ORIGINAL RESEARCH

Insomnia: Prevalence, risk factors, and its effect on quality of life among elderly in Zagazig City, Egypt

Eman Shokry Abd Allah[1], Hassanat Ramadan Abdel-Aziz[1], Amany Rashad Abo El-Seoud[2]

1. Faculty of Nursing, Zagazig University, Zagazig, Egypt. 2. Faculty of Medicine, Zagazig University, Zagazig, Egypt.

Correspondence: Eman Shokry Abd Allah. Address: Faculty of Nursing, Zagazig University, Zagazig, Egypt. Email: emanshokry2012@yahoo.com

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Abstract

Background: Insomnia is a highly prevalent complaint among elderly; it is associated with significant morbidity and is often a persistent problem, particularly in older adults. Aim of the study: The present study aimed to determine the prevalence and risk factors of insomnia and its effect on quality of life among elderly.

Design: a cross-sectional descriptive design was utilized to conduct this study. Sample: a stratified random sample of 107 elderly subjects attending the two geriatric social clubs in Zagazig city. Tools: Four tools were used in the present study; a structured interview questionnaire, Athens insomnia scale, The Geriatric Depression Scale: short form, and The Medical Outcomes Study Short Form Health Survey (SF-36).

Results: The prevalence of insomnia among the studied elderly was 33.6%, while difficulty initiating sleep was the most prevalent insomnia symptoms among them. Unmarried status, depressive status, smoking, eating before bedtime, daytime long naps, irregular sleep hours were significantly associated with insomnia. Suffering from asthma, nocturia, apnea, and total number of daily medications were significantly associated with insomnia. Insomniac elderly had significantly lower scores in all quality of life domains, except the social functioning domain.

Conclusion: One-third of the studied elderly was suffering insomnia which was associated with many different factors. Insomnia was associated with worse quality of life in older adults. Recommendations: Health instructions and educational programs should be conducted for elderly individuals with insomnia to improve their sleeping pattern and quality of life.

Key words

Insomnia, Prevalence, Risk factors, Quality of life, Elderly

1 Introduction

Aging population is a worldwide phenomenon reflecting the increase in life expectancy. By 2030, One billion people, representing 1 in 8 people globally, will be over 65 years old [1]. In Egypt, the number of older persons reached 5.8 million in 2011 and was estimated 7.3% of total population, and it is expected to increase to 11.6% in 2030 due to the development of health services [2]. In this rapidly expanding older portion of the population, one of the major changes that commonly accompany the aging process is an often profound disruption of an individual's daily sleep-wake cycle [3].

Sleep is a vital physiological process with important restorative functions [4]. However, significant quantitative and qualitative sleep-related changes occur with aging. Sleep disorders and sleeping difficulties are among the most pervasive

and poorly addressed problems of aging. Getting enough sleep can have a significant impact on daily function, alertness, and overall quality of life [5]. Several studies have demonstrated that sleep problems may lead to substantially impaired health, cognitive decline, and reduced quality of life (QOL) [6, 7].

Insomnia is defined as difficulty initiating sleep, difficulty maintaining sleep, morning awakening, or sleep that is chronically non-restorative or poor in quality associated with daytime impairment such as fatigue, memory impairment, social or vocational dysfunction, or mood disturbance [8]. Insomnia is the number one sleep disorder complaint in older adults. Clinically significant insomnia is accompanied by significant distress or impairment that occurs for at least 1 month [5]. Epidemiological studies show that the prevalence of insomnia increases steadily with age. About 20% of persons aged 65 years and older experience significant and persistent insomnia [9]. In Egypt, a recent study found that 33.4% of elderly people in Alexandria experienced insomnia [10]. Also another study in Egypt found that the prevalence of insomnia among institutionalized older people in Cairo was 36.4% [11].

With age, several changes occur that can place one at risk for sleep disturbances including increased prevalence of medical condition, increased medications use, age related changes in various circadian rhythms, and environmental and life style changes [12]. Insomnia is generally classified as primary or secondary to some underlying cause. Common causes of primary insomnia include irregular sleep patterns, jet lag, poor sleep hygiene, excessive caffeine intake, excessive alcohol, certain medications, and stress. Primary insomnia is usually not associated with a medical or psychiatric condition. Secondary insomnia occurs most frequently in the older adult with medical or psychiatric disorders [13].

Insomnia impairs the individual functioning and diminishes the quality of life, as it is associated with low scores of mental and physical component summary of quality of life. Also insomnia increases the risk of falls and accidents especially during hospitalization and in nursing home placement. Insomnia is the most important predictor of perceived anxiety and depression. Insomnia is a costly medical condition and associated with increased health service utilization [11].

The ability to maintain a satisfying QOL is an important aspect of aging successfully. Unfortunately, sleep problems increase in prevalence with advancing age due to a variety of factors. Research suggests that these sleep problems can negatively impact QOL in the older adult, particularly mood, cognition, and functional status. Several population based studies suggest that the effects of sleep on QOL may be even more important in older versus younger adults, and several population-based studies have demonstrated an association between impaired sleep and worse performance QOL in the older adult [14].

The nurse who provides care for older adults plays a central role in reducing the negative consequences of insomnia through a systematic approach for diagnosis, evaluation, and management of insomnia. Effective management of insomnia is necessary for improved quality of life, which is a primary issue for the elderly and their families. Therefore, insomnia among elderly warrants thorough attention from nurse who provides care for older adults [15].

1.1 Significance of the study

The increase in the older population is seen world-wide. Older people are at particular risk of insomnia. Insomnia is a significant problem and studies investigating insomnia and its effect on QOL among Egyptian elderly people are scarce. So, this study was conducted to determine the prevalence and risk factors of insomnia among a sample of elder Egyptian population and study its effect on their QOL.

