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Original article

Sleep complaints: snoring and daytime sleepiness in pregnant and pre-eclamptic women

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Abstract

Background and purpose: To examine whether snoring and sleepiness are linked in pregnancy and pre-eclampsia.

Patients and methods: We recruited 167 healthy and 82 pre-eclamptic women in the third trimester of pregnancy and 160 non-pregnant women. Subjects and their partners completed a sleep questionnaire. Height, weight, neck circumferences and blood pressure were recorded for all.

Results: Pregnant and pre-eclamptic women were (mean $\pm$SD) 36 ± 3.6 and 36 ± 3 weeks pregnant, respectively. Age and height did not differ significantly between groups ($P>0.2$), but pre-eclamptic women were heavier than pregnant and non-pregnant women and had higher BMI than pregnant women before pregnancy (all $P<0.05$). Thirty-two percent of control, 55% of pregnant and 85% of pre-eclamptic women snored ($P<0.001$), but pre-pregnancy snoring rates (pre-eclamptic = 36%, healthy pregnant women = 27%) were similar to those in non-pregnant women (32%) ($P>0.7$). Sleepiness was reported by 12% of non-pregnant, 23% of pregnant and 15% of pre-eclamptic women ($P<0.04$), but non-pregnant women had lower mean Epworth Sleepiness scores than both pregnant and pre-eclamptic groups ($P<0.001$). Snoring was correlated with ($P=0.002$), but explained only <2%, of the variance in sleepiness.

Conclusion: Snoring and sleepiness increased in the third trimester of pregnancy, particularly in patients with pre-eclampsia. However, the study suggests that sleepiness in pregnancy is largely due to factors other than snoring or breathing pauses.

Keywords: Pregnancy; Third trimester; Snoring; Sleepiness; Blood pressure; Pre-eclampsia

1. Introduction

The third trimester of pregnancy is characterised by increased snoring frequency, nocturnal awakenings and daytime sleepiness as well as decreased daytime alertness and sleep quality [1–4]. The most frequent reasons reported for these symptoms are weight gain, fragmented sleep, and loss of deep sleep stages [1,5–9].

In the third trimester of pregnancy, around 14–28% of pregnant and 75% of pre-eclamptic women snore compared to 4–14% of non-pregnant women [1–3]. Snoring is associated with hypertension and is a risk factor for pre-eclampsia and intra-uterine growth retardation in pregnancy [1,2,7,10,11].

Daytime sleepiness increases in up to 65% of pregnant women by the end of pregnancy [2]. Polysomnographic studies show that total sleep time and sleep efficiency significantly decrease and that sleep stages three and four are shortened after the first trimester of pregnancy [5–9].

The American Sleep Disorders Association has asserted the existence of 'pregnancy-associated sleep disorder'. It is generally agreed that this disorder begins with excessive sleepiness and progresses to severe insomnia [12]. The most common reason given for sleep alterations was pregnancy-associated physiological changes, including

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high concentration of sex steroids and sleep complaints. These include snoring, insomnia, nocturnal awakenings, parasomnias and daytime sleepiness [5,7,11,13–15].

Thus, both snoring [1–3,7] and sleepiness [2,11,13] are common in pregnancy, but it is not clear whether these features are associated. We have examined the association of snoring and sleepiness across groups of non-pregnant and pregnant women. The pregnant group was supplemented with women with pre-eclampsia as they have a higher rate of snoring [1,2].

2. Method

One hundred and sixty-seven healthy pregnant and 82 pre-eclamptic women, all in the third trimester of singleton pregnancies, including both primigravida and multigravida, were recruited at an antenatal clinic and day assessment unit. Pre-eclampsia was defined as the presence of new hypertension [blood pressure (BP) > 140/90 or > +30/+15 from booking BP] with proteinuria (>0.3 g/24 h). One hundred and sixty non-pregnant women of similar age were randomly selected, mainly from hospital staff. All non-pregnant and pregnant women except for the pre-eclamptic women were healthy. All subjects gave written informed consent to the study, which had the approval of the local ethical advisory committee.

All subjects, together with their partners, completed a standard sleep questionnaire with respect to the woman's sleep. Some of the questions were posed in a format that allowed the subjects to retrospectively rate their response for the time before pregnancy as well as during the third trimester of pregnancy to assess alterations in their sleep. For all women height, weight, and neck circumferences were recorded and BP measured.

The standard sleep questionnaire included questions on medical history in relation to sleep, sleep-related complaints (e.g. snoring) and depression. Snoring frequency and breathing pauses were rated before pregnancy and during the last month on a five-point Likert scale, corresponding to 'never', 'rare' (1–2 nights per month), 'occasional' (1–2 nights per week), 'often' (3 nights per week), 'frequent or always' (more than three nights per week) and 'do not know'. If snoring frequency and breathing pauses were rated by either the woman or her partner as occasional, often or always, the conditions were considered to exist in the subject. Those who snored often or always (greater than or equal to 3 days per week) were defined as habitual snorers.

The questionnaire also included a five-point Likert scale for refreshment [16] and Epworth Sleepiness Scale (ESS).

2.1. Refreshment five-point Likert scale

The question 'How refreshed do you feel on wakening in the morning regardless of sleep duration?' was rated on a five-point Likert scale from 1 (very unrefreshed) to 5 (fully refreshed). This question is widely used in sleep units to evaluate individuals for possible sleep-disordered breathing (SDB). A similar form (or the Visual Analog Scale) for refreshment, snoring and daytime sleepiness has been used by other researchers successfully [11,16–18]. It has been shown that this question has significant correlations with excessive daytime sleepiness [17] and snoring [18].

2.2. Epworth sleepiness scale

The ESS provides a subjective estimate of patients' daytime sleepiness in eight everyday situations (each question scores 0 (never) to 3 (high chance), total = 0–24). It has been shown to have good test–retest reliability ($r = 0.82$) and internal consistency (Cronbach alpha = 0.74–0.88) [19,20]. The ESS has been validated with the Multiple Sleep Latency Test (MSLT) in patient sample sizes of 27 [19], 44 [20] and 60 [21]. It demonstrated a minor but significant correlation with MSLT. Some studies which have compared patients before and after treatment also provide some validation for ESS [22]. The ESS has a high sensitivity and high specificity with a cut-off score of >10 for an abnormal level of daytime sleepiness [23]. Higher ESS scores indicate greater daytime sleepiness.

2.3. Statistical analysis

Statistical analysis was performed using the SPSS for windows, version 10 (SPSS, Inc., Chicago, IL, USA). Comparisons were performed using the paired *t*-test for dependent samples and analysis of variance, followed by between-group comparisons using the Student–Neuman–Keuls multiple comparison test when appropriate. Logistic regression was used to analyze the relationship between snoring and sleepiness. Chi-square and Pearson's correlation were used in the basic descriptive statistical analyses. Results are presented as mean with SD or SEM. *P* values of 0.05 or less were taken as significant.

3. Results

3.1. Subject characteristics

The mean duration of pregnancy in the pregnant and pre-eclamptic groups was (mean ± SD) 36 ± 3.6 weeks and 36 ± 3 weeks, respectively. There were no significant differences between pregnant, pre-eclamptic and control women in terms of age or height, but pre-eclamptic women were heavier than pregnant and non-pregnant women and reported higher body mass indices (BMI) than pregnant women before pregnancy (Table 1). Pre-eclamptic women had significantly larger neck circumferences than the healthy pregnant and non-pregnant women, and pregnant women also had larger neck circumferences than non-pregnant women (Table 1).