

An Experimental Study to Evaluate the Effectiveness of Foot Reflexology on Level of Fatigue, Quality of Sleep & Quality of Life among Primi Post - Caesarean Mothers Admitted in Selected Hospitals of Haryana

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Abstract: **Aim:** The aim of the study was to evaluate the effectiveness of foot reflexology on the levels of fatigue, quality of sleep, and quality of life among primi post - cesarean mothers. **Design:** The experimental design with samples of 270 (135 in the experimental group and 135 in the control group) who were selected by using a simple random sampling technique at the N. C Jindal Institute of Medical Care and Research in Hisar, Haryana. **Methods:** The data were collected by using a self - structured questionnaire on the fatigue severity scale (FSS), the Groningen sleep quality scale (GSQS), and the World Health Organization Quality of Life Scale (WHO - QOL - 100). The foot reflexology was performed in the experimental group for 30 minutes (15 minutes on each foot) twice a day for 5 consecutive days in the morning at 10 am and in the evening at 3.30 pm, whereas the control group received routine postnatal care only. **Results:** The obtained paired "t" value in the experimental group, level of fatigue (11.23), quality of sleep (20.21) and quality of life (28.66), was significant at ($p < 0.0001^{***}$), and the control group, level of fatigue (1.69), quality of sleep (1.79) and quality of life (1.75) was non - significant at ($p < 0.07$). There was an significant association between pre - test level of fatigue with age (6.87, $p < 0.01^{**}$) residence (6.67, $p < 0.04^{*}$), and quality of sleep with type of family (5.35, $p < 0.02^{*}$), regularity of menstruation cycle (3.85, $p < 0.05^{*}$) and quality of life with monthly income (6.42, $p < 0.04^{*}$), frequency with which the mother woke up during the night (4.89, $p < 0.05^{*}$) in the experimental group. The obtained post - test correlation (r) between level of fatigue and quality of sleep (- 0.38) in the experimental group and (- 0.12) in the control group shows a negative correlation, and between level of fatigue and the quality of life (- 0.48) in the experimental group and (- 0.17) in the control group shows negative correlation and between quality of sleep and quality of life (0.36) in the experimental group and (0.18) in the control group shows positive correlation. **Conclusion:** The results showed that foot reflexology reduced the level of fatigue and improved the quality of sleep and quality of life among primi post - cesarean mothers in the experimental group, which will help the nurses implement it in the hospitals.

Keywords: foot reflexology, fatigue, primi, post - caesarean, quality of life, quality of sleep

1. Introduction

Cesarean section (CS) is one of the most successful major surgical operations when medically endorsed, saving both the mother and the newborn's lives. CS, like any surgical treatment, exposes the woman and her baby to long - term health hazards, which might affect the course and outcome of subsequent pregnancies.¹

The postpartum period is a six - week period when all systems, particularly the reproductive organs, revert back to the pre - pregnancy state. The postpartum period is a process of physiological and psychological changes for every woman. During this period woman may have some complaints depending on the alteration that occur throughout the postpartum period.²

According to aksu, varol, and hotunsahin (2017), who recommended developing policies aimed at rising post - partum care because of physical health problems (77.5%),

(76.0%) sleep disturbances, and (61.35%) dysuria in the first 0–6 weeks of post - partum, and fatigue (33.9%), sleep disturbance (32.8%), and constipation (15.5%) were the most commonly reported complaints at one year postpartum.³

Postpartum fatigue (PPF) is defined as "subjective experiences of the whole body, encompassing the physical, emotional, and cognitive functioning reported by mothers during the postpartum period.⁴ Fatigue has been identified as the fifth most common cause of postpartum anxiety among mothers in developed countries (52%) of women experience fatigue within 18 months postpartum). Its prevalence rises from (20%) in the antepartum period to (50%–64%) in the postpartum phase.⁵

The severity of postpartum fatigue (PPF) can be affected by socio - demographic factors (education level or age, duration of hospitalization), physiological (increasing metabolic needs, effects of hormones, anemia, thyroid dysfunction, cardiomyopathy, mother's nutritional status, nausea -