1.2 Aim of the study

The present study aimed to determine the prevalence and risk factors of insomnia and its effect on quality of life among elderly persons attending geriatric social clubs in Zagazig City.

1.3 Research questions

- What is the prevalence of insomnia among the elderly persons attending geriatric social clubs in Zagazig City?

- What are the risk factors of insomnia among the elderly persons who are affected by insomnia?
- Does insomnia affect the quality of life of the affected elderly group?

2 Subjects and method

2.1 Research design

A cross sectional descriptive design was used to conduct this study.

2.2 Study settings

The study was conducted in two settings. The first setting was the geriatric social club in El-Qawmia in Zagazig City, and the second setting was the geriatric social club in El-Hokamaa in Zagazig City. These two clubs are the only geriatric social clubs present at Zagazig City and provide recreational and social services in addition to some medical care at low cost for the elderly.

2.3 Subjects

The study sample comprised 107 elderly persons from the above mentioned settings provided that the subjects were: (a) 60 years and older; (b) free from communication problems (speech and hearing problems); and (c) accept to participate in the study.

2.4 Sample size

The sample size was calculated using EPI Info software program version 6.04. It was based on the prevalence of insomnia among elderly in previous studies, which ranged between 15% and 35% according to Buysse *et al.* [16]. The sample size was calculated to estimate a prevalence of 25% or higher, with 4% standard error, at 95% level of confidence and a population correction for a finite population since the elderly population attending the two geriatric social clubs in Zagazig city was 713. Accordingly, the required sample size was 97. This was increased to 107 to compensate for any missing data at a rate of about 10%.

2.5 Sampling technique

A stratified random sampling technique was used in the recruitment of this study subjects. ***First stratum*** *(clubs)***:** Based on the records of the two geriatric social clubs, the total population of the first club was 451, and 262 in the second. So the total population (N) was 713 elderly and the calculated sample size (n) was 107 elderly subjects. Hence, a proportionate sample was recruited from the two clubs in a ratio of 64: 36. So, the numbers of elderly taken from the first and second clubs was 68 and 39, respectively. ***Second stratum*** *(gender)***:** This stratification was done to ensure that females and males are proportionately represented in the study sample. Proportionate allocation was done in each of the first strata in order to ensure that the number of units selected for the sample from each stratum is proportionate to the numbers of males and females in the population. The ratio of females to males in the first club was nearly 3: 2; hence the numbers of females and males taken from the First club were 41 and 27, respectively. In the second-club, the percentage of females and males was 56:44. So, the numbers of females and males taken from the second club were 22 females and 17 males. The researchers used simple random sampling technique to select sample from each of the four strata in the two clubs.

2.6 Tools for data collection

Tool I: A structured interview questionnaire: It was developed by the researcher to collect the necessary data. It consisted of four parts:

> **Part 1: Demographic characteristics of the Elderly people:** Entails data about demographic characteristic of the studied elderly such as; age, sex, educational level, residence, and marital status.

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Part 2: History of chronic diseases and medication used to take daily: This part was concerning with medical history of the elderly. It involved questions about number and type of chronic diseases, and the number of medication used to take daily.

Part 3: Habits among Elderly before Sleeping: This part assessed the habits practiced by the elderly before sleeping such as smoking, drinking tea, and eating too close to bedtime, as well as problems during sleep as reported by the elderly such as: cough, nocturia, snoring, and apnea.

Part 4: Environmental factors that could affect sleeping: This part was concerning with environmental factors that affect sleeping such as: excessive light, sound, and temperature variation.

Tool II: Athens insomnia scale (AIS): This scale was developed by Soldatos *et al.* [17] for the assessment of insomnia through a detailed sleeping history during the last month. It consists of eight items. The first five items cover night-time symptoms of insomnia (difficulty initiating sleep, difficulty maintaining sleep and early morning awakening, total sleep period, and overall quality of sleep), while the last three items ask for daytime consequences of disturbed sleep (problems with sense of well-being, overall functioning, and sleepiness during the day).The scale is a useful screening tool in reliably establishing the diagnosis of insomnia [18]. ***Scoring system:*** The eight items of the AIS were rated from zero to 3, (with 0 corresponding to no problem at all and 3 to very serious problem. The elderly subjects are asked to grade the severity of these complaints (absent = 0, mild = 1, severe = 2, and very severe = 3). Elderly subject who had a total score 6 points or higher was considered as a positive case for insomnia [18].

Tool III: The Geriatric Depression Scale: short form (GDS: SF): This scale was developed by Sheikh and Yesavage [19] as a basic screening measure for depression in older adults. The GDS: SF consists of 15 questions taking only 5-7 minutes to administer. The validity and reliability of the tool have been supported through both clinical practice and research. ***Scoring system:*** The GDS: SF consists of 15 questions requiring "yes" or "no" answers. Of the 15 items, 10 indicate the presence of depression when answered positively, while the rest (question numbers 1, 5, 7, 11, 13) indicate depression when answered negatively. A score higher than five suggests depression. Scores exceeding ten are almost always depression [19].

