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ASSOCIATION BETWEEN POSTPARTUM DEPRESSION AND SLEEP QUALITY AND ITS RELATED FACTORS

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Abstract

The present study aims to investigate the association between postpartum depression and sleep quality and its related factors.

A descriptive cross-sectional study was conducted in the period between January and March 2020. A sample of 204 women in Saudi Arabia were recruited from the "Well-Baby Clinic" affiliated to King Abdul Aziz Medical City. Both Pittsburgh sleep quality index and Edinburgh postnatal depression scale were used to assess the sleep quality and postpartum depression, respectively. Descriptive statistics and Chi-Square analysis was performed to examine the association between postpartum depression and sleep quality

The study results showed that there was significant association between postpartum depression and subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications and daytime dysfunction ($p<0.05$). Furthermore, the study revealed that maternal complications during pregnancy and/or delivery, the chosen mode of feeding, usage of painkillers, and post-delivery complications for the child (such as hypoxia) were factors influencing the postpartum depression among the surveyed women.

The study concluded that women having postpartum depression are experiencing poor sleep quality. As a result, the study recommends increasing the awareness and knowledge of Saudi women concerning postpartum depression, alongside providing them with specific coping strategies to proficiently manage and alleviate the consequences of postpartum depression.

Keywords: *postpartum depression, sleep quality, Saudi Arabia, PSQI, EPDS.*

Introduction

Postpartum depression, also known as postpartum blues, is a relatively common emotional disturbance with crying, confusion, mood lability, anxiety and depression mood [*Stewart D, Vigod S, 2016*]. It is considered usually a depression that begins for the mother within the first 12 months after a baby is born [*Silverman M et al., 2017*]. Sometimes, the more likely periods are within the first six to nine months for sure. One in ten women will experience postpartum depression and this has been found across many different countries, cultures, geographical settings; both urban and rural, developed or developing countries [*Slomian J et al., 2019*]. A total of sixty percent of women who will develop a major postpartum depression won't have had particularly any

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formal history of mental health problems and certainly no previous diagnosis, they might have had some period of mood instability around period of stress or something more minor [*Brummelte S, Galea L, 2016*]. Family and friends may not expect postpartum depression, and it's pretty easy to put down some of the initial symptoms of depression after a baby comes to all of the stresses and changes and fatigue that can come with looking after young infants [*Pao C et al., 2019*].

There are a number of sings that would suggest that this may be more of a depressive illness and less of a typical adjustment period [*Ertmann R et al., 2019*]. An inability to rest when the baby rests, So, a sense of restlessness, difficulty falling asleep, poor concentration or planning, lack of ability to enjoy usual activities or people, low self-concept, unusual hopelessness, overwhelmed easily compared to past coping, in addition to unexplained changes in sleep or appetite [*Fiala A et al., 2017*].

It is significant to acknowledge that the social determinants of health, such as housing, education, the quality of the neighborhood, nutrition and overall income really influence availability and accessibility of healthcare, and have a lot to do with the outcome for postpartum depression or any psychiatric illness [*Kumar N et al., 2017*].

Most new parents actually have a deficit of sleep compared to what was like for them, sort of pre-pregnancy for sure, and even within pregnancy [*Okun M et al., 2018*], but it is believed that some people's brain chemistry is particularly sensitive to sleep quality and sleep duration, and for those people that may be one of a number of triggers for mood dysregulation. Certainly, any kind of psychological stress can be a factor in why depression begins at a particular time or why begins for that particular person. Sometimes, it is the culmination of things that have been happening for that person [*Lewis B et al., 2018*].

Several studies were performed to investigate the sleep quality among women having postpartum depression. Iranpour S. and co-authors (2016) carried out a cross-sectional study to investigate the association between postpartum depression and sleep quality among Iranian women. A total of 360 women with postpartum depression were recruited in this study. The study adopted the Standard Pittsburgh Sleep Quality Index to detect the sleep quality among the participating women, in addition to the Edinburgh Postnatal Depression Questionnaire to determine the level of postpartum depression. The findings of the study revealed that women having poor sleep quality had a triple chance of getting postpartum depression compared to those women having a good sleep quality. The study reported a significant association between sleep quality and postpartum depression.

