Upsala J Med Sci 102: 185–198, 1997

A Survey of Sleep Habits and Sleeping Difficulties in an Elderly Swedish Population

Lena Mallon[1,2] and Jerker Hetta[1]

[1]*Sleep Disorders Unit, Department of Psychiatry, University Hospital, Uppsala, Sweden and*
[2]*Psychiatric Clinic, Falun Hospital, Falun, Sweden*

ABSTRACT

A random sample of 876 subjects aged 65-79 years were investigated by means of a questionnaire concerning sleep and related factors. Sleep problems were reported by 23.8% of females and 13.3% of males.Moderate or major complaints of maintaining sleep were reported by 43.5% of subjects, early morning awakening 33.4% and difficulties falling asleep 31.4%. Daytime sleepiness was more common among males, and a relationship between daytime sleepiness and perceived poor sleep was found. Daytime napping was common, but not related to poor sleep. The prevalence of regular sleeping pill users was 7.6% for females and 3.0% for males and a relationship between sleep problems, sleeping pill usage and psychiatric symptoms was established. Among the regular sleeping pill users 39.1% had possible depression (PD) and 63.0% had possible anxiety disorder (PA). Among respondents with sleep complaints 29.8% had PD and 48.7% had PA. Sleep problems were also related to impaired physical health. Various medical illnesses contributed to sleep complaints among males, and depression affected sleep the most among females.

INTRODUCTION

During the last century there has been a progressive increase in the number of aged people in the community. This change in the demographic pattern will have profound medical consequences because a large proportion of these elderly suffer from chronic, disabling health problems, one of which is sleep disturbances.

Several community based surveys of sleep disturbances have compared the prevalence of insomnia across age and demonstrated that sleep disturbances are common and that the prevalence of insomnia increases with age, especially among women (2, 11-16, 18, 19, 26, 27).

Karacan (11) conducted an interview survey in Houston USA of 2347 subjects aged 18 years and older. Difficulties initiating sleep did not appear to be age related, whereas difficulty maintaining sleep, early morning awakenings and use of hypnotic medication all increased with age both for females and males. Welstein (26) published results from a telephone survey in San Francisco USA, where 6340 respondents aged 6 to 103 years of age answered questions about sleeping habits. The age effect in the material was significant, supporting the finding of increasing sleep disturbances with

increasing age. In Lugaresis study (16) from San Marino where 5713 subjects aged between 3 and 94 years were interviewed, reports of insomnia increased progressively after the 20th year. Mellinger (19) interviewed 3161 adults aged between 18 to 79 years in the National Survey of Psychotherapeutic Drug Use, a cross national survey in USA, and the prevalence of "trouble falling asleep or staying asleep a lot the past year" was 15% in the age group 35 to 49 years and 25% in the age group 65 to 79 years. One third of those with serious insomnia were characterized by syndromes resembling either depression or generalised anxiety.

Recently more interest has been directed on providing information on sleep disturbances in the elderly population and some studies have specifically surveyed sleep disturbances among elderly subjects (3-5, 7, 8, 22).

Data derived from the Activity and Ageing Survey in Nottinghamshire England, an interview study of 1023 subjects aged over 65 years published by Morgan (22), reported prevalence of "current insomnia often or all the time", 22.5%, significantly more among women. Symptoms of anxiety rather than depression emerged out as a the more important predictor of poor sleep quality. From an interview survey in Canberra Australia of 874 elderly aged over 70 years Henderson (8) reported population prevalence of "trouble sleeping last two weeks", 18.0% for women and 12.6% for men. Gisalson (5) found that the most commonly reported insomnia complaint of 430 subjects aged over 65 years on Iceland was habitual difficulties maintaining sleep, 37% of men and 30% of women. Occasional or habitual complaints of both difficulties initiating sleep, difficulties maintaining sleep and early morning awakenings was reported by 10.4% of subjects. In a study on the effects of exercise on cardiovascular function in Sunnyvale USA Bliwise (3) had the opportunity to study sleep habits in a group of 357 healthy adults aged 50 to 65 years. The results of the questionnaire study showed low prevalence of poor sleep. The prevalence of "trouble falling asleep every night or almost every night" was 2.6% for females and 1.1% for males, and "trouble awakening and returning back to sleep" was 3.3% for females and 4.4% for males. Despite these low prevalences, about a third of the population reported not well-rested and/or not getting the sleep they required.

