Comorbidity of Insomnia Detected by the Pittsburgh Sleep Quality Index with Anxiety, Depression and Personality Disorders

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ABSTRACT

Background: The comorbidity of insomnia with various psychiatric conditions, such as anxiety, depressive and some personality disorders has been repeatedly shown in previous studies, although research investigating these disorders together is scarce.

Method: Two hundred and sixty five patients were interviewed individually. Two hundred and twelve of them completed the Pittsburgh Sleep Quality Index. They were also given the Beck Depression Inventory (BDI), the Spielberger State and Trait Anxiety Inventory (STAI-1 and 2), the Severity of Psychosocial Stressors Scale of DSM-III-R, and the Structured Clinical Interview of DSM-III-R for Personality Disorders (SCID-II) Personality Questionnaire.

Results: There were no significant correlations between the patients' insomnia scores and their gender, marital status, education, depression and trait anxiety scores, and stress levels. There were, however, significant associations of patients' PSQI scores with their ages and STAI-1 scores.

Conclusions: When age, BDI scores, STAI-1 and 2 scores, education and stress level during the last year are accepted as factors that may have an impact on PSQI scores, it appears that a patient's age and STAI-1 score best estimates his or her PSQI scores.

INTRODUCTION

Insomnia is an important public health issue because it has a significant negative impact on individuals' physical and social performance, their ability to work and their quality of life (1). It is the most prevalent sleep disorder in both the general population and among psychiatric patients (2). Epidemiologic-based studies estimated that 7.5% to 15% of the general adult population suffers from chronic insomnia, and an additional 25% to 35% experience insomnia on a transient or occasional basis (3). The clinical diagnostic criteria for insomnia are contained in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (4), the International Classification of Disease, 10th edition (5) and the International Classification of Sleep Disorders guidelines (ICSD) (6). Insomnia, as described in the DSM-IV, is characterized by complaints of difficulty initiating or maintaining sleep, or nonrestorative sleep lasting for at least one month, in association with clinically significant distress or the impairment of psychosocial or physical functioning. The DSM-IV and ICSD guidelines provide essential distinctions between insomnia as an independent disorder (primary insomnia) and insomnia as a symptom related to other factors such as a psychiatric or other medical comorbidity (secondary or comorbid insomnia).

The most common factors shown to be associated with insomnia include various demographic characteristics such as age, gender, education level, socioeconomic status, employment status, and marital status as well as having a psychiatric or somatic illnesses or experiencing other stressful life events (7-9). Epidemiological and clinical studies have shown that a high number of people with insomnia also suffer from a concomitant

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mental disorder, mainly depressive or anxiety disorders: with between 40% and 60% of insomnia complainers falling into this category (7, 10, 11). Additionally, there is a growing body of evidence suggesting that there is a significant relationship between substance abuse and insomnia (12, 13). Moreover, insomnia has also been suggested to be associated with some personality patterns, such as perfectionism and the tendency to internalize emotions (14).

The present paper aims to investigate the relation of insomnia with sociodemographic features, such as age, gender, marital status and education level, on the one hand, and with psychological factors, such as stress and anxiety levels, history of substance use, comorbid psychiatric disorders and personality disorders on the other.

METHOD

Two hundred and sixty five consecutive patients were interviewed by the author between in January 1, 2006, and June 30, 2006, in the outpatient setting in the Department of Psychiatry of a University Hospital. The patients were informed about the content of the study by the author and each patient gave verbal approval of participation in the study. The protocol of the research project was approved by the Ethics Committee of the University where the work was undertaken. Through a questionnaire, data were obtained of the sociodemographic characteristics of 234 patients, including their age, duration of marriage, educational level, and history of physical illness and psychoactive substance abuse; 212 patients (76 men and 136 women) who completed the Pittsburgh Sleep Quality Index (15, 16) were also given the Beck Depression Inventory (17, 18), the Spielberger State and Trait Anxiety Inventory (STAI-1 and 2) (19, 20), the Severity of Psychosocial Stressors Scale of DSM-III-R, and the Structured Clinical Interview of DSM-III-R for Personality Disorders (SCID-II) Personality Questionnaire (21, 22).

