

DOI: 10.5455/msm.2021.33.21-25

Received: FEB 09 2021; Accepted: MAR 10, 2021

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ORIGINAL PAPER

Mater Sociomed. 2021 Mar; 33(1): 21-25

Infant Sleep Difficulties at the 6th Week and the 12th Month Postpartum: What Is their Relationship with Maternal Mental Health and Other Perinatal Factors?

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ABSTRACT

Introduction: Infant sleep difficulties are often a challenge for new parents and may be related to maternal mood. **Aim:** The aim of this study was to investigate whether the presence of reported infant sleep difficulties at the 6th week and at the 12th month postpartum is associated with maternal psychological well-being and the presence of a mental health disorder in the perinatal period or with other perinatal factors. **Methods:** It is a retrospective longitudinal study, examining a sample of 622 women who attended a 12-month innovative psychosocial intervention. Data were obtained through the EPDS and PHQ-9 psychometric tools, and the completion of a health history. Statistical analyses included Spearman rank correlation coefficients and *Chi-square tests*. **Results:** Reported infant sleep difficulties at the 6th week postpartum were associated with a) increased maternal scores on psychometric tools (EPDS and PHQ-9) during pregnancy and at the 6th week postpartum, b) the presence of pathological maternal mental health symptoms in the perinatal period ($p=.034$), c) high maternal educational level ($p<.001$), and d) reported maternal breastfeeding difficulties at the 6th week postpartum ($p=.031$). Reported infant sleep difficulties at the 12th month postpartum were associated with a) increased maternal scores on the EPDS at the 6th week after birth ($p=.030$), and at the 6th ($p=.031$) and the 12th month ($p=.006$) postpartum, b) reported infant sleep difficulties ($p<.001$) and frequent infant awakenings in the puerperium ($p<.001$), d) maternal fatigue at the 6th week postpartum ($p<.001$), e) infant gastroesophageal reflux problems ($p<.001$), and f) high

maternal educational level ($p=.001$). **Conclusions:** This study demonstrates a positive relationship between infant sleep difficulties at the 6th week and at the 12th months postpartum, with poor maternal mental health in the perinatal period.

Keywords: infant sleep difficulties, postpartum, maternal mental health

1. INTRODUCTION

The neonatal period is characterized by frequent and short-term infant sleep. We know that the way newborns sleep differs greatly from that of adults (1). On average, adults sleep 8.5 hours a night (2), while the longest continuous sleep of a healthy full-term newborn lasts 4 to 5 hours (3). Neonatal sleep is, to a greater extent, active, and cycles frequently between quiet and indeterminate sleep stages (4, 5). Newborns, usually, do not distinguish day from night, may sleep for longer periods during the day and often wake up at night because of hunger.

The course of the sleep-wake pattern, from multiple sleep episodes distributed around the 24-h period to the point where the child sleeps continuously during the night, is a complex developmental process that poses a challenge for new parents (6, 7). The frequency and duration of neonatal/infant awakenings depend on the infant's age (8), as well as factors such as gender, breastfeeding, infant temperament, and maternal mental health (9). Male infants and those who are breastfed are more likely to wake up during the night than females and those who are fed with formula, due to the fact that

breast milk is more digestible (10). Factors that can affect the amount and quality of infant sleep, also, include prematurity (11), colic, and co-sleeping (12). At the same time, it seems that the cultural context of the family (13) and the attitude, views and beliefs of parents have an influence on whether they perceive their child's sleep as problematic (14).

Although night awakenings and disturbed sleep are normal during the neonatal and infant age, they often trouble parents (8, 15). Many mothers express that they have difficulty with their baby's sleep. More specifically, 23% of parents complain of such difficulties in the first 1-3 months (16) and 36-46% of parents express similar difficulties during the second half of the baby's life (17). Mothers who report problems with their baby's sleep, often, have babies who wake up more often and for longer periods during the night, find it more difficult to calm them down, and have poorer mental health (18). Neonatal/infant sleep problems have been associated with the onset of maternal depressive symptoms, severe maternal stress, poor mental health, and feelings of maternal impotence (19-21). In addition, factors such as marital stress, family breakdown, child abuse, and child behavioral problems have been associated with both infant sleep problems and postpartum depression (22, 23).

