

# The relationship of sleep problems to life quality and depression

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## ABSTRACT

**الأهداف:** لتحديد مستوى الاكتئاب، جودة الحياة، والعلاقة بينهما في المرضى الذين يسجلون في مراكز النوم لمشاكل النوم المختلفة.

**الطريقة:** شملت هذه الدراسة المستعرضة 229 مريضاً تقدموا بطلبات لدراسة تخطيط النوم في مراكز النوم تحت إشراف عيادات الأمراض العصبية وأمراض الصدر في مستشفى للأبحاث والتعلم، كبسي، تركيا بين يونيو وأغسطس 2013م. كانت أدوات جمع البيانات باستخدام نموذج بيانات الإجتماعية والسكاني، مقياس بيك للاكتئاب (BDI)، مؤشر جودة النوم بيتسبرغ (PSQI)، ومقياس جودة الحياة لمنظمة الصحة العالمية (WHOQOL-BREF). واستخدمت أيضاً التحليلات الإحصائية، واختبار الطالب تي، تحليل المتغير كروسكال-واليس واختبارات مربع كاي. واعتبر مستوى الأهمية  $p < 0.05$ .

**النتائج:** في دراستنا لوحظ أن المرضى الذين تقدموا بالعمر، والمتزوجون، والعاطلون، والذين يعانون من أمراض مزمنة وأعراض الاكتئاب الشديد بجودة النوم السيئة. بينما المرضى الذين يعانون من أي مرض مزمن لديهم مؤشرات عالية لـ PSQI والاكتئاب. وانخفاض المؤشرات WHOQOL-BREF البدنية والعقلية والاجتماعية. كانت مجموع درجات PSQI ومعدلات الاكتئاب من المرضى المدخنين أعلى بكثير في البدني والعقلي والاجتماعي WHOQOL-BREF. كان هناك علاقة إيجابية بين درجات PSQI ودرجات BDI بينما كان هناك علاقة سلبية بين BDI و PSQI و WHOQOL-BREF مقياس الدرجات الفرعي لجودة الحياة.

**الخلاصة:** كانت نوعية النوم سيئة في المرضى الذين تقدموا بالعمر، والمتزوجون، والعاطلون، والذين لديهم مرض مزمن وأعراض الاكتئاب الشديد. كان هناك ارتباط سلبي كبير بين الاكتئاب، ونوعية النوم ونوعية الحياة، في حين أن هناك علاقة إيجابية إلى حد كبير بين نوعية الحياة والاكتئاب.

**Objective:** To identify the level of depression, the level of life quality, and the relationship between these, in patients applying to sleep centers for various sleep problems.

**Methods:** This cross-sectional study included 229 patients who applied for polysomnography at sleeping centers under supervision of the Neurology

and Chest Diseases Clinics of Kayseri Education and Research Hospital, Kayseri, Turkey between June and August 2013. The data collection tools were a socio-demographical data form, Beck Depression Inventory (BDI), Pittsburgh Sleep Quality Index (PSQI), and the World Health Organization Quality of Life Scale (WHOQOL-BREF). For statistical analyses, the Student t-test, Kruskal-Wallis-variant analysis, and chi-square tests were used. Significance level was considered as  $p < 0.05$ .

**Results:** In our study, patients who were older aged, married, not working, and who had a chronic disease, and a severe depressive symptom were observed to have significantly poorer sleep quality. While patients with any chronic disease had significantly higher scores for total PSQI and depression, their physical, mental, and social WHOQOL-BREF scores were significantly lower. The PSQI total scores, and depression scores of the smoking patients were significantly higher for physical, mental, and social WHOQOL-BREF fields. There was a positive correlation between PSQI scores and BDI scores while there was a negative correlation among BDI, PSQI, and WHOQOL-BREF life quality sub-scale scores.

**Conclusions:** Sleep quality was significantly poorer in patients who were older aged, married, not working, and who had a chronic disease, and a severe depressive symptom. There was a significantly negative correlation among depression, sleep quality, and life quality, while there was a significantly positive correlation between life quality and depression.

