Original Article

Relationships among Anxiety and Depression Levels with Sleep Quality and Insomnia Severity in Geriatric Patients with Depression

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ABSTRACT

Objective: The prevalence of sleep problems increases with age. Both anxiety and depression symptoms can cause certain changes in sleep architecture. The aim of this study is to investigate the relationship of anxiety and depression levels with sleep quality and insomnia severity in geriatric patients with depression and concomitant anxiety symptoms.

Methods: Fifty-three patients aged 60 and over were included in the study. Geriatric Depression Scale (GDS), Beck Anxiety Inventory (BAI), Insomnia Severity Index (ISI), Mini-Mental State Examination (MMSE) and Pittsburgh Sleep Quality Index (PSQI) were applied to the patients.

Results: There was a positive and statistically significant relationships between the total GDS score and the mean PSQI Subjective sleep quality and Sleep latency scores, as well as between BAI and PSQI Subjective sleep quality, Sleep latency, Sleep disturbance, Daytime dysfunction and global PSQI score (p=0.018; p=0.006; p=0.043; p=0.009; p=0.012; p=0.045; p=0.049, respectively). There was positive and statistically significant relationships between total GDS, total ISI and ISI subscale scores, and there was positive and statistically significant relationships between BAI scores, total ISI, and ISI subscale scores (p=0.002; p=0.002; p=0.001; p=0.006, respectively).

Conclusion: This study showed that sleep disorders were closely associated with anxiety and depression levels in the geriatric patients with depression. The deterioration in sleep quality and the increase in insomnia severity associated with the aging process may increase the incidence of new depressive disorders, while current anxiety and depression symptoms may cause sleep disorders.

INTRODUCTION

Sleep can affect mental and physical health.[1] The prevalence of sleep disorders increases in old age. Overall, 40% of people complain of sleep disorders; this rate increases to 63% of those aged ≥60 years and to a whopping 67% of those who have had a prolonged stay in a nursing center. [2-4] An epidemiological study including participants aged ≥65 years, found that more than 80% were experiencing at least one sleep problem and more than 50% had experienced at least one sleep problem throughout their lifetime.[5]

The sleep–wake cycle changes with age. Changes to the circadian rhythm cause altered sleep periods, in particular, an advanced phase in elderly individuals.[6] The sleep durations in rapid eye movement sleep and stages 3 and 4 are reported to be shorter in elderly individuals. These changes, in conjunction with other age-related medical problems, lead to commonly encountered sleep issues.[7]

Sleep problems increase susceptibility to and manifest as a result of psychiatric disorders.[8,9] Bidirectional relationships between sleep problems, depression and anxiety have been reported.[10,11] Depression and anxiety disorders often coincide, and accompany general medical diseases, which affect their course and treatment.[12] Both anxiety and depression can affect sleep architecture, whereas sleep disorders can increase the risk of depression and anxiety attacks by up to two-fold.[11,13]

Insomnia is a frequent sleep disorder in geriatric population,[14] with a prevalence rate of 30%–48%.[15,16] Physical disorders such as pain, confusion and hypoxia and sleep disorders such as sleep apnea are potential causes of insomnia in the elderly population.[7] Moreover, insomnia may be associated with psychiatric disorders such as

anxiety[17] and depression.[18] Sleep deprivation can lead to mania or cause fatigue and irritability in depressed patients. In one study, higher levels of neuroticism and anxiety were found in severe insomniac patients compared to those without insomnia.[19] It is determined in another study that 70% of older adults with depression had insomnia.[20]

There are many studies evaluating the relationships between sleep disorders and psychiatric conditions which have been conducted on patients with depression; however, fewer studies have been conducted on those with anxiety disorders.

This study aims to investigate the relationships among anxiety and depression levels with sleep quality and insomnia severity in geriatric patients with depression and concomitant anxiety symptoms who presented to a psychiatric outpatient clinic. The hypothesis of this study is: (a) geriatric patients with depression who have poor sleep quality and insomnia would have significantly higher depression and anxiety levels and (b) as insomnia severity increased, depression and anxiety levels would also increase.