In another study carried out by AlModayfer O. and his colleagues (2015), the purpose of the study was to identify the prevalence rate of postpartum depression among Saudi women, in addition to identifying the risk factors influencing the prevalence of postpartum depression. The qualitative research approach was adopted in this study through recruiting 1200 Saudi women. A total of 571 women were interviewed 5 weeks after delivery. The Edinburgh Postpartum Depression Scale was used as a data collection tool in this study. The findings of the study revealed that the prevalence rate of postpartum depression is 14%. Furthermore, it had been reported that the presence of mental illness, health status of the mother during the pregnancy period, and the delivery time were significant risk factors influenced the development of postpartum depression among Saudi women.

Improving the mental health of women has been the overwhelming concern of many healthcare providers and international health bodies [*Katon J et al., 2017*]. Females who are experiencing chronic mental illness like depression, Schizophrenia, or bipolar disorder, they can have physical health problems too. If a woman is experiencing depression, how she perceives her health and how she perceives her body can definitely be affected. If she has a lot of negative thoughts and feeling sad and down a lot of times, she may think that her health is in worse shape than it potentially is. It had been reported that individuals who are experiencing depression, they tend to have a lot of somatic complaints, trouble sleeping, fatigue, trouble with their memory or their concentration, and they complain a lot about physical problems [*Fellmeth G et*

al., 2017]. Therefore, the current study aimed at investigating the association between the sleep quality and the postpartum depression among women in Saudi Arabia. In addition, this study sought to identify the risk factors associated with the elevated levels of postpartum depression among Women in Saudi Arabia. This study would provide a clear theoretical and empirical framework that guides the clinicians and healthcare providers in Saudi Arabia on identifying the depressive symptoms at an early onset and enables them to design appropriate interventions that would help women in Saudi Arabia overcome the consequences of these symptoms and prevent their development to a postpartum depression.

Material and methods

Participants and setting

The current study was performed at well baby clinic affiliated to the pediatrics department of King Saud Medical City, which is one of the largest tertiary hospitals in Saudi Arabia. It provides both academic and healthcare services for Saudi and non-Saudi population. The medical city serves a large population including those having health insurance through the Saudi Ministry of Health, university staff and students, in addition to individuals having a valid health insurance from various private companies. The family medicine clinics in King Saud Medical City are outpatient clinics providing healthcare services for patients of all age groups attending either for regular checkups or with acute or chronic complaints.

A total of 204 women with a response rate of 82.2% out of 248 participants as the calculated sample size, who had a baby ages less than a year were recruited in this study. The participating women were referred to the "well baby clinic" at King Saud Medical City between January 2020 and March 2020 for different reasons. The participants were assessed in term of meeting the inclusion criteria, and then they were kindly asked to fill in the study questionnaire. The inclusion criteria were being a female, having a baby aged less than one year, able to read and write either Arabic or English (or both), attends the "Well baby clinic" during January to March 2020, and accepted to be recruited in the study. Exclusion criteria included participants who had no history of sleep nor mental health disease.

Data collection tool

This cross-sectional study adopted the questionnaire as a data collection tool. The study questionnaire consisted of three parts. The first part was designed to elicit data about the participants' sociodemographic and clinical characteristics, such as age, husband's age, marital status, educational level, type of job, nationality, number of boys, number of girls, age of youngest child, own residency, years of marriage, presence of other wives, income, smoking, last baby gender and age, gender satisfaction, desire to get pregnant again, pregnancy type and duration, having any diseases or complications either during pregnancy or delivery, type of feeding and sleep location of the baby.

The second part of the study questionnaire was Pittsburgh Sleep Quality Index (PSQI) consisted of 10 items measuring seven domains; they are subjective sleeping quality (item 6), sleep latency (items 2 and 5a), sleep duration (item 4), habitual sleep efficiency (items 1, 3, and 4), sleep medications (item 7), and daytime dysfunction (items 7,8, and 9). Item 10 of the PSQI was optional in the study, it measures the responses of a bed partner or a roommate.

