Impact of the Quality of Postpartum Sleep on Breast Milk Volume among Primipara Mothers

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Abstract

Motherhood is a distinct bio-psychosocial process in which a woman's role as a mother is transformed and broadened. Each woman experiences childbirth in her own special way; it is a subjective and complicated affair. New-borns must be breastfed every 2-3 hours, or 8-12 times a day. As a result of their short sleep duration, new mothers are less likely to get enough sleep time. Both are developed on a regular basis and this may correlate to the sleep-wake cycle. This might contribute to decreased milk volume in some new mothers. A descriptive observational study was conducted in selected hospitals of Mangalore in the year 2021-22 to find out the correlation between the quality of postpartum sleep and breast milk volume among primipara mothers on day 2 and 3. A total of 42 primipara mothers were selected by using the purposive sampling technique. The information was collected by using Demographic Performa, PROMIS sleep disturbance short form scale and feeding log. Sleep disturbance was a significant predictor for decrease in breast milk production on day 2 and day 3 of the postpartum period (r=-0.048 and r=-0.408 respectively). This proved that sleep disturbance was frequent in the early postpartum period and may have a negative impact on breast milk production.

Key words: Quality of postpartum sleep, Breast milk volume, Primipara mothers

Becoming a mother for the first time is a life-changing experience and birth of a child in the family is a significant event. Hence, first few months after giving birth is an exciting period for a woman as she recovers from the pressures of pregnancy and childbirth while adjusting to her new position and responsibilities as a mother.

Insomnia is a common condition for a pregnant woman, especially during the third trimester. Most mothers also face new sleep challenges after giving birth to the baby. New-borns are constantly awake and need to be fed throughout the day and night. These pressures frequently cause women to change their sleep cycles and, in some cases, sleep less at night.

According to International Sleep Foundation, the average women sleep for only 6 hours and 41 minutes during the post-natal period. In India, the overall incidence of sleep disturbances among post-natal women was 26.7 percent and 22.3 percent subjectively poor quality of sleep. Sleep disturbance is a major problem of 62 percent of post-natal mothers. The most recent National Health Survey found that 54 percent of mothers in Karnataka were having poor sleep pattern (Horiuchi & Nishihara, 2022).

Breastmilk has been recognised by the World Health Organisation as offering "superior nutrition for optimal growth". New-borns must be breastfed every 2-3 hours, or 8-12 times a day. As a result of their short sleep duration, new mothers are less likely to get enough sleep time. Both are developed on a regular basis and this may correlate to the sleep-wake cycle. This might contribute to decreased milk volume in some new mothers.

Need for the study: The process of adjusting to a new baby in the family starts in the postpartum period. This time period is crucial for transition because of factors like acquiring new tasks and responsibilities as well as caring for a newborn. The mother undergoes significant psychological and social changes, as well as changes in roles, as she accepts responsibility for the new-born and accepts her into the family. However, some women actually view these changes as a problem and find that they significantly lower their quality of life.

Through the personal experience during clinical practice the researcher found that most of

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the primipara mothers having postpartum undergo sleep disturbance due to breastfeeding. Thus, the researcher strongly felt the need to study the correlation of postpartum sleep disturbances with breast milk volume. This study aimed to observe the relationship between the quality of postpartum sleep and breast milk volume among primipara mothers in selected hospitals of Mangalore.

Objectives

The objectives of the study were:

- To determine the (a) quality of postpartum sleep among primipara mothers on day 2 and day 3, (b) breast milk volume among primipara mothers on day 2 and day 3.
- To compare (a) the quality of postpartum sleep among primipara mothers on day 2 and day 3, (b) breast milk volume among primipara mothers on day 2 and day 3.
- To find out (a) the correlation between the quality of postpartum sleep and breast milk volume among primipara mothers on day 2 and day 3, (b) significant association of the quality of postpartum sleep among primipara mothers on day 2 and day 3 with selected demographic variables.
- To find the significant association of breast milk volume among primipara mothers on day 2 and day 3 with selected demographic variables.

Hypotheses

All hypotheses will be tested at 0.05 level of significance.

H1: There is a significant difference in the quality of postpartum sleep among primipara mothers on day 2 and day 3.

H2: There is a significant difference in breast milk volume among primipara mothers on day 2 and day 3.