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Sleeping is a period in which the interaction of an organism with its environment temporarily, partly, and periodically is lost to reversible stimulants of various severity. During sleep, all systems in the body including respiratory and circulatory systems undergo some changes.<sup>1</sup> Sleeplessness can be identified with difficulty in falling asleep and maintaining sleep, waking up early, and the emergence of one or more decreases in sleep quality, and the restorative quality of sleep in chronic cases. These problems result in inabilities in function during the day (mood disorder, dysfunction of attention and memory, exhaustion, and so forth).<sup>2</sup> The reasons for sleeplessness may be classified into 3 main groups. Secondary reasons are listed as medical or psychiatric disorders, respiratory problems during sleep, or sleeplessness secondary to other respiratory problems. Among the reasons generated by patients is sleeplessness resulting from the age and gender of the patient, disorders in his/her sleep-wake pattern, bad sleep hygiene, lifestyle including environmental factors, or psychoactive substance use. Cases for which no reasons are found are called primary.<sup>3</sup> Among the risk factors of insomnia; old age and female gender can be listed. The female/male ratio for insomnia is reported to be 1.4:1.<sup>4</sup> The changes experienced in sleep pattern with aging are also important. In addition, comorbid cases,<sup>5</sup> psychiatric disorders,<sup>6</sup> and working in shifts increase the risk for insomnia. It is estimated that 75-90% of patients with insomnia have an increased comorbid disease,<sup>5</sup> and ~40% of the patients have a psychiatric disorder accompanying insomnia.<sup>6-8</sup> Depression is the most frequently observed disorder among these.<sup>7</sup> Asthenia, exhaustion, depression, immense anxiety, tension, sensitivity to pain, shivering in muscles, immunosuppressant use, and lack of wakefulness throughout the day may lead to sleep disorders.<sup>9</sup> Sleep related sleep disorders such as obstructive sleep apnea syndrome (OSAS) or hyperventilation account for 5-9% of sleeplessness problems,<sup>10</sup> while sleeplessness complaints resulting from a medical or neurological situation comprise 4-11% of them. It was found that 10% of sleeplessness problems originated from bad sleep hygiene or environmental factors, while 3-7% originated from psychoactive substances used by the individual.<sup>3</sup>

Various epidemiological studies asserted that sleep complaints are observed in modern society quite frequently. A notable, often long term, sleep problem can be seen in approximately 30-33% of the general population (at a higher rate in certain groups such as older age, those with a psychiatric disorder, and those who have learning problems).<sup>11-14</sup> In a study conducted

on 35,327 adults from 10 countries in 4 continents, which aimed to demonstrate the varieties in sleep habits, it was reported that one in every 4 people on earth had a sleep disorder and less than one third of these were found to have applied to a health organization for help.<sup>15</sup> Furthermore, this study asserts that the most common health problem, insomnia, is the second most prevalent health problem after pain, and 95% of the society has insomnia at someone period in their life.<sup>15</sup>

In another study, it was stated that 27% of respondents had a "good" sleep quality level during the previous year, and more than one third of respondents reported that they were sleepy during the day insofar as their everyday activities were affected a few times a month.<sup>14</sup> In his study, Chokroverty<sup>16</sup> stated that daytime sleepiness occurred in one in every 5 adults. In Turkey, a study by Kaynak et al<sup>17</sup> on 8000 individuals highlighted that 22% of the population had sleeplessness complaints, while a study by Aslan et al<sup>18</sup> on 1034 individuals stated that 29.4% of the participants had a sleep problem.

The aim of this study is to identify and investigate the correlation between depression level, life quality, and sleep quality levels of patients who applied to sleep centers for various reasons (insomnia, snoring, sleep apnea, exhaustion, asthenia after sleep, dissatisfaction, and so forth).

**Methods.** This cross-sectional study included 229 patients who applied to sleeping centers under the supervision of the Neurology and Chest Diseases Clinics of Kayseri Education and Research Hospital, Kayseri, Turkey between June and August 2013 and were given a date for polysomnography (PSG) for the first time. No sample was selected and the whole population was included in the study.

