

# Insomnia and its correlates among elderly patients presenting to family medicine clinics at an academic center

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## Abstract

**Objective:** The objective of this study is to determine the frequency and correlates of insomnia among elderly patients presenting to family medicine clinics at an academic center in Karachi, Pakistan.

**Study design:** This is a cross-sectional study.

**Place and duration of study:** The study was conducted at the Outpatient Family Medicine Clinics at Aga Khan University Hospital between February 2013 and June 2013.

**Methodology:** Patients 60 years old and above were recruited (n=152) through non-probability consecutive sampling. Information was collected on a pretested structured questionnaire on demographics, insomnia symptoms, medical co-morbidities, lifestyle factors and sleep disorders. Data was analyzed on SPSS 19. Proportions and the Chi-Square test were used in the analyses, along with binary logistic regression.

**Results:** The mean age of the participants was 65.68 years, and 38.80% of the participants were male and 61.20% were female. The prevalence of insomnia was 42.1%. It was more common in women than in men (64.10% vs. 35.9%). Increasing age [OR<sub>adj</sub>: 4.54; 95%CI: 1.85-11.17], being divorced/widowed [OR<sub>adj</sub>: 10.26; 95%CI: 2.79- 37.73] and having an average household income of over Rs.50, 000, were significantly related to insomnia. The other factors associated with insomnia were Gastro Esophageal Reflux Disease [OR<sub>adj</sub>: 4.30; 95% CI: 1.67-11.04], depression [OR<sub>adj</sub>: 2.88, 95% CI: 1.13-7.33], caffeine consumption [OR<sub>adj</sub>: 6.50; 95% CI: 2.27-18.57], and cigarette smoking close to bed time [OR<sub>adj</sub>: 4.78; 95% CI: 0.88-25.90].

**Conclusion:** The study showed that older adults with multiple diseases were at high risk of insomnia. Certain life style practices enhanced the risk; hence, physicians should incorporate sleep history and tailor treatment to target both insomnia and related factors to optimize quality of life.

## Introduction

Insomnia, a common complaint among the elderly population, impacts quality of life a great deal.<sup>1</sup> Changes in sleep architecture occur with age but do not result in insomnia per se. Geriatric insomnia is multifactorial and related to underlying co-morbid conditions, psychiatric disorders and certain lifestyle practices.<sup>2</sup> Insomnia results in difficulty in sustaining attention, slow responses, a decrease in cognitive ability, daytime sleepiness and memory impairment. These symptoms not only increase the incidence of falls, fractures and automobile accidents, potentially resulting in long-term morbidity, mortality and utilization of health care resources, but also decrease the pain threshold, which hampers the elderly in accomplishing daily tasks and enjoying family and friends.<sup>3</sup> Insomniacs have shorter survival

and are twice as likely to die of heart attacks and strokes.<sup>4,5</sup>

There is a global demographic aging trend due to advancements in medical technology.<sup>4</sup> As is true elsewhere, the elderly population in Pakistan is increasing. According to the World Health Organization, six percent of Pakistan's population is above 60 years of age, and this percentage is expected to double by the year 2025.<sup>6</sup> Life expectancy has also risen by almost three decades in the last 50 years and will reach 72 years by 2023,<sup>7</sup> hence, there will be a significant elderly population with varying numbers of chronic illnesses and psychosocial issues manifesting in insomnia and vice versa. There is considerable variation in the prevalence of insomnia locally, regionally and internationally.<sup>8</sup> Moreover, insomnia is an under-recognized and under-reported public health issue due to a lack of

awareness among patients as well as limited training of primary care physicians in terms of diagnosing and appropriately managing the condition.<sup>9</sup> This study aims to estimate the actual magnitude of the problem and to determine various correlates of insomnia among the elderly population.

