

Association of depression, anxiety and stress scores with sleep and life quality in men and women

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ABSTRACT

Introduction: Depression, anxiety, and stress have been shown to be associated with quality of life and sleep quality. This association did not examine separately in men and women. In the present study, we aim to examine the association between depression, anxiety and stress with RLS, Epworth, insomnia, apnea, PSIQ and QoL by gender in Mashhad-study data.

Methods: A total of 289 individuals (143 male and 146 female) aged 50-30 years old who completed the SUVINA study. They completed the Epworth sleepiness scale (ESS), Pittsburg sleep quality index (PSQI) and quality of life (QoL). For statistical analysis, SPSS software was used for data analysis and p value $0.05 > 0$ was considered significant.

Results: Depression scores were correlated with higher scores for RLS, ESS, insomnia, and PSQI in men but inversely related to QoL ($P < 0.05$). RLS and PSQI was positively correlated with anxiety in women, and subjects without anxiety had lower mean of RLS and PSQI scores than the other anxiety groups ($P < 0.05$ for both). QoL was conversely associated with anxiety in women. Stress was related with higher scores of RLS, ESS, insomnia and PSQI in men (all $P < 0.05$).

Conclusion: Older Although scores for depression, anxiety and stress were higher in women compared to men, the association of depression, anxiety and stress with RLS, quality of life and sleep quality varies between genders and unlike our expectation these disorders were more highly correlated with RLS, QoL and sleep quality in men.

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Introduction

Anxiety and depression are the most frequently mental problem such that the frequency of anxiety disorders during life is between 10 and 25%(1). Depression is usually accompanied by dysfunction, sadness and lack of interest in life (2). Also stress, which is caused by a person's incompatibility with the environment and society, causes psychological changes in the person (3). Quality of life has been shown to be associated with major depressive disorder (MDD) and has been reported to be significantly lower in MDD patients than in healthy individuals(4). Studies have shown that quality of life is associated with mental health problems, including anxiety(5), psychotic (6) and obsessive compulsive (7). Depression is associated with decreased serotonergic neurotransmission performance and can change sleep patterns (8).

Sleep is a basic need for human activities and good body function (9). When we go to sleep, the body system stores energy (10). Adequate sleep causes more energy, better performance, alertness and greater concentration in the person (11). On the contrary, insufficient and poor sleep causes nervous, behavioral and physiological weakness (12). Sleep disorder is one of the main problems in psychiatry and is the symptom of major depressive and stress disorders (13). Common sleep disorders include psychophysiological insomnia, obstructive sleep apnea syndrome (OSAS), restless legs syndrome (RLS), narcolepsy and periodic limb movement disorder (PLMD)(14).

A study which was done in turkey to examine association between anxiety and sleep disorders in two hundred and fifty academicians showed that anxiety and sleep disorders are interrelated (15). There is association between Obstructive sleep apnea syndrome (OSAS) with anxiety and depression symptoms (16). It was reported that Insomnia can increase the risk of depression and / or anxiety disorders (17,18). Insomnia is defined as a chronic or acute sleep disorder that results in poor sleep quality (19). According to a cross-sectional study to examine the relationship between sleep disorders and anxiety in 462 university students, anxiety was more frequent in students with insomnia (20).

Various instruments are used to measure the quality of sleep, insomnia and daily drowsiness but the most widely used are the Epworth Sleepiness Scale (ESS) and the Pittsburgh Sleep Quality Index (PSQI)(21, 22). The PSQI is a 19-item self-assessment questionnaire to assess sleep quality over the previous month and the ESS is a 8-item self-assessment questionnaire which measures a person to nap or fall asleep normally in normal everyday situations (23).

Another symptom that can lead to severe sleep

disorders and may be associated with depressive symptoms is Restless legs syndrome (RLS)(24, 25). RLS is a common and annoying sensory-motor disorder characterized by move the legs, accompanied by discomfort in the legs and worsening of symptoms at night (26).

Thus, anxiety, depression and stress problems are associated with sleep disorders, quality of life and RLS in the general population.

