



## **Prevalence and Associated Factors of Insomnia Syndrome in the Elderly Residing in Kahrizak Nursing Home, Tehran, Iran**

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### **Abstract**

**Background:** As insomnia is common, especially among the elderly in the nursing homes, we aimed to estimate insomnia prevalence among the elderly residing in nursing homes as well as to determine factors associated with insomnia in the elderly.

**Methods:** This cross-sectional study was carried out in 2009 on 772 elderly residents at Kahrizak Nursing Home, Tehran Iran. The information was gathered through 5-part questionnaires by interviewing either the individuals or the nurses in charge and also reviewing the subjects' medical files. Eventually, the necessary data were analyzed using one-way ANOVA and Chi-square tests.

**Results:** The mean age of the participants was  $76.8 \pm 8.05$  years (range, 65 to 107 years). Based on the results, 303 (39.2%) of the elderly, including 86 (34.7%) men and 217 (41.1%) women, had insomnia syndrome. 433 (56.1%) participants complained of difficulty initiating sleep, 357 (46.2%) of disrupted sleep, 362 (46.9%) of early morning awakening, and 313 (40.5%) of non-restorative sleep. Our findings also showed that age ( $P = .004$ ), number of diseases ( $P = .019$ ), motility status ( $P = .017$ ), sleep environment satisfaction ( $P < .001$ ), cognitive status ( $P = .023$ ), and functional autonomy ( $P = .003$ ) were significantly associated with insomnia.

**Conclusion:** Insomnia is a prevalent disorder amongst the nursing home elderly population, especially elderly women, and several pharmaceutical and nonpharmaceutical factors may trigger its occurrence. However, to prevent this problem, further studies are required in Iran and Middle Eastern region to establish a reliable understanding about insomnia patterns, causes, and cures.

**Keywords:** Aged, Insomnia disorders, Nursing home, Sleep Disorders

### **Introduction**

Insomnia is generally explained by a decrease in duration, quality, or efficiency of sleep (1). According to the recent National Institutes of Health Consensus Conference, insomnia is defined as difficulty in initiating or maintaining sleep, early morning awakening with an inability

to fall back asleep, and feeling not rested during daytime after a common period of sleep or non-restorative sleep, in the presence of adequate circumstance for sleep (2, 3).

Recent studies have presented that sleep disturbances in general population may vary from

continuous problems to periodic patterns with the prevalence of 9% and 27%, respectively (4). However, this rate may be relatively higher among the elderly (5-7), especially those living in nursing homes (8,9). For instance, the prevalence of sleep complaints in community-dwelling elderly people was reported to be 20% to 54%, while it was 65% in nursing home residents (10) for being more vulnerable to insomnia, more sensitive to external stimuli, and more easily provoked during sleep (11).

Numerous factors may lead to sleep disturbances in the elderly, especially nursing home residents. Apart from the normal effect of aging that leads to alterations in the circadian rhythm (12), it has been shown that an underlying medical condition, namely depression, anxiety, stress, heartburn, respiratory disorders, Parkinson's disease, dementia, Alzheimer's disease, urinary incontinence, heart failure, cancer, diabetes, etc. can play an important role in occurrence of sleep-related difficulties and sleep pattern alteration in the elderly (13, 14). Medications, such as bronchodilators,  $\beta$ -blockers, methyl dopa, diuretics, theophylline, cimetidine, and phenytoin, prescribed to treat a chronic disease, may also alter sleep patterns of senior residents (14). Nursing home environment may be counted as an important factor as well. It has been seen that it takes time for elderly people to adapt themselves to the level of light, noise, and temperature. Therefore, shared rooms, noise, televisions, and alarms in nursing homes may disrupt their sleep (15).

Insomnia, in turn, may result in loss of concentration, dissatisfaction with sleep, and decrease in the individual's ability to perform important tasks. Long-lasting insomnia may even lead to more severe consequences, such as mistimed naps, loss of track of time, delirium, mental block, cognitive impairments, and increase in accidents and casualties (16).

