Journal of Integrative Nursing and Palliative Care (JINPC)

Original Article

Volume 5 | Issue 1 | Page 48-54
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Studying the Effectiveness of Mindfulness Intervention on the Stress of Mothers with Premature Infants

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Abstract

One of the serious stress factors is the birth of a premature infant, which causes significant stress in mothers and affects their quality of life. Reducing the mother's stress will cause an improvement in the quality of care of the infant and, as a result, better outcomes. The current study was done to investigate the effect of mindfulness exercises on the stress of mothers with premature infants. This research was done with a pre-test-post-test design along with a control group and non-random allocation of samples, which was conducted on 72 mothers with premature babies. In addition to routine care, the mothers of the intervention group received eight sessions of mindfulness training in the form of face-to-face group and virtual sessions. Mothers in the control group did not receive the new intervention. To collect data, two demographic information questionnaires and a parental stress scale were used. Questionnaires were completed before and one month after the intervention, which coincided with the last session of mindfulness exercises. SPSS version 23 software and descriptive and inferential statistical tests were utilized to analyze the data. According to the obtained results, before the implementation of the intervention, the mean and SD (standard deviation) of the stress scores of the mothers in the control and test groups were not significantly different ($P>0.05$). After the intervention, the mean and SD of mothers' stress scores in the control and test groups were significantly different ($P<0.05$). The results of univariate covariance analysis showed that mindfulness exercises significantly reduced the stress of mothers in the intervention group compared to the control group with a large effect size.

Keywords: Mothers, Stress, Premature infant, Mindfulness

Introduction

A premature or preterm baby is a live baby that is born before the completion of the 37th week of pregnancy due to premature birth. This issue is a serious challenge for healthcare providers and a global health concern [1-3]. Mothers of preterm babies experience more stress compared to mothers with healthy and term babies. The main source of this stress is the premature birth of the baby and as a result his need to be admitted to the neonatal intensive care unit. Environmental factors, the baby's appearance, and changes in the mother's parental role are among the main causes of stress in mothers of premature babies [4]. These conditions have a significant negative impact on the mother's mental health and her quality of life [5]. Healthcare providers who are involved in the care of children and parents after premature birth should be aware of the high prevalence of anxiety, depression, and post-traumatic stress disorder symptoms among parents of infants admitted to the intensive care unit [6]. The findings of a study in England revealed that the prevalence of mental health problems in mothers of newborns

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Received: 01 December 2023; **Accepted:** 14 March 2024; **Published:** 30 June 2024

How to Cite This Article: Landry MA, Spinella M, Kumaran K, Levesque V, Tyebkhan JM. Studying the Effectiveness of Mindfulness Intervention on the Stress of Mothers with Premature Infants. J Integr Nurs Palliat Care. 2024;5(1):48-54. https://doi.org/10.51847/YRsdPlmIDO

hospitalized in neonatal intensive care units after delivery was 23.7% for depression, 16.0% for anxiety, and 14.6% for Post-traumatic stress disorder [7]. The findings of other studies also show the high prevalence of anxiety and depression among mothers of newborns hospitalized in the neonatal intensive care unit [5, 7].

Mothers need serious support from nurses to meet their needs and overcome the negative psychological effects of having a premature baby. However, due to reasons such as work pressure and busyness, the current role of nurses in the intensive care unit is mainly focused on supporting the survival and development of infants, and less attention is paid to the emotional needs of parents. Meanwhile, nurses are an important source of support for parents, and providing emotional and psychological support is a key responsibility of the health care team [8, 9].

Previous researchers stated that strengthening cognitive skills such as mindfulness can be an effective intervention to improve people's mental health. Mindfulness-based interventions involve focusing one's attention on specific stimuli such as breathing and body parts. In mindfulness exercises, physical and mental relaxation techniques and cognitive strategies are used to focus on current events and divert one's thoughts from the stressor, which can reduce one's stress [10].

Even though mindfulness exercises seem to be an effective intervention to reduce mothers' stress, the review of the literature showed that the evidence in this field is not sufficiently certain. The results of Marshall *et al*.'s study [11] indicated that mindfulness exercises are not effective in decreasing the stress of mothers with premature babies. Meanwhile, in another study done by Mendelson *et al*. [12], the results showed the effectiveness of mindfulness exercises in improving mothers' anxiety, depression, and stress. In a review study, Zhang *et al*. [13], while pointing to the cost-effectiveness of mindfulness exercises, emphasize the inconclusiveness of the available evidence about the effectiveness of interventions based on mindfulness on some variables related to mental health. Therefore, in previous studies, more studies on the effectiveness of mindfulness exercises have been recommended [11, 12].

