.[13] Repeat CS accounts for up to one-third of the factors increasing the rate of CS.[14] National medical associations are attempting to modify CS rates by the replacement of VBAC.[15] The aim of this research is to explore a thorough understanding of women's and obstetrician's experiences with VBAC and the challenges that come with it.

Materials and Methods

This study aimed to explore the experiences of women and obstetricians regarding VBAC and the challenges they faced during 2020-2021. The study used conventional qualitative content analysis and included 30 participants who were fluent in Persian and willing to participate. The participants consisted of 10 mothers who had undergone CS, 12 midwives, and 8 obstetricians. The study continued until data saturation, and all participants provided written consent before the interview. The data was collected through in-depth, semi-structured individual interviews that were conducted face-to-face and lasted for 30-60 min per interview. The interviews were held in quiet places in hospitals and health centers. Each interview started with the question "Tell me about your experience with VBAC?" and followed up with questions aimed at identifying the challenges and problems faced by VBAC mothers. For midwives and obstetricians, questions focused on why the rate of VBAC is low and what the challenges and issues faced by obstetricians with VBAC are, as well as why obstetricians avoid performing VBAC procedures.

The participants' responses were used to form exploratory questions such as "Can you elaborate on this?" and "What did you mean by that?" The data collected was analyzed using the qualitative method of conventional content analysis and managed with MaxQDA 10 software. To analyze the qualitative data, the method of qualitative content analysis of the conventional content analysis type by Lundman and Graneheim method was used.[16] The first step in conventional content analysis is to determine the unit of analysis in the study, which was done by researcher, Z Kh, as follows.

Lundman and Graneheim proposed a series of steps for analyzing interview data. First, the entire interview should be transcribed immediately after conducting it. Next, the entire text should be read to gain a general understanding of its content. After that, meaning units and primary codes should be determined. Similar primary codes should be categorized into more comprehensive categories, and a main theme should be determined.

To study the interviews, the researcher reviewed them several times and wrote them down on paper. By immersing themselves in the data, they gained a general sense of the text of the interviews. Then, they identified the relationship between the codes and extracted them. The codes were reviewed and entered into the categorization process.

As the analysis process progressed, the titles of the codes were identified directly from within the text. Finally, the themes were categorized into different categories based on similarities and differences. These themes were used to explain the main themes of the interviews.[16]

To achieve the study's trustworthiness, the criteria presented by Guba and Lincoln, namely, credibility, dependability, conformability, authenticity, and transferability, were considered and applied.[17]

The researcher actively collected and analyzed data, seeking assistance from external supervisors with research experience to ensure the credibility, authenticity, dependability, and conformability of the findings. Transferability was considered.

Ethical considerations

Before the interview, the researcher explained the purpose of the study to the participants and obtained their written consent. The participants were informed that their participation was voluntary and that they could withdraw at any time. The Qom University of Medical Sciences (IR.MUQ.REC.1398.126) supported this study, and no external funding was provided.

Results

Participants' characteristics are given in Table 1. Analysis of 30 interviews yielded 152 codes, 23 subcategories, 6 categories, and 3 main categories: "positive aspects of VBAC," "empowerment of women," and "upcoming challenges." These main categories had six subcategories [see Table 2]. Participants' characteristics are given in Table 1.

Positive aspects of Vaginal Birth After Cesarean section (VBAC)

These main categories were composed of two subcategories: individual aspects and family-social. Mothers consider vaginal birth to be a wonderful gift they can offer their children and themselves. CS is associated with more maternal and neonatal complications than vaginal birth. Mothers are in excellent physical and mental health following a vaginal birth. Additionally, VBAC provides the advantage of shorter recovery time for the mother, which is, in turn, beneficial for both the mother and the family.

Individual aspects of Vaginal Birth After Cesarean section (VBAC)

During participant interviews, "individual aspects" emerged as a subcategory with four sub-sub-categories: less maternal and neonatal complications, improved health, the spiritual

Table 1: Characteristics of the woman participants, obstetricians, and midwives

Age	Work experience (years) & Education	Job
30	High school diploma	Homemaker
25	Bachelor degree	Homemaker
31	High school diploma	Homemaker
38	Junior high school education	Homemaker
28	Bachelor degree	Homemaker
39	Post-diploma	Employee
29	Post-diploma	Employee
32	Bachelor degree	Employee
35	Junior high school education	Homemaker
35	Bachelor degree	Employee
39	15	Midwife
38	10	Midwife
30	6	Midwife
37	10	Midwife
45	20	Midwife
48	22	Midwife
30	6	Midwife
42	17	Midwife
30	6	Midwife
45	20	Midwife
36	15	Midwife
44	19	Midwife
35	5	Obstetrician
34	5	Obstetrician
38	8	Obstetrician
40	10	Obstetrician
45	15	Obstetrician
43	12	Obstetrician
40	10	Obstetrician
38	6	Obstetrician

significance of vaginal birth, and prioritizing motherhood emotions.

Less maternal and neonatal complications

Generally, it is indicated that VBAC constitutes a safe method of delivery and is considered necessary for pregnant women who have at least one CS.[18] Several participants emphasized that vaginal birth has far fewer complications than CS. *"I had less pain and bleeding with a vaginal birth after a CS, and my child was also in good health"* (Mother #5).

Optimal physical and spiritual aspects

Most of the participants recognized the physical and psychological advantages of VBAC. According to the mothers, VBAC is the preferred option for women without any medical reasons for CS. The spiritual benefits of vaginal birth were also acknowledged as one of its advantages. "*After my first birth, I was very annoyed. I couldn't even hold my baby. It was impossible to breastfeed him. CS has lots of complications*" (Mother #10).

By vaginal birth, I feel closer to God. I feel like I have shed my sins in pain and it's like I'm born again" (Mother #1 and #2).

Motherhood feeling

Mothers often believe that the pain they go through during labor provides them with an authentic and satisfying experience of motherhood. Furthermore, evidence suggests that VBAC can bring about emotional benefits, such as improved bonding, greater birth satisfaction, a sense of maternal empowerment, and overall emotional well-being.*"Childbirth is painful, and the pain is unbearable. However, this pain cannot be compared to the pleasure you will experience. "It's surely exhausting. But there are no words to describe how happy and satisfied you get once your child is born* " (Mother #4).

Family-social aspects

Sub-categories in this category include low-cost, faster recovery, faster family reunion, and a family dimension, all of which will be discussed in depth.

Lower cost

VBAC is economically beneficial for both the family and the community. *"A vaginal birth at this hospital is free, but a CS costs me a lot"(Mother #8)*.

Faster recovery, a quick return to the family

According to the professionals, vaginal birth leads to a quicker physical recovery, enabling women to resume their daily activities sooner. Furthermore, most of the participants concurred that opting for a VBAC could reduce the duration of hospital stay. *"The length of hospital stay is shorter in a vaginal birth, and getting back to daily activities happens much faster*" (Obstetrician #23).

"After a vaginal birth, I could return to my daily life and care for my baby very quickly" (Mother #6).

Ideal family size

Almost all mothers who have given birth agree that having an ideal family size is important. However, CS may lead to reduced fertility, which is becoming a growing concern since the rates of CS continue to rise. There is a possible adverse association between CS and subsequent fertility.[19] *"My sister had two children, and she was told by her doctor that having another child could be dangerous and complicated for her because she already had two CS. My husband and I both want a big family, so we decided to have a vaginal birth*" (Mother #9).

Empowerment for the woman

Clinicians reported that natural childbirth empowers women. This study identifies self-efficacy and decision-making participation as subcategories of empowerment.

Table 2: Sub subcategory divisions, subcategories, and main categories of study

Sub-sub-category	Subcategory	Main Category
1.1.1. Less maternal and neonatal complications	1.1. Individual aspects of VBAC*	1. Positive aspects of VBAC
1.1.2 Optimal physical and spiritual aspects		
1.1.3. Motherhood feeling		
1.2.1. Lower cost	1.2. Family-social aspects of VBAC	
1.2.2 Faster recovery, a quick return to the family		
1.2.3 Ideal family size		
2.1.1. Perceived ability	2.1. Self-efficacy	2. Empowerment of women
2.1.2. Risk-taking		
2.1.3. Social persuasion		
2.1.4. Active childbirth		
2.2.1. Common approach	2.2. Decision-making participation	
2.2.2. The right to choose		
2.2.3. Informed choice		
1.3.1. Lack of legal protections	3.1. Technical challenges	3. Upcoming challenges
1.3.2. Lack of adequate facilities and equipment		
1.3.3. It is stressful and time-consuming		
1.3.4. Inadequate payment		
2.3.1. Fear of complications	3.2. Women' challenges	
2.3.2. Fear of failure		
2.3.3. Insufficient information		
2.3.4. Inappropriate behavior		

*Vaginal Birth After Cesarean section

Self-efficacy

Participants also mentioned that perceived ability, risk-taking, cultural perspectives on VBAC, and active birth all played a role in their self-efficacy. Women's attitudes toward childbearing were also shaped by their level of self-confidence and belief in their ability to give birth. It was observed that all women who had a vaginal birth exhibited a sense of confidence and self-efficacy.

Perceived ability

Some mothers stated that after the CS that they experienced in their first birth. Now, according to what the obstetrician told them, they have realized that they can give vaginal birth and they want to have their second birth as a vaginal birth. *"I insisted on having a CS for my first delivery. But things went differently in my second delivery. "I am grateful to my doctor, who suggested me to have a vaginal birth and will that I became confident that I could do it"* (Mother #2).

Risk-taking

The mother's and the professional's willingness to take risks contributes to the possibility of VBAC. The professionals may be influenced by an "against-VBAC" culture in the hospital, which may influence them to only present risks involved with VBAC. *"Given the potential risks and lack of legal protection, young and inexperienced doctors are less likely to encourage mothers to have a VBAC. The vast majority of VBACs are carried out by specialists with a history of high-risk behavior"* (Obstetrician # 29).

"My doctor explained all the possible risks of VBAC. But my choice was to have a vaginal birth" (Mother #7).

Cultural perspectives on VBAC

Changes in maternal characteristics and professional practice styles, increasing malpractice pressure, as well as organizational, social, and cultural factors have an impact. "*My husband and his family want a vaginal birth for me. We are Lur and vaginal birth is a cultural value for a woman"* (Mother #14).

Active birth

Participants in the present study stated that active birth and a sense of control over their bodies were important factors in developing self-efficacy and autonomy in the birth process. Control over the birth experience was of great value to them, and vaginal birth increases their future self-efficacy and self-esteem.*"In a vaginal birth, you feel in control of your body and can be active. But during a cesarean, you have no control or activity. Giving birth feels like conquering a mountain, and your self-esteem rises"* (Mother #7).

Decision-making participation

The study has shown that women should be given the freedom to choose their preferred method of childbirth and opt for a vaginal birth if they wish to. When women are involved in the decision-making process, it boosts their

self-confidence and trust in their healthcare providers. It also helps them to have advocacy skills and allows them to have a say in interventions. By participating in the decision-making process, women feel more in control, which is highly valued. Among the three sub-subcategories of a common approach, right to choose, and informed choice, participants emphasized this section more than others, which we will discuss in detail.

Common approach

Clinicians need a common approach to increase the VABC rate, and obstetricians should make the final decision on the mode of birth. Participants emphasized that the decision to have a VBAC is a two-way street between the clinicians and the mother. "*Doctors and health center staff can play an important role in informing mothers and providing them with the right information to help them make the right decision about a VBAC"* (Obstetrician #28).

The right to choose

Many obstetricians and midwives believe that the informed choice of birth is met with the rights of mothers; therefore, providing comprehensive advice on this informed choice is the undeniable duty of the healthcare workers. *"In any case, every mother has the right to choose how to give birth after a CS*" (Midwife #21).

Informed Choice

The majority of participants in the study agreed that women who are fully informed about the risks and alternatives to CS are more likely to request VBAC at their request. *"After being aware of the possible side effects of accepting or rejecting this delivery method by mothers, accepting or rejecting a VBAC can be very helpful"* (Midwife #15).

Upcoming challenges

Furthermore, another main category of this study was the upcoming challenges. The main category includes the subcategories "technical challenges" and "women's challenges," which we will discuss in more detail.

Technical challenges

Sub-categories include a lack of legal protection, inadequate facilities and equipment, a stressful and time-consuming work environment, and insufficient compensation.

Lack of legal protections

Participants stated that legal accountability, inadequate legal protection for obstetricians, and a lack of transparency in their responsibilities are major barriers to performing VBAC, making it difficult for Iranian mothers to access VBAC. *"I was the only doctor in this hospital who performed a vaginal birth after a CS. During one of my operations, I had a ruptured uterus. The hospital's chief warned me that I no longer had the authority to perform a CS delivery"* (Obstetrician #26).

Lack of adequate facilities and equipment

Mothers who are interested in having VBAC may face difficulties due to a lack of facilities and equipment. Studies have shown that many medical centers do not have enough resident physicians or VBAC-compliant doctors to provide recommendations to mothers who have had a cesarean. This can result in healthcare providers not offering VBAC as an option, even if the mother is interested. *"Our pregnant mother was about to have a CS when she developed a ruptured uterus. Because she was not diagnosed in time, she required an intensive care unit, but the hospital did not have an ICU, and the mother died"* (Midwife #17).

It is stressful and time-consuming

Most obstetricians and midwives believe that labor in mothers who have had a CS is highly stressful and laborious. *"Because we can't induce labor, the labor of mothers who want to have a VBAC is prolonged. And it's very stressful because of potential complications like a uterine rupture*" (Midwife #11).

Inadequate payment

Obstetricians and midwives have pointed out that performing VBAC is a much more time-consuming and stressful process than opting for CS. Additionally, VBAC puts them under immense psychological pressure as they are always worried about potential complications for mothers. They need to be with the mother for hours and control her; however, no organization provides more financial support for the hard work of VBAC than performing a CS. *"Every stressful VBAC stresses me out, and I worry that it will not result in complications. I may be at a mother's side for hours at a time, but I am not financially* supported" (Midwife #12).

Women's challenges

VBAC can be difficult due to lack of knowledge, concerns about complications, and negative experiences with medical staff. Being informed and educated can improve the chances of success. Specific difficulties include fear of consequences, failure, lack of information, and medical staff misconduct.

Fear of complications

Fear and traumatic past experiences can prevent mothers from choosing VBAC due to concerns about risks, such as heavy bleeding, ruptured uteruses, and infant mortality. *"The most serious concern that I had about trying a vaginal birth after a cesarean was the possibility of uterine rupture"* (Mother #5).

"During my son's birth, I worried that he would become retarded if he became stuck in the birth canal and didn't get enough oxygen to his brain" (Mother #10).

Fear of failure

Participants stated that they are concerned about the failure

of VBAC and they said that they are afraid to endure the pain of birth for a long time, but in the end, they will not be able to give VBAC and will be forced to perform a repeated cesarean delivery. *"I was scared of going through labor pains, not being able to give birth, and having to have a cesarean again"* (Mother #8).

Insufficient information

Mothers believed that doctors and midwives should provide adequate and accurate information about VBAC, whereas mothers typically receive inaccurate and insufficient information through informal means. *"When you understand the issues and complications of cesarean delivery and the benefits of vaginal birth, it's easy to see that vaginal birth is the best choice. But I was also given the wrong information in my first childbirth* " (Mother #1).

Inappropriate behavior

During labor, one challenge was the mother's misconduct, which resulted in her losing control over the decisions made regarding her care. A strong relationship between a woman and her healthcare provider is exemplified by mutual respect and support, and is fostered through consistent attention throughout the course of pregnancy and delivery. *"They treated me badly during delivery, and no matter how many times I asked about my condition, they never answered. They examined me every hour, and when I objected, they said, "How much do you ask*" (Mother #6).

Discussion

Our study investigates women and obstetricians' experiences of VBAC and the challenges ahead. Positive aspects include empowerment, but challenges remain. Consistent with the metacentric study, Lundgren *et al.*[9] reported that vaginal birth provided more emotional and psychological contact with the infant than CS.[20] VBAC contributes to the health and well-being of the mother and her child, and it facilitates the transition to motherhood,[9] lower rates of maternal and neonatal mortality and morbidity,[9,21] faster recovery,[20,22] and lack of disruption of family life.[9]

The empowerment of women was another main category of this study. In line with the current study, most women described vaginal birth as empowering.[9] Successful vaginal birth requires a strong sense of self-confidence and self-efficacy, which includes managing pain and challenges during childbirth. Factors affecting a woman's self-efficacy include perceived capability, willingness to take risks, and cultural attitudes toward VBAC and active birth.[23]

Empowering mothers means giving them the right to choose their preferred method of delivery, including vaginal birth. This involvement in decision-making increases their confidence in themselves and their caregivers.[9] The research examines challenges faced by technical teams, including inadequate facilities, stressful VBAC, non-payment of adequate salary, and lack of legal protection.

Legal issues surrounding VBAC have greatly impacted physicians' actions, leading them to opt for CS instead. Studies show that legal protections can affect the rate of VBAC.[22] The findings of a review study also revealed that the most significant obstacles to VBAC in Iran are imposed policies, a lack of access to specialized services, inefficiency in the incentive system, modeling in CS, the central physician in performing VBAC, obstetricians' fear of legal responsibilities, and a lack of legal protection.[24]

Mothers who had a C-section struggle to receive VBAC recommendations due to a lack of facilities and supportive physicians.[25] Obstetricians prefer C-sections due to liability, convenience, and shorter stays despite no significant compensation.[26] Women fear complications, lack information, and face negative interactions when attempting VBAC. Empowering them with accurate information and support can help them succeed.[27]

Women have had negative experiences with healthcare professionals who fail to respect their delivery priorities and provide adequate support.[28] A woman's relationship with her healthcare provider is strengthened through continued care during pregnancy and childbirth.[29] This study emphasizes the importance of respectful and supportive care from healthcare providers toward pregnant and delivering women.