Increase in number of employed women, raise in life expectancy, growing number of elderly population, and diseases such as Alzheimer and dementia have made keeping the elderly in the

family harder than ever. However, in Iran, unlike many other developing countries, keeping the elderly in nursing homes is a stigma. In the eyes of the Islamic belief, it is a virtue to give services to parents for as long as they live, especially when they are impaired. As a result, the vast majority of the elderly who are sent to nursing homes in Iran are those with unbearable mental or physical impairment.

Recently, many countries have paid special attention to the elderly population's general health as a high priority (17). It is therefore crucial to make efforts to assess insomnia in the elderly population, which can affect global quality of life and impose a heavy load of socio-economic and healthcare expenses on the families, society, and country's healthcare systems (18). To the best of our knowledge, very few studies, with medium-sized sample, have described the sleep disorders among nursing home residents and this study seems to be the first attempt in this regard using such a sample size within Iranian nursing homes.

In this study, we aimed to estimate insomnia prevalence among the elderly residing in nursing homes as well as to determine factors associated with insomnia in the elderly.

## Materials and Methods

### Study Population

This cross-sectional study was carried out between January 2009 and March 2009 on 1200 elderly residents of Kahrizak nursing home, which is the biggest nursing home in Tehran, capital of Iran. Kahrizak Charity Foundation (KCF) is a private, non-governmental, non-profit, and charitable organization where physically handicapped or elderly individuals are being sponsored.

This study was approved by the Ethics Committee of the Islamic Azad University, Tehran Medical Branch as well as Kahrizak Charity Foundation. To begin, the interviewers, who were four general practitioners and were trained

and coordinated to use the unified method of gathering information, referred to Kahrizak nursing home and explained the aim of this research to the residents. Then, the written informed consent was taken from those who intended to participate in the study and had the inclusion criterion of being 65 years or older. Therefore, ones who refused to attend the study and those that were younger than 65 years were excluded from the study.

### **Data Collection**

Eventually, 772 subjects were known eligible for the research. The data collected came from two sources: First, the questions that were prepared beforehand (Appendix 1) were asked by the interviewers either from the individuals themselves or from two nurses who were familiar with the subjects' conditions. Thereafter, the subjects' medical files were also reviewed in case they could not respond due to dementia, speaking problems, and likewise.

The study questionnaire included five parts:

- The first part was demographic questions, including age, gender, and length of stay at the nursing home (3 questions).

- The second part, which was based on an English version of Aikens questionnaire (19), concerned about the participant's underlying disorders and number of diseases he or she had (2 questions). These data were mostly gathered by referring to the participant's medical file.

- The third part was based on Voyer questionnaire (4) and included motility status, benzodiazepine drugs consumption, and duration of sunlight exposure (3 questions).

- The fourth part consisted of two aspects: functional autonomy in doing their chores (6 questions) and cognitive status (7 questions). Each item was rated from 1 to 4 on a Likert-type scale. This part of the questionnaire was extracted and translated from a French version of "Multidimensional observation scale for elderly subjects (MOSES)", which was designed by Helmes et al. (20); it has high reliability as well as good internal consistency of 0.80. This part

of questionnaire was completed based on observing individual's condition and information collected by interviewing the nurse in charge.

- The fifth part had five questions; 4 regarding sleep disorders using DSM-IVR measures (1): difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS) or disrupted sleep (DS), early morning awakening (EMA), and non-restorative sleep (NRS), with four alternatives (never, seldom, often, and always) been set for each criterion; and 1 concerning the nursing home environment. The insomnia sign was considered positive if any of these four questions was marked, but insomnia syndrome was confirmed if either of the DIS, DS, or EMA was present simultaneously with NRS.

### **Statistical Analysis**

Eventually, data were extracted from the questionnaires and analyzed using SPSS software (Statistical Package for the Social Sciences, version 14.0, SPSS Inc, Chicago, Illinois, USA) through statistical methods. Descriptive statistics were reported via mean  $\pm$  SD or counts and percentages. Univariate analysis was performed using one-way ANOVA, Chi-square test, and Odds ratio (OR) plus its 95% confidence interval (95% CI). The simultaneous association of independent variables on probable insomnia was assessed through multiple logistic regressions. *P*-values  $<0.05$  were considered statistically significant.

