

Nightmares, sleep and cardiac symptoms in the elderly

R. Asplund

Family Medicine Stockholm, Karolinska Institute, Research and Development Unit (Jämtland County Council), Sweden, tel.: +46 (0)670-100 07, fax: +46 (0)63-16 56 26, e-mail: r.asplund@telia.com or ragnar.asplund@jll.se

ABSTRACT

Background: Sleep complaints and various sleep symptoms are common in elderly persons with cardiac diseases. Nightmares are associated with profound sleep disturbances.

Methods: The present questionnaire survey with questions on sleep symptoms, nightmares and cardiac symptoms comprised 6103 elderly subjects (39.5% men).

Results: Nightmares occurred rather often in 6.9% and very often in 2.1% of the men. The corresponding frequencies in women were 9.6 and 2.3%, respectively. Irregular heart beats were reported by 11.8% of the men and 13.1% of the women (NS). Spasmodic chest pain occurred in 12.9 and 10.6%, respectively ($p < 0.01$). Irregular heart beats increased in association with increasing nightmares in both men ($p < 0.01$) and women ($p < 0.0001$). The percentages of men and women with both irregular heart beats and spasmodic chest pain were three times and seven times higher, respectively, among those who had nightmares very often than among those who very seldom or never had nightmares. The increase in cardiac symptoms in nightmare sufferers was not attributable to an increase in medication with cardiac drugs.

Conclusion: In this group of elderly men and women increased nightmares were associated with an increase in irregular heart beats and spasmodic chest pain.

INTRODUCTION

Sleep is important for health, and impaired sleep is a major cause of untimely death and illness.^{1,3} Mortality from

cardiac diseases is increased in parallel with increased sleep impairment.⁴ Short sleep is associated with an increased frequency of chest pain that can be related to myocardial infarction or angina pectoris, and poor sleep is even more detrimental to cardiac health than short sleep.^{5,6} Frequent waking in the night is associated with an increased risk of angina pectoris.⁷ Waking up is a common consequence of nightmares. Nightmares, in turn, are common at all ages and may be insignificant in adults, but increased nightmares in the elderly often reflect somatic diseases.^{8,9} Most of the nightmares occur during rapid eye movement (REM) sleep and frequent nightmares are often an expression of a disturbance in the sleep structure.⁸ Nightmares may have serious consequences for health in certain conditions. They are closely related to several somatic and mental symptoms and also to impaired quality of life.^{10,11} The present study was undertaken to assess the relationship between the occurrence of nightmares and cardiac symptoms in a large group of elderly persons and to determine whether this relationship, if any, remained after the possible influence of antianginal drugs and other drugs for cardiac diseases had been taken into account.

MATERIAL AND METHODS

The present study is based on an extensive questionnaire survey of sleep and health in elderly men and women in northern Sweden.¹² All 10,216 members of the pensioners' association SPF in the Swedish counties of Västerbotten and Norrbotten were asked to participate in the survey.

A further questionnaire was sent to those who did not respond within one month.

The questionnaire included questions on the general state of health, occurrence of somatic diseases and symptoms, smoking and snuffing, coffee consumption and the use of drugs. In addition there were questions about nocturnal sleep (good vs. poor), the ability to fall asleep after nocturnal awakenings (easy vs. difficult) and nightmares (very seldom, rather seldom, rather often and very often). Two statements on cardiac symptoms were analysed. 'I am troubled by spasmodic pain in the chest', referred to in the following as 'spasmodic chest pain', and 'I am troubled by a sensation of irregular heart beats', referred to in the following as 'irregular heart beats', both with the alternative answers 'yes' or 'no'. In the text these two symptoms are together named 'cardiac symptoms'.

Treatment with antianginal drugs was analysed by the statement: 'I take medication for treatment of spasmodic chest pain', and the use of other drugs for cardiac diseases by the statement 'I take other cardiac medication than antianginal drugs', both with the alternative answers 'yes' or 'no'.

Statistical methods

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 simultaneous evaluation of the influence of more than one independent variable on a dependent variable, multiple logistic regression analysis (StatView 5.0 for the Macintosh) was performed. For assessing the relationship between nightmares and cardiac symptoms, two multiple logistic regression analyses were performed with sex, nightmares and sleep as independent variables and irregular heart beats and spasmodic chest pain as dependent variables. The possible influence of antianginal drugs and other drugs for cardiac diseases was assessed by a multiple logistic regression analysis with antianginal drugs and other drugs for cardiac diseases, irregular heart beats and spasmodic chest pain as independent variables and nightmares as the dependent variable.