Tool IV: The Medical Outcomes Study Short Form Health Survey (SF-36): This 36-item generic QOL measure was developed by Ware and Sherbourne [20] and has proven useful in comparisons of the relative burden of different diseases. It was used in this study to assess the impact of insomnia on QOL. The tool assesses 8 domains through 36 questions: (1) physical functioning (PF); (2) role limitation due to physical health problems (RP); (3) bodily pain (BP); (4) general health perceptions (GH); (5) Vitality (VT); (6) social functioning (SF); (7) role limitations due to emotional health problems (RE); and (8) mental health (MH). The SF-36 is well validated and has been used widely all over the world, including in older populations. It has been the generic QOL measure most often used in insomnia studies [21]. ***Scoring system***: The SF-36 consists of 36 questions, 35 of which are compressed into eight multi-item scales. The scales are assessed quantitatively, each on the basis of answers to two to ten multiple choice questions, and a score between 0 and 100 is then calculated on the basis of well-defined guidelines, with lower scores indicating greater impairment in health status, or QOL and higher scores indicating better functioning [22].

2.7 Preparatory phase

Based on review of the current local and international literature about insomnia using books, web sites, articles, and magazine, the researchers prepared the data collection tools including demographic data and medical history sheet, habits among elderly before sleeping and environmental factors affecting sleeping sheet, Athens Insomnia Scale, Geriatric Depression Scale Short Form, and QOL scale (SF-36).

2.8 Content validity

The tools were tested for content validity by five experts from the Faculty of Nursing (Community and Psychiatric Nursing Departments) and Faculty of Medicine (Community Medicine Department). These experts assessed the tool for clarity, relevance, comprehensiveness, applicability, and understanding. All recommended modifications in the tools were done.

2.9 Pilot study

Before performing the main study, a pilot study was carried out on 11 elderly attended to the geriatric social club in El-Qawmia in Zagazig City, constituting about 10 percent of the total study sample. The purpose of pilot was to test the questions for any ambiguity, and to assess the practicability and feasibility of using the structured interview questionnaire sheet for the elderly. It also helped the researcher to determine the time needed for filling out the forms. The pilot study served to assess the reliability of the three scales used through testing their internal consistency. Their reliability proved to be high as shown by the values of Cronbach alpha coefficient (0.826 for Athens Insomnia Scale, 0.829 for Geriatric Depression Scale, and 0.817 for QOL scale (SF-36)). Those who shared in the pilot study were not included in the main study sample.

2.10 Ethical consideration

An informed consent for participation in the study was taken verbally from elderly persons after full explanation of the aim of the study. They were informed that their participation in this study was voluntarily. The elderly persons were given the opportunity to refuse participation, and they were notified that they could withdraw at any stage of the data collection without giving any reason. The subjects were also assured that any information collected would be confidential and used for the research purpose only. Also the study protocol and tools were approved by the Faculty Ethical Committee.

2.11 Field work

Once permission was granted to proceed with the study, the researcher visited the study settings and met with the elderly subjects. The purpose of the study was explained to each elderly individually, and then the elderly was invited to participate in the study. Upon agreement to participate, the researcher started the interview with each elderly individually using the data collection tools. The average time to complete the interview questionnaire and other three tools was 30-40 minutes. Data were collected through four months, starting from 1st. July 2012 to the end of October 2012. Work was done three days per week from 10 am to 3 pm.

2.12 Administrative design

Permission to conduct the study was obtained by submission of official letters issued from the Dean of the Faculty of Nursing at Zagazig University to the Undersecretary of the Ministry of Social Solidarity in Sharkia governorate and to the directors of the two geriatric social clubs in Zagazig City. The researchers visited these two settings, met with the directors of the two clubs, explained to them the study aim and the importance of the study and its procedures, and asked for their cooperation.

2.13 Statistical design

Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Quantitative continuous data were compared using the non-parametric Kruskal-Wallis or Mann-Whitney tests as normal distribution of the data could not be assumed. Qualitative categorical variables were compared using chi-square test. Spearman rank correlation was used for assessment of the inter-relationships among scales and quantitative variables and ranked ones. Statistical significance was considered at $p < .05$.

3 Results

Table 1 shows that the age of the elderly in the study sample ranged between 60 and 83 years, with mean 66.8±5.0 years, with higher percentage of women (58.9%). Approximately one-third of the elderly was having secondary education (30.8%), while more than two-fifth of them (41.1%) were having university education. Slightly more than half of the elderly (52.3 %) were currently unmarried, and the majority of them had children (92.5%). Almost all of them were not working (95.3%) and residing in urban areas (91.6%), and mostly lived with others (64.5%). For almost all of them, the main source of income was the retirement pension (96.3%), and this income was sufficient (62.6%). Table 1, also

illustrates that the majority of the studied elderly (85%) were having chronic diseases, and were on medications (83.2%). The diseases were mostly hypertension (57.9%), arthritis (40.2%), and diabetes (37.4%). Concerning depression, approximately one-third of the studied elderly (32.7) were suffering from the symptoms of depression.

Table 1. Demographic and medical characteristics of the elderly in the study sample (n = 107)

Items	Frequency	Percent
Club:		
El-Qawmia	68	63.6
El-Hokamaa	39	36.4
Age (years):		
60<65	43	40.2
65+	64	59.8
Range 60.0-83.0		
Mean±SD 66.8±5.0		
Gender:		
Male	44	41.1
Female	63	58.9
Residence:		
Rural	9	8.4
Urban	98	91.6
Marital status:		
Unmarried (divorced, widowed, single)	56	52.3
Married	51	47.7
Education:		
Illiterate/read and write	15	14.0
Basic	15	14.0
Secondary	33	30.8
University	44	41.2
Current Job status:		
Not working	102	95.3
Working	5	4.7
Have children:		
No	8	7.5
Yes	99	92.5
Living:		
Alone	38	35.5
With others	69	64.5
Income source:		
Pension	103	96.3
Aids	4	3.7
Income:		
Insufficient	19	17.8
Just sufficient	67	62.6
Sufficient and saving	21	19.6
Have chronic diseases:	91	85.0
Mean ± SD 1.7±1.1		
Hypertension	62	57.9
Arthritis	43	40.2
Diabetes	40	37.4
Cardiac	14	13.1
Hepatic	5	4.7
Asthma	4	3.7
Neuropsychiatric	4	3.7
Chest disease	3	2.8
Renal disease	2	1.9
Depression symptoms	35	32.7
On medications		
Mean ± SD 2.9 ± 2.6	89	83.2

