## ORIGINAL ARTICLES

# Nightmares in Relation to Sleep and Sensory Organ Functions in the Elderly 

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#### Abstract

The present study, a questionnaire survey, was undertaken to assess the relationship between nightmares and sleep and between nightmares and sensory organ dysfunctions in a large group of elderly persons. The survey comprised 6,103 elderly subjects ( $39.5 \%$ men). The ages (mean $\pm$ standard deviation) of the male and female participants were $73.0 \pm 6.0$ and $72.6 \pm 6.7$ years, respectively. Poor sleep was reported by $14.4 \%$ of the men and $28.1 \%$ of the women ( $\mathrm{p}<0.0001$ ). Frequent nightmares were reported by $9.0 \%$ of the men and $11.9 \%$ of the women ( $\mathrm{p}<0.05$ ). Compared with men and women without nightmares, the sleep time to first awakening was shorter, time taken to get to sleep after nocturnal awakening was longer, longest uninterrupted sleep period was shorter and total nocturnal time in bed was longer in nightmare sufferers of both sexes. In a multiple logistic regression analysis with age, visual status, hearing and tinnitus as the independent variables and nightmares as the dependent variable, nightmares were $1.5(1.0-2.3)$ times more frequent in men with than without hearing impairment and $2.2(1.4-3.4)$ times more frequent in men with than without tinnitus but were unaffected by visual status and age. In women nightmares were 1.9 (1.3-2.5) times more frequent in association with visual impairment but unaffected by hearing impairment, tinnitus and age. It is concluded that the occurrence of nightmares in the elderly is associated with different kinds of sleep disturbances. Visual impairment, hearing impairment and tinnitus were all associated with increased nightmares. (Sleep and Hypnosis 2004;6(1):1-7)


Key words: elderly, hearing impairment, nightmares, sleep, tinnitus, visual impairment

## INTRODUCTION

Nightmares are common in an adult or elderly population. In a study conducted by telephone interviews in a large sample on men and women at ages 15 years or older, Ohayon et al. found that nightmares occurring

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at least once a month were reported by $7 \%$ of the sample, with a slightly higher prevalence in women and a decrease in prevalence with increasing age. Risk factors for reporting nightmares were depressive, anxiety and psychotic symptoms. There was also an increase in sleep symptoms, such as difficulty in initiating and maintaining sleep and early morning awakenings (1). Social factors, such as being unemployed or being single, separated, divorced or widowed also increased the probability of reporting nightmares (1).

Previous studies have shown that not only mental disorders and symptoms but also
different somatic conditions, such as spasmodic chest pain and irregular heart beats, are increased in elderly men and women with frequently occurring nightmares (2). A relationship between nightmares and sleepdisturbing somatic symptoms has also been found (3). Frequent nightmares were reported 4.1 (2.1-7.9) times more often by men and 5.0 (2.0-8.5) times more often by women who were very often troubled by musculo-skeletal pain than by those who suffered such pain very seldom or never. Corresponding odds ratios (OR) in men and women who experienced restlessness in the legs very often vs. very seldom or never were 6.1 (2.1-17.3) and 6.1 (3.3-11.3), respectively, and in those who had muscle cramps in the legs very often vs. very seldom or never 9.5 (4.1-22.1) and 6.5 (3.611.9), respectively (3). Snoring is also associated with increased nightmares (4) and treatment of sleep-disordered breathing is followed by a reduction of nightmares (5).

Sensory organ dysfunctions also have a detrimental influence on sleep in the elderly. In a questionnaire survey among 6,103 elderly men and women ( $39.5 \%$ men) with visual impairment, poor sleep was found to be $60 \%$ more common in the men and $40 \%$ more common in the women compared with those with no visual impairment after adjustment for age, health, circulatory organ disease and diabetes (6). An increase in sleep disorders has also been found in elderly persons with hearing impairment and tinnitus $(7,8)$.

