The Role of Circadian Rhythms in Postpartum Sleep and Mood

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KEYWORDS

• Postpartum • Perinatal • Circadian rhythms • Sleep • Depression • Maternal mental distress

KEY POINTS

- Altered circadian rhythms during pregnancy and postpartum can affect postpartum mood.
- Circadian rhythm disturbances are strongly correlated with depression, social factors, and mother's exposure to light.
- Randomized controlled trial designs are needed to test effects of circadian rhythm interventions on postpartum mental health outcomes.

INTRODUCTION

Pregnancy and the postpartum period are characterized by sleep disturbances and poor sleep quality. In most cases, sleep quality worsens during the last trimester, and mothers experience shorter and more interrupted sleep in the first few months after delivery.[1] The arrival of the newborn places new demands on the mother and may change the rhythms of nighttime and daytime activities. Over the last decade or so, there has been an increasing number of studies describing maternal sleep both during pregnancy and during postpartum (also called the perinatal period) and how sleep disturbances may be linked to higher risk of mood disorders.[1–4]

Circadian rhythms are closely linked to sleep, wakefulness, and health and are therefore essential to examine when investigating different aspects of sleep disturbance among perinatal women.[5] Circadian rhythms are generated by a central pacemaker, the suprachiasmatic nucleus, a self-sustained timing system that is highly regulated and synchronized to elements of the external environment (zeitgebers), such as light and social activities.[6] Altered circadian rhythms have been hypothesized to be associated with mood disorders in the general population[5,7] and may be an important factor to consider in the context of mental illness that develops in the perinatal period. In order to develop effective strategies for preventing and treating sleep disturbances linked to altered circadian rhythms, an important first step is to provide a structured overview of existing literature in the area of circadian rhythms in the perinatal period. Hence, the aim of this systematic review was to provide a summary of studies looking at how circadian rhythms are affected and contribute to sleep problems during pregnancy and postpartum, with special focus on the postpartum period.

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Overview of Sleep in the Postpartum Period

According to a large longitudinal study, more than 50% of women with insomnia during the third trimester of pregnancy continue to have insomnia at 8 weeks postpartum, whereas an additional 23% of women without insomnia during pregnancy develop insomnia during the postpartum period.[8] Longitudinal studies of the perinatal period show a variety of sleep changes during this time. From late pregnancy to the early postpartum period, there is typically a decrease in sleep duration and sleep efficiency, accompanied by an increase in wake after sleep onset (WASO), according to both actigraphy and self-report studies.[1,9] From the early postpartum period to approximately 3 months postpartum, sleep duration and sleep efficiency tend to increase, whereas WASO decreases, although these continue to differ from women who are not pregnant.[9] It has been estimated that it is only after 6 months postpartum that mothers fully recover their own prepregnancy sleep pattern.[10]

Postpartum Sleep and Mood Disorders

Approximately 6% to 13% of women in high-income countries experience postpartum depression, and the prevalence in low- and middle-income countries may be even higher.[11,12] Around 8.5% experience distressing postpartum anxiety.[13]

Insomnia and depressive symptoms are associated both before[14] and after delivery in a bidirectional and additive relationship. Several investigators have recently reviewed this topic.[2–4,14] A common finding in these reviews is that self-reported poor sleep during both pregnancy and the postpartum period has been linked to increased risk for or worsening of postpartum depression,[3,4] whereas the relationship between objectively poor sleep, measured by actigraphy or polysomnography, and postpartum depression is more difficult to determine.[3,14] Lawson and colleagues[3] concluded that there was not enough evidence to conclude whether there is a link between sleep problems postpartum, anxiety or psychosis. Bhati and colleagues[2] found that effect sizes relating sleep disturbance with postpartum depression ranged between 0.4 and 1.7 across studies, indicating strong relationships between sleep disturbances and postpartum depression but the definitions and measurements of postpartum sleep "disturbance" varied greatly among the included articles.

Insomnia in pregnancy may seem to be a predictor for postpartum depressive symptoms, but several studies have found that insomnia did not remain a risk factor when controlling for lifetime depression.[1,15] Sleep problems, especially insomnia, may alternatively be an early marker of recurrence of depression or precipitate depression in women susceptible to this disorder. Furthermore, despite this strong relationship between poor sleep and depression, nonpharmacologic interventions for maternal sleep have proved effective for improving maternal sleep and infant sleep, but not for improving maternal depression.[16] This emphasizes the need to address and treat both conditions separately and not assume that depression is merely a symptom of poor sleep.

Although sleep disturbances are a key early warning sign of depression, there is growing evidence that circadian rhythm disturbances may have a role in the cause of depression in the general population.[17,18] For instance, depressed individuals display more variability in salivary melatonin levels over a 30-day period and have higher mean melatonin levels than their nondepressed counterparts.[19] Expression of melatonin receptor 1 in the suprachiasmatic nucleus of the hypothalamus seems to be increased in depressed patients.[20]

Purpose

Currently, knowledge of how circadian rhythms change and may be associated with mood in the postpartum period is limited. In light of increasing evidence of associations between sleep, circadian rhythms, and mood disorders in the general population, the authors conducted a systematic review of studies of circadian rhythm disturbances, sleep, and mood among women in the postpartum period.

METHODS

Selection Criteria

All types of studies of circadian rhythms in women of all ages in the first year postpartum were considered relevant for inclusion. The authors' main focus was on studies of circadian rhythms in postpartum mothers, but longitudinal studies looking at circadian rhythms from pregnancy to the postpartum period were also reviewed, whereas studies restricted to pregnancy only were not included. They also included studies looking at the mutual influence of circadian rhythms in mothers and infants in the first year postpartum. The authors limited their scope to studies performed in humans.

Search Strategy

The authors performed a literature search in the PubMed/Medline database and included longitudinal, cross-sectional, etiologic, biological, and intervention studies to examine circadian rhythms