**Data collection tools.** We used the socio-demographical data form, the Beck Depression Inventory (BDI), Pittsburgh Sleep Quality Index (PSQI), and the World Health Organization Quality of Life Scale (WHOQOL-BREF). The required organizational consent was obtained from the Secretary General of the State Hospitals Association of Kayseri and informed consent was obtained from the participants of the study.

**Beck Depression Inventory.** Hisli<sup>19</sup> tested the reliability and validity of the scale, which was developed by Beck et al,<sup>20</sup> for a Turkish society. The scale consists of 21 items and each item is given a score between 0-3. The highest possible score is 63. The score distribution of BDI is as follows: mild depression (11-17 points), moderate depression (18-29 points), and severe depression (30-63 points).

**Pittsburgh Sleep Quality Index.** This was developed by Buysse et al,<sup>21</sup> and was adapted to Turkish by Agargun

et al.<sup>22</sup> The PSQI is a self-rating questionnaire of 19 items that assess sleep quality and disturbances over the last one-month. It is composed of 24 questions, 19 of which are self-rated, and 5 of which are to be rated by the bed partner or roommate. Eighteen of the scored items comprises 7 components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is rated by 0-3 points. The total score of 7 components yields the global PSQI score. The global PSQI score ranges from 0-21. A global score higher than 5 indicate "worse sleep quality".

**Table 1 -** Distribution of the polysomnography patients according to their demographic-socio-cultural backgrounds.

Variable	No	(%)
Age, median (min-max)		49.0 (18-71)
Income, median (min-max)		1300 (400-9000 TL)
<b>Gender</b>		
Male	119	(52.0)
Female	110	(48.0)
<b>Educational status</b>		
Illiterate-Literate	20	(8.7)
Primary School	69	(30.1)
High School	87	(38.0)
University	53	(23.2)
<b>Marital status</b>		
Single	18	(7.9)
Married	211	(92.1)
<b>Resident in</b>		
City	146	(63.8)
District	61	(26.6)
Village	22	(9.6)
<b>Employment</b>		
Yes	145	(63.3)
No	84	(36.7)
<b>Profession</b>		
Worker	70	(30.6)
Government employee	56	(24.5)
House wife	52	(22.7)
Self-employed	42	(18.3)
Other (student, farmer)	9	(3.9)
<b>Smoking</b>		
Yes	73	(31.9)
No	156	(68.1)
<b>Alcohol</b>		
Yes	17	(7.4)
No	212	(92.6)
<b>Chronic disease</b>		
Yes	101	(44.1)
No	128	(55.9)

PSQI - Pittsburgh Sleep Quality Index, BDI - Beck Depression Inventory, WOQOL-BREF - World Health Organization Quality of Life Scale, TL- Turkish Lira

**World Health Organization Quality of Life Scale (Turkish).** The WHOQOL (TR) for Turkish people is a questionnaire that assesses how an individual perceives quality of life. It defines the positive and negative aspects of quality of life. Its validity and reliability for a Turkish population were studied by Eser et al.<sup>23</sup> The WHOQOL-BREF (TR) is a short form of the WHO Quality of Life for Turkish people. It consists of 27 questions in total. The questions asked refer to the last 15 days. In all the questions, except for the first 2 general questions, the scores can be calculated for physical, social, psychological, environmental, and national environment fields. The questions are of a typical 5-level Likert item ordinal rating scale type. As the scores increase in the physical, psychological, social, environmental, and national environment fields rated between 0-20 points, the quality of life increases.

**Statistical analysis.** The statistical analysis of the data was conducted using the Statistical Package for Social Sciences version 17.0 (SPSS Inc., Chicago, IL, USA). To analyze the constant variables, parametric and non-parametric tests were applied after normal distribution suitability test. We used the Student t-test for independent groups to compare 2 groups; Kruskal-Wallis variant analysis (post hoc test: Dunn's method) was used to compare more than 2 groups; the chi-square test was used to compare categorical variables.  $P < 0.05$  was taken as statistically significant.