The third part of the study questionnaire was Edinburgh Postnatal Depression Scale (EPDS), which consisted of 10 items designed to identify the risk of developing postpartum depression among women. Items 3, 5-10 of the scale were reversed. The maximum score of the scale is 30. Patients obtaining 10 or higher are considered to have possible depression. The validity and reliability measures of the used scales were achieved and ensured in the original research papers.

A bilingual version (Arabic and English) of the study questionnaire was distributed over the study participants. The Arabic version of the PSQI was validated and ensured for reliability in the Arabic context by Suleiman K. and co-authors (2012) and the Arabic version of the EDPS was validated and ensured for reliability by Naja S. and others (2019). The Institutional Review Board approval was ob-

tained on the 22nd of April/2019 (No. E-19-3829).

Data collection procedure

The study questionnaire was prepared with a cover page that included the title of the study, the researcher's name and contact information. A consent form was enclosed with each questionnaire, which had to be signed by the women who agree to participate in the study. The researcher visited the "well baby clinic" several times to ensure having the highest number of participants. Due to the COVID-19 pandemic and the movement control orders, the questionnaire was converted to an online version and was sent to the women attending the "well baby clinic" as a short text message on their mobile phones after getting their approval and acceptance to participate in the study.

In the paper-based data collection phase, a total of 148 valid and complete questionnaires were received, whereas 56 valid and complete questionnaires were collected through the online questionnaire phase.

Data analysis

The Statistical Package of Social Sciences (IBM Corporation v.25) was used to analyze the participants' responses. The descriptive statistics were used to analyze the participants' sociodemographic and clinical characteristics. In addition, Chi-square analysis was used to investigate the association between sleep quality and postpartum depression among the study participants. A p value <0.05 was considered statistically significant.

RESULTS

The purpose of this study was to investigate the association between postpartum depression and sleep quality among a randomly selected sample of women in Saudi Arabia (n=204). The results presented in table 1 represent the sociodemographic characteristics of the study participants.

The mean age of the study participants was 30.79 and the mean age of the participants' husbands was 35.6. results related to the number of children showed that the mean number of boys was 1.40 and the mean number of girls was 1.47. in addition, the mean age of the youngest child was 2.4 years. The mean duration of marriage for the study participants was 7.85 years.

Results related to the marital status of the study participants showed that 95.6 (n=195) of the study participants were married. For their educational level, the findings showed that those holding a bachelor degree were the most represented category, which constituted 55.9% (n=114), followed by those women having secondary education who constituted 21.1% (n=43). About 57.8% (n=118) of the study participants were housewives, 29.4% (n=60) were having jobs, and 12.7% (n=26) were students. Women who had a job or were students were divided as 14.2% as

TABLE 1

Sociodemographic characteristics of the study participants

Variables	n (%)
Married	195 (95.6)
Divorced	6 (2.9)
Widowed	3 (1.5)
Educational level	
Diploma or less	75 (36.8)
Bachelor	114 (55.9)
Postgraduate studies	15 (7.4)
Job	
Housewif e	118 (57.8)
Student	26 (12.7)
Working	60 (29.4)
Type of Job	
Full time	29 (14.2)
Part time	26 (12.7)
Shifts	7 (3.4)
No Job	142 (69.6)
Nationality	
Saudi	189 (92.6)
Non Saudi	15 (7.4)
Residency	
Living with husband	176 (86.3)
Living with husband's family	28 (13.7)
Own residency	
Yes	124 (60.8)
No	80 (39.2)
Presence of other wives	
Yes	18 (8.8)
No	186 (91.2)
Family income (Saudi Riyal)	
Less than 3000	9 (4.4)
3000 – 6000	33 (16.2)\
6001 – 9000	40 (19.6)
9001 – 12000	54 (26.5)
12001 – 15000	33 (16.2)
More than 15000	35 (17.2)

having a full time job, 12.7% as having a part time job, and 3.4% as working in shifts.

