



The Prevalence of Self-Reported Sleep Problems and Some Factors Affecting It Among the Elderly in Amirkola

Seyed Reza Hosseini,¹ Payam Saadat,^{2,*} Mohsen Esmaili,³ and Ali Bijani⁴

¹Social Determinant of Health Research Centre, Health Research Institute, Clinical Research Development Unit of Rouhani Hospital, Babol University of Medical Sciences, Babol, IR Iran

²Mobility Impairment Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, IR Iran

³Babol University of Medical Sciences, Babol, IR Iran

⁴Social Determinant of Health Research Centre, Health Research Institute, Babol University of Medical Sciences, Babol, IR Iran

*Corresponding author: Payam Saadat, Assistant Professor, Mobility Impairment Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, IR Iran. Tel: +98-9111911730, E-mail: sepanta1968@yahoo.com

Received 2017 August 05; Revised 2017 October 03; Accepted 2017 October 10.

Abstract

Background: Knowing the quality of sleep in the elderly and its effective factors helps to take measures in increasing or decreasing their effect.

Objectives: The aim of this study is to determine the sleep problems and its effective factors in the elderly of Amirkola, the northern part of Iran.

Methods: This cross-sectional study was extracted from the Amirkola health and ageing project (AHAP), which is a cohort project regarding the elderly in the city of Amirkola, the northern part of Iran. Since 2011, it has been started and has continued so far. Data including age, sex, level of education, life status, occupation, smoking, physical activity, self-reported chronic diseases, depressive symptoms by Geriatric depression scale (GDS), cognitive status by mini-mental state examination (MMSE), history of medication, and questions regarding sleep problems were collected by interviewing with older people or their close relatives.

Results: The overall prevalence of sleep disorders in this study was 354 (24.8%). Gender, drug use, marital status, chronic pain, depression, urinary incontinence, education level, metabolic syndrome, occupation, MMSE, hypnotics, and diabetes were associated with the prevalence of sleep disorders. According to the logistic regression analyses, 12-month back pain (OR = 1.64, P = 0.003), hypnotic drugs (OR = 1.5, P = 0.03), depression (OR = 1.66, P = 0.001), age range of 75 to 79 years old (OR = 0.58, P = 0.01), accompanying chronic disease (OR = 1.15, P < 0.001), and MMSE (OR = 1.59, P = 0.003) had a significant role in sleep problems.

Conclusions: This study showed a high prevalence of sleep disorders in the elderly in Amirkola, especially in women. It is necessary to assess all older individuals with sleep disorders for identifying and treatment risk factors.

Keywords: Elderly, Prevalence, Sleep Disorder, Self-Reporting

1. Background

Sleep plays a crucial role in the health of all human beings, especially the elderly. Complete and comfortable sleep leads to excitement and cheerfulness yielding high energy, a very good mood, and the ability to perform every-day tasks during the day. Any disorder in the elderly causes physical and mental disorders (1). The results of various experiments show that elderly people do not have a gradual light sleep style towards deep sleep, their sleep is generally light and any mild audio stimuli awakens them. In fact, the degree of sleep (REM) and the stages 3 and 4 of sleep, which are considered as deep sleep, are reduced in the elderly and the second stage of sleep (light sleep) are increased. As a result, the elderly snort throughout the day. In 24 hours, the elderly needs 6 - 9 hours of sleep (2). The most common

sleep disorder in the elderly is insomnia, which falls into 3 types: onset sleep disorder, disorder during their sleep (the person wakes up several times during the night), and early sleep disorders (the elderly first sleeps easily but wakes up after 3 to 4 hours and does not fall back to sleep again) (2, 3).

It has been estimated that approximately 20% of the world's population suffers from insomnia (4, 5), however, this figure touches 40% of people over 60 (5). The prevalence of insomnia symptoms in Western Europe is reported to be between 20% - 40%. Women and the elderly have the highest rates of insomnia (6). Sleep disorders in elderly care centers are more than 75% (7, 8). The process of Aging changes the quantity and quality of sleep, which resulted in sleep disorders. Moreover, the accompanying comorbidities exacerbates the occurrence of sleep disorders

in this range of age. Elderly patients also experience emotional stress due to retirement or death of a loved one (for example, "spouse"). There are often delays in falling asleep and episodes of frequent waking up during sleep. Elderly people often take medication to control and treat chronic diseases; these drugs can affect the quantity and quality of sleep as well (9).