Even though these studies show an increase in sleeping difficulties with age, the prevalence figures show considerable variation, and only a few of the studies have investigated health status in relation to sleep. The principal aim of the present study was to investigate sleep habits, the prevalence and types of sleeping difficulties and related symptoms in a geographically-defined population of elderly in Sweden.

MATERIAL AND METHODS

Subjects

The investigation was performed during the month of December 1995. A randomly selected sample of 1228 elderly inhabitants, 65-79 years, in the county of Dalarna in Sweden were asked to participate in a questionnaire survey.

Sleep questionnaire

The survey sleep questionnaire contained 89 questions designed to supply information about typical sleep behaviours and certain variables that might affect sleep.

1. Demographic variables (age, gender, residential status, marital status).
2. Questions about life style variables (smoking habits, alcohol drinking habits, coffee and tea consumption, car driving).
3. Sleep habits. Questions about time for going to bed, time to fall asleep, number of nocturnal awakenings, total sleep time, time for arising, day time napping and sleep-requirement expectations.
4. Questions adopted from the Uppsala Sleep Inventory (USI) (13-15) concerning the *severity* of various sleeping difficulties on a five-point 1. 1. scale (1= no problems, 2= small problems, 3= some problems, 4= great problems, 5= very great problems). In the subsequent statistical analysis scores 1 and 2 were considered to represent "no complaints", score 3 "moderate complaints" and scores 4 and 5 "major complaints".
5. Questions adopted from Uppsala Sleep Inventory (USI) concerning *how often* a symptom occurred on a five-point scale (1= never, 2= seldom, 3= sometimes, 4= often, 5= very often). In the subsequent statistical analysis scores 1 and 2 were considered to represent "never", score 3 "occasionally" and scores 4 and 5 "habitually".
6. Questions adopted from the Basic Nordic Sleep Questionnaire (BNSQ) (23) concerning the frequency of a symptom during the last three months on a five-point scale. occurred (1= never or less than once a month, 2= less than once per week, 3= once or twice per week, 4= three to five times per week, 5= every night or almost every night).
7. Questions about physical illness (medical history, hospital admissions, number of illnesses). Physical health status was to be rated on a six-point scale (1=excellent, 2=good, 3=quite good, 4= fairly good, 5=poor, 6=very poor).
8. Questions about medication (medication currently used, past and present sleep medication usage).
9. Measure of mood. The Hospital Anxiety and Depression Scale (HAD Scale) (28) consists of 14 questions in which the overall severity of anxiety and depression is rated on a four point scale (0 to 3). Seven questions are related to anxiety and seven to depression. It is recommended that scores of 8 or more on a subscale are taken to indicate possible pathology.

Procedure

Each subject was mailed a questionnaire, a pre-stamped envelope and a letter explaining the purpose of the study. Subjects were encouraged to call the investigator if they had any questions. Full anonymity protection was ensured. One month later a follow up letter, along with duplicates of all material, was sent to all non respondents.

The study protocol was approved by the Ethics Committee of the Faculty of Medicine at Uppsala University in Sweden.

Statistical methods

The statistical analysis was performed on a Macintosh computer with the StatView software package. The results are presented as means ± SD. A chi-squared test was used for categorical variables and unpaired t-test for continuous scales. For all results $p<0.05$ was required for statistical significance.

RESULTS

General results

In all 876 subjects answered the questionnaire after one reminder giving a response rate of 71.3%. Respondents were 405 men and 471 women and their mean age was 71.2 years (SD=4.0 years, range 65 to 79 years). Table 1 gives the age and sex distribution of respondents in the study and the population in the county of Dalarna at the time of the study. The younger age groups were slightly overrepresented in the study and the age group of 75 years and older underrepresented. Of the males 79.3% lived with someone else compared to 59.6% of females ($\chi^2=37.5$; $p<0.001$), and 26.0% of females were widowed versus 9.1% of males ($\chi^2=40.8$; $p<0.001$).