MATERIALS AND METHODS

Participants

Of the 70 older adults who presented to the psychiatry outpatient clinic, the research population included 53 older participants who were aged ≥60 years and met the research criteria and agreed to participate in the study. The participants were psychotropic-drug-naive during the study, literate, and did not have an alcohol or substance abuse problem within the past 6 months. Participants who had alcohol or substance abuse problems, schizophrenia or other psychotic disorders, were in a manic or hypomanic episode, had organic mental disorders, such as dementia and mental retardation according to the DSM-5[21] criteria and had severe hearing or visual impairment were excluded. Nine older adults who had Mini Mental State Examinatin (MMSE) scores less than 24 and 8 older adults who did not agree to participate in the study were excluded. Participants were recruited randomly and consecutively to the study. The study protocol was approved by the local Ethics Committee (date: 04/17/2018, number: 985). The purpose and methods of the proposed research were explained to the participants and their written consent was obtained.

Procedure and measures

The demographic information (i.e., age, gender, marital status) was provided from the participants at baseline. The participants included in the study had a MMSE score ≥24 and were diagnosed with major depressive disorder according to the DSM-5[21] criteria by a senior psychiatrist.

The Geriatric Depression Scale (GDS) which consists of a 30-item questionnaire was used to assess depression.

[22] Each item includes a yes or no response. In this study, a GDS cut-off score of ≥14 was applied. The validity and reliability of GDS scoring for Turkish population was affirmed by Ertan et al.[23] (2000). The validity and reliability study of Turkish version revealed the cut-off score to be 13/14. In our study, the cut-off score for GDS was ≥14 to indicate clinically relevant depression.

To assess anxiety level, The Beck Anxiety Inventory (BAI)[24] was applied. The scale includes 21 items scored on Likert scales ranging between 0 to 3. The validity and reliability of BAI scoring for Turkish population was affirmed by Ulusoy et al.[25] (1996).

To assess the severity of insomnia, The Insomnia Severity Index (ISI) was applied. ISI score of 0–7 was defined as absence of clinically significant insomnia, ISI score of 8-14 was defined as subthreshold insomnia, ISI score of 15-21 was defined as moderate clinical insomnia and ISI score of 22-28 was defined as severe clinical insomnia.[26,27] In this study, participants who scored ≥8 on the ISI were classified into the 'insomnia group' and those who scored <8 were classified into the 'absence of insomnia group'. The validity and reliability of ISI scoring for Turkish population was affirmed by Boysan et al.[28] (2010).

Cognition was assessed using the MMSE; a score less than 24 was accepted as impairment.[29] The validity and reliability of MMSE scoring for Turkish population was affirmed by Güngen et al.[30] (2002).

Subjective sleep quality was assessed using the Pittsburg Sleep Quality Index (PSQI). This is a 19-item questionnaire that consists of seven components: 1) subjective sleep quality, 2) sleep onset latency, 3) sleep duration, 4) habitual sleep efficiency, 5) sleep disturbance, 6) use of sleep medication and 7) daytime functioning. The sum of seven component scores make up the global score that ranges from 0 to 21. Higher scores reflect worse sleep. A standard cut-off greater than 5 indicates poor sleep quality. This cutoff has a sensitivity of 89.6% and specifity of 86.5% in distinguishing good sleepers from poor sleepers.[31] The validity and reliability of PSQI scoring for Turkish population was affirmed by Agargun et al.[32] (1996).

Statistical analyses

Statistical analyses were conducted by using the SPSS software version 15.0. Descriptive statistics were reported as numbers and percentages for categorical variables, and as means, standard deviations and minimum and maximum values for continuous variables. For data that were not normally distributed, comparisons were conducted using the Mann–Whitney U test for two independent groups. Comparisons of continuous variables comprising >2 independent groups were conducted using one-way ANOVA or the Kruskal–Wallis test if they were normally or not normally distributed, respectively. Subgroup analyses were performed using the Tukey honestly significant difference test for parametric data and Mann–Whitney U test for non-parametric data and were interpreted using the Bonferroni correction.