### Methods

This cross-sectional study was conducted from February 2013 to June 2013 at the outpatient family medicine clinics of Aga Khan University Hospital, Karachi, Pakistan. Patients 60 years and above visiting family medicine clinics who consented to participate were recruited through a non-probability consecutive technique. Patients fulfilling the eligibility criteria were approached in the waiting area of the clinic and written informed consent were obtained from them after explaining the study protocol. Elderly patients with dementia or any other mental illness which prevented them from understanding and giving consent were excluded from the study.

Ethical approval was given by the Ethical Review Committee of the Aga Khan University Hospital, Karachi (2185-FM-ERC-12). Written informed consent was obtained from all of the participants. After an extensive literature search and consensus by study investigators, a structured questionnaire was developed and pre-tested on a group of volunteer patients representing 5% of the final sample size. The questionnaire had three parts: Section A dealt with demographic characteristics (age, gender, marital status, employment status, educational level, household monthly income, Body Mass Index [BMI]), Section B included specific insomnia questions based on the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition),<sup>10</sup> and Section C consisted of factors related to insomnia, medical co-morbidities, use of tobacco or/and caffeinated drinks, exercise and intake of sleeping pills and other medications.

The outcome variable insomnia was present in the study if an individual had any one of the below-mentioned symptoms at least three times a week over last three months.<sup>10</sup>

- Difficulty in falling asleep (30 minutes or more),
- Maintaining sleep (three or more nighttime awakenings),
- Early morning awakenings (between 3:00-5:00 am)
- Feeling unrefreshed upon getting up in the morning.

Patients with insomnia were referred back to their primary physician for further evaluation of their sleep problem and co-morbid conditions. The sample size was calculated with the World Health Organization (WHO) software for sample size determination. The prevalence of insomnia and related factors from the literature was found to be in the range of 9.9% to 70%<sup>11,12</sup> using these values with a 95% confidence interval and bound of error of 5%, the sample size computed was 138. After adding 10% for non-responders, the final sample size was 152 study participants.

Data was entered in SPSS version 19 by two different data entry personnel to maintain quality and avoid mistakes in data entering. Baseline information on demographics was analyzed using descriptive statistics. For continuous variables, the means and standard deviations were calculated. Correlates (medical co-morbidities, lifestyle factors) of insomnia among the elderly were identified using binary logistic regression. At the univariate level, co-variables that showed p-values of  $\leq 0.25$  were included in the multivariable analysis for adjustment. Results were reported in the form of adjusted odds ratios, confidence intervals and p-values. All analyses were two-tailed, and p-values of 0.05 or less were considered to be statistically significant.

### Results

There were a total of 152 participants. The demographic characteristics of the study participants are shown in Table 1. Insomnia was present in 64 participants (42.1%), out of which 23 (35.9%) were male and 41 (64.1%) were female.

**Table 1:** Demographic characteristics of study participants ( $n= 152$ )

Variable	n	%
<b>Age (mean age= 65.68 years, SD= 5.86)</b>		
60-65 years	97	63.8%
66 years or more	55	36.2%
<b>Gender</b>		
Male	59	38.8%
Female	93	61.2%
<b>Marital status</b>		
Married	125	82.2%
Widowed/Divorced	27	17.8%
<b>Employment status</b>		
Employed	15	9.9%
Unemployed/Retired/Housewife	137	90.1%
<b>Average household monthly income</b>		
< 10,000	45	29.6%
10,000 to less than 20,000	49	32.2%
20,000 to 50,000	25	16.4%
More than 50,000	33	21.7%
<b>Educational level</b>		
No formal education	39	25.7%
Primary(1-5 years)	44	28.9%
Secondary (6-10 years)	25	16.4%
Intermediate	14	9.2%
Graduate and above	30	19.7%
<b>*BMI( Body Mass Index)</b>		
Below 18.5	39	25.7%
18.5 to 22.9	20	13.2%
23 and above	93	61.2%

\* BMI: Asian cutoffs

Table 2 presents the demographic factors associated with insomnia among elderly. Increasing age [OR<sub>adj</sub>: 4.54; 95%CI: 1.85-11.17], being divorced/widowed [OR<sub>adj</sub>: 10.26; 95%CI: 2.79- 37.73] and having an average household monthly income of over Rs.50, 000 [OR: 16.79; 95%CI: 4.47-63.01] were significantly related to insomnia among the elderly. Gender, educational status, employment status and BMI did not show significant associations.