Preventing negative consequences in mothers and improving their mental health and quality of life is one of the main tasks of the health care team, which will improve the quality of care for the baby and obtain better outcomes. Considering the high level of stress among mothers whose babies are hospitalized in intensive care units, there is a serious need to find psychological techniques to improve their ability to cope with stress [10]. So far, preliminary studies have been done on the effectiveness of mindfulness exercises on the stress of mothers of premature babies, but they did not provide definitive results and reliable evidence. Therefore, in this study, the effect of mindfulness exercises on the stress of mothers with premature babies admitted to the intensive care unit was investigated.

Materials and Methods

The current study was a semi-experimental research with two control and intervention groups, with a pre-test and post-test design and without random allocation of samples. The research population included mothers of premature babies admitted to the neonatal intensive care unit. To calculate the sample size, the standard deviation of the study by Oswalt *et al*. [14] was used. The probability of type one and type two errors was considered to be 0.05 and 0.20, respectively. By placing in the formula and taking into account the 10% probability of dropping samples, the final sample size for each group was 36 people and a total of 72 people was calculated.

Sampling was done as available, and the mothers were divided into two control and control groups in a non-random way. The criteria for entering the study included the following: mastering reading and writing, ability to participate in training sessions after discharge in person or virtually, no previous experience with mindfulness exercises, and no history of underlying chronic diseases or abnormalities in the baby. There was no history of taking tranquilizers or psychotropic substances by the mother before or during pregnancy, the mother did not suffer from chronic diseases such as depression and anxiety. Exclusion criteria included the following: non-attendance at training sessions (even one session), and infant death.

The members of the intervention group were divided into three subgroups of 12 people. Then, for each subgroup, mindfulness practice sessions were held at different times during eight sessions. For each subgroup, two sessions of group mindfulness exercises were held every week, and each session lasted approximately one and a half hours. At the beginning of the intervention, all mothers in all subgroups were present in the hospital. Therefore, the exercises started in the form of face-to-face meetings. In addition, due to the discharge of babies at different times and the impossibility of mothers participating in face-to-face meetings, online meetings were also held live. In this way, if the mother was present in the hospital, she participated in face-to-face meetings, and if her baby was discharged, she participated in virtual meetings. At the end of each session, mothers were given a task related to the training of that session and they were asked to practice it until the next training session. At the beginning of the next session, by completing the assigned task, the previous trainings were reviewed and feedback was obtained from the mothers.

Table 1 demonstrates each session's content. Mothers in the control group did not receive any new intervention.

Table 1. Content of mindfulness practice sessions.

Session 1	Introduction, communicating and conceptualizing the problem, introducing mindfulness in the form of eating a raisin, teaching the body check meditation technique.
Session 2	Facing obstacles: Reviewing last week's homework, training for three minutes of breathing with mindfulness and mind meditation, awareness of thoughts, feelings, and emotions, practicing body check meditation
Session 3	Presence of Mind from Breathing: Review of last week's assignment, sitting meditation practice, practice review, three-minute breathing space practice
Session 4	Staying in the present: Review of last week's assignment, five-minute "see or hear" exercise, re-practice breathing mindfulness and body awareness
Session 5	Permission to attend: Review of last week's homework, sitting meditation (awareness of body, breathing, thoughts, and sounds), breathing exercises, explanations about stress and its relationship with pain, checking awareness of unpleasant and pleasant events on thoughts, feelings, and sensations body
Session 6	Thoughts are not facts: Review of last week's assignment, mindfulness yoga, discussion of seeing thoughts differently or vicarious thoughts, sitting meditation (presence of mind from sounds and thoughts)
Session 7	How can I best take care of myself: Reviewing last week's homework, good hygiene, repeating exercises from the previous session, making a list of enjoyable activities
Session 8	Acceptance and change: Review of the previous week's assignments, the exercise of physical examination, a summary of meetings, examination and discussion of programs, and continuation of exercises.

The data of this research were collected by two demographic information questionnaires and the Parental Stress Scale. The demographic information questionnaire included questions about the mother's age, employment status, education level, place of residence, history of having a hospitalized baby, the rank of the hospitalized baby, and the duration of the baby's hospitalization. To investigate the stress levels of mothers of premature babies, the 2011 edition of Miles *et al*.'s parental stress questionnaire was used. This tool contains 34 items and consists of three sub-scales: ward environment (6 items), infant's appearance (17 items), and parent's role (11 items). The scoring of this tool is based on a six-point Likert scale. The total score of this questionnaire is between 0 and 170, and the higher the score, the more stress a person has experienced [15].

Data were entered in SPSS23 software. Descriptive statistics including Mean±SD were utilized to report the quantitative variables of the study. Frequency and percentage reports were utilized to report nominal variables. The normal distribution of quantitative variables was checked by the Kolmogorov-Smirnov test. The chi-square test was utilized to examine the difference between the control and intervention groups in terms of nominal variables. Independent t-test and covariance analysis were utilized to compare the average stress scores between the two groups, after and before the intervention. The significance level of all statistical tests was considered to be $P<0.05$.