H3: There is a significant correlation between the quality of postpartum sleep and breast milk volume among primipara mothers on day 2 and day 3

H4: There is a significant association of the quality of postpartum sleep among primipara mothers on day 2 and day 3 with selected demographic variables.

H5: There is a significant association of breast milk volume among primipara mothers on day 2 and day 3 with selected demographic variables.

Review of Literature

A project was done by Smith et al (2021) on the title association between breastfeeding and new mothers' sleep in Australia. The study collected data of 156 mothers of infants aged 3, 6 and/or 9 months. Sociodemographic and feeding status data were collected by questionnaire. The results showed that there were no significant differences between lactating and non-lactating mothers. Lactating mothers had more time awake at night hours and spent more time in childcaring activity (p=0.007) and in employment (p<0.01). But there were no significant differences in free time. Hence, the study concluded that exclusively breastfeeding mothers experienced reduced sleep hours but maintained leisure time comparable to other mothers by allocating their time differently.

A descriptive study was conducted to assess the relationship of postpartum sleep quality and breastfeeding self-efficiency of Turkish mothers in 2019. A total 128 primiparas women who had vaginal deliveries were selected for the study. The scales for measuring sleep quality and breastfeeding self-efficiency were used to evaluate each subject's level of self-sufficiency. The study showed that the mothers' mean scores on the postpartum sleep quality scale and the breastfeeding self-efficiency scale were 33.57±11.26 and 46.82±14.89 respectively. A strong negative direction was detected between post-partum sleep quality scale and breastfeeding self-efficiency scale. The study concluded that mothers postpartum sleep quality improves how effectively they breastfeed their babies (Aksu et al, 2019).

A cross-sectional study was conducted to find the relationship between breastfeeding, sleep and postpartum depression in 2015. By purposive sampling technique a total of 180 samples were selected with 90 mothers each in breastfeeding and non-breastfeeding group. Edinburg post-natal depression scale was used to measure postpartum depression and sleep was assessed by Pittsburgh sleep quality index. The result revealed that there was significant association between breastfeeding, non-breast feeding and postpartum depression score χ^2= 6.95, p<0.05. Similarly there was a significant association between sleep score and postpartum depression score χ^2=11.17. The study concluded that breastfeeding decreases the chance of postpartum depression and improves the extent of sleep (ur Rehman, 2016).

Materials and Methods

A descriptive observational study was conducted in the post-natal ward at selected hospitals of Mangalore. Purposive sampling technique was used to select 42 samples. Clearance was obtained from Ethics Committee.

Inclusion criteria: Primipara mothers who had undergone vaginal or caesarean section and delivered full term healthy baby, minimum 4 days hospitalisation after delivery (slight underestimates expect-

ed because of losses (e.g., of urine or feces, vomitus, or insensible water during feeding or 12 hours of delivery); willingness to participate in the study, ability to read, write and understand Kannada and English, ages 18 and older, giving only breastfeeding at the time of discharge.

Exclusion criteria: High risk pregnancy and maternal complication, high risk babies and primipara mothers with breast complication.

The tool used in this research was demographic proforma, PROMIS sleep disturbance short form scale and feeding log. The validity and reliability was done. Baby's weight was measured by infant electronic weighing machine before and after each feed. One calibrated weighing scale was carried by investigator. The reliability of the weighing scale was ensured.

The pilot study was done by administered tool to the 10 primipara mothers. No modifications were made after the pilot study. Prior to data collection, written permission was obtained from the concerned authority. Samples were selected according to the selection criteria and confidentiality was assured. Informed consent was obtained from the samples. Demographic proforma was used to collect demographic data. On day 2 after 12 hours of delivery, PROMIS sleep disturbance short form scale was administered to primipara mothers to assess the quality of postpartum sleep. Then the clothed infant (without diaper) was weighed just prior to feed and immediately after the feeding. This was recorded for 3 consecutive feeds and difference in weight was recorded. The average of difference in 3 weights was calculated. Additional feedings for the 24 hours period were recorded using a feeding log. An estimate of 24 hours milk volume in milliliters was calculated (estimated 24 hours milk volume =Average of 3 test weight X number of feeds in 24 hours). Same procedure was continued the next day. Collected data was analysed by using descriptive and inferential statistics on the basis of objectives and hypothesis of the study.

Results

The socio-demographic variables: Majority of the samples were in the age group of 23-27 years and belonged to Hindu religion. Educational status revealed that most of them were graduates. Equal number of the samples had undergone normal as well as caesarean section. Weight of majority of the post-natal mothers was between 50-70 kg and baby's birth weight was between 2500-3500 gm (Table 1).