Knowing that the difficulties a mother faces in relation to her newborn/infant's sleep can affect her mood and mental health, further investigation of the relationship between these factors is of value.

2. AIM

The purpose of this study was to investigate whether the presence of infant sleep difficulties at the 6th week and at the 12th month postpartum, as reported by mothers, is associated with maternal psychological well-being and the presence of a mental health disorder in the perinatal period, as well as with other perinatal factors.

3. MATERIALS AND METHODS

This is a retrospective longitudinal study that was conducted at the "Day Center for the Care of the Mental Health of Women (Perinatal Mental Health Disorders)", a primary mental health facility in Athens (Greece). The study examined 622 women who had participated in a 12-month innovative psychosocial health intervention implemented in the Day Center, from January 2015 to May 2018. This Day Center is the first and only specialized Day Center in Greece that aims at the prevention, early detection and treatment of perinatal mental health disorders. It has been created by Fainareti, a non-profit organization that aspires to develop actions, through specialized midwife-led and psychosocial interventions, to improve perinatal care in Greece. It is funded and supervised by the Greek Ministry of Health and all its services are provided free of charge.

The psychosocial health intervention of the Day Center, provided to all women and their partners/husbands, included: a) midwife-led antenatal education, b) midwife-led counseling and support of breastfeeding, c) timely screening for pathological mental health symptoms, d) timely treatment and counseling by mental health professionals to those women for whom it was considered necessary, e) training and support to new parents, f) phone support and

counseling by mental health professionals and midwives. The inclusion criteria that were implemented in this study were the following: a) the woman should have completed the Day Center's intervention program, b) there should be sufficient recorded data for her (e.g., a complete health history) and c) the data should be written in Greek. All women who participated in this study were informed about the purposes of the Day Center and the analysis of their information in a research context. They had also given their informed oral and written consent for the analysis of their data for research purposes and had been informed of their right to withdraw their consent at any point. This research study was approved by the Research Ethics Committee of the Non-Profit Organization "FAINARETI" (Ref. Number 91/17.9.19). The data analyzed in this study emerged from two sources; the women's health history and the administration of psychometric tools. Specifically, medical, obstetric, psycho-emotional, psychiatric and socio-demographic information was obtained during the completion of the woman's health history at the start of the intervention, i.e. between the 18th and the 22nd gestation week. Information concerning the labor and the puerperium was obtained during the completion of the peripartum and postpartum health and well-being history at the 6th week postpartum. Regarding the psychometric tools, they were completed before (at approximately 24th-28th gestation week and at approximately 34th-38th gestation week) and after childbirth (at the 6th week postpartum). A questionnaire was also completed after breastfeeding cessation in order to obtain information on infant feeding and infant behavior.

The screening tools that were used included: a) The Edinburgh Postnatal Depression Scale (EPDS)-Greek version, and b) The Patient Health Questionnaire-9 (PHQ-9). The first (24) is a 10-item self-report questionnaire which has been established as a useful screening instrument for detection of women at risk for depression in the perinatal period (25). We used the Greek EPDS-version which has been validated by Leonardou et al. (26). In this study, the average alpha coefficient was .86. The Patient Health Questionnaire-9 (PHQ-9) has been validated to screen for depression and it has been developed specifically for use in primary care settings (27). It is not yet culturally adapted to the Greek language; it has, only, been translated for the needs of the Day Center's participants. In the present study the average Cronbach alpha coefficient was .85.

Statistical analysis

The data were analyzed using SPSS version 22.0. We used Chi-square Test to explore the association between infant sleep difficulties at the 6th week postpartum and a number of independent variables. Also, a set of independent continuous variables were investigated through Spearman rank correlations coefficient with "infant sleep difficulties at the 6th week postpartum" as the dependent variable, with another such analysis being applied in order to examine the relationship of "infant sleep difficulties at the 12th month postpartum" with the independent variables of interest.