Results and Discussion

Before the completion of the study, one of the mothers in both the control and intervention groups dropped out of the study due to her unwillingness to continue participating; therefore, the data of 70 mothers were statistically analyzed. The average age of mothers in the intervention group was 26.80 and in the control group was 27.17. The average rating of the hospitalized child was 1.63 in the control group and 1.57 in the intervention group. The average duration of hospitalization of infants in the control group was 3.14 days and in the intervention group was 3.63 days. In both the intervention and control groups, the majority of mothers were housewives and their education level was diploma. Mothers mainly lived in urban areas and most of them had no history of having a hospitalized baby. The findings of the independent t-test and chi-square revealed that there was no significant difference between the control and intervention groups in terms of demographic variables **(Table 2)**.

Table 2. Comparison of demographic characteristics in two control and intervention groups.

Variable	Intervention group (Mean ± SD/ N (%))	Control group (Mean ± SD/ N (%))	The result of the intergroup comparison
Mother's age (years)	26.80 ± 5.35	27.17 ± 6.22	P = 0.79 F = 0.268 DF = 68

The rank of the baby admitted to the hospital		1.57 ± 0.73	1.63 ± 0.73	P = 0.74 F = 0.325 DF =68
Duration of hospitalization of the baby		3.63 ± 1.85	3.14 ± 1.47	P = 0.22 F = -1.214 DF = 68
Mother's employment status	Worker	10 (28.60)	14 (40)	P = 0.31 X^2 = 1.014 DF = 1
	Housewife	25 (71.40)	21 (60)	
Mother's residence	City	31 (86.60)	33 (94.30)	P = 0.39 X^2 = 0.729 DF = 1
	Village	4 (11.40)	2 (5.70)	
Mother's education level	High school	7 (20)	7 (20)	P = 0.86 X^2 = 0.299 DF = 2
	Diploma	18 (51.4)	16 (45.7)	
	University	10 (28.60)	12 (34.30)	
History of having a hospitalized baby	Yes	3 (8.60)	3 (8.60)	P = 1 X^2 = 0 DF = 1
	No	32 (91.40)	32 (91.40)	

Before the implementation of the intervention, the Mean±SD of the stress score of the mothers in the control and test groups were 88.92 ± 17.25 and 83.48 ± 25.69, respectively, and there was no significant difference between the two groups in terms of the stress score and its subscales (P>0.05). After the intervention, the Mean±SD of the stress score of the mothers in the control and test groups were 74.15 ± 13.41 and 47.43 ± 12.23 respectively, and a significant difference was observed between the two groups in terms of the stress score and its subscales (P<0.05) **(Table 3)**.

Table 3. Comparison of stress score between two groups, after and before the intervention.

Variable	Time	Group		The result of the intergroup comparison
		Control (Mean ± SD)	Intervention (Mean ± SD)	
Environment	Before intervention	15.49 ± 3.49	13.51 ± 4.13	P = 0.627 T = 1.892 DF = 68
	After intervention	13.37 ± 2.72	8.49 ± 1.90	P < 0.001 T = 8.704 DF = 68
The appearance of the baby	Before intervention	46.74 ± 11.45	45.80 ± 16.55	P = 0.783 T = 0.277 DF = 68
	After intervention	38.71 ± 8.16	20.91 ± 6.81	P < 0.001 T = 10.280 DF = 68
Parental role	Before intervention	26.69 ± 7.87	24.17 ± 11.18	P = 0.281 T = 1.088 DF = 68
	After intervention	22.06 ± 5.56	18.03 ± 7.53	P = 0.013 T = 2.544 DF = 68
Stress	Before intervention	88.92 ± 17.25	83.489 ± 25.69	P = 0.303 T = 1.038 DF = 68
	After intervention	74.15 ± 13.41	47.43 ± 12.23	P < 0.001 T = 7.708 DF = 68

Univariate covariance showed that mindfulness exercises with a large effect size significantly reduced the stress score of mothers in the intervention group compared to the control group **(Table 4)**.

Table 4. The results of univariate covariance analysis of stress score difference and its dimensions between control and intervention groups.

