

Sleep, Nocturia and the Burning Mouth Syndrome (BMS) in the Elderly

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The present study, a questionnaire survey, was undertaken to assess the simultaneous influence of burning mouth syndrome (BMS) and nocturia on the four variables: sleep (poor vs. good) awakenings (often vs. seldom or never), the ability to fall asleep after nocturnal awakenings (easy vs. difficult) and nightmares (often vs. seldom or never) in a large group of elderly persons. The survey comprised 6,103 elderly men and women (39.5% men) of ages (mean±standard deviation) 73.0±6.0 and 72.6±6.7 years, respectively. Poor sleep was reported by 14.4% of the men and 28.1% of the women ($p<0.0001$). BMS was reported by 5.7% (2.4% of the men and 8.5% of the women; $p<0.0001$). The occurrence of poor sleep was not related to BMS in men, but was 2.8 (1.8-4.3) times more common in women with BMS than in those without. Nightmares were 3.5 (1.2-11.0) times more common in men and 5.2 (3.0-9.0) times more common in women with BMS than in those without BMS. The occurrence of poor sleep was increased in both men and women who either had ≥ 3 micturition episodes at night or were often troubled with BMS, and was further increased in those who reported both. It is concluded that BMS and nocturia are both independently involved in deterioration of sleep in the elderly and that BMS has a significant influence on the occurrence of nightmares. **(Sleep and Hypnosis 2006;8(1):6-11)**

Key words: burning mouth syndrome, nightmares, nocturia, nocturnal polyuria, sleep

INTRODUCTION

Poor sleep in the elderly is a common finding (1). Many somatic diseases and symptoms, such as cerebrovascular diseases, heart diseases, stroke, cancer, diabetes, and painful conditions in the musculo-skeletal system, and nocturia are all associated with

sleep impairment (1-4).

One condition with profound impact on sleep is burning mouth syndrome (BMS) (5). This syndrome, which is characterized by a burning pain in the tongue or other oral mucous membranes, usually in the absence of clinical and laboratory findings, is a fairly common complaint (6). In a questionnaire survey among randomly selected men and women of ages 20-69 years in northern Sweden, the prevalence of BMS was found to be 1.6% in the men and 5.5% in the women. The prevalence increased with increasing age (7).

BMS has a profound impact on health. In a study of 102 subjects suffering from BMS, increased occurrence of headache, pain

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complaints, severe menopausal symptoms, taste disturbances, dry mouth and thirst was found (8). Oral dryness, the use of different kinds of medication, depression and anxiety are often noted in association with BMS (7).

In a recent study it was found that BMS is difficult to diagnose in many cases and that misinterpretation of the symptoms and, accordingly, delay in the treatment of the condition are common (9). An expected consequence of this is extensive health care consumption. In one study 50% of persons with BMS had utilized health care services during the past 12 months (physicians 39%) and the average number of visits to health care providers during the same period for this syndrome was 8.0 (10).

A strong relation has been found between dryness of the mucous membranes of the oral cavity, nocturnal thirst and drinking, on the one hand, and nocturia, on the other (11,12). From these findings it would seem that a negative fluid balance as a consequence of nocturnal polyuria, which is one of the main causes of nocturia, may be an overlooked pathogenetic mechanism in the development of BMS in the elderly (11).

BMS and nocturia not only are interrelated, but also have many associated symptoms in common. The both have a highly disturbing effect on sleep (1,11). In both conditions oral dryness and thirst, particularly at night, and a need to drink during the night, are increased, in contrast to the findings in elderly people in general, in whom thirst and drinking at night are fairly infrequent (1,12,13).

Although the three conditions nocturia, BMS and sleep in the elderly are closely interrelated no study seem to have addressed their possible interaction. The present study was undertaken to determine whether, in elderly people with nocturia, BMS and poor sleep, it is nocturia or the BMS that is the underlying mechanism of the sleep impairment, or whether BMS and nocturia exert an independent but simultaneous influence on sleep in these cases.

MATERIALS AND METHODS

All 10,216 members of the pensioners' association SPF in the Swedish counties of Västerbotten and Norrbotten were asked to participate in a questionnaire survey. A further questionnaire was sent to those who did not respond within one month.

Questionnaire

The questions concerned the general state of health, the occurrence of somatic diseases and symptoms, everyday habits and behaviour, and the use of medication. In addition, there was a question on the number of nocturnal voiding episodes.

The responses to the statement "I am troubled by a burning pain in the tongue and/or mouth" (with the alternative answers "often" vs. "seldom or never") and to the statements concerning four sleep variables, namely sleep (poor vs. good) awakenings (often vs. seldom or never), the ability to fall asleep after nocturnal awakenings (easy vs. difficult) and nightmares (often vs. seldom or never), were analysed.

Questions were asked about total time in bed, total sleep time at night and time from waking in the morning to getting up. Sleep efficiency was calculated as total time asleep/time in bed*100 (14).

Statistical analyses

Standard methods were used for calculating mean values and standard deviations (SD). Group comparisons of non-numerical data were made with the chi-square test. For comparing frequencies, odds ratios (OR) with 95% confidence intervals (CI 95%) were calculated. For simultaneous evaluation of the influence of more than one independent variable on a dependent variable, logistic regression analysis (StatView 5.0 for the Macintosh) was performed.