The majority of the study sample (92.6%, n=189) were Saudi women whereas 7.4% (n=15) were non-Saudi women. Investigating the residency status of the participating women revealed that 86.3% (n=176) were living with their husbands and 13.7% (n=28) were living with their husband's family. Only 60.8% (n=124) had their own resident place. In addition, 91.2% (n=186) of the participating women's husbands had no other wives, on the other hand a small percentage (8.8%, n=18) had other wives.

Finally, exploring the monthly family income of the study participants revealed that the most represented category was comprised of individuals with a monthly income ranging between 9001 and 12000 SAR (26.5%, n=54), followed by women with a monthly income ranging between 6001 and 9000 SAR (19.6%, n=40).

Results shown in table 2 indicated that 92.2% (n=188) of the study participants were nonsmokers. Moreover, the results showed that 92.2% (n=188) had a single baby in the last pregnancy, whereas 7.8% (n=16) had more than one baby in the last pregnancy. With regard to the baby gender, the results showed that 52.5% (n=107) of the participating women gave birth of girls and 47.5% (n=97) were boys. The majority of the study participants (94.1%, n=192) were satisfied with the baby gender.

A great majority of the surveyed women (94.1%, n=192) indicated that their pregnancy was planned. On the other hand, 5.9% (n=12) pointed that they were not planning to get pregnant.

Results related to women's pregnancy showed that the full term pregnancy was present among 72.1% (n=147) of the study participants. Women who had a duration of pregnancy less than 37 weeks and more than 40 weeks constituted 17.2% and 10.8%, respectively. Natural pregnancy was the most prevalent type of pregnancy among the study participants (94.6%, n=193).

Results related to delivery showed that 67.2% (n=137) of the surveyed women had a spontaneous vaginal delivery, whereas 32.8% (n=67) had a cesarean delivery.

Results shown in table 3 indicates the Chi-

Table 2

Pregnancy and delivery related characteristics of the study participants.

Variable	n (%)
Smoking last year	
Yes	16 (7.8)
No	188 (92.2)
Having more than a baby in the last pregnancy	
Yes	16 (7.8)
No	188 (92.2)
Baby gender	
Boy	97 (47.5)
Girl	107 (52.5)
Gender satisfying	
Yes	192 (94.1)
No	12 (5.9)
Planning to get pregnant	
Yes	192 (94.1)
No	2 (5.9)
Pregnancy duration	
Full term	147 (72.1)
Less than 37 weeks	35 (17.2)
More than 40 weeks	22 (10.8)
Type of pregnancy	
Natural	193 (94.6)
Medical intervention	11 (5.4)
Type of delivery	
Spontaneous Vaginal Delivery (SVD)	137 (67.2)
Caesarean	67 (32.8)

Table 3

PSQI scores according to the elevated or low EPDS Score

	EPDS≤13 n=67 M(SD)	EPDS>13 n=137 M(SD)	Mean difference (CI 95%)	Effect size	P value
PSQI total	14.23 (3.02)	12.86 (2.95)	1.37	1.18	<0.05
PSQI sub scores					
Subjective sleeping	1.41(0.907)	1.01 (0.889)	0.40	1.06	<0.05
Sleep latency	1.61 (0.834)	1.37 (0.890)	0.24	0.53	<0.05
Sleep duration	1.13 (1.19)	0.978(1.16)	1.52	0.88	<0.05
Sleep efficiency	0.97 (1.23)	0.897(1.20)	0.152	0.71	<0.05
Sleep disturbance	1.04 (0.208)	1.0 (0.27)	0.04	1.13	<0.05
Sleep medication	0.47 (0.876)	0.248(0.626)	0.22	1.01	<0.05
Daytime dysfunction	2.46 (1.34)	1.89(1.71)	0.57	1.23	<0.05

square analysis for the association between sleep quality and the postpartum depression among the study participants. The results showed that there is a significant association between the total perceived sleep quality and the level of the postpartum depression among the study participants. Investigating the association between the participants' perceived sleep quality domains and the level of postpartum depression indicated that there is a significant association between the subjective sleeping, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, sleep medications, and daytime dysfunction on one hand, and the level of postpartum depression on the other hand.