Conclusion

VBAC is a complex decision influenced by multiple factors, such as medical, psychological, social, cultural, personal, and practical considerations. It requires careful evaluation of the opinions of both women and healthcare professionals on the use of CS.

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Conflicts of interest

Nothing to declare.

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Original Article

Effects of Reflexology on Anorexia and Sleep Quality in Patients Undergoing Chemotherapy: A Randomized Clinical Trial

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Abstract

Background: Cancer and associated treatment methods present numerous complications, including anorexia and disturbances in sleep patterns. Consequently, the purpose of this study is to examine the impact of reflexology on the symptoms of anorexia and sleep quality among individuals afflicted with cancer. **Materials and Methods:** In this double-blinded randomized clinical trial, a total of 60 patients undergoing chemotherapy at Khansari Hospital, Arak, Iran, were selected using convenience sampling and then assigned to two groups of control and experimental using blocked randomization (30 patients in each group). The sample intervention group received reflexology in an exceedingly 4-week amount (two sessions a week), By contrast, the control group was administered a placebo treatment without exerting any pressure on the reflex points during the same time frame. Sleep quality and anorexia in patients were measured using a Pittsburgh questionnaire and visual analog scale before and right after the intervention. Eventually, the data were analyzed, and we used the tests of central tendency, dispersion, independent- and paired-samples *t*-tests, and Chi-square. **Results:** The findings of the study revealed a significant improvement in sleep quality and reduction in anorexia symptoms among patients who received reflexology treatment scores ($p < 0.001$). Conversely, there was no significant difference in the control group before and after the intervention (without pressure effect on the foot points) ($p > 0.05$). **Conclusions:** According to the positive effects on sleep quality and the reduction of anorexia symptoms, it is recommended to incorporate this therapeutic modality along with conventional medication for the treatment of individuals with cancer.

Keywords: *Anorexia, nursing, sleep quality*

Introduction

Many countries suffer cancer as a major health problem.[1] There is an anticipated rise in the annual incidence of new cancer cases globally, with an estimated increase from 14 million in 2012 to approximately 22 million by the year 2030.[2] Cancer is the third leading cause of mortality in the Iranian population, accounting for 14% of all deaths. Daily, around 98 people in the nation die from this illness.[3] Chemotherapy, a commonly used treatment for cancer, causes various physical, psychological, and social complications. Anorexia and sleep quality disorders are the main problems in these patients.[1,4] Sleep disturbances can worsen in individuals diagnosed with cancer, thereby contributing to heightened feelings of resentment.[5] These disturbances can be caused by various factors such as anxiety, depression, radiotherapy, chemotherapy, fatigue, pain, and changes in biological rhythms. These disorders may have an effect on the social performance and lifestyle.[1,6] Anorexia, a condition characterized by a diminished appetite, is prevalent in a significant proportion of individuals with cancer who seek palliative care, ranging from 30 to 80 percent. This phenomenon has a detrimental impact on their overall quality of life, leading to heightened morbidity and mortality rates.[7] Pharmacological and nonpharmacological treatments can be used to treat sleep disorders and anorexia in patients with cancer. Pharmacological treatments require a doctor's order and often cause many side

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effects, whereas nonpharmacological treatments (methods of complementary medicine) often have few side effects and can be used alone or in combination with other methods.[1,8] The majority of nonpharmacological treatments used in contemporary healthcare fall under the category of Complementary and Alternative Medicine (CAM). Most recommended CAM therapies include massage, aromatherapy massage, reflexology, relaxation therapy/simulation, hypnotherapy, and acupuncture/acupressure. Reflexology is a commonly used form of complementary and alternative medicine.[8-10] Reflexology is a particular type of hand and foot massage. The most important theory about the effect of this method is the connection between the limbs and other parts of the body through energy lines.[11-13] Because the feet are known to be the most sensitive part of the body, making them an optimal location for this therapeutic technique.[14] Stimulation of reflex points is responded by muscles, nerves, and cells, and this response can accordingly relieve stress and tension, improve blood circulation, calm the mind, boost the immune system, and convey the sense of well-being.[15,16] In many studies, reflexology reduces anxiety and stress, improves sleep quality, increases energy, causes relaxation, and promotes the feeling of well-being in patients with cancer.[17,18] In a research investigation performed by Leyla Zengin, the study demonstrated the impact of reflexology in mitigating fatigue and enhancing the sleep quality of patients receiving chemotherapy.[19] In a separate study conducted to investigate the impact of reflexology on children's health, the findings indicated that the application of reflexology did not yield a favorable outcome in terms of alleviating the digestive system and enhancing the overall quality of life among children. Consequently, further research with a larger sample size is necessary to substantiate these findings.[20] In a separate research conducted in Iran, the findings indicated that reflexology did not yield a substantial effect on the overall quality of life among individuals diagnosed with multiple sclerosis.[12] Therefore, this finding underscores the increased importance of incorporating complementary medicine into healthcare practices, and this study was performed to investigate the impact of foot reflexology on sleep quality and anorexia in patients undergoing chemotherapy.

Materials and Methods

This study is a double-blinded randomized clinical trial (IRCT20130424013110N8) conducted between August 2020 and April 2020. The participants consisted of 60 patients receiving chemotherapy at Khansari Hospital, Arak, Iran. Both the data analyst and the study participants in both groups are blinded to the allocation of the intervention and control groups. The sample size was determined by considering the power of the test 80% and the significance level of 5%. Based on the results of the study by Unal and Akpinar (2016),[21] the number of samples was calculated as 60 (N = 30 in each group). The participants for this study were selected through convenience sampling and then assigned to two groups of control and experimental using blocked randomization, so that the block size was determined to be 4 (A, A, B, B) (code A for the intervention cluster and code B for the control group). The inclusion criteria included (a) being in the age range of 30-60 years, (b) having a history of a minimum of one course of chemotherapy, (c) having no foot issues or wounds, and (d) not receiving any other nondrug sedation treatments. The exclusion criteria were (a) reluctance to continue involvement in the research, (b) leg sores, (c) patient discharge, and (d) death of the patient.

Demographic Information Questionnaire, Visual Analog Scale (VAS), and also the Pittsburgh Sleep Quality Index Questionnaire (PSQI) were the tools used in this study. The PSQI exceedingly measures sleep quality in a 1-month period as a self-reported questionnaire. The PSQI consists of nineteen items, generating seven dimensions (subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction).[18] Every item is scored from zero to three on a 4-point Likert scale, and every item is combined to create seven "component" scores. The seven-part scores are then added to yield an overall score starting from 0 to 21 because lower scores denote higher sleep quality. The specificity, sensitivity, and Cronbach's alpha constant of the Persian version of this questionnaire are 93%, 100%, and 89.36, respectively.[22] The VAS is a measurement tool used to assess appetite. It consists of a 10-cm straight horizontal line, with "0" representing a complete lack of appetite and "10" indicating a very strong appetite. This tool has been assessed in terms of reliability and validity in various studies. The reliability of this tool was approved by Shahinfar *et al*.[23] with a Cronbach's alpha of 0.88. In addition to validity and reliability, the most important feature of this tool is its simplicity of use. In this study, patients self-reported the level of anorexia. After the acquisition of written informed consent, questionnaires were distributed. Then at the beginning and before the intervention, a demographic information questionnaire, the levels of anorexia, and sleep quality were completed in both groups. Questionnaires were distributed and completed by the researcher. The experimental group received 8 sessions of reflexology in a 4-week period (two sessions a week) during the intervention phase, each session lasted for 30 minutes. In each session, 15 minutes of reflexology was performed for each foot, of which 5 minutes were allocated to general massage of the sole and 10 minutes were allocated to massage of the reflex points of the brain (pituitary gland, hypothalamus, and pineal gland), gastrointestinal tract (small and large intestine, stomach, and liver), and the solar plexus. A researcher trained in the field conducted the intervention. In the control group, patients merely received 30 minutes of dorsum touch in each session without applying any pressure to the reflex points. After

completion of the intervention (at the end of the fourth week), patients in both groups completed the PSQI and the VAS again. In this research, the data were analyzed through descriptive and inferential statistics using International Business Machines (IBM) SPSS Statistics V21. The tests used included measures of central tendency, dispersion, independent- and paired-samples *t*-tests, and Chi-square. The level of significance was considered as $p < 0.05$.

Ethical considerations

This study protocol was approved by the Research Ethics Committee of Arak University of Medical Sciences (Ethics No. IR.ARAKMU.REC.1398.095). Before participation, patients were provided with a comprehensive explanation of the study methodology and objectives, and the anonymity of the questionnaires and the confidentiality of personal data were ensured. Then, written informed consent was obtained from all participants.

Results

The 91 patients were assessed for being eligible to participate in this study. However, 27 patients were excluded from the study because they lack inclusion criteria, and 4 patients were excluded because they refused to participate in the study. Finally, 30 patients were allotted to the intervention group and 30 patients were in the control group [Figure 1]. The average age of patients within the experimental group was 50.43 ± 14.67 and in the control group was 49.13 (15.30) years. The bulk of the participants (76.60%) were married. Of 60 participants, 45 (75%) patients had a sickness length of less than one year. The level of education for most participants was a diploma or lower than a diploma 86.70% in the intervention group and 76.70% in the control group) [Table 1]. Independent *t*-test results showed that the intervention and control groups were not significantly different before the intervention in terms of mean score of sleep quality ($p > 0.05$). However, they were significantly different after the intervention, specifically that the mean score of sleep quality was significantly improved in the intervention group compared with that in the control group ($p < 0.05$) [Table 2]. In the experimental group, the mean score of anorexia was 6.30 (3.06) before the intervention and 2.67 (2.24) after the intervention. Paired-samples *t*-test showed significantly different mean scores of anorexia before and after the intervention ($p < 0.05$), whereas in the control group, a paired *t*-test showed no significant differences in the mean scores of anorexia before and after the intervention ($p > 0.05$) [Table 3].

Discussion

In this study, we endeavored to determine the effect of

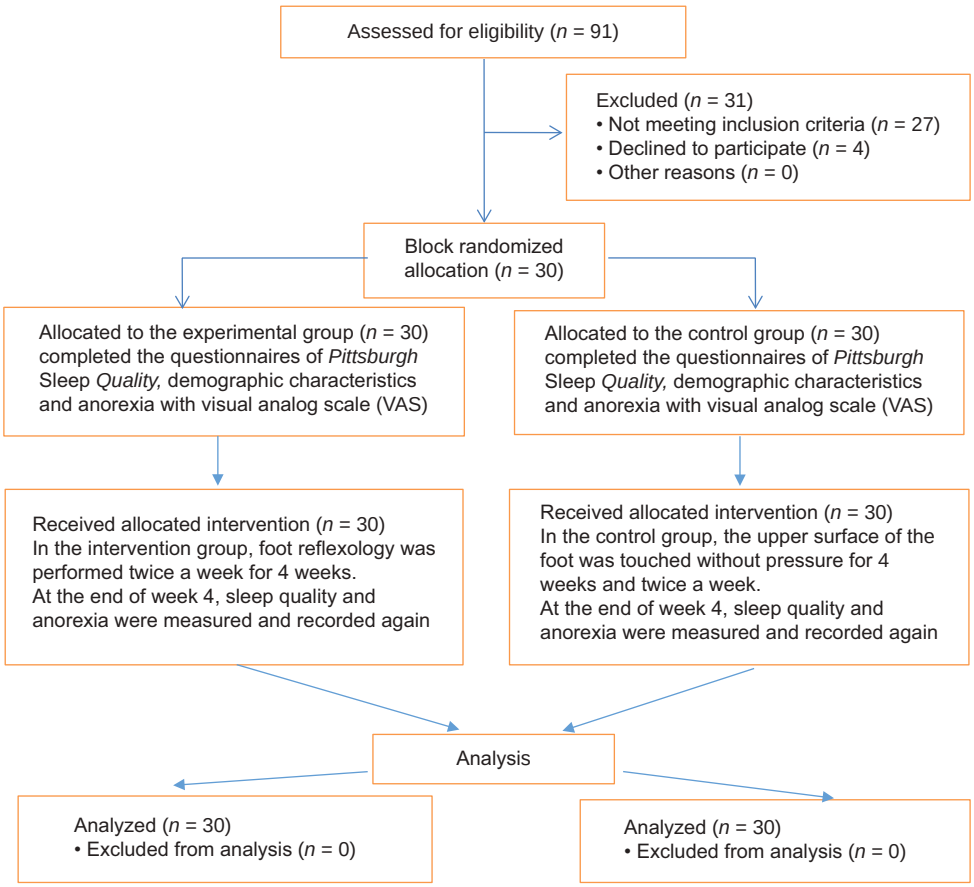

Figure 1: The CONSORT flow diagram of the patients' recruitment

Table 1: Comparison of demographic characteristics in the control and intervention groups

Variable		Intervention group (*n*=30) *n*(%)	Control group (*n*=30) *n*(%)	*p**
Gender	Male	15 (50)	15 (50)	1 *
	Female	15 (50)	15 (50)	
Educational level	Illiterate	5 (16.70)	7 (23.30)	0.136**
	Less than diploma	13 (43.30)	4 (13.40)	
	Diploma	8 (26.70)	12 (40)	
	Collegiate	4 (13.30)	7 (23.30)	
Marital status	Single	1 (3.30)	4 (13.30)	0.515**
	Married	25 (83.30)	21 (70)	
	Divorced	1 (3.30)	1 (3.30)	
	Wife died	3 (10)	4 (13.40)	
Occupation	Unemployed	7 (23.30)	9 (30)	0.738**
	Retired	7 (23.30)	3 (10)	
	Employee	2 (6.70)	2 (6.70)	
	Housewife	12 (40)	14 (46.70)	
	Student	2 (6.70)	2 (6.70)	
Duration of Cancer (years)	<One year	21 (70)	24 (80)	0.799*
	1-2 years	4 (13.30)	2 (6.70)	
	2-3 years	1 (3.30)	1 (3.30)	
	>3 years	4 (13.3)	3 (10)	
The type of cancer	PANCREAS	3 (10)	4 (13.30)	0.904*
	LANPHOM	4 (13.30)	4 (13.30)	
	CRC	8 (26.70)	8 (26.70)	
	OVARIYAN	2 (6.70)	0 (0)	
	AML	3 (10)	5 (16.70)	
	Breast	4 (13.30)	3 (10)	
	Lung	2 (6.70)	2 (6.70)	
	Liver	4 (13.30)	4 (13.30)	
Age		50.43 (14.67)	49.13 (15.30)	0.595***

All values are expressed as number (percentage) or mean (SD). *Chi-square. **Fisher exact test. ***Independent-samples *t*-test

Table 2: Comparison of sleep quality score among control and intervention groups before and after intervention

Group	Before Mean (SD)	After Mean (SD)	*p**
Intervention	13.53 (5.57)	3.06 (2.16)	<0.001
Control	13.60 (3.13)	12.93 (2.67)	0.324
*p***	0.934	<0.001	

*Paired *t*-test. **Independent-samples *t*-test

Table 3: The mean scores of anorexia severity in the intervention and control groups

Group	Before Mean (SD)	After Mean (SD)	*p**
Intervention	6.30 (3.06)	2.67 (2.24)	<0.001
Control	6.10 (3.42)	6.20 (3.23)	0.813
*p***	0.735	<0.001	

*Paired *t*-test. **Independent-samples *t*-test

foot reflexology on anorexia and sleep quality in patients with cancer undergoing chemotherapy. Based on the results of this study, it was found that the two groups were not significantly different in terms of demographic characteristics. In addition, it was determined that there was no statistically significant difference between the two groups before the intervention in terms of the mean scores of anorexia and sleep quality. The results of this study showed that foot reflexology can positively affect the sleep quality in patients with cancer undergoing chemotherapy. The effect of this method has also been investigated on other patients' sleep quality.

Another study conducted in 2016 indicated that reflexology can improve the sleep quality of patients undergoing hemodialysis.[21] Another study conducted in 2019 also demonstrated that reflexology has a positive impact on the sleep quality of individuals diagnosed with lymphoma.[24] Similarly, a study in 2020 indicated the foot reflexology massage can effectively improve the quality and quantity of sleep in patients with burn injuries[25] that these findings align with the current research. Another study conducted in 2020 found that foot reflexology may alleviate pain and fatigue, as well as enhance sleep quality in patients who have undergone kidney transplantation.[26] A study conducted in 2020 demonstrated that foot reflexology can be used to enhance the sleep quality and duration of postpartum women after a natural delivery.[27] These studies indicate that

foot reflexology can have beneficial effects on the nervous system and blood circulation, leading to valuable outcomes. One theory within the realm of reflexology posits that its impact on the nervous system and blood circulation can be attributed to the breakdown of lactic acids. This breakdown facilitates the restoration of energy and promotes healthy blood flow, thereby enhancing overall blood circulation. In addition, reflexology is believed to impede the transmission of pain impulses by obstructing their entry points, resulting in a reduction of pain and a sense of tranquility and stability within the nervous system.[28,29] In a study conducted in 2019, the primary aim was to examine and explore the impact of reflexology on constipation and the quality of life of individuals with Multiple Slerosis (MS). The findings revealed that although reflexology demonstrated improvements in constipation, it did not significantly influence the quality of life of patients.[12] This outcome contrasts with the results of our study, which focused on sleep quality.