**Table 2:** Demographic factors associated with insomnia among the elderly

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P-Value
<b>Age</b>			
60-65 years	Ref	Ref	0.001
66 years and more	6.10 (2.95-12.63)	4.54 (1.85-11.17)	
<b>Gender</b>			
Male	Ref	NS	
Female	0.81 (0.41-1.57)		
<b>Marital status</b>			
Married	Ref	Ref	<0.001
Widowed/Divorced	11.71 (3.82-36.30)	10.26 (2.79- 37.73)	
<b>Employment status</b>			
Employed	Ref	NS	
Unemployed/Retired/Housewife	1.06 (0.51-2.18)		

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P-Value
<b>Average household monthly income</b>			
< 10,000	Ref	Ref	<0.001
10,000 to less than 20,000	1.59 (0.61- 4.17)	2.11 (0.69-6.43)	
20,000 to 50,000	5.09 (1.73-14.92)	5.89 (1.60-21.65)	
More than 50,000	17.90 (5.71-56.68)	16.79 (4.47-63.01)	
<b>Educational level</b>			
No formal education	Ref	NS	
Primary(1-5 years)	0.38 (0.14-1.03)		
Secondary (6-10 years)	0.18 (0.06-0.51)		
Intermediate	0.28 (0.09-0.85)		
Graduate and above	0.37 (0.10-1.38)		
<b>*BMI</b>			
Below 18.5	Ref	Ref	0.263
18.5 to 22.9	0.85 (0.26-2.74)	0.38 (0.08-1.74)	
23 and above	1.87 (0.85-4.09)	1.20 (0.44- 3.29)	

\* BMI: Asian cutoffs  
Ref: Reference category

The insomnia symptoms observed among study participants are shown in Table 3. In this study, 12.5% of the elderly participants had one insomnia symptom, 34.4% had two, 31.3% had three and 21.9% had four insomnia symptoms.

Table 3: Frequency of Insomnia symptoms among study participants (n= 152)

Variable	Frequencies & Percentages	
	Yes	No
Insomnia	64 (42.1%)	88 (57.9%)
Difficulty initiating sleep of duration $\geq$ 30 minutes at least three times a week	45 (29.6%)	107(70.4%)
Difficulty in maintaining sleep with $\geq$ three awakenings at least three times a week	51 (33.6%)	101(66.4%)
Early morning awakening (between 3:00-5:00 am) at least three times a week	35 (22.0%)	117(77.0%)
Waking unrefreshed at least three times a week (non-restorative sleep)	37 (24.3%)	115(75.7%)

Table 4: Sleep Disorders related to insomnia among study participants (n=152)

Variables	Insomnia present	Insomnia absent	P-value
Restless leg syndrome	34(68.0%)	16(32.0%)	<0.001
Snoring at night	24(53.3%)	21(46.7%)	0.069
Sleep apnea	9(75.0%)	3(25.0%)	0.016
<sup>e</sup> Circadian rhythm shift	24(88.9%)	3(11.1%)	<0.001

<sup>e</sup>Feeling sleepy early in the evening between 7:00-8:00 pm at least three times a week

The associations of life style factors, co-morbidities and drug usage with insomnia is presented in Table 5. Caffeine consumption [OR<sub>adj</sub>: 6.50; 95% CI: 2.27-18.57] and cigarette smoking close to bedtime [OR<sub>adj</sub>: 4.78; 95% CI: 0.88-25.90] were significantly associated with insomnia. However, factors such as exercise, sleeping pill usage more than once a week and medication usage of more than four drugs daily were not statistically associated with insomnia.