Elderly people with insomnia experience symptoms such as headaches, anger and aggression, fatigue, frequent naps, reduced focus and attention, and if occupied, they would experience disorder in social and occupational performance during the day. Sequential insomnia can cause physical impairment in the elderly, such as blood pressure and heart and respiratory problems (10).

Various reasons can cause insomnia in the elderly, the most significant include aging and suffering from chronic painful diseases, especially infectious and inflammation diseases and cancer. Of course, taking some medications, including stimulant drugs and some new antidepressants, also causes insomnia. Psychiatric disorders such as depression, mania and anxiety also affect the incidence of severe insomnia. Any change in sleep conditions, such as a change in location, can interfere with the onset of sleep (11).

Sleep disorders have a high prevalence in societies, especially in the elderly population; therefore, approximately 35% of people over 60 lack good sleep quality (12).

Several studies were conducted on the quality of sleep in different countries (13-16) and among older people (17).

However, there are few studies in the country regarding the quality of sleep in the elderly and its related factors, most of which pertain to nursing homes (18-21). The aim of this study was to declare the prevalence of self-reported sleep problems and some factors affecting it among the elderly in Amirkola.

2. Methods

This cross-sectional study was extracted from the Amirkola health and ageing project (AHAP), which is a cohort project regarding the elderly in Amirkola city, the northern part of Iran. Since 2011, it has been started and has continued so far. A total of 1616 people, who were 60 years old or more, were entered into the study (response rate = 72%) (22). The study protocol was approved by the research council of the Babol University of Medical Sciences (number 2736). The inclusion criteria for this study included all older individuals participating in AHAP who have complete data.

Data including age, sex, level of education, life status, occupation, smoking, self reported chronic diseases, history of medications, and questions regarding sleep problems were collected by interviewing with older people or

their close relatives. Sleep problems were assessed by asking the elderly 3 questions: 1. do you sleep comfortably at night? 2. Are you having trouble sleeping?, and 3. Do you use hypnotic drugs?

Cognitive status was obtained by mini-mental state examination (MMSE) (23). The maximum and minimum score for the questionnaire is 30 and 0, respectively. The normal person was defined by the score of 25 or more, according to questionnaire. Scores 21 - 24 entail mild cognitive disorder, scores 10 - 20 show average cognitive disorder, and score 9 or less depicts severe cognitive disorder. In consistent with the Seyedian et al. study, the cutoff point of 22 was considered for MMSE in this study.

Depressive symptoms were assessed by the Geriatric depression scale (GDS). This questionnaire includes 15 questions. Based on points earned, patients are divided into different categories, i.e., scores 0 - 4 are normal, scores 5 - 8 show mild depression, scores 9 - 11 depicts moderate depression, and scores 12 - 15 entail severe depression (24). Physical activity was assessed by the physical activity scale for the elderly (PASE). The total score of physical activity for each individual was determined between 0 and 400; higher scores meant higher physical activity levels (25).

Sleeping and sedative drugs include benzodiazepines, Zolpidem, and any other hypnotic drugs. Tricyclic antidepressants also have an effect on the sleep.

Diagnosis of diabetes in this study was based on self-reported or measured fasting blood sugar (FBS \geq 126 mg/dL for 2 times) or based on a doctor's diagnosis. Hypertension was diagnosed when systolic blood pressure or diastolic blood pressure were \geq 140 mmHg and \geq 90 mmHg, respectively, based on a doctor's diagnosis or self-reported. Metabolic syndrome was defined according to the 2005 adult treatment panel (ATP) III criteria (26).

Data were analyzed by SPSS18 using the Chi-square test, t-test, and logistic regression. Furthermore, P value < 0.05 was considered as the significant level.

3. Results

In this study, 1416 individuals over the age of 60 were eligible to enter the study. Among them, 354 (24.8%) had sleep problems. The prevalence of sleep problems in women (35.9%) was significantly higher than men (15.8%) ($P < 0.001$) elderly individuals taking drugs to affect their sleep (38.2%) were significantly more than the elderly who did not consume drugs (22.9%) ($P < 0.001$), in non-married elderly (31.6%) it was significantly higher than married elderly (23.6%), ($P = 0.012$), and in elderly individuals who did not have someone to take care of them (35.4%), it was significantly higher than the elderly who had a person to take care of (24%) ($P = 0.011$). The prevalence of sleep problems

in the literate elderly ($P < 0.001$) and employed ($P < 0.001$) was significantly less than other elderly people (Table 1).

