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Cross-sectional and longitudinal associations between sleep and health-related quality of life in pregnant women: A prospective observational study

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ABSTRACT

Background: Sleep disturbances are common in women, especially during pregnancy. Previous studies have confirmed the importance of sleep disturbances as a risk factor of adverse pregnancy outcomes and the need for screening and treatment of inadequate sleep. These reports, however, did not examine health-related quality of life which may be affected by sleep long before adverse clinical consequences are detectable in women during pregnancy.
Objectives: To examine the cross-sectional and longitudinal association between sleep and health-related quality of life in pregnant women.
Design: A prospective observational study.
Setting: A university-affiliated hospital in Taiwan and participants' homes.
Participants: A total of 164 pregnant women completed questionnaires and wore a wrist actigraphy monitor for 7 days each trimester.
Methods: Objective sleep was measured by actigraphy, subjective sleep was measured by the Pittsburgh Sleep Quality Index, and health-related quality of life was measured using the SF-12v2 questionnaire across three trimesters. Multiple linear regression analyses were performed to evaluate the cross-sectional and longitudinal associations between sleep and health-related quality of life.
Results: Sixty-four (39.0%) women consistently had an average sleep efficiency $< 85\%$ by actigraphy and 40 (24.4%) had a Pittsburgh Sleep Quality Index global score > 5 in all three trimesters. Cross-sectionally, more actigraphic daytime sleep ($p = 0.04$) and better subjective sleep quality ($p < 0.01$) were associated with better physical health-related quality of life in first-trimester pregnant women. Better actigraphic sleep efficiency ($p = 0.04$) and better subjective sleep quality ($p < 0.01$) were associated with better mental health-related quality of life in second-trimester pregnant women. Longer actigraphic total nighttime sleep ($p < 0.01$) and better subjective sleep quality ($p < 0.01$) were associated with better mental health-related quality of life in third-trimester pregnant women.

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Longitudinally, first-trimester actigraphic total nighttime sleep ($p < 0.05$) and subjective sleep quality ($p < 0.01$) predicted mental health-related quality of life in the second and third trimester.

Conclusions: Sleep disturbances are a highly prevalent and persistent problem in pregnant women. Adequate sleep is essential for women at all pregnancy stages and improving nocturnal sleep quantity and quality in early gestation is of utmost importance for an optimal health-related quality of life later in pregnancy.

What is already known about the topic?

- Sleep disturbances have been reported in a European sample of pregnant women, with up to 75% of the cohort complaining of poor sleep, decreased vigilance, and requiring a nap during the day.
- Sleep problems during pregnancy are a significant health issue and have been associated with preterm delivery and prolonged labor, antenatal and postnatal depression, and an increased risk of cesarean delivery, gestational hypertensive disorders, and glucose intolerance.
- Poor health-related quality of life (HRQoL), particularly in the physical health domain, has predicted increased incidence of having low-birth-weight infants.

What this paper adds

- Our study shows not only that sleep disturbances were prevalent at every assessment stage between the first and third trimesters of pregnancy but also that a substantial number of Taiwanese women experienced persistent sleep problems in all three trimesters.
- Our results provide strong support for a casual model of HRQoL in which objective and subjective sleep variables add uniquely to the prediction of concurrent and future HRQoL in women during pregnancy.
- Adequate sleep is essential for women at all pregnancy stages and improving nocturnal sleep quantity and quality in early gestation is of utmost importance for an optimal HRQoL later in pregnancy.

1. Background

Sleep disturbances are common in women, especially during pregnancy (Lee et al., 2008; Palagini et al., 2014; Pien and Schwab, 2004). According to a recent US survey involving 2427 pregnant women, 76% reported poor sleep quality, 78% took daytime naps, 38% had insufficient nighttime sleep ($\leq$6 h), and 49% experienced significant daytime sleepiness, with 100% reporting frequent nighttime awakenings (Mindell et al., 2015). Sleep disturbances have also been reported in a European sample of pregnant women, with up to 75% of the cohort complaining of poor sleep, decreased vigilance, and requiring a nap during the day (Neau et al., 2009). Sleep problems during pregnancy are a significant health issue and have been associated with preterm delivery and prolonged labor (Kajeepeta et al., 2014; Lee and Gay, 2004; Okun et al., 2011), antenatal and postnatal depression (Dorheim et al., 2012; Okun et al., 2013; Tomfohr et al., 2015), and an increased risk of cesarean delivery, gestational hypertensive disorders, and glucose intolerance (Haney et al., 2014; Herring et al., 2014; O'Brien et al., 2013). All these studies have confirmed the importance of sleep disturbances as a risk factor of adverse pregnancy outcomes and the need for screening and treatment of inadequate sleep. These reports, however, did not examine health-related quality of life (HRQoL) which may be affected by sleep long before adverse clinical consequences are detectable in women during pregnancy.

HRQoL has long been considered an important outcome of nursing and medical practice and research (Kyle et al., 2010; Weaver, 2001). Poor HRQoL, particularly in the physical health domain, has predicted increased incidence of having low-birth-weight infants (Lau, 2013). To the best of our knowledge, only two studies have examined sleep and HRQoL in pregnant women (Da Costa et al., 2010; Rezaei et al., 2013). One study conducted in Canada was based on sleep and HRQoL data on 245 third-trimester pregnant women (Da Costa et al., 2010). Another study conducted in Iran focused on 100 second-trimester pregnant women with sleep disorders (Rezaei et al., 2013). Although results from both studies showed that poor sleep was associated with impaired HRQoL, causal relationships between sleep and HRQoL could not be adequately determined due to the cross-sectional study design. The sleep measure in both studies was also subjective in nature and therefore may be subject to recall bias. For example, the Canadian study collected sleep information based on a single question asking whether women were bothered by the problem of trouble falling or staying asleep, or sleeping too much over a 2 week timeframe (Da Costa et al., 2010). The Iranian study used retrospective estimates of subjective sleep quality over the previous one-month period (Rezaei et al., 2013). The use of objective sleep measures may be particularly important given prior research showing inaccurate sleep perceptions in pregnant women (Herring et al., 2013). Because sleep patterns have been shown to change with advancing gestation (Mindell et al., 2015; Neau et al., 2009), the results of these studies may not apply to women in early pregnancy.

Alterations in sleep patterns, such as less deep sleep and more nocturnal awakenings, can be observed in pregnancy as early as at 10–12 weeks gestation (Izci Balserak et al., 2013; Lee et al., 2000; Okun et al., 2013). Emerging evidence shows that poor sleep manifesting during early pregnancy may contribute to increased inflammation and cardio-metabolic dysregulation expressed up to delivery