Table 1. Age and sex distribution of respondents in the statistical analysis and the population in the county of Dalarna at the time of the study.

	Respondents in study			Population of Dalarna county*		
	Men (%)	Women (%)	Total (%)	Men (%)	Women (%)	Total (%)
Age group (in years)						
65-69	162 (40)	183 (39)	345 (39)	6 569 (35)	7 454 (33)	14 023 (34)
70-74	140 (35)	156 (33)	296 (34)	6 510 (35)	7 542 (34)	14 052 (34)
75-79	103 (25)	132 (28)	235 (27)	5 740 (30)	7 463 (33)	13 203 (32)

*Source: Swedish Central Bureau of Statistics, Yearbook 1995, Stockholm 1996.

Sleep habits

Time for going to bed was similar between sexes, 10.32± 0.77 hours, but males woke up earlier, 06.74±1.01 hours versus 07.04± 0.86 hours for females ($t= 4.6$; $p<0.001$). Sleep latencies was significantly longer for females, 41.7± 59.0 min versus 27.9± 36.6 min ($t=4.1$; $p<0.001$), and females also reported a shorter total sleep time 398.8± 81.5 min versus 416.2± 71.5 min ($t=3.3$; $p<0.001$).

The estimated need for sleep in the total sample was equal between males and females, 434.4± 59.0 min. The ratio of amount of habitual sleep to the amount of estimated need for sleep expressed in

percent (called Sleep Sufficiency Index, SSI), was 91.4% for females and 95.7% for males (t=4.2; p<0.001). The number of reported nocturnal awakenings ranged from 0 to 16, with a mean number of 1.9± 1.3 awakenings per night. No difference between sexes was found (Table 2). Of the study population 47.7% reported waking up at least twice per night and 19.5% reported waking up at least 3 times per night, equal between sexes.

Table 2. Sleep variables (means ±SD) according to gender.

Variables	Females (n=471)	Males (n=405)	t - value
Time for going to bed (hours)	10.27± 0.76	10.37± 0.77	1.9
Time for waking up (hours)	07.04± 0.86	06.74± 1.01	4.6***
Sleep latency (minutes)	41.7± 59.0	27.9± 36.6	4.1***
Total night sleep time (minutes)	398.8± 81.5	416.2± 71.5	3.3***
Estimated sleep need (minutes)	434.1± 61.0	434.8± 56.8	0.1
Sleep Sufficiency Index (%)	91.4± 14.6	95.7± 13.2	4.2***
No of awakenings/night	1.9± 1.4	1.8± 1.2	1.5

*p<0.05, **p<0.01, ***p<0.001

Sleep complaints

In a categorical (yes-no) question (CSP), 18.9% stated that they had sleep problems. Females more often than males, 23.8% versus 13.3% (χ^2=15.1; p<0.001). Subjects living alone did not report sleep problems more frequently than those living with someone else, and no relationship was found between reported sleep problems and coffee or tea consumption, smoking habits or body mass index (BMI).

Table 3 shows the reported severity of sleeping difficulties according to the USI-question. The most commonly reported sleep complaints were difficulties maintaining sleep (DMS). Moderate complaints of DMS were reported by 34.2% of subjects, followed by moderate complaints of difficulties initiating sleep (DIS) 22.9% and moderate complaints of early morning awakenings (EMA) 21.7%. The only gender difference was a female preponderance in reports of major complaints of DIS, 12.0% versus 4.5% (χ^2=19.2; p<0.001).