Table 1. Demographic and Clinical Characteristics of PD Patients and Control Group^a

Variables		Patient Group (50)	Control Group (50)
Gender	Male	24 (48)	25 (50)
	Female	26 (52)	25 (50)
Age	Less than 60 years	5 (10)	10 (20)
	60 years and older	45 (90)	40 (80)
Marital Status	Unmarried	-	-
	Married	45 (90)	48 (96)
	Death of spouse	5 (10)	2 (4)
Education	Higher than diploma	6 (12)	12 (24)
	Under diploma	19 (38)	13 (26)
	Illiterate	25 (50)	25 (50)
Disease duration, y	Under 5	34 (68)	-
	5 - 10	9 (18)	-
	More than 10	7 (14)	-
Cardinal features of disease	Tremor	34 (68)	-
	Rigidity	2 (4)	-
	Bradykinesia	11 (22)	-
	Postural instability	3 (6)	-
Disease severity	1 - 2	19 (38)	-
	2.5 - 3	20 (40)	-
	More than 3	11 (22)	-

^aValues are expressed as No. (%).

In the present study, there was no significant difference in the prevalence of sleep problems in elderly individuals at different levels of BMI. The prevalence of sleep problems in elderly with hypertension (25.8%) and the elderly without hypertension (23%) did not differ significantly ($P = 0.23$) (Table 2).

The prevalence of sleep problems in elderly individuals who had 3 months of chronic pain over the past 6 months at any point of the body ($P < 0.01$), back pain in the last 12 months ($P < 0.01$), urinary incontinence ($P < 0.01$), depression ($P < 0.01$), and metabolic syndrome ($P = 0.01$), were significantly higher than the elderly who did not have these disorders (Table 2).

The prevalence of sleep problems was significantly higher in the elderly with diabetes (30%) than in the non-

diabetic elderly (22.4%) ($P = 0.002$), the elderly with cognitive impairment (34.3%) was significantly higher than the elderly with normal cognitive status (20.5%), ($P < 0.001$), and the elderly who consumed hypnotics (45.8%) was significantly less than the other elderly (19%) ($P < 0.01$) (Table 2).

The mean of MMSE, BMI, and GDS of the elderly in the 2 groups are listed in Table 3. The mean of MMSE and GDS were significantly different between the 2 groups.

A logistic regression analysis was used to determine the role of variables affecting sleep problems. As shown in Table 4, after pasting all study variables in the model (Method = Enter), including 12-month back pain (OR = 1.64, $P = 0.003$), the effective drugs on sleep (OR = 1.5, $P = 0.03$), depressive symptoms (OR = 1.66, $P = 0.001$), age group 75-79 (OR = 0.58, $P = 0.01$), having chronic disease (OR = 1.15, $P < 0.001$), and MMSE (OR = 1.59, $P = 0.003$) remained in the model (Table 4).

4. Discussion

This study showed that marital status, level of literacy, sex, chronic disease (diabetes, depression), metabolic syndrome, chronic pain history, urinary incontinence, and the use of hypnotic drugs in the elderly are factors that can affect the prevalence of sleep problems.

The results of this study showed that there is a significant relationship between demographic characteristics of marital status, educational status; occupational status and sex with elderly sleep problems. These findings are similar to the results of other studies that have a direct and significant relationship with high incomes, job success, male gender and low age, as well as the desirable quality of sleep (12, 18, 27). A justification regarding age can be due to the low age range of participants due to the fact that they were over 60; however, other studies were conducted with people aged 50 - 93.