The present study, a questionnaire survey, was undertaken to assess the relationship between the occurrence of nightmares and different sleep variables in a group of elderly men and women. A secondary aim was to see whether the occurrence of nightmares differed between persons with sensory organ dysfunction and those with intact sensory organ functions.

## 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.

The present study is based on data concerning nightmares and different sleep characteristics and sensory organ functions obtained in this questionnaire survey. Nightmares were reported by the response alternatives: "Very seldom or never", "rather seldom", "rather often" and "very often". In the analysis of the data the groups reporting "very seldom or never" and "rather seldom" were analysed together as one group, (the nonightmare, $\mathrm{N}-\mathrm{NM}$, group), and those reporting the alternatives "rather often" and "very often" as the nightmare (NM group).

## Statistical analyses

Standard methods were used for calculating mean values and standard deviations. Group comparisons of non-numerical data were made with the chi-square test. For univariate comparisons of frequencies, odds ratios (OR) with a $95 \%$ confidence interval (CI) were calculated. For comparison of two numerical variables, Student's t-test was used. For multivariate analysis, logistic regression analysis was performed (StatView 5.0 for the Macintosh).

## RESULTS

Out of the 10,216 men and women in the target group the questionnaire was completed initially by 4,544 persons. In 73 persons the mailing address was wrong, 83 persons declined to participate and 42 persons had died between the times when the member list was obtained and the questionnaire was sent. 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 thus $61.3 \%$.

The ages (mean $\pm$ standard deviation) of the male and female participants were $73.0 \pm 6.0$ and $72.6 \pm 6.7$ years, respectively.

## Nightmares and sleep

NM were reported by $9.0 \%$ of the men and $11.9 \%$ of the women ( $\mathrm{p}<0.05$ ). Among the men there was no age-related difference in the occurrence of nighrmares, but among the women nightmares were 1.5 (1.1-2.1) times more common in the age group 70-79 years, and 1.9 (1.2-3.0) times more common in those aged 80 years and older than in the age group below 70 years. Sleep deterioration during the past five-year period was reported by $12.6 \%$ of $\mathrm{N}-\mathrm{NM}$ men and by $30.1 \%$ of NM men ( $\mathrm{p}<0.0001$ ) and by $20.8 \%$ of $\mathrm{N}-\mathrm{NM}$ women and $39.8 \%$ of NM women ( $\mathrm{p}<0.0001$ ).

Poor sleep was reported by $14.4 \%$ of the men and in $28.1 \%$ of the women ( $\mathrm{p}<0.0001$ ). Total sleep time was similar in the men of the two groups but among the women half an hour longer in the N-NM than in the NM group (Table 1). Both NM men and NM women had more difficulty in initiating sleep (Figure 1) and had a larger number of nocturnal awakenings (Figure 2). Compared with the N-NM men and women, the sleep time to the first awakening in the NM men and women was shorter, the time taken to get to sleep after nocturnal awakening was longer, the longest uninterrupted sleep period was shorter and the total nocturnal time in bed was longer (Table 1).

Difficulty in falling asleep at least once per weekwas reported by $12.7 \%$ of $\mathrm{N}-\mathrm{NM}$ men and


Figure 1. Time taken to fall asleep after going to to bed in the evening (minutes) in men with frequent nightmares (white bars) and in men with no or infrequent nightmares (black bars) (left pair of bars) ( $p<0.01$ ) and in the corresponding groups of in women (right pair of bars) ( $\mathrm{p}<0.01$ ).


Figure 2. The number of nocturnal awakenings in men with frequent nightmares (white bars) and in men with no or infrequent nightmares (black bars) (left pair of bars) ( $p<0.0001$ ) and in the corresponding groups of women (right pair of bars) ( $\mathbf{p}<0.0001$ ).

