Published in final edited form as:

MCN Am J Matern Child Nurs. 2016 ; 41(2): 104–109. doi:10.1097/NMC.0000000000000213.

Sleep, Depression, and Fatigue in Late Postpartum

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Abstract

Purpose—To study the relation of infant characteristics and home environment on maternal sleep, depression, and fatigue in late postpartum.

Study Design and Methods—Forty-two healthy mother-infant dyads completed a home-based study at infant age 32 weeks. Maternal measures included Patient Reported Outcomes Measurement Information System (PROMIS) sleep and wake disturbance, depression, and fatigue scales. Home regularity was assessed using the Confusion, Hubbub, and Order Scale (CHAOS). Infant sleep and regulation were measured respectively by the Brief Infant Sleep Questionnaire (BISQ) and Infant-Toddler Symptom Checklist (ITSC).

Results—Significant correlations among maternal sleep and wake disturbance, fatigue, and depression was detected ($r = .519$ to $.746$, $p < .01$), but not with infant variables. Home regularity was significantly related with maternal variables ($r = .597$ to $.653$, $p < .01$).

Clinical Implications—Regularity of the home environment appears to contribute to maternal sleep, depression, and fatigue. Implications for intervention include establishment of daily routines and household management to improve regularity and consequently improve maternal outcomes.

Keywords

postpartum; depression; sleep; fatigue; infant; family health

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The authors have no conflict of interest to report.

World Wide Web Sites:

- 2014 Sleep in the Modern Family, National Sleep Foundation http://sleepfoundation.org/sleep-polls-data/2014-sleep-the-modern-family
- 2007 Women and Sleep, National Sleep Foundation http://sleepfoundation.org/sleep-polls-data/sleep-in-america-poll/2007-women-and-sleep
- Sleep, Zero to Three http://www.zerotothree.org/child-development/sleep/
- Temperament & Behavior, Zero to Three http://www.zerotothree.org/child-development/temperament-behavior/

Introduction

Disturbance of maternal sleep following birth of an infant is well documented as are the relations among maternal sleep and wake disturbance, fatigue, and depression. In the early postpartum period infant sleep pattern is considered a major contributor to maternal sleep disruption and its related effects, with an implied assumption that infant self-regulation and sleep persist as primary determinants of maternal sleep and related outcomes. Despite the prevalence of disturbed sleep among women (Armstrong & Dregan, 2014), there is limited understanding of the continued influence of infant sleep pattern in the late postpartum period (>3 months) and the contribution of regularity of the home environment to maternal sleep, depression and fatigue. Aims included examining (1) relations among maternal sleep disturbance, wake disturbance, fatigue, and depression, (2) relation of infant sleep characteristics and self-regulation with maternal sleep, depression, and fatigue, and (3) the relation of maternal sleep depression, and fatigue with home regularity at infant age 32 weeks.

Background

Mothers experience significant sleep disruption in the immediate postpartum period (6 weeks) and during early infancy related to infant sleep and feeding patterns (McGuire, 2013). Even when total sleep amount is adequate, fragmented sleep poses substantial problems (Bonnet & Arand, 2003). Sleep in the postpartum period and beyond is a concern due to robust associations with wake disturbance, fatigue, and depression (Hunter, Rychnovsky, & Yount, 2009; Kurth, Kennedy, Spichiger, Hosli, & Stutz, 2011). Quality of sleep is correlated with severity of postpartum depression and poor sleep is more prevalent in depressed versus non-depressed postpartum women (Posmontier, 2008). Nighttime sleep and reduced daytime napping are related with increased depression risk three months postpartum (Goyal, Gay, & Lee, 2009). Depression is of particular concern because maternal-infant interaction is altered (Field, 2010).

Maternal sleep, depression, and fatigue are intertwined with numerous health implications. Sleep loss and resulting fatigue are highly associated with quality of life (Lee et al., 2009). Sleep is increasingly recognized as a factor contributing to metabolic disturbance and obesity (Penev, 2012), inflammation and cardiovascular disease (Grandner, Sands-Lincoln, Pak, & Garland, 2013), emotional health and mood (Goldstein & Walker, 2014), and cognitive abilities and performance (Jackson et al., 2013).

With development, infant sleep demonstrates increased consolidation of night sleep, with longer sleep periods, and less night awaking as well as increasing ability to self-regulate sleep-wake pattern (Henderson, France, & Blampied, 2011). Night awakening, considered a normal occurrence in the young infant, is modified by temperament and development of self-regulated sleep (Schwichtenberg & Goodlin-Jones, 2010). During the first year of life, infants acquire increasing self-regulatory ability due to neurological maturation and development of integration across multiple, hierarchical systems yielding organized behavior (Feldman, 2009).