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vomiting, birth modes, feeding patterns, duration of the second stage of labour or perineal pain) and psychosocial (depression, stress, anxiety, or social support, habit of alcohol - smoking, familial changes, infant care, sleep status, domestic work and going back to professional life)^{2,6}

According to research, high levels of fatigue among infants' mothers cause stress in parents, feelings of incapacity and dissatisfaction, irritability, and hopelessness, as well as impaired parent-infant communication, signs of depression, shorter sleep, and less social support, delayed foetal growth, delayed mothers' return to normal function, and early discontinuation of breastfeeding.⁴ Hospital and home care are two options for preventing fatigue in the postpartum period. As a result, it is critical for midwives and nurses who take an active role in women's care and follow - up during the postpartum period to stress the importance of fatigue in terms of mother and newborn health protection and maintenance. Midwives and nurses can help mothers cope with fatigue and improve their coping abilities. It is necessary to evaluate the degree of fatigue experienced during the postpartum period, taking into account the birth procedures, in order to reduce or eliminate the fatigue that affects the mother, family and society.²

Linda C. Pugh and Renee A. Milligan (1995) proposed a framework for assessing postpartum fatigue (PPF) that included four factors: situational factors (such as demographics and lifestyles), physiological factors (such as clinical characteristics), performance factors (such as childcare activities), and psychological factors (e. g., anxiety).⁷ Fatigue can have a wide range of symptoms and be caused by a variety of causes working together, making diagnosis challenging. Personal history about diet, lifestyles, and life events; medical history (recent events such as childbirth, medication, surgery, or bereavement); and physical examination to check for signs of illness or disease, as well as tests such as blood tests, urine tests, x - rays, and other investigations, are all used to diagnose fatigue. The goal is to eliminate any physical factors, such as anaemia, infections, or hormone issues.⁸ The subjective fatigue can be assessed by using example the fatigue severity scale, lee's visual analog scale for fatigue.⁹

W. Troy And P. Dialgas - Pelish (1995) developed the tiredness management guide (TMG), which includes 59 interventions that may help reduce maternal fatigue in the postpartum period (Varcho Ms, Hill Pd, Anderson M, 2010).¹⁰ Some ways of reducing postpartum fatigue (PPF) include advising the mother to rest as much as possible; preserve energy; stay hydrated; eat a balanced diet that provides sustained energy; avoid coffee and sweets; and do breathing exercises.¹¹ Slow stroke back massage, meridian acupressure, and pilate's exercises are just a few of the nursing interventions that can be used to help relieve fatigue after childbirth.¹²

Sleep is a basic and biological need. The average sleep for healthy adults are 7 to 9 hours at night.¹³ Sleep changes in the first postpartum week include a 90 - minute reduction in sleep time compared to pregnancy, three or more episodes of sleep in a 24 - hour period, (70%) napping, and increased sleep changes.¹⁴

The first week of postpartum has a link with neuro - biological causes, with an increase in mono - amine oxidase, a decrease in oestrogen levels, and a change in sleep pattern, as well as other behavioural problems. This hormone imbalance has an impact on circadian rhythms, which are governed by the body's internal master clock in the brain.¹⁵

Anxiety, cot death, and a loss of confidence are all factors that lead to postnatal mothers' lack of sleep or tiredness. The mother's ability to sleep may be limited because feedings have not yet been developed or the baby is not in a stable setting, causing her to be continuously interrupted as she tries to sleep. Furthermore, other people messing with their mother may be the reason for not sleeping well.¹⁶

Failure to sustain a person's normal sleep - wake cycle has a detrimental impact on their overall health. Identifying and treating sleep pattern disturbances in patients are critical objectives. Sleep is measurable both objectively and subjectively. During the day, objective measures are used in sleep laboratories to determine sleep delay. The multiple sleep latency exams is a regularly used test (MSLT). The maintenance of wakefulness exam is another less - used test (MWT).¹⁷

The objective sleep assessment is done by using instruments such as the Electroencephalogram (EEG), which measures electrical activity in the cerebral cortex; the electro myogram (EMG), which measures muscle tone; and the electro - oculogram (EOG), which measures eye movements, provide information about some structural physiological aspects of sleep.¹⁸ A sleep study, commonly known as polysomnography, is a comprehensive examination used to diagnose sleep disorders. Actigraphy is a validated way of objectively assessing sleep parameters and average motor activity over a period of days to weeks using a non - invasive accelerometer, bed sensors, eyelid movement and arm sensors.¹⁹