### **Results**

A total of 772 participants, including 524 (67.9%) women and 248 (32.1%) men, with the mean age of  $76.8 \pm 8.05$  years (range, 65 to 107 years) and the mean length of stay of  $47.3 \pm 46.60$  months were included in this study. Hypertension, diabetes mellitus, neurological, and psychological disorders were detected in 396 (51.3%), 86 (11.1%), 172 (22.3%), and 260 (33.7%) of participants, respectively.

Our findings showed that 303 (39.2%) of the residents of Kahrizak, including 86 (34.7%) men and 217 (41.1%) women, suffered from insomnia syndrome. Based on DSM IV-R measure, 433 (56.1%) participants were classified with difficulty initiating sleep, 357 (46.2%) with difficulty maintaining sleep or disrupted sleep, 362 (46.9%) with early morning awakening, and 313 (40.5%) with non-restorative sleep. Men and women significantly differed only on the early morning awakening factor ( $P = .004$ ).

Our findings also showed that age group ( $P = .004$ ), number of diseases ( $P = .019$ ), motility status ( $P = .017$ ), sleep environment satisfaction ( $P < .001$ ), cognitive status ( $P = .023$ ), and functional autonomy ( $P = .003$ ) were significantly associated with insomnia (Table 1). The elderly in the age range of 75 to 84 years were more at risk of probable insomnia compared to those between 65 and 74 years (Unadjusted OR

= 1.59; 95% CI: 1.16 to 2.18). Moreover, insomnia is less prevalent among those who declared suffering from one or two diseases compared to those with three or more diseases (Table 1). The elderly who had perfect satisfaction of their sleep environment were less at risk of insomnia compared to those without any satisfaction. Furthermore, regarding the cognitive status, subjects with mild impairment suffered more from insomnia compared to those without any impairment (OR: 1.49; 95% CI: 1.10 to 2.00). Besides, subjects with dependency of autonomous functions suffered less from insomnia compared to those with complete independency.

Multiple logistic regressions revealed that age group, sleep environment satisfaction, cognitive status, and degree of dependency were variables with the most significant impact on the sleeping disorders (Table 2).

**Table 1:** Univariate association of insomnia syndrome with general characteristics and risk factors

P-value	Unadjusted OR (95% CI)	Without insomnia, n (%)	With insomnia, n (%)	Variables
0.074	1 1.33 (0.97, 1.82)	162 (65.3) 307 (58.6)	86 (34.7) 217 (41.4)	Gender Male Female
0.004	1 1.59 (1.16, 2.18) 0.92 (0.59, 1.46)	107 (34.5) 158 (45.7) 38 (32.8)	203 (65.5) 188 (54.3) 78 (67.2)	Age group, year 65-74 75-84 ≥ 85
0.350	1 0.75 (0.52, 1.11) 0.95 (0.69, 1.32)	126 (41.2) 61 (34.7) 116 (40.0)	180 (58.8) 115 (65.3) 174 (60.0)	Length of stay, month 0-24 25-48 ≥ 49
0.019	0.98 (0.55, 1.74) 0.65 (0.48, 0.89) 1	32 297 140	26 161 116	No. of diseases None 1-2 > 3
0.950	1.01 (0.64, 1.60) 1	52 (60.5) 417 (60.8)	34 (39.5%) 269 (39.2%)	Diabetes mellitus Yes No
0.064	1.31 (0.98, 1.76) 1	228 (57.6) 241 (64.1)	168 (42.4%) 135 (35.9%)	Hypertension Yes No
0.534	0.89 (0.63, 1.27) 1	108 (62.8) 361 (60.2)	64 (37.2%) 239 (39.8%)	Neurological diseases Yes No

Table 1: Continued...