Table 1. Total sleep time, sleep time to first awakening, time taken to get to sleep again after nocturnal waking, longest uninterrupted sleep period, total nocturnal time in bed (all in minutes) and sleep efficiency (total sleep time/time in bed*100, [\%]) among men and women reporting that nightmares occurred often (NM group) and those in whom nightmares never or seldom occurrec (N-NM group).

|  | Men |  |  | Women |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | NM | N-NM | $p=$ | NM | N-NM | $p=$ |
| Total sleep time | 407 | 413 | NS | 367 | 398 | < 0.0001 |
| Sleep time to first awakening | 185 | 217 | $<0.001$ | 234 | 260 | < 0.01 |
| Time taken to get to sleep again | 31.5 | 25.1 | $<0.01$ | 44.3 | 36.6 | $<0.01$ |
| Longest uninterrupted sleep period | 256 | 288 | $<0.01$ | 222 | 264 | $<0.0001$ |
| Total nocturnal time in bed | 533 | 519 | $<0.05$ | 553 | 540 | $<0.05$ |
| Sleep efficiency | 79.5 | 84.4 | $<0.0001$ | 74.0 | 79.8 | < 0.0001 |



Figure 3. Length of time in bed (minutes) after waking in the morning in men with frequent nightmares (white bars) and in men with no or infrequent nightmares (black bars) (left pair of bars) ( $p<0.001$ ) and in the corresponding groups of women (right pair of bars) $(p<0.0001)$.
$31.2 \%$ of NM men ( $\mathrm{p}<0.0001$ ), and by $32.9 \%$ of N-NM women and $64.1 \%$ of NM women ( $\mathrm{p}<0.0001$ ). Sleeplessness at least once per week occurred in $1.4 \%$ of N-NM men and in $3.8 \%$ of NM men ( $\mathrm{p}<0.05$ ), and in $3.7 \%$ of N NM women and $11.4 \%$ of NM women
( $p<0.0001$ ). Too early awakening in the morning at least once per week was reported by $10.0 \%$ of N-NM men and $22.9 \%$ of NM men ( $\mathrm{p}<0.0001$ ), and by $20.5 \%$ of N-NM women and $42.2 \%$ of NM women ( $p<0.0001$ ).

NM men and women stayed in bed longer after waking in the morning (Figure 3). Too little sleep at night was reported by $12.1 \%$ of the men and $27.2 \%$ of the women ( $p<0.0001$ ). In NM men too little sleep was 2.7 (1.6-4.4) times more common and in NM women 3.6 (2.5-5.1) times more common than in N-NM men and women, respectively.

## Nightmares and sensory organ functions

Visual impairment was reported by $20.9 \%$ of the men and $32.9 \%$ of the women ( $p<0.0001$ ); hearing impairment by $43.5 \%$ of the men and $26.0 \%$ of the women ( $\mathrm{p}<0.001$ ); and tinnitus by $14.9 \%$ of the men and $12.0 \%$ of the women ( $p<0.0001$ ). In univariate analyses visual impairment, hearing impairment and tinnitus were all associated with increased nightmares (Figure 4).


Figure 4. The occurrence of nightmares (\%) in men and women without (white bars) and with visual impairment (black bars) (left group of bars; men $p<0.05$, women $p<0.0001$ ); hearing impairment (middle group of bars; men $p<0.001$, women $p<0.05$ ); and tinnitus (right group of bars; men $\mathrm{p}<0.0001$, women $\mathrm{p}<0.05$ ).

In a multiple logistic regression analysis with age, visual status, hearing and tinnitus as the independent variables and nightmares as the dependent variable, nightmares were found to be 1.5 (1.0-2.3) times more frequent in men with hearing impairment and 2.2 (1.4-3.4) times more frequent in men with tinnitus, but not increased in men with visual impairment. In women the frequency of nightmares was increased 1.9 (1.3-2.5) -fold in association with visual impairment but unaffected by hearing impairment and tinnitus. Age was deleted by the logistic model in both sexes.

## DISCUSSION

In this study it was found that men and women with frequent nightmares reported poor sleep twice as often as those with no or infrequent. Also, sleep deterioration during the past five years was associated with a 2.5 -fold increase in nightmares in men and a two-fold increase in women. Nightmares were more common in women than in men and an agerelated increase in nightmares was found only in women. This is in accordance with the findings in many studies, that poor sleep and numerous sleep symptoms are more common in women than in men (9).