Concerning the environmental problems affecting night sleep, Table 2 indicates that more than half of the elderly (54.2%) were suffering from hot weather, and slightly less than one-third of them (30.8%) were having another person in the same bedroom. Habits done before bedtime were mostly eating (32.7%), drinking tea (22.4%), and smoking (11.2%). Bad sleep habits were mostly irregular sleep time (47.7%), using bed in other activities (37.4%), and having long daytime naps (31.8%). Concerning the problems reported during sleep, Table 2 demonstrates that the most common problems reported were nocturia (86.9%), followed by snoring (14%), and pain and apnea (9.3% each).

Table 2. Environmental factors, different habits among elderly, and problems during sleep as reported by the elderly in the study sample (n = 107)

Items	Frequency	Percent
Environmental factors		
Hot weather	58	54.2
Another person in same room	33	30.8
Another person in same bed	28	26.2
Noise	22	20.6
Uncomfortable bed	6	5.6
Cold weather	3	2.8
High lighting	1	0.9
Smoking:		
Never	86	80.4
Yes	21	19.6
Habits done before bedtime:		
Eating	35	32.7
Drinking tea	24	22.4
Smoking	12	11.2
Drinking cola	8	7.5
Drinking coffee	5	4.7
Exercising before bedtime	2	1.9
Bad Sleep habits:		
Irregular sleep time	51	47.7
Daytime long naps	34	31.8
Use bed in other activities (TV, reading, etc.)	40	37.4
Problems during night sleep:		
Cough	7	6.5
Pain	10	9.3
Nocturia	93	86.9
Snoring	15	14.0
Bad dreams	6	5.6
Apnea	10	9.3

Figure 1 demonstrates that the prevalence of insomnia among the studied elderly was 33.6% according to the Athens scale of insomnia, the median score was 5. Figure 2 indicates that difficulty initiating sleep (DIS) was the most prevalent insomnia symptoms among the studied elderly (58.4%), followed by difficulty maintaining sleep (DMS) (53.5%), and early morning awakening (EMA) (26%).

Table 3 demonstrates that the only statistically significant association between insomnia and elderly sociodemographic characteristics was the current marital status ($p = .03$).

Concerning the relationship between insomnia and elderly medical history, Table 4 points to statistically significant associations between insomnia and asthma ($p = .01$), and the number of medications ($p = .004$). Concerning the relation between insomnia among elderly and the depression symptoms, the same table indicates a statistically significant association between insomnia and depression symptoms ($p < .001$).

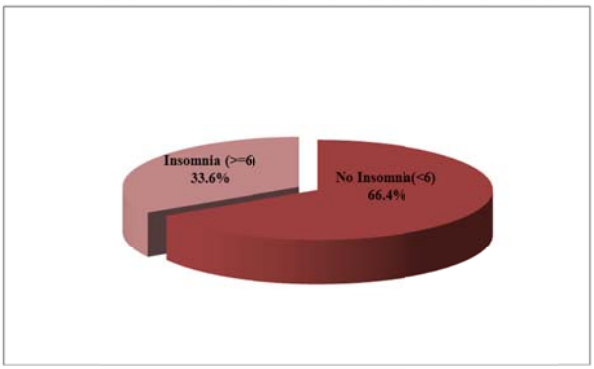

Figure 1. Prevalence of insomnia among the studied elderly (n = 107)

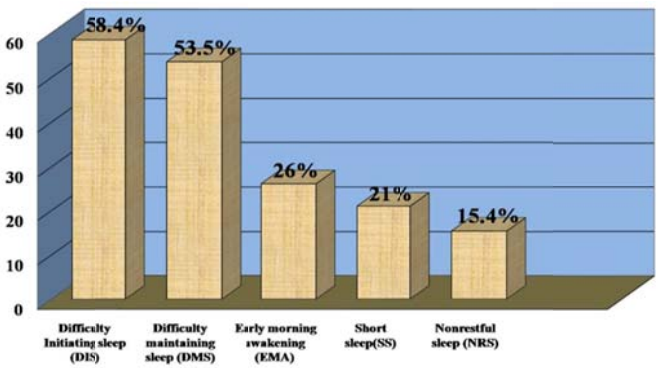

Figure 2. Prevalence of insomnia symptoms among the studied elderly (n = 107)

Table 3. Relation between insomnia among elderly and their demographic characteristics

Items	Insomnia				X^2 /Fisher's Exact Test**
	Absent		Present		
	No.	%	No.	%	*p*
Club:					
El-Qawmia	46	64.8	22	61.1	0.71
El-Hokamaa	25	35.2	14	38.9	
Age (years):					
60<65	30	42.3	13	36.1	0.54
65+	41	57.7	23	63.9	
Gender:					
Male	30	42.3	14	38.9	0.74
Female	41	57.7	22	61.1	
Residence:					
Rural	7	9.9	2	5.6	0.71[a]
Urban	64	90.1	34	94.4	
Marital status:					
Unmarried (divorced, widowed, single)	32	45.1	24	66.7	0.03*
Married	39	54.9	12	33.3	
Education:					
Illiterate/read and write	10	14.1	5	13.9	0.46
Basic /Secondary	29	40.8	19	52.8	
University	32	45.1	12	33.3	
Current Job status:					
Not working	68	95.8	34	94.4	1.00[a]
Working	3	4.2	2	5.6	
Have children:					
No	7	9.9	1	2.8	0.26[a]
Yes	64	90.1	35	97.2	
Living:					
Alone	23	32.4	15	41.7	0.34
With others	48	67.6	21	58.3	
Income source:					
Pension	69	97.2	34	94.4	0.60
Aids	2	2.8	2	5.6	
Income:					
Insufficient	11	15.5	8	22.2	0.54
Just sufficient	47	66.2	20	55.6	
Sufficient and saving	13	18.3	8	22.2	

