

Early Postpartum Depressive Symptoms and Its Association to Postpartum Fatigue and Sleep Disorder

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Abstract

Back ground: The postpartum period is an unpredictable time for mothers and they may find it especially difficulties to adapt to the new routines and responsibilities of taking care of a newborn, which ultimately interfering with their quality of sleep and cause fatigue and depressive symptoms **Aim of this study:** Was to explore the association between sleep disorder , fatigue, and early postpartum depressive symptoms. **Subjects and Methods: Research design:** Analytic cross-sectional research design was used to achieve the study aim. **Setting:** This study was conducted at postpartum inpatient and outpatient clinics in Zagazig University Hospitals. **Subjects:** The sample was composed of 500 postpartum women recruited from postpartum inpatient and outpatient clinics during follow-up visits. **Tool of data collection:** Four tools was used for data collection: 1. Interview questionnaire form, 2. Global Sleep Assessment Questionnaire – GSAQ 3. The Multidimensional Fatigue Symptom Inventory-Short Form - MFSI-SF ,and 4. depressive symptoms (CES-D). **Results:** The study result indicated that, the women had worried and "feel sad or anxious" followed by daytime sleepiness which interfere with activities" ,emotional fatigue items and general /vigor items were much higher than physical fatigue, highly positive correlation was present between postnatal sleep disturbance and fatigue, depressive symptoms was negatively correlated with fatigue, and positively with sleep disturbances. **Conclusion:** It was concluded that studied women had worried , anxious, and daytime sleepiness ,having emotional fatigue which correlated positively with sleep ,and having depressive symptoms which was negatively correlated with fatigue, and positively with sleep disturbances. **Recommendations:** It is recommended that, further research is required to determine the optimal dose and domain of physical activity for reducing postnatal depressive symptoms as well as to examine the link between sedentary behavior and postnatal depressive symptoms, and designed a psycho-educational intervention that addresses heightened learning needs of mothers at postnatal period will useful in preventing common postnatal problems.

Key words: Women, postnatal, sleep disturbance, fatigue, depressive symptoms.

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I. Introduction

The postpartum period is generally defined as beginning first hour after delivery of the placenta and lasting about six weeks (McGrath et al., 2008).

The postpartum stage is an unpredictable time for mothers, most women challenge with several minor to moderate discomforts for weeks (e.g., fatigue, breast tenderness, episiotomy discomfort, constipation, and hemorrhoids (Gjerdingen et al., 2009) and some face serious problems, such as depression and sleep disorder, that may limit daily activities for months (McGovern et al., 2014).

Following childbirth women are susceptible to poor sleep quality in part because of dramatic hormonal fluctuations occurring through the reproductive cycle (Soares and Murray, 2006). Immediately after childbirth, estrogen and progesterone hormone levels plunge which precipitate sleep disorder in most women including difficulty initiating and maintaining sleep even in the absence of infant care (Tsai et al., 2010). They typically spend twenty percent more of the day stirring than average during the first six weeks postpartum. (Shih-Yu, and Lee, 2016).

In women nocturnal breastfeeding demands, high-needs infants, and little nighttime maintain may negatively impact on sleep quality (Bernstein et al., 2006; Posmontier, 2014).

Rychnovsky and Hunter, (2009) define sleep disturbance as the perception of the degree the bulk sleep was disturbed due to fragmentation and sleep latency. The normal sleep cycle lasts about 90 minutes, and is repeated four to six times per night (Shih-Yu, and Lee, 2016).

Most postpartum women find that their largest problem is lack of sleep. Large changes occur in sleep duration, quality, and the changeability of these variables across pregnancy and postnatal. Multiple sleep episodes are most common, and the premier frequency of nighttime sleeping occurs in the first week post-

partum, which is also when total sleep duration per twenty four hour is lowest (an average of 1.5 h less than during pregnancy) (Signal et al., 2007).

Postpartum period is generally associated with significant daily life changes which can induce sleep disorder and fatigue (Tu et al., 2017).

Fatigue was the most frequent symptom, and 50% reported never or rarely feeling refreshed after waking in the morning. Although fatigue often results from reduced sleep and increased childcare responsibilities, it may also be related to low levels of hemoglobin (Gunderson et al., 2008; McGovern et al., 2014).

It has been reported that postpartum fatigue is related to sudden changes in the endocrine system, and sleep disturbances, which is also influenced by pain and exhaustion during labor and delivery. In addition, there are physiological factors that affect fatigue, including episiotomy, changes in sleep cycles, adaptation to breast feeding, and sudden hormone mobility. Environmental factors also affect fatigue, including social and economic status, employment, exercise and sleep (Sung-Hee, 2008).

Allen (2012) defined postpartum fatigue as a multidimensional phenomenon that causes a woman to feel tired, uncomfortable, and less efficient than usual. They also added that fatigue in postpartum period has the capacity to adversely affect the woman health and ability to resume former role functions as well as to assume new role functions associated with the birth of an infant.

In general, it has been shown that postpartum fatigue begins immediately after delivery and becomes severe more time, so that within 36 hours of childbirth, postpartum women consider fatigue to be a problem, which continues to become more serious during the first six weeks (Sung-Hee, 2008).