After removal of the data of patients under 18 years of age, all of the data were summarized as descriptive statistics. Due to the type of variables, analyses were carried out by parametric or nonparametric statistical methods. For numeric variables that were not distributed normally, the Mann-Whitney U test was used in the comparisons between two groups, and the Kruskal Wallis' test was used in the comparisons among more than two groups. The Mann-Whitney U test was used to test the difference between two groups. To differentiate variables thought to be responsible for differences in more than two groups, we used the post hoc test, which takes the Bonferroni correction into account; $p < 0.05$ was used as the value of significance. Finally, the effect of various numeric variables, such as age, marital and educational status, stress levels, and depression and anxiety scores on the PSQI was computed using a regression analysis model.

RESULTS

The descriptive statistics of 224 patients (81 men and 143 women) are shown in Table 1. According to the DSM-IV, they were predominantly diagnosed with anxiety disorder (n: 80; 36.5%), including panic disorder (n: 30; 13.7%) and other anxiety disorders (n: 43; 19.6%). This was followed by depression (n: 62; 28.3%). Adjustment disorders and alcohol and substance abuse were also fairly common (n: 12; 5.4% and n: 8; 3.6%, respectively) in this group.

Among the patients who were included in statistical assessments because they had completed the PSQI, there were no associations between the insomnia score and gender (z:-0.212; p: 0.832), marital status (p:0.609), or educational level (r: -0.063; p: 0.353) (Table 2). Level of the psychosocial stressors (r: 0.034; p:0.615), depression (r: 0.123; p:0.066) and trait anxiety (r: 0.096; p: 0.152) did not reveal any significant differences. However, our findings demonstrated that insomnia increased with age, as is shown by the significant correlation between

Table 1. *Descriptive statistics of the patients whose data are available (STAI-1: Spielberger State Anxiety Inventory; STAI-2: Spielberger Trait Anxiety Inventory; BDI: Beck Depression Inventory; PSQI: Pittsburgh Sleep Quality Inventory).*

	n	Average	Mean	SD	Min	Max
Age	226	38.5	35	16.1	18	90
Marriage duration	132	19.9	16	14.8	0.4	60
Number of sibling(s)	195	2	2	1.6	0	9
No. of children	137	1.6	2	1.2	0	10
Education (yrs)	223	11.7	12	3.9	0	17
Severity of the stressors	226	3.3	4	1.6	1	7
STAI-1	222	32.9	32	9.8	0	67
STAI-2	222	28.4	24	9.5	0	67
BDI	223	10.5	8	8.0	0	45
PSQI	224	8.7	8.5	4.1	1	19

Table 2. *Relationships between the PSQI scores and sociodemographic characteristics of the patients.*

	n	Average	Mean	SD	Min	Max	
Gender							
Male	81	8.6	9	4.0	2	18	z:-0.229
Female	143	8.8	8	4.1	1	19	p:0.819
Marital Status							
Single	91	8.5	8.0	4.0	1	16	
Married	109	8.7	8	4.1	1	19	p:0.571
Divorced	18	10.0	10	4.1	3	17	
Widowed	6	9.0	9.5	4.6	2	16	
Education Level (yrs)							
	230	11.6	12	3.9	0	17	r:-0.068 p: 0.944
Physical Illness							
No	150	8.5	8	4.0	1	19	z:-0.931
Yes	74	9.1	9	4.2	1	17	p:0.352
Psychoactive Substance Abuse							
No	179	8.4	8	4.1	1	19	z:-2.678
Yes	34	10.3	11	3.3	3	18	p:0.007

Table 3. *Correlations between the PSQI scores of the patients and their sociodemographic and psychological characteristics such as age, marriage duration, education level, severity of psychosocial stressors, BDI and STAIs scores.*

		PSQI
Age	R	0.174
	P	0.009
	n	224
Marriage Duration	R	0.228
	P	0.009
	n	130
Education level	R	-0.063
	P	0.353
	n	221
Severity of the psychosocial stressors during the last year	R	0.034
	P	0.615
	n	224
Beck Depression Inventory	R	0.123
	P	0.066
	N	223
STAI-1	R	0.206
	P	0.002
	n	222
STAI-2	R	0.096
	P	0.152
	n	222

the PSQI scores and patients' age (r: 0.174; p: 0.009) (Table 3). Duration of marriage was also significantly correlated with the insomnia score (r: 0.228; p: 0.009). Unexpectedly, there was no significant correlation between PSQI score and the severity of psychosocial stressors experienced in the previous year (r: 0.034; p: 0.615) and between PSQI score and the Beck Depression Inventory score (r: 0.123; p: 0.066) (Table 3). STAI-1 (i.e., state anxiety) scores had a significant relationship with the PSQI scores (r: 0.206; p: 0.002), but the trait-anxiety scores did not (r: 0.096; p: 0.152) (Table 3). The PSQI scores were also higher in patients with OCD or bipolar disorder than in patients with other diagnoses, although this did not reach statistically significant levels (p: 0.058 and p: 0.054, respectively) (Table 4).

