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# Sleep quality at 3 months postpartum considering maternal age: A comparative study

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### ABSTRACT

**Background:** Poor sleep quality is related to old age among the general population, but few studies have focused on postpartum women of advanced maternal age. The present study aimed to describe and compare sleep quality between women younger or older than 35 years of age at 3 months postpartum, and to examine the related factors.

**Methods:** A cross-sectional survey was conducted with 160 postpartum women who had given birth at a teaching hospital in Taiwan. The participants were assigned to two groups according to age ( $\geq 35$  years,  $n = 80$ ; and 20–34 years,  $n = 80$ ). Sleep quality was measured using the Pittsburgh Sleep Quality Index with a cut-off score of 5.

**Results:** The prevalence of poor sleep quality at 3 months postpartum was higher in older mothers (61.6%) than in younger mothers (38.4%,  $p < 0.01$ ). Multiple logistic regression revealed that poor sleep quality was positively correlated with the severity of postpartum physical symptoms, lack of exercise, and room-sharing with infants. After adjustment for those variables, older mothers were three times more likely to have poor sleep quality than younger mothers (odds ratio = 3.08; 95% confidence interval 1.52–6.23).

**Conclusion:** Health care providers should pay attention to sleep problems among postpartum women, especially mothers of advanced maternal age. In particular, health care providers should evaluate sleep quality among postpartum women, instruct them not to share the bed with their infants at night, perform exercise, and manage their postpartum physical symptoms to improve the sleep quality.

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### Statement of significance

#### Problem

Advanced maternal age has become more common in modern society, however, its' association with postpartum sleep quality remained unclear.

#### What is already known

Poor sleep quality is common among postpartum women. Factors related to poor sleep quality included socio-demographics, obstetrical history, infant care, personal health history and symptoms, and lifestyle factors.

### What this paper adds

Mothers  $\geq 35$  years of age were three times more likely to have poor sleep quality than younger mothers after adjustment for the three factors that were significantly positively associated with poor sleep quality; severity of postpartum physical symptoms, lack of exercise, and room-sharing with infants.

### 1. Introduction

Advanced maternal age has recently become more common in Taiwan. Between 2006 and 2016, the proportion of primiparous women aged 35 years or older increased from 33.05% to 36.73%,<sup>1</sup> and the mean maternal age at birth increased from 30.9 years in 2013<sup>2</sup> to 31.9 years in 2016.<sup>1</sup> Childbearing at an advanced maternal age is a growing clinical concern because women with advanced maternal age have generally high-risk pregnancies and births.<sup>3–5</sup>

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Indeed, advanced maternal age was associated with an increased risk of pregnancy complications, caesarean births, preterm births, and postpartum physical symptoms.<sup>3–5</sup> In addition, older mothers may demonstrate several physical and psychosocial characteristics or limitations, such as poor physical strength<sup>6</sup> and limited social support.<sup>7</sup> Those factors may interfere with maternal adaptation after childbirth. Advanced maternal age has also been associated with postpartum depression, particularly in primiparous women.<sup>8</sup> In the postpartum period, infants typically require frequent feedings at night that result in frequent waking after sleep onset, reduced sleep duration, and reduced time of asleep in night among mothers.<sup>9</sup> Sleep disturbance is an important health issue in postpartum women, because of its association with fatigue, depression, and emotional disturbance.<sup>10–12</sup>

Previous studies on subjective sleep quality in postpartum women using Pittsburgh Sleep Postnatal Depression Scale (PSQI)<sup>13–15</sup> indicated that the sleep quality is disrupted immediately after childbirth, followed by an improvement; however, it remains a problem during the first 2–3 months postpartum for many women. In addition, the sleep quality has been reported to decline with age in adults.<sup>16</sup> However, most previous studies have focused on sleep quality among young postpartum women, and only few studies reported on postpartum sleep quality in mothers with advanced maternal age. The objectives of the present study were to describe and compare sleep quality between women 20–34 years or  $\geq 35$  years of age at 3 months postpartum, and to examine the related factors in Taipei City, Taiwan.

## 2. Participants, ethics, and methods

### 2.1. Sample size estimation

Based on results of a previous study,<sup>17</sup> we hypothesised that the effect size of differences in sleep quality between women with and without advanced maternal age was 0.5. Using G power 3.1.7, the required sample size was 64 per group when effect size was 0.5, two-sided  $\alpha$  was 0.05, and power was 0.8. To account for rejection and missing data, we decided to recruit 80 women each for women with and without advanced maternal age.