In a separate investigation performed in 2021, the objective was to examine the impact of reflexology on the sleep quality and delirium experienced by patients after cardiac surgery, and the findings of this study indicated that reflexology did not yield any significant effects on the sleep patterns of these patients,[30] and it is plausible that the dissimilarity can be attributed to the limited sample size and the brief duration of the intervention used in the aforementioned study, which this outcome contrasts with the results obtained in our study. This lack of compatibility between reflexology and certain individuals can be attributed to the area of application, type, depth, and number of reflexology sessions as well as the existing comorbidities. The results of various studies show it can be stated that reflexology induces a sense of calm in an individual. The results of this study demonstrated that patients' level of anorexia decreases after reflexology. Few studies have investigated the effect of CAM therapies on anorexia in patients with cancer. There are also a few studies on other patients, which revealed that CAM therapies such as massage, acupuncture, and acupressure have a positive effect on anorexia in other patients, and it leads to the improvement of the nutritional pattern.[31] In addition, acupuncture has the potential to provide a feeling of contentment and tranquility, resulting in enhanced nourishment for the individual.[32] Within this study, the level of anorexia was examined in patients with cancer undergoing chemotherapy, and it should be stated that the causes of anorexia in these patients may be different from the ones in other patients. In patients with cancer undergoing chemotherapy, activation of inflammatory pathways of the hypothalamus as a result of inflammation (stimulator of anorexia) of intestines or diarrhea-related dehydration can account for anorexia.[33,34] Regarding the differences in the samples and the mechanism of anorexia, it would be difficult to compare our study and the above studies. A review study conducted in 2021 found that foot reflexology did not show significant effectiveness in reducing nausea and vomiting.[35] These findings contradict the outcomes of our study. The limited sample size and the possibility of requiring more reflexology sessions in the studies may explain this outcome. Based on the findings, it seems that foot reflexology can be used as a CAM therapy along with pharmacological and other modern treatments to improve anorexia and sleep quality in patients with cancer. However, despite that the positive effects of this method have been confirmed in most patients, more comprehensive researches need to be conducted in this area. One of the limitations was the possible effect of confounders on the dependent variables of the study. To eliminate this limitation, patients were selected randomly. Another limitation is not having a follow-up period to check the long-term effects of the desired interventions. Their effects are temporary or not temporary.

Conclusion

The utilization of foot reflexology as an intervention promotes sense of calm and improves anorexia and sleep quality in patients with cancer. Because the results of this study cannot completely suggest the utilization of foot reflexology, it is imperative for the healthcare personnel, particularly the nursing staff, to acquire knowledge and skills in using complementary medicine interventions, with a specific emphasis on reflexology, to enhance anorexia and sleep quality in patients with cancer.

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Conflicts of interest

Nothing to declare.

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Original Article

Explaining the Components of Resilience in Patients with Chronic Pain: A Qualitative Content Analysis

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Abstract

Background: Resilience is a psychological trait and a protective factor that plays a vital role in coping with Chronic Pain (CP). Despite its importance, research has yet to fully clarify the concept and components of resilience in patients with CP. Accordingly, the present study aims to explain the components of resilience in patients with CP. **Materials and Methods:** The current qualitative study used a conventional content analysis methodology. The research population included all patients with CP who were referred to clinics affiliated with Shiraz University of Medical Sciences (south of Iran) from August 2021 to August 2022. Participants were selected using the purposive sampling method. In-depth semi-structured interviews were conducted with 20 participants to collect information. Data analysis was conducted using MAXQDA 2020 software in conjunction with data collection efforts. **Results:** Generally, in the current study, 30 sub-sub-categories, 11 sub-categories, and five main categories were extracted as components of resilience in patients with CP. The main categories of resilience against CP included the following: 1. emotional self-regulation, 2. psychological flexibility, 3. self-care, 4. appeal to religion–spirituality, and 5. internal resources and individual competencies. **Conclusions:** The present study highlights the different physical, mental, and religious-spiritual strategies that may contribute to resilience against pain. The resilience components identified in this study provide a foundation for healthcare professionals, particularly nurses, to design and implement diverse pain management strategies that enhance adjustment to CP conditions.

Keywords: *Chronic pain, qualitative research, resilience, strategies*

Introduction

Chronic Pain (CP) is one of the most critical medical problems worldwide.[1] The prevalence of CP in different countries has been reported between 13.0% and 51.3%.[2,3] CP generally disrupts all aspects of the person's quality of life.[4-7]

Resilience is one of the psychological factors playing a significant role in the acceptance of pain,[8] the intensity of the pain,[9] the level of disability, depression, and, generally, the mental health of people with CP.[10-12] This psychological trait is significant in predicting pain acceptance, thinking about pain,[8,13] and related health outcomes.[11] Individuals grappling with CP may experience heightened sensitivity to pain as their resilience diminishes over time.[12] Consequently, building resilience is crucial for adapting to CP.[14] This psychological trait helps us understand why people react differently to pain; some may feel overwhelmed by it, while others leverage their discomfort to enhance their quality of life and psychological development.[15]

Although resilience has an influential role in outcomes related to CP,[12] many researchers believe the precise components of resilience—as a multi-dimensional concept—still need to be clarified.[12,16-19] Johnson states that defining resilience is challenging because its nature is heavily influenced by context.[20] In addition, the applicability of these resilience components to patients from various cultural and social backgrounds remains unclear. For instance, in Iran, religious beliefs significantly influence how pain is perceived and accepted.[21] Moreover, cultural norms often lead some parents to conceal their pain.[22]

Although several qualitative studies regarding CP have been increasing in recent years, Sheedy *et al*.[23] have merely explored the components of resilience in CP—most of the participants in their study were fibromyalgia patients. However, resilience

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is a profound concept that includes broader components and dimensions. Consequently, the results from a handful of qualitative studies carried out in different cultural settings may not be generalized to individuals with CP in Iran. Resilience components may differ depending on the type of personality, type of challenge, available resources, environmental context, and social context and from one person to another.[10,18,20] Therefore, based on existing evidence, both CP and resilience are context-dependent, and more comprehensive studies are still needed to identify their precise concepts and dimensions.[12,16,18,20,24,25] Given the limited resilience observed in patients with CP,[12,26] it is essential to take interventions to increase resilience mechanisms in these patients or reduce its negative consequences.[10] To effectively enhance resilience in individuals with CP, it is crucial to identify the components that contribute to resilience within the specific socio-cultural context of Iran. This still needs to be explored, and understanding these components is essential for designing and implementing successful interventions. Therefore, this qualitative study aims to explain "the components of resilience in patients with CP" in Iran.

Materials and Methods

The present study used a qualitative research method with a conventional content analysis methodology. The current study was conducted from August 2021 to August 2022 in clinics affiliated with the Shiraz University of Medical Sciences. Patients were informed about the study's goals, benefits, and potential applications to encourage their participation. However, one individual declined to participate due to an unwillingness to spend time answering the survey questions. Twenty participants were selected, including 16 patients with CP and four physicians with various specialties related to pain, pain specialist fellowship, psychosomatic diseases fellowship, rehabilitation specialist, and neurosurgeon, to serve as key informants using a purposive sampling method. The study's main objective was to explain the resilience-enhancing strategies drawing on the experiences of patients with CP. This study initially selected individuals from this patient group as participants. To deepen our understanding of resilience components in the context of CP, we incorporated insights and experiences from physicians who had treated patients with CP. In addition, participants were selected using maximum variance sampling according to essential demographic information and clinical characteristics such as age, gender, education level, marital status, occupation, and type of CP. Participant selection and interview conduct continued until data saturation occurred.

The inclusion criteria of the participating patients include age over 18 years, diagnosis of CP based on the specialist physician's diagnosis [under the criteria of the 11th revision of the International Classification of Diseases (ICD-11)] and patient self-report, willingness to participate in the study, having physical health (e.g., lack of hearing and speech loss) and mental health (according to the patient's report) to participate in the interviews, the ability to share rich information around the study's subject, and the ability to speak Persian. Besides, the criteria for the withdrawal of participating patients from the study include suffering from other chronic physical diseases such as cancer and MS due to the different nature and prognosis of these diseases, which might affect the study's results (according to the patient self-report), suffering from known chronic mental disorders (according to the patient self-report), and unwillingness to continue participating during the study. The inclusion criteria of the participating doctors included clinical work experience with CP patients for at least 5 years, the ability to share rich information about the study's subjects, the ability to speak Persian, and the willingness to participate.

In addition to the specialist physician's diagnosis, a questionnaire was used to measure the pain in the patient. This questionnaire was designed by Shaygan *et al*. (2020).[27] The tool's psychometric properties have been evaluated and validated, with an impact score of at least 1.5, a content validity index ranging between 0.89 and 1, a content validity ratio exceeding 0.84, and a correlation coefficient ≥0.72.

Data collection was done through semi-structured individual interviews with the participants. All the interviews were conducted face-to-face. A follow-up interview was conducted over the phone for the sixth participant to clarify the ambiguities and issues raised in the first interview. Every interview commenced with general questions: "based on your experience, how would you define the concept of endurance or tolerance to pain? What techniques do you employ to manage pain and make it more bearable?" These were followed by probing questions aimed at directing the conversation, providing clarification, and drawing out more detailed responses.

The time and place of the interview were determined with the coordination of the participants. In addition, the interview was conducted whenever they were in the best condition. The participants' addresses and phone numbers were obtained, and the researcher's phone number was also provided to them to conduct subsequent interview sessions (if needed) and confirm their statements. In the end, the interview was finished by summarizing the contents, announcing the termination or continuing the interview in future sessions, and thanking the participant. The duration of the interviews was between 30 and 60 minutes. The conversations of each interview session were audio-recorded in mp3 format, and then the authors listened to the conversations recorded in each interview. Conversations were transcribed verbatim into Persian immediately after each interview and before the following interview. The recorded contents were then checked regarding correspondence with the manuscripts.

Data collection and analysis occurred concurrently utilizing the Graneheim and Lundman (2004) methodology. This involved thoroughly reading interview transcripts for an overarching comprehension, pinpointing semantic units and preliminary codes, grouping similar codes into broader categories, and synthesizing these categories to extract principal themes.[28] MAXQDA 2020 served as the data analysis software.

Four criteria are used to evaluate trustworthiness or rigor in qualitative studies: credibility, confirmability, transferability, and dependability.[29] The credibility and confirmability dimensions were fulfilled through prolonged engagement (12 months) with the study's subject to ensure an in-depth understanding of the concept, immersion in the data, and peer checking by four experts in qualitative studies and CP. Additionally, to improve the credibility criterion, the initial coding of data (by the third author) was independently reviewed by each member of the research team, followed by a review by all research members. In addition, two qualitative researchers (Ph.D. nursing faculty members) assessed coded data blinded to the study process. Moreover, maximum sampling variation enhanced the data's confirmability and credibility. Eventually, the results were cross-checked by the participants for accuracy, completeness, and conformity of the interpretations with their experiences, as well as ensuring correct coding. Accordingly, the feedback from the participants was used to modify some items. This study implemented precise interview methods, meticulous record-keeping, and a thorough peer-review process to guarantee the data's confirmability and dependability. The researchers described demographic information, research environment, interview technique, data collection, and analysis process to fulfill the transferability dimension.

Ethical considerations

The current study was approved by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (Approval code: IR.SUMS.NUMIMG.REC.1400.011). After describing the study's purpose and methodology, written and constantly informed consent was obtained from all participants. In all research steps, confidentiality was observed, and codes were used to refer to the participants for reporting the findings (Participant 1: P1, P2, P3, and the like). Furthermore, the participants were ensured they could withdraw from the study at any time. Participants were informed that their conversations would be recorded during the interview for accurate information collection and documentation.

Results

Semi-structured in-depth interviews were conducted with 20 participants (16 patients and four doctors) to collect data, and the data obtained were analyzed using conventional qualitative content analysis. The mean age of the participants was 49.50 ± 11.36 years, from 30 to 75 years old. The majority of patients had musculoskeletal pain for more than 1 year. Eleven had pain in other parts of the body besides their main pain. The demographic characteristics of the participants are presented in Table 1.

In total, 1618 primary codes were extracted from 20 interviews during the data analysis process. After numerous revisions and removing unnecessary and unrelated codes, 30 sub-sub-categories, 11 sub-categories, and five main categories were extracted. The main categories created included 1. emotional self-regulation, 2. psychological flexibility, 3. self-care, 4. appeal to religion–spirituality, and 5. internal resources and individual competencies. Figure 1 displays the main and sub-categories (components) of resilience. For a detailed view of the sub-sub-categories, sub-categories, and main categories of resilience in patients with CP.

Emotional self-regulation

Based on the present study's findings, emotional self-regulation in the context of resilience against CP means patients should be aware of the impact of internal emotions on pain tolerance and gaining the ability to control their emotions. Most participants agreed that recognizing and understanding how thoughts, feelings, and emotions influence pain, as well as effectively managing these emotions, are key factors that enhance resilience to chronic pain. This main category included two sub-categories: "Cognition and awareness of the impact of internal emotional on pain tolerance" and "Emotional control."

Cognition and awareness of the impact of internal emotions on pain tolerance

Most participants acknowledged that people's inner feelings could affect their pain tolerance. They stated that the way of thinking, fear, despair, stress, and anxiety are effective in pain resilience: *"I know that stress and nervousness have a great effect. When my work interferes with each other, for example, when I have school work, and I have to do homework, my stress levels increase, drastically worsening my experience of pain." (P11)*

Emotional control

Most participants stated that controlling their inner emotions and self-restraint when experiencing pain are essential factors influencing pain tolerance, so positive feelings and emotions increase resilience against pain and vice versa: *"For example, the times when I expressed my pain and kept saying to others, "Oh, I'm in pain," then (my pain) doesn't get better, it even gets worse. That's why I try not to express my pain in front of others and not to sigh and moan. Because when I don't express it too much, I think less about pain, and therefore, I feel that it has gotten better." (P12)*

Psychological flexibility

This study suggests that psychological flexibility, as it relates to resilience against CP, involves openness to pain—this includes accepting the pain, finding the

Table 1: Demographic characteristics of the participants

n	Role	Age (years)	Gender	Marital status	Educational level	Job
P1	Patient	60	Female	Married	Diploma	Housewife
P2	Patient	35	Male	Married	Elementary school	Worker
P3	Patient	61	Female	Married	Associate degree	Retired teacher
P4	Patient	47	Female	Single	Diploma	Employee
P5	Patient	57	Male	Married	Diploma	Taxi driver
P6	Patient	39	Female	Married	Junior school	Shopkeeper
P7	Patient	73	Female	Married	Associate degree	Retired teacher
P8	Patient	40	Male	Single	Master's degree	Employee
P9	Patient	51	Female	Dead husband	Junior school	Housewife
P10	Patient	57	Female	Married	Diploma	Tailor and worker
P11	Patient	55	Female	Married	Bachelor's degree	Teacher
P12	Patient	70	Female	Married	Elementary school	Tailor
P13	Physician	45	Male	Married	Fellowship	Doctor
P14	Physician	39	Female	Married	Specialist	Doctor
P15	Patient	46	Female	Married	Diploma	Housewife
P16	Patient	40	Female	Married	Bachelor's degree	Housewife
P17	Physician	51	Male	Married	Specialist	Doctor
P18	Physician	42	Female	Married	Fellowship	Doctor
P19	Patient	30	Male	Married	Associate degree	Worker
P20	Patient	52	Female	Married	Diploma	Photographer and videographer

n: Number, P: Participant

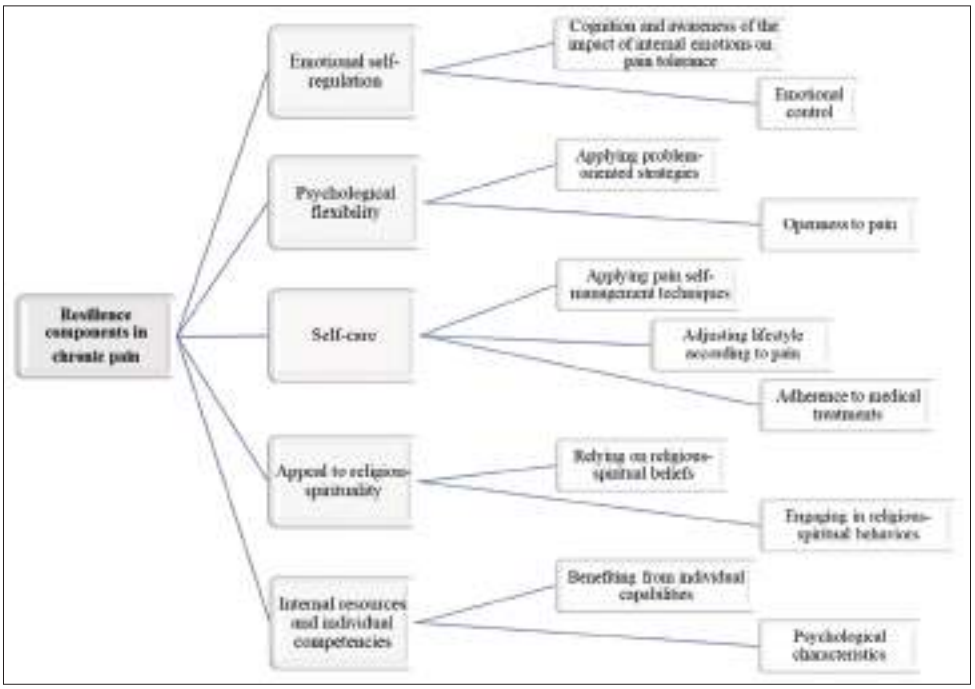

Figure 1: Main categories and sub-categories (components) of resilience in patients with CP

meaning of pain, and remaining committed to goal-oriented activities despite pain. Moreover, it involves developing the capacity to employ problem-solving strategies to manage pain more effectively. According to most participants, accepting the pain and using skills and strategies to lead a good life despite the pain can help improve their resilience against CP. Psychological flexibility includes "Applying problem-oriented strategies" and "Openness to pain."