**Results.** Based on the PSG applied to 229 patients between June and August 2013 at sleep centers, 150 of the patients were found to have OSAS; 49 had snoring problems; 20 had restless legs syndrome (RLS); and 10 had sleep rapid eye movements (REM) OSAS.

The mean age of the individuals in the study group was 49 years (range 18-71), 52% were male; 92.1%

**Table 2 -** The scores of the polysomnography patients in PSQI, BDI, and WHOQOL-BREF Scales.

Scales	Median (min-max)
PSQI Global	7 (1-19)
BDI total	11 (0-47)
Physical field- WOQOL-BREF	57.1 (7.1-96.4)
Mental field- WOQOL- BREF	54.2 (12.5-95.8)
Social Field - WOQOL- BREF	58.3 (0.0-100)
Environmental Field -WOQOL- BREF	59.4 (31.3-96.9)
Environmental Field -TR WOQOL- BREF	61.1 (27.8-97.2)

PSQI - Pittsburgh Sleep Quality Index, BDI - Beck Depression Inventory, WOQOL-BREF - World Health Organization Quality of Life Scale

**Table 3 -** Sleep quality of the polysomnography patients based on several variables.

Variables	PSQI		P-value
	Good n (%)	Bad n (%)	
Age*	n=90 46.2±11.6	n=139 50.8±11.8	0.004
Income <sup>#</sup>	n=74 1300(1000-2455)	n=117 1635(940-2200)	0.601
<b>Gender</b>			
Male	49 (41.2)	70 (58.8)	0.546
Female	41 (37.3)	69 (62.7)	
<b>Marital Status</b>			
Single	13 (72.2)	5 (27.8)	0.006
Married	77 (36.5)	134 (63.5)	
<b>Educational Status</b>			
Illiterate-Literate	4 (20.0)	16 (80.0)	0.217
Primary School	31 (45.0)	38 (55.0)	
High School	36 (41.0)	51 (59.0)	
University	19 (36.0)	34 (64.0)	
<b>Resident in</b>			
City	7 (32.0)	15 (68.0)	0.741
District	25 (41.0)	36 (59.0)	
Village	58 (40.0)	88 (60.0)	
<b>Employment</b>			
Employed	64 (44.0)	80 (56.0)	0.038
Non-Employed	26 (31.0)	59 (69.0)	
<b>Profession</b>			
Worker	34 (49.0)	36 (51.0)	0.119
Government employee	18 (32.0)	38 (68.0)	
House wife	15 (29.0)	37 (71.0)	
Self-employed	18 (43.0)	24 (57.0)	
Student	3 (75.0)	1 (25.0)	
Unemployed	2 (50.0)	2 (50.0)	
<b>Chronic Disease</b>			
Yes	28 (28.0)	73 (72.0)	0.001
No	62 (48.0)	66 (52.0)	
<b>Depressive Symptom Level</b>			
None	48 (58.5)	34 (41.5)	<0.001
Mild	33 (37.5)	55 (62.5)	
Moderate	9 (18.0)	40 (82.0)	
Severe	0 (0.0)	10 (100)	
<b>WOQOL-BREF</b>			
Physical field	14.7±2.1	11.9±2.4	<0.001
Mental field	13.9±1.9	12.1±2.4	<0.001
Social Field	13.4±2.3	11.9±2.7	<0.001
Environmental Field	13.8±2.1	13.0±1.8	0.003
Environmental Field -TR	14.0±1.9	13.3±1.8	0.002