Most women experience fatigue in the weeks and months after childbirth, perhaps nature's way of ensuring new mothers rest to improve recovery and reduce exposure to infection. However, fatigue may be severe, impacting a woman's mood and ability to meet the demands of new motherhood (Elizabeth, 2012).

Fatigue in Postnatal period has negatively affect not only the woman's quality of life, but also that of her family Postpartum fatigue is most effectively conceptualized as a multidimensional concept with physical and mental aspects that is different from sleepiness and can be differentiated from postpartum depression /or milder "baby blues," with which there is some overlap (Runquist, 2007). In addition, fatigue is both a symptom and a predictor of depression in women after delivery. At the same time, postnatal fatigue is experienced by most non-depressed women (Jansen et al., 2007)

Fatigue is commonly mentioned in the literature related to postpartum depression; however, the relationship between these concepts is not clear. Depression may donate to fatigue or fatigue may contribute to depression. Fatigue has also been classified as a symptom of postnatal depression (Corwin and Arbor, 2007; Posmontier, 2014).

Postpartum depression is highly prevalent in women. while fatigue and sleep disturbance has been found to increase the risk of depression in the general population, little is known concerning its link with postpartum depression (Megan,2017)

Although most mothers have declining levels of fatigue over the first two weeks postpartum, some experience persistent fatigue. For these women, an intervention aimed at encouraging rest and quiet time may be necessary for preventing depression (Corwin et al., 2009).

All through the immediate postnatal period as well as the early days post partum, care and support must be regularly balanced among three critical areas: assessment, monitoring, and support the mother's physiological and emotional adaptation following birth through progressive relaxation and deep breathing, education on techniques to improve infant sleep, and discussion of ways to maximize opportunities for sleep (Stremler et al., 2006). Women with postpartum depression, who continue to have poor sleep quality despite non-pharmacological measures, may also benefit from referrals for pharmacotherapy and/or Cognitive Behavioral Therapy (CBT) (Edinger and Means, 2014).

One of the most important aspects to getting adequate sleep is to create a sleep environment free from distractions. Similarly, body needs to be prepared for sleep, meaning that both brain and muscle activity need to be slowed down. More guiding principle have been documented to help in construction a sleep environment (Huang et al., 2010; Da Costa et al., 2015).

Sleep disorder and fatigue among postpartum women has received inadequate research attention. Therefore, this study is carried out to explore and evaluate postpartum women levels of fatigue and sleep disorder , and detect the its association with postpartum depressive symptoms.

Objectives

The aim of this study was to :

1. Explore the prevalence of sleep disturbances , fatigue, and depressive symptoms among women during the first week of postpartum recovery.
2. Investigate the association between sleep disorders , fatigue, and early postpartum depressive symptoms.

3. Investigate the association between sleep disorder, fatigue, early postpartum depressive symptoms and socio-demographic characteristics in the studied women.

II. Subject And Methods

Research questions:

1. Do the women experience sleep disorders, fatigue, and depressive symptoms at postpartum period?
2. What is the association between sleep disorders, fatigue, and early postpartum depressive symptoms?
3. Is a relation was present between sleep disorders, fatigue, early postpartum depressive symptoms and socio-demographic characteristics of studied women?

Research Design and Setting:

Analytic cross-sectional research design was used to achieve the study aims.

Setting:

This study was conducted at the postpartum inpatient and outpatient clinics during follow-up visits at Zagazig University Hospitals during the period from the first of Jun 2019 to end of October 2019. This hospital is affiliated to the ministry of high education, it is educational hospital in Zagazig region

Subjects:

The sample consisted of 500 postpartum women recruited from postpartum inpatient and outpatient clinics during follow-up visits at the study setting. Women were eligible for recruitment in the study sample if they met the following inclusion criteria:

In normal reproductive age (16-45), Delivered vaginally, and Free from any medical problems that may cause fatigue or sleep disturbances.

Sampling technique: A consecutive sampling technique was used where eligible women were recruited in the sample after application of the inclusion criteria. This was continued until the required sample size was fulfilled.

Tools of data collection:

Four instruments were used for data collection:

1. Interview questionnaire form:

it was developed by the researcher for collection of the socio-demographic characteristics such as women's age, level of education, job, residence, Having private room for rest, and crowding index (persons/room).

2. Global Sleep Assessment Questionnaire – GSAQ

This scale was developed by **Roth et al., (2002)** to evaluate sleep pattern and causes of sleep disorders among postpartum women. It consists of 15 items. Responses are measured on a 4-point Likert scale where the highest score indicates the highest level of sleep disturbances. The four categories for scoring system are: (1) never, (2) sometimes, (3) usually, and (4) always.

Scoring: The items of the scale were classified into its six principal components according to **Unger et al., (2004)**. These are 1) insomnia/ hypersomnia, 2) non-restorative sleep, 3) sleep schedule disorder, 4) excessive daytime somnolence, 5) sleep apnea, and 6) restlessness. For individual item analysis, the scale was dichotomized by grouping never with sometimes, and usually with always. Then, for quantitative analysis, the responses never, sometimes, usually, and always were respectively given scores 1 to 4. The sum score of each component was calculated and its mean and standard deviations were computed by dividing by the number of items. Then, the total of each component and of the scale was dichotomized into low if the mean was less than 2 and high if 2 or higher.