Applying problem-oriented strategies

Creative and intelligent strategies such as using hobbies and positive attachments; seeking support from family, friends, neighbors, and the treatment team; planning and setting goals; managing relationships with others; and managing family economic affairs were among the things that the participants used or suggested to promote tolerance to pain: *"When your*

mind is busy, you feel the pain but ignore it. I watch excellent and informative movies on TV... But I study more. When I study, I sink into another world and forget myself and my pain, so you don't have to think about the pain." (P7)

As mentioned, managing social relationships and having a rich social support network played an essential role in coping with chronic pain. For example, one of the participants said the following regarding the impact of social relationships: *"Having strong social relationships and communication skills can help a person's resilience. Usually, people with a social and communication network around them can withstand problems and pain better." (P18)*

Openness to pain

According to the participants, purposeful acceptance of pain, tolerating pain to achieve pain treatment goals, unifying with pain, committing to activities in line with goals, and finding the meaning of pain can help increase resilience to pain: *"...the way is to know this (pain) as a part of my life, to know it as a part of my being, to live with it, ... I live with it." (P8)*

Another participant said the following regarding committing to activities in line with goals: *"I try my best to do my tasks at home and in life; prepare food for my children, go to work... I say it's not my customers' fault that my foot hurts. These things make me do my job properly despite the pain and fatigue and endure it." (P20)*

Regarding finding the meaning of pain, one of the participants said: *"...you can say that sometimes pain is a blessing from God, because when a person is in pain, he/she remembers God, calls out to God a lot and gets closer to God... such a person can accept in his/her life that pain is a blessing from God, then he/she can deal with it better." (P6)*

Self-care

Self-care in this study refers to individuals with CP adopting a variety of strategies—physical, psychological, medical, and complementary therapies—on their own. Additionally, they tailor their lifestyles to better manage pain and enhance their ability to cope with it. By taking care of oneself (i.e., doing activities according to one's skill and ability to maintain and improve one's physical and mental health), the patient can help improve his/her resilience against pain. The self-care component consisted of the sub-categories of "Applying pain self-management techniques," "Adjusting lifestyle according to pain," and "Adherence to medical treatments."

Applying pain self-management techniques

The use of physical strategies, such as applying pressure in the pain area and performing various sports, and mental strategies of pain control, such as mental imagery and meditation, were among the practical techniques of the participants to increase resilience to pain: *"Sometimes I would sit quietly in a corner and press my head to calm down..., sometimes I would wrap my head with a cloth to calm down." (P6)*

Another participant said the following concerning the positive effect of exercise as a physical strategy for better pain tolerance: *"Once a week on Fridays, we go mountain climbing. It helps me a lot (to tolerate the pain). I regularly ride a bike, walk..., the most important (solution to better pain tolerance) is exercise..." (P5)*

Furthermore, meditation as a mental strategy can be effective in order to improve pain control: *"Many patients welcome spiritual and religious views in any form… Yoga and meditation by patients can increase their resilience (against pain)." (P17)*

Adjusting lifestyle according to pain

According to the participants, if patients try to modify their lifestyle and habits and try to maintain a suitable lifestyle before the existence of pain, this means tolerating pain and increasing their ability to endure pain. For instance, they suggested that strategies like modifying one's diet and managing weight, being in a suitable environment, and finding equilibrium between physical activity and rest can facilitate lifestyle adjustments, even amid pain. In the following, examples of the statements of several participants regarding these strategies are presented respectively: *"During this time when I was in pain, the diet I followed and my weight dropped by ten kilograms had a great effect on me (to bear pain easier)..." (P5)*

"Where there is more noise, it makes it harder to bear the pain. The best condition that makes me bear the pain better is where I have more peace... A quiet and dark place is perfect." (P8)

"...or, for example, after working for a while, I sit for 5-10 minutes, rest, get up again and continue my work." (P4)

Adherence to medical treatments

According to the experience of the participants, timely consumption of drugs prescribed by the therapist, taking advantage of non-pharmacological solutions and medical treatments for pain, and following the treatment of other underlying diseases can be effective in reducing pain and increasing their resilience to pain. In the following, examples of the statements of several participants regarding these strategies are presented:

"I take the medicine that the doctor gave me... A person in pain should follow the doctor's orders and take his/her medicine on time." (P9)

"...Physiotherapy was great. If I had gone to physiotherapy at the beginning when I got the disease, I wouldn't have been in so much pain ... I have had a few acupuncture sessions, which was good." (P20) "Illnesses such as

digestive problems can make the headache worse, or if a person already has a mental illness, these can make the pain worse... The pain will be easier if other diseases are treated." (P19)

Appeal to religion–spirituality

An appeal to religion–spirituality in the context of resilience and CP means patients relying on religious–spiritual beliefs and engaging in religious–spiritual practices in order to promote tolerance to pain. Taking advantage of God's mercy and feeling of belonging to the eternal divine source can help to increase patience and tolerance in dealing with pain. This category included two sub-categories: "Relying on religious-spiritual beliefs" and "Engaging in religious-spiritual practices."

Relying on religious–spiritual beliefs

According to the participants, a person's belief in religious–spiritual matters affects the endurance of pain, so faith and trust in God and hope in the Lord lead to an increase in tolerance against pain: *"Some people have a higher level of faith; these people have a much higher level of tolerance to pain. I trust in God, and that's why I can withstand pain better." (P2)*

"...I say only hope in God; having hope is very important to cope with pain." (P15)

Engaging in religious–spiritual practices (behaviors)

Patients report that engaging in religious–spiritual practices, such as prayer and expressions of gratitude to God, can enhance their ability to cope with pain. The sense of peace, mood elevation, comfort, and mental liberation experienced through reciting dhikr and praying appears to positively impact their pain tolerance: *"... I go to prayer sessions more often; it's excellent, and one's mood improves. When your mood improves, it also affects the pain, and I think my pain gets better because I don't think about it anymore..." (P9)*

"Sometimes when I'm working, I say thank you to God; I'm grateful that I could do this work or walk this far... I always say thank you to God, and this (gratitude) increases my pain tolerance... (P1)

Internal resources and individual competencies

In the current study, internal resources and individual competencies in the field of resilience against CP refer to the strengthening of positive psychological characteristics and learning to use one's capabilities for better pain tolerance. According to the participants, the abilities and experiences of patients, their psychological characteristics and personality type, and even their personality before the onset of pain were vital factors affecting the ability of patients to endure CP. This category includes "Benefiting from individual capabilities" and "Psychological characteristics."

Benefiting from individual capabilities

Patients with CP can foster resilience by actively seeking to improve their pain tolerance, drawing on their personal strengths, educational background, and past experiences: *"The person who helped me the most was, in fact, me; I wanted to deal with it (pain) and not disturb my work. If a person wants to survive, he/she must want to overcome his/her pain." (P8)*

Some participants regarding the role of learning and using one's previous experiences said:

"Some things can be learned, like tolerating pain. Some families teach their children patience from the very beginning ..." (P10) "Learning the resilience skill is effective. As soon as people learn, children learn how to be resilient in school, which can help increase resilience. People's previous experiences can also be effective (in resilience against pain)." (P18)

Psychological characteristics

Most participants stated that having a series of positive psychological characteristics, such as independence, high decision-making power, self-confidence, trust in the doctor, trust in the people around you, and the like, can increase the resilience of patients to pain. The quotes of two of the participants in this regard are as follows:*"People with a high pain tolerance have independence, and their decision-making power is higher..." (P5)*

"I trust in the doctor... Trusting helps a person in life and to better tolerate pain. Trusting helps to reduce stress, and as a result, the pain becomes easier. (P4)

Discussion

According to the obtained findings, emotional self-regulation, including awareness of the impact of internal emotions on pain tolerance and emotional control, is considered one of the main components of resilience against pain. Most participants were aware of the influence of their feelings, thinking, and behavior on pain tolerance. They acknowledged that negative emotions such as stress and thoughts reduce pain tolerance and vice versa. Consistent with many previous studies,[30-33] the present findings showed that awareness of the impact of emotions and emotional control plays a vital role in pain resilience. In line with the current study's findings, West *et al*.[30] state that having positive thoughts and behaviors can help increase the resilience and overall well-being of patients with CP. Regarding the role of emotion regulation in modulating resilience to pain, various studies indicate that positive emotions, such as hope and expectation for the situation to improve, positively affect the resilience of patients with CP.[30,31,34] Correspondingly, emotional intelligence could be a vital factor in the development or maintenance of CP.[35]

Participants indicated that avoiding reactions to pain can enhance an individual's ability to withstand and tolerate

higher levels of pain. In Iranian culture, self-control is highly valued, particularly among patients and mothers experiencing pain. These individuals often choose to remain silent and refrain from exhibiting pain-related behaviors to prevent causing distress or inconvenience to their loved ones, particularly family members. Moreover, aligning with recent research, Mustafa *et al*.[36] observed that Indian women typically prioritize their families and refrain from voicing their suffering. Based on these findings, designing educational programs according to the patients' culture to increase the awareness of patients with CP regarding the effects of factors affecting pain makes it possible to help empower patients to overcome pain and be more resilient.

Similarly, this research found that psychological flexibility was one of the main components of resilience in patients with CP. The participants stated that taking advantage of problem-oriented strategies such as hobbies and positive attachments, seeking support from others, goal setting and planning, managing relationships with others, and managing family economic affairs lead to increased flexibility and resilience against pain. Problem-solving skills help improve the resilience and health of people with pain.[37] In line with these results, the study participants in Rolbiecki *et al*.'s[31] research reported that they were distracted from pain during work and consequently did not perceive it. Being supported by health professionals and having positive social experiences play a role in the resilience process of patients with CP.[23] Additionally, Daffin *et al*.[38] stated that social support and receiving approval from family members and friends were essential factors affecting resilience against fibromyalgia disease. The findings from a meta-analysis indicate that individuals with low to medium socio-economic statuses face a greater risk of developing CP than those with a high socio-economic status.[39] According to participants, openness to pain and coping with pain led to a more comfortable and less stressful life experience. Besides, the effort and commitment of the patients to carry out their tasks and responsibilities in their personal and social lives, despite the presence of pain, have helped them to reach their goals in life. Consistent with these findings, participants in a qualitative study noted that resilience to pain means fighting to be robust against pain, accepting pain as part of who we are, and learning to live with the pain.[30] Admittedly, several studies have shown that pain acceptance is necessary to improve patients' performance.[40] Likewise, meaning in life enhances individual resilient responses[41] and is associated with improved health outcomes for patients with CP.[42,43] Therefore, designing programs to train and strengthen the creativity of patients to use problem-oriented strategies and meaning therapy to improve their resilience may be effective.

In the present study, self-care, as another main component of resilience, included using physical and mental self-management techniques to control pain, adjusting the lifestyle according to pain, and following medical treatments. The results of systematic review studies show the effect of self-management programs on improving pain and the resulting disability in patients with CP.[44,45] Regular physical activity, including walking, has been recognized for its significant role in managing pain effectively.[31,23,46] Consistent with recent research, physical pain management techniques, including engaging in various sports, have been significant in enhancing pain tolerance among study participants. Similarly, when it comes to mental pain management strategies, the effectiveness of cognitive approaches has been corroborated. Techniques such as positive thinking and comparing oneself to those in more severe conditions have been shown to bolster patients' ability to cope with CP.[23,31]

In addition, in this study, adjusting the lifestyle according to pain, adherence to medical approaches, and follow-up treatment of other underlying diseases were other self-care strategies to tolerate pain as much as possible. In a qualitative study, active participation in treatment programs, proper diet, supplements, and acupuncture were among the factors that increased patients' resilience against pain.[31] Sheedy *et al*.'s[23] study highlighted the significant impact of a consistent management plan on patient resilience, emphasizing the importance of timely medical treatment access, medication adherence, and sleep for individuals with CP. Study participants highlighted the management of coexisting conditions and other underlying diseases as a key factor in enhancing tolerance to CP, a point not touched upon in other qualitative research on resilience. This suggests the importance of including this aspect in educational programs for patients with CP.

Appeal to religion–spirituality was another component of resilience against pain, which almost all participants acknowledged. The present research's findings demonstrated the positive effect of religious–spiritual beliefs and behaviors on the participants' pain tolerance. In this regard, the findings of Corbett *et al*.'s[47] phenomenological study show that spirituality (belief in God, meaning, and purpose) can help patients adapt to CP. In another study, participants stated that faith, prayer, and hope in God were a source of support and relief for their CP.[31] Given the crucial impact of spirituality on the resilience of individuals with CP and acknowledging that patients with CP often experience lower levels of spiritual well-being compared to healthy individuals,[48] it is recommended that culturally and religiously sensitive spiritual interventions be developed and executed to enhance their resilience. The component of internal resources and individual competencies was the last component of resilience in CP. The participants of the present study indicated that the ability to better tolerate pain depends on individual capabilities and the application of past experiences. People's willingness to learn is closely linked to a person's resilience.[49] In a qualitative study, West *et al*.[30] concluded that learning from past experiences leads to better pain tolerance. According to the participants' statements, psychological characteristics were another component

of internal resources and individual competencies. The participants of the present study stated that psychological characteristics such as independence, decision-making power, trust, forgiveness, determination, and strength play an essential role in resilience against pain. Consistent with these findings, Sheedy *et al*.[23] showed that stoicism, confidence, and motivation to control pain were factors that enhanced resilience in patients with CP. Personality strengths such as creativity, hope, open-mindedness, forgiveness, gratitude, leadership power, and humor predict resilience.[49] Accordingly, healthcare workers' attention to the positive psychological characteristics of patients and strengthening these characteristics can be a valuable and effective strategy to improve their resilience to pain and its effective management.

The present study is one of the few qualitative studies showing the components of resilience in patients with CP. Some of the current study's strengths are the selection of participants from different clinics and the high variance of the sample of participants. Incorporating open-ended questions introduced a diverse range of themes, which was a significant strength. Additionally, the resilience components identified in this study can be utilized in experimental designs aimed at enhancing the patients' resilience with CP. Although the ability to generalize the results of this qualitative study is limited, replicating the research in various locations with diverse socio-cultural conditions is essential. Nevertheless, given that the purpose of qualitative research is to delve into the social reality of a specific group at a particular time, the broad applicability or transferability of the findings is not its primary objective.

Conclusion

The present study revealed that patients with CP use different physical, mental, and religious–spiritual strategies to improve their resilience against pain. The details of the strategies and how to implement them in patients with varying living conditions and socio-cultural backgrounds can be different. The components obtained from this study can be used to design a suitable program to improve patients' resilience with CP. Additionally, the resilience-enhancing components obtained from the current study can be a starting point for healthcare providers, primarily nurses, to plan and develop different pain management strategies. Healthcare professionals should implement and advocate for protective measures to help individuals with CP in hospitals, clinics, and community settings, thereby enhancing their ability to adapt to living with CP. It is suggested that interventional research be used to investigate the effects of these strategies on the physical and psychological outcomes of patients with CP.

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Conflicts of interest

Nothing to declare.

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Original Article

The Impact of Self-Care Recommendations with and without Tilt-Training on Quality of Life in Children and Adolescents with Vasovagal Syncope: A Randomized Clinical Trial

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Abstract

Background: Syncope is among the most common paroxysmal disorders in children and adolescents. Vasovagal syncope is the most common syncope in children and adolescents. The aim of this study was to evaluate the impact of self-care recommendations with and without tilt training on the Quality of Life (QoL) of children and adolescents with syncope. **Materials and Methods:** This randomized controlled clinical trial was conducted in Isfahan, Iran, from April 2017 to June 2021 and included 120 patients with syncope. Eligible children and adolescents (aged 6–18 years) who met inclusion criteria were recruited by the simple sampling method and then assigned randomly into two groups. The intervention group (n = 60) received routine self-care recommendations such as dietary advice, behaviors to prevent syncope, and counter-pressure maneuvers along with tilt training, while the control group (n = 60) received self-care recommendations without tilt training. The education training included two face-to-face sessions, each of which lasted for 45–60 min. Then, both groups were followed up by telephone (once a month) for six months. A researcher-made self-care questionnaire and Pediatric Quality of Life Inventory (PedsQL™ 4.0) were completed for both groups before and after the intervention. Data were analyzed using descriptive and inferential statistical methods. **Results:** The Wilcoxon test results showed a significant difference in the mean scores of physical functioning, emotional functioning, social functioning, school functioning, psychosocial functioning, understanding of health, and total QoL in the intervention and control groups before and after the intervention ($p < 0.05$). Also, the paired *t*-test results showed a significant difference in the mean scores of self-care domains and total self-care in the intervention and control groups before and after the intervention ($p < 0.05$). **Conclusions:** Self-care recommendations with and without tilt training can improve QoL in children and adolescents with syncope.