Relationships between variables were analyzed using Spearman's correlation coefficient because the requirement for parametric testing was not provided. Ratio data were compared between groups using the chi-squared test. The statistical significance level (alpha) was set at $p < 0.05$.

RESULTS

Sociodemographic characteristics of the patients

On average, participants had a mean±standard deviation age of 70.6±5.3. Seventy-three point six percent of the participants were male and 26.4% were female. Sociodemographic characteristics of the patients are summarized in Table 1.

Correlations between PSQI subscales, GDS and BAI scores

There was a positive and statistically significant relationship between total GDS scores and mean PSQI subjective sleep quality (r=0.324; p=0.018) and sleep latency scores (r=0.370; p=0.006), and between BAI scores and PSQI subjective sleep quality (r=0.279; p=0.043), sleep latency r=0.355; p=0.009), sleep disturbance (r=0.343; p=0.012), daytime dysfunction (r=0.277; p=0.045) and global (r=0.272; p=0.049) scores (Table 2).

Sociodemographic characteristics of the patients with and without insomnia

There was a statistically significant difference between patients with and without insomnia in terms of the number of medical conditions (p=0.035). The rate of having ≥2 diseases was higher among patients with insomnia (Table 3).

Correlations between total ISI, ISI subscales, GDS and BAI scores

There was a positive and statistically significant relationship between total GDS scores and total ISI (r=0.409; p=0.002) and ISI subscale (r=0.414; p=0.002) scores, and between BAI scores and total ISI (r=0.434; p=0.001) and ISI subscale (r=0.375; p=0.006) scores (Table 4).

Comparisons between ISI subscale scores and mean GDS and BAI scores

There was a statistically significant difference between ISI subscale scores and mean GDS (p=0.014) and BAI (p=0.015) scores (Table 5). Mean GDS (p=0.008) and BAI (p=0.009) scores among patients with severe insomnia were statistically significantly higher than those without insomnia (Table 6).

DISCUSSION

In this study, relationships between anxiety and depression levels with some sleep paremeters were detected in geriatric patients with depression.

Table 1. Sociodemographic characteristics of patients

	n	%
Gender		
Male	39	73.6
Female	14	26.4
Age, mean±SD (min-max)	70.6±5.3 (61-86)	
Age		
60-74	43	81.1
≥75	10	18.9
Education		
Reading and writing	17	32.1
Primary school	31	58.5
High school and above	5	9.4
Marital status		
Married	34	64.2
Single	1	1.9
Divorced/widowed	18	34.0
Employment status		
Homemaker	28	52.8
Employee	1	1.9
Retired	24	45.3
Living arrangements		
Alone	11	20.8
With others	41	77.4
Nursing home	1	1.9
Housing types		
One or two rooms	4	7.5
Three rooms	37	69.8
Four or five rooms or bigger	12	22.6
Medical conditions		
None	1	1.9
1	5	9.4
2	17	32.1
>2	30	56.6
Smoking status		
Never	35	66.0
Current	2	3.8
Former	16	30.2
BMI (kg/m^2), mean±SD (min-max)	27.9±4.2 (20.2-41.8)	
BMI		
<25	10	18.9
25.0-29.9	31	58.5
>=30	12	22.6
Walks for exercise	14	26.4

BMI: Body mass index.