Throughout infancy, infant sleep pattern frequently results in disruption of maternal sleep, and maternal sleep is associated with fatigue and depression. While infant temperament and regulation are implicated in maternal depression, in one study fragmented maternal sleep demonstrated a larger correlation with depression than infant temperament (Goyal et al., 2009). Poor infant sleep is a family stressor and increases maternal depression risk (Sadeh, Tikotzky, & Scher, 2010). Although infant sleep problems are thought to have an impact on family function, in one study at 12 months' infant age, mother's sleep and depression mediated the relation between infant sleep disruption and family dysfunction (Piteo et al., 2013).

Presumably developmental improvement in infant sleep results in reduced maternal sleep disturbance and related decreased wake disturbance, fatigue, and depression, however there is limited study of maternal sleep and its effects in the late postpartum period (> 3 months) and the influence of infant sleep and self-regulation in the context of the home. While the infant may be a factor, the home environment is an understudied factor in the examination of maternal sleep disturbance and its consequences. Household chaos is defined as noise, clutter, lack of routine, and disorganization (Dumas et al., 2005; Matheny, 1995). Sleep is a rhythmic circadian function susceptible to environmental influences and enhanced by regularity (Van Someren & Riemersma-Van Der Lek, 2007). Maternal sleep pattern is shaped by the home environment including routines. There are few reports of the relation between household environment and maternal sleep disruption, fatigue, and depression.

Method

Design

Data reported here were from an exploratory parent project in which a cross section of infants and mothers were studied longitudinally at infant age 4, 8, 12, and 32 weeks. Findings are based on the 32 week (± 2 days) time of measure, the late postpartum. At 32 weeks of age, infant sleep pattern shows increasing stability with increased night time sleep consolidation, increased non-REM sleep, and maturing sleep cycling while infant self-regulation is emerging (Henderson et al., 2011; Sadeh, Mindell, Luedtke, & Wiegand, 2009).

Subjects

Healthy biological mother-infant pairs with no pregnancy, birth, or postnatal complications were recruited. Infants were singleton birth and term gestation. Maternal selection criteria included ≥ 18 years of age and absence of depression by screening (Edinburgh Postnatal Depression Scale ≤ 13) at time of entry.

Instruments

Patient Reported Outcomes Measurement Information System (PROMIS)— PROMIS short form instruments were used to record maternal sleep disturbance, wake disturbance, depression, and fatigue. Tools consisted of 7-8 items self-report rated by Likert scale. PROMIS instrument development is sponsored by NIH and includes a number of validated measures of outcome measures with demonstrated validity and reliability (Cella et

al., 2010; Pilkonis et al., 2011; Riley et al., 2010). In the current study, Cronbach's alpha for the PROMIS instruments ranged from .802 to .874. T scores for PROMIS instruments are standardized and based on the United States general population with a population mean of 50 and SD of 10.

Confusion, Hubbub, and Order Scale (CHAOS)—Mothers completed the CHAOS, a fifteen item true/false instrument with established reliability (Cronbach's alpha = .79) and validity assessing routine and organization in the home environment (Dumas et al., 2005; Matheny, 1995). Scores range from 0 to 15 with higher scores indicating greater disorganization.

Brief Infant Sleep Questionnaire (BISQ)—The BISQ includes a 13 item, parent completed survey of infant sleep duration, night awakenings, and method of falling asleep (Sadeh, 2004). Total sleep and classification of poor sleeper (defined as infant waking more than three times per night, nighttime wakefulness greater than 1 hour, and total sleep time less than nine hours) were derived. Test-retest reliability of the BISQ is r = .82 and the BISQ accurate discriminates sleep problems ($p < .01$ to .0001) (Sadeh, 2004).

Infant-Toddler Symptom Checklist (ITSC)—Infant regulation was measured using the ITSC (7 to 9 months), a standardized 23 item instrument completed by mothers and covering infant self-regulation behaviors, sleep, attention, sensitivity, and emotions (DeGangi, 1995). Normed total score cutoff for infants seven to nine months of age is ≥ 10 suggest regulatory disorder.

Edinburgh Postnatal Depression Scale (EPDS)—The ten item, Likert scale EPDS was used to measure depression. Scores ≥ 13 indicate possible postpartum depression (Cox, Holden, & Sagovsky, 1987). The EPDS is a valid and reliable measure frequently used in practice and research with sensitivity 79% and specificity 85% in depression detection (Cox, Chapman, Murray, & Jones, 1996).

Analysis

Analysis included descriptive statistics and correlation among study variables.