Keywords: *Adolescent, behavior, child, quality of life, self-care, syncope*

Introduction

Syncope is among the most common paroxysmal disorders in children and adolescents.[1] A syncope is defined as a sudden, short-term, self-limited loss of consciousness and postural tone followed by automatic and complete recovery without any neurological insult.[1]

A syncope event is associated with the premonitory phase and is characterized by non-specific symptoms such as dizziness, sweating, visual blurring, nausea, palpitations, pallor, weakness, and cold skin.[2] The symptoms can occur singularly or in combination for a few seconds to 1–2 minutes.[2] Syncope occurs more often in females than in males and is more common in both genders at the age of 15 years.[3] Approximately 15.0% of children experience an episode of syncope before the end of the second decade of life, and 1.0% of common pediatric emergency complaints are related to syncope.[4]

About 70.0–80.0% of syncope events in children and adolescents such as Vasovagal Syncope (VVS), Orthostatic Hypotension (OH) also called postural hypotension, Postural Orthostatic Tachycardia Syndrome (PoTS), and orthostatic hypertension are autonomic neurally-mediated syncope.[5] VVS is the most common syncope in children and adolescents.[5] The onset of VVS peaks initially in childhood and adolescence and accounts for 60.0–70.0% of all syncope causes.[6]

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These patients may suffer from fall-related injuries and recurrent episodes of anxiety and distress, leading to reduced school attendance or community engagement and a loss of independence and Quality of Life (QoL).[6]

Nonpharmacological therapy for the management of patients with syncope based on clinical guidelines includes, patient education and reassurance about its benign nature and avoidance of triggers, monitoring signs and symptoms of exacerbation of the syncope, reducing psychological stress, improving self-care behaviors (class I/recommended), physical counter maneuvers for prevention of syncope (e.g., limb and/or abdominal contraction, squatting, and leg crossing) that are a core management strategy, and increased salt and fluid intake in patients without contraindicated medication (class IIa/can be beneficial), and recommendations for tilt training (class IIb/may be reasonable).[7]

The systematic review studies show that physical counter-pressure maneuvers and increased salt and fluid intake were successful in improving syncopal symptoms and reducing syncope or presyncope recurrence rates in children with VVS.[8,9] However, in patients who have undergone tilt training, Randomized Controlled Trials (RCT) studies have not shown a sustained benefit in reducing episodes of syncope.[7]

Lifestyle education is a potentially effective strategy for the management of syncope and the promotion of self-care in patients.[10] Increased self-care abilities and improved self-care behavior in children and adolescents with syncope can empower the patients to have better control over their daily lives, prevent syncope attacks, and increase QoL.[9,10]

The results of a systematic review and meta-analytic study by Hockin *et al*.[8] that aimed to evaluate the impact of syncope and presyncope on QoL showed that syncope can have a negative impact on patients' QoL.

Despite the importance of self-care and lifestyle education in preventing syncope and reducing accidents, anxiety, and stress in children and adolescents with syncope and their parents, limitations such as inadequate patient education and a lack of time prevent clinicians from educating patients.[11]

Research studies show that only 53% of patients receive education about their condition after being diagnosed with VVS.[7] This suggests that patients do not receive adequate education about self-care and lifestyle for preventing and managing syncope/presyncope.[7]

Considering the limitations of the studies conducted in this field in Iran, and the importance of self-care recommendations for the management of syncope, we sought to examine the effect of self-care behaviors on QoL based on clinical guidelines for definitions of classes of recommendation in children and adolescents with VVS. In addition, we explored whether the addition of tilt training to other routine recommendations is effective in improving QoL. Therefore, this study aimed to assess the effect of self-care recommendations with and without tilt training on QoL in children and adolescents with VVS.

Materials and Methods

This randomized clinical trial was conducted in Isfahan, Iran, from April 2017 to June 2021. This study was registered in the Iranian Registry of the Clinical Trial (IRCT) [registration number: IRCT20150428021987N3] and followed the Consolidated Standards of Reporting Trials (CONSORT) guideline.

The participants of this study consisted of children and adolescents aged 6–18 years with recurrent syncope and positive Upright Tilt Testing (UTT) admitted to pediatric cardiology clinics of the Isfahan University of Medical Sciences (Imam Hossein Hospital and Shahid Chamran Hospital), Isfahan, Iran.

The sample size for the present study was calculated based on sample size tables for clinical studies.[12] The confidence interval was 95.0%, while the power of the study (1-β) was set at 80.0%. At least, a 108-subject sample size (n = 54 per group) was determined for the study. By considering a 10.0% attrition rate, the final sample size for both groups was about 120 (n = 60 per group).

Inclusion criteria were patients with a history of at least two episodes of syncope or more in the previous year, no mental or physical disorder, no use of drugs that affect syncope (such as mineralocorticoid and beta-blockers), and a positive tilt test. Exclusion criteria included patients with suspected or overt heart disease with a high probability of cardiac syncope, vascular steal syndrome, and voluntary withdrawal from the study.

All children and adolescents referred to a pediatric cardiology clinic for evaluation of syncope symptoms were visited by a pediatric cardiologist with a complete physical examination and complementary diagnostic tests such as electrocardiogram and echocardiography and were deemed to be potentially eligible participants (for syncope) based on UTT results.

In total, 130 eligible children and adolescents with syncope were assessed for eligibility. The subjects were selected based on a simple sampling method among all children and adolescents who were referred to a pediatric cardiology clinic for the evaluation of syncope symptoms. Before random allocation, six patients did not meet inclusion criteria, and four patients were excluded from the study due to unwillingness to participate in the study. The remaining children and adolescents (n = 120) were randomly divided into control (n = 60) and intervention (n = 60) through block randomization.

Numbered, opaque envelopes were used to conceal the allocation of participants. The patients were blinded in

this study. According to the random sequence generated, cards A (intervention) and B (control) were placed in an opaque envelope. In the next step, envelope number 1 was opened for the first participant, and his or her group was selected on the basis of the envelope card. The same method continued for each patient until 60 patients were allocated to the intervention and control groups. We used an independent person who was not involved in the study to allocate concealment and sampling.

In this study, the participants and statistics analyzers were completely unaware of the assigned intervention.

The CONSORT flow diagram of the included participants in the trial is presented in Figure 1.

In this study, educational needs were assessed based on the participants' responses to the pre-test questionnaire. The content of the education program was developed based on the guidelines for the evaluation and management of patients with syncope,[7] and approval by five pediatric cardiologists. Children, adolescents, and their parents in the intervention groups received routine self-care recommendations such as dietary advice, behaviors to prevent syncope, and counter-pressure maneuvers along with tilt training while the control group received usual self-care recommendations without tilt training in two separate individual sessions of 45–60 minutes each, which were held in Imam Hossein Hospital and Shahid Chamran Hospital. The objectives, content, method, and duration of training sessions are shown in Table 1.

All educational sessions in the intervention and control groups were conducted by a pediatric cardiologist and a health education specialist. At the end of the educational intervention, the intervention group received an educational booklet and the control group received a pamphlet.

In addition, after completion of the intervention program, the children and adolescents who participated in this study were followed up by a researcher by telephone (once a month) at the pediatric cardiovascular research center for six months to ensure the implementation of the educational programs.

Self-care behaviors and QoL were measured using self-report questionnaires for the intervention and control groups before and six months after the intervention.

The evaluation of the effect of self-care behavior on QoL was the primary outcome of the present study. In addition to the socio-demographic variables, including age, gender, education level, number of family members, level of education of parents, occupation of parents, and history of physical, and mental diseases, etc., the following variables were measured:

Self-care behaviors in children and adolescents with syncope were measured using a researcher-made questionnaire. Self-care behaviors were assessed using 20 items in three sections, based on guidelines for the evaluation and management of patients with syncope[7]:

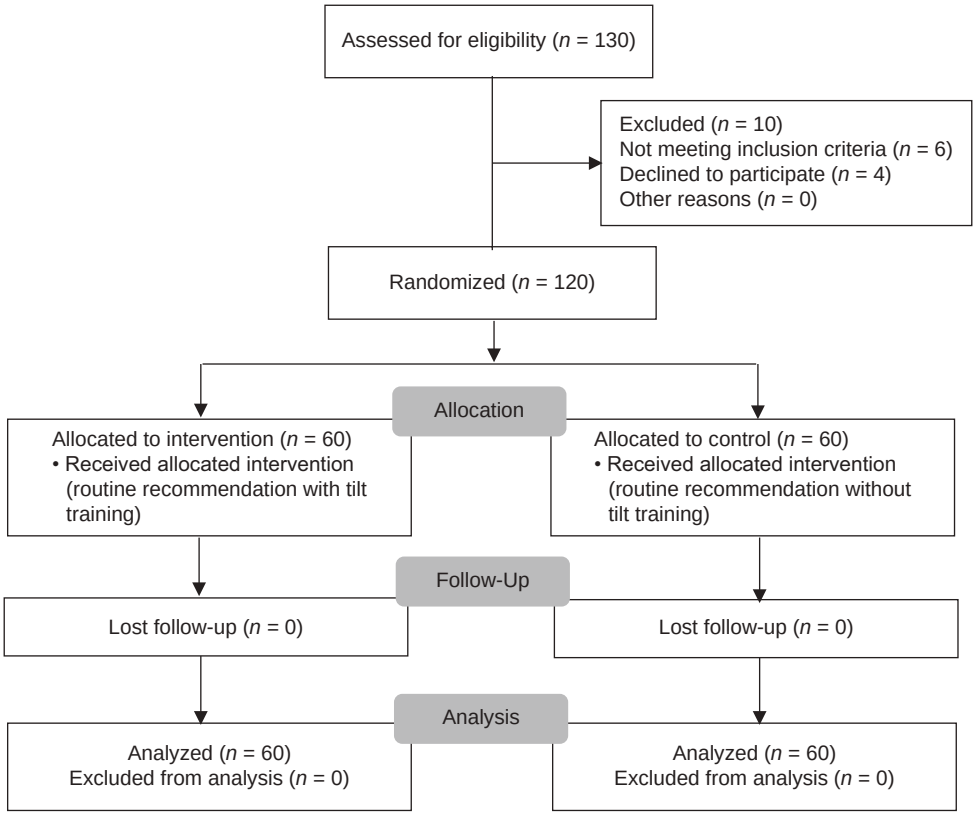

Figure 1: CONSORT flow diagram of participants

Table 1: Objectives, content, method, and duration of educational sessions

Sessions	Object	Content**	Training method
1	Patient education on the diagnosis and prognosis of VVS	-Providing explanations about the basic definition of syncope and an assessment of the cause of syncope -Diagnosis, management, and treatment of syncope -The importance of self-care behaviors in syncope -Reassuring parents about the benign nature of the condition	-Lecture -Questions and answers
2	Education of patients on self-care behaviors	-Eating breakfast -Increasing daily intake of salt to 5.0 g (equals 5,000 mg or 1 tsp) -Eating salty snack -Drinking plenty of water and fluids -Avoiding prolonged standing and sitting in one place -Avoiding exposure to warm environments -Stress management in dental and medical environments -Increasing strengthening exercises in a seated position or lying down, as well as performing isometric muscle tensing (including arm tensing and leg tensing) -Performing physical counter-maneuvers (e.g., limb or abdominal contraction, squatting, leg-crossing) -Increased strengthening exercises in a sitting position or lying down, performing isometric muscle tensing (e.g., arm tensing and leg tensing) -*Standing quietly against a wall (tilt training)	-Lecture -Questions and answers -Role-playing

*The intervention group received all training on self-care behaviors with tilt training (standing-training). **At the end of the educational intervention, the intervention group received an educational booklet and the control group received a pamphlet

Dietary advice (e.g., eating breakfast, increasing daily salt intake, eating salty snacks, and drinking plenty of water and fluids) (five items).

Behaviors to prevent the recurrence of syncope (e.g., avoidance of prolonged standing or sitting in one place, avoidance of exposure to warm environments, stress management in dental and medical environments, avoidance of sudden movements or changes of position, etc.) (eight items).

Physical counter-maneuvers (e.g., limb or abdominal contraction, squatting, leg-crossing), increased strengthening exercises in a sitting or lying down position, performing isometric muscle tensing (e.g., arms tensing, and leg tensing) (six items), and standing quietly against a wall (tilt training) for the intervention group (one item).

The self-care questions were scored on a five-point rating scale ranging from 1 (never) to 5 (always).

The Content Validity Index (CVI) and Content Validity Ratio (CVR) were used to determine the validity of the instrument after approval by five expert faculty members (pediatric cardiologists).

CVR and CVI of the designed scale ranged from 0.90 to 1.00. The reliability of the instrument was examined using Cronbach's alpha coefficient (α = 0.71–0.80).

For measuring the QoL, the Pediatric Quality of Life Inventory™ (PedsQL™ 4.0) was used. The PedsQL™ 4.0 is a questionnaire assessment tool used to evaluate health-related QoL (HRQoL) in children.[13] The Persian version of the PedsQL™ 4.0 was previously translated and validated by other studies in Iran.[14,15] Cronbach's alpha was obtained to be between 0.74 and 0.87.

This questionnaire includes five domains (e.g., physical function (eight items), emotional function (five items), school function (five items), social function (five items), psychosocial function (six items), and general understanding of health (one item)). Each item is rated on a scale from 1 (never) to 5 (always).

Data were analyzed with Statistical Package for the Social Sciences (SPSS) software (version 25.0, IBM Corporation, Armonk, NY, USA).

To investigate the normal distribution of the data, the Kolmogorov-Smirnov test was used. The frequencies and percentages were computed for nominal and ordinal variables and the mean and standard deviation (SD) were calculated for continuous variables.

A Chi-square test was applied for the analysis of the nominal and categorical variables. For the analysis of changes within each group, we used the Wilcoxon test

for non-normally distributed data and the paired *t*-test for normally distributed data. The Mann-Whitney U test and the independent-samples test are used to compare differences in the dependent variable between two independent groups for non-normally distributed and normally distributed data, respectively. The significance level was chosen at 5.0%.

Ethical considerations

The protocol was approved by the ethics committee of the Isfahan University of Medical Sciences (IR.MUI.REC.1396.2.125), and all participants signed the written informed consent before participation.

Results

Overall, 120 children and adolescents participated in this study. They were randomly assigned to either an intervention group (n = 60) or a control group (n = 60). The intervention and control groups were similar at baseline. According to the results of the Chi-square test, no significant differences were found between the groups in terms of age (p = 0.616), gender (p = 0.118), number of family members (p = 0.651), birth order (p = 0.497), educational level (p = 0.650), parent's education (p = 0.759, p = 0.198), parent's occupation (p = 0.191, p = 0.990), and type of living arrangement (p = 0.402). The mean age in the intervention group and control group was 11.87 (3.11) and 12.55 (3.34) years, respectively. Table 2 demonstrates the socio-demographic characteristics of participants.

The results of the Mann-Whitney test showed that there was no significant difference in the mean scores for all dimensions of QoL in the intervention and control groups before the intervention ($p > 0.05$).

The Wilcoxon test results showed a significant difference in the mean scores of physical functioning, emotional functioning, social functioning, school functioning, psychosocial functioning, understanding of health, and total QoL in the intervention and control groups before and after the intervention ($p < 0.05$) [Table 3].

Based on the independent *t*-test results, the intervention and control groups were not statistically different in the mean scores of self-care domains and total self-care before the intervention ($p > 0.05$). The paired *t*-test results showed a significant difference in the mean scores of self-care domains and total self-care in the intervention and control groups before and after the intervention ($p < 0.05$) [Table 4].

Discussion

Self-care is one of the main factors to promote positive health outcomes and prevent frequent syncope episodes in patients.[6] The purpose of the present study was to assess the effect of self-care recommendations with and without tilt training on QoL in children and adolescents with VVS.

Generally, the aim of syncope treatment and management is to prevent children and adolescents from accidental injury, reduce syncopal recurrence, and improve patients' QoL.[11]

Self-care behavior education including increasing daily salt and fluid intake, avoiding prolonged standing and sitting, avoiding warm environments, physical counter-pressure maneuvers, standing quietly against a wall, etc. are helpful and necessary first strategies, especially for children and adolescents with syncope.[16,17]

The result of a systematic review and meta-analysis by Hockin *et al*.[8] shows that the frequency of syncopal events with profound impairment in all domains of physical and mental health is the most important factor influencing the QoL of patients with syncope. Syncopal episodes in patients can lead to anxiety, fear, stress, and distress and affect the individual's ability to participate fully in active, independent living and activities of daily living.[8] In our study, data analysis showed that the mean scores of physical and mental health, emotional functioning, social functioning, and school functioning domain in the intervention and control groups were significantly lower before the intervention.

The study results are similar to those obtained by Kovalchuk *et al*.[18] that the PedsQL scores and psychosocial health, emotional functioning, and social functioning domain scores were reduced in the patients with VVS.

In addition, the results of the study by Jorge *et al*.[19] showed activity restrictions in children and adolescents because the frequent syncope episodes may impair school attendance, performance and participation in activities.

Moreover, the results of a qualitative study by Skeldon *et al*.[20] on adolescents aged 12–17 years old show that syncope affects their current and future opportunities, psychological well-being, and HRQoL. This evidence suggests that in addition to standard management of syncope, attention to physical, social, and mental health concerns and injury rehabilitation is a priority to prevent school absenteeism in patients with VVS syncope, especially in children and adolescents with frequent syncope episodes.[20]

Based on the results of the present study, the score of all PedsQL domains (including physical functioning, emotional functioning, social functioning, school functioning, psychosocial functioning, and understanding of health) increased significantly in all patients with syncope in both groups after the intervention with a six-month follow-up.