Table 2

The percentages of men and women with poor sleep and difficulty in falling asleep after nocturnal waking in relation to the occurrence of nightmares

SEX	VERY SELDOM OR NEVER	RATHER SELDOM	RATHER OFTEN	VERY OFTEN	TOTAL	P VALUE
<i>Poor sleep</i>						
Men	12.8	20.4	33.8	28.0	15.7	<0.0001
Women	27.6	41.7	55.5	78.1	33.4	<0.0001
<i>Difficulty in falling asleep after nocturnal waking</i>						
Men	16.1	26.8	28.4	25.0	18.7	<0.001
Women	31.8	48.3	55.6	62.5	37.3	<0.0001

Results

The questionnaire was initially completed by 4544 persons. In 73 persons the mailing address was wrong, 83 persons declined to participate and 42 persons had died between the time when the list of members was obtained and the questionnaire was sent. After a reminder, a further 1559 answers were received. Thus there were 6103 evaluable questionnaires, of which 39.5% were from men. The response rate was 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. Sixty-one percent of the men and 67.3% of the women lived in urban areas ($p < 0.0001$). Twenty-six percent of the men and 57% of the women were living alone. Poor health was reported by 16.8% of the men and 18.7% of the women (NS). Health deterioration during the past five years was reported by 30.9% of the men and 34.6% of the women ($p < 0.01$).

Nightmares and sleep

Women were more troubled by nightmares than were men (table 1). In men there was no age-related difference in the occurrence of nightmares, but in women there was a slight increase in age in parallel with increasing occurrence of nightmares ($p < 0.05$). Poor sleep was reported by 15.7% of the men and 33.4% of the women ($p < 0.001$). Difficulty in falling asleep after nocturnal awakenings occurred in 18.0% of the men and 35.1% of the women ($p < 0.001$). Sleep and the ability to fall asleep after nocturnal awakenings showed a stepwise increase in parallel with more frequent nightmares in both sexes (table 2).

Table 1

The percentages of elderly men and women with different frequencies of nightmares ($p < 0.01$)

	MEN	WOMEN
Very seldom or never	75.9	70.9
Rather seldom	15.1	17.2
Rather often	6.9	9.6
Very often	2.1	2.3
Totals	100.0	100.0

Frequent awakenings with a feeling of despondency was reported by 1.2% of the men and 3.7% of the women. In men there was no change in the feeling of despondency in relation to nightmares, but in women this feeling occurred in 2.2% of those who had nightmares very seldom or never, and in 4.0, 13.2 and 17.2% of those with nightmares rather seldom, rather often and very often, respectively ($p < 0.0001$).

Nightmares, irregular heart beats and spasmodic chest pain

Irregular heart beats were reported by 11.8% of the men and 13.1% of the women (NS) and spasmodic chest pain occurred in 12.9 and 10.6%, respectively ($p < 0.01$). The occurrence of irregular heart beats increased in parallel with increasing nightmares in both men ($p < 0.01$) and women ($p < 0.0001$) (figure 1). Increasing nightmares were not associated with an increased occurrence of spasmodic chest pain in men, but such an association was found in women ($p < 0.0001$) (figure 2). The occurrence of both irregular heart beats and spasmodic chest pain in the same patient was 3.4 (1.0 - 11.7) times more common in men and 6.4 (2.8 - 14.7) times more common in women with very frequent nightmares than in the total group of men and women, respectively.

In a multiple logistic regression analysis with sex, nightmares and sleep as independent variables, female sex, poor sleep and nightmares were all significant independent correlates of increased irregular heart beats in men. Correspondingly, poor sleep and nightmares were significant independent correlates of increased spasmodic chest pain, while female sex was associated with decreased spasmodic chest pain (table 3).

Medication

Antianginal medication was used by 16.6% of the men and 13.5% of the women. Use of this medication was

reported by 86.6% of the men with spasmodic heart pain and 89.9% of the women with this symptom. Other cardiac drugs were used by 13.1% of the men and 10.6% of the women, and by 52.4% of the men and 43.8% of the women with irregular heart beats.

Of the men who were very seldom or never troubled by nightmares, 15.9%, were being treated with antianginal drugs; among men who rather seldom had nightmares this figure was 24.2%, rather often 28.1% and very often 33.3% ($p < 0.0001$). The corresponding frequencies in women were 13.7, 20.6, 20.5 and 34.2%, respectively ($p < 0.0001$). The corresponding proportions of men taking other drugs for treatment of cardiac diseases were 14.3, 13.9, 20.3 and 18.5% (NS), and of women 12.1, 14.6, 16.7 and 28.9%, respectively ($p < 0.0001$).