3. The Multidimensional Fatigue Symptom Inventory-Short Form - MFSI-SF

This scale was constructed by **Stein et al., (2004)** to evaluate fatigue symptoms among postnatal women. It consists of 30 items. Responses are measured on a 5-point Likert scale where the highest score indicates the highest level of fatigue symptoms. The five categories for scoring system are: (1) Not at all, (2) A little, (3) Moderately, (4) Quite a bit, and (5) Extremely

Scoring: The items of the scale were classified into its six principal components according to **Reeves et al (2003)**. These are 1) emotional, 2) general, 3) mental, 4) physical, and 5) vigor. For individual item analysis, the scale was dichotomized by grouping not at all with a little and moderately, and quite a bit with extremely. Then, for quantitative analysis, the responses not at all, a little, moderately, quite a bit, and extremely were respectively given scores 1 to 5. The sum score of each component was calculated and its mean and standard deviations were computed by dividing by the number of items. Then, the total of each component and of the scale was dichotomized into low if the mean was less than 3 and high if 3 or higher.

4. The 20-Item Center for Epidemiological Studies Depression Scale (CES-D) is widely used to assess the frequency of depressive symptoms in women before and after childbirth. It was used by *Callahan et al., (1991)*, the instructions ask respondents to think back to feelings and attitudes over the past week and check the response that best describes how often they felt or behaved this way. It consists of 20 items. Responses are measured on a 4-point Likert scale where the highest score indicates the highest level of depressive symptoms. The four categories for scoring system are: (0) Rarely or none of the time, (1) Some or little of the time, (2) Occasionally or moderate amount of time, and (3) Most or all the time.

Scoring: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

Content validity

Validity was established for face and content validity by expertise from nursing faculty - Zagazig University (psychiatric and obstetric nursing) who revised the tools for clarity, relevance, applicability, comprehensiveness to assess the study aims, understanding and ease for implementation and according to their opinion minor modification were applied.

Pilot study

A pilot study was carried out before performing the actual study on 10 percent of the targeted sample. I asked the women to pay particular attention while they completed their surveys and note any questions that were confusing or hard to answer and were asked to identify any survey questions that caused them emotional distress or discomfort. In order to test the validity and questions clarity and emotional distress as well as to estimate the time needed for data collection, both oral and written comments are provided. The necessary modifications were done; these participants were excluded from the sample.

Fieldwork

The investigator met with each woman individually and explained to her the purpose and procedures of the study. Upon obtaining her oral consent, the researcher started the interview. At the end of the interview, the woman was given an appointment to meet her in the outpatient clinic for assessment of postnatal details after two weeks. Each interview lasted for about 30 minutes. Data collection lasted for 5 months which started from June to October 2019.

Administrative and ethical considerations:

An official permission was granted to proceed in the study from the head of postpartum inpatient and outpatient clinics at Zagazig University Hospitals explaining the aim of the research to get the permission for data collection. Clear instructions on how to complete the questionnaire were given and voluntary participation and confidentiality was ensured.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS software statistical computer package version 16. For quantitative data, the range, mean and standard deviation were calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $p < 0.05$ for interpretation of results of tests of significance.

III. Results

Table (1) revealed that, the studied women age ranged between 20 and 35 years, with mean (SD) 26.1 ± 3.0 years. Majority of them (60.4%) had university education, and the minority (2%) can Read/write. more than half were housewives (58.2%), with private residence (93.8%), and a private room (86.8%), and a crowding index less than two persons per room (53.2%).

Table (2) shows that, among "Sleep schedule disorder", the most common sleep disturbances problems were related to "Have worried interfering with sleep" which reported (52.6%), followed by "Have something else interfering with sleep" (26.2%). Regarding the "Non-restorative sleep" the most common sleep disturbances problems were related to "Feel sad or anxious" (58.0%), followed by "Daytime sleepiness interfere with activities" (31.2%). The table also revealed that among "Restlessness", about one-third of the women reported having "nightmares, scream, walk, punch or kick during sleep" (30.8%)

Figure (1) illustrated that, the most frequent sleep disturbance group as reported by the studied women were the "a non-restorative sleep" (30.2%), followed by "excessive daytime somnolence", "insomnia/

hypersomnia", "sleep schedule disorder" (26%) , (23.6%) and (18.92%) respectively. On the other hand, the less common sleep disturbance group was " sleep apnea", (2.5%)

Table (3) indicates that among emotional scale items, the most frequent symptoms reported by studied women were "I feel upset", "I feel nervous", and "I feel depressed" (36%),(30%),and (21.8%) respectively. While, only (6.5%) reported a quite a bit "I feel calm" . Among physical scale items, the most frequent symptoms reported by studied women was "I feel tired"(45.8%) While, only (0.8%) reported "My arms feel weak". Overall, about one-third of the women (32.4%) had fatigue, with a mean (SD) score 1.3 ± 0.4 from a maximum of 4.

Figure (2) illustrated that, the most frequent fatigue symptoms reported by the studied women were the " emotional fatigue " (74.4%), followed by " general /vigor " (64.4%). On the other hand, the less common fatigue symptoms was " physical", (1.8%)

Table (4) revealed that two thirds of the studied women (67.2%) were reported that " I was happy" and more than half of (52.6%) were reported that " My sleep was restless". While about one-fifth of women (37.2%, 36.2%) were reported that " I enjoyed life " and "I could not get "going"" respectively.