Moreover, the results of similar studies by Shigeyasu *et al*.[21] showed that patient education, including teaching self-care and healthy lifestyle advice, facilitates self-efficacy, which is a significant predictor of QoL. These results indicate that, due to the usually benign nature of VVS and its frequent remission, the

Table 2: Socio-demographic characteristics of the participants

Characteristics Continuous variables	Intervention (self-care with tilt-training) (*n*=60) Mean (SD)	Control (self-care without tilt-training) (*n*=60) Mean (SD)	df	*p**
Age (years)	11.87 (3.11)	12.55 (3.34)	118	0.616
Categorical variables	***n* %**	***n* %**		***p*****
Gender				
Boy	15 (25.00)	24 (40.00)		
Girl	45 (75.00)	36 (60.00)	2	0.118
Number of family members				
Three	11 (18.33)	13 (21.67)		
Four	31 (51.67)	34 (56.67)	3	0.651
Five	15 (25.00)	12 (20.00)		
Six	3 (5.00)	1 (1.66)		
Birth order				
First-born	30 (50.00)	35 (58.34)		
Second-born	21 (35.00)	21 (35.00)	3	0.497
Third-born	6 (10.00)	3 (5.00)		
Fourth-born	3 (5.00)	1 (1.66)		
Educational level				
(Grade 1–6) elementary school	33 (55.00)	38 (63.34)		
(Grade 7–8) high school	11 (18.33)	9 (15.00)	2	0.650
(Grade 9–12) high school	16 (26.67)	13 (21.66)		
Mother's education				
Illiterate	3 (5.00)	1 (1.66)		
Elementary school	3 (5.00)	5 (8.34)		
High school	11 (18.33)	8 (13.33)	5	0.759
Diploma	24 (40.00)	28 (46.67)		
College degree or more	19 (31.67)	18 (30.00)		
Father's education				
Illiterate	6 (10.00)	1 (1.66)		
Elementary school	9 (15.00)	10 (16.66)		
High school	8 (13.33)	10 (16.66)	5	0.198
Diploma	15 (25.00)	22 (36.67)		
College degree or more	22 (36.67)	17 (28.35)		
Mother's occupation				
Housewife	49 (81.70)	54 (90.00)		
Employed	11 (18.30)	6 (10.00)	1	0.191
Father's occupation				
Laborer	16 (26.67)	15 (25.00)		
Employee	11 (18.33)	12 (20.00)		
Retired	3 (5.00)	3 (5.00)	4	0.990
Self-employed	28 (46.67)	27 (45.00)		
Unemployed	2 (3.33)	3 (5.00)		
Type of living arrangement				
Living with father and mother	56 (93.33)	58 (96.67)		
Living with mother	4 (6.67)	2 (3.33)	1	0.402

Significant at 0.05 level, **p*=independent samples *t*-test, ***p*-value=Chi-square tests, SD=standard deviation

implementation of self-care recommendations in patients with syncope will improve the QoL of patients with VVS.[21]

The results of our study are consistent with these findings and show that teaching self-care behaviors is effective in improving the QoL of children and adolescents with syncope.

The results of the present study showed that self-care behaviors (including dietary advice, preventive behaviors, counter-pressure maneuvers, and physical exercise) were significantly increased after six months in both groups of children and adolescents who performed the syncope routine recommendations with and without tilt training (standing-training).

Table 3: Comparison between the Mean (SD) scores of quality of life (PedsQL) domains in children and adolescents at baseline and 6 months after intervention in two groups

PedsQL domains	Intervention (self-care with tilt-training) (*n*=60) Mean (SD)***	Control (self-care without tilt training) (*n*=60) Mean (SD)	df*	*p**
Physical functioning				
Baseline	33.70 (5.72)	32.93 (6.78)	1	0.818
Six months after intervention	37.28 (3.45)	39.90 (3.68)		
*p***	<0.001	<0.001		
z**	−4.12	−4.42		
Emotional functioning				
Baseline	16.66 (5.57)	17.58 (5.01)	1	0.395
Six months after intervention	20.70 (3.95)	21.60 (3.10)		
*p***	<0.001	<0.001		
z**	−5.12	−5.58		
Social functioning				
Baseline	19.86 (5.17)	18.53 (5.19)	1	0.096
Six months after intervention	23.78 (2.06)	23.11 (3.31)		
*p***	<0.001	<0.001		
z**	−5.43	−5.98		
School functioning				
Baseline	21.63 (4.36)	21.83 (3.59)	1	0.638
Six months after intervention	23.35 (2.95)	23.85 (2.71)		
*p***	0.001	<0.001		
z**	−3.35	−3.80		
Psychosocial functioning				
Baseline	19.81 (3.36)	19.76 (4.09)	1	0.971
Six months after intervention	26.90 (3.31)	27.61 (3.39)		
*p***	<0.001	<0.001		
z**	−4.95	−3.50		
Understanding of health				
Baseline	3.28 (0.90)	3.18 (0.70)	1	0.562
Six months after intervention	4.45 (0.64)	4.13±0.83		
*p***	<0.001	<0.001		
z**		−5.15		
Total				
Baseline	114.98 (18.14)	113.83 (19.31)	1	0.840
Six months after intervention	131.78 (11.74)	133.35 (11.90)		
*p***	<0.001	<0.001		
*Z***	−5.70	−6.28		

Significant at 0.05 level, *the results of the Mann-Whitney test, **the results of the Wilcoxon test, ***SD=standard deviation

In this study, dietary recommendations, including eating breakfast, increasing daily salt intake and salty snacks, and drinking plenty of water and fluids, were considered to be a dimension of self-care behaviors. Similarly, a meta-analysis published by Wang *et al*.[22] with the aim to assess the efficacy of increased salt and water intake on pediatric VVS showed that salt and water intake is an effective measure in the management and treatment of pediatric VVS and can significantly reduce the recurrence rate of syncope or presyncope.

Therefore, it is theoretically believed that salt and water supplementation may increase blood volume and have a role in the prevention and management of VVS in children and adolescents.[9] Our results showed the importance of increasing salt and water intake in patients with syncope, indicating that self-care behavior education can help improve VVS and QoL.

In our study, lifestyle modification education programs (including avoiding prolonged standing and sitting in one place, exposure to warm environments, etc.) increased in both groups after education and six-month follow-up. Similar to this research, the results of the study by Dani *et al*.[23] showed that a multifaceted approach to syncope management and treatment (including patient education and lifestyle changes) plays a critical role in syncope and reduces physical, psychological, and

Table 4: Comparison between the mean scores of self-care domains in children and adolescents with syncope at baseline and six months after intervention in both groups

Self-care domains	Intervention with tilt-training (*n*=60) Mean (SD)***	Control without tilt-training (*n*=60) Mean (SD)	*p**	df*	*t**
Dietary advice					
Baseline	9.38 (3.02)	9.78 (3.63)	0.513	118	−0.655
Six months after intervention	18.05 (2.77)	18.50 (2.08)			
*p***	<0.001	<0.001			
df **	59	59			
*t***	−15.39	−17.59			
Behaviors to prevent syncope					
Baseline	18.31 (5.46)	17.68 (6.12)	0.555	118	0.598
Six months after intervention	35.48 (4.50)	33.48 (3.13)			
*p***	<0.001	<0.001			
df **	59	59			
*t***	−16.30	−16.81			
Counter-pressure maneuvers					
Baseline	5.55 (1.88)	4.75 (1.49)	0.291	118	−1.06
Six months after intervention	19.45 (5.16)	16.98 (3.24)			
*p***	<0.001	<0.001			
df **	59	59			
*t***	−20.16	−26.28			
Total					
Baseline	32.21 (8.63)	30.83 (8.35)	0.105	118	−1.63
Six months after intervention	72.98 (10.68)	68.96 (6.45)			
*p***	<0.001	<0.001			
df **	59	59			
*t***	−20.23	−26.28			

Significant at 0.05 level, *the results of the independent sample *t*-test, **the results of the paired sample *t*-test, ***SD=standard deviation

Note:

Dietary advice (e.g., eating breakfast, increasing daily salt intake, eating salty snacks, and drinking plenty of water and fluids).

Behaviors to prevent syncope (e.g., avoidance of prolonged standing or sitting in one place, avoidance of exposure to warm environments, stress management in dental and medical environments, and avoidance of sudden movements or changes of position, etc.).

Counter-pressure maneuvers (e.g., limb or abdominal contraction, squatting, leg-crossing), increased strengthening exercises in a sitting position or lying down, and performing isometric muscle tensing (e.g., arm tensing and leg tensing).

psychosocial morbidity in patients, which is associated with improving the QoL in them.

In the present study, we observed an increase in the children's and adolescents' mean scores for exercises and physical counter-pressure maneuvers six months after the intervention completion. Consistent with the present study, the results of a systematic review and meta-analysis by Williams *et al*.[24] show that physical counter-pressure maneuvers are a risk-free, cost-effective, and first-line management strategy for syncope prevention.

The results of the study by Loughlin *et al*.[9] and Alizadeh *et al*.[25] show that QoL in patients is inversely related to the frequency of recurrent syncope. Therefore, training in physical counter-pressure maneuvers for patients with VVS may reduce episodes of syncope, lower syncope burden, and improve QoL.

Our results showed that with the addition of tilt training to the routine recommendations for the management of syncope, there were no large differences in the mean scores for QoL between the two groups. Therefore, tilt training as an adjunctive therapy alone is not superior for the reduction of recurrent syncope and improvement of QoL in patients with syncope.[7] Similarly, the results of the study by Sabri *et al*.[26] during an eight-year follow-up period on 70 patients (aged 5–20 years) with syncope demonstrated that nonpharmacologic treatment (including diet along with tilt training) is effective in the prevention of syncope relapses.

Therefore, according to the American College of Cardiology guidelines for the evaluation and management of patients with syncope, conventional recommendations such as fluid and salt intake, patient education on the diagnosis and prognosis of VVS, and physical counter-pressure maneuvers along with tilt training are

effective in the prevention and management of syncope and improve patients' QoL,[7] which has been confirmed by current researchers.

It can be said that self-care education for children and adolescents with syncope leads to increased awareness, prevention of syncope recurrence, and improved QoL in these patients.

Among the strengths of this study is that it was designed and implemented for the first time to investigate the effect of self-care on the QoL of children and adolescents with syncope in Iran and across the world. Other strengths of this study are the investigation of QoL in children and adolescents with syncope in both genders of participants, face-to-face education, and six-month follow-up.

The most important limitation of this study was that the PedsQL™ inventory was not used for parent reports. Therefore, future studies are recommended to compare the effects of self-care on QoL in children and adolescents with syncope using the PedsQL™ 4.0 inventory for child self-report and parent proxy. Another limitation of the present study was the use of a self-report questionnaire. Consequently, to increase the generalizability of the results, more studies are warranted in this regard.

Conclusion

Routine recommendations for self-care behaviors, including dietary advice, preventive behaviors, and performing counter-pressure maneuvers with and without tilt training, can improve the QoL of children and adolescents with syncope. This study also showed that adding tilt training (standing training) to self-care behaviors did not significantly improve QoL scores in children and adolescents with syncope. As a result, clinicians can use all self-care recommendations for the management and prevention of syncope and effectively improve the QoL of patients with syncope.

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Conflicts of interest

Nothing to declare.

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Original Article

Relationship between 25-Hydroxyvitamin D3 Levels with Pain Intensity and Duration of Labor Stages in Primiparous Women

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Abstract

Background: Prolonged labor is associated with various maternal and neonatal complications. This study aims to investigate the relationship between 25-hydroxyvitamin D3 levels and pain intensity and duration of labor stages in primiparous women. **Materials and Methods:** This cross-sectional study was conducted in Iran from November 2021 to January 2022 and comprised primiparous women who were in active labor after a term pregnancy (37–42 weeks). Five milliliter of blood was taken from each subject and centrifuged for the measurement of vitamin D level using the enzyme-linked immunosorbent assay method. The High-Performance Liquid Chromatography (HLPC) method was used to measure 25-OH vitamin D. In addition, through history, examination, and investigations, the subjects were evaluated according to the pain intensity and duration of the first (active phase) and second stages of labor. **Results:** The results of the Pearson correlation test indicated a significant relationship between vitamin D and active phase duration (r = 0.64, p = 0.012), second stage duration (r = 0.73, p = 0.001), pain intensity of the active phase (r = 0.61, p = 0.022), and pain intensity of the second stage (r = 0.65, p = 0.026). According to the analysis of variance table, based on vitamin D, there were statistically significant differences between the groups in terms of the active phase duration, second stage duration, pain intensity of the active phase, and that of the second stage of labor (p < 0.05). **Conclusions:** Low levels of vitamin D may influence the progress of labor and increase the rate of prolonged labor.

Keywords: *25-Hydroxyvitamin D3, labor stage, labor pain, pregnancy*

Introduction

Childbirth is one of the most unique moments in women's lives, but if its stages are prolonged, it becomes an unbearable phenomenon.[1] According to studies conducted in Indonesia and Guatemala, the prevalence of prolonged labor was 2.8%.[2] According to a study in public maternity centers in Kashan, Iran, the rate of cesarean section (CS) after prolonged delivery and lack of progress in labor was 7.4%[3]; and in general, prolonged labor in Iran has been reported in 10% of pregnancies.[4] Prolonged and difficult labor is a critical condition[5] with maternal complications including the risk of uterine rupture, vesicovaginal or vesicocervical fistulas, severe rupture of the genital area, cystocele, rectocele, infertility, and fetal complications such as head compression, hypoxia, and a low Apgar score,[1] which are associated with suffocation, seizures, cerebral palsy, and eventually fetal death.[6] Recent reports suggest that poor muscle function and contractile disorders may be signs of vitamin D deficiency.[7] Nowadays, there is a possibility of a biological relationship between maternal vitamin D deficiency and the side effects of childbirth on muscle function.[8]

Vitamin D deficiency can also affect the method of delivery in several ways. One of the possible cases is a decrease in the strength of the muscular structure of the uterus and the mother's ability to expel the fetus.[9] Vitamin D, 1, and 25-dihydroxyvitamin D (25-OH-D) receptors are present in skeletal muscle and smooth muscle and naturally increase skeletal muscle function.[10] For this reason, attention to the role of vitamin D in causing uterine contractions has led some researchers to conduct research in this field. Researchers concluded that vitamin D receptors are present in human muscle tissue and that the direct effect of vitamin D on muscle physiology is biologically acceptable.[11]

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Another study showed that vitamin D regulates contractile proteins in myometrial cells.[12] The results of some studies contradict the findings of previous studies; for example, a study conducted at Tehran Women's General Hospital showed that there was no relationship between vitamin D levels and the type of delivery or the length of labor phases.[13]

The results of a review study indicate that serum levels of 25-OH-D were less than 25 ng/ml during pregnancy in 17% Caucasian pregnant women, 61% New Zealand pregnant women, 32–42% Indian pregnant women, 59–84% Kuwaiti pregnant women reported, 84% of Iranian pregnant women, and 75% of pregnant women in the United Arab Emirates (UAE).[7] Due to the widespread deficiency of vitamin D in pregnant women, widespread and costly complications due to vitamin D deficiency, limited scientific research on labor pains and vitamin D, and considering the approach and policies of Iran to promote natural childbirth and increase the rate of primary CS with no medical symptoms or prolonged deliveries, it was decided to obtain effective factors in reducing the rate of CS and increasing natural childbirth.[12] The aim of this study was to determine the relationship between 25-OH-D level and pain intensity and duration of labor in primiparous women, which is an important step to prevent the progression of these complications.

Materials and Methods

A cross-sectional analytical study was conducted in Isfahan City from November 2021 to January 2022. In the present study, primiparous women with cephalic presentation, dilatation of the cervix of 4 cm, spontaneous uterine contractions for at least 40–60 s, and three contractions in 10 minutes were included in the study. Primiparous women aged 18–35 years in active labor (4 cm cervical dilatation with uterine contractions) with gestational age between 37–42 completed weeks (calculated from reliable last menstrual periods and the first or early second trimester ultrasound), with the single viable fetus, longitudinal lie, and cephalic presentation were included and enrolled from the labor room. In cases of problems such as preeclampsia, active bleeding, or evidence of fetal distress in heart rate monitoring, multiple pregnancies, fetal congenital malformations like anencephaly and hydrocephaly, macrosomic fetuses weighing 4 kg or more, abnormalities of amniotic fluid, cephalopelvic disproportion, or any indication for emergency CS during labor like fetal distress, intrauterine fetal death, or intrauterine growth restriction, samples were excluded from the study.

The study was carried out in Zahraye Marzieh Hospital (due to the high statistics of natural vaginal delivery). Before the collection of data, the aim of this study was explained, and informed consent was obtained from all participants. Data were gathered by the researcher in the delivery room using demographic questionnaires (age, Body Mass Index (BMI), economic status, level of education, occupation, and place of residence) and reproductive questionnaires (gestational age, number of abortions, and number of pregnancies) and a delivery progress registration form (partograph). The visual analog scale was a 5-cc syringe and an ELISA kit. The visual pain scale in this study included a straight horizontal ruler that was graded from zero to 10. Number zero indicates the absence of pain, and number 10 indicates the maximum pain intensity. This scale is an effective tool with sensitivity and validity, and its validity and reliability in measuring pain have been evaluated in various studies.[14-16] An examination was performed for all pregnant women, which included measuring height and weight, calculating BMI (using height and weight before or in the first 12 weeks of pregnancy available in the medical record), measuring vital signs, and fetal heart rate (every 30 minutes in the first stage and every 15 minutes in the second stage).