There are numerous scales to measure subjective sleep quality, example such as the pittsburgh sleep quality index, Richard campwell sleep questionnaire, Stanford sleepiness scale, Groningen sleep quality scale, Epworth sleepiness scale.³ Subjective reports of maternal sleep were shown to be improved by non - pharmacological sleep therapies (cohen's d = - 0.54). The interventions that had the greatest impact on mothers' sleep quality were massage (cohen's d = - 1.07) and exercise (cohen's d = - 0.82).²⁰

Along with fatigue and sleep disturbances, the post partum women also experiences the changes in quality of life (QOL). The World Health Organization (WHO) describes QOL as "an individual's perception of their position in life within the context of the culture and value systems in which they live and concerning their goals, standards, expectations, and concerns."²¹

According to several studies, a woman's Health - Related Quality - of - Life (HRQOL) after childbirth reduces daily activity, reduces self - care ability, impairs child care, causes breastfeeding to be discontinued, causes the early introduction of solid food to an infant's diet, and increases medical care costs. Age, educational status, marital status,

and wealth, as well as obstetric (parity, mode of birth) and psychosocial (depressive disorder) characteristics, have all been found to be highly linked to HRQOL post - partum.²²

Sadat Z, Taebi M, Saberi F, Kalarhousi Ma. (2013) used the SF - 36 questionnaire to assess the relationship between postpartum Health - Related Quality - of - Life (HRQOL) and mode of delivery in 300 women who had 150 vaginal deliveries (VD) and 150 caesarean sections (CS). The results showed that physical HRQOL at 2 months after vaginal delivery was significantly better than after a caesarean section (CS) and mental HRQOL at 4 months.²³

The subjective quality of life (QOL) can be assessed by using the Health - Related Quality of Life (Centers for Disease Control and Prevention, 2000), the World Health Organization - Quality of Life Instrument (WHO - QOL, 2012), Brunnsviken brief quality of life scale & McGill quality of life questionnaire.²⁴

Providing a postpartum self - care programme based on the teach back approach can have a significant role in enhancing the quality of life (QOL) in mothers following childbirth.²⁵ Non - pharmacological treatments, like health education, exercise, and relaxation therapy throughout pregnancy and the postpartum period, can be used to improve maternal quality of life (QOL) in the postpartum period.²⁶

Approximately (80%) of the world's population lacks access to modern medicine. In the next ten years, health - care prices are expected to double. Low - cost interventions, such as lifestyle changes, food, supplement therapy, and behavioural modifications, can be used to replace high - cost medications and technological interventions. Alternative medicine, according to eskinazi, is a broad set of health - care practises (i. e., those that are already available to the public) that are not easily integrated into the prevailing health - care model because they challenge varied societal ideas and practices (cultural, scientific, medical, and educational). All of the major alternative medicine systems begin by attempting to support and induce the person's self - healing process.²⁷

The one best example of manipulative and body - based systems under complementary and alternative medicine (CAM) is reflexology is the application of pressure techniques to the hands and feet to affect a specific part of the body. These techniques activate pressure receptors, resulting in a relaxing reaction in the body. Reflexology encourages good health by encouraging people to relax, alleviate discomfort, prevent illness and improve their overall quality of life (QOL). Reflexology's advantages are as diverse as the individuals who use it. Fundamentally, reflexology's hands - on contact helps people to communicate with one another, which strengthens relationships, facilitates safe living and empowers both the giver and the recipient.²⁸

Wei - Li Wang Et Al., (2020) found in 26 randomised controlled studies with a total of 2, 366 people that the foot reflexology treatments significantly reduced adult depression (- 0.921), anxiety (- 1.237), and sleep quality (-

1.665) according to meta regression results ($p = 0.002$) and duration ($p = 0.01$).²⁹

Lee et al., (2011) analysed 44 investigations, including 15 studies related to fatigue, 18 studies related to sleep, and 11 studies related to pain. Fatigue, sleep, and pain had weighted averages of (1.43), (1.19), and (1.35), respectively. Foot reflexology was found to have a greater impact on reduce the fatigue and improves sleep than on pain.³⁰

