International Journal of Nursing Studies 66 (2017) 1–6

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Persistent and new-onset daytime sleepiness in pregnant women: A prospective observational cohort study

Shao-Yu Tsai[a,*], Pei-Lin Lee[b,c,d], Jou-Wei Lin[e], Chien-Nan Lee[f]

[a] School of Nursing, National Taiwan University, No. 1, Sec. 1, Jen-Ai Rd, Taipei, 10051, Taiwan
[b] Department of Internal Medicine, National Taiwan University, Taipei, Taiwan
[c] Center of Sleep Disorder, National Taiwan University Hospital, Taipei, Taiwan
[d] Division of Pulmonary and Critical Care Medicine, National Taiwan University Hospital, Taipei, Taiwan
[e] Department of Medicine, National Taiwan University, Taipei, Taiwan
[f] Department of Obstetrics and Gynecology, National Taiwan University, Taipei, Taiwan

ARTICLE INFO

Article history:
Received 25 July 2016
Received in revised form 3 November 2016
Accepted 5 November 2016

Keywords:
Pregnancy
Sleep
Sleepiness
Women

ABSTRACT

Background: Daytime sleepiness is a frequent complaint in women during pregnancy. It has also been linked to negative obstetric consequences. Although high prevalence of excessive daytime sleepiness throughout pregnancy is well-documented, neither the causes of persistent daytime sleepiness nor new-onset daytime sleepiness during pregnancy have been investigated. Identifying predictive factors may play an important role in the management of daytime sleepiness in pregnant women and improve prenatal care and maternal-fetal outcomes.
Objectives: To examine first-trimester maternal characteristics associated with the persistence and new-onset daytime sleepiness in pregnant women.
Design: A longitudinal, prospective cohort design.
Setting: One medical center in Taipei, Taiwan and participating women's homes.
Participants: A total of 204 pregnant women.
Methods: First-trimester pregnant women recruited from an outpatient obstetric clinic at a medical center provided socio-demographic and health information, wore an actigraphy monitor for 7 days, and completed sleep, mood, and daytime sleepiness questionnaires. Data were collected again when the women were in the second and third trimester.
Results: Thirty-one (15.2%) women experienced excessive daytime sleepiness that persisted across all three trimesters. Nulliparous women and women who snored in the first trimester were 2.28 and 2.10 times more at risk of being classified of persistent daytime sleepiness than multiparous women and women who did not snore in the first trimester, respectively. Thirty-one (15.2%) women developed new-onset daytime sleepiness with advancing gestation. Women were more likely to develop new-onset daytime sleepiness if they worked longer hours per week (OR = 1.04, $p < 0.001$), if they reported snoring (OR = 6.75, $p < 0.001$), and if they had elevated depressive symptoms in the first trimester of pregnancy (OR = 1.09, $p = 0.01$).
Conclusions: Snoring in the first trimester is involved in both the persistence and new-onset of daytime sleepiness with elevated depressive symptoms related to new-onset daytime sleepiness in pregnant women. Findings suggest that intervention strategies for alleviating daytime sleepiness in pregnant women should focus on managing snoring and symptoms of depression in early trimesters with special attention to nulliparous and employed women.

What is already known about the topic?

- Daytime sleepiness is a frequent complaint among pregnant women with up to 52.6–65.4% women reporting it sometime during pregnancy.
- Daytime sleepiness during pregnancy has been linked to negative obstetric consequences, and may impair women's quality of life and interfere with their daily living activities.

What this paper adds

- Monitoring the symptom of daytime sleepiness over time is important because such a symptom is likely to be longstanding

* Corresponding author.
E-mail address: stsai@ntu.edu.tw (S.-Y. Tsai).

http://dx.doi.org/10.1016/j.ijnurstu.2016.11.003
0020-7489/

and was sustained throughout the pregnancy in 15.2% of women in our study.
- Snoring in the first trimester is involved in both the persistence and new-onset of daytime sleepiness with elevated depressive symptoms related to new-onset daytime sleepiness in pregnant women.
- Snoring and depressive symptomology should be managed concurrently in early trimesters to not only achieve symptom relief but also to effectively modify the course of excessive daytime sleepiness experienced by pregnant women.

1. Background

Daytime sleepiness is a frequent complaint among pregnant women with up to 52.6–65.4% women reporting it sometime during pregnancy (Cai et al., 2013; Mindell et al., 2015; Neau et al., 2009). Prevalence estimates indicate that 31–77%, 29.3–62.6%, and 33–61.3% of the first-, second-, and third-trimester pregnant women reported high levels of daytime sleepiness, respectively (Cai et al., 2013; Facco et al., 2010; Hutchison et al., 2012; Mindell et al., 2015; Neau et al., 2009; Pien et al., 2005). Daytime sleepiness during pregnancy may impair women's quality of life and interfere with their daily living activities. It has also been linked to negative obstetric consequences (Bourjeily et al., 2013a,b). Bourjeily et al. (2013a,b) conducted a cross-sectional survey of women in the immediate postpartum period and found that elevated daytime sleepiness was associated with planned cesarean deliveries even after controlling for most known risk factors. In the same study they also reported an association between severe excessive daytime sleepiness and gestational diabetes. Although high prevalence of excessive daytime sleepiness throughout pregnancy is well-documented, no studies have estimated the occurrence of persistent daytime sleepiness and incidence of new-onset daytime sleepiness in pregnant women.