RESULTS

The questionnaire was completed initially by 4,544 persons. After a reminder, a further 1,559 answers were received. Thus there were 6,103 evaluable questionnaires, of which 39.5% were from men. The response rate was 61.3%. The ages of the male and female participants were 73.0 (SD 6.0) and 72.6 (6.7) years, respectively.

Sleep, sleep medication and BMS

Poor sleep was reported by 14.4% of the men and 28.1% of the women ($p < 0.0001$). In the total group BMS was reported by 5.7% (2.4% of the men and 8.5% of the women; $p < 0.0001$). The occurrence of poor sleep was not related to BMS in men but was 2.8 (1.8-4.3) times more common in women with BMS than in those without. The occurrence of poor sleep increased in both men and women who reported having ≥ 3 micturition episodes per night or were often troubled with BMS, and was further increased in those with both conditions (Figure 1).

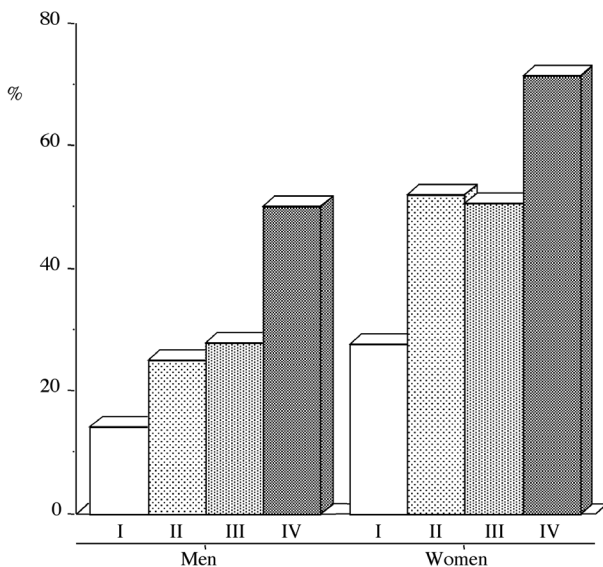


Figure 1. The proportions (%) of men and women with poor sleep among those reporting that they seldom or never had BMS and with ≤ 2 nocturnal voids (I), or ≥ 3 nocturnal voids (II); and among those who often had BMS and with ≤ 2 nocturnal voids (III), or ≥ 3 nocturnal voids (IV) (men: $p < 0.05$; women: $p < 0.0001$).

The total sleep time in men with BMS was 415 minutes (min) and in men without BMS 424 min (NS). The corresponding figures in women were 379 min and 397 min ($p < 0.05$), respectively. Sleep efficiency was 78% in men with BMS and 84% in men without BMS ($p < 0.05$). The corresponding proportions in women were 75.6 and 80.0%, respectively ($p < 0.01$).

Frequent awakenings. Nightmares

Frequent awakenings were reported by 32.1% of the men and 43.0% of the women ($p < 0.0001$). The occurrence of frequent awakenings was 2.7 (1.0-6.8) times more common in men and 3.1 (1.9-5.0) times more common in women with BMS than in those without. Reports on frequent nightmares were 3.5 (1.2-11.0) times more common in men and 5.2 (3.0-9.0) times more common in women with BMS than those not troubled with BMS.

Difficulty in falling asleep after nocturnal awakenings

Difficulty in falling asleep after waking up at night was reported by 18.0% of the men and 35.1% of the women ($p < 0.0001$). Such difficulty was not related to BMS in men, but was 2.2 (1.5-3.4) times more common in women with BMS than in those without.

Final awakening and getting up in the morning

Men with BMS stayed in bed 65 min and men without BMS 52 min ($p < 0.01$) after their final awakening in the morning. The corresponding lengths in time in women were 76 and 58 min ($p < 0.01$), respectively. Waking up with a feeling of anxiety was no more common in men with BMS than in those without, but was 5.2 (2.4 - 11.4) times more common in women with BMS than in women without BMS.

Results of logistic regression analyses

A series of logistic regression analyses was performed in order to investigate the simultaneous influence of BMS and nocturia on sleep, awakenings, the ability to fall asleep after nocturnal awakenings, and nightmares. In men sleep was unaffected by BMS but deteriorated by nocturia. In women both BMS and nocturia were associated with sleep deterioration. Nocturnal awakenings were increased by BMS and nocturia in both sexes. In men the ability to fall asleep after nocturnal awakenings was unaffected by BMS but impaired by nocturia. In women both BMS and nocturia were associated with a deteriorated ability to fall asleep after such awakenings. Nightmares were increased by BMS and nocturia in men but only by BMS in women (Table 1).

women with BMS, in whom disturbed sleep was found to be 2.3 times more likely than in age- and sex-matched controls (5). In that study the proportion of women with BMS was 88% and it may therefore be assumed that the increase in sleep impairment in association with BMS is mostly referable to women.