Although, few studies have examined this relationship separately in men and women. Therefore, the aim of this study was examining the association between depression, anxiety and stress with RLS, Epworth, insomnia, apnea, PSIQ and QoL by gender in Mashhad-study data.

Materials and Methods

Study design and Study population

We conducted an analytical cross-sectional study as a part of the survey of ultraviolet intake by nutritional approach (SUVINA). Among screening data of SUVINA study, 239 participants with 30-50 years old age (women 121, men 118) were selected. Our study participants were student of Mashhad University of Medical Science and recruited staff came to the Ghaem hospital.

We include every participant aged between 30-50, those who were satisfied to participate in study, Participants with maximum energy intake 4200 kcal/d and minimum 800 kcal/d, and those who filled at least 90% of FFQ (food frequency questionnaire).

Individuals with special food habit, like vegan, smoking or drinking alcohol, caffeine, nicotine were excluded from our study. Also, participants with a history of chronic disease and inflammation were omitted from our study.

All of our study cases written an informed consent to show their satisfaction to take a part in our analytical research. The Research Ethics Committee of the Iran National Institute for Medical Research Development (NIMAD) approved this study (protocol ID: IR.NIMAD.REC.1396.027).

Data collection

Demographic information was gathered an interview by a nurse. Our participants filled a questionnaire, with sort of questions covering: depression, anxiety, stress, restless legs syndrome (RLS), insomnia, Apnea (27).

Also, they filled Epworth sleepiness scale (ESS) questionnaire and we collect this questionnaire outcomes (28). We also, gathered the Pittsburgh sleep quality index (PSQI) scores (29). Moreover, participants filled the quality of life (QoL), questionnaire to assess this variable (30).

Statistical design

For describing quantitative data, we utilized means + SD (standard deviation). Discrete variables are presented as frequency and percentage. After accrediting the data gathered from questionnaires, we imported data into 16th version of SPSS. For assessing normalized data, we performed T-test, and for non-normalized data we used Mann-Whitney U. By performing Shapiro-Wilk and Kolmogorov Smirnov tests we determined normality. For comparing categorized data's, we utilized

Chi-square or fisher's test. P value more than 0.05 is considered as non-significant.

Result

Total 289 subjects (143 male and 146 female) who completed SUVINA were included in the study. Depression and stress scores were significantly higher in women than men (respectively, $p < 0.001$ and $p = 0.002$). There was not a significant difference in score of anxiety and RLS in both genders (Table 1).

Table 1: Comparison between male and female in terms of depression, anxiety, stress and RLS scores

	Male (n=143)	Female (n=146)	P value
Depression	6.37±7.15 5 (1-11)	10.60±0.03 6 (2-15)	0.076
Anxiety	7.92±6.5 6 (3-11)	9.02±6.098 (4-13)	0.049
stress	13.22±9.15 12 (6-26.75)	17.15±9.9 17 (8.5-23)	0.001
RLS	8.5878±8.4 7 (1-14)	10.2837±9.9 6 (2-17)	0.264

RLS, restless legs syndrome.

Data was reported as median (1st quartile-3rd quartile)

Table 2 shows the relationship between RLS, ESS, insomnia, apnea, PSIQ and QoL with depression in men and women. The increase in depression score was positively correlated with higher amounts of mean scores related to RLS, ESS, insomnia, and PSIQ in men ($P < 0.05$ for all associations).

QoL scores were conversely associated with rate of

depression and in overall, QoL decreased as the rate of depression was enhanced. There was no significant linkage between apnea and depression levels. RLS, PSIQ and QoL scores were found to have an association with depression scores in women (all $P < 0.05$). ESS, insomnia, and apnea didn't have any meaningful relationship with depression rates.

