



Original Article

Excessive daytime sleepiness and nocturia in women

Cinara Sacomori^a, Fernando Luiz Cardoso^a, Fernando Mazzilli Louzada^b, Érico Felden Pereira^{a,*}^a Santa Catarina State University, Florianópolis, Santa Catarina, Brazil^b Federal University of Paraná, Curitiba, Paraná, Brazil

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ABSTRACT

Objective: To investigate associations between excessive daytime sleepiness and nocturia in women.**Method:** A total of 488 women aged 18–89 years who underwent screening for cervical cancer at one institution in Florianópolis, Brazil, took part in this investigation. Sleep issues and daytime sleepiness, urinary frequency, and nutritional status were investigated.**Results:** The prevalence of excessive daytime sleepiness was 31.3%. Most of the women reported having nocturia, since 32.4% reported one nocturnal voiding, and 24.3% two or more nocturnal voidings. Higher nocturnal voiding frequency was identified in women who spent longer in bed ($P = 0.028$) and had worse quality of sleep ($P < 0.001$), higher daytime sleepiness ($P = 0.016$) and excess body weight ($P < 0.001$). A higher prevalence of daytime sleepiness was also observed in those women assumed to have urine leakage ($P = 0.006$). Women with two or more nocturnal voidings presented 1.58 (CI: 1.06–2.37) higher prevalence of daytime sleepiness independent of time in bed ($P = 0.030$).**Conclusion:** Women with at least two nocturnal voidings presented higher prevalence of daytime sleepiness, worse sleep quality, and longer time in bed. Moreover, women with daytime sleepiness presented higher frequency of urine leakage.

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1. Introduction

Urinary functions exhibit daily or circadian variation in mammals. In humans the transition from day to night is followed by a pronounced decrease in diuresis [1]. During sleep the circadian system is modulated by three factors: decreased arousal level in the brain, decreased urine production rate from the kidneys, and increased functional bladder capacity [2]. However, for many reasons the circadian system may be altered, resulting in an increase of urinary frequency during sleep, called nocturia.

Nocturia is defined as the need to wake up during the night to urinate. Consequently, it is a cause of nocturnal awakening, leading to sleep loss and reduced quality of life [3]. According to a population-based study carried out with women aged 25–84 years, frequency of nocturnal voiding higher than once per night is considered bothersome [4] because it is linked to diurnal fatigue, decreased concentration, lower work performance, and accidents due to cognitive and motor impairment [5–7]. The prevalence of nocturia increases with age [5,8–10].

The associations between sleep, excessive daytime sleepiness, and nocturia are not well defined in the literature, but epidemiological studies [7,10–14] indicate a possible direct association

between these variables which would assume clinical and public health importance in the context of women's health. One recent literature review identified a lack of articles investigating the association between nocturia and sleep disorders [8].

Some articles have reported that nocturia is much more frequent in women when compared to men [3,8,15]. It has been demonstrated that the prevalence of nocturia doubles during the climacteric period [10]. However, there are few articles investigating this association in the female general population. Most of the studies showing the relationship between nocturia and sleep problems include men with prostatic hyperplasia [16,17] or older adults [9,13,18] or were literature reviews [6–8,19].

With this in mind, our research focused on the public and free health service of cytologic screening for cervical cancer, which is comprehensively available for Brazilian women [20]. Due to the recognized relevance of this topic, the aim of this study was to investigate associations between excessive daytime sleepiness and nocturia in women.

2. Method

2.1. Participants

This is an observational study that used a cross-sectional design with 485 women aged between 18 and 89 years who underwent

* Corresponding author. Tel.: +55 4833218683, fax: +55 4833218607.

E-mail address: ericofelden@yahoo.com.br (É. F. Pereira).

screening for cervical cancer at a non-governmental institution promoting the prevention of cervical and breast cancer (Rede Feminina de Combate ao Câncer de Florianópolis, SC). This institution assists about 4200 women annually from several social classes, and the sample of this study comprises about 11% of that population. Women were not selected randomly; only those who were at the institution on Tuesday, Thursday and Friday afternoons, without any appointment, were approached. This methodological choice was due to the availability of the venue to do this research.

All the women were approached before their cytologic screening for cervical cancer and agreed to participate in this study, which was approved by the Ethics Committee of Human Research of Santa Catarina State University (No. 15/2011). The volunteers signed a Statement of Awareness and Consent. Moreover, the protocol conformed to international ethical standards for human research and the Helsinki Declaration of 1975.

The exclusion criteria were pregnancy, physical disability, cognitive deficit and age <18 years. All women were interviewed in a private situation in the waiting room of the institution during the time in which they were waiting for the screening examination, without a set schedule, between September 2011 and June 2012.