This study indicated that sleep problems are related to the gender of the participants; men have better sleep than women. Other studies also emphasized the relationship between gender and quality of sleep, namely, the study of Izadi who mentioned gender as one of the most crucial factors affecting sleep disorder (28). For example, in a study conducted in France, being female, being over 65, being retired, and being alone were certainly associated with sleep disorders (29). In a study in Poland, gender was one of the 4 factors associated with sleep disorders (30). The result of a recent epidemiological study in Japan (31) also showed that the prevalence of sleep disorders and physical and psychological complications is significantly higher in women than in men, and the duration of sleep for men is significantly longer than women. Similarly, women had more

Table 2. The Prevalence of Sleep Problems in Terms of Studied Variables

Variable		Sleep Problems		OR (CI = 95%)	P Value
		Yes	No		
Drugs Affecting the sleep	Yes	65 (38.2)	105 (61.8)	2.08 (1.2 - 48.91)	< 0.01
	No	289 (22.9)	971 (77.1)		
3 months Chronic pain	Yes	324 (26.6)	892 (73.4)	2.22 (1.3 - 48.34)	< 0.01
	No	30 (14)	184 (86)		
Back pain for past 12 months	Yes	280 (31)	622 (69)	2.76 (2.3 - 66.8)	< 0.01
	No	74 (14)	454 (86)		
Urinary Incontinence	Yes	116 (32.2)	244 (67.8)	1.66 (1.2 - 27.16)	< 0.01
	No	238 (2.22)	832 (77.8)		
Depression	Yes	221 (36.4)	386 (63.6)	2.97 (2.3 - 31.8)	< 0.01
	No	133 (16.2)	690 (83.8)		
Metabolic syndrome	Yes	274 (26.5)	759 (73.5)	1.43 (1.1 - 89.8)	0.01
	No	80 (20.2)	317 (79.8)		
Body Mass Index	< 25	107 (23)	359 (77)		0.26
	25 - 29.99	150 (24.4)	466 (75.6)		
	≥ 30	97 (27.9)	251 (72.1)		
High blood pressure	Yes	230 (25.8)	660 (74.2)	1.16 (0.91 - 1.50)	0.23
	No	124 (23)	416 (77)		
Diabetes	Yes	133 (30)	310 (70)	1.48 (1.1 - 15.91)	0.002
	No	221 (22.4)	766 (77.6)		
MMSE	Normal	203 (20.5)	878 (79.5)	2.02 (1.57 - 2.60)	< 0.001
	Impaired	151 (34.3)	289 (65.7)		
Sleeping pills	Yes	140 (45.8)	166 (54.2)	2.08 (1.2 - 48.91)	< 0.01
	No	214 (19)	910 (81)		

Table 3. Average Number of Studied Variables in Terms of Sleep Problems in the Elderly in Amirkola City

Variable	Sleep Problems	Number	Mean ± SD	P Value
MMSE	Yes	354	24.32 ± 3.80	< 0.001
	No	1076	25.71 ± 3.36	
BMI, kg/m ²	Yes	354	27.45 ± 4.57	0.18
	No	1076	27.08 ± 4.53	
GDS	Yes	354	6.11 ± 3.64	< 0.001
	No	1076	3.98 ± 3.21	

“Sleep Initiating Difficulty” and “Sleep Maintaining Difficulty (SMD)”. Therefore, being a female is considered as the underlying factor for the incidence of insomnia (32). The results of this study showed that the age of the individual is related to their sleep; therefore, in elderly people, sleep quality is more undesirable and in middle-aged people it is

more desirable. This finding is consistent with the results of Adib-Hajbaghery et al. (28).

The results of this study indicate that the prevalence of sleep problems is significantly related to the marital status of participants. In other words, the prevalence of sleep problems in married people was significantly lower than

Table 4. Logistic Regression for Evaluation of the Variables Affecting the Sleep Problems in the Elderly in Amirkola City

Variable	OR	CI 95%	P Value
Back pain for past 12 months	1.64	1.17 - 2.28	0.003
Effecting drugs on sleep	1.50	1.02 - 2.18	0.03
Depressive symptoms	1.66	1.24 - 2.22	0.001
75 - 79 years	0.58	0.37 - 0.90	0.01
Chronic disease	1.15	1.06 - 1.25	< 0.001
MMSE	1.59	1.17 - 2.18	0.003

that of single, widowed, or divorced people, which is not consistent with the results of the study of Arasteh et al. (33). This finding can be due to the fact that in the current economic situation, one of the main concerns of married people is to provide the needs of their dependent family, which is usually not a concern for single people. The divorce factor is one of the significant risk factors that contribute to the prevalence of all sleep disorders. Foley et al. (2000) stated that being widowhood is related with an increased risk of sleep disorders in a population above 65 (34). Being alone, divorced, or widowed are among the factors, the positive relationship of which insomnia and sleep disorders is shown in other studies (35).