0.870	0.98 (0.72, 1.32) 1	159 (61.2) 310 (60.5)	101 (38.8%) 202 (39.5%)	Psychological diseases Yes No
0.017	1 1.49 (0.96, 2.32) 1.28 (0.88, 1.88) 0.72 (0.49, 1.07)	206 (61.7) 54 (51.9) 89 (55.6) 120 (69.0)	128 (38.3%) 50 (48.1%) 71 (44.4%) 54 (31.0%)	Motility status Without help With walker With wheelchair Complete bed rest
0.506	1 1.74 (0.62, 4.90) 1.75 (0.68, 4.53)	16 (72.7) 52 (60.5) 401 (60.4)	6 (27.3%) 34 (39.5%) 263 (39.6%)	Exposure to Sunlight Not at all < 10 min > 10 min
0.434	0.87 (0.62, 1.22) 1	120 (63.2%) 349 (60.0)	70 (36.8%) 233 (40.0)	Use of benzodiazepine Yes No
<0.001	1 0.43 (0.31, 0.61) 0.17 (0.11, 0.26)	86 (40.6) 213 (61.2) 170 (80.2)	126 (59.4) 135 (38.8) 42 (19.8)	Sleep environment satisfaction Never Fairly Perfectly
0.023	1 1.49 (1.10, 2.00) 0.90 (0.43, 1.91)	226 (65.3) 218 (55.9) 23 (67.6)	120 (34.7) 172 (44.1) 11 (32.4)	Cognitive status No impairment Mild impairment Severe impairment
0.003	1 0.95 (0.67, 1.33) 0.47 (0.29, 0.77)	112 (57.1) 261 (58.5) 96 (73.8)	84 (42.9) 185 (41.5) 34 (26.2)	Functional Autonomy Independent Slightly dependent Dependent

Table 2: Result of the multiple logistic regression

Variables	Adjusted Odds Ratio	95% Confidence Interval
<b>Age group, year</b>		
65-74	1	-
75-84	1.66	1.18 to 2.32
≥ 85	1.04	0.64 to 1.69
<b>Sleep environment satisfaction</b>		
Never	0.45	0.31 to 0.64
Fairly	0.16	0.11 to 0.26
Perfectly		
<b>Cognitive status</b>		
No impairment	1	-
Mild impairment	1.76	1.26 to 2.45
Severe impairment	1.03	0.45 to 2.34
<b>Functional autonomy</b>		
Independent	1	-
Slightly dependent	0.76	0.52 to 1.11
Dependent	0.40	0.24 to 0.69

**Table 3:** Ten-year cross-cultural comparison of insomnia prevalence in the elderly

#	First Author (Ref)	Year of publication	Place	n	Age or mean	Criteria used	Prevalence (%) male/female
<b>Non-institutionalized</b>							
1	Chiu (28)	1999	Non-Institutionalized Hong Kong, China	1034	70	Consider themselves as having insomnia	8.6/17.5
2	Ohayon (30)	2000	Paris, France	1026	60	Dissatisfied with sleep quality or quantity	11.5/16.0
3	Ohayon (31)	2001	UK, Germany, Italy	2429	65	DIS, DS, EMA, NRS	DIS: 16.0 DS:33.0 EMA:16.0 NRS:11.0 DIS: 13.1 DS:34.1 EMA:11.4 NRS:6.8
4	Ohayon (32)	2002	Italy	728	65	DIS, DS, EMA, NRS	60 to 69 years old:9.5 >70 years old:8.1
5	Morin (23)	2006	Quebec, Canada	213 168	60-69 >70	Often or always having DIS	DIS:30.6 DS:40.0 EMA:35.8 NRS:38.0
6	Mousavi (26)	2008	Tehran, Iran	696	65-90	DIS, DS, EMA or NRS	20.3
7	Gras (33)	2009	Albacete, Spain	424	65-90	Primary Insomnia	DIS: 29.7 EMA:27.5 NRS:35.8 15.92/16.29
<b>Institutionalized</b>							
8	Voyer (4)	2006	Quebec, Canada	2332	65	Sometimes to always DIS, EMA, NRS	60.9
9	Eser (34)	2007	Izmir, Turkey	540	75.49	PSQI	DIS:56.1 DS:46.2 EMA:46.9 NRS:40.5
10	Mousavi (current study)	2009	Tehran, Iran	772	65-107	DIS, DS, EMA or NRS	

\*Part of the Table data are extracted from the study by Dr. M.M. Ohayon (21).