Table 3

Probability of suffering from irregular heart beats or spasmodic chest pain in relation to sex, sleep and nightmares

	IRREGULAR HEART BEATS	SPASMODIC CHEST PAIN
<i>Sex (Male = 1.0)</i>		
Female	1.3 (1.0 - 1.6)	0.8 (0.6 - 1.0)
<i>Sleep (Good = 1.0)</i>		
Poor	1.7 (1.4 - 2.2)	1.5 (1.1 - 1.9)
<i>Nightmares (Very seldom = 1.0)</i>		
Rather seldom	1.3 (1.0 - 1.7)	1.3 (0.9 - 1.7)
Rather often	2.3 (1.6 - 3.2)	1.3 (0.8 - 1.9)
Very often	2.8 (1.6 - 5.1)	3.2 (1.8 - 5.7)

Multiple logistic regression analyses with odds ratios and 95% confidence intervals.

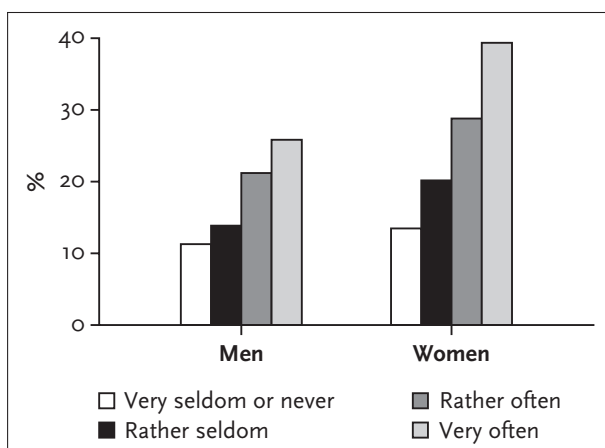


Figure 1

The occurrence of irregular heart beats (%) in men ($p < 0.01$) and women ($p < 0.0001$) in relation to their perception of nightmares

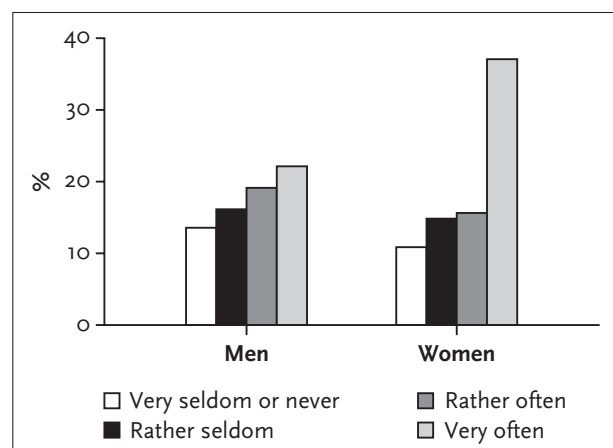


Figure 2

The occurrence of spasmodic chest pain (%) in men (NS) and women ($p < 0.0001$) in relation to their perception of nightmares

A multiple logistic regression analysis with antianginal drugs, other drugs for cardiac diseases, irregular heart beats and spasmodic chest pain as independent variables and nightmares as the dependent variable, revealed that nightmares were increased in parallel with increased reports of irregular heart beats and spasmodic chest pain, while antianginal drugs and other drugs for cardiac diseases were deleted by the statistical model.

Sleep medication was used every night by 10.3% of the men, at least once a week by 7.5%, less than once a week by 8.8% and was never used by 73.4%. The corresponding frequencies in women were 12.2, 13.9, 16.9 and 57.0%, respectively ($p < 0.0001$). In men there was no change in the occurrence of nightmares in relation to the use of sleep medication, but in women such treatment was used in 4.8% of those who very seldom or never had nightmares and in 9.3, 12.2 and 23.7% of those with nightmares rather seldom, rather often and very often, respectively ($p < 0.0001$).

Coffee drinking, smoking and snuffing

Coffee drinking at least once a day was reported by 91.5% of the men and 88.5% of the women ($p < 0.0001$), and 44.9% of the men and 35.1% of the women ($p < 0.0001$) drank at least one cup of coffee after 6 p.m. Coffee drinking decreased with increasing age in both sexes. Daily smoking was reported by 9.7% of the men and 7.0% of the women ($p < 0.001$), and daily snuff-taking by 13.5% of the men and 1.5% of the women ($p < 0.0001$).