Level of literacy was one of the determinants of sleep quality. Both in the univariate analysis and logistic regression analysis, a significant relationship was found between sleep quality and literacy level. These tests showed that illiterate participants had lower sleep quality. Friedman's study showed that a delay in sleep and sleep efficiency were related to the level of literacy. Those with a higher education had a shorter delay and their sleep onset and efficiency was higher, which is due to the fact that literate people had a better mental image of sleep efficiency (36). In the study of Moore et al. education had a direct relationship with sleep quality (37). Several researchers also reported that socioeconomic factors such as level of literacy, occupation, and income are not related to sleep quality (36, 38, 39). Illiterate people seem to be less familiar with problem-solving methods; besides, in most cases, the economic situation of the illiterate is inappropriate and hospitalization adds an extra burden on the family's economy.

The prevalence of sleep problems was more in those with chronic illness, which is consistent with the research results of Ayas et al. (40). Perhaps the reason for this is the feeling of despair and hopelessness of the outcome of the treatment, especially in the case of elder patients suffering from chronic illness. It seems that the effect of previous hospitalization on patients' sleep should be further investigated, since the prevalence of chronic diseases in the el-

derly and their frequent hospitalization in the treatment centers can lead to adaptation, and thus, reduce the stress caused by unfamiliar environment of the hospital.

The results of this study showed that there is a statistically significant relationship between diabetes and sleep in the elderly; however, there is no relationship between blood pressure and sleep in the elderly. In many studies, there was a significant relationship between the disease in the elderly such as diabetes and hypertension with sleep (41, 42). While Middlekoop et al. did not observe any significant relationship between health status and quality of sleep (27). There are several reasons for the lack of such relationship; for example, the current research samples were selected among non-hospitalized elderly people who were able to answer questions, so by and large, their general health status were much higher compared to the hospitalized elderly or those who were not able to respond. In addition, self-reporting measures for sleep disorders and health problems may have caused our estimates of health, sleep, or both to be somewhat distant from reality. However, this probability may not take place, due to the fact that the method of data collection in the present study is similar to that of other studies in this field. Moreover, the Pittsburgh instrument is a standard index for evaluating the quality of sleep.

In the present study, the prevalence of sleep disorders in elderly people who had depressive symptoms, pain that lasted more than 3 months, as well as had back pain in the last 12 months was significantly higher than others. Pain is a multidimensional phenomenon with physical, psychological, and social components. Chronic pain is a major problem in chronic physical illnesses. The inadequate treatment of pain leads to disruption in many aspects of life, such as mood function and sleep. It is estimated that between 50% - 80% of patients with chronic non-transient pain have a significant sleep disorder. Research findings also indicated that insomnia and depression have adverse effects on chronic physical illnesses; the main problem is chronic pain (43). Nonetheless, sleeplessness is a sign of major depression, based on the DSM IV criteria. Therefore, it is unclear whether the relationship between pain and insomnia is due to depression or that insomnia has independent or even additional effects. Although the relationship between chronic pain and insomnia is still not well known, the studies that were done on other patient populations showed that sleep disorders are correlated with more pain, higher levels of depression and anxiety, and decreased levels of activity. Sleep disorder in patients with chronic pain can increase pain sensitivity, increase attention to pain, intervene with daily function and produce a permanent cycle, sleep disorder, increasing pain, and depression.

The prevalence of sleep disorder in elderly individu-

als with urine incontinence was significantly higher than other elderly individuals. In Plantinga et al. (44) nocturia was the most common cause of sleep disorders. Nocturia is not often considered a cause of sleep disorder, but this problem can have a significant effect on ones sleep and quality of life (42).

4.1. Conclusions

This study declares the high prevalence of sleep problems in the elderly of Amirkola city. The following factors are among the major ones affecting the prevalence of sleep problems in elderlies from Amirkola city: factors such as marital status, literacy level, occupation, chronic diseases, underlying specific annoying pain, involuntary urination, and taking sleeping pills. Therefore, identification of these factors can have implications for nurses and other individuals in the treatment team, while planning to control insomnia by reinforcing factors and diminishing them as much as possible. Applying effective non-medicinal methods along with training the elderlies to make them aware of the undesirable effects of sleeping pills, it is hoped that their sleep quality improves.

Acknowledgments

We thank the clinical research development unit of Rouhani hospital.

Footnotes

Conflict of Interest: No conflict of interest is declared.

Funding/Support: None.