DIS indicates difficulty initiating sleep; DS, disrupted sleep; DMS, difficulty maintaining sleep; EMA, early morning awakening; and NRS, non-restorative sleep.

## Discussion

We have compared our results with other similar studies on the insomnia among the elderly with approximately the same age range. The results have been summarized in Table 3 as a ten-year cross-cultural comparison (21).

Studies on the elderly not residing in nursing homes show a wide range of insomnia preva-

lence, from as high as 54% for women and 35.6% for men in Italy (22) to as low as 8.1% in Canada (23). Some surveys carried out in Sweden (24), the USA (25), and Iran (26) have shown high prevalence of insomnia. On the contrary, some other studies in the USA (27), China (28), Japan (29), France (30), England,

Germany, Italy (31, 32), and Spain (33) were among those showing low insomnia prevalence. Our study reveals a comparatively high prevalence of insomnia amongst the nursing home elderly population (39.2%) which is in line with other studies in the USA (10) and Turkey (34). However, the estimated prevalence is far greater than what has been reported for elderly population in Canada (4). As the general population in nursing homes is mostly composed of those with physical or mental diseases, higher insomnia prevalence has been reported comparing to non-institutionalized subjects. But in the study conducted by Voyer et al., potential participants with a known history of psychiatric disorder were excluded, resulting in an extremely low reported insomnia. However, as reasoned by Voyer et al. the main reason of extreme difference with other studies was due to data acquisition by two nurses with complete knowledge of the residents instead of just referring to their personal profile (4), but it does not justify the difference with our study as the same method was applied in both studies.

Present study showed higher prevalence of insomnia among elderly women (41.1%) comparing to men (34.7%), which is in line with other studies indicating that women spent more time to fall asleep and experienced more disrupted sleep during night sleep (35). Our study also presented a significant relationship between insomnia and age. The elderly in the age range of 75 to 84 years composed nearly 40% of total elderly with insomnia syndrome, which may be due to the population mass in this age range in our study.

Prevalence of diabetes mellitus accelerated with increasing age in both genders in our study. The elderly men and women in the age range of 65 to 70 years constituted nearly 12% of total diabetics, and the prevalence rose to nearly 15% and 13.5% for women and men aged over 80 years, respectively. Although in current study, based on the bivariate analysis, insomnia syndrome was not associated with diabetes ( $P =$

.95), 39.5% of residents with insomnia syndrome were in fact diabetic.

According to a large Iranian survey in 2002, 10.8% of Iranian elderly aged between 60 and 69 years had hypertension (36). Another Iranian survey stated that 28% of men and women aged between 55 and 64 years had raised blood pressure (37). Based on the study in the USA, the prevalence of hypertension was considerably higher among elderly women (71%) and men (55%) (11). Although hypertension was not related significantly with insomnia in our bivariate analysis ( $P = .64$ ), it was close to the value of other studies showing 42.4% of hypertension prevalence among the elderly with insomnia syndrome. It has been pointed out that hypertension cannot be diagnosed in the vast majority of people with insomnia (38).

Our findings indicated that 37.2% and 38.8% of insomniac elderly had neurological and psychological diseases, respectively, which is not in line with some other studies (8, 18). However, neurological and psychological diseases were not significantly associated with insomnia syndrome ( $P = .53$  and  $P = .87$ ). A possible justification for the difference between this study and others may go back to the fact that the elderly with mental problems are being taken care of in a separate center close to Kahrizak. Yet, another reason may be due to the fact that our data regarding mental diseases were mainly taken from medical files; it is therefore possible that minor mental problems had not been reflected in patients' files.

Exposure to sunlight is one of the most applicable and effective therapies which can be done in nursing homes and rehabilitation centers. Many believe that insomnia may be caused due to circadian rhythm disruption (4, 39, 40). In current study, exposure to sunlight did not show meaningful relationship with insomnia syndrome ( $P = .05$ ). However, 60.4% of the elderly with more than 10 minutes of daily sunlight exposure reported as non-insomniac.