Table (5) revealed that, there is a statistically significant negative correlations were found between fatigue, depressive symptoms and women's age, having a private room for rest, residence, and education , As for the women's job, it statistically significant negative correlated with fatigue, depressive symptoms, and sleep disturbance. Meanwhile, all scales were positively correlated with the "crowding index".

Table (6) revealed that, depressive symptoms was negatively and significantly correlated with fatigue (MSFI) P- value < 0.01, while positively significantly correlated with Global Sleep Assessment Scale (GSAQ) P- value < 0.05. Women's sleep disturbance highly significantly correlated with fatigue P- value < 0.001.

IV. Discussion

Studies suggest postpartum fatigue is significantly related to several demographic variables. At three months postpartum, mothers in a middle socioeconomic range have been found to report higher levels of postpartum fatigue compared to mothers in a lower socioeconomic range. At six weeks postpartum, fatigue levels were higher in mothers with less education, and also in mothers who were younger (*Tikotzky et al., 2010*)

The present study finding revealed that, among the "Sleep schedule disorder", the most common sleep disturbance reported by the studied women were related to having worried followed by having something else interfering with sleep.

This finding consistent with *Kurth et al., (2010)* who found that nighttime sleep disruptions may negatively impact on sleep quality, also numerous studies have demonstrated that decreased sleep efficiency and increased sleep disturbances are most common for new mothers in the first week to 1 month postpartum with gradual improvement over time (*Yamazaki et al., 2005&Signal et al., 2007*).

In addition postpartum women experience less total sleep time, less sleep efficiency (time asleep vs. time in bed), and decreased time to rapid eye movement (REM) compared to non-postpartum women. In spite of being biologically programmed to be awake during the day and sleepy at night, new mothers normally experience less sleep and a 20% increase in wake time during the first 6 weeks postpartum (*Goyal et al., 2007*). Because the same neurotransmitters that mediate sleep quality also mediate mood, poor sleep quality with accompanying neurotransmitter imbalance has also been linked to an increased prevalence of psychiatric disorders during the postpartum period including postpartum depression (PPD) (*Ross et al., 2010*).

This finding also agrees with *Huang et al., (2010)* who found that the most common mother's sleep problem was poor sleep quality. Furthermore, *Hayama et al., (2008)* showed that postpartum mothers in Taiwan experience poor sleep that is multi-faceted, and not simply a matter of insufficient sleep.

In agreement with these present study findings, *Montgomery et al., (2010)* reported that the disturbance of the quality of postnatal sleep was more important than the total time of sleep. Though postpartum mothers' total sleep time was higher than expected during the initial postpartum months, this sleep was highly fragmented and inefficient. This profile of disturbed sleep should be considered in intervention designs and family leave policies.

The present study finding indicated that among "non-restorative sleep" the most common sleep disturbances problems were related to "Feel sad or anxious" followed by daytime sleepiness interfere with activities" , and having nightmares, scream, walk, punch or kick during sleep" which reported by about one-third of the women of the present study,

In agreement with these present study findings, *Nielson and Paquette (2007)* reported about the dream-associated behaviors affecting pregnant and postpartum mothers. They consist of episodes of anxious dreams and nightmares about the new infant that are accompanied by complex behaviors as motor activity, speaking, and expressing emotions. Also, more postpartum women reported dreams containing anxiety and the infant in peril than did pregnant women.

In contrary **Dørheim et al., (2009)** in a study in Norway on the prevalence of and risk factors for postpartum maternal sleep problems. The prevalence of sleep problems was 57.7%. Similarly, **Hayama et al., (2008)** in a Japanese study found that about thirty percent of mothers experienced some sleep problems and were suspected of being at high risk of insomnia.

These wide differences in the prevalence of postnatal sleep disorders among various studies might be attributed to two reasons. First, the present study sample consisted of selected normal primiparous women, while the Nordic study included all women delivered in a general hospital with no inclusion or exclusion criteria. The second reason is related to the measuring tool, which was the Pittsburgh Sleep Quality Index (PSQI) in the Nordic study, whereas the present study used the Modified Global Sleep Assessment Scale (GSAQ).

On the other hand, the least sleep disturbance revealed in the current study was that of sleep apnea. The low frequency of sleep apnea among women might be explained by the inclusion and exclusion criteria of the sample, where only women with normal pregnancy and uneventful delivery were included. Apnea is in fact more common with pregnancy disorders such as eclampsia, as well as with obesity. In this regard, **Ye et al., (2010)** investigated the relationship between sleep apnea and preeclampsia and found that it may induce or aggravate preeclampsia. It was also present in pregnant women with obesity. Similar findings were also reported by **Louis et al., (2010)**. Meanwhile, **Verdaguer et al., (2008)** indicated that sleep related apnea disorders observed during pregnancy are more likely upper airway resistance syndrome.

Generally the current study results shows that the studied women had postnatal fatigue. An important finding was that the frequency of emotional fatigue items which were much higher than physical fatigue, this indicates that the problem of postnatal fatigue is not primarily a physical one due to tiredness and exhaustion.

In congruence with these findings, **Kammerer et al., (2009)** who emphasized that Postpartum fatigue is a real problem and continues to be so for as long as 19 months after delivery. Also **Troy, (2003)** reported that postnatal fatigue was one of the best discriminating symptoms of postnatal depression, which confirms its emotional and mental rather than physical elements.