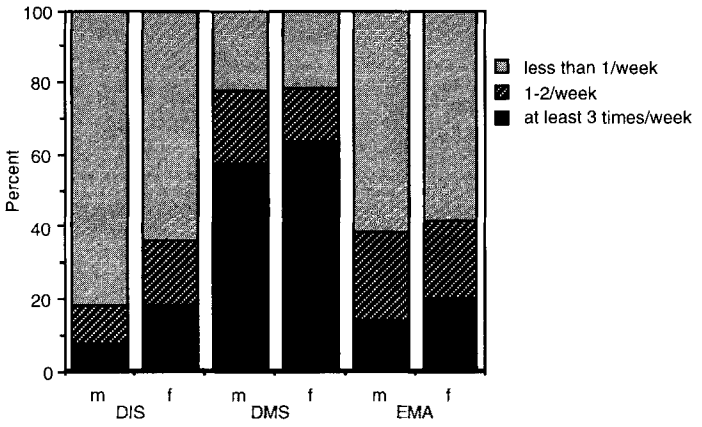
Table 3. Prevalence of sleeping difficulties according to gender (%).

	% females (n=471)	% males (n=405)	% total (n=876)	χ^2 value
Difficulties initiating sleep (DIS)				
Moderate complaints	24.6	20.8	22.9	NS
Major complaints	12.0	4.5	8.5	19.2, $p<0.001$
Difficulties maintaining sleep (DMS)				
Moderate complaints	33.9	34.6	34.2	NS
Major complaints	10.0	8.5	9.3	NS
Early morning awakenings (EMA)				
Moderate complaints	20.1	23.5	21.7	NS
Major complaints	12.0	11.3	11.7	NS

Pain was the most commonly reported complaint during initiation of sleep. Among females 18.8% and of males 10.0% reported this as a major complaint (χ^2= 12.9; $p<0.01$), followed by major complaints of tension, 11.7% of females and 6.3% of males (χ^2=7.2; $p<0.01$).

How many nights per week a sleeping difficulty occurred was measured by using BNSQ. Fig. 1 shows that more than three out of four elderly, 78.3%, reported waking up at least one night per week and 60.7% reported waking up at least 3 nights per week. No difference between sexes was found. Of females 18.1% reported DIS at least 3 times per week versus 7.6% of males (χ^2=19.7; $p<0.001$) and 20.1% of females versus 13.8% of males reported EMA at least 3 times per week (χ^2=5.8; $p<0.05$).

Fig 1. Frequency of sleeping difficulties according to gender (%).



Daytime symptoms

Females reported more often than males "never" or only "occasionally" feeling well rested after sleep, 34.4% versus 23.5% (χ^2=12.0 p<0.001). Of the males, 26.0% had moderate complaints of daytime sleepiness compared to 17.5% of females (χ^2= 8.2; p<0.01), and 5.8% of males and 5.1% of females considered this a major problem.

Subjects with moderate or major complaints of daytime sleepiness had shorter total night sleep time 368.4± 84.8 min versus 418.1± 69.8 min (*t*=8.2; p<0.001).

Of subjects reporting moderate or major complaints of daytime sleepiness 37.1% reported sleep problems in the categorical item (CSP) compared to 13.7% of those reporting no complaints of daytime sleepiness (χ^2=49.6; p<0.001).

Some 69.5% of males and 50.5% of females reported daytime napping at least occasionally (χ^2=31.8; p<0.001), and 29.4% of males and 14.7% of females reported napping habitually (χ^2=21.1; p<0.001). There was no difference in total night sleep time or sleep problems (CSP) between subjects napping and subjects not napping.

Sleeping pill usage

There was a female preponderance in both past and present sleeping pill usage. Almost three times as many females as males used sleeping pills at least once per week, 14.7% versus 5.5% (χ^2=19.4; p<0.001). The prevalence of regular sleeping pill users (every night or almost every night) was 7.6% of females and 3.0% of males (χ^2=8.7; p<0.05). Almost twice as many females compared to males had previously used sleeping pills, 19.2% versus 10.4% (χ^2=12.7; p<0.001). Females had also consulted a physician because of sleeping difficulties more often than males, 15.7% versus 9.3% (χ^2=7.6; p<0.01). (Table 4).

Table 4. Prevalence of sleeping pill usage and physician consultations because of sleeping difficulties according to gender (%).