<sup>#</sup>Median (25-75 percentiles), \*Arithmetic mean±standard deviation, PSQI - Pittsburgh Sleep Quality Index, WOQOL-BREF - World Health Organization Quality of Life Scale

were married; 38% were secondary school graduates; 63.8% resided in cities, 63.3% were employed (Table 1). Among the patients, 44.1% had at least one chronic disease, and 37.8% had diabetes mellitus (DM); 45%

had hypertension (HT); 17.2% had congestive heart failure (CHF). The rate of smoking patients was 31.9%, while 7.4% drank alcohol. The mean PSQI score of the patients was 7 (1-19) and the sleep quality of 60.7% of the subjects was “bad,” while it was “good” for 39.3%. The median score (min-max) of the patients was 11 (0-47). According to BDI, it was observed that 25.8% of the patients had depressive symptoms, and 38.4% had mild depression, while 21.4% had moderate, and 4.4% had severe depression (Table 2). When we compared the good or poorer sleep qualities of the patients in relation to various variables, the mean age of the patients with poorer sleep quality was significantly higher than that of patients with good sleep quality. Patients who were married, unemployed, with chronic disease, and with a moderate depression had significantly poorer sleep quality. Patients with good sleep quality were found to have significantly higher scores in all fields of quality of life than patients with poorer sleep quality ( $p<0.05$ ) (Table 3). Based on the correlation analyses, a significantly negative correlation was found among BDI, PSQI scores, and WHOQOL-BREF life quality sub-scale scores ( $p<0.05$ ). A significantly positive correlation was found between the scores of PSQI and BDI. On the other hand, a significantly positive correlation was found between the scores of the WHOQOL-BREF life quality sub-scales ( $p<0.05$ ) (Table 4).

**Discussion.** In the study, the mean age of the patients with poorer sleep quality was found to be significantly higher than that of patients with good sleep quality. Sleep problems are common in the advanced age adult population.<sup>16,24,25</sup> The main reasons for this are the high prevalence of medical and psychosocial morbidity and frequency of using multiple drugs, rather than aging.<sup>25</sup> Sleep disorder has a significantly negative effect on the mortality and morbidity of the elderly population in particular.<sup>7,26</sup> Fadiloglu et al<sup>27</sup> reported in their study that as age increases, the quality of sleep gets worse. In our study, we think that the deterioration of sleep with aging may be related to the disruption of sleep rhythm in the form of daytime sleeping and daily life activities associated with social position and age, such as having a lot of medical problems, psychosocial stressors, retirement, staying at home, and so forth.

Sleep quality was found to be significantly poorer in married patients than in single patients in this study. In their study Senol et al<sup>28</sup> found that married people had more severe sleep quality problems. A determiner for lower quality of sleep is not seen as a universal factor. Since it is obvious that a good number of variables such as internal marriage affairs and person’s partner’s

**Table 4 -** The correlation among sleep, quality of life, and depressive symptom level scores among polysomnography patients.

Scales	PSQI Global Rho	Total Rho	Physical Field- WOQOL- BREF Rho	Mental Field- WOQOL- BREF Rho	Social Field- WOQOL- BREF Rho	Environmental Field- WOQOL- BREF Rho	Environmental Field-TR WOQOL- BREF Rho
PSQI Global	1	0.439**	-0.572**	-0.458**	-0.361**	-0.262**	-0.293**
Total		1	-0.597**	-0.612**	-0.281**	-0.300**	-0.350**
Physical Field- WOQOL- BREF			1	0.714**	0.383**	0.403**	0.431**
Mental Field- WOQOL- BREF				1	0.363**	0.475**	0.512**
Social Field- WOQOL- BREF					1	0.396**	0.382**
Environmental Field- WOQOL- BREF						1	0.964**
Environmental Field-TR WOQOL- BREF							1

\*\* $p < 0.01$ , \* $p < 0.05$ , PSQI - Pittsburgh Sleep Quality Index, BDI - Beck Depression Inventory, WOQOL-BREF - World Health Organization Quality of Life Scale

health condition may affect one's partner on a positive or negative way. The health of one's partner may have positive or negative effects on the other.

The quality of sleep was observed to be worse in unemployed patients than in employed patients. In their studies, Saygili et al<sup>29</sup> stated that they observed no difference in sleep quality between employed students and unemployed students. Lower sleep quality prevalence was found among the elderly people living in cities.<sup>30</sup> Good sleep quality is an expected situation for employed patients. Being able to work not only indicates that the individual is physically and mentally more healthy, but also means that the person is engaged in daily activities and thus able to maintain the sleep-awake cycle better. In addition, being able to work is an indicator of self-dependent in both economical terms and life functions; in other words, not needing anyone's help at all may mean being protected from psychosocial stress, which may possibly result in losing sleep. In fact, while the PSQI global scores and depression scores of the unemployed patients were significantly higher than those of employed patients, their physical, mental, and environmental fields WHOQOL-BREF scores were significantly lower.