On the same line, **Taylor and Johson (2010)** study results revealed that preparing women and their partners to manage postnatal fatigue more effectively is essential. **Stremmer et al., (2006)** showed that a nursing maternal-infant sleep intervention for first-time mothers in the early postpartum period promoted maternal and infant sleep.

Also in congruence with these present study findings indicating the value of women's education and instructions regarding postnatal period in preventing such postnatal sleep disturbances and fatigue (**Rowe and Fisher, 2010**)

Meanwhile, according to the present study findings, there is a statistical significance positive relation could be demonstrated between postnatal sleep disturbance and fatigue, this result is in disagreement with what has been previously reported. For instance, **Lee and Kimble (2009)** found that mothers of such vulnerable children reported clinically significant sleep disturbance and fatigue severity. These mothers of hospitalized infants need interventions to promote sleep during postpartum recovery. The lack of significant association in the present study might be attributed to the very small number of infants admitted to the NICU.

Kurth et al., (2010) found that mothers who suffered from sleep deprivation mainly suffers severe tiredness and fatigue.

Regarding depressive symptoms the current study revealed that two thirds of the studied women reported that "I was happy" and about one-fifth of women were reported that "I enjoyed life" Consistent with this research results **Lee et al., (2003)** found that screening at early postpartum depressive symptoms was associated with a high false-positive rate: nearly 50% of women with EPDS scores > 9 at 1 week postpartum no longer screened positive for probable depression at 8 weeks postpartum (EPDS > 9). On the same line longitudinal study found that occupational physical activity vs fatigue was positively associated with postnatal depressive symptoms. There was inconclusive evidence to suggest an optimal dose of postpartum physical activity for reducing postnatal depressive symptoms (**Megan, 2017**).

Consistent with the current study finding, studies by **Artazcoz et al., (2004)** on the relationship between level of education, common mental disorders and psychosocial health often produce conflicting results, the close links between education, employment status, income, and socioeconomic position, make it very difficult to quantify and contextualise educational level. This is particularly true if one considers that, in some situations, the physician's influence and practices regarding a patient's physical and mental health status will be substantially affected by the patient's level of education. However, as our research data show, among women of parallel socio-economic status, those with university-level education are less likely to suffer from higher levels of postnatal depressive symptomatology (**Bryanton and Beck, 2010**)

On the other hand **Dennis (2004)** found that nearly 80% of women with elevated EPDS scores at 8 weeks postpartum also had elevated scores in the immediate postpartum period. The variables that differentiated the women with new-onset symptoms of depression from those with persistent symptoms were very similar to

the variables identified in the previous analysis of true- and false-positive scores. As would be expected on the basis of the postpartum depression risk-factor literature *Teissedre and Chabrol (2004)* reported that immigrant status, recent life stressors, perceived stress, low social support, conflict with partner, and a vulnerable personality were also associated with new onset of depressive symptoms at 8 weeks postpartum.

The current study shows that, there is a statistically significant negative correlations were found between depressive symptoms and women's "age", "having a private room for rest", "residence", "education", and women's job was statistically significant negative correlated with fatigue, depressive symptoms, and sleep disturbance. Meanwhile, all scales were positively correlated with the "crowding index".

Some factors were identified to be related to sleep disturbance and fatigue in the present study. Furthermore, both sleep disturbance and fatigue scales were positively and significantly correlated with the crowding index. These factors reflect stressful life conditions. The home condition not allowing privacy, with high crowding couldn't give the postnatal woman the chance to rest and have good sleep. Also, this environment might make her tired from frequent baby crying, which has been shown as a predictor of postnatal fatigue.

In agrees with the current study results *Webb et al.,(2008)* found a relation between employment and emotional wellbeing of postpartum women, and *McGovern et al., (2007)* emphasized that postpartum women whose fatigue or postpartum symptoms limit daily role function may need counseling regarding return to work.

Roberts et al., (2006) in a study in New Zealand comparing the psychological health of husbands with wives who have post-partum depression. It was found that husbands are themselves at increased risk for experiencing psychological symptoms and disturbances, therefore, they might be unable to help their wives properly.

On the other hand, (*Lee et al., 2000b*) have noted significant relationships between postpartum fatigue and a variety of subjective characteristics. The related characteristics were maternal depression, social support, infant difficulty, infant feeding method, socioeconomic status, education level and age. They might be grouped into maternal, infant, and socio-demographic related factors

Concerning the relation between depressive symptoms and fatigue, the present study finding revealed that depressive symptoms was negatively and significantly correlated with fatigue

This results supported by *Cindy-Lee,(2005)* who found that maternal fatigue are strongly associated with a new onset of depressive symptoms in the postpartum period, postpartum

Shu-Yu et al.,(2012) emphasized that mothers in the high-risk depressive symptoms group were most likely to fall into the high-risk group for fatigue. Joint trajectories were predicted by poor sleep score (odds ratio = 2.96, 95% confidence interval = 1.2, 7.3) using multinomial logistic regression analysis

Depression, identified as a factor potentially producing fatigue, is also considered a negative consequence, or outcome, of unrelieved postpartum fatigue (*Rychnovsky and Hunter, 2009*).