	% females (n=471)	% males (n=405)	χ^2 value
Sleeping pill usage>1/week	14.7	5.5	19.4***
Sleeping pill usage regularly	7.6	3.0	8.7**
Previous sleeping pill usage	19.2	10.4	12.7***
Consulted physician because of sleeping difficulties	15.5	9.3	7.6**

*p<0.05 , **p<0.01, ***p<0.001

Psychological status

On the HAD-scale, scores of 8 or more on a subscale was used as an indicator of depression and anxiety respectively. The criterion level indicating possible depression was exceeded by 13.3% of the total sample, equally between sexes. A significant difference between sexes was calculated for anxiety, 23.5% for females and 10.9% for males had scores of 8 or more on the anxiety subscale (χ^2= 23.8; p<0.001).

As seen in Table 5, almost one-third of subjects stating sleep problems in the categorical item (CSP), 29.8%, scored 8 or more on the depression subscale versus 9.4% of subjects without sleep problems (χ^2=46.6; p<0.001). Almost one-half of subjects with sleep problems, 48.7%, scored 8 or more on the anxiety subscale versus 10.5% of subjects without sleep problems (χ^2=128.6; p<0.001).

Among the regular sleeping pill users (every night or almost every night) 39.1% exceeded the cut-off point indicating possible depression versus 11.9% of respondents not using sleeping pills regularly (χ^2=27.8; p<0.001). The cut-off point for possible anxiety disorder was exceeded by 63.0% of subjects using sleeping pills regularly versus 15.1% of subjects not using sleeping pills regularly (χ^2=68.7; p<0.001).

Table 5. Prevalence of HAD score ≥8 on depression or anxiety subscale (%) among respondents with and without sleep problems (CSP) and among respondents using and not using sleeping pills regularly.

	Sleep problems (%)	*No sleep problems (%)*	χ^2 value	*Regular sleeping pill usage (%)*	*No regular sleeping pill usage (%)*	χ^2 value
HAD depression score ≥8	29.8	9.4	46.6***	39.1	11.9	28.7***
HAD anxiety score ≥8	48.7	10.5	128.6***	63.0	15.1	68.7***

*p<0.05 , **p<0.01, ***p<0.001

Physical health status

Subjects stating sleep problems in the categorical item (CSP) rated their physical health as being poor more often than subjects without sleep problems. Only 19.4% of subjects reporting sleep problems in the categorical item (CSP) rated their physical health as being excellent or good compared to 52.3% of subjects without sleep problems (χ^2=83.5; p<0.001).

Table 6. Prevalence of any major sleep comlaint (ASC) among females and males with and without medical health problems (%).

		ASC[a]		ASC[a]
	Males % (n)	Males %	Females % (n)	Females %
Hyper-tension				
No	72.0 (275)	14.6	69.0 (309)	21.0
Yes	28.0 (107)	21.5	31.0 (139)	22.3
Cardiac disease				
No	77.5 (289)	14.2	85.1 (378)	20.6
Yes	22.5 (84)	26.2**	14.9 (66)	27.3
Angina				
No	82.5 (312)	14.4	87.9 (392)	19.4
Yes	17.5 (66)	28.8**	12.1 (54)	35.2**
Diabetes				
No	89.4 (339)	14.4	92.1 (408)	20.3
Yes	10.6 (40)	37.5***	7.9 (35)	31.4
Joint pain				
No	74.2 (279)	11.5	64.2 (281)	18.9
Yes	25.8(97)	29.9***	35.8 (157)	26.1
Asthma				
No	93.1 (352)	16.8	92.3 (408)	20.3
Yes	6.9 (26)	19.2	7.7 (34)	32.4
Gastric symptoms				
No	76.7 (289)	15.2	78.6 (348)	19.8
Yes	23.3 (88)	22.7	21.4 (95)	26.3
Depression				
No	95.4 (357)	15.4	89.4 (390)	16.4
Yes	4.6 (17)	29.4	10.6 (46)	56.5***
Urinary tract symptoms				
No	84.3 (316)	15.7	79.1 (352)	19.9
Yes	15.7 (59)	17.1	20.9 (93)	28.0
Prostate problems				
No	73.3 (277)	15.9		
Yes	26.7 (101)	19.8		

[a]ASC= any major sleep complaint (DIS, DMS or EMA)
*p<0.05, **p<0.01, ***p<0.001

As can be seen in Table 6, among males any major sleep complaint (DIS, DMS or EMA) was related to joint pain, diabetes, cardiac disease and angina. Among females any major sleep complaint was more commonly reported by females with depression and angina.