Daytime sleepiness during pregnancy is presumably attributed to physical, hormonal, and sleep-related changes such as frequent nocturnal arousals and fragmented sleep (Mindell et al., 2015; Neau et al., 2009; Signal et al., 2014). Limited studies have prospectively investigated symptoms of excessive daytime sleepiness and their correlates in women over the course of pregnancy (Facco et al., 2010; Pien et al., 2005; Sarberg et al., 2014). Pien et al. (2005) conducted a study of women from the first trimester of pregnancy to delivery and found that both the severity and presence of daytime sleepiness increased significantly with advancing gestation. Their results also showed that maternal age and symptoms of sleep disordered breathing predicted the severity of daytime sleepiness symptoms. On the contrary, Facco et al. (2010) focused on nulliparous women and reported that the proportion of women who reported excessive daytime sleepiness did not change significantly as pregnancy progressed. More recently, Sarberg et al. (2014) reported that both the severity of daytime sleepiness symptoms and frequency of snoring increase during pregnancy. They also found that gestational snorers, defined as women who snored after pregnancy, experienced significantly greater daytime sleepiness than non-snorers in early and late pregnancy. Although these longitudinal data are informative and extend previous cross-sectional studies, neither the causes of persistent daytime sleepiness nor new-onset daytime sleepiness during pregnancy have been investigated. Identifying predictive factors may play an important role in the management of daytime sleepiness in pregnant women and improve prenatal care and maternal-fetal outcomes.

Excessive daytime sleepiness is also documented as a problem for the general non-pregnant population and is found to be related to employment status, insufficient sleep, and a diagnosis or symptoms of depression or sleep disorders such as insomnia, sleep disordered breathing, or restless legs syndrome (Breslau et al., 1997; Ohayon, 2012; Whitney et al., 1998). Findings from the Penn State cohort study specifically found that excessive daytime sleepiness is more strongly related to depression than with sleep disordered breathing or disrupted sleep (Bixler et al., 2005). A recent study involving 4322 Swedish women followed up for 10 years reported that insomnia, anxiety, and depression increased the risk of developing excessive daytime sleepiness (Theorell-Haglow et al., 2015). Another study conducted in 944 women in Australia found an association between current and lifetime depressive, but not anxiety disorders, with excessive daytime sleepiness (Hayley et al., 2013). High rates of depression are observed in patients with excessive daytime sleepiness and one study even showed that surgical treatment for obstructive sleep apnea was associated with resolution of depression in 75% and sleepiness in 77% of the patients, respectively (Chellappa et al., 2009; Harris et al., 2009; Ishman et al., 2014).

Depressive symptoms are repeatedly reported as a common presentation for women during pregnancy and their prevalence can be as high as 41.2% during the early trimesters (Li et al., 2009; O'Brien et al., 2013a,b; Rubertsson et al., 2005). However, no studies have included depressive symptoms when examining the correlates or predictors of excessive daytime sleepiness in pregnant women. The purpose of the prospective and longitudinal study was to examine a range of first-trimester maternal clinical and psychosocial characteristics associated with the persistence and new-onset daytime sleepiness in pregnant women.

2. Methods

2.1. Design and sample

This is a longitudinal study of sleep in women across pregnancy. Data were collected from October 2012 to August 2015. First-trimester pregnant women who received their routine prenatal care at a medical center in Taipei Taiwan were informed about the study. Women were eligible to participate in the study if they were >18 years old, <15 weeks gestation, and were healthy experiencing no pregnancy-related complications. Exclusion criteria were women working night shifts, women with multiple gestation pregnancies if known, and those with previous or current diagnosis of a psychiatric or sleep disorder. Participating women provided socio-demographic and health information in the clinic, wore an actigraphy monitor for the next 7 consecutive days, and completed sleep, mood, and daytime sleepiness questionnaires. Data were collected again when the women were at the second (i.e., 16–28 weeks gestation) and third trimester (i.e., >29 weeks of gestation), with each data collection scheduled at least 2 months apart. Part of the data on the sleep and health-related quality of life in this cohort of pregnant women has been reported elsewhere (Tsai et al., 2016). Only data relevant to the purpose of the current study are reported here.

A total of 587 women who expressed interest in the study were given a more detailed explanation about the study purpose and procedures. The eligibility of 532 women was confirmed through a structured interview and medical record review. A total of 233 first-trimester pregnant women participated in the study. The analyses of the current report were based on 204 women with complete data available at all three trimesters who had a singleton pregnancy, did not have a miscarriage, did not develop pregnancy-related complications, and did not have a diagnosis of a psychiatric or sleep disorder such as depression, sleep apnea, or restless legs syndrome after study enrolment. This study was approved by the institutional review board of the hospital where the study was