Results

Sample description for the 42 mother-infant pair participants is included in Table 1. Fifty percent of mothers were employed outside the home. Number in the household (including the infant) ranged from three to six. Twenty-one percent of infants slept in the parents' room. Three women (7.2%) reported taking antidepressants. Descriptive statistics for study variables are provided in Table 2. Based on scoring of the BISQ, 13 (31%) of the infants were classified as having a sleep problem, and 17 (40.5%) met the ITSC criteria for possible regulatory disorder. As expected, infant total sleep and sleep problem both correlated with ITSC total score ($r = .331$ to .345, $p < .05$). Depression as measured by the PROMIS scale correlated strongly with the EPDS ($r = .813$, $p < .01$) thus further analysis was limited to the PROMIS measure. The minimum and maximum EPDS scores were 0 and 20 respectively. Mean PROMIS T scores for sleep and wake disturbance, depression, and fatigue are similar

to the general population level of 50. Although maternal depression T scores are close to the population mean, when PROMIS depression scores are calibrated with the Patient Health Questionnaire (PHQ-9) (Gibbons et al., 2011) results show various levels of depression in 63.6% of the sample 1) as follows: mild, 20 (47.2%); moderate, 7 (16.7%); moderately severe, 1 (2.4%).

Maternal sleep and wake disturbance, depression, and fatigue are strongly inter-correlated (r = .519 to .746) (Table 2). Additionally CHAOS measuring disorganization and irregularity in the home is strongly correlated with maternal depression, fatigue, and sleep (r = .576 to . 653). Correlation of infant regulation and sleep with mother's depression, fatigue, sleep and wake disturbance were examined to identify possible infant contributions to maternal outcomes. Neither infant total sleep time nor sleep problem, as determined by the BISQ, were significantly correlated with maternal fatigue or depression however there was a modest correlation ($p < .05$) with mother's sleep disturbance (r = .350) and related wake disturbance (r = -.305). There were no significant relations between infant total ITSC score and maternal outcomes. Similar findings are seen for classification of regulatory disorder using the ITSC. More impressive are the correlations between home environment organization (CHAOS) and maternal depression (r = .579), fatigue (r = .597), sleep (r = . 576) and wake disturbance (r = .653). Given the observed strong influence of CHAOS, the relations among maternal sleep and wake disturbance, fatigue, and depression were examine with and without CHAOS using partial correlations (Table 2). Controlling for CHAOS attenuates relation among maternal fatigue, depression, wake and sleep disturbance.

Discussion

Both infant sleep problem and possible regulatory issues were prevalent in the sample. Infant sleep problem was identified by the BISQ in approximately one-third of the sample, consistent with prior reports in healthy infant populations (Sadeh, 2004). Mean ITSC scores for infants without regulatory disorder are comparable to a normed sample (DeGangi, 1995). PROMIS depression scores calibrated with the PHQ-9 show depression in a substantial portion of the sample.

Maternal sleep and wake disturbance, fatigue, and depression are closely associated at infant age 32 weeks; however these correlational values may reflect conceptual overlap. Infant total sleep amount was not correlated with maternal variables, however infant sleep problem was correlated with positively with maternal sleep and negatively with wake disturbance, providing possible evidence of the effect of fragmented maternal sleep. Infant sleep problem was not correlated with maternal fatigue or depression. While infant sleep is somewhat implicated in disruption of maternal sleep pattern, additional factors are in play. In other words, it's more than the baby. The home environment plays a major role in the composite of maternal sleep, depression, and fatigue, although infant sleep and regulation are not substantial factors contributing to CHAOS scores. Controlling for home environment organization and regularity attenuates the relations among maternal sleep and wake disturbance, fatigue, and depression.

Limitations

Absence of data about maternal sleep prior to pregnancy is a study limitation. Subjects were predominantly married or partnered, and findings do not reflect the particular stresses of single motherhood. Mothers and infants were healthy and the influence of compromised maternal or infant health was not studied. Sample size did not allow detailed examination of particular aspects of family size and structure. Future research would be enhanced by further information regarding family structure and home characteristics, intentional inclusion of single women, increased cultural diversity, and study of the impact of infant or maternal chronic illness. Additionally inclusion of biomarkers as well as other objective measures would augment self-report measures.