DISCUSSION

The results of our study demonstrate that sleep disturbances are common among elderly subjects. Almost one-fifth, 18.9%, of subjects reported sleep problems in a categorical (yes-no) question. Other surveys have reported prevalence of insomnia from 10-40%, possibly due to various populations and various definition of investigated sleep problem. For example Brabbins (4) reported that 35% of persons over the age of 65 living in Liverpool reported trouble sleeping the last 4 weeks, Weyerer (27) reported 23.3% prevalence of moderate or severe insomnia among persons aged 60-69 years in the Upper Bavarian Field Survey and Henderson (8) reported the prevalence of insomnia 15.8% in a sample of people aged 70 years and over in Canberra and Queanbeyan in Australia.

Like previous investigations, females in our sample reported sleep problems more frequently than males, 23.8% versus 13.3%. Females went to bed at the same time as males, but waking up time was later. Despite this, females rated their total sleep time as shorter than males. These findings indicate that females spend more time awake in bed. Females also complained of never or only occasionally feeling well rested after sleep more often than males, 34.3% versus 23.5%.

The most commonly reported sleeping difficulty was DMS. Moderate or major complaints of DMS was reported by 43.5% of subjects. The reports of major complaints of DIS, DMS and EMA was rather uniform (8.5%, 9.3% and 11.7% respectively) and the only gender difference was that females reported major complaints of DIS more often than males.

Reports of sleep continuity disturbances were very common in our study. Almost one-half of subjects, 47.7%, reported waking up at least twice per night and 19.5% reported waking up at least 3 times per night. Nocturnal awakening occurred for over one-half of subjects, 60.7%, at least 3 nights per week. However, only 9.3% of subjects reported major complaints of DMS and our interpretation is that these nocturnal awakenings were not always perceived as a sleep disturbance for many of the elderly subjects. These findings underline the importance of distinguishing between the severity and the frequency of a sleep complaint before interpretations are made.

We found a male preponderance in reports of daytime symptoms. Moderate or major complaints of daytime sleepiness was reported by 31.8% of males versus 22.6% of females, which is in agreement with others. For example, Asplund (1) reported that of pensioners in northern Sweden 32.0% of males and 23.2% of females were often sleepy during the day and Schmitt (24) reported that 37.2% of subjects aged 70-79 years in Kentucky, USA, complained of excessive daytime somnolence.

Schmitt found daytime somnolence to be associated with snoring, and we found, like Asplund, that daytime sleepiness was related to poor sleep.

In our survey we found that daytime napping was not related to sleep problems. This finding supports the hypothesis that napping is an effect of changed distribution of sleep wakefulness in elderly and that it is not necessarily related to sleep disturbances (9, 20). Like previous investigators, we found that napping is a common phenomenon. In our sample 69.5% of males and 50.5% of females reported napping at least occasionally. Metz (20) reported that 72.7% of males and 56.3% of females reported taking naps among subjects aged 58-95 years, and Gislason (5) reported that 50% of males and 31% of females aged 65-84 years on Iceland slept during the day for an average of 28 min.

In our study population 14.7% of females and 5.5% of males used sleeping pills at least once per week, and 7.6% of females and 3.0% males used sleeping pills regularly (every or almost every night). Karacan (11) reported that 17% of females and 15% of males aged over 64 years used sleeping pills sometimes, and 9% of females and 8% of males were regular users. Morgan (22) reported that 22% females and 11.1% of males aged over 65 years used sleeping pills and Gislason (5) reported that 16.7% of females and 12.2% of males aged over 65 years on Iceland were habitual users of sleeping pills. In view of these results, our study provides similar or lower prevalence rates of hypnotic usage.