The required sample size was calculated by dividing the correlation coefficient from the pilot study by 0.35, alpha 0.05, and beta 0.085 according to the formula, which equals 91 samples.

After teaching the visual scale to measure pain intensity to the participating women, the amount of pain in the active phase and the second stage of labor was measured by a standard instrument of the visual scale (a ruler).

A partograph diagram was used to record the length of labor stages from the beginning of the active phase to the end of the second stage of labor. The reason for recording dilatation and presentation at the beginning of the active phase of maternal mating at admission was to ensure that all specimens were admitted under the same conditions. After the initial measures, an amniotomy was performed with a 5-cm dilatation to strengthen the labor and check if the amniotic sac is healthy and the fetal head is fixed. Moreover, oxytocin injections were used for patients with dysfunctional uterine contractions. It was started at 2 mIU per minute, and gradually its flow rate and dose could be increased (until three uterine contractions occurred in 10 minutes).

The BMI was categorized as normal when it was <25 kg/m^2, overweight when it was 25.1–29.9 kg/m^2, and obese when it was ≤30 kg/m^2.[17]

For measuring vitamin 25-OH-D level, at the time of admission, 5 mL of venous blood was drawn from each participant and placed in sterile tubes with the patient's name. The separated sera were kept at −30°C until all samples were completed, and then, while being kept in a cold box, they were transferred to a reference laboratory (Abu Reyhan) for measuring 25-OH vitamin D. The enzyme-linked immunosorbent assay (ELISA) method from Immunodiagnostic Systems Limited, validated against the HLPC method, was used to measure 25-OH vitamin D (Monobind Company, USA), and all measurements were reported by nanogram. Participants were classified into the following groups based on the amount of vitamin D:

25-OH-D <20 ng/ml and 20/1–29 ng/ml were considered severe deficiency and moderate insufficiency, respectively, and ≥30 ng/ml was considered normal.

The level of vitamin D (25 OH D) has a biological half-life of three weeks, making the measurement of this element the most reliable indicator of vitamin D. All methods were performed in accordance with the relevant guidelines and regulations.

All statistical analyses were performed using Statistical Package for Social Sciences (SPSS) version 23 (IBM Corp., Armonk, NY, USA). Quantitative variables were described by the mean and standard deviation (SD), and categorical variables were also provided by frequency (percentage). Descriptive statistics were used to provide frequency tables, mean indices, and SD, and the Pearson correlation coefficient and analysis of variance were used to measure the correlation. The significance level was less than 5% ($p < 0.05$).

Ethical considerations

In order to conduct this research, after obtaining the permission of the ethics committee (IR.AJUMS.REC.1400.140), all participants were granted their permission by signing the informed consent form before entering into the study. All participants were allowed to be excluded at any time during the study if they did not wish to continue the research.

Results

Among 200 women referring to the Zahraye Marzieh Hospital in Isfahan, 91 women were included according to the inclusion criteria [Figure 1]. Variance analysis and multiple comparisons were used for comparison in different groups. According to the results, there was a significant difference between the average duration and pain intensity of the active phase and the second stage of labor at three levels of vitamin D ($p = 0$).

Discussion

The purpose of the present study was to evaluate the relationship between 25-hydroxy vitamin D3 levels and pain intensity and duration of labor stages in primiparous women. Vitamin D deficiency is more prevalent in Iranian women.[18]

According to Table 1, the mean and SD of maternal age in the group were 18–35 years (27.07 ± 4.312). Lean considers the elderly age of the mother as a factor in the inefficiency of the uterus as a result of prolonged labor.[19] In this study, the highest economic status was in the moderate group (50.5%), and weak economic status (21.1%) was less common than other conditions. Studies have shown that long and difficult deliveries are more common in women with poor economic status.[20]

Our findings indicated that 87.4% of the participants were homemakers. In this study, the highest level of maternal education was in the high school group (77.9%). One of the most effective factors in health care is the mother's education. Having a minimum basic education allows the mother to use educational books to better understand the educational tips and content; therefore, considering the observance of nutritional principles and other health care during pregnancy, education can have a role in overshadowing the results of pregnancy.[21] In this study and according to the mentioned materials, the subjects were at the appropriate level to read, write, and understand educational concepts. Our findings indicated that 76.8% of the participants had a normal BMI. In various studies, the effect of maternal overweight and obesity has been proven by pregnancy results, so that the average length of the second and third stages of labor in the group of overweight women was higher than that of underweight women.[22] In the present study, the highest status of women was in the city group (86.3%), who experience a longer delivery[23] according to studies of city women.

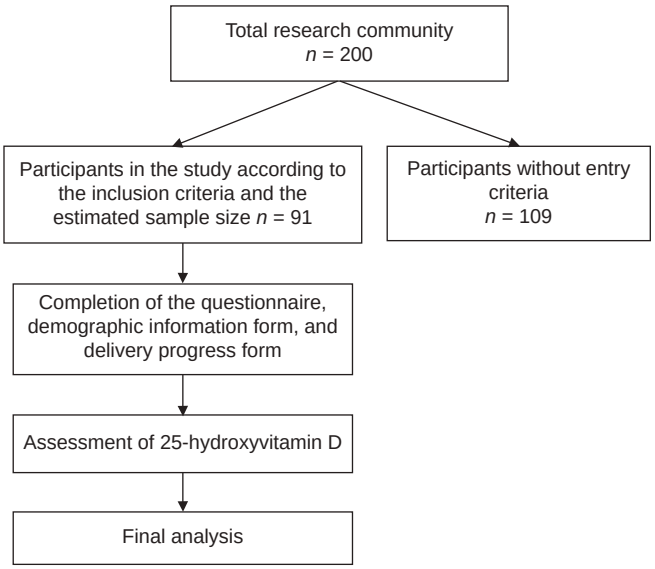

Figure 1: Flowchart of the cross-sectional study

According to Table 2, the highest number of pregnancies occurred in primigravid women (86.3%). Increasing the number of pregnancies is one of the factors associated with prolonging the third stage of labor.[24] Ahmari *et al*.[25] concluded that long and difficult deliveries were observed in women with 0 or 1 more pregnancies. In the present study, all women participating in the study underwent amniotomies (95.8%). A study by Tafazli *et al*.[26] evaluated the performance of midwives showed that one of the reasons for their undergoing amniotomy was to reduce the duration of labor.

Our findings showed that oxytocin was administered to 95.8% of participants. Ebrahimzadeh *et al*.[27] found that oxytocin did not change the shape of contractions or prolong labor. Our results showed that as vitamin D increases, the active phase and second stage duration decrease.

In line with the results of the present study, in a cross-sectional study, Humadi *et al*.[12] showed that in women with long stage 1, the mean level of vitamin D (32.7 ± 16.7) nmol/L was lower than in those without long stage 1 (43.9 ± 22.2) nmol/L, which showed a significant relationship between the two variables ($p < 0.05$). Furthermore, in women with long stage 2, the level of vitamin D (28.1 ± 14.1) nanomoles per liter was lower than in those without long stage 2 (44.3 ± 22.2) nanomoles per liter ($p < 0.05$). In a study, Gernand *et al*.[11] also found that without adjusting BMI before pregnancy, race, or study location, the association between 25-OH-D and the prolonged first and second stages of labor was observed, which is in line with the results of the present study. Contrary to the results of the present study, after adjusting for BMI, race, and prenatal study site, Gernand *et al*. showed that a concentration of 25-OH vitamin D was not associated with a risk of prolonging stages 1 and 2 of labor.[11]

Table 1: Frequency distribution of demographic characteristics of the studied units

Variables	Mean (SD)/*n* (%)
Age (y*)	
18–35 y*	27.07 (4.31)
Economic situation	
Good	23 (24.21)
Moderate	48 (50.53)
Weak	20 (21.11)
Job	
Homemaker	83 (84.74)
Employee	7 (7.45)
Education	
Primary	8 (8.45)
High school	74 (77.94)
University education	9 (9.57)
Body mass index (kg/m^2)	
Underweight	12 (12.62)
Normal	73 (76.81)
Overweight	6 (6.32)
Lodging	
City	82 (86.33)
Town	9 (9.53)
Number of pregnancies	
Primigravida	82 (86.33)
Multigravida	9 (9.53)
Amniotomy	
Yes	91 (100)
No	0
Oxytocin	
Yes	91 (100)
No	0
Mode of delivery	
Normal vaginal delivery	91 (100)
Cesarean section	0

SD=standard deviation

According to Table 3, our results showed that as vitamin D increases, the pain intensity of the active phase and second stage of labor also increases. In line with the results of the present study, in a study, Ahrari *et al*.[28] showed that the average of 25-OH-D in the plasma of women with labor pain was 59.78 ± 08.2 more than that of those without labor pain, 66.51 (4.2) ($p = 0.007$).

The number of studies that have addressed the relationship between 25-OH-D3 levels and pain intensity and duration of labor stages is very low, and to the best of our knowledge, no study has ever been conducted among Iranian women.

In this study, blood samples and the completion of the demographic questionnaire and delivery progress form were done simultaneously, whereas in other studies, questionnaires were completed with a time interval between sampling or patient records were used. On the other hand, the serum level of vitamin D in all samples was assessed by one person, which adds to the accuracy of the research.

Conclusion

A low 25-OH-D3 level during labor was an important predictor of prolonged labor. It means that there was a significant association between 25-OH-D3 deficiency and prolonged stages of labor and poor pain intensity.

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Table 2: Comparison of the mean and standard deviation of active phase and second stage duration by three levels of vitamin D

Variables	Vitamin D level (ng/mL)			*p*
	≥30	20–29	<20	
	Mean (SD)			
Active phase duration (Min/hr*) *n*=91	248.85 (34.09)	282.03 (15.12)	337.88 (55.80)	0.012
Second-stage duration (Min/hr*) *n*=91	34.62 (8.59)	46.25 (5.38)	61.56 (12.92)	0.001

SD=standard deviation

Table 3: Comparison of the mean and standard deviation of pain intensity in the active phase and second stage of labor by three levels of vitamin D

Variables	Vitamin D level (ng/mL)			*p*
	≥30	20–29	<20	
	Mean (SD)			
Active phase intensity (Based on the McGill ruler) (*n*=91)	7.77 (0.71)	7.22 (0.42)	6.88 (0.70)	0.022
Second-stage intensity (Based on the McGill ruler) (*n*=91)	9.31 (0.67)	8.50 (0.50)	8.27 (0.58)	0.02

SD=standard deviation

Conflicts of interest

Nothing to declare.

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Original Article

Lifestyle Interventions vs. Multi Interventional Therapy on Physiological Parameters of Metabolic Syndrome among Women: A Comparative Study

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Abstract

Background: Metabolic syndrome is one of the emerging health issues in developing countries. It includes diabetes, high Blood Pressure (BP), obesity, and elevated blood cholesterol. **Materials and Methods:** This comparative study was conducted from March 2019 to February 2020 in selected areas of Ernakulam district, Kerala. The study used a quasi-experimental design with a nonequivalent control group. One-way analysis of variance and paired *t*-tests were used for statistical analysis. Women (aged between 35 and 55 years) with metabolic syndrome were recruited by multistage sampling ($N = 220$) and randomly assigned into three groups: (a) control, (b) Lifestyle Interventions (LI), and (c) Multi Interventional Therapy (MIT). LI was given to the LI group, and reflexology foot massage along with LI was given to the MIT group for 12 weeks. The control group received routine care. Physiological variables were assessed before and after the intervention. **Results:** Women who received MIT and LI had significantly lower values of weight, Body Mass Index (BMI), and waist circumference after the treatment from baseline and compared with control ($F = 12.09, 15.58, 22.37$, $p < 0.001$). A remarkable change in systolic and diastolic BP was found in the MIT group (pretest mean of systolic BP and diastolic BP in control: 142.3 and 90.1, LI: 141.7 and 89.7, MIT: 141.8 and 89.8, $p = 0.945$, posttest means control: 142.6 and 90.4, LI: 131.5 and 85.5, MIT: 118.5 and 78.3, ($F = 54.83, 57.87$, $p < 0.001$). **Conclusions:** Both LI and MIT should be considered as interventions for reducing the physiological parameters of metabolic syndrome, such as body weight, BMI, and obesity. MIT was found to be more effective in reducing blood pressure.

Keywords: *Body mass index, hypertension, obesity*

Introduction

Metabolic syndrome is a combination of diabetes, high Blood Pressure (BP), and obesity. It is a group of disorders consisting of Insulin resistance, abdominal obesity, dyslipidemia, endothelial dysfunction, genetic susceptibility, increased blood pressure, hypercoagulable state, and continuous stress.[1] Obesity is a killer lifestyle disease, and it is interrelated with other components of metabolic syndrome.[2] The obesity rates have leveled off during the past 10 years in several developed countries.[3] In 2016, more than 1.9 billion adults, 18 years and older, were overweight all over the world.[4] A correlation was found between overweight and obesity with metabolic syndrome.[5] Hypertension (HTN) increases the risk of cardiac arrest, cerebrovascular accident, renal failure, and blindness.[6] In the North Indian state of Punjab, 40.1% of people were found to be hypertensive.[7] Metabolic syndrome adversely affects several body systems.[8] The prevalence of metabolic syndrome among the adult population is 20–25%, whereas in women, it varies between 7 and 56.7%. The prevalence also increases with age.[9] In India, around 1/3rd of the adult population has metabolic syndrome, and in females, it is very high (48.2%) as compared to males (16.3%).[10] In Kerala, it is more prevalent among women.[5] Hence, prime importance should be given to early diagnosis and lifestyle changes.[9] Numerous systematic reviews confirmed the positive effect of reflexology.[10] Studies reported that reflexology foot massage has a significant effect on BP, lipoproteins, and blood sugar levels. However, little is known about the combined effects of LI and reflexology foot massage on body weight, Body Mass

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Index (BMI), waist circumference, and BP among women with metabolic syndrome. Therefore, the study aimed to compare the effectiveness of LI and MIT on body weight, BMI, waist circumference, and BP among women with metabolic syndrome between 35 and 55 years.

Materials and Methods

The current study was conducted from March 2019 to February 2020 among self-help group women in selected areas of Ernakulam district in Kerala. A quasi-experimental nonequivalent control group design was used in this study. Multistage sampling was used to select the samples. The selection of samples and sampling technique are depicted in Figure 1. The sample size was estimated with a 12% expected difference in mean independent variables, a 20% Standard Deviation (SD), and 90% power. Women belonging to the age group of 35–55 years who meet any three of the five criteria of metabolic syndrome were included in the study, like waist circumference >88 cm, systolic BP (SBP) >130 mmHg, or diastolic BP (DPB) >85 mmHg or on treatment for hypertension, high fasting blood sugar >100 mg/dL or on treatment for Diabetes Mellitus (DM), High-Density Iipoprotein (HDL) <50 mg/dL and triglycerides >150 mg/dL. Women who reported a history of heart or kidney disease, cancer, ligament injury, surgery in the leg, neurovascular problems, pregnancy, mental illness, or severe cognitive impairment were excluded from the study. A socio-demographic and clinical information sheet was used to collect the basic information. Body weight was recorded using a calibrated weighing machine (ASIN: B00JB81EWA) kept on a firm surface. A flexible, non-stretchable, narrow plastic inch tape was used to measure height and waist circumference. BMI was calculated by the formula, weight/height $(m)^2$. Waist circumference was measured with non-stretching tape. BP was measured by using a calibrated sphygmomanometer (Model No: CEO483) and a stethoscope. After the assessment interventions are given, LI are given to the LI group. Dietary modification: BMI was assessed. The dietary modification was given as per the BMI. One woman (BMI <18.5) received 1800 kcal/day, 26 women (BMI: 18.5–24.99) received 1500 kcal/day, and 47 (BMI ≥25) women received 1200 kcal/day. A food exchange list was prepared as per the directions of the dietician and provided to the participants. Participants were instructed to maintain a daily diary, and it was monitored weekly to ensure their intake.

Moderate intensity exercises: The women were instructed to walk 30 min per day (between 5 pm and 7 pm) for 5 days a week. Before beginning the exercises, the women were instructed to do warm-up exercises for 10 min, followed by brisk walking for 30 min, and cool down after the walking. A record of walking exercises, including distance walked, duration, and walking speed, was maintained by the participants. It was observed and monitored weekly.