### 2.2. Design and participants

In this cross-sectional survey, we recruited women who hospitalized at a postpartum ward of a regional teaching hospital in Taipei, Taiwan. The inclusion criteria were adult women ( $\geq 20$  years of age) without severe maternal or neonatal complications and who can communicate in Mandarin Chinese or Taiwanese. During the period between February 2014 and December 2014, the first author assessed eligibility of the study participants at the ward every 3 days. She approached women who were eligible to be enrolled in the study and explained the study purpose to ask whether the women agreed to participate and to be telephone-interviewed about 3 months later. The recruitment was conducted in a consecutive of presentations to the hospital until the desired sample size and proportion of parity was reached. In accordance with the requirement of the institutional review board at the study hospital, those women who agreed to participate signed a consent form and left their contact phone number to the first author. Of the 183 women approached, 23 refused to participate in the study. In total, 160 postpartum women were enrolled, of whom 80 were aged 35 years or older (advanced age group) and 80 were aged 20–34 years (non-advanced age group). The two groups were frequency-matched for parity. Since half of the women in the advanced age group were primiparous ( $n = 40$ ) and the remaining were multiparous ( $n = 40$ ), we recruited the same proportion of parity in the non-advanced age group. The study participants were

interviewed by the first author using structured questionnaires at 12–14 weeks postpartum during 15 to 20-min telephone interviews from May 2014 through February 2015. This study was approved by the institutional review board at the Taiwan Adventist Hospital (No. 103-E-01).

### 2.3. Measurements

Based on literature review and clinical observations, we designed the study tool. The study tools included the following: (1) a self-designed structured questionnaire, which comprised basic information and pregnancy/childbirth history, healthy life style, and newborn care variables; (2) the Postpartum Physical Symptoms Checklist (PPSC); and (3) the Pittsburgh Sleep Quality Index (PSQI).

The basic information included age, work status, education level, and family socio-economic status. The family socio-economic status was determined based on the Hollingshead 2-factor index of social position. The highest level of education and occupation of each couple were used to calculate the index based on the following equation: (education level  $\times 4$ ) + (occupational level  $\times 7$ ). The index was divided into high (41–55), middle (30–40), and low (11–29) groups.<sup>18</sup>

The obstetrical history included parity, birth mode, preterm birth, and infant sex. The personal lifestyle included the behaviour of coffee/tea drinking and exercise in the past 2 weeks. The newborn care variables included the infant feeding method and sleeping arrangements for the baby.

Content validity of the self-designed structured questionnaire was reviewed by 5 experts, including 2 obstetricians, 1 clinical nursing instructor, 1 nursing professor, and 1 deputy head nurse of postpartum ward. The experts rated the appropriateness of the questions on a 5-point Likert-scale (from 1 to 5) and provided feedback on revising the question if a question received a score of  $< 3$ . The content validity index was 0.98, i.e., 98% of the questions received a score of  $\geq 3$ .

The PPSC was designed to measure the severity of postpartum physical symptoms among postpartum women.<sup>3</sup> The original checklist contained 18 common postpartum physical symptoms, including caesarean section wound or perineal pain, constipation, backache, headache, haemorrhoids, joint pain, numbness in the hands, excessive leucorrhoea, vaginal infection, numbness in the feet, urinary-tract infection, excessive vaginal bleeding, dizziness, varicose vein over legs, urinary incontinence, a higher incidence of cold than usual, and cold hands and/or feet. The content validity of the PPSC had been established through experts review. The internal consistency of the scale as assessed by Cronbach's  $\alpha$  among women at one month postpartum in Taiwan was 0.77.<sup>3</sup> We deleted one item in this study, namely the poor sleep quality, because it overlapped with the dependent variable. A 4-point Likert-scale ranging from 0 to 3 (none, mild, moderate, severe) was applied to each item in the PPSC, for a total scale range of 0–51 points, with higher scores suggesting severer physical symptoms. The internal consistency of the scale as assessed by Cronbach's  $\alpha$  was 0.56 for the 18 items and 0.54 for the 17 items (deleting poor sleep quality) in this study.

Sleep quality was measured using the PSQI,<sup>19</sup> which consisted of seven sleep components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, day-time dysfunction, and use of sleeping medication. Items were measured using a 4-point Likert-scale ranging from 0 to 3. The sum of the seven component scores formed a global PSQI score (range 0–21), with higher scores indicating a poorer quality of sleep. A cut-score of 5 was used to demarcate good sleepers from poor sleepers. The PSQI was previously shown to be a reliable and valid tool in measuring quality of sleep.<sup>19</sup> The PSQI was translated into Chinese

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