Sleep disturbances are common in persons suffering from long-standing painful conditions, and the chronic nature of BMS has been considered to be one explanation of the increase in anxiety and depression in persons with this syndrome (15). Three out of four patients attending a dentistry clinic for specialist assessment and treatment of BMS were reported to have suffered from BMS for two or more years (5).

Sleep efficiency was reduced in both men and women with BMS, while the total sleep

Table 1. Logistic regression analyses (odds ratios and 95% confident intervals) showing the influence of BMS and nocturia (\geq three vs. \leq two episodes) on each of the four dependent variables poor sleep (I), frequent awakenings (II), nightmares (III) and difficulty in falling asleep after nocturnal awakenings (IV).

	I	II	III	IV
Men				
BMS	2.4 (0.9 – 6.4) *	2.7 (1.0 – 7.2)	3.5 (1.1 – 11.1)	1.1 (0.3 – 3.9) *
Nocturia	2.0 (1.2 – 3.6)	11.1 (6.3 – 20.0)	4.4 (2.5 – 7.9)	1.8 (1.1 – 3.0)
Women				
BMS	2.6 (1.7 – 4.1)	2.8 (1.7 – 4.5)	4.9 (2.9 – 8.6)	2.0 (1.3 – 3.2)
Nocturia	2.8 (1.8 – 4.2)	12.0 (6.2 – 23.0)	1.6 (0.9 – 3.0) *	2.4 (1.6 – 3.6)

* = non-significant

DISCUSSION

In the present study the univariate analysis revealed that reports on poor sleep were increased almost three-fold in women with BMS, compared with women who were not troubled with BMS. In men the increase was not statistically significant ($p=0.08$), and in the logistic regression analysis BMS again failed to show significant influence on sleep (Table 1). The increase in sleep impairment in association with BMS in this study is in line with findings in a recently published questionnaire survey among adult men and

time was shortened only in women. The simultaneous detrimental influence of BMS and nocturia on sleep was increased three-fold in men and two-fold in women, increases which were greater than those caused by either of the symptoms alone (Fig. 1). It is known from previous studies that nocturia has a deleterious effect on sleep (1). It can be concluded that the two symptoms nocturia and BMS, seem to influence on sleep independently and that neither of them seems to serve as a proxy for the other.

Although more men and women with BMS were troubled with frequent nocturnal

awakenings compared with those without BMS, nocturia was the major cause of frequent awakenings in both sexes (Table 1). This seems reasonable, as nocturia, in contrast to BMS, cannot be successfully ignored but makes it necessary to get out of bed and go to the toilet. There are reports indicating that nocturia is the major cause of disturbed sleep maintenance in people over 50 years of age (16).

Difficulty in regaining sleep after nocturnal awakenings was not related to the presence or absence of BMS in men, but was increased almost two-fold by nocturia. In women both BMS and nocturia had a negative influence on the ability to fall asleep after nocturnal awakenings. It has been estimated that BMS is four times more prevalent in women than in men and, in women but not in men, its prevalence increases with age (7,8). The most common time of onset of BMS is from three years before to 12 years after the menopause, and approximately 90% of women in studies dealing with BMS are postmenopausal (8). The difference between men and women in the ability to fall asleep after waking up at night can be explained by the fact that the menopausal transition makes sleep more superficial and fragile (17).

Having many periods in the awake state at night i.e. sleep fragmentation, results in sleepiness in the morning and daytime fatigue. In the present study the sleep efficiency was reduced in both men and women with BMS, and they stayed longer in bed after their final awakening in the morning, suggesting that they were less well rested than those who were not troubled with BMS.

Nightmares were increased in association with BMS in both sexes and were further increased in the simultaneous presence of nocturia in men, in contrast to the findings in

women (Table 1). Nightmares have often been regarded as symptoms of neurotic or psychotic states (18,19). More recent studies have shown that there are also numerous somatic diseases and symptoms that increase the occurrence of nightmares. Irregular heart beats, spasmodic chest pain and particularly the occurrence of these two symptoms in the same patient increase the occurrence of nightmares (20,21). Increased nightmares have also been reported by persons suffering from musculo-skeletal pain, restless legs syndrome and muscle cramps in the legs (22).

Reports on BMS are increased in parallel with increasing nocturnal micturition (11). There is also a strong relation between nocturnal thirst and drinking, on the one hand, and reports on BMS on the other. BMS is also increased in diuretic users of both sexes (11). In addition, nocturia is associated with increased giddiness when getting up at night (23). Dizziness and/or giddiness were found to be more prevalent in men and women with BMS in the previously mentioned study by Lamey et al. (83% in patients with BMS vs. 17% in controls) (5). These results indicate that a negative fluid balance as a consequence of nocturnal polyuria is a pathogenetic mechanism in BMS in the elderly.

In conclusion: BMS and nocturia are both involved in the deterioration of sleep, although they influence the different sleep variables to different extents. Logistic regression analyses showed that nocturia in men was associated with increased negative reports on all the four studied sleep variables: poor sleep, frequent awakenings, difficulty in falling asleep after nocturnal awakenings and nightmares, while BMS affected only nocturnal awakenings and nightmares. In women all four sleep variables were affected by BMS, while nocturia influenced them all except nightmares.

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