Results showed in table 4 represents the clinical characteristics of the study participants during pregnancy and delivery periods. The results showed that 76% (n=155) of the surveyed women had no diseases during the pregnancy. On the other hand, 24% (n=49) reported that they had a disease during pregnancy. The most prevalent diseases during pregnancy among those women were gestational diabetes miletus (7.8%, n=16), preeclampsia (3.9%, n=8), iron deficiency anemia (1.5%, n=3) and placenta previa (1.5%, n=3).

During the delivery, there was no complications for 93.1% (n=190) of the study participants. Those women who had delivery complications constituted 6.9% (n=14). Bleeding was the most reported complication among the surveyed women (4.4%, n=9).

Delivery complications affecting the child were reported to be experienced by 10.3% (n=21) of the study participants. The most prevalent complications were hypoxia (3%, n=6), intrauterine growth restriction (2.5%, n=5) and bradycardia (2.5%, n=5). Furthermore, the results showed that 80.9% (n=165) of the neonates were not admitted to the neonatal intensive care unit after delivery.

A high percentage of the surveyed women (60.3%, n=123) reported that they did not get the pain killer injection in the back during delivery, whereas 39.7% (n=81) got the injection during delivery. On the other hand, 75% (n=153) of the participating women reported that they were using pain killers after delivery.

Finally, the results related to the type of feeding showed that a combined feeding method of breast feeding and formula was the most common

TABLE 4

The clinical characteristics of the study participants during pregnancy and delivery periods

Variable	n (%)	EPDS≤13 n=67	EPDS≥13 n=137
Having Disease during pregnancy for the mother			
Yes	49 (24)	16 (23.8)	66 (48.2)
No	155 (76)	51 (76.1)	71 (51.8)
Disease during pregnancy for the mother			
Yes	47 (23)	16 (7.8)	31 (15.2)
No	157 (77)	114 (55.8)	43 (21.2)
Having complications during the delivery for the mother			
Yes	14 (6.9)	3 (4.5)	11 (8.03)
No	190 (93.1)	64 (95.5)	126 (92)
Type of complications during the delivery for the mother			
Bleeding during delivery (more than 500ml)	9(4.4)	2 (3)	7 (5.1)
Placenta Abruption	2 (1)	0 (0)	2 (1.46)
Uterine rupture	1 (0.5)	1 (1.5)	0 (0)
Vaginal tear	1 (0.5)	0 (0)	1 (0.73)
Complications during the delivery for the child			
Yes	21 (10.3)	2 (3)	19 (13.9)
No	183 (89.7)	65 (97)	118 (86.1)
Types of complications during delivery for the child			
Fetal Bradycardia	5 (2.5)	0 (0)	5 (3.6)
Hypoxia	6(3)	0 (0)	6 (4.4)
Intrauterine Growth Restriction	5(2.5)	2 (3)	3 (2.2)
Low birth weight	1 (.5)	0 (0)	1 (0.73)
Meningitis	2 (1)	0 (0)	2 (1.46)
Respiratory Alkalosis	1 (.5)	0 (0)	1 (0.73)
Admission of the baby to the NICU			
Yes	39 (19.1)	15 (22.4)	24 (17.5)
No	165(80.9)	52 (77.6)	113 (82.5)
Getting pain killer injection in the back during delivery			
Yes	81 (39.7)	27 (40.3)	54 (39.4)
No	123 (60.3)	40 (59.7)	83 (60.6)
Taking pain killers after delivery			
Yes	153(75)	56 (83.6)	97 (70.8)
No	51(25)	11 (16.4)	40 (29.2)
Type of feeding			
Breast feeding only	55 (27)	18 (26.9)	37 (27)
Breast feeding and formula	114 (55.9)	36 (53.7)	78 (56.9)
Formula only	35(17.2)	13 (19.4)	22 (16.1)
Sleep location of the baby			
In mother's bed	62 (31.9)	17 (25.4)	45 (32.8)
Private bed	133 (65.2)	49 (73.1)	84 (61.3)
Private room	6 (2.9)	1 (1.5)	5 (3.7)

(55.9%, n=114), followed by breast feeding only (27%, n=55), and the least common type was using the formula (17.2%, n=35). The results showed that 65.2% of the participating women had their baby slept in a private bed, where as 31.9% and 2.9% reported that they had their baby slept in mother's bed and private room, respectively.