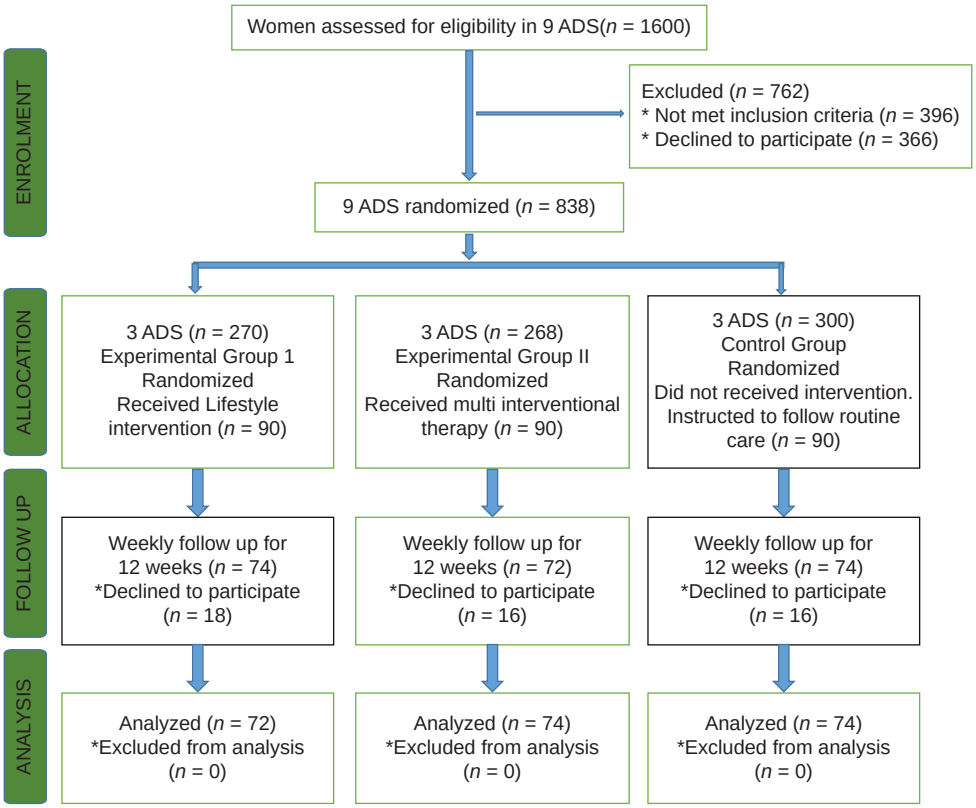

Figure 1: Consort diagram of the study

Structured health education: Individualized health education was given regarding metabolic syndrome components, causes, and its control measures, including diet, exercises, and regular follow-up. The importance of dietary modification was emphasized, and a daily dietary intake of calories, salt, and fiber was recommended. Further emphasized were the benefits of moderate intensity exercises like walking and steps to be followed while walking and warm-up exercises. An information booklet related to metabolic syndrome was given to the participants after the education.

Reflexology foot massage has 10 stages:1. Preparation 2. Lungs 3. Thyroid 4. Liver 5. Gall bladder 6. Stomach from right foot 7. Small intestine, and 8. Large intestine from the left foot, 9. spinal cord, 10. solar plexus, and 11. hypophysis from both feet. Begin every foot reflexology session on the right foot; do the whole foot, followed by the left. The duration of the procedure was 30 min in the specific points related to metabolic syndrome. It was provided once a week for 12 weeks in the home setting. The control group received routine care. The posttest was performed after 12 weeks of intervention among two groups [Figure 1].

One-way Analysis of Variance (ANOVA), paired *t*-test with Student–Newman–Keul's multiple comparisons, was used for comparison between pre and posttest scores of physiological variables. The analysis was carried out using Sigma Plot 13.0 (Systat Software Inc., USA).

Ethical Considerations

The study was approved by the institutional ethical committee. (Approval no: 003/02/2019/IEC/SMCH). Permission was obtained from the State Kudumbashree Mission and Community Development Society. Informed consent was obtained from the participants. Confidentiality was maintained.

Results

Demographic and clinical characteristics of the participants, such as age, marital status, education, occupation, monthly income, type of family, preferred food groups, lifestyle habits, menstruation, history of gestational diabetes, pregnancy-induced hypertension, history of diabetes mellitus, history of hypertension were assessed. Homogeneity was observed in all characteristics of women ($p < 0.05$) [Tables 1 and 2].

The mean weight in the pretest of the control group, Lifestyle Intervention (LI) group, and Multi Interventional Therapy (MIT) group were 62.30, 61.1, and 61.30 kg, respectively. It was not found to be statistically significant ($p = 0.825$). The mean weight in the posttest of the control group, LI group, and MIT group were 62.30, 54.20, and 54.60 kg, respectively. It was found to be statistically significant ($p < 0.001$). The pretest and posttest of the respective control group, LI group, and MIT group were tested by paired *t*-test. In the case of control, it was not significant ($p = 1.0$). Whereas, in the case of the LI group and MIT group, it was statistically significant ($t = 22.74, 14.58$, $p < 0.001$). Compared to the control, both MIT and the interventional package were found to be statistically significant ($F = 12.09$ $p < 0.001$). Compared to LI, MIT was not significant ($p = 0.849$). The mean BMI in the pretest of the control group, LI group, and MIT group are 26.50, 23.60, and 23.70, respectively. It was not found to be statistically significant ($p = 0.927$). The mean BMI in the posttest of the control group, LI group, and MIT group are 26.5, 23.6, and 23.7, respectively. It is found to be statistically significant ($F = 15.58$, $p < 0.001$). A significant difference was observed in the paired *t*-test between the pre and posttest of the respective LI group and MIT ($t = 19.39, 12.98$, $p < 0.001$). However, it was not significant in the control group ($p = 0.188$). Compared to LI, MIT was not significant ($p = 0.849$). The mean waist circumference in the pretest of the control group, LI group, and MIT group are 95.0, 95.1, and 95.0 cm, respectively. It was not found to be statistically significant ($p = 0.996$). The mean waist circumference in the posttest of the control group, LI group, and MIT group are 95.20, 88.30, and 87.9 cm, respectively. It was found to be statistically significant ($F = 22.37$, $p < 0.001$). The pretest and posttest of the respective control group, LI group, and MIT group were tested by paired *t*-test. In the case of control, it was not significant ($p = 0.021$). Whereas, in the case of the MIT group and LI group, it was statistically significant ($t = 17.08, 22.48$, $p < 0.001$). Compared to control, both MIT and LI were found to be statistically significant ($F = 22.37$, $p < 0.001$). Compared to MIT, LI was not significant ($p = 0.758$). The mean SBP in the pretest of the control group, LI group, and MIT group were 142.3, 141.7, and 141.9 mmHg, respectively. It was not found to be statistically significant ($p = 0.971$). The mean systolic BP in the posttest of the control group, LI group, and MIT group were 142.7, 131.51, and 118.2 mmHg, respectively. It was found to be statistically significant ($F = 54.83$, $p < 0.001$)*. The pretest and posttest of the respective control group, LI group, and MIT group were tested by paired *t*-test. In the case of control, it was not significant ($p = 0.156$). Whereas, in the case of the MIT group and LI group, it was statistically significant ($t = 27.36, 27.36$, $p < 0.001$). Compared to control, both MIT and LI were found to be statistically significant ($F = 54.83$, $p < 0.001$). Compared to LI, MIT was significant.

The mean DBP in the pretest of the control group, LI group, and MIT group were 90.1, 89.7, and 89.8 mmHg, respectively. It was not found to be statistically significant ($p = 0.945$). The mean systolic BP in the posttest of the control group, LI group, and MIT group were 90.4, 85.5, and 78.3 mmHg, respectively. It was found to be statistically significant ($F = 57.87$, $p < 0.001$). The pretest and posttest of the respective control group, LI

Table 1: Homogeneity verification of demographic characteristics (*n*=220)

Characteristics	Classification	CO* (*n*=74) *n* (%)	MIT** (*n*=72) *n* (%)	LI*** (*n*=74) *n* (%)	χ^2	*p*
Age (Years)	35–40	13 (17.60)	11 (15.31)	11 (14.90)	0.54	0.997
	41–45	11 (14.99)	12 (16.70)	12 (16.20)		
	46–50	17 (23.00)	16 (22.20)	19 (25.70)		
	51–55	33 (44.60)	33 (44.80)	32 (43.30)		
Marital status	Married	63 (85.10)	61 (84.70)	63 (85.10)	0.05	0.997
	Widow	10 (13.50)	10 (13.90)	10 (13.50)		
	Divorced	1 (1.50)	1 (1.40)	1 (1.40)		
Education	Graduation and above	6 (8.10)	6 (8.30)	6 (8.10)	0.86	0.990
	Higher Secondary	21 (28.40)	20 (27.8)	19 (25.70)		
	Secondary	21 (28.40)	22 (30.60)	26 (35.10)		
	Primary	26 (35.10)	24 (33.30)	23 (31.10)		
Occupation	Professional	2 (2.70)	2 (2.80)	2 (2.70)	0.20	1.0
	Skilled worker	8 (10.80)	8 (11.10)	8 (10.80)		
	Unskilled worker	15 (20.30)	14 (19.40)	13 (17.60)		
	Unemployed	49 (66.30)	48 (66.70)	51 (69.00)		
Monthly income (Rupees/Month)	<6000/-	17 (23.00)	18 (25.00)	18 (24.30)	1.43	0.964
	6000–10000	29 (39.20)	29 (40.30)	34 (45.90)		
	10000–20000	23 (31.10)	20 (27.80)	17 (23.00)		
	20000–50000	5 (6.80)	5 (6.90)	5 (6.80)		
Type of family	Joint family	23 (31.10)	22 (30.60)	25 (33.80)	0.20	0.903
	Nuclear family	51 (68.90)	50 (69.40)	49 (66.20)		
Food habits	Vegetarian	16 (29.60)	15 (20.80)	14 (18.90)	0.18	0.916
	Mixed food	58 (78.40)	57 (79.20)	60 (81.10)		
Menstruation	Regular	31 (41.90)	28 (38.90)	24 (32.40)	2.58	0.631
	Irregular	12 (16.20)	12 (16.70)	18 (24.30)		
	Menopause	31 (41.90)	32 (44.40)	32 (43.20)		

*CO=Control, **LI=Lifestyle interventions, ***MIT=Multi interventional therapy

group, and MIT group were tested by paired *t*-test. In the case of control, it was not significant ($p = 0.244$). Whereas, in the case of the MIT group and LI group, it was found to be statistically significant ($t = 15.84, 21.08$, $p < 0.001$). Compared to control, both MIT and LI were found to be statistically significant ($F = 54.83$, $p < 0.001$). Compared to LI, MIT was significant [Table 3].

Discussion

The findings of the study highlight that the application of MIT and LI has a remarkable role in improving the physiological parameters of metabolic syndrome. In the present study, the MIT group and LI group showed a significant decrease in the means of body weight, BMI, and waist circumference after 12 weeks of intervention. A review says that exercise programs reverse metabolic syndrome, and weight loss is best achieved by decreasing energy consumption and increasing energy expenditure.[11,12] A three-armed RCT on the effect of diet with or without exercise on abdominal fat in postmenopausal women for 15 weeks found a reduction of weight among both groups.[13] Moderate or vigorous aerobic exercises have a greater effect on visceral adipose tissue, and exercise training significantly reduces body weight.[14,15] Well-planned lifestyle modification programs are necessary for treating obesity.[16] Reviews support the use of exercise to reverse metabolic syndrome.[11] Similarly, the combined use of acupuncture and massage also significantly reduced the BMI among obese women.[17]

Here, a marked reduction in SBP and DBP among the MIT group was observed as compared to the LI group. A significant correlation was found between SBP and DBP with weight, waist circumference, salt intake, and physical activity.[17] Another study using multi-lifestyle residential medical interventions for reversing hypertension also found that SBP decreased significantly within 14 days.[18] A systematic review observed that Community-based health workers' interventions are effective in promoting Cardiovascular Disease (CVD) risk reduction.[19] Studies found increased adherence to the therapeutic regimen in people with hypertension who received teaching by nurses.[20] Similarly, in another study, LI by a female healthcare provider was found to be effective in lowering SBP.[21] The review says that foot massage on both feet for 20 min twice a day for 3 days significantly reduced the BP.[22] Both reflexology massage and trans-dental meditation were found effective.[23] A systematic review also supports the role of reflexology in reducing BP.[24] In another study, foot massage and back massage

Table 2: Homogeneity verification of clinical variables (*n*=220)

Variables	Classification	CO* (*n*=74) *n* (%)	MIT*** (*n*=72) *n* (%)	LI** (*n*=74) *n* (%)	χ^2	*p*
H/o PIH	Present	4 (5.40)	3 (5.60)	4 (5.40)	0.01	0.999
	Absent	70 (94.60)	69 (94.40)	70 (94.60)		
H/o gestational diabetes	Present	6 (9.50)	7 (9.70)	8 (9.50)	0.004	0.998
	Absent	68 (90.50)	65 (90.30)	66 (90.50)		
H/o diabetes mellitus	Present	19 (25.70)	18 (25.00)	16 (21.60)	0.38	0.827
	Absent	55 (74.30)	54 (75.00)	58 (78.40)		
H/o hypertension	Present	22 (29.70)	22 (30.60)	24 (32.40)	0.13	0.936
	Absent	52 (70.30)	50 (69.40)	50 (67.60)		
H/o dyslipidemia	Present	8 (9.50)	7 (9.70)	6 (9.46)	0.004	0.998
	Absent	66 (90.50)	65 (90.30)	68 (90.50)		

*CO=Control, **LI=Lifestyle interventions, ***MIT=Multi interventional therapy, PIH=Pregnancy induced hypertension

Table 3: Mean, standard deviation (SD), One-way ANOVA, and paired t of physiological parameters among control (CO), Lifestyle intervention (LI), and Multi Interventional Therapy (MIT) Group (*n*=220)

Variable	Time	CO (*n*=74)		LI (*n*=74)		MIT (*n*=72)		f	*p*
		Mean (SD)	Paired "*t*" (*p*)	Mean (SD)	Paired "*t*" (*p*)	Mean (SD)	Paired "*t*" (*p*)		
Weight (kg)	Pretest	62.30(1.80)	0.00 1.00	61.20 (1.20)	22.74 0.00	61.30 (1.20)	14.58 0.00	0.19	0.83
	Posttest	62.30 (1.80)		54.20 (1.00)		54.60 (0.90)		12.09	*p*<0.001
Body mass index (kg/m^2)	Pretest	26.40(0.50)	1.33 0.19	26.40 (0.50)	19.39 0.00	26.50 (0.50)	12.98 0.00	0.08	0.93
	Posttest	26.50 (0.50)		23.60 (0.40)		23.70 (0.30)		15.57	*p*<0.001
Waist circumference (cm)	Pretest	95.00 (1.00)	2.36 0.02	95.10 (1.00)	17.01 0.00	94.90 (1.00)	22.48 0.00	0.00	1.00
	Posttest	95.20 (1.00)		88.30 (0.80)		87.90 (0.80)		22.37	*p*<0.001
Systolic blood pressure (mmHg)	Pretest	142.30 (1.80)	1.43 0.16	141.70 (1.90)	27.37 0.00	141.80 (1.80)	22.50 0.00	0.03	0.97
	Posttest	142.60 (1.80)		131.50 (1.80)		118.00 (1.30)		54.83	*p*<0.001
Diastolic blood pressure (mmHg)	Pretest	90.10 (0.90)	1.18 0.24	89.70 (1.00)	15.84 0.00	89.80 (0.90)	21.08 0.00	0.06	0.95
	Posttest	90.40 (0.90)		85.50 (0.90)		78.30 (0.60)		57.87	*p*<0.001

*CO=Control, **LI=Lifestyle interventions, ***MIT=Multi interventional therapy, ANOVA=analysis of variances

were found to be equally effective in reducing BP.[25] These studies strongly support the findings of the present study, and reflexology foot massage can be recommended along with LI for reducing BP among women with metabolic syndrome. One strength of this study is that it includes three groups of women, with two intervention groups and one control group. Another strength of the study is that it is one of the first few studies conducted in India among middle-aged self-help group women where the metabolic syndrome is addressed. The intervention was provided by the trained researcher. The study is limited to middle-aged women, and enactment of the interventions was assessed through monitoring the self-reported activity checklist and dietary diary.

Conclusions

The study results added more evidence to support the use of MIT as well as LI for reducing body weight, BMI, waist circumference, and BP among women with metabolic syndrome. The findings suggest that LI alone or MIT for a period of 12 weeks helps to reduce the physiological parameters of metabolic syndrome. Clinicians should incorporate these measures while treating patients with metabolic syndrome.

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Nil.

Conflicts of interest

Nothing to declare.

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Finding the Right Balance in Nurses' Sickness Presenteeism

Dear Editor,

Sickness presenteeism refers to the act of showing up at work while unable to safely participate in work-related activities due to an acute or ongoing health issue.[1] Despite its potential burdens, presenteeism continues to generate conversation regarding finding the right balance.

Nursing has one of the highest rates of presenteeism, four times that of other occupations.[2] There are several reasons why nurses go to work despite being in poor physical or mental health, including high work demands, lack of adequate replacement, and a lack of consideration from coworkers. But is sickness presenteeism the way forward? Among the professional concerns associated with presenteeism is the sustainability of healthcare, as it can threaten long-term health and increase the likelihood of future absenteeism due to accelerated health decline. In addition, there is concern for patient safety because these nurses are at greater risk from workplace accidents and are more likely to engage in clinical errors.[3]

Moreover, there is the potential risk of burdening the coworkers. The demanding nature of the nursing profession necessitates that nurses navigate complex situations while caring for patients. As a result, coworkers have the right to expect professionals with whom they collaborate to be dependable and effective team members. It is uncertain, however, whether this is always viable, given that workplace incapacity does not guarantee dependability.

Nevertheless, presenteeism is not necessarily always detrimental and undesirable. Human resources remain a priority due to the heavy workload and limited workforce.[4] However, nurse managers must refrain from penalizing staff who require time off due to health concerns. In addition to finding a replacement immediately, they must actively discourage presenteeism. To encourage a resilient workforce and reduce future absenteeism and presenteeism, it is central that managers consider multiple factors, such as schedule flexibility and optimal workload, in managing safe staffing.[5] Unavoidable presenteeism should also be consistently monitored to balance advantages and burdens for all parties. Striking an optimal harmony in sickness presenteeism generally requires consideration of the health and safety of patients and healthcare professionals and an appropriate burden-benefit ratio.

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