4. RESULTS

In this study, data from 622 women with a mean age of 32.58 ± 6.15 (SD) years were analyzed. The significance of

	Infant Sleep Difficulties at the 6th Week Postpartum	
	Spearman ρ	p
EPDS—at the 24 th -28 th Gestation Week	.103*	.013
EPDS—at the 6 th Week Postpartum	.173**	.003
PHQ-9—at the 24 th -28 th Gestation Week	.102*	.034
PHQ-9—at the 6 th Week Postpartum	.183**	.001

Table 1. Infant Sleep Difficulties at the 6th Week Postpartum Correlated with the EPDS and PHQ-9 scores **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

the relationships and the degree and direction of the correlations between infant sleep difficulties at the 6th week postpartum and a set of independent continuous variables were investigated through Spearman rank correlations coefficient (Table 1). Only statistically significant relationships were reported. It seems that with increase of scores on the EPDS and PHQ-9 scales at 24th-28th gestation week (EPDS ρ =.103, PHQ-9 ρ =.102) and at the 6th week postpartum (EPDS ρ =.173, PHQ-9 ρ =.183), infant sleep difficulties at the 6th week postpartum were also increased. All the correlations were low and positive, with EPDS and PHQ-9 at the 6th week postpartum showing somewhat higher correlations with the dependent variable, in relation to the other independent variables.

According to the *Chi-square test*, infant sleep difficulties at the 6th week postpartum are associated with maternal mental health status and education, as well as with reported breastfeeding difficulties (Table 2). Mothers with pathological mental health symptoms or with risk factors in their medical history during the perinatal period (p =.034), those with a higher education (p <.001), and those who reported very much breastfeeding difficulties at the 6th week postpartum (p =.031) appeared to encounter more infant sleep difficulties at the 6th week postpartum than the others. A different Spearman rank correlation analysis was applied in order to examine the relationship of infant sleep difficulties at the 12th month postpartum with a number of independent variables (Table 3). With increase of the EPDS scores at the 6th week (ρ =.114), at the 6th month (ρ =.138), and at the 12th month postpartum (ρ =.115), and with increase of the PHQ-9 scores at the 12th month postpartum (ρ =.151), infant sleep difficulties at the 12th month postpartum were also increased. The correlations between these variables were low and positive. Furthermore, infant sleep difficulties at

the 6th week postpartum (ρ =.316) and awakening frequency (ρ =.181), and also maternal wake up fatigue at the 6th week postpartum (ρ =.151) showed positive correlations with infant sleep difficulties at the 12th month postpartum. These correlations appeared to be low, with the exception of the independent variable “infant sleep difficulties at the 6th week postpartum” which demonstrated medium, positive correlation with dependent variable. Additionally, infant gastro-esophageal reflux problems (ρ =.179) are more likely to be associated with infant sleep difficulties at the 12th month postpartum, showing low, positive correlation (Table 3). In an additional analysis, the Chi-square test showed that mothers with higher education reported more infant

	Infant Sleep Difficulties at the 6th Week Postpartum			
	No	Yes	p	
Mother's Mental Health Status in Perinatal Period	Healthy/Without Pathological Symptoms	57.7	43.3	.034
	With Risk Factors in Medical History	48.6	51.4	
	With Pathological Symptoms (and/or increased scores on Psychometric Tools)	43.4	56.6	
Mother's Education	High School	59.6	40.4	p<.001
	Bachelor's Degree	53.7	46.3	
	Master/PhD	31.3	68.8	
Mother's Breastfeeding Difficulties at the 6th Week Postpartum	Not at all	57.0	43.0	.031
	A bit	55.7	44.3	
	Moderately	54.0	46.0	
	Quite much	52.4	47.6	
	Very much	37.5	62.5	

Table 2. Infant Sleep Difficulties at the 6th Week Postpartum Associated with Mother's Mental Health Status, Education and Breastfeeding Difficulties

	Infant Sleep Difficulties at the 12th Month Postpartum	
	Spearman ρ	p
EPDS - at the 6th Week Postpartum	.114*	.030
EPDS - at the 6th Month Postpartum	.138*	.031
EPDS - at the 12th Month Postpartum	.115**	.006
Infant Sleep Difficulties at the 6th Week Postpartum	.316**	p<.001
Infant Awakening Frequency at the 6th Week Postpartum	.181**	p<.001
Maternal Wake Up Fatigue at the 6th Week Postpartum	.151**	p<.001
Infant Gastro-esophageal Reflux problems	.179**	p<.001

Table 3. Infant Sleep Difficulties at the 12th Month Postpartum correlated with the EPDS and PHQ-9 scores, and other perinatal factors. **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

sleep difficulties at the 12th month postpartum (p =.001) (this data are not presented in table form).