The mean age of women having EPDS score ≤13 was 29.32 years, whereas the mean age of women having EPDS score >13 was 31.51 years. About 66.42% (n=91) of women having EPDS score >13 had a spontaneous vaginal delivery compared to 68.65% (n=46). Those who had delivered through caesarean constituted 31.34% (n=21) of the women had EPDS score ≤13 and 33.57% (n=46) of the women had EPDS score higher than 13.

There was a close mean scores with regard to the mean duration of marriage years between the women had EPDS score ≤13 (7.76±**5.85**) and women who had EPDS scores higher than 13 (7.89±**6.25**). In addition, women with EPDS scores less than 13 had a higher mean of number of boys (1.56) compared to women having EPDS score higher than 13 who had a mean number of boys equals to (1.32). Among women having EPDS scores ≤13, about 68.65% were having no jobs, whereas 70.1% of women having EPDS scores more than 13 were having no jobs.

Regarding the number of girls, the mean score of the number of girls among women having EPDS scores ≤13 was 1.35 compared to 1.52 in women having EPDS higher than 13. The mean age of the youngest child was 1.83 among women having EPDS score ≤13 and 2.67 among women having EPDS scores higher than 13.

About 64.2% (n=43) of the study participants had EPDS scores ≤13 had bachelor degree, whereas 51.8% (n=71) of the study participants had a bachelor degree and EPDS score higher than 13. Finally, the results regarding the feeding mode of the baby indicated that 36 participants (53.7%) of the study participants had EPDS score ≤13 were using breast feeding in addition to the formula feeding. On the other hand, 56.9% of the participants had EPDS higher than 13 and were using breast feeding and formula (Table 5).

Discussion

The current study sought to identify the association between postpartum depression and sleep quality among women in Saudi Arabia. In addition, this study sought to identify the related factors affecting the sleep quality among women in Saudi Arabia having postpartum depression. The sample of the study was 204 women attending the "well-baby clinic" at King Abdul-Aziz medical city.

The findings of the study suggest that there is a significant association between postpartum depression and sleep quality. The overall sleep quality (subjective sleeping) was significantly associated with the level of postpartum depression. Lower sleep quality was associated with higher levels of

Table 5

Sample characteristics based on the postpartum depression score

	EPDS≤13 (n=67)	EPDS>13 (n=137)	P value
Mode of delivery N(%)			
Spontaneous Vaginal Delivery (SVD)	46 (68.65)	91 (66.42)	0.142
Caesarean	21(31.34)	46(33.57)	0.013
Number of boys (Mean±SD)	1.56±1.53	1.32±1.19	0.201
Years married (Mean±SD)	7.76±5.85	7.89±6.25	0.064
Type of job N(%)			
Full time job	6(8.95)	23(16.8)	0.002
Part time job	9(13.4)	17 (12.4)	0.704
Shifts	6 (8.9)	1(0.73)	0.317
No jobs	46(68.65)	96(70.1)	0.341
Own residency			
Yes	44(65.67)	80(58.4)	0.268
No	23 (34.3)	57 (41.6)	0.019
Number of girls (Mean±SD)	1.35±1.15	1.52±1.39	0.000
Age (Mean±SD)	29.32±5.46	31.51±6.1	0.308
Age of youngest child (Mean±SD)	1.83±2.10	2.67±2.97	0.241
Educational level			
Diploma or less	17 (25.4)	58 (42.3%)	0.306
Bachelor	43 (64.2)	71(51.8)	0.803
Postgraduate studies	7 (10.44)	8(5.8)	0.291
Infant feeding			
Breast feeding	18 (26.9)	37 (27)	0.071
Breast and formula	36 (53.7)	78 (56.9)	0.447
Only formula	13 (19.4)	22 (16.05)	0.166

postpartum depression, and this could be attributed to the symptoms associated with postpartum depression, such as mood disturbance, anxiety, overthinking and sadness. In addition, going late to sleep at night was significantly associated with elevated levels of postpartum depression. Falling asleep late at night might be referred to the effect the depressive symptoms on the mental health of the women.