The medical co-morbidities which showed positive associations with insomnia were Gastro Esophageal Reflux Disease (GERD) [OR<sub>adj</sub>: 4.30; 95% CI: 1.67-11.04] p-value 0.002 and depression [OR<sub>adj</sub>: 2.88, 95% CI: 1.13-7.33] p value 0.026. Nevertheless, diseases such as hypertension (p-value= 0.363), arthritis (p-value=0.191), diabetes, respiratory diseases, cardiovascular diseases and previous history of stroke did not show statistically significant relationships with the outcome, i.e., insomnia.

**Table 5:** Life style factors, co-morbidities and drug usage (sleeping pills and other medications) relationships with insomnia among study participants (n= 152)

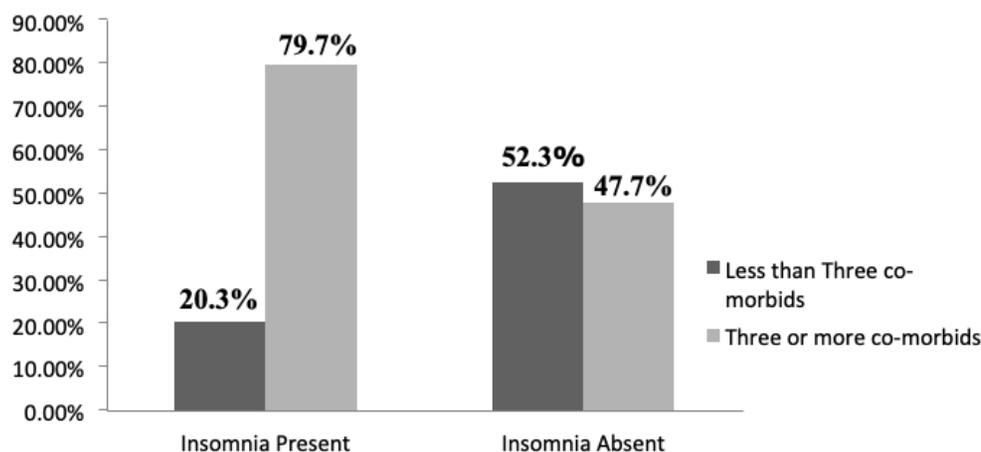
Variable	Insomnia present	Insomnia absent	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P-Value
Caffeine intake within 2 hours prior to going to bed	58(55.8%)	46(44.2%)	8.82(3.45-22.56)	6.50 (2.27-18.57)	<0.001
Cigarette smoking within 2 hours prior to going to bed	2(14.3%)	12(85.7%)	4.89(1.05-22.69)	4.78 (0.88-25.90)	0.062
Exercising >3 times a week for at least 30 minutes <sup>^</sup>	18(40.9%)	26(59.1%)	1.07(0.52-2.18)	NS	
Sleeping pills usage > once a week	16(37.2%)	27(62.8%)	1.32 (0.64-2.74)	NS	
Medication usage >4 drugs daily <sup>§</sup>	60(42.3%)	82(57.7%)	1.09 (0.29-4.06)	NS	
Hypertension	44(37.9%)	72(62.1%)	2.04 (0.96-4.36)	1.52 (0.61-3.79)	0.363
Diabetes	27(32.1%)	57(67.9%)	2.52 (1.30-4.88)	NS	
Heart disease (IHD)	16(35.6%)	29(64.4%)	1.47 (0.71-3.02)	NS	
Respiratory Disease (Asthma, COPD)	11(57.9%)	8(42.1%)	2.07 (0.78-5.50)	NS	
Stroke	3(33.3%)	6(66.7%)	1.48 (0.35-6.18)	NS	
Arthritis	38(61.3%)	24(38.7%)	3.89 (1.96-7.73)	1.79 (0.74-4.28)	0.191
Benign Prostatic Hypertrophy (men)	41(45.1%)	50(54.9%)	2.05 (0.97-4.31)	NS	
Nocturia (women)	23(40.4%)	34(59.6%)	3.63 (1.58-8.37)	NS	
GERD	27(75.0%)	9(25.0%)	6.40 (2.73-14.97)	4.30(1.67-11.04)	0.002
Depression	31(66.0%)	16(34.0%)	4.22 (2.036-8.77)	2.88(1.13-7.33)	0.026