(*) Statistically significant at $p < .05$ ** Chi square test used unless indicated

[a] Fisher's exact test

Table 4. Relation between insomnia among elderly and their medical history

Item	Insomnia				X^2 /Fisher's Exact Test** *p*
	Absent		Present		
	No.	%	No.	%	
Have chronic diseases					
No	12	16.9	4	11.1	0.43
Yes	59	83.1	32	88.9	
Hypertension					
No	31	43.7	14	38.9	0.64
Yes	40	56.3	22	61.1	
Diabetes					
No	48	67.6	19	52.8	0.13
Yes	23	32.4	17	47.2	
Cardiac					
No	65	91.5	28	77.8	0.07[a]
Yes	6	8.5	8	22.2	
Arthritis					
No	42	59.2	22	61.1	0.85
Yes	29	40.8	14	38.9	
Chest disease					
No	69	97.2	35	97.2	1.00[a]
Yes	2	2.8	1	2.8	
Renal disease					
No	70	98.6	35	97.2	1.00[a]
Yes	1	1.4	1	2.8	
Asthma					
No	71	100.0	32	88.9	0.01[a]*
Yes	0	0.0	4	11.1	
Neuropsychiatric					
No	69	97.2	34	94.4	0.60[a]
Yes	2	2.8	2	5.6	
Hepatic					
No	67	94.4	35	97.2	0.66[a]
Yes	4	5.6	1	2.8	
Depression symptoms:					
No	57	80.3	15	41.7	< 0.001*
Yes	14	19.7	21	58.3	
No. of chronic diseases (mean ± SD)	1.5±1.0		1.9±1.2		0.06[b]
No. of medications (mean ± SD)	2.6±2.7		3.6±2.2		0.004[b]*

(*) Statistically significant at $p < .05$

** Chi square test used unless indicated

[a] Fisher's exact test

[b] Mann whitney

Concerning the relation between insomnia among elderly and the environmental problems affecting night sleep, Table 5 indicates no statistically significant associations with any of these environmental problems. As regards the relation between insomnia and various habits, the same table demonstrates statistically significant relations between insomnia and smoking ($p = .04$), eating too close to bedtime ($p = .02$), daytime long naps ($p = .045$), and irregular sleep time ($p = .047$). The table also demonstrates that insomnia is statistically significantly higher among the elderly suffering from cough ($p = .04$), nocturia ($p = .03$), and apnea ($p = .03$).

Table 5. Relation between insomnia among elderly and their environmental problems, different habits among elderly, and problems during sleep

Item	Insomnia				X^2 /Fisher's Exact Test**
	Absent		Present		
	No.	%	No.	%	*p*
Environmental Problems					
High lighting	1	1.4	0	0.0	1.00[a]
Noise	13	18.3	9	25.0	0.42
Heat	38	53.5	20	55.6	0.84
Cold	2	2.8	1	2.8	1.00[a]
Another person in same bed	21	29.6	7	19.4	0.26
Uncomfortable bed	5	7.0	1	2.8	0.66[a]
Another person in same room	26	36.6	7	19.4	0.07
Smoking:					
Never	61	85.9	25	69.4	
Yes	10	14.1	11	30.6	0.04*
Habits done before bedtime:					
Smoking	5	7.0	7	19.4	1.00[a]
Eating	18	25.4	17	47.2	0.02*
Drinking tea	16	22.5	8	22.2	0.97
Drinking coffee	5	7.0	0	0.0	0.17[a]
Drinking cola	6	8.5	2	5.6	0.71[a]
Exercising before bedtime	2	2.8	0	0.0	0.55[a]
Bad Sleep habits:					
Irregular sleep time	29	40.8	22	61.1	0.047*
Daytime long naps	18	25.4	16	44.4	0.045*
Use bed in other activities (TV, reading)	22	31.0	18	50.0	0.055
Problems during night sleep					
Nocturia	58	81.7	35	97.2	0.031[a]*
Cough	2	2.8	5	13.9	0.04[a]*
Pain	4	5.6	6	16.7	0.08
Snoring	9	12.7	6	16.7	0.57
Bad dreams	2	2.8	4	11.1	0.18
Apnea	3	4.2	7	19.4	0.03[a]*

(*) Statistically significant at $p < .05$

** Chi square test used unless indicated

[a] Fisher's exact test

Concerning the studied elderly QOL, Table 6 illustrates that the highest scores were in mental health (MH) and role limitation due to physical health problems domains (RP), 68.3 ± 15.4 and 68.0 ± 38.5, respectively. On the other hand, the lowest scores were in the general health (GH) and social functioning (SF) domains, 48.9 ± 17.8 and 51.3 ± 7.7, respectively. The same table also indicates that the insomniac elderly had statistically significantly lower scores in all QOL domains ($p < .001$) compared with those not having insomnia. The only exception is with the QOL domain of social functioning ($p = .313$). It is also noticed that the largest difference in QOL scores was in the role limitation due to emotional problems (RE) domain (82.6 vs. 38.0) while the smallest difference in the Mental health (MH) domain (72.6 vs. 59.7).