There was a positive relationships between depression scores and PSQI subscale scores reflecting subjective sleep quality and sleep latency. There are other studies with similar results in the literature.[33,34] Maglione et al.[35] conducted a study on older women and found a positive relationship between poorer subjective sleep quality and depression, consistent with the results of this study; by contrast, they did not report a relationship between the

Table 2. Correlations between PSQI subscale scores and GDS and BAI scores

	GDS		BAI	
	rho	p	rho	p
PSQI				
Subjective sleep quality	0.324	0.018	0.279	0.043
Sleep latency	0.370	0.006	0.355	0.009
Sleep duration	0.131	0.349	0.062	0.659
Habitual sleep efficiency	0.170	0.223	0.099	0.481
Sleep disturbance	0.047	0.739	0.343	0.012
Use of sleep medication	-0.097	0.491	0.053	0.704
Daytime dysfunction	0.244	0.078	0.277	0.045
Global score	0.230	0.098	0.272	0.049

PSQI: Pittsburgh Sleep Quality Index; GDS: Geriatric Depression Scale; BAI: Beck Anxiety Inventory.

level of depression and prolonged sleep latency. Orhan et al.[36] conducted a study in Turkey, which included older patients living in a nursing home and reported similar results in this study. Another study conducted on an elderly Asian population detected no relationships between sleep quality, sleep latency and GDS, differentness from the results of this study.[37]

It was reported a positive relationship between anxiety scores and subjective sleep quality, sleep disturbance, daytime dysfunction, sleep latency and global PSQI scores in this study. Similarly, Yu et al.[37] detected a relationship between anxiety scores and global PSQI, sleep latency, sleep disturbance and subjective sleep quality scores in an elderly population, but they detected no relationship between anxiety scores and daytime dysfunction. Similarly Gould et al.[38] showed that anxiety symptoms might be associated with poor sleep quality in old adults.

There was no relationships between anxiety scores and habitual sleep efficiency, use of sleep medication and sleep duration which is similar to the findings of Yu et al.[37] Chang et al.[33] detected a relationship between anxiety and all PSQI subscale scores, which is different to a certain extent from the current findings.

Although some studies in the literature showed that short sleep duration was related to anxiety and depression levels,[33,39] there was no such relationship in this study. Mason et al.[40] demonstrated that symptoms of anxiety and depression were ameliorated after treatment, but there was no change in sleep duration. Therefore, it has been hypothesized that sleep duration could not be associated with depression and anxiety.[37] According to this study, there was no relationship between anxiety or depression levels and habitual sleep efficiency and use of sleep medication, in contrast with the results obtained by Chang et al.[33] These different results could be associated with regional and aetiological differences and smaller sample size of this study compared with other studies in the literature. In one study, it was found that sleep disturbances in late-life depression are related to the severity of depression and older depressive patients with sleep problems had

more anxiety and depression symptoms which is consistent with the results of this study.[41]

This study demonstrated that patients with insomnia had a higher number of medical issues. Similarly, other studies have reported that multiple medical problems were associated with insomnia.[42,43] By contrast, there was no relationship between other sociodemographic factors and insomnia in this study.

There was a positive correlation between the severity of insomnia and anxiety and depression scores in this study. Patients with severe insomnia had higher GDS and BAI scores compared to those without insomnia. In parallel, it was detected that patients with depression had higher rates of moderate and severe insomnia. There are many studies that provided similar results to this study. For example, in one study, elderly patients with insomnia had higher levels of anxiety and depression compared to those without insomnia.[43] Another study conducted on patients older than 80 years detected that insomnia severity was associated with various medical problems including depression and anxiety.[7] Dragioti et al.[14] observed in an elderly sample that the incidence of depression and anxiety was higher in patients with subthreshold, moderate and severe insomnia than those without insomnia. Similar to the results of this study, Farazdaq et al.[44] showed that depression increases the risk of insomnia in old age.