<sup>^</sup> Walking/jogging (aerobics) exercise three or more times a week for at least 30 minutes

<sup>§</sup> Any prescription drugs used for different ailments

NS: Not significant at a p-value of 0.05

**Figure 1:** Relationship between co-morbid conditions and insomnia among study participants (n= 152)



There was a statistically significant relation of comorbid conditions and insomnia among elderly (p-value <0.001).

## Discussion

The aim of this study was to estimate the burden of insomnia among the elderly and the factors related to it. To date, there have been limited studies conducted in Pakistan highlighting insomnia in the context of its factors. The results of this study suggest that 42.1% of the participants met the criteria of insomnia.

The prevalence of insomnia reported in literature shows wide variation. In Asia, studies on the Chinese ageing population show that 6-41% of the elderly experience insomnia.<sup>13</sup> In Egypt, 50% of the patients older than 60 years old had insomnia.<sup>14</sup> An Iranian study conducted in six hospital clinics with 696 individuals reported a much higher prevalence rate of 62.1%.<sup>15</sup> Previous local studies in which insomnia was used as a variable have reported insomnia rates in the elderly of between 25.5% and 34.8%.<sup>16,17</sup> This variance in the prevalence of insomnia appears to be the result of the lack of standardization in the classification of insomnia. Moreover, even when using the same classification system, prevalence rates have varied between 10-37% because of differences in the frequency of occurrence of symptoms and length of time over which they are assessed.<sup>18</sup> In the current study, one out of four insomnia symptoms occurring at least three times a week was used to categorize insomnia, which, in itself, is a strict criterion.

Factors which showed increased risk of insomnia among the elderly included: increasing age, being divorced/widowed, consuming caffeine and smoking cigarettes two hours before bedtime and having comorbidities such as GERD and depression.

Studies suggest that there is a strong association between age and insomnia, which is evident from the study results. In this study, increasing age [OR<sub>adj</sub>: 4.54; 95%CI: 1.85-11.17] was found to be a risk factor for insomnia among the elderly. However, epidemiological studies of three communities of elderly people with 9,000 participants concluded that the aging process itself was not responsible for insomnia but that chronic medical conditions, depressed moods, and perceived health status were responsible for incident insomnia.<sup>19</sup> Similarly, another study carried out by Tsou in Taiwan found that aging was associated with a decreased risk of insomnia, even after controlling for

covariates.<sup>13</sup> Therefore, age itself may not be a contributing factor to insomnia in otherwise healthy elderly people, and the relationship between insomnia and age could be explained by other factors.

A survey by the American National Sleep Foundation (NSF) revealed that approximately two thirds of the participants with insomnia had four or more medical conditions, whereas one third of the participants reporting insomnia had no associated medical conditions.<sup>20</sup> The current study has also demonstrated similar results, as 79.7% of insomniacs had three or more comorbidities, compared to 20.33% of those who reported insomnia having less than three co-morbid conditions. In the current study, the results were not statistically significant with respect to commonly occurring comorbidities, such as diabetes, hypertension and arthritis. Statistically insignificant associations were also found with previous history of stroke and cardiovascular and respiratory diseases, which could be attributed to the sample being collected in the primary care set up, where there are relatively smaller numbers of patients with these comorbidities.