One important question in the interpretation of the present data concerns the validity of reports on nightmares and other sleep symptoms in a questionnaire. Consistent correspondence has been found between reports on poor sleep and different sleep measurements $(10,11)$. Higher frequencies of poor sleep and of difficulties in falling asleep after nocturnal awakenings have been noted in elderly men and women with an increased propensity for nightmares (2).

Nightmares are troublesome sleep symptoms and waking with a feeling of anxiety is ten times more common in men and women with nightmares than in those without (3). The correspondence between the reported propensity for nightmares and the feeling of
anxiety on wakings indicates that there is a consistent relationship between the occurrence of nightmares and self-reports of this occurrence (3). Furthermore, in the present study reports on sleep time to first awakening, time taken to get to sleep again after nocturnal awakenings, the longest uninterrupted sleep period and sleep efficiency were all more unfavourable in the NM than in the $\mathrm{N}-\mathrm{NM}$ group (Table 1). Total sleep time was half an hour shorter in NM than in the N-NM women but did not differ between the two male groups (Table 1). A substantial decrease in total sleep time, 328 min compared with 403 min in nonsufferers, was found in in both men and women sufferering from idiopathic nightmares, of ages $39.0 \pm 12.1$ years ( $m e a n \pm S D$ ) and $28.2 \pm 5.3$ years, respectively (12).

Nigthmares were associated with difficulty in initiating sleep (Figure 1), an increased number of awakenings (Figure 2) and sleeplessness in both sexes. Other authors have reported that otherwise healthy nightmare sufferers have less sleep and more awakenings (13).

Waking too early in the morning was more common in NM men and women than in NNM men and women. In contrast, they stayed in bed longer after waking in the morning (Figure 3) and the total nocturnal time in bed was increased correspondingly (Table 1). The propensity for early awakening is often attributed to depression, and depression is twice as common in young nightmare sufferers as in those without nightmares (12).

The perception of too little sleep at night was increased in both men and women with NM. High sleep satisfaction is associated with greater well-being (14). Short sleep has also been associated with severe health impairment and with reduced life expectancy $(15,16)$.

Sensory organ dysfunctions are associated with increased occurrence of sleep impairment (6-8). In this study univariate analyses showed an increase in nightmares in men and women with visual impairment, hearing impairment and tinnitus (Fig. 4). All these three kinds of
sensory organ dysfunctions are associated with an increased prevalence of poor sleep and numerous other sleep symptoms, such as frequent awakenings and difficulty in falling asleep after nocturnal waking (6-8). In the whole study group visual impairment was more common in women than in men. Nightmares have been reported to be improved in persons who have been surgically treated for cataract, and this improvement was twice as common in women as in men (17). Concerning hearing impairment and tinnitus, no corresponding studies have been found, to indicate whether or not nightmares can be reduced by medical treatment resulting in alleviation of these conditions.

In a multiple logistic regression analysis with age, visual status, hearing and tinnitus as the independent variables and nightmares as the dependent variable, nightmares were increased in women with visual impairment but not with hearing impairment or tinnitus, and in men

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with hearing impairment or tinnitus but not with visual impairment. These results were unaffected by age in both sexes. This sex difference may, at least partly, be explained by the fact that visual impairment is about $60 \%$ more common in elderly women than in elderly men, while hearing impairment and tinnitus are both more prevalent in elderly men (6-8).

To summarise, in this group of elderly persons the occurrence of poor sleep, nocturnal awakenings, difficulty in falling asleep after wakings and too early awakenings were all increased in nightmare sufferers of both sexes. Their sleep efficiency was reduced. In a multiple logistic regression analysis with age, visual status, hearing and tinnitus as the independent variables and nightmares as the dependent variable, nightmares were increased in men with hearing impairment or tinnitus and in women with visual impairment. Age was deleted by the logistic model for both sexes.
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