Postpartum fatigue may be caused by recovery from childbirth, childcare responsibilities, reduced sleep, and anemia. Infant sleep patterns and maternal fatigue have been shown to be strongly associated with the onset of depressive symptoms (*Corwin et al., 2009*), suggesting that postpartum fatigue is important in its own right, and it may lead to other more serious problems.

Goyal et al., (2007), in their descriptive study of postpartum fatigue, measured fatigue and depression in a subsample of 188 mothers (vaginal births) within the first 72 hours of delivery, and on the total sample of 259 mothers (vaginal and caesarean births) at six and twelve weeks postpartum. At six and 12 weeks postpartum, they found the mothers with a greater number of fatigue symptoms also reported more depressive symptomatology. Similarly, *Ross et al. (2010)*, in their study of 35 women following vaginal births found, at two days and two weeks postpartum, the mothers with higher levels of fatigue also reported higher levels of depression.

Concerning the relation between depressive symptoms and sleep disturbances, the present study finding revealed that depressive symptoms was positively and significantly correlated with sleep disturbances.

Our findings are similar to *Huang et al., (2010)* who noted that Taiwanese primiparas with depressive symptoms were more likely report increased daytime sleepiness related to infant care when assessed between 13–20 days postpartum. In our sample, the GSDS subscale addressing excessive daytime sleepiness was significantly correlated with postpartum depressive symptoms. The daytime sleepiness may be due in part to infant care during the night or to the inability or lack of opportunity to nap during the day.

Several postpartum studies suggest that women with depressive symptoms experience poorer sleep quality, less total sleep time, longer sleep latency (take more time to fall asleep), and experience more sleep disturbance, while women without depressive symptoms sleep more efficiently and adjust to postpartum sleep disturbance (*Dennis and Ross, 2006 & Goyal et al., 2007*). *Lee et al. (2000a)* found that participants who

experienced depressive symptoms also experienced 80 minutes less total sleep time, shorter REM latency, and less time spent in REM sleep compared to the women who did not experience depressive symptoms.

Even controlling for all of the previous variables, subjective report of sleep disturbance was a significant predictor of postpartum depressive symptoms ($\beta=0.41$, $p<.001$) and explained an additional 13.4% of the variance in postpartum CES-D scores. Regardless of other factors, including objective measures of sleep quality and quantity, mothers who felt they were not obtaining adequate sleep, either in the GSDS subscale for difficulty falling asleep or subscale for excessive daytime sleepiness, had higher depressive symptom scores in the postpartum period (*Pires et al., 2010*).

Fragmented maternal sleep is more strongly correlated with depressive symptoms than infant temperament at three months postpartum (*Deepika Goyal et al., 2009*).

From the present study, it was observed that a statistically significant highly positive correlation was present between postnatal sleep disturbance and fatigue. This means that fatigue might be increased by sleep deprivation, or reciprocally the excess fatigue leads to sleep disturbance. This latter possibility may be supported by the fact that the postnatal fatigue in the present study sample was mainly emotional rather than physical, and emotional fatigue unlike physical fatigue most probably deprives from sleep.

In agreement with the foregoing present study findings, *Rychnovsky and Hunter (2009)*, in a study in San Diego, California, examined the relation between sleep characteristics and postpartum fatigue during the first six weeks after delivery. They demonstrated that fatigue had a positive correlation with sleep disturbance, indicating that higher levels of fatigue are associated with more disturbed sleep. Moreover, the levels of fatigue had a negative correlation with sleep effectiveness, indicating that the women were more fatigued if they perceived their sleep quality and adequacy to be poor or if they perceived the time spent sleeping to be short. Moreover, *Meltzer and Mindell (2007)* in a USA study found that maternal sleep quality was a significant predictor of maternal fatigue.

So far these results compromised with, the results of *Rowe and Fisher, (2010)* who mentioned that although it is evident that sleep patterns have direct effects on fatigue, the multidimensionality of fatigue may imply that complex patterns of relationships exist between fatigue and sleep characteristics. In their study, they investigated the correlations between fatigue and quantitative and qualitative sleep measurements, while taking into consideration depression and somatization which are known to affect both sleep and fatigue. Fatigue was significantly predicted by subjective sleep quality, but not quantitative sleep characteristics such as sleep latency, nocturnal awakenings and early morning arousals.

V. Conclusions

On the basis of the findings of this study, it can be concluded that:

- Among the "Sleep schedule disorder", the most common sleep disturbance reported by the studied women were related to "having worried " followed by "having something else interfering with sleep"
- Among "non-restorative sleep" the most common sleep disturbances problems were related to "Feel sad or anxious" followed by daytime sleepiness interfere with activities" , and having nightmares, scream, walk, punch or kick during sleep" which reported by about one-third of the women of the present study,
- Generally the current study results shows that the studied women had postnatal fatigue. An important finding was that the frequency of emotional fatigue items and general /vigor items were much higher than physical fatigue, this indicates that the problem of postnatal fatigue is not primarily a physical one due to tiredness and exhaustion.
- A statistically significant highly positive correlation was present between postnatal sleep disturbance and fatigue.
- There is a statistically significant negative correlations were found between depressive symptoms and women's "age", "having a private room for rest", "residence", "education", and women's job was statistically significant negative correlated with fatigue, depressive symptoms, and sleep disturbance, Meanwhile, all scales were positively correlated with the "crowding index".
- Depressive symptoms was negatively and significantly correlated with fatigue
- Depressive symptoms was positively and significantly correlated with sleep disturbances.