References

- Gunderson CH, Daroff RB. Neurology in the Vietnam War. *Front Neurosci*. 2016;**38**:201-13. doi: [10.1159/000442657](https://doi.org/10.1159/000442657). [PubMed: [27035455](https://pubmed.ncbi.nlm.nih.gov/27035455/)].
- Ancoli-Israel S, Ayalon L, Salzman C. Sleep in the elderly: normal variations and common sleep disorders. *Harv Rev Psychiatry*. 2008;**16**(5):279-86. doi: [10.1080/10673220802432210](https://doi.org/10.1080/10673220802432210). [PubMed: [18803103](https://pubmed.ncbi.nlm.nih.gov/18803103/)].
- LeBlanc M, Merette C, Savard J, Ivers H, Baillargeon L, Morin CM. Incidence and risk factors of insomnia in a population-based sample. *Sleep*. 2009;**32**(8):1027-37. [PubMed: [19725254](https://pubmed.ncbi.nlm.nih.gov/19725254/)].
- Kim K, Uchiyama M, Okawa M, Liu X, Ogihara R. An epidemiological study of insomnia among the Japanese general population. *Sleep*. 2000;**23**(1):41-7. [PubMed: [10678464](https://pubmed.ncbi.nlm.nih.gov/10678464/)].
- Kaneita Y, Ohida T, Osaki Y, Tanihata T, Minowa M, Suzuki K, et al. Insomnia among Japanese adolescents: a nationwide representative survey. *Sleep*. 2006;**29**(12):1543-50. [PubMed: [17252885](https://pubmed.ncbi.nlm.nih.gov/17252885/)].
- Bazargan M. Self-reported sleep disturbance among African-American elderly: the effects of depression, health status, exercise, and social support. *Int J Aging Hum Dev*. 1996;**42**(2):143-60. doi: [10.2190/GM89-NRTY-DERQ-LC7D](https://doi.org/10.2190/GM89-NRTY-DERQ-LC7D). [PubMed: [8859496](https://pubmed.ncbi.nlm.nih.gov/8859496/)].
- Ohayon MM, Lemoine P. [Sleep and insomnia markers in the general population]. *Encephale*. 2004;**30**(2):135-40. [PubMed: [15107715](https://pubmed.ncbi.nlm.nih.gov/15107715/)].
- Gentili A, Weiner DK, Kuchibhatil M, Edinger JD. Factors that disturb sleep in nursing home residents. *Aging (Milano)*. 1997;**9**(3):207-13. [PubMed: [9258380](https://pubmed.ncbi.nlm.nih.gov/9258380/)].
- Redeker NS. Sleep in acute care settings: an integrative review. *J Nurs Scholarsh*. 2000;**32**(1):31-8. [PubMed: [10819736](https://pubmed.ncbi.nlm.nih.gov/10819736/)].
- Eser I, Khorshid L, Cinar S. Sleep quality of older adults in nursing homes in Turkey: enhancing the quality of sleep improves quality of life. *J Gerontol Nurs*. 2007;**33**(10):42-9. [PubMed: [17955737](https://pubmed.ncbi.nlm.nih.gov/17955737/)].
- Stevens JA, Phelan EA. Development of STEADI: a fall prevention resource for health care providers. *Health Promot Pract*. 2013;**14**(5):706-14. doi: [10.1177/1524839912463576](https://doi.org/10.1177/1524839912463576). [PubMed: [23159993](https://pubmed.ncbi.nlm.nih.gov/23159993/)].
- Zeitlhofer J, Schmeiser-Rieder A, Tribl G, Rosenberger A, Bolitschek J, Kapfhammer G, et al. Sleep and quality of life in the Austrian population. *Acta Neurol Scand*. 2000;**102**(4):249-57. [PubMed: [11071111](https://pubmed.ncbi.nlm.nih.gov/11071111/)].
- Nunes DM, Mota RM, de Pontes Neto OL, Pereira ED, de Bruin VM, de Bruin PF. Impaired sleep reduces quality of life in chronic obstructive pulmonary disease. *Lung*. 2009;**187**(3):159-63. doi: [10.1007/s00408-009-9147-5](https://doi.org/10.1007/s00408-009-9147-5). [PubMed: [19399553](https://pubmed.ncbi.nlm.nih.gov/19399553/)].