Table 7 indicates the presence of a moderate positive statistically significant correlation between the scores of insomnia and depression among the elderly ($r = .472$). The same table also demonstrates statistically significant negative weak to moderate correlations between the scores of insomnia and each of the QOL domains except the social functioning domain.

Table 6. Quality of life (QOL) domains scores as measured among the elderly and their relations with insomnia (n= 107)

QOL Domains	All Elderly (No= 107)		No Insomnia (No= 71)		Insomnia (No= 36)		Mann Whitney Test	*p*
	Mean	SD	Mean	SD	Mean	SD		
Role limitation due to physical health (RP)	68.0	38.5	81.0	29.1	42.4	42.2	4.931	<.001*
Role limitation due to emotional problems (RE)	67.6	41.3	82.6	30.3	38.0	44.5	5.423	<.001*
Physical functioning (PF)	67.6	21.4	73.0	18.9	56.8	22.3	3.741	<.001*
Social functioning (SF)	51.3	7.7	50.7	7.0	52.4	8.9	-1.019	.313
Bodily Pain (BP)	67.3	22.6	75.0	21.0	52.1	17.4	6.000	<.001*
General health (GH)	48.9	17.8	55.6	14.9	35.5	15.6	6.388	<.001*
Mental health (MH)	68.3	15.4	72.6	13.4	59.7	15.7	4.233	<.001*
Vitality (VT) (Energy/fatigue)	57.4	14.7	62.5	14.4	47.4	9.2	6.606	<.001*

(*) Statistically significant at $p < .05$

Table 7. Correlation between the score of insomnia, depression, and QOL among elderly

	Spearman's rank correlation coefficient
	Insomnia
Depression	.472**
QOL domains Role limitation due to physical health (RP)	-.527**
Role limitation due to emotional problems (RE)	-.535**
Physical functioning (PF)	-.345**
Social functioning (SF)	0.2
Bodily Pain (BP)	-.541**
General health (GH)	-.607**
Mental health (MH)	-.517**
Vitality (VT) (Energy/fatigue)	-.585**

(**) Statistically significant at $p < .01$

Comment rebuttal: In correlational study, *p* value exist in Spearman's rank correlation test indicates significant relationships between the two variables.

4 Discussion

Insomnia is highly prevalent, especially at advanced age [23]. However, elderly people are in need of a sleep of good quality in order to perform physical and psychological functions properly and to keep their quality of life at the optimum level. Sleep is a key indicator of quality of life. Therefore, changes that occur in sleep during the aging process affect quality of life negatively [24]. Insomnia is the most common sleeping disorder, associated with a high societal cost. Insomnia affects the daily lives of millions of people around the world [25]. Although there are studies on different variables thought to be affecting quality of life and sleep among the elderly people; the number of the studies that investigate the relation between insomnia and quality of life is rather few. The present study therefore was conducted in order to determine the prevalence and risk factors of insomnia among elderly and its effect on quality of life.

The study was carried out on 107 elderly. The range of age in the study sample was 60-83 years with mean 66.8 ± 5.0 years and about three-fifths of them were women (see Table 1). Although the higher percentages of women may reflect the distribution of the gender attendants of the two geriatric social clubs, likely due to our recruitment of participants at community centers (used more commonly by women). It may at the same time reflect the higher life expectancy of women in general, and in Egypt as shown in the Central Intelligence Agency (CIA) report where the life expectancy was 68.7 years for male and 73.9 years for female people [26].

In the present study, according to Table 1, the majority of the elderly had chronic diseases. Almost all of the elderly had at least one type of chronic diseases, with mean around two diseases per person. In agreement with these results, Anderson [27] reported that 90% of seniors in America have at least one chronic disease. A similar finding was reported in another USA study [28]. This prevalence was comparable to Lessov-Schlaggar *et al.* [29] who found depressive symptoms among 30.7% of their study group.

The current study findings revealed that the prevalence of insomnia among the studied elderly was 33.6% (see Figure 1).This mean that one-third of the studied elderly were suffering from insomnia, which suggests that insomnia should be considered an important public health concern for this population. Similar findings were reported by Bakr *et al.* [11] in a study conducted in Cairo in Egypt, they found a prevalence of insomnia to be 36.4 %. Also a recent study in Egypt found that the prevalence of insomnia among elderly people in Alexandria was 33.4% [10]. On the same line in Brazil, Aragao and Reimao [30] studied a sample of 1105 individuals; they reported an elevated prevalence of insomnia to be 32 %.

However the present study results were lower than Abdelwadoud [31] who conducted a study in a rural area in Egypt, who found that 47% of his study subjects were suffering insomnia. Possible explanation for this high prevalence of insomnia are the insufficient medical care service in the rural areas of Egypt and a lack of awareness among the elderly of the importance of consulting a doctor regarding their illnesses. Interpersonal variations, environmental and life style factors might explain the differences between Egyptian elderly living in different governorates in Egypt.

The prevalence of insomnia among the present study subjects also was lower than that observed among elderly in dialysis unit in a study done in El-Mansoura, Egypt which revealed the prevalence rate of insomnia to be 65.9% [32]. In another study by Reid *et al.* [33] a total number of 1503 elderly from 11 primary care settings, they found a prevalence of insomnia to be 45%. Another study revealed a high prevalence of insomnia to be 62.7% among acute ward inpatients in Japan [34]. This high prevalence could be attributed to impaired health status of these elderly necessitating their admission to hospital compared to the present study group attending the geriatric social clubs and free from acute health condition.