Clinical Implications

Women's health concerns are reflected in the findings with implications for practice. During the childbearing and childrearing years, women experience more sleep disruption than men (National Sleep Foundation, 2007) and in general women experience more fatigue than men (Junghaenel, Christodoulou, Lai, & Stone, 2011). Maternal sleep disruption continues into childhood and is associated with depression, stress, and fatigue (Meltzer & Mindell, 2007). Mood itself may change perception of sleep (Coo, Milgrom, & Trinder, 2014. Care for childbearing and childrearing women nurses should include assessment of sleep, fatigue, and depression, as well as the home environment. Infant and child sleep problems can translate into maternal sleep disruption. Care approaches include maximizing maternal sleep (earlier bedtime, increased activity during the day, avoiding caffeine, reducing light exposure prior to bedtime, educating regarding sleep hygiene), and ways to increase regularity in the home environment (such as routines, scheduled mealtimes). Addressing infant and child sleep issues may also improve maternal sleep. Depression meeting clinical cutoff points in standard assessment tools should prompt referral for possible treatment.

In summary among maternal-infant dyads studied at 32 weeks infant age infant sleep pattern is not the primary factor contributing to maternal sleep and wake disturbance, fatigue, and depression. These four maternal outcomes are highly interrelated and organization of the home environment is a powerful contributing factor. Findings may inform intervention programs directed both toward women and home regularity and pattern.

Acknowledgments

Funded by NICHD R21 HD068597-01A and P30 NR011400

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Callouts

While sleep disruption in early postpartum is widely acknowledged, limited research depicts subsequent maternal sleep and relation with depression and fatigue.

Maternal sleep disruption in late postpartum and consequent effects on wake disturbance, depression, and fatigue is frequently attributed to infant sleep pattern and demands of caregiving with few studies examining other aspects of the home environment.

Disorganization in the home, including reduced regularity and routine, relates significantly with on maternal sleep and wake disturbance, depression, and fatigue.

Disorganization in the home is more strongly correlated with maternal sleep and wake disturbance, depression and fatigue than is infant sleep or regulatory ability.

Maternal sleep and wake disturbance, depression, and fatigue are complexly interrelated and disorganization in the home a strong moderator in these relations.

Clinical Implications

Although the infant's sleep pattern in the late postpartum is related with maternal sleep disruption, infant sleep itself does not explain maternal fatigue and depression.

Organization and regularity of the home environment are strongly correlated with maternal sleep disruption, fatigue, and depression.

The home environment, in addition to sleep pattern, fatigue, and depression should be included in assessment of women in the late.

Interventions aimed at regularity of the home environment may aid maternal sleep pattern, fatigue, and depression.

Table 1

Sample and variable description (n = 42).

		frequency (%)
Infant gender	Male	23 (54.8%)
Mother relationship	Married/partnered	38 (90.5)
	Divorced	1 (2.4)
	Single	3 (7.1)
Feeding		
	Breast	15 (35.7)
	Bottle	4 (9.5)
	Mixed	23 (54.8)
Race & Ethnicity		
	Mother fr (%)	Infant fr (%)
Hispanic	1 (2.4)	1 (2.4)
Asian	4 (9.5)	6 (14.3)
Native Hawaiian, Pacific Islander	1 (2.4)	1 (2.4)
Black, African American	3 (7.1)	5 (11.9)
White	34 (81.0)	29 (69.0)
	Mean (SD)	Min, Max
Mother age (yrs)	31.5 (2.62)	24, 37
Infant birth weight (gm)	3585.0 (394.5)	2750, 4281
BISQ Infant Total Sleep (min)	797.3 (70.43)	600, 930
ITSC Total Score	8.0 (4.58)	0, 19
CHAOS	3.2 (3.43)	0, 11
PROMIS T score		
Sleep Disturbance	50.3 (7.93)	33, 68
Wake Disturbance	51.9 (8.37)	35, 77
Fatigue	51.6 (7.17)	37, 66
Depression	47.6 (7.67)	37, 64
EPDS	5.4 (4.82)	0, 20

Table 2

Correlation among maternal outcomes with and without control of CHAOS (shaded values = partial correlation) and correlation of maternal outcomes with infant factors (n = 42 mothers and infants).

	CHAOS	Maternal			
		Depression	**Fatigue**	**Sleep disturbance**	**Wake disturbance**
CHAOS	-	.579**	.597**	.576**	.653**
Depression		-	.555**	.519**	.561**
			.321*	.278	.297
Fatigue			-	.545**	.743**
				.306*	.581**
Sleep disturbance				-	.746**
					.597**
Infant Factors					
BISQ total sleep	.051	-.006	.099	-.028	.062
BISQ sleep problem	.272	.078	.176	.350*	-.305*
ITSC total	.175	.285	.243	.271	.169
ITSC regulatory disorder	.028	.269	.242	.181	.153

Note: PROMIS scales for depression, fatigue, sleep disturbance, and wake disturbance.

* $p < .05$

** $p < .01$

MCN Am J Matern Child Nurs. Author manuscript; available in PMC 2017 March 01.