Table 4. *The PSQI scores compared with the diagnoses of the patients.*

	n	Average	Mean	SD	Min	Max	MW-U
Depression							p: 0.351
No	157	8.6	8	4.1	1	19	
Yes	62	9.2	9	4.0	1	18	
Panic Disorders							p: 0.869
No	189	8.8	8	4.2	1	19	
Yes	30	8.8	9	3.0	4	15	
Obsessive Compulsive Disorder							p: 0.058
No	212	8.9	9	4.1	1	19	
Yes	7	6.1	7	1.9	3	8	
Other Anxiety Disorders							p: 0.890
No	176	8.8	8.5	4.0	1	19	
Yes	43	8.6	9.0	4.2	1	17	
Adjustment Disorder							p: 0.934
No	207	8.8	9	4.1	1	19	
Yes	12	8.8	8	4.0	4	16	
Psychotic Disorder							p: 0.471
No	211	8.7	8.0	4.1	1	19	
Yes	8	9.6	10	4.3	3	15	
Bipolar Disorder							p: 0.054
No	210	8.7	8	4.0	1	19	
Yes	9	11.6	12	4.3	5	17	
Psychoactive Substance Abuse							p: 0.254
No	211	8.7	8.5	4.1	1	19	
Yes	8	10.3	11	4.1	3	15	
Other Diagnoses							p: 0.471
No	194	8.8	9	4.0	1	18	
Yes	25	8.4	8	4.6	2	19	

Table 5. *The PSQI scores compared with the personality clusters of the patients (KW: Kruskal Wallis, MW-U: Mann Whitney U test).*

Personality	N	Average	Mean	SD	Min	Max	p (KW)
Cluster A	17	11.1	11	2.8	5	17	
Cluster B	40	9.3	9.5	4.0	2	18	0.024
Cluster C	129	8.4	8	4.2	1	19	
A vs. B							P: 0.123 (MWU)
A vs. C							P: 0.008 (MWU)
B vs. C							P: 0.246 (MWU)

Patients were also assessed for axis II personality disorders. To make the statistical procedures simpler, they were accepted as fulfilling diagnostic criteria for only one personality disorder even when they met the criteria for more than one. Thus, of 212 patients, 186 (84%) met the DSM-IV diagnostic criteria for a personality disorder, the most common of which was a cluster C personality disorder (n = 129, 59%). A significant relationship was found between sleep quality and the cluster of the personality disorder (p: 0.024). When we compared the three clusters as a whole with each other, however, we found that in fact this significance was essentially based on the difference between cluster A and cluster C personality disorders (Table 5). The model built on variables such as age, BDI scores, anxiety scores (STAI-1 and 2), education level and the stress level during the last year demonstrated that the age and STAI-1 scores best predicted PSQI scores (R=0.406, R^2=0.165). It should be noted, however, that when the model was applied to married subjects only, the duration of the marriage and the STAI-1 score best estimated patients' PSQI scores (R=0.436, R^2=0.190) (Table 6).

DISCUSSION

Relatively few studies have simultaneously investigated the relationships between insomnia and psychosocial and clinical factors. In the present study, we found positive correlations between the insomnia scores of the patients and their ages, anxiety scores and personality types. Although female gender has been described as a risk factor in almost all studies, the lack of a correlation between the patients' gender and their insomnia scores in our study is consistent with recent surveys (23), suggesting that there are comparable rates of insomnia in both genders. The significant association between PSQI score and the duration of marriage may be explained by the age-related increase of insomnia scores and is in accordance with some previous as well as recent epidemiological studies (24). Because some studies have shown that more education was associated with better sleep (25), the lack of a correlation between insomnia scores and the educational levels of our patient sample may also be explained by the fact that our patient population is not representative of average Turkish people because their average educational level (11.7 years) was higher than that of the normal Turkish population (3 to 4 years on average).