- Martikainen K, Hasan J, Urponen H, Vuori I, Partinen M. Daytime sleepiness: a risk factor in community life. *Acta Neurol Scand*. 1992;**86**(4):337-41. [PubMed: [1455978](https://pubmed.ncbi.nlm.nih.gov/1455978/)].
- Marty M, Rozenberg S, Duplan B, Thomas P, Duquesnoy B, Allaert F, et al. Quality of sleep in patients with chronic low back pain: a case-control study. *Eur Spine J*. 2008;**17**(6):839-44. doi: [10.1007/s00586-008-0660-7](https://doi.org/10.1007/s00586-008-0660-7). [PubMed: [18389288](https://pubmed.ncbi.nlm.nih.gov/18389288/)].
- Loo HV, Tan EK. Case-control study of restless legs syndrome and quality of sleep in Parkinson's disease. *J Neurol Sci*. 2008;**266**(1-2):145-9. doi: [10.1016/j.jns.2007.09.033](https://doi.org/10.1016/j.jns.2007.09.033). [PubMed: [17942122](https://pubmed.ncbi.nlm.nih.gov/17942122/)].
- Hsu HC, Lin MH. Exploring quality of sleep and its related factors among menopausal women. *J Nurs Res*. 2005;**13**(2):153-64. [PubMed: [15986316](https://pubmed.ncbi.nlm.nih.gov/15986316/)].
- Onji IM, Bagheri HA, Afazel MR. Sleep quality and its related factors in inpatient elderly of Kashan Hospitals in 2006. *Fez J*. 2008;**12**(4):107-12.
- Torabi S, Shahriari L, Zahedi R, Rahmanian S, Rahmanian K. A survey the prevalence of sleep disorders and their management in the elderly in Jahrom City, 2008. *J Jahrom Univ Med Sci*. 2013;**10**(4):31.
- Sgharpour MA, Ep S. Sleep quality in elderly residents of Kahrizak and its related factors. *Bimonth School Nurs Obstetr Orumiyeh*. 2011;**9**(5):374-83.
- Afkham Ebrahimi A, Bandi G, Salehi M, Tafti K, Vakili Y, Farsi A. Sleep parameters and the factors affecting the quality of sleep in patients attending selected clinics of Rasoul-e-Akram hospital. *Razi J Med Sci*. 2008;**15**(58):31-8.
- Hosseini SR, Cumming RG, Kheirkhah F, Nooreddini H, Baiani M, Mikaniki E, et al. Cohort profile: the Amirkola Health and Ageing Project (AHAP). *Int J Epidemiol*. 2014;**43**(5):1393-400. doi: [10.1093/ije/dyt089](https://doi.org/10.1093/ije/dyt089). [PubMed: [23918798](https://pubmed.ncbi.nlm.nih.gov/23918798/)].
- Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*. 1975;**12**(3):189-98. [PubMed: [1202204](https://pubmed.ncbi.nlm.nih.gov/1202204/)].
- Seyedian M, Falah M, Nourouzian M, Nejat S, Delavar A, Ghasemzadeh HA. Validity of the Farsi version of mini-mental state examination. 2008.
- Washburn RA, Smith KW, Jette AM, Janney CA. The Physical Activity Scale for the Elderly (PASE): development and evaluation. *J Clin Epidemiol*. 1993;**46**(2):153-62. [PubMed: [8437031](https://pubmed.ncbi.nlm.nih.gov/8437031/)].
- Persell SD, Lloyd-Jones DM, Baker DW. Implications of changing national cholesterol education program goals for the treatment and control of hypercholesterolemia. *J Gen Intern Med*. 2006;**21**(2):171-6. doi: [10.1111/j.1525-1497.2006.00323.x](https://doi.org/10.1111/j.1525-1497.2006.00323.x). [PubMed: [16390501](https://pubmed.ncbi.nlm.nih.gov/16390501/)].
- Middelkoop HA, Kerkhof GA, Smilde-van den Doel DA, Ligthart GJ, Kamphuisen HA. Sleep and ageing: the effect of institutionalization on subjective and objective characteristics of sleep. *Age Ageing*. 1994;**23**(5):411-7. [PubMed: [7825489](https://pubmed.ncbi.nlm.nih.gov/7825489/)].