- Therefore provide support for the development of postpartum depression preventive interventions designed to reduce sleep deprivation in the early weeks, and differentiation between depressive symptoms and fatigue is possible and important for improving care during the early postpartum period.
- However, our results suggest that an understanding of a woman's biological and psychosocial risk for postpartum depression, together with use of a screening tool such as the EPDS, may assist health professionals to identify early symptoms of depression.

VI. Recommendation

- Further research is required to determine the optimal dose and domain of physical activity for reducing postnatal depressive symptoms as well as to examine the link between sedentary behavior and postnatal depressive symptoms
- Postpartum clinical visits should include questions about maternal sleep so interventions can be directed toward sufficient sleep to minimize risk of postpartum depression.
- Longitudinal data collection that follows women later into their first postpartum year.
- Designed a psycho-educational intervention that addresses heightened learning needs of mothers at postnatal period will useful in preventing common postnatal problems.
- Special care must be given to women who are at higher risk of developing postnatal fatigue and sleep disturbances, such as working mothers and those living in home environment not encouraging rest as living with extended families, and high crowding index.
- Further research is proposed to assess the effect of nursing interventions to help women who have postnatal sleep disturbances and fatigue to cope with these problems.

Tables

Table 1. Frequency distributions of socio-demographic characteristics of studied women (n=500)

Variables	The studied women (n=500)	
	No.	(%)
Age (years):		
<21	49	9.8
21-	157	31.4
25+	294	58.8
Range	20-35	
Mean±SD	26.1±3.0	
Education:		
Illiterate	27	5.4
Read/write	10	2
Primary	16	3.2
Preparatory	53	10.6
Secondary	92	18.4
University	302	60.4
Job:		
Housewife	291	58.2
Working	209	41.8
Residence:		
Private	469	93.8
With extended family	31	6.2
Have private room for rest:		
No	66	13.2
Yes	434	86.8
Crowding index:		
<2	266	53.2
2+	234	46.8

Table 2. Frequency distributions of sleep disorder in the studied women (n=500)

Scale items	Usually/always	
	No	%
Sleep apnea:		
▪ Snore loudly	2	0.4
▪ Hold breath, have breath pause or stops during sleep	11	2.2
Mean±SD	0.4±0.3	
Excessive daytime somnolence:		
▪ Fall asleep unintentionally or have to fight sleep during day	130	26.0
Mean±SD	1.1±0.9	
Insomnia/hypersomnia:		
▪ Have difficulty falling asleep or feel poorly rested in the morning	118	23.6
Mean±SD	1.0±0.7	
Non-restorative sleep:		
▪ Feel sad or anxious	290	58.0
▪ Daytime sleepiness interfere with activities	156	31.2
▪ Work, travel or other activities prevent from getting enough sleep	7	1.4
Mean±SD	1.1±0.6	
Restlessness:		
▪ Have nightmares, scream, walk, punch or kick during sleep	154	30.8
▪ Have restlessness or crawling feelings in legs at night that went away after moving legs	12	2.4
▪ Have repeated rhythmic leg jerks or twitches	7	1.4
Mean±SD	0.8±0.4	
Sleep schedule disorder:		
▪ Have worried interfering with sleep	263	52.6
▪ Have something else interfering with sleep	131	26.2
▪ Have pain interfering with sleep	77	15.4
▪ Have other problems interfering with sleep	2	0.4
▪ Use medications interfering with sleep	0	0.0
Mean±SD	0.8±0.4	
Total score	0.9±0.4	

Figure 1. Total scores of sleep disorders in the studied women (n=500)

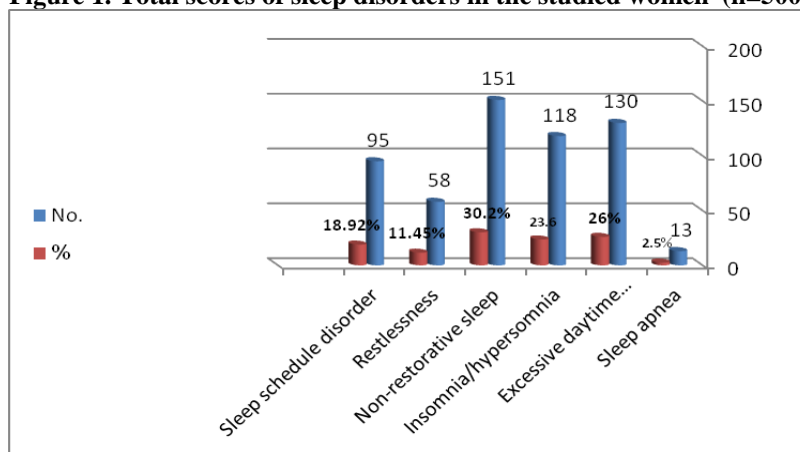


Table 3. Frequency distributions of fatigue symptoms in the studied women (n=500)