The patients with alcohol and drug abuse problems had significantly higher insomnia scores as measured by the PSQI than those without these problems. However, the relationship between psychoactive substance use disorders and insomnia may be complicated by the presence of other psychiatric issues such as mood, anxiety, and depression (13). Therefore, this difference has been ignored in this analysis. Although stressful life events have also been viewed as major factors relating to onset of insomnia (26), we could not find any association

Table 6. *Regression analysis of the correlations between the PSQI scores and the patients variables (STAI-1: Spielberger State Anxiety Inventory; STAI-2: Spelbierger Trait Anxiety Inventory; BDI: Beck Depression Inventory).*

	STAI-2	Age	BDI	Stress Level	Education (yrs)	STAI-1	Marriage Duration (yrs)
STAI-2	1.000						
Age	0.072	1.000					
BDI	0.036	0.064	1.000				
Stress Level	0.039	0.160	-0.092	1.000			
Education	0.050	0.097	0.139	0.061	1.000		
STAI-1	0.598	0.106	-0.033	-0.235	-0.047	1.000	
Marriage Dur. (yrs)	0.107	0.858	-0.077	-0.145	0.081	0.035	1.000
R		R^2			p		
0.406		0.165			0.039		

between psychosocial stresses experienced by a patient in the last year and his or her insomnia score. This result may be due to the recent conclusion by Roth and Drake (9) that insomnia patients generally do not experience stressful events more frequently but that stressful events have a significantly greater impact on insomnia patients compared with normal-sleeping subjects.

There is evidence in the literature suggesting that certain types of personalities are more likely to have insomnia than others (27). Therefore, we investigated the personality characteristics of our patients. We found that there is a significant association between the insomnia scores of the patients and the cluster of personality disorders into which they fell. Given the suggested role of anxiety-induced arousal in the etiology of insomnia, it may not be surprising to find that the greatest significance was seen between cluster A (including paranoid, schizoid and schizotypal personality disorders) and cluster C (including avoidant, dependent, obsessive compulsive) personality disorders (i.e., anxious group).

Epidemiological and clinical studies have shown that a high number of insomnia patients also suffer from a concomitant mental disorder, mainly depressive or anxiety disorder: with between 40% and 60% of insomnia complainers falling into this category (7, 11). A recent study (28) also found a moderate to strong lifetime association between insomnia and anxiety disorders, on one hand, and between insomnia and major depression, on the other. Although the present study was carried out in a clinical sample of patients, it appears to confirm the significant association between insomnia and anxiety, as shown in the state anxiety scores (measured by STAI-1). This relationship has not been demonstrated for depression in our study. It is probably the case because the association of depression with insomnia may manifest itself in various ways (29-32). Instead of looking for simple cause and effect relationships between insomnia and depression, a broader view that places the insomnia into the context of a syndrome that is known to include other symptoms that all result from a common vulnerability of the pathophysiological process is needed (33).

There are some limitations in this study. The most important one is the lack of a control group. In addition, the cross-sectional design does not allow the establishment of a cause-and-effect relationship. The same interviewers assessed insomnia complaints and psychiatric diagnoses, and this lack of blinding can lead to experimenter bias (34). Second, our sleep quality data

were self-reported. Although research studies sometimes need to apply specific quantitative definitions, such measures can be misleading in clinical practice (35-37). Third, we were not able to examine the different dimensions of the insomnia. For example, we did not have separate data on difficulty initiating, difficulty maintaining sleep and on early morning awakening. Nonetheless, Hohagen et al's findings (38) illustrate that cross-sectional studies focusing on subtypes of insomnia (e.g., sleep-onset insomnia), may even lead to erroneous results. Finally, it should be accepted that there may be a significant overlap between insomnia and depression and anxiety scores of the patients since their insomnia may be an essential part of their mood states. However, we found a relationship between the state anxiety and the insomnia score of the patients without a relationship between the trait anxiety and depression scores. Therefore, viewing sleep difficulties as a result of the interactions between insomnia and state anxiety, not depression, may be an alternative explanation.

Practical clinical consequences can be drawn from the results of our study. First, establishing risk factors such as age, history of substance abuse, high anxiety scores, and some personality categories may be useful to achieve the diagnosis of insomnia within a primary health care or outpatient setting. Second, the association of insomnia with anxiety and some personality features suggests a need for therapeutic consequences.

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