2.2. Research instruments

This study considered five independent variables: age group, nutritional status, sleep quality, time spent in bed, and frequency of nocturnal urinary voiding. All of them were evaluated with questionnaires based on self-report. In addition, some demographic (schooling, income, and marital status) and health-related (health status, practice of physical activity during leisure, and alcohol intake) characteristics were evaluated. Health status was assessed with the question 'How do you perceive your health status?' (very good, good, regular, bad, or very bad).

Sleep was investigated through the instrument proposed by Louzada and Menna-Barreto [21], which was administered to obtain self-reported bedtime and wake-up time, from which the time-in-bed variable was derived. In the questionnaire, women were asked the following questions: 'What time do you usually wake up?'; 'What time do you usually go to bed?' The quality of sleep was evaluated using the following question: 'In general how do you classify the quality of your sleep during the last thirty days?' Possible answers varied between: 4, very good quality; 3, good quality; 2, bad quality; and 1, very bad quality. The participants were dichotomized regarding their answers into 'good quality of sleep' (those who reported 'good' or 'very good') and 'bad quality of sleep' (those who reported 'bad' or 'very bad').

The frequency of nocturnal urinary voiding was assessed with the question: 'How many times on average do you wake up to empty your bladder during sleeping hours?' Responses were categorized according to a cut-off point of 2, where two or more episodes of voiding per night were considered as 'bothersome nocturia'.

The dependent variable – excessive daytime sleepiness – was evaluated through the Epworth Sleepiness Scale [22]. Those women whose scores were >10 points were classified as presenting excessive daytime sleepiness.

The indicators of the body mass index (BMI; kg/m²) were obtained with a digital scale for body mass and a stadiometer to measure height. The cut-off point for categorization was 25, BMI above this value being considered excessive body weight.

For evaluation of lower urinary tract symptoms, The International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) was used. This questionnaire evaluates the impact of urine leakage on quality of life. The ICIQ-SF was developed and validated by Avery et al. [23] and translated and validated in Brazilian Portuguese by Tamanini et al. [24]. Participants were considered

incontinent when they referred to urine leakage at least once a week.

2.3. Data analyses

The data were tabulated in the SPSS statistical program version 18.0 and analysed with descriptive (absolute and relative frequency, mean and standard deviation) and inferential statistics. Poisson regression [25] analysis was used with robust variance in order to analyse the associations between independent variables (age group, nutritional condition, sleep quality, time in bed and frequency of nocturnal urinary voiding) and the dependent variable (daytime sleepiness). Data were described as crude and adjusted prevalence ratios, considering $P < 0.05$.

3. Results

The prevalence of excessive daytime sleepiness observed in the investigated sample was 31.3%. Low quality of sleep was identified in 30.1% of the sample and 44.7% of women sleeping 7–8 h per night. Most of the sample (56.7%) presented frequency of nocturnal urinary voiding of at least once. In addition, 30.6% of the women reported presenting urine leakage (Table 1). Most of the women had low levels of schooling and income, reported not consuming alcohol, and evaluated their health status as good or very good (Table 1). Around 50% of them were with body weight excess and only 50.9% reported to be physically active during leisure time.

Analyses of the frequency of nocturnal urinary voiding in relation to sleep variables and nutritional status indicated that the women with greater frequency of nocturnal voiding stayed longer in bed ($P = 0.028$), presented worse quality of sleep ($P < 0.001$), had more indicators of excessive daytime sleepiness ($P = 0.016$), and had excess body weight ($P < 0.001$) (Table 2). Additionally, higher prevalence of excessive daytime sleepiness was also verified among women with urine leakage (Fig. 1).

Associations between excessive daytime sleepiness and bothersome nocturia are presented in Table 3. Women with bothersome nocturia (frequency of nocturnal voidings of two or more episodes) presented 1.58 (CI, 1.06–2.37) higher prevalence of excessive daytime sleepiness, even in the adjusted analyses considering the time spent in bed ($P = 0.030$).

4. Discussion

This study identified high prevalence of excessive daytime sleepiness (31.3%) in women aged 18–89 years seeking cervical cancer screening. The prevalence of women who spent <7 h in bed was 40.8%. Studies have verified important associations between excessive daytime sleepiness and low sleep duration, and a high prevalence of depressive symptoms and anxiety disorders [26,27].

Moreover, most of the women in this study had nocturia: 32.4% reported one nocturnal voiding and 24.3% reported two or more voidings during sleeping hours. It has been indicated that micturition twice per night or more is considered bothersome by women [4,18]. Studies in the USA with women of different ages identified a higher prevalence: 72% urinated at least once in the night [4] whereas around 33% urinated two or more times per night [3,4]. In other population-based studies, a prevalence rate of 68% was described for individuals who reported at least one night urination [11] whereas 38.1% of individuals reported urinating twice or more during sleep [9].

It was found that women with higher nocturnal voiding frequency tended to stay longer in bed and presented worse sleep quality and more indicators of excessive daytime sleepiness.

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