In another study, elderly patients with generalized anxiety disorder with depression or without depression, exhibited a higher insomnia severity which is consistent with the findings of this study; by contrast, no difference was found between patients with generalized anxiety disorder only and patients with comorbid depression in terms of sleep disorders.[45]

The impact of insomnia on depression and anxiety are explained by the diathesis–stress model. In this model, stress triggered by an insomnia attack could aggravate or induce the development of recurrent depression or anxiety. Time spent awake in bed at night might induce negative thoughts about the past or concerns about the future, including responsibilities in the upcoming day, thereby

Table 3. Sociodemographic characteristics of patients with and without insomnia

	Patients with insomnia		Patients without insomnia		
	n	%	n	%	p
Gender					
Male	34	73.9	5	71.4	1.000
Female	12	26.1	2	28.6	
Age					
60-74	37	80.4	6	85.7	1.000
≥75	9	19.6	1	14.3	
Education					
Reading and writing	14	30.4	3	42.9	0.850
Primary school	27	58.7	4	57.1	
High school and above	5	10.9	0	0.0	
Marital status					
Married	29	63.0	5	71.4	1.000
Single	1	2.2	0	0.0	
Divorced/widowed	16	34.8	2	28.6	
Employment status					
Homemaker	24	52.2	4	57.1	1.000
Employee	1	2.2	0	0.0	
Retired	21	45.7	3	42.9	
Living arrangements					
Alone	8	17.4	3	42.9	0.265
With others	37	80.4	4	57.1	
Nursing home	1	2.2	0	0.0	
Housing types					
1 or 2 rooms	4	8.7	0	0.0	1.000
3 rooms	32	69.6	5	71.4	
4 or 5 rooms or bigger	10	21.7	2	28.6	
Medical conditions					
None	0	0.0	1	14.3	0.035
1	3	6.5	2	28.6	
2	16	34.8	1	14.3	
>2	27	58.7	3	42.9	
Smoking status					
Never	30	65.2	5	71.4	1.000
Current	2	4.3	0	0.0	
Former	14	30.4	2	28.6	
BMI (kg/m^2)					
<25	8	17.4	2	28.6	0.729
25.0-29.9	27	58.7	4	57.1	
>=30	11	23.9	1	14.3	
Walks for exercise					
Yes	12	26.1	2	28,6	1.000
No	34	73.9	5	71.4	

BMI: Body mass index.

causing depression and anxiety. Conversely, daytime ruminations about depression and anxiety (e.g. depressive relationships, negative thoughts about the past or responsibilities in the upcoming day) could enhance mental and physiological arousal, leading to insomnia.[46]

The main limitations of this study are: First, this was a single-center study with a small sample. Second, self-reported data were obtained and objective sleep measurements (such as polysomnography) could not be performed which could have affected the outcomes reflecting sleep. Third, chronic diseases such as asthma, obstructive sleep apnea, chronic obstructive pulmonary disease and heart diseases could have affected the results of sleep quality and insomnia severity.

Table 4.   Correlations between total ISI score, ISI subscales and GDS, BAI scores

	GDS		BAI	
	rho	**p**	**rho**	**p**
Total ISI score	0.409	0.002	0.434	0.001
ISI Subscales scores	0.414	0.002	0.375	0.006

GDS: Geriatric Depression Scale; BAI: Beck Anxiety Inventory; ISI: Insomnia Severity Index.

Table 5.   The comparison of mean GDS and BAI scores with ISI subscales

	GDS		BAI	
	Mean±SD	**Median**	**Mean±SD**	**Median**
ISI Subscales				
Absence of insomia	8.8±5.0	7	9.0±9.5	7
Subthreshold insomnia	14.0±7.3	14	17.5±11.9	17.5
Moderate insomnia	14.2±6.6	13	17.8±12.8	17
Severe insomnia	19.5±7.6	20	28.4±14.8	26
p-value	0.014		0.015	

GDS: Geriatric Depression Scale; BAI: Beck Anxiety Inventory.