We found in this study that patients with a chronic disease had significantly worse sleep quality. In their studies, Senol et al<sup>28</sup> reported that patients with a chronic disease had higher PSQI global scores while they had significantly lower sleep quality. There is a strong 2-way relation between sleep disorders and severe medical problems. However, this is often not taken into consideration or assessed by clinicians. We can list HT, depression, cardiovascular diseases, and cerebrovascular diseases among the diseases that may develop in patients with sleep disorder. On the other hand, individuals with

any one of these diseases have a higher risk of developing sleep disorders.<sup>25</sup> In fact, in our study, sleep quality was significantly worse in patients with DM and HTN than in patients without. Gunes et al<sup>31</sup> reported that the sleep quality of 34% of the patients with DM was referred to as bad. Consequently, having a chronic disease may play a role not only in discomfort resulting from pain, movement restriction, and other symptoms related to the type of illness, but also in the decline of sleep quality due to expected lower life quality because of possible mental problems such as depression associated with a chronic disease, which made it more apparent.

Patients with depressive symptoms and severe depressive symptoms were found to have significantly poorer sleep quality in the study. Sleeplessness results in difficulty in falling asleep, problems with maintaining sleep, low quality sleep (non-restorative sleep), deterioration in performing functions the next day, and psychological distress. Chronic insomnia is accompanied by several physical and psychiatric causes.<sup>32</sup> Depression is the greatest risk factor for sleeplessness.<sup>31</sup> Although depression is accepted as a common reason for sleeplessness, the causal relation between sleep disorder and depression has been controversial in recent times.<sup>33</sup> When poorer sleep quality is combined with more than one comorbidity, depression is more likely to occur among these people. Moreover, as this will cause further deterioration in sleep quality, the diagnosis of depression symptoms is of great importance.<sup>34</sup> Consequently, there is an obvious correlation between depression and sleep quality. Therefore, since restoring one may result in the restoration of the other case, it is highly important to take precautions to closely follow and treat the mental problems and sleep problems of people who are older and have a chronic medical disease in particular.

There was a significantly negative correlation among the scores of WHOQOL-BREF life quality subscales, BDI, and PSQI, as observed in our study. Sleep disorders are also closely related to changing mental states, decreased life quality, and increased mortality.<sup>12</sup> In their studies, Schuilting et al<sup>35</sup> reported a significant decrease in the sleep quality of patients with severe sleep problems. The negative effect of depression on life quality is suggested in numerous studies.<sup>36-38</sup> Bayar et al<sup>39</sup> stated that bad sleep quality results in a decrease in SF-36 scores, that leads to a decrease in the life quality of workers. Karabulutlu et al<sup>40</sup> found that there was a strongly positive correlation among anxiety, depression levels, and sleep problems experienced by caregivers. Sleep problems, depression, and life quality dimensions may be a possible reason for and a result of each other. Thus, instead of trying to solve all these problems individually, dealing with them together will yield better results.

In conclusion, we found significantly poorer sleep quality in patients who were older, married, unemployed, and who had a chronic disease and severe depression symptoms. There was a significantly negative correlation among depression, sleep quality, and life quality, while there was a significantly positive correlation between sleep quality and depression. In addition, we noted the importance of the presence of depression and lower life quality as well as demographic socio-cultural characteristics, which are among the determiners of lower life quality. Furthermore, from a different perspective, since sleep disorders may have a role, not only in a decrease of quality of life, but also in a severer depression process, it is crucial to take depression and life quality dimensions into consideration when dealing with protection and treatment approaches concerning sleep problems.

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## ***ETHICAL CONSENT***

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed. Research papers not involving human or animal studies should also include a statement that approval/no objection for the study protocol was obtained from the institutional review board, or research ethics committee.