There was a relationship between reports of sleep problems and psychological factors. Of subjects stating sleep problems in the categorical question, 29.8% scored 8 or more on the HAD depression subscale, indicating possible depression, compared to 9.4% of subjects without sleep problems. The criterion level indicating possible anxiety disorder was exceeded by 48.7% of subjects reporting sleep problems versus 10.5% of those without sleep problems. Sleep disturbances have often been reported to be associated with depression and anxiety disorders. Mellinger (19) found that one third of those with serious insomnia in a population aged 18 to 79 years were characterized by syndromes resembling either major depression or generalised anxiety. Henderson (8) found insomnia associated with symptoms of both anxiety and depression in subjects older than 70 years, and Morgan (22) found symptoms of anxiety rather than depression as predictor of poor sleep quality in subjects aged 65 to 74 years.

Among the regular sleeping pill users in our study there was a high percentage of subjects scoring 8 or more on the HAD subscales respectively, 63.0% had possible anxiety disorder and 39.1% had possible depression.

Subjects with sleep problems in our study also showed evidence of poor physical health status that confirms previous reports of associations between insomnia, self-perceived poor health and physical illnesses. Bixler (2), for example, found among adults that subjects with insomnia more frequently reported multiple health problems and Bliwise (3) found very low prevalence of poor sleep in his sample of subjects aged 50-65 years with relatively good health. Morgan (22) reported from a sample of elderly that subjects with insomnia were significantly more likely to rate their health below average. From a sample of elderly in Australia Henderson (8) found insomnia to be associated with poor self-rated health. In our sample there was a gender difference insofar as medical illnesses among males, but depression among females, was related to any major sleep complaint (DIS, DMS or EMA).

Our results are based on subjective reports of sleep quality, which is not the same as sleep disorders of clinical significance. Webb (25) states that self-reports reflect the person´s view about sleep and its importance, and these conceptions are important to understand because they will determine if the person defines himself as having a sleep problem for which he might seek professional advice or treatment. As a clinician, it is important to understand the relationship between self-reported sleep problems and general health. The present study shows that sleep problems are common among elderly and our data suggest that late life insomnia is not simply due to a normal ageing process. Physical and psychiatric disorders must be considered in the evaluation of sleep complaints in the elderly patient.

Because our data is cross-sectional we are not able to make definitive conclusions about causal relationships. We therefore intend to continue with longitudinal studies and also make structured clinical interviews in an effort to increase knowledge about sleep complaints among elderly.

ACKNOWLEDGEMENTS

This study was supported by grants from the Swedish Medical Research Council (Project 06869), the Dalarna Research Institute, the Swedish Psychiatric Association, the Marta and Nicke Nasvells Foundation and the Swedish Lundbeck Foundation.

REFERENCES

1 Asplund R. Daytime sleepiness and napping among the elderly in relation to somatic health and medical treatment. J Intern Med 1996;239:261-267.
2 Bixler E, Kales A, Soldatos C, Kales J, Healy S. Prevalence of sleep disorders in the Los Angeles metropolitan area. Am J Psychiatry 1979;10:1257-62.
3 Bliwise D L, King A C, Harris R B, Haskell W L. Prevalence of self-reported poor sleep in a healthy population aged 50-65. Soc Sci Med 1992;34(1):49-55.
4 Brabbins C J, Dewey M E, Copeland J R M, Davidson I A, Mcwilliam C, Saunders P, Shama V K, Sullivan C. Insomnia in the elderly: Prevalence, gender differences and relationship with morbidity and mortality. Int J Geriatric Psychiatry 1993;8:473-80.
5 Gislason T, Reynisdottir H, Kristbjarnarson H, Benediktsdottir B. Sleep habits and sleep disturbances among elderly- an epidemiological survey. J Intern Med 1993;234:31-9.
6 Gislason T, Almqvist M. Somatic disease and sleep complaints. An epidemiological study of 3 201 Swedish men. Acta Med Scan 1987;221:475-81.
7 Habte-Gabr E, Wallace R B, Colsher P L, Hulbert J R, White L R, Smith I M. Sleep pattern in rural elders: Demographic, health and psychobehavioral correlates. J Clin Epidemiol 1991;44:5-13.
8 Henderson S, Jorm A F, Scott R L, Mackinnon A J, Christensen H, Korten A E. Insomnia in the elderly: Its prevalence and correlates in the general population. Med J Aust 1995;162:22-4.
9 Hohagen F, Käppler C, Schramm E, Rink K, Weyerer S, Riemann D, B Berger M. Prevalence of insomnia in elderly general practice attenders and the current treatment modalities. Acta Psychiatr Scand 1994;90:102-08.
10 Janson C, Björnsson E, Hetta J, Boman G. Anxiety and depression in relation to respiratory symptoms and asthma. Am J Respir Crit Care Med 1994;149:93.
11 Karacan I, Thornby J, Williams R L. Sleep disturbances: A community survey. In: Guilleminault L, Lugaresi E, eds. Sleep/wake disorders: Natural history, epidemiology and long-term evolution. New York: Raven Press 1983;73-85.
12 Lack L, Miller W, Turner D. A survey of sleeping difficulties in an Australian population. Community Health Stud 1988;12:200-7.