Our study also showed that being completely dependent for functional autonomous was

significantly related to having insomnia ( $P = .003$ ), as 26.2% of dependent elderly had insomnia which may be due to unavailable nighttime services for dependent elderly. Studies conducted in Iran reported a rise in the elderly physical problems. One such example is a study on 150 subjects in the age range of 55 to 100 years that referred to rehabilitation clinics. It reported that 63.3% of subjects suffered from coronary artery and respiratory diseases while 54% had musculoskeletal problems (8).

Present study showed a significant association between insomnia and cognitive status ( $P = .23$ ); 44.1% of the elderly with mild impairment did suffer from insomnia. Other studies also support this finding as insomnia can cause severe cognitional disorders in long term (16) and can lead to a wide range of problems like delirium, cognitive disorders, high risk of accidents, and body injuries. As a result, disease screening and finding afflicted individuals can play main roles in increasing welfare and health conditions (41). However, we still have little knowledge of those elderly who never complain about their long-lasting sleeplessness during night.

Our study showed that sleep environment satisfaction had meaningful relationship with insomnia ( $P = .001$ ), and only 19.8% of the elderly with perfect satisfaction of their sleep environment had insomnia syndrome. This figure is much lower comparing to those who were never satisfied with their sleep media and surroundings (59.4%), which show the critical importance of mental and physical satisfaction of sleep environment.

Regarding factors affecting insomnia, our findings revealed that self-health evaluation undeniably affects sleep problems. For instance, ones who rated their general health status as "poor" were four times more at risk of having insomnia compared to those who rated their general health status as "good". This result is similar to that of Aikens and Rouse who have found a significant association between physical health and sleep problems (19).

Polypharmacy in the elderly is a well-known issue. Since many pharmaceuticals cause insomnia as their side effects, drug prescription should be avoided as long as non-medical treatments are available. Should these drugs be given, sedatives must be taken before sleep while stimulants and diuretics must be used during the day. Major drug types known as sleep disturbance-causing agents are bronchodilators,  $\beta$ -blockers, corticosteroids, decongestants, diuretics, cardiovascular, neurologic, psychiatric, and gastrointestinal medications (42). Insomnia and other related problems, in turn, particularly in the elderly, may increase drug consumption which has its own side effects (5). It has been reported that prescribed drugs for treating the elderly physical problems can seriously change sleep and wakefulness pattern leading to difficulty in falling asleep, decrease in depth of the sleep, and occurrence of nightmares (43, 44). In our study, 190 (24.6%) elderly used benzodiazepines as a sedative, but only 36.8% of subjects with insomnia syndrome used this drug type, which did not produce a significant result ( $P = .43$ ). This is compatible with a study by Voyer et al. in which half of the participants were taking benzodiazepines as a short-term medication for their insomnia; but their results were also insignificant in multivariate analysis (4). Many studies proved benzodiazepines as effective drugs for short-term treatment of insomnia either in community-dwelling elderly (45) or in long-term residents (10). However, this type of drug is not a permanent medication for chronic insomnia (46). Shochat et al. believed that a great number of the elderly suffering from insomnia do not receive necessary treatments and therefore are more at risk of physical and mental problems (9). In this regard, for decreasing drug usage, especially benzodiazepines, non-pharmacological treatments such as Cognitive Behavioral Therapy (CBT) are advised (47).

In conclusion, as elderly population is growing all around the world, it is important to keep



them in good physical, mental, and social health condition. Reaching these goals on the one hand and distinguishing high-risk groups among the elderly on the other hand require broader research.

Insomnia is a prevalent disorder amongst the nursing home elderly population. Further studies in this field can certainly help find a pattern to reduce insomnia and improve quality of life in the elderly population, and certainly Iranian society is not an exception. To the best of our knowledge, this study is the first attempt in this regard using such a sample size within Iranian nursing homes and it confirms that still further research must be carried out in Iran and Middle Eastern region to establish a reliable understanding about insomnia patterns, causes, and cures.

### **Ethical considerations**

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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