Quality of postpartum sleep among primipara mothers on 2nd and 3rd day: On 2nd day majority (52.4%) of 22 samples had mild level of sleep disturbance followed by 20 (47.6%) samples with moderate level of sleep disturbance and none of the samples with none to slight and severe sleep disturbance. On 3rd day majority (59.5%) of 25 samples had mild level sleep disturbance followed by 14 (33.3%) samples with none to slight sleep disturbance, only 3 (7.1%) samples had moderate level of sleep disturbance and none of the samples had severe sleep disturbance (Figure 1).

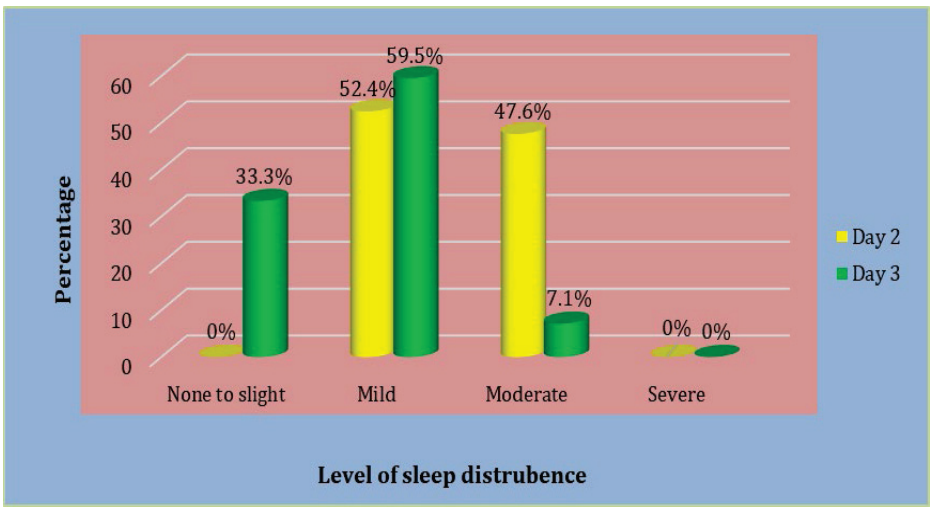

Figure 1: Cylindrical diagram representing the percentage distribution of the quality of postpartum sleep among primipara mothers on day 2 and day 3.

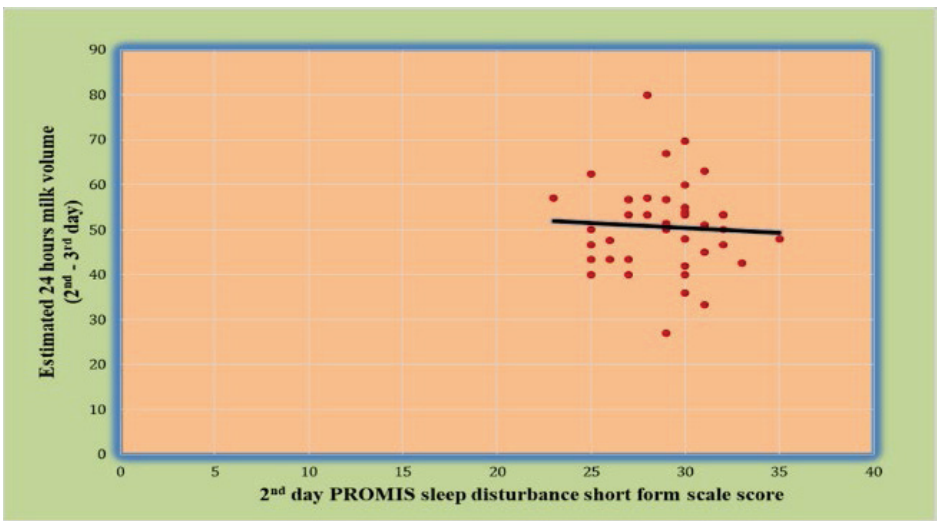

Figure 2: Scatter diagram showing no significant correlation between the quality of postpartum sleep and breast milk volume among primipara mothers on day 2.