Based on the results, counselling and sole reflexology significantly decreased fatigue in 42 pregnant women in Hamadan's medical centers, which is in groups A and B, the mean score of fatigue severity after the intervention demonstrated A significant decrease ($p < 0.05$).³¹

Varghese J, George J, Gowda Y (2014) conducted a randomized control trial to determine the effect of foot reflexology on the intensity of pain and quality of sleep among 60 post - caesarean mothers (30 were in the experimental group and 30 were in the control group) by performing 15 - minute foot reflexology session at the same time each evening for five consecutive days. After 5 days of treatment, pain intensity was measured using a visual analogue scale (VAS) and sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), both of which were significantly lower in the intervention group ($p < 0.001$) than in the control group.³²

The research conducted with twelve healthy adults (n_1 ($p = .833$) and n_2 ($p = .227$)) with 35 minutes of reflexology caused changes in brain wave activity that led to the presence of a high degree of sleepiness and sleep (n_1 and n_2 NREM sleep) was assessed by using polysomnography and recommended that during the application of reflexology, there is a gradual transition and an orderly progression from wakefulness to sleep, which could explain the effects of relaxation and well - being obtained.³³

S. sarojini (2018) suggested that foot reflexology was successful in improving the quality of sleep among 30 primi post caesarian mothers in St. Joseph colony, puducherry. The findings of the study reveal that the pre - test mean was (13.73) with standard deviation (SD) of (3.24) and the post - test mean was (8.64) with SD of (1.88). The obtained "t" value was (7.39).³⁴

Manjuri, A. E. And Fathima Latheef (2016) compared the effectiveness of foot reflexology and back massage in enhancing sleep quality among post - cesarean mothers among 120 post - cesarean mothers. For three consecutive evenings, each participant received back massage and foot reflexology for the respective group. Control group and back massage group had Chi - squares of (13.132) and (41.645), respectively, whereas foot reflexology group had a chi - square of (101.234). As a result, foot reflexology was more effective than back massage in enhancing sleep quality.³⁵

Deepshikha and Vibha (2016) assessed the impact of foot reflexology on the level of pain and sleep among 60 post - cesarean mothers (30 for the experimental group and 30 for the control group). The experimental group received 15 minutes of foot reflexology once a day for 3 days starting on

the first post - operative day, while the control group received normal post - operative treatment. An experimental group's sleep quality improved and reduced pain after the intervention ($p < 0.001$).³⁶

Throughout the professional experience, the researcher found that many women suffer from fatigue, lack of sleep, and poor quality of life (QOL) among primi post - cesarean mothers. On investigating the reviews, the researcher found the majority of women like to receive non - pharmacological relief strategies. The depth of reviews and the information available about the new and advancing alternative therapies to manage fatigue and improve the quality of sleep and quality of life (QOL) made the researchers boost the use of foot reflexology to reduce fatigue and improve the quality of sleep and quality of life (QOL) among primi post - cesarean mothers.

Statement of the problem

An experimental study to evaluate the effectiveness of foot reflexology on level of fatigue, quality of sleep & quality of life among primi post - cesarean mothers admitted in selected hospitals of Haryana.

Research hypotheses

H₁: there is a significant difference in the level of fatigue, quality of sleep, quality of life among primi post - cesarean mothers between the pre - test and post - test in the experimental and control group.

H₂: there is a significant difference in post - test level of fatigue, quality of sleep, quality of life among primi post - cesarean mothers between experimental and control group.

H₃: there is a significant association between the pre - test level of fatigue, quality of sleep, quality of life and selected demographic variables of primi post - cesarean mothers in the experimental and control group.

H₄: there is a significant relationship between post - test level of fatigue, quality of sleep, quality of life among primi post - cesarean mothers in the experimental and control group.

2. Research Methodology

The researcher used a quantitative research approach with experimental design (pre/post - test only) to assess the effect of foot reflexology on fatigue, sleep quality, and quality of life in primi post - cesarean mothers at the N. C Jindal Institute Of Medical Care And Research (N. C. JIMCR), Hisar, Haryana. The foot reflexology was an independent variable and the level of fatigue, quality of sleep & quality of life was an independent variable. Power analysis has been carried out to calculate the estimated sample. Based on previous study by allowing (30%) of dropout rate, a total sample size was 280 mothers (140 experimental group + 140 control groups) were included in this study. The probability - based simple random sampling techniques using the lottery method (non - replacement) were selected. During data collection, 10 of the subjects were discontinued, so the total sample size was 270 (135 in the experimental group and 135 in the control group).