Neither coffee-drinking habits, smoking nor taking snuff showed any influence on the occurrence of nightmares.

DISCUSSION

In this study it was found that among elderly persons who were troubled by nightmares there was an increased frequency of both irregular heart beats and spasmodic chest pain.

One important question in the interpretation of these data is whether or not there is any correspondence between perceived cardiac symptoms, such as irregular heart beats or spasmodic chest pain, and objective cardiac arrhythmia or angina pectoris. One finding that supports the view that the reported symptoms correspond with cardiac arrhythmia or angina pectoris in the majority of cases is that almost 90% of the subjects who reported spasmodic chest pain were being treated with antianginal drugs and that those who suffered from irregular heart beats also reported a high consumption of drugs for cardiac diseases. Another question in the interpretation of the findings 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.^{13,14} The correspondence between a reported propensity for nightmares, on the one hand, and increased figures for poor sleep and increased difficulties in falling asleep after nocturnal awakenings, on the other hand, would seem to allow the interpretation that there is a consistent relationship between the actual occurrence of increased nightmares and reports on nightmares. This view is also supported by the finding that increased reported awakenings with a feeling of despondency paralleled an increasing occurrence of nightmares.

In parallel with increasing nightmares, there was an increase in irregular heart beats in both men and women, while there was a significant increase in spasmodic chest pain in women but not in men. Occurrence of the two symptoms irregular heart beats and spasmodic chest pain in the same patient was increased threefold in men and sixfold in women with very frequent nightmares compared with the whole group of men and women.

An increase in the occurrence of irregular heart beats and spasmodic chest pain has also been observed in elderly people of both sexes with difficulty in falling asleep and too early awakening in the morning.¹² Indirect support for the possibility of a relationship between nightmares and the two cardiac symptoms is that antianginal drugs in both men and women showed a stepwise increase in parallel with increasing nightmares. A similar relationship between nightmares and other cardiac drugs was seen in women but not in men.

The use of antianginal drugs as well as that of other cardiac drugs showed an increase in persons with higher frequencies of nightmares. It has been reported from previous studies that the use of cardiac drugs is increased in elderly persons with insomnia.¹⁵ One possibly confounding factor to be considered is that β -blockers are probably prescribed to some patients with angina pectoris or cardiac arrhythmia and that nightmares are well-known side effects of these drugs.¹⁶ However, the use of cardiac drugs (including β -blockers) showed no influence on the occurrence of nightmares when the effect of irregular heart beats and spasmodic chest pain were taken into consideration in the logistic regression analysis.

Although coffee consumption was very high in this group of elderly subjects it showed no influence on the occurrence of nightmares, either as the total daily consumption or coffee drinking after 6 p.m. Smoking was rather infrequent in this group, and in men the habit of taking snuff was more prevalent than smoking. Neither smoking nor taking snuff was associated with an increased prevalence of nightmares.

In women, but not in men, the use of sleep medication was increasingly common in parallel with an increased occurrence of nightmares. This result may be a confounder of the previously reported finding that sleep medication is increased not only by sleep impairment *per se* but also in

association with impaired somatic and mental health.¹⁷ A logistic regression analysis revealed that nightmares occurring rather often or very often, sleep and female sex were all associated with an increase in irregular heart beats. It has been shown previously that an increase in the number of nocturnal awakenings is associated with an increase in irregular heart beats and that this relationship is more pronounced in women than in men.¹⁴ The results of the present study show that very frequent nightmares are associated with an increase in irregular heart beats independent of the detrimental effect of poor sleep. Very frequently occurring nightmares were still associated with an increase in spasmodic chest pain after adjustment had been made for the influence of poor sleep. This finding is in line with the previous observation that there is an increase in the frequency of spasmodic chest pain in parallel with an increase in the number of nocturnal awakenings.¹⁴ This may support the view that the increase in awakenings in elderly persons with cardiac symptoms is to some extent an expression of their more frequent nightmares. This brings us to the question of what is the cause and what is the effect with regard to nightmares and cardiac symptoms. It is known that different kinds of sleep disturbances are associated with increased cardiac symptoms. Difficulty in falling asleep¹⁸ and increased nocturnal awakenings⁷ are associated with an increased risk of spasmodic chest pain. Barry *et al.*⁷ report that waking up at night mostly precedes rather than follows a nocturnal anginal attack, and Quyyumi *et al.* found that nocturnal ST depression is more often observed after than before awakening.¹⁹ There are case reports on persons with no previously known heart disease in whom nightmares have occurred immediately before they have fallen ill with coronary artery dissection and other life-threatening cardiac events.²⁰ It therefore seems reasonable to assume that nightmares precede rather than succeed cardiac symptoms in the majority of cardiac events. This may indicate that nightmares and also other sleep complaints in the elderly are important health problems and should receive more attention, and that sleep-improving therapeutic measures may be one way of protecting cardiac health in the elderly. Further research is needed to elucidate this issue. To summarise, in this group of elderly men and women increased nightmares were associated with an increase in irregular heart beats as well as in spasmodic chest pain. The use of antianginal drugs and other cardiac drugs increased in parallel with increased frequencies of the two cardiac symptoms, but the increase in nightmares could only be attributed to cardiac symptoms and not to cardiac drugs. The results indicate that in the elderly, cardiac symptoms are associated to a considerable extent with the occurrence of nightmares.