Variable	Source	Uncorrected means after intervention	Adjusted mean after intervention	Difference in averages	Standard error	The result of the intergroup comparison	Eta coefficient (η_p^2)
Environment	Control group	13.37	12.90	3.95	0.37	P < 0.001 F = 113.938	0.630
	Intervention group	8.49	8.95				
The appearance of the baby	Control group	38.71	38.51	17.40	0.99	P < 0.001 F = 307.918	0.821
	Intervention group	20.91	21.11				
Parental role	Control group	22.06	21.28	2.48	0.70	P = 0.001 F = 12.322	0.155
	Intervention group	18.03	18.80				
Stress	Control group	74.15	72.76	23.95	1.540	P < 0.001 F = 241.838	0.783
	Intervention group	47.43	48.81				

This study was conducted to investigate the effectiveness of mindfulness exercises on the stress of mothers with premature babies. The results showed that after four weeks of mindfulness exercises, mothers' stress in the intervention group was significantly different from the control group.

One of the main factors of stress in mothers of premature babies is the unknown environment of the intensive care unit and its equipment, especially the monitors whose numbers are frequently changing. This condition creates a lot of rumination and anxiety regarding the current state of the child and causes significant stress in the mother [16, 17]. The findings of this study showed that the use of mindfulness exercises effectively reduced the stress score in the environment subscale. Based on Kabat Zinn's theory of mindfulness, mindfulness exercises lead to an increase in one's skill in non-judgment, increase in patience, increase in trust, non-struggle, and acceptance, and enhance one's ability to let go. Improving any of these characteristics can help reduce people's stress levels. For example, improving the two skills of patience and non-judgment allows mothers with premature babies to ignore irrational beliefs and emotions that can intensify stress, and to focus on issues such as numbers on the monitor or devices. The unknown part that causes stress, keep away [18].

Observing the weak and weak appearance of the baby, abnormal breathing patterns such as stopping breathing, changing skin color, crying and pain and other physical characteristics of the baby cause negative emotional responses and stress in mothers [19, 20]. In this research, the use of mindfulness exercises caused a significant decrease in the stress score in the aspect of the baby's appearance. In The James Lange Theory, it is stated that exciting situations trigger specific physiological responses such as sweating, trembling, and increased heart rate. The brain receives sensory feedback from the muscles and organs that create these reactions, and as a result, emotional feelings are created in the person. When a person finds himself shaking, heart palpitations, nausea, or other similar symptoms, he experiences stress [21].

Mindfulness exercises can lead to better stress control by increasing people's awareness of emotions, focusing people on the present, and improving their control over physical symptoms. In line with the present research, it was reported in previous studies that mindfulness exercises are effective in reducing stress and improving emotion regulation [22, 23].

Admitting a baby to the intensive care unit damages the bond between the mother and the baby and can lead to a disturbance in the interaction between the baby and the mother. Many mothers mistakenly consider themselves or others responsible for the created conditions and feel guilt, fear, anxiety, and helplessness, which will intensify the perceived stress [16, 24]. The results of the present study revealed that the use of mindfulness exercises can significantly reduce stress in the role of parenting. In the framework of Selye's general adjustment syndrome theory, it can be said that stress is not always unpleasant and people's interpretation of the stressful factor plays an important role in adapting to it [25]. Mindfulness exercises allow parents to have a better perception of the situation, blame themselves less, accept the child with his unique characteristics, focus more on aspects of the child's nationality, and ultimately emotional behavior show a more acceptable attitude towards the child. This facilitates the creation of an emotional relationship with the baby. Strengthening the bond between mother and child improves the ability to cope with stress [26].

The results of this study revealed that mindfulness exercises can effectively reduce stress. The findings of a preliminary study by Marshall *et al*. [11] in America revealed that the use of mindfulness exercises is not effective

in reducing the stress of parents of premature babies, which is not in agreement with the results of the current study. It seems that the reason for the different results is the larger sample size in the current study, the longer duration of the exercises, and also the collection of data with a longer interval after the start of the intervention. In line with the current research, Mendelson *et al*. [12] in another preliminary study in America reported the effectiveness of mindfulness exercises based on audio and video files on stress improvement.
By examining the results of previous studies, it can be seen that mindfulness exercises, in addition to reducing stress, have a favorable effect on other mental health variables. Rayan and Ahmad [27] showed that mindfulness-based intervention can significantly improve the anxiety, stress, and depression of parents of children with autism. Considering the results of the current research and previous studies, it can be said that mindfulness exercises with low costs and the absence of side effects can help improve people's mental health and reduce stress. Also, the implementation of mindfulness exercises in the hospital environment brings healthcare systems closer to their ultimate goal of providing comprehensive and integrated care.

Conclusion

Mothers of preterm infants suffer from high levels of stress related to the ward environment, infant appearance, and changes in parenting roles. The results of this research showed that mindfulness exercises can reduce the stress of mothers with premature babies. According to the positive results reported for mindfulness exercises, it is recommended for the managers of health centers to add such interventions to the care program to improve the mental state and reduce the stress of mothers in special care units and to hold classes for training and consider implementing mindfulness exercises.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

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