Table 6.   Comparisons between ISI subcale scores and mean GDS and BAI scores

	ISI subscales	p
GDS		
Absence of insomia	Subthreshold insomnia	0.315
	Moderate insomnia	0.243
	Severe insomnia	0.008
Subthreshold insomnia	Moderate insomnia	1.000
	Severe insomnia	0.207
Moderate insomnia	Severe insomnia	0.176
BAI		
Absence of insomia	Subthreshold insomnia	0.431
	Moderate insomnia	0.349
	Severe insomnia	0.009
Subthreshold insomnia	Moderate insomnia	1.000
	Severe insomnia	0.154
Moderate insomnia	Severe insomnia	0.128

BAI: Beck Anxiety Inventory; GDS: Geriatric Depression Scale; ISI: Insomnia Severity Index.

In conclusion, this study demonstrated that sleep disorders were closely related to anxiety and depression levels in the geriatric population. The deterioration in sleep quality and increase in the severity insomnia associated with the ageing process may increase the incidence of new depressive disorders, whereas current anxiety and depression symptoms may cause sleep disorders. Considering that the geriatric population is gradually expanding, sleep disorders are becoming more prevalent in this group and should be evaluated in conjunction with psychiatric disorders. Further studies with a larger sample size are warranted to obtain more robust evidence among this patient group and to develop treatment approaches.

Ethics Committee Approval

The study protocol was approved by the local Ethics Committee (date: 04/17/2018, number: 985).

Informed Consent

Prospective study.

Peer-review

Internally peer-reviewed.

Conflict of Interest

None declared.

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Geriatrik Depresyon Hastalarında Anksiyete ve Depresyon Düzeyleri ile Uyku Kalitesi ve Uykusuzluk Şiddeti Arasındaki İlişki

Amaç: Uyku problemlerinin sıklığı yaşla birlikte artmaktadır. Hem anksiyete hem de depresyon belirtileri uyku mimarisini etkileyebilmektedir. Bu çalışmanın amacı, psikiyatri polikliniğine başvuran anksiyete belirtilerinin eşlik ettiği geriatrik depresyon hastalarında anksiyete ve depresyon düzeyleri ile uyku kalitesi ve uykusuzluk şiddeti arasındaki ilişkinin incelenmesidir.

Gereç ve Yöntem: 60 yaş ve üzeri 53 hasta çalışmaya dahil edildi. Hastalara Geriatrik Depresyon Ölçeği (GDÖ), Beck Anksiyete Ölçeği (BAÖ), Uykusuzluk Şiddeti İndeksi (UŞİ), Kısa Akıl Muayenesi (KAM) ve Pittsburg Uyku Kalitesi İndeksi (PUKİ) uygulandı.

Bulgular: Total GDÖ skoru ile PUKİ öznel uyku kalitesi (p=0.018) ve uyku latansı (p=0.006), alt skorları arasında pozitif yönde ve BAÖ ile PUKİ öznel uyku kalitesi (p=0.043), uyku latansı (p=0.009), uyku bozukluğu (p=0.012), gündüz işlev bozukluğu (p=0.045) ve global PUKİ (p=0.049) skorları arasında pozitif yönde istatistiksel olarak anlamlı ilişkili saptandı. Total GDÖ skoru ile total ISI skoru (p=0.002) ve ISI alt ölçekleri arasında (p=0.002) ve BAÖ skoru ile total ISI (p=0.001) ve ISI alt ölçekleri (p=0.006) arasında ile pozitif yönde istatistiksel olarak anlamlı ilişkili saptandı.

Sonuç: Bu çalışmada, geriatrik depresyon hastalarında uyku bozukluklarının anksiyete ve depresyon düzeyi ile yakından ilişkili olduğu gösterilmiştir. Yaşlanma süreciyle birlikte ortaya çıkan uyku kalitesindeki bozulma ve insomnia şiddetindeki artış yeni oluşan depresif bozukluk görülme sıklığı ve şiddetini artırabilirken, mevcut anksiyete ve depresyon belirtileri de uyku bozukluklarına sebep olabilmektedir.

Anahtar Sözcükler: Anksiyete; depresyon; geriatrik hasta; uyku kalitesi; uykusuzluk şiddeti.