REFERENCES

1. Morgan K, Healey DW, Healey PJ. Factors influencing persistent subjective insomnia in old age: a follow-up study of good and poor sleepers aged 65 to 74. *Age Ageing* 1989;18:117-22.
2. Wingard DL, Berkman LF. Mortality risk associated with sleeping patterns among adults. *Sleep* 1983;6:102-7.
3. Mallon L, Broman JE, Hetta J. Relationship between insomnia, depression, and mortality: a 12-year follow-up of older adults in the community. *Int Psychogeriatr* 2000;12:295-306.
4. Nilsson PM, Nilsson JA, Hedblad B, Berglund G. Sleep disturbance in association with elevated pulse rate for prediction of mortality-consequences of mental strain? *J Intern Med* 2001;250:521-9.
5. Partinen M, Kaprio J, Koskenvuo M, Putkonen P, Langinvainio H. Genetic and environmental determination of human sleep. *Sleep* 1983;6:179-85.
6. Diest R van. Subjective sleep characteristics as coronary risk factors, their association with Type A behaviour and vital exhaustion. *J Psychosom Res* 1990;34:415-26.
7. Barry J, Campbell S, Yeung AC, Raby KE, Selwyn AP. Waking and rising at night as a trigger of myocardial ischemia. *Am J Cardiol* 1991;67:1067-72.
8. Pagel JF. Nightmares and disorders of dreaming. *Am Fam Physician* 2000;61:2037-44.
9. Vgontzas AN, Kales A. Sleep and its disorders. *Annu Rev Med* 1999;50:387-400.
10. Zadra A, Donderi DC. Nightmares and bad dreams: their prevalence and relationship to well-being. *J Abnorm Psychol* 2000;109:273-81.
11. Jensen E, Dehlin O, Hagberg B, Samuelsson G, Svensson T. Insomnia in an 80-year-old population: relationship to medical, psychological and social factors. *J Sleep Res* 1998;7:183-9.
12. Asplund R. Sleep and heart diseases among the elderly. *J Int Med* 1994;236:65-71.
13. Morgan K, Healey DW, Healey PJ. Factors influencing persistent subjective insomnia in old age: a follow-up study of good and poor sleepers aged 65 to 74. *Age Ageing* 1989;18:117-22.
14. Edell-Gustafsson UM. Insufficient sleep, cognitive anxiety and health transition in men with coronary artery disease: a self-report and polysomnographic study. *J Adv Nurs* 2002;37:414-22.
15. Jensen E, Dehlin O, Hagberg B, Samuelsson G, Svensson T. Insomnia in an 80-year-old population: relationship to medical, psychological and social factors. *J Sleep Res* 1998;7:183-9.
16. Thompson DF, Pierce DR. Drug-induced nightmares. *Ann Pharmacother* 1999;33:93-8.
17. Asplund R. Sleep and hypnotic use in relation to perceived somatic and mental health among the elderly. *Arch Gerontol Geriatr* 2000;31:199-205.
18. Appels A, Schouten E. Waking up exhausted as risk indicator of myocardial infarction. *Am J Cardiol* 1991;68(4):395-8.
19. Quyyumi AA, Efthimiou J, Quyyumi A, Mockus LJ, Spiro SG, Fox KM. Nocturnal angina: precipitating factors in patients with coronary artery disease and those with variant angina. *Br Heart J* 1986;56:346-52.
20. Parmar MS, Luque-Coqui AF. Killer dreams. *Can J Cardiol* 1998;14:1389-91.