Table 2: Association of RLS, ESS, insomnia, apnea, PSQI and QoL with depression in male and female

	No (97)	Mild (9)	Moderate (10)	Severe (6)	p-value
Male (n=143)					
RLS	6.78±6.81	13.12±10.35	15.9±12.1	15.33±11.32	<0.001
ESS	7.43±4.27	10.01±5.75	8.7±5.07	13.33±5.49	0.011
Insomnia	5.43±4.76	8.12±4.42	9.7±5.31	10.33±5.53	0.005
Apnea	0.72±0.64	1.01±0.92	0.5±0.53	0.83±0.98	0.460
PSQI	7.58±4.84	13.13±7.16	13.3±5.47	13.01±4.73	<0.001
QoL	99.52±8.9	93.5±10.28	89.2±14.15	90.33±12.61	0.002
Female (n=146)					
	No (72)	Mild (11)	Moderate (20)	Severe (22)	
RLS	9.34±9.18	12.9±9.12	5.25±6.45	15.65±11.78	0.004
ESS	6.62±3.46	7.54±3.67	8.35±3.16	8.2±4.2	0.160
Insomnia	8.01±5.28	6.81±4.35	9.45±3.84	8.4±6.56	0.560
Apnea	0.42±0.55	0.45±0.52	0.6±0.82	0.45±0.68	0.750
PSQI	8.74±5.84	10.45±6.1	13.25±7.47	12.5±7.35	0.017
QoL	93.27±10.7	95.01±7.98	87.4±10.38	82.25±9.74	0.005

RLS, restless legs syndrome; ESS, Epworth sleepiness scale; PSQI, Pittsburgh sleep quality index; QoL, quality of life

The association between RLS, ESS, insomnia, apnea, PSIQ and QoL with anxiety in men and women is shown in Table 3. Anxiety was correlated with RLS, ESS, insomnia and PSIQ in men. The mean of RLS, ESS, insomnia and PSIQ scores were lower in no anxiety group compared to the other anxiety groups for men (all $P < 0.05$).

On the contrary, QoL was inversely associated with anxiety as there was higher mean of QoL score for subjects without anxiety ($P < 0.05$).

Apnea didn't have a significant linkage with anxiety in men.

RLS and PSIQ had a positive correlation with anxiety in women, and subjects without anxiety had lower mean of RLS and PSIQ scores than those with anxiety ($P < 0.05$ for both).

QoL was conversely associated with anxiety and women without anxiety had higher mean of QoL score in comparison with those who had anxiety ($P < 0.05$).

Table 3: Association of RLS, ESS, insomnia, apnea, PSQI and QoL with anxiety in male and female

	No (70)	Mild (18)	Moderate (12)	Severe (22)	P value
Male (n=143)					
RLS	5.56±8.81	7.64±8.72	11.18±9.13	16.4±9.69	<0.001
ESS	6.76±4.16	9.52±4.15	10.18±4.42	9.59±5.62	0.008
Insomnia	4.95±4.55	4.88±4.22	10.18±4.99	9.18±4.96	<0.001
Apnea	0.73±0.64	0.7±0.68	0.72±0.78	0.72±0.76	0.990
PSQI	6.98±4.37	7.7±6.5	11.72±5.17	13.31±4.97	<0.001
QoL	100.64±9.23	97.05±9.09	95.63±9.81	90.68±11.02	0.001
Female (n=146)					
	No (54)	Mild (20)	Moderate (27)	Severe (24)	
RLS	8.7±9.02	6.45±7.67	12.11±10.08	13.65±11.19	0.045
ESS	7.23±4.23	6.15±2.56	7.77±3.27	7.68±3.75	0.460
Insomnia	7.36±4.97	7.85±5.61	8.96±5.33	9.54±5.28	0.330
Apnea	0.46±0.6	0.3±0.57	0.62±0.62	0.4±0.66	0.320
PSQI	8.21±5.7	8.65±5.7	12.4±5.29	13.95±8.63	0.001
QoL	94.92±9.36	94.3±10.58	86.53±9.25	84.63±11.07	<0.001

RLS, restless legs syndrome; ESS, Epworth sleepiness scale; PSQI, Pittsburgh sleep quality index; QoL, quality of life

Table 4, shows the association of RLS, ESS, insomnia, apnea, PSIQ and QoL with stress in both genders. Stress was related with higher scores of RLS, ESS, insomnia and PSIQ in male (all $P < 0.05$).