Development of the tools

The following are the instruments (Hindi language) were used in this study.

Section A consists of clinical variables such as body mass index (BMI) category, haemoglobin levels during admission to hospital for delivery, fertility treatments, types of caesarean section, history of sedatives, whether the baby is with the mother or in a neonatal intensive care unit (NICU), the newborn's gender, and any immediate post - caesarean complications.

Section B includes socio - demographic variables such as age, education, religion, residence, occupation, diet, monthly income, family type, menstrual history (age at menarche, regularity of menstrual cycle, length of menstrual cycle, nature of menstrual flow, duration of menstruation in days), any history of bad habits, family support for looking after the baby, frequency of the mother waking up during night, sleeping hours of the baby in a day, and exposure to any alternative and complementary medicine before hospitalization.

Section C includes a comprehensive analysis of the literature was used to design the data collection instruments. The following were the instruments (in Hindi) that were used in this study after getting a Copy Clearance Certificate (CCC) from the respective publishing company. A self - structured questionnaire based on the Fatigue Severity Scale (FSS), The Groningen Sleep Quality Scale (GSQS), and the World Health Organization - Quality of Life Scale (WHO - QOL - 100).

Description and scoring of the scales

The Fatigue Severity Scale (FSS) was developed by Krupp et al. (1989) and is a self - reported questionnaire consisting of nine items with a seven - point Likert scale ranging from "1 = strongly disagree" & "7 = strongly agree". The minimum score possible is 9, and the highest is 63. The higher the score, the more severe the fatigue is and the more it affects the person's activities.³⁷ The level of fatigue score was calculated by adding up all the answers and dividing them by nine as well as converted into a percentage, and the total score was divided into the three categories of likely <50% (0 - 32) as mild, 51% - 75% (33 - 48) as moderate, and >75% (49 - 63) as severe.

Meijman T. F. et al. (1988) developed the Groningen Sleep Quality Scale (GSQS). The scale consists of 15 items, and the respondent is asked to circle either a true or false statement. The first question doesn't count towards the total score. 1 point if the answer is "true" for questions 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 14, and 15; and 1 point if the answer is "false" for questions 8, 10, or 12. The maximum score of 14 points indicates poor sleep the night before.³⁷ The quality of sleep score was calculated by adding up all the answers and converting the score into a percentage, and the higher the score, the poorer the sleep the night before. The total score was divided into the three categories as follows: likely <50% (<7) as a good sleep quality, 51% - 75% (7 - 11) as an average sleep quality, and >75% (12 - 15) as a poor sleep quality.

The World Health Organization - Quality of Life Scale (WHO - QOL - 100) is a self - reported measure comprised of a 100 - item survey with a 5 - point Likert scale. The WHO - QOL - 100 measures six domains such as physical health, psychological health, independence, social

relationships, the environment, and spirituality. The total score is presented as a range between 30 and 150, where higher scores represent higher levels of life quality of life.³⁸ For the purpose of research, the investigator used the 30 questions from each domain. The total score was converted to a percentage and classified as follows: likely <50% (<75) as a poor quality of life, 51%–75% (76–112) as an average quality of life, and >75% (113–150) as a good quality of life.

Validity

The tool was validated by 14 experts, including three obstetrics and gynecology doctors and six obstetrics and gynecology nursing, one reflexologist, one epidemiologist, one statistician, and one English and one Hindi. The instrument was finalized based on their modifications and recommendations.

Reliability

The reliability of the scale was checked by using Cronbach's alpha. The reliability of the Fatigue Severity Scale (FSS), The Groningen Sleep Quality Scale (GSQS), and World Health Organization Quality of Life Scale (WHO - QOL - 100) were showed the excellent reliability ($r = 0.92$), ($r = 0.88$) and ($r = 0.96$). Hence the tool was used in this study.