The prevalence of insomnia among the present study subjects was higher than that observed among elderly in long-term care residents in a study conducted in Canada which revealed the prevalence rate of insomnia to be only 17.4% [35]. This difference may be due to difference in tools used to assess sleep quality and the size of the sample. It may also be due to the higher level of care and facilities available in geriatric homes in western countries.

Prevalence estimates of insomnia vary because of inconsistent definitions and diagnostic criteria. Epidemiological studies examining insomnia vary widely in their methodologies, defining criteria, and geographic foci [36]. Lack of uniformity in defining insomnia has led to prevalence estimates that vary anywhere from 5% to 50% [37, 38]. Furthermore, International studies were also carried out to observe the geographic distribution of insomnia. These studies demonstrated the universality of the insomnia complaint [25].

In the present study, Figure 2 revealed that insomnia symptoms were highly prevalent among the studied elderly. The most frequent insomnia symptom among the elderly was difficulty initiating sleep (DIS), followed by difficulty maintaining sleep (DMS) and early morning awakening (EMA). The finding of higher frequencies of insomnia symptoms among the elderly of the current study can be explained by the high prevalence of chronic diseases and the fact that the ability to initiate and maintain nighttime sleep declines with aging. In congruence with this, Singer and Nanda [39] mentioned that the ability to initiate and maintain nighttime sleep declines with aging, also sleep becomes more fragmented with aging and with more nighttime awakenings and greater tendency for daytime sleepiness.

Prevalence of insomnia symptoms among the studied elderly was lower than Makhlouf *et al.* [40] study at geriatric homes in Alexandria, Egypt. The high prevalence of sleep disturbances among the elderly living in geriatric homes may be associated with unfamiliar environment especially in the early period after admission, lower social support, higher prevalence of chronic illnesses, and depressive symptoms among the residents. Environmental factors, mainly excessive

noise and light, were significantly associated with DIS and NRS in these studies conducted in geriatric homes. Prevalence of insomnia symptoms among the studied elderly in the present study was also lower than Abdelwadoud [31] who conducted a study in a rural area in Egypt. Elderly in this study are living in rural area with different living arrangements from the current study.

According to the present study findings, unmarried elderly (divorced, widowed, and single) significantly suffered from insomnia more than married elderly (see Table 3). This finding was in accordance with Zoilinawati *et al.* [41] who found that insomnia was more common among elderly who were separated, divorced, or widowed. This finding is consistent also with Liu and Liu [42] who reported that unmarried status was associated with increased risk for insomnia symptoms in the Chinese elderly.

The current study findings also showed that increasing age was not associated with increased risk of insomnia (see Table 3). This finding was similar to Su et al. [43] who found that age was not associated with increased rate of insomnia in Taiwan. On the other hand, significant association between age and sleeping quality was found in El Kady *et al.* [44] study in elderly homes in Alexandria, Egypt. More recently, a study examined the prevalence of insomnia among Chinese adults; it was found that the prevalence of insomnia was highest in the oldest age group [45]. Ancoli-Israel [46] added that incidence of insomnia in older adults is most often associated with age related conditions rather than age per se.

Interestingly, the present study revealed that although females had higher level of insomnia than males, this difference was not significant (see Table 3). A possible explanation for the present study finding may be due to the fact smoking is more prevalent among males and this raised the percent of insomniac males. This result was in agreement with Su *et al.* [43] who found that female gender was not an independent risk factor for sleep disturbances. This finding also agrees with Botts [47] who reported that no gender differences were found in the insomnia ratings in the study. This finding is contradictory to the results of a study conducted by Oliveira *et al.* [48] who reported that elderly women had significantly higher frequency of insomnia symptoms than males.

In the present study, according to Table 4 there was a significant relation between insomnia and asthma. This may be due to asthma medication side effects. Similarly, Bassarguina [49] found that asthma was found a significant risk factor for insomnia in the population of Nova Scotia. In agreement with this, Resi [50] mentioned that insomnia may be caused by a multitude of causes, one of these causes are medical conditions as asthma.

In the present study, insomnia was found to have statistically significant association with total number of daily medications (see Table 4). This finding was in accordance with Botts [47] who performed a study in the United States, she reported that insomnia was found to have a significant positive relationship with total daily medications. The current study's findings support Ancoli-Israel and Ayalon [51] as well as Grigg-Damberger [52] research findings that show medications have a negative effect on sleep in older adults.

In the present study, according to Table 4 there was a high statistically significant association between insomnia and depression symptoms. Also Table 7 indicates the presence of a moderate positive statistically significant correlation between insomnia and depression. This result was in agreement with Khater and Abouelezz [53] who recorded that depressive status was significantly associated with increased risk of insomnia. On the same point, this finding was similar to Botts [47] who reported that depression was found to have significant positive relationships with insomnia scores.

In the current study, smokers suffered significantly from insomnia compared to non-smokers (see Table 5). Similarly, Zailinawati *et al.* [41] found that insomnia was more common among those who smoked at bed time in a study on Malaysian adults. This result is consistent also with Bassarguina [49] who reported that smoking was found to be a significant risk factor for insomnia in the population of Nova Scotia.

In the present study, according to Table 5 there was a high statistically significant association between insomnia and eating too close to bedtime. This finding was incongruent with Subedi [54] who found that insomnia was significantly higher among the elderly who had the habit of eating too close to bedtime than those who didn't have. Another study in Japan revealed that eating too close to bedtime was significantly associated with insomnia [55].

Regarding irregular sleep time, Table 5 revealed that there was significant relation between insomnia and irregular sleep time. Similarly, Ohayon and Sagales [56] reported that irregular bedtime hours at least four evenings per week was significantly more common in participants who had difficulty initiating sleep compared to non-insomnia participants. Table 5 also revealed that daytime long naps was significantly associated with insomnia, This is consistent with Liu and Liu [42] who reported that regular napping was associated with increased risk for insomnia symptoms in the Chinese elderly.