Males without stress had a higher mean of QoL score than those with stress ($P < 0.05$). In women, RLS, ESS, insomnia, apnea and PSIQ were not associated with stress but it had an inverse correlation with QoL score.

Women who had not stress had a higher mean of QoL score ($P < 0.05$). Table 5, shows the univariate regression between depression, anxiety, and stress with RLS,

Epworth, insomnia, apnea, PSIQ and QoL in male and women. After adjusting with age, as a confounding factor depression was still associated with RLS, PSIQ and QoL in male but it was just correlated with insomnia and PSIQ in women so, this significant relation is independent of age in the mentioned items.

Anxiety was correlated with RLS, ESS and QoL in man after adjusting with age and it was related with QoL in women after age regulation. Stress was linked with insomnia and QoL in male and just with insomnia in women after adjusting with age.

Table 4: Association of RLS, ESS, insomnia, apnea, PSQI and QoL with stress in male and female

	No (77)	Mild (14)	Moderate (18)	Severe (13)	P value
Male (n=143)					
RLS	6.37±5.94	9.25±10.28	9.05±8.80	18.53±11.53	<0.001
ESS	7.31±3.52	10.08±3.52	7.27±3.52	11.15±5.81	0.014
Insomnia	4.55±4.04	7.16±5.16	9.44±4.49	10.46±4.92	<0.001
Apnea	0.75±0.67	0.50±0.67	0.83±0.61	0.61±0.76	0.520
PSQI	7.25±4.66	7.25±4.4	12.94±6.13	12.61±5.53	<0.001
QoL	100.4±9.36	94.25±11.63	95.01±6.49	89.98±12.82	0.001
Female (n=146)					
	No (52)	Mild (16)	Moderate (30)	Severe (27)	
RLS	8.42±8.49	7.43±7.75	10.53±10.69	13.96±11.06	0.083
ESS	6.46±3.84	6.56±3.09	7.6±3.62	8.64±4.01	0.087
Insomnia	8.12±4.95	6.87±3.48	7.5±5.62	9.8±5.98	0.270
Apnea	0.4±0.53	0.5±0.63	0.4±0.62	0.64±0.75	0.430
PSQI	8.69±5.79	10.81±6.76	10.36±6.83	13.01±7.34	0.067
QoL	94.34±10.59	92.93±11.53	88.8±8.18	86.7±11.57	0.014

RLS, restless legs syndrome; ESS, Epworth sleepiness scale; PSQI, Pittsburgh sleep quality index; QoL, quality of life.

Table 5: Multivariate regression between depression, anxiety and stress with RLS, Epworth, insomnia, apnea, PSQI and QoL in male and female adjusted for age

		Male		Female	
		Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
		Reference: no		Reference: no	
Depression	RLS	1.069 (1.001-1.141)	0.047	0.993 (0.950-1.038)	0.750
	ESS	1.041 (0.912-1.189)	0.550	1.118 (0.993-1.258)	0.065
	Insomnia	0.996 (0.874-1.135)	0.950	0.899 (0.811-0.997)	0.043
	Apnea	1.002 (0.416-2.414)	0.940	0.902 (0.463-1.758)	0.760
	PSQI	1.152 (1.014-1.308)	0.029	1.136 (1.035-1.246)	0.007
	QoL	0.947 (0.897-0.999)	0.047	0.978 (0.937-1.043)	0.320
Anxiety	RLS	1.091 (1.021-1.166)	0.010	0.993 (0.949-1.04)	0.760
	ESS	1.116 (1.003-1.242)	0.044	0.941 (0.84-1.053)	0.280
	Insomnia	0.978 (0.875-1.094)	0.730	0.968 (0.875-1.071)	0.520
	Apnea	0.954 (0.574-1.635)	0.840	0.907 (0.468-1.758)	0.770
	PSQI	1.11 (1.000-1.233)	0.050	1.082 (0.986-1.187)	0.097
	QoL	0.944 (0.891-0.991)	0.033	0.946 (0.935-1.039)	0.018
Stress	RLS	1.041 (0.098-1.107)	0.180	1.013 (0.968-1.059)	0.580
	Epworth	1.016 (0.91-1.135)	0.770	1.071 (0.953-1.204)	0.240
	Insomnia	1.149 (1.022-1.291)	0.020	0.892 (0.802-0.991)	0.034
	Apnea	0.786 (0.39-1.589)	0.500	1.122 (0.578-2.192)	0.730
	PSQI	1.047 (0.945-1.159)	0.380	1.088 (0.989-1.198)	0.083
	QoL	0.95 (0.905-0.997)	0.038	0.966 (0.924-1.037)	0.120