Table I: Frequency and percentage distribution of primipara mothers according to their demographic variables (N= 42)

Sl. No.	Variables	Frequency (f)	Percentage (%)
1	*Age (in years)*		
	18-22	11	26.2
	23-27	25	59.5
	28-31	6	14.3
	Above 31	0	0.0
2	*Religion*		
	Hindu	26	61.9
	Muslim	14	33.3
	Christian	2	4.8
	Any other, specify	0	0.0
3	*Education*		
	Primary school	0	0.0
	High school	12	28.6
	Graduate	28	66.7
	Post graduate	2	4.8
4	*Type of delivery*		
	Normal	21	50.0
	Caesarean section	21	50.0
5	*Weight of the mother (kg)*		
	Below 49	11	26.2
	50-70	29	69.0
	>70	2	4.8
6	*Birth weight of baby (gm)*		
	<2499	5	11.9
	2500- 3500	37	88.1
	>3501	0	0.0

On 2nd day, quality of postpartum sleep score range (23-35) with mean±SD (28.83±2.622) was higher than the 3rd day quality of postpartum sleep score range (17-31) with mean±SD of 25.83±2.862. The data also depicts that the mean percentage of 2nd day quality of postpartum sleep scores (72.07%) was higher than the mean percentage of 3rd day quality of postpartum sleep (64.57%) among primipara mothers.

Mean of 2nd day PROMIS sleep disturbance short form scale score was higher than the mean of 3rd day PROMIS sleep disturbance short form scale score. The calculated t value (10.10) was significantly higher than the table value (t41=2.0196) at 0.05 level of significance.

Breast milk volume among primipara mothers on 2nd and 3rd day: On 2nd day breast milk volume range score (27.00-80.00) with mean±SD (50.61±9.79) was lesser than 3rd day breast milk volume range score (46.66-106.66) with mean±SD (83.15±13.56) among primipara mothers.

Mean of 3rd day 24-hour feeding log score was higher than the mean of 2nd day 24-hour feeding log score. The calculated t value (15.48) was significantly higher than the table value (t41=2.0196) at 0.05 level of significance.

Correlation between the quality of postpartum sleep and breast milk volume: On 2nd day the calculated coefficient of correlation 'r' value was found to be -0.048 at 0.05 level of significance implying that there is no significant correlation between the quality of postpartum sleep and breast milk volume among primipara mothers (Figure 2).

On 3rd day the calculated coefficient of correlation 'r' value was found to be -0.408 at 0.05 level of significance. Hence, there was a negative significant correlation between the quality of postpartum sleep and breast milk volume (r=-0.048, P= 0.765) among primipara mothers (Figure 3).

Association of the quality of postpartum sleep among primipara mothers on 2nd and 3rd day with selected demographic variables: On 2nd day the computed chi-square value shows a significant association between the quality of postpartum sleep among primipara mothers with the demographic variables such as age of mother (p<0.014), religion (p<0.024), and type of delivery (p<0.000). But on 3rd day there was a significant association between the quality of postpartum sleep among primipara mothers with the demographic variables of type of delivery (p<0.005).

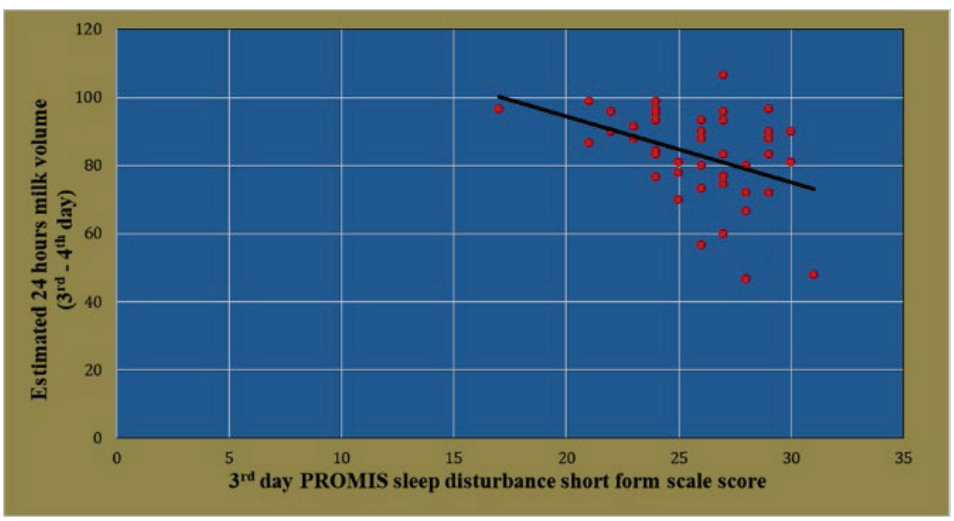

Figure 3: Scatter diagram showing negative significant correlation between the quality of postpartum sleep and breast milk volume among primipara mothers on day 3.