5. DISCUSSION

This study investigated the association of specific maternal psychosocial and perinatal factors with the occurrence of infant sleep difficulties at the 6th week and at the 12th month postpartum. Statistical analyses showed that infant

sleep difficulties at the 6th week postpartum, as reported by mothers, were associated with a) increased maternal scores on psychometric tools (EPDS and PHQ-9) during pregnancy and at the 6th week postpartum, b) the presence of pathological maternal mental health symptoms in the perinatal period ($p=.034$), c) high maternal educational level ($p<.001$), and d) reported maternal breastfeeding difficulties at the 6th week postpartum ($p=.031$). In addition, reported infant sleep difficulties at the 12th month postpartum were associated with a) increased maternal scores on the EPDS in the puerperium ($p=.030$), and at the 6th ($p=.031$) and the 12th month ($p=.006$) postpartum, which probably indicate the presence of a mother's mental health disorder, b) reported infant sleep difficulties in the puerperium ($p<.001$), c) frequent infant awakenings in the puerperium ($p<.001$), d) maternal fatigue in the puerperium ($p<.001$), e) infant problems with gastro-esophageal reflux ($p<.001$), and f) high maternal educational level ($p=.001$).

Given that infant sleep difficulties have not been fully clarified in the literature, and the distinction between a normal and a problematic infant sleep pattern is not well-defined (28), in this study, infant sleep problems were assessed based on mothers' reports. This research confirms the findings of previous studies suggesting that pre-existing depressive maternal behavior is associated with reported infant sleep problems (29-34). In addition, this study agrees with and confirms previous studies suggesting that depressive maternal symptoms in the first months postpartum are associated with poor neonatal/infant sleep (35, 36). In general, maternal mental health is known to partly explain how mothers perceive their environment and their relationships with their infants (37). We also know that maternal depression negatively affects her quality of life, her relationship with her child, and the development of infants (38, 39). Depressed mothers appear to have less positive and more negative interactions with their babies (40), and are more likely to have children with difficult temperaments (41). Also, women with poorer mental health report more infant night awakenings and bed-time distress, and appear more bothered by these behaviors (15, 42). All the above justify the association of poor mental health of women with infant sleep problems that was highlighted in this study. On the other hand, there is discussion in the literature as to whether maternal depression precedes or follows infant sleep problems (15). Some researchers claim that the depression symptoms follow infant sleep disorders, so they are the result and not the cause. It often happens that new mothers are sleep-deprived due to the newborn's many awakenings that normally occur in infancy. As a result, mothers' sleep in the puerperium is intermittent and shorter in duration. We also know that persistent sleep difficulties are associated with parental exhaustion in the early postpartum period (43, 44), and exhaustion has, in turn, been associated with depressive symptoms and the prediction of depression at 18 months postpartum (45-47). This reasoning justifies the occurrence of depressive symptoms as a result of the infant's disturbed sleep. Conversely, the results of this study suggest that depressive symptoms, when present during pregnancy, may be the cause of infant sleep problems. Further research is needed to clarify these

and other aspects of the issue of maternal mental health and the occurrence of infant sleep problems.

6. CONCLUSION

This study showed that the poor mental health of women during pregnancy and the 1st year postpartum is positively associated with the existence of infant sleep problems in the puerperium and at the end of the 1st year postpartum. Other perinatal factors that are associated with infant sleep problems include high maternal educational level, reported difficulties with breastfeeding and infant sleep in the puerperium, frequent infant awakenings, maternal fatigue and infant gastro-esophageal reflux problems. Early detection of perinatal mental health disorders in women, from pregnancy and throughout the 1st year postpartum, and the timely treatment of these disorders would greatly contribute not only to the improvement of women's mental health but, also, to the improvement of the quality and quantity of infant sleep.

- **Author's contribution:** All authors were involved in the preparation of this article. All authors have read and approved the manuscript.
- **Conflict of interest:** The authors declare no conflict of interest.
- **Financial support and sponsorship:** None received.

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