Training for foot reflexology

The investigator attended a training course on "diploma in reflexology therapy" (D. R. T.) at the acupressure/acupuncture and alternative medicine institute in jodhpur, rajasthan, india, for a period of 1 month of theory and practical sessions, and obtained a certificate along with registration number 25536 before conducting the pilot study.

Protection of human rights

Formal permission was obtained from the ethical committee of Desh Bhagat University, Punjab and Medical Director of the N. C. Jindal Institute of Medical Care and Research (N. C. JIMCR) in Hisar, Haryana. Informed written consent of each primi post - cesarean mothers were obtained before data collection. Confidentiality and anonymity was be maintained throughout the study.

Pilot study

A pilot study was conducted in Sapra Multispecialty Hospital, Hisar, Haryana from 06/12/2021 to 08/01/2022. The total sample was chosen for the pilot study was 20 (10 in the experimental and 10 control group). The obtained paired 't' value of level of fatigue, quality of sleep, quality of life (11.56), (5.75), (5.01) in the experimental group, and (4.14), (2.44), (2.44) in the control group which indicates there were significant changes in level of fatigue, quality of sleep, and quality of life in the experimental group ($p < 0.05$). The findings of the pilot study revealed that it was feasible and practicable to conduct the study.

Data collection procedure

The formal permission was obtained from the ethical committee of Desh Bhagat University, Punjab and Medical Director of the N. C. Jindal Institute of Medical Care and Research (N. C. JIMCR) in Hisar, Haryana. The data collection was done from 12/02/2022 to 18/01/2023. The probability - based simple random sampling techniques using the lottery method (non - replacement) were selected.

The total sample chosen for the study was 280 (140 in the experimental and 140 control group). The researcher distributed a self - structured questionnaire to all primi post - cesarean mothers after the written consent and reminded them that there answers would be kept confidential. The researchers were asked to respond honestly and completely. On the first day of the evening, collected the demographic questionnaire and pre - test level of fatigue with the Fatigue Severity Scale (FSS), quality of sleep with the Groningen Sleep Quality Scale (GSQS) and quality of life by the World Health Organization Quality of Life Scale (WHO - QOL - 100) in the both experimental and control groups. The foot reflexology was performed among primi post - cesarean mothers in the experimental group for 30 minutes (15 minutes on each foot) twice a day for 5 consecutive days in the morning at 10 a. m and evening at 3.30 p. m, whereas the control group received routine postnatal care. The post - test level of fatigue, quality of sleep and quality of life were collected on the 6th post - cesarean day in both the experimental and control groups.

3. Results

Section I: Data on demographic variables among primi post - cesarean mothers in the experimental and control groups.

In terms of age, the majority of them 84 (62.2%) in the experimental group and 94 (69.63%) in the control group were over the age of 25. In terms of education, the majority of them are 41 (30.37%) high school graduates with intermediate or diploma degrees in the experimental group, and 50 (37.03%) are in the control group. In terms of religion, 128 (94.81%) in the experimental group and 124 (91.8%) in the control group were Hindus. In terms of residence, the majority of them are rural, with 61 (45.18%) being experimental and 65 (48.15%) being control. The majority of them are housewives, with 117 (86.67%) in the experimental group and 107 (79.26%) in the control group. In terms of diet, the majority of them are vegetarians: 100 (74.07%) in the experimental group and 98 (72.59%) in the control group. In terms of monthly income, the majority of them are in the >10001 group (82 (60.74%) and 87 (64.44%), respectively. Regarding type of family, the majority of them belong to joint families 86 (63.70%) in the experimental group and 83 (61.48%) in the control group.

Section II: a) Data on level of fatigue among primi post - cesarean mothers in the experimental and control groups.

In the experimental group the majority of 97 (71.86%) had severe fatigue in the pre - test and in the post - test only 11 (8.15%) had severe fatigue. In the control group the majority of 94 (69.62%) had a severe fatigue in the pre - test and 91 (67.41%) had a severe fatigue in the post - test.

Section II: b) Data on quality of sleep among primi post - cesarean mothers in the experimental and control groups.

In the experimental group the majority of 92 (68.15%) had an average sleep quality in the pre - test and post - test only 49 (36.30%) had an average sleep quality and in the control group the majority of 89 (65.93%) had an average sleep quality in the pre - test and 85 (62.96%) had average sleep quality in the post - test.