A study conducted on the American general population by Ohayon concluded that insomnia was significantly associated with chronic pain, restless leg syndrome, obstructive sleep apnea, circadian rhythm shift (advanced sleep phase syndrome), GERD, and nocturia.<sup>21</sup> Similar associations were also revealed by the 2005 NSF poll.<sup>22</sup> These results are consistent with the current study, with the exception of nocturia, as it did not have a significant relation with insomnia. A strong association was observed between depression and insomnia [OR<sub>adj</sub>: 2.88, 95% CI: 1.13-7.33] in the current study, and this relation has been found in several other studies, as well.<sup>14,15</sup> Previous studies suggest that women are more likely to experience insomnia throughout their lives.<sup>12,13</sup> Similar results have been found in this study, as insomnia was more common among women as compared to men (61.2% vs. 38.8%). Earlier studies have shown a positive association between being divorced/widowed and insomnia,<sup>11-13</sup> the same trend was observed in this study as well. In the literature, insomnia has been reported to be more prevalent among those with less education, in lower income groups and who are unemployed or retired.<sup>12,15</sup> However, in

this study, we found contrasting results, as insomnia was more prevalent among graduates (31.3%) and the relatively affluent group (>50,000 rupees monthly income), whereas employment status was not statistically related to insomnia (p-value=0.86). The reason for this non-association could be because a high proportion of women in the current study were homemakers.

A Malaysian study published in the *Asia-Pacific Journal of Public Health* reported that consuming caffeinated beverages and smoking cigarettes close to bedtime increases the risk of insomnia.<sup>11</sup> This is congruent with our study results, as 20.3% of the insomniacs were consuming caffeinated beverages close to bedtime. Similarly, smoking within two hours prior to going to bed was marginally associated with insomnia (p-value=0.062). This trend may have been observed because a limited number of elderly reported of smoking (13 or 8.6%). Evidence suggests that long-term use of sleeping pills leads to rebound insomnia due to the eventual loss of their therapeutic effect.<sup>11</sup> This phenomenon was not observed in the current study, as few participants reported sleeping pill usage of more than once a week (25.70% vs. non-users at 74.3%). Insomnia could be a side effect of many drugs used to treat other medical problems. A study conducted among elderly Taiwanese showed that taking four or more prescription drugs daily for other co-morbid conditions resulted in insomnia in 74.3% of the participants,<sup>13</sup> and a similar association of insomnia with an increasing number of drugs for various medical problems was seen in a study conducted on Egyptian community-dwelling elders.<sup>14</sup> Nonetheless, such associations were not observed in the current study.

This study has several potential limitations. Since the respondents of the study were limited to those utilizing the family medicine clinics at a single teaching hospital, the sample may not be representative of the entire elderly population. This was a cross-sectional study; therefore, causality cannot be established. In this study, we did not use a validated questionnaire, which can lower the credibility of the study. Moreover, to reduce the chances of recall bias, the participants were asked

about their symptoms over the previous three months, as proposed in the *Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM V)*.<sup>10</sup> In addition, we have not inquired about the duration of sleeping pills usage among the study participants, which might have led to statistically insignificant results in the current study.

Further longitudinal studies are needed to identify the nature and direction of the relationship between insomnia and its correlates and the long-term impact on sufferers and the health care system.

### Conclusion

The findings of the current study show that insomnia is a common complaint among elderly people. Increasing age; being divorced/widowed; having underlying medical conditions, such as depression and GERD; and consumption of caffeinated beverages and cigarette smoking close to bedtime puts the elderly at increased risk of insomnia. The impairment in social and occupational functioning resulting from disturbances in sleep should be further assessed.

In order to address this important issue, primary health care needs to be reoriented, and primary health care physicians ought to be trained to screen older individuals for insomnia and create awareness among this population to seek timely help for insomnia and not assume it is a natural part of aging.

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### Conflicts of interest

The authors do not have any potential conflicts of interest.

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