In the current study significant causes of insomnia were having nocturia, cough, and apnea (see Table 5). This might be attributed to that nocturia is a frequently overlooked cause of poor sleep in the elderly; also cough and apnea lead to difficulty maintaining sleep and nonrestful sleep. This agrees with Bakr *et al.* [11] study who reported that the most significant causes of insomnia were nocturia and pain among their study group. This is in accordance with Bliwise et al. [57] who found that nocturia was an independent predictor both of self-reported insomnia and reduced sleep quality.

In the present study, the mean scores of QOL domains of all the elderly subjects in the sample were low, with the highest scores in the mental health (MH) domain and lowest scores in the general health (GH) domain (see Table 6). These low QOL domains scores may be attributed to advancing age, chronic medical conditions accompanied by deterioration in general health (GH) domain, bodily pain (BP) and worse physical functioning (PF). Also low score of social functioning (SF) domain may be attributed to social isolation and loss of social roles after retirement. This agrees with Lo and Lee [58] who studied the relationship between sleep quality and quality of life among older Chinese adults. The study found that the mean scores of QOL domains of all the elderly subjects in their study were low, with the highest scores in the social functioning (SF) domain and lowest scores in general health (GH) domain. The highest scores in the social functioning (SF) domain in the study may be attributed to social policies in China that support active aging after retirement, such as the engagement of volunteers in research and community activities.

In the present study according to Table 6, insomniac elderly had significantly lower scores in all QOL domains, except in the social functioning domain compared with those not having insomnia, with the largest difference in the role limitations due to emotional health problems (RE) domain and the smallest difference in the mental health (MH) domain. This result indicating significant negative relationship between insomnia and all QOL domains except social functioning domain which was worsen for all the studied elderly subjects. This is in agreement with Roy [21] who reported that all domains of QOL were influenced by insomnia and Lee *et al.* [59] who found that all domains of QOL were significantly worsened by sleep disturbances. Also similar results have been found by several studies [24, 60-62].

Similarly, this study result is in accordance with that of Lo and Lee [58] who studied the relationship between sleep quality and quality of life among older Chinese adults. The authors found that poor sleepers had significantly lower scores in all QOL domains, with the largest difference in the BP domain and the smallest difference in the PF domain. On the same line, another study that compared matched samples (drawn from the general population) of good sleepers (without insomnia), with mild and severe insomniacs found that on every domain, good sleepers had the best quality of life, followed by mild insomniacs, followed by severe insomniacs, with differences seen on all domains on the QOL [63]. This study found that insomnia was independently associated with worse qualify of life that was almost as severe as the association between QOL and several serious chronic comorbid conditions (e.g. congestive heart failure and clinical depression).

Also in agreement with the present study findings, Leger *et al.* [64] in a cross-sectional international survey to assess health related quality of life (HRQOL) in individuals from three different countries (USA, France, and Japan), comparing sufferers of chronic insomnia to good sleepers. They found that in all countries, people with chronic insomnia reported

lower QOL scores in each of eight domains compared with good sleepers, with greatest impact on the vitality, social functioning, role-emotional, and mental health dimensions. Also they found that chronic insomnia was associated with significantly lower scores compared with good sleepers. Furthermore, Leger et al. [64] study clearly demonstrates that chronic insomnia has an impact on QOL, in three different continents, independent of the geographical origin of the patient and independent of its sociodemographical characteristics.

In the current study according to Table 7, insomnia had negative correlations with all QOL domains, except social functioning domain. Similar results have been found by Li *et al.* [65] whose study's correlation analysis found sleep quality to be negatively correlated with all domains of the QOL, there were significant differences between sleep quality and the QOL domains. The results suggested that poor QOL domains were correlated with poor sleep quality among the rural Chinese elderly. The same table also revealed that the highest correlation coefficient among all the QOL domains in general health domain (r = -.607) (see Table 7), indicating that general health had a close relationship with insomnia. This result is in accordance with that of Li *et al.* [65] whose study observed that the highest correlation coefficient among all the QOL domains in general health and mental health (r = -0.409), indicating that general and mental health had a close relationship with sleep quality.

In the current study, the social functioning domain was very low for both elderly with and without insomnia; it may be due to loss of social roles after retirement. The most likely interpretation of these results is that the majority of the elderly were suffering from loneliness, isolation, and other emotions when they grow older and this was supported by Murphy [66].

5 Conclusion

Based upon the findings of the present study, it was concluded that one-third of the studied elderly was suffering from insomnia, while difficulty initiating sleep was the most prevalent insomnia symptoms among them. Risk factors significantly associated with insomnia include; unmarried status, depressive status, smoking, eating too close to bedtime, daytime long naps, irregular sleep hours, asthma, nocturia, apnea, and total number of daily medications. The results revealed that insomnia was associated with worse quality of life in older adults on all quality of life domains except social functioning domain.

Recommendations

In view of the study findings, it is recommended to conduct educational programs for elderly individuals with insomnia to improve their sleep quality and quality of life, with more efforts to improve the awareness of the elderly regarding the importance of sleep and the avoidance of risk factors of insomnia through posters, pamphlets, and booklets. Elderly education on normal sleep related changes with emphasizing on the importance of sleep hygiene practice and healthy life style. Also more-effective behavioral and non-pharmacological interventions must be identified that will help to improve sleep patterns in older population and the effectiveness of pharmacological interventions to improve sleep in elderly should be tested. Further research is needed to determine to what extent interventions to improve sleep can produce beneficial effects on QOL in the elderly.

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