13 Liljenberg B, Almqvist M, Hetta J, Roos B, Ågren H. The prevalence of insomnia: The importance of operationally defined criteria. Ann Clin Res 1988;20:293-8.
14 Liljenberg B, Almqvist M, Hetta J, Roos B, Ågren H. Age and prevalence of insomnia in adulthood. Eur J Psychiatry 1989b;3:5-12.
15 Liljenberg B, Almqvist M, Hetta J, Roos B, Ågren H. Affective disturbance and insomnia. Eur J Psychiatry 1989b;3:91-8.
16 Lugaresi E, Cirignotta F, Zucconi M, Mondini S, Lenzi P L, Coccagna G. Good and poor sleepers: An epidemiological survey of the San Marino population. In: Guilleminault L, Lugaresi E, eds. Sleep/wake disorders: Natural history, epidemiology and long-term evolution. New York: Raven Press 1983;1-12.
17 Lundh L-G, Broman J-E, Hetta J. Perfectionism and insomnia. Scand J Behav Ther 1994;23:3-18.
18 McGhie A, Russel S. The subjective assessment of normal sleep patterns. J Ment Sci 1962;108:642-54.
19 Mellinger G D, Balter M B, Ulenhuth E H. Insomnia and its treatment. Prevalence and correlates. Arch Gen Psychiatry 1985;42:225-32.
20 Metz M E, Bunnell D E. Napping and sleep disturbances in the elderly. Family Practice Res J 1990;1:47-56.
21 Moorey S, Gear S, Watson M, Gorman C, Rowden L, Tunmore R, Robertson B, Bliss J. The factor stability of the Hospital Anxiety and Depression Scale in paients with cancer. Br J Psychiatry 1991;158:255-9.
22 Morgan K, Dallasso H, Ebrahim S, Arie T, Fentem P H. Characteristics of subjective insomnia in the elderly living at home. Age and Ageing 1988;17:1-7.
23 Partinen M, Gislason. Basic Nordic Sleep Questionnaire (BNSQ): a quantitated measure of subjective sleep complaints. J Sleep Res 1995;4:150-5.
24 Schmitt F A, Phillips B A, Cook Y R, Berry D T R, Wekstein D R. Self reports of sleep symptoms in older adults: Correlates of daytime sleepiness and health. Sleep 1996;19:59-64.
25 Webb W B. Age-related changes in sleep. Clin geriatric Med 1989;5.259-74.
26 Welstein L, Dement W C, Redington D, Guilleminault C, Mitler M M. Insomnia in the San Fransisco Bay Area: A telephone survey. In: Guilleminault L, Lugaresi E, eds. Sleep/wake disorders: Natural history, epidemiology and long-term evolution. New York: Raven Press 1983;73-85.
27 Weyerer S, Dillinger H. Prevalence and treatment of insomnia in the community: Results from the Upper Bavarian Field Study. Sleep 1991;14(5):392-8.
28 Zigmond A S, Snaith R P. The Hospital Anxiety and Depression Scale. Acta psychiatr scand 1983;76:361-70.

Correspondence to:

Lena Mallon
Sleep Disorders Unit
Department of Psychiatry
University Hospital
S-751 85 Uppsala
Sweden
Tel +46 18 66 30 00
Fax +46 18 51 58 10