Scale items	quite a bit		Extremely	
	No	%	No	%
Emotional				
I am confused	100	20	13	2.6
I feel upset	155	31	25	5
I feel cheerful	83	16.6	0	0
I feel calm	13	6.5	0	0
I am distressed	75	37.5	20	10
I feel nervous	136	27.2	11	2.2
I feel relaxed	17	3.4	2	0.4
I feel depressed	105	21	4	0.8
I feel tense	38	7.6	5	1
I feel sad	53	10.6	10	2
I have trouble paying attention	62	12.4	16	3.2
Mean±SD	1.9±0.7			
Physical				
I feel fatigued	66	13.2	2	0.4
My arms feel weak	3	0.6	1	0.2
I feel sluggish	31	6.2	2	0.4
My head feels heavy	21	4.2	0	0
I have ache all over	100	20	2	0.4
I feel pooped	62	12.4	1	0.2
My body feels heavy all over	124	24.8	10	2
I am worn out	133	26.6	26	5.2
My legs feel weak	5	1	0	0
I feel tired	162	32.4	67	13.4
My muscles ache	9	1.8	1	0.2
Mean±SD	0.3±0.3			
Mental				
I am forgetful	28	5.6	0	0
I am unable to concentrate	3	0.6	0	0
I make more mistakes than usual	4	0.8	0	0
I have trouble remembering things	84	16.8	0	0
Mean±SD	1.0±0.4			
General/vigor				
I feel lively	21	4.2	0	0
I feel refreshed	16	3.2	0	0
I feel run down	19	3.8	0	0
I feel energetic	14	2.8	1	0.2
Mean±SD	1.8±0.5			
Total scale	1.3±0.4			

Figure 2. Total scores of fatigue symptom in the studied women (n=500)

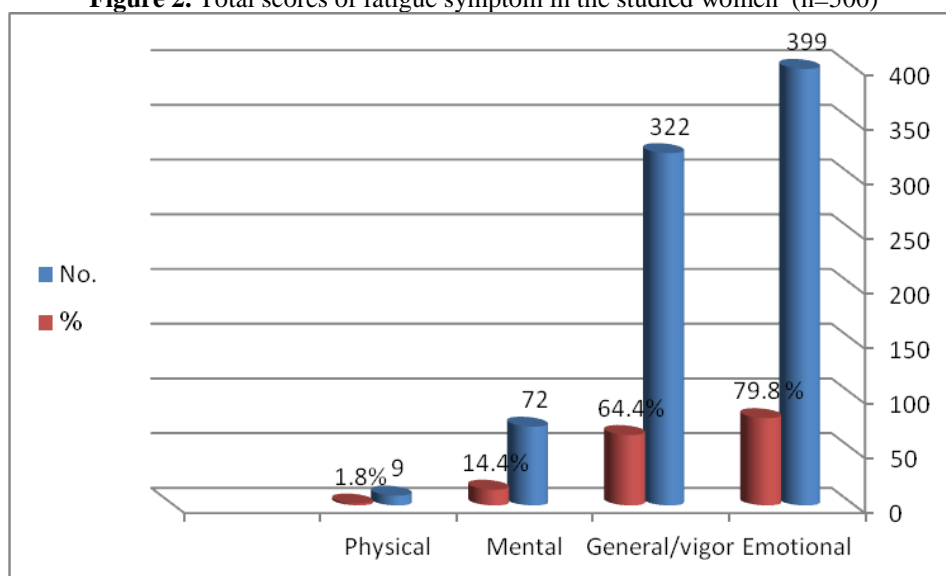


Table 4. Frequency distributions of depressive symptoms in the studied women (n=500)

Scale items	Occasionally /Most or all of the time	
	No	%
I was bothered by things that usually don't bother me.	2	0.4
I did not feel like eating; my appetite was poor.	21	4.2
I felt that I could not shake off the blues even with help from my family or friends.	30	6
I felt I was just as good as other people.	113	22.6
I had trouble keeping my mind on what I was doing.	9	1.8
I felt depressed.	75	15
I felt that everything I did was an effort	7	1.4
I felt hopeful about the future	149	29.8
I thought my life had been a failure.	12	2.4
I felt fearful.	7	1.4
My sleep was restless.	263	52.6
I was happy.	336	67.2
I talked less than usual.	108	21.6
I felt lonely.	7	1.4
People were unfriendly	15	3
I enjoyed life	186	37.2
I had crying spells	10	2
I felt sad	20	4
I felt that people dislike me.	20	4
I could not get "going"	181	36.2

Table 5. Correlation matrix of postnatal fatigue (MSFI), sleep disturbance (GSAQ) and depressive symptoms (CES-D) and socio-demographic characteristics in the studied women (n=500)

Items	Pearson correlation coefficient		
	GSAQ	MFSI	CES-D
Age	-0.027	-0.139**	-0.132**
Job	-0.182**	-0.290**	-0.288**
Crowding index	0.503**	0.559**	0.529**
Have a private room for rest	-0.083	-0.134**	-0.129**
Residence	-0.011	-0.095*	-0.099*
Education	-0.081	-0.101*	-0.101*

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 6. Correlation matrix of fatigue (MSFI), Global Sleep Assessment Scale (GSAQ), and depression symptoms (CES-D) in the studied women (n=500)

Scale	Fatigue (MSFI)	Global Sleep Assessment Scale (GSAQ)
	R	R
Depression symptoms (CES-D)	-0.38**	0.24*
Global Sleep Assessment Scale (GSAQ)	0.662***	

Correlation coefficients were used to examine relationships between the major study variables

* *P- value < 0.05*

** *P- value < 0.01*

*** *P- value < 0.001*

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