Section II: c) Data on quality of life among primi post - cesarean mothers in the experimental and control groups.

In the experimental group the majority of 82 (60.74%) had an average quality of life in the pre - test and only 32 (23.70%) had an average quality of life in the post - test and in the control group 78 (57.78%) had an average quality of life in the pre - test and 84 (62.22%) had an average quality of life in the post - test.

Section III: a) Effectiveness of foot reflexology in terms of fatigue, quality of sleep and quality of life among primi post - cesarean mothers between the experimental and control groups.

The obtained paired "t" value computed between the experimental group regarding the level of fatigue (11.23), quality of sleep (20.21) and quality of life (28.66) was significant at ($p < 0.0001^{***}$) levels. The obtained paired "t" value computed between the control group regarding the level of fatigue (1.69), quality of sleep (1.79) and quality of life (1.75) was significant at ($p < 0.07$) levels. Hence the alternative hypothesis H_1 was accepted. The obtained unpaired "t" value computed between the experimental and control group regarding the level of fatigue (15.33) quality of sleep (4.56) and quality of life (19.74) was significant at ($p < 0.0001^{***}$) levels. Hence the alternative hypothesis H_2 was accepted.

Section IV: a) Association between pre - test level of fatigue, quality of sleep & quality of life and selected demographic, clinical variables among primi post - cesarean mothers in the experimental & control groups.

There was a significant association between pre - test level of fatigue and age ($\chi^2 = 6.87$, $p < 0.01^{**}$), residence ($\chi^2 = 6.67$, $p < 0.04^{**}$), regularity of menstrual cycle ($\chi^2 = 3.85$, $p < 0.05^*$), between quality of sleep and residence ($\chi^2 = 8.91$, $p < 0.05^{**}$), type of family ($\chi^2 = 5.35$, $p < 0.02^{**}$), regularity of menstrual cycle ($\chi^2 = 3.85$, $p < 0.05^*$), between quality of life and monthly income ($\chi^2 = 6.42$, $p < 0.04^{**}$), type of family ($\chi^2 = 5.87$, $p < 0.02^{**}$), frequency of waking up during night ($\chi^2 = 4.89$, $p < 0.05^*$) in the experimental group. There was a significant association between level of fatigue and regularity of menstrual cycle ($\chi^2 = 9.38$, $p < 0.01^{**}$) in the control group.

Section V: Relationship between the post - test level of fatigue, quality of sleep and quality of life among primi post - cesarean mothers in the experimental and control groups.

The obtained post - test correlation (r) of level of fatigue and the quality of sleep (- 0.38) in the experimental group, (- 0.12) in the control group shows a negative, fair correlation. Regarding the level of fatigue and the quality of life (- 0.48) shows a negative, moderate correlation in the experimental group and (- 0.17) negative, fair correlations in the control group and quality of sleep and quality of life (0.36) shows positive, fair correlation in the experimental group and (0.18) shows a positive, poor correlation in the control group among primi post - cesarean mothers.

4. Discussion

This study finding was in congruent with the study findings of Farideh Bastani, Elaheh Roohi Rahim Beigloo, Hamid Haghani (2015) had investigated the effectiveness of foot reflexology on 99 maternal post cesarean section (CS). After the interventions, the mean scores of fatigue severity in the experimental and placebo groups were significantly lower than the control group ($p < 0/001$).³⁹

The findings was also supported by the findings of Masoumeh Nasiri, Fatemeh Ranjkesh, Maryam Maf, Mojtaba Senmar, Seyedeh Zahra Hosseinigolafshani, (2019) conducted the study was to investigate the effect of foot reflexology on sleep quality in high risk pregnant women. The intervention group received 30 minute foot 153 reflexology twice a week, for four weeks. The control group received routine prenatal care. Before and after the intervention, the sleep condition indicator scale was used to assess sleep quality. The results of paired t - test revealed significant improvement of sleep quality in the intervention group ($p < 0.05$). In the control group, sleep quality significantly decreased ($p < 0.05$).⁴⁰

Conflicts of interest

There are no conflicts of interest to disclose.

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