28. Adib-Hajbaghery M, Izadi-Avanji F, Akbari H. Quality of sleep and its related risk factors in hospitalized older patients in Kashan's Hospitals, Iran 2009. *Iran J Nurs Midwifery Res.* 2012;17(6):414-20. [PubMed: 23922581].
29. Tribl GG, Schmeiser-Rieder A, Rosenberger A, Saletu B, Bolitschek J, Kapfhammer G, et al. Sleeping habits in the Austrian population. *Sleep Med.* 2002;3(1):21-8. [PubMed: 14592249].
30. Kiejna A, Rymaszewska J, Wojtyniak B, Stokwiszewski J. Characteristics of sleep disturbances in Poland - results of the National Health Interview Survey. *Acta Neuropsychiatr.* 2004;16(3):124-9. doi: 10.1111/j.0924-2708.2004.00063.x. [PubMed: 26984163].
31. Asai T, Kaneita Y, Uchiyama M, Takemura S, Asai S, Yokoyama E, et al. Epidemiological study of the relationship between sleep disturbances and somatic and psychological complaints among the Japanese general population. *Sleep Biol Rhythms.* 2006;4(1):55-62. doi: 10.1111/j.1479-8425.2006.00197.x.
32. Hugel H, Ellershaw JE, Cook L, Skinner J, Irvine C. The prevalence, key causes and management of insomnia in palliative care patients. *J Pain Symptom Manage.* 2004;27(4):316-21. doi: 10.1016/j.jpainsymman.2003.09.010. [PubMed: 15050659].
33. Arasteh M, Yousefi FJS. Assessment of quality and correlates of sleeping in elderly admitted in Gynecology and Surgery departments. *Med J Mashhad Univ Med Sci.* 2014;57(6):762-9.
34. Foley DJ, Monjan AA, Brown SL, Simonsick EM, Wallace RB, Blazer DG. Sleep complaints among elderly persons: an epidemiologic study of three communities. *Sleep.* 1995;18(6):425-32. [PubMed: 7481413].
35. Ohayon MM, Caulet M, Priest RG, Guilleminault C. DSM-IV and ICSD-90 insomnia symptoms and sleep dissatisfaction. *Br J Psychiatry.* 1997;171:382-8. [PubMed: 9373431].
36. Friedman EM, Love GD, Rosenkranz MA, Urry HL, Davidson RJ, Singer BH, et al. Socioeconomic status predicts objective and subjective sleep quality in aging women. *Psychosom Med.* 2007;69(7):682-91. doi: 10.1097/PSY.0b013e31814ceada. [PubMed: 17766692].
37. Moore PJ, Adler NE, Williams DR, Jackson JS. Socioeconomic status and health: the role of sleep. *Psychosom Med.* 2002;64(2):337-44. [PubMed: 11914451].
38. Adams J. Socioeconomic position and sleep quantity in UK adults. *J Epidemiol Commun Health.* 2006;60(3):267-9. doi: 10.1136/jech.2005.039552.
39. Sekine M, Chandola T, Martikainen P, McGeoghegan D, Marmot M, Kagamimori S. Explaining social inequalities in health by sleep: the Japanese civil servants study. *J Public Health (Oxf).* 2006;28(1):63-70. doi: 10.1093/pubmed/fdi067. [PubMed: 16287708].
40. Ayas NT, White DP, Manson JE, Stampfer MJ, Speizer FE, Malhotra A, et al. A prospective study of sleep duration and coronary heart disease in women. *Arch Intern Med.* 2003;163(2):205-9. [PubMed: 12546611].
41. Yilan L. A Survey on Both Sleep Quality and Sleep Disturbing Factors of Hospitalized Senile Patients [J]. *Shanxi Nurs J.* 2001;3:14.
42. Ancoli-Israel S, Bliwise DL, Norgaard JP. The effect of nocturia on sleep. *Sleep Med Rev.* 2011;15(2):91-7. doi: 10.1016/j.smr.2010.03.002. [PubMed: 20965130].
43. Davison SN, Jhangri GS. The impact of chronic pain on depression, sleep, and the desire to withdraw from dialysis in hemodialysis patients. *J Pain Symptom Manage.* 2005;30(5):465-73. doi: 10.1016/j.jpainsymman.2005.05.013. [PubMed: 16310620].
44. Plantinga L, Rao MN, Schillinger D. Prevalence of self-reported sleep problems among people with diabetes in the United States, 2005-2008. *Prev Chronic Dis.* 2012;9. E76. [PubMed: 22440550].