Association of breast milk volume among primipara mothers on 2nd and 3rd day with selected demographic variables: On 2nd day the null hypothesis is accepted for all the variables (age of mother, religion, educational status, type of delivery, weight of the mother and birth weight of baby). But on 3rd day there is a significant association of type of delivery ($p<0.001$).

Discussion

This study findings are similar to those of Hughes et al (2018) on sleep patterns during the first 48 hours postpartum for first time mothers in Ireland. They showed that during the first 48 hours the mothers slept longer in the second 24-hour (5.43±1.69h) compared to the first 24-hour (4.27±2.23h). The findings of this study can be compared with the one by Neville et al (1988) in human lactation. Milk volumes in lactating women during the onset of lactation and full lactation showed that 24-hour breast milk volume increased on 2nd (185± 103) to 3rd (393±158) day of postpartum.

Another study (Kent et al, 2016) conducted to assess the breast milk production in the first 4 weeks after birth of term infants showed that there were no significant differences between the groups for birth weight, frequency of breastfeeds, duration of breastfeeds, or total breastmilk production, but there were significant differences between the two groups for gestational age at delivery, average feed amount, total breastfeeding transfer, and total infant milk intake. Those with perceived breastfeeding problems who were supplemented with infant formula had a significantly lower average feed amount and total breastfeeding transfer ($p< 0.001$).

Our study results can also be compared with another study conducted to assess the impact of the quality of postpartum sleep and its health determinants on human milk volume by Carrega et al (2020) also which showed that poor sleep quality was the only significant predictor for lower milk volume ($\beta=-0.70$, $p=0.02$).

The findings of the current study are supported by the study conducted in Mersin by Aksu et al (2019) to assess the relationship of postpartum sleep and breastfeeding self-efficacy of Turkish mothers; the later showed a significant negative correlation between the results of the postpartum sleep quality scale and the breastfeeding self-efficacy scale ($p<0.01$).

Another study (Belete & Misgan, 2019) to determine insomnia among mothers during postpartum period in Northwest Ethiopia showed that mothers who did not have opportunities for education were shown to be at higher risk for sleep issues and there was a significant association with maternal sleep difficulty and educational status [AOR=2.35, 95% CI (1.57, 3.51)].

Nursing Implications

This study highlights the need for nurses to have a better understanding of the high prevalence of sleep disturbance in postpartum women. Nurse educators should plan and organise teaching programmes, which focus on imparting knowledge to the mothers regarding breastfeeding and its importance on her health and the baby. So, they will be able to identify and appreciate the changes and relationship on maternal sleep with breast milk volume and accept the changes. The knowledge acquired through research further helps in improving nursing practice, nursing education and nursing administration.

Limitations

The study was limited to finding out the impact of the quality of postpartum sleep on breast milk volume. Only subjective responses were considered. No other method was adopted to identify the maternal sleep and breast milk volume.

The clothed infant was weighed just prior to feeding and immediately after the feeding without diaper. The study was limited to primipara mothers in the post-natal ward in selected hospitals of Mangalore. Use of standardised structured tool restricted the amount of information that could be collected from the respondents.

Recommendations

- Similar study can also be conducted on (a) multigravida mothers and (b) mothers (whose babies were admitted in NICU) and breast pump.
- Similar studies adopting a longitudinal approach can be undertaken.
- Similar study can be conducted (a) using randomised samples with other research approaches and designs and (b) in community settings.

Conclusions

Delivery has physical, physiological and psychological effects on women's sleep. Taking care of a newborn with irregular sleep patterns results in sleep disturbances during the postpartum period which has a negative impact on breast milk production. This study proved that sleep disturbance was frequent in the early postpartum period and may have a negative impact on 24-hour breast milk volume. This study also underscores the need for perinatal nurses to gain a better understanding of the factors that influence new mother's capacity to effectively breastfeed their newborns in the early postpartum period.

Very few studies were done by using this methodology. Hence the investigator recommends simi-

lar studies to be replicabled on a larger sample in various areas.

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