The results of the current study are consistent with the findings reported by Iranpour S. (2016), Posmontier B. (2008), and Dørheim S.K. (2009) and their co-authors who found that sleep quality is significantly associated to postpartum depression.

Moreover, the results of the study indicated that less sleep duration is significantly associated with the elevated levels of postpartum depression. This might be attributed to that lower sleep durations affect the physical and mental health status of the woman, which consequently affects the hormonal balance in the woman body.

Poor habitual sleep efficiency was found to be significantly associated with the postpartum depression among the surveyed women. This might be referred to the negative thoughts, low mood status, fatigue and fee of guilt accompanied by the postpartum depression. Higher time gap between going to sleep and falling asleep might be a suitable time for the woman to start thinking negatively about the baby and this would yield a poor sleep efficiency.

These results are consistent with the findings of those authors who found that habitual sleep efficiency was significantly associated with postpartum depression among women after delivery [Mirghaforvand M et al., 2017].

The results of the present study revealed that sleep disturbance was significantly associated with the postpartum depression experienced by the investigated women in Saudi Arabia. This might be result of the hormonal change in the woman's body which causes other physical problems that disturb the woman's sleep, such as waking up early at the morning, disturbance in the body temperature, feeling pain and other physiological changes. In addition, it was found that using medications by the women was significantly associated with the level of the postpartum depression. This could be explained that taking medications might be believed by the depressed women to improve their mental health status and could improve their sleep quality.

The previously presented results are in line with the results reported by Okun M.L. (2015), which revealed that sleep disturbance is a consequence of having postpartum depression.

The results related to the daytime dysfunction showed that there was a significant association between performing the daytime functions and the postpartum depression. The reduction in daytime functionality could be referred to that less sleep quality and higher mood disturbance reduce the functionality and the ability of the individual to perform daily life activities. Feeling of fatigue, loss of interest and sadness, in addition to other depressive symptoms negatively affect the individuals' ability to carry out routine and normal functions.

These findings are similar to the findings reported by Ghaedrahmati M. and colleagues (2017) that revealed the negative effect of postpartum depression on the daytime functionality of the women after delivery.

It is noteworthy from the results that having chronic diseases (mostly gestational diabetes mellitus), having complications for the mother during delivery (such as bleeding), hypoxia of the child as a complication after delivery, getting pain killer injection during delivery, taking pain killers after delivery, and using formula for feeding the baby were more prevalent among the women assessed as having postpartum depressed.

The presence of a chronic disease during the pregnancy period might significantly affect the woman's mental health status due to her fear and negative attitudes towards the delivery process and the baby health status [Do T et al., 2018]. In addition, bleeding during delivery might significantly affect the hormonal balance in the body, which will consequently affect her physical and mental health status and participate in the development of postpartum depression [Eckerdal P et al., 2016]. In

addition, any complications happening to the baby might increase the mother's mental health due to the negative thoughts and anxiety related to the baby's health status [Laudi A, Peeples E, 2019]. Furthermore, using formulas might weaken the relation between the mother and the child, which consequently helps in the progression of the postpartum depression [Sharkey K et al., 2016].

Conclusion

To conclude, the current study aimed at investigating the association between sleep quality and postpartum depression and its related factors in a sample of women in Saudi Arabia. The findings of the study revealed that there is a significant association between poor sleep quality and higher levels of postpartum depression. Women who had detected postpartum depression were having lower subjective sleeping, lower habitual sleep efficiency, higher sleep latency, higher sleep disturbance, getting more medications, less sleep duration, and less daily functionality. The study recommends increasing pregnant women knowledge and awareness regarding postpartum depression, pregnancy-related complications, delivery-related complications, coping strategies that could be used to reduce the level of postpartum depression, and the significance of breast feeding in reducing the effect of postpartum depression and its symptoms.

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