RLS, restless legs syndrome; ESS, Epworth sleepiness scale; PSQI, Pittsburgh sleep quality index; QoL, quality of life.

Discussion

In this study, we examined the association between depression, anxiety and stress with RLS, ESS, insomnia, apnea, PSQI and QoL by gender. Our results showed that the mean score of depression and stress were significantly different in men and women. Also in this study, we compared the mean score of depression, anxiety and stress for each factors include RLS, Epworth, insomnia, apnea, PSQI and QoL by gender. Our results showed that the mean scores of RLS, PSQI and QoL in various levels of depression/anxiety were significantly different for both genders but the mean scores of ESS and Insomnia in various levels of depression/anxiety were significantly different only for males.

The mean scores of RLS, Epworth, Insomnia, PSQI and QoL in various levels of stress were significantly different for males but only the mean score of QoL was significantly different for females. In current study, we used adjusted logistic regression models to identify the relation between depression, anxiety and stress with RLS, Epworth, insomnia, apnea, PSQI and QoL by gender.

The association between RLS and depression/anxiety were significant for males in adjusted logistic regression model. Our finding is consistent with a review study which have shown symptoms of depression are more severe in people with RLS (25). In a Prospective Study to evaluate the association between RLS and depression, Xiang Gao et al. showed the risk of depression and symptoms of depression increased in women with RLS (31). On the contrary, our study indicates no association between RLS with depression, anxiety and stress in women. subject with RLS have experienced problems such as fatigue, poor sleep and decreased concentration (25). Insomnia and sleep disorders themselves are a factor in depression, so sleep disorders in subject with RLS can be a cause for depression (32).

Our study also indicate that a one unit increase in insomnia score, the chance of having depression, anxiety and stress were significantly increased 16,13 and 23(%), respectively, in male. In the literature, Chang-Myung Oh et al. found that the incidence of depression and anxiety were more common in people with insomnia and they showed that by controlling for possible confounding variables, subject with insomnia were 9.8 times more likely to have anxiety and 19.7 times more likely to have depression than healthy subject (33).

Patients with persistent insomnia are prone to depression and also patients with depression, symptoms of anxiety and insomnia are important predictors (34). A cross sectional study conducted by Kutlu et al. did not find significant differences in depression score between patients with and without Apnea (35). This finding is consistent with

our results that didn't observe significantly association between anxiety/depression/ stress and apnea scores in either sex group. Although, a study performed in Iranian population to identify the correlation between anxiety and depression with OSAS showed the higher frequency of depression and anxiety in patients with apnea compared to general population (16).

A review study found that the depression rates in OSAS varies in range 7% to 63% (36). This variation can be related to differences in depression assessment methods and characteristics of patients.

In current study, an inverse relationship was observed between quality of life scores and anxiety/depression/ stress in both genders. Our results showed with one unit increase in quality of life score, the chance of having anxiety/depression/ stress decreases by about 0.8% in male.

This is consistent with, Wonhee Lee et al., who examined the relative contributions of sleep quality and depression in quality of life in patients with Obstructive sleep apnea. They reported that 41.6 % of patients with obstructive sleep apnea had depressive symptoms (37). Another pervious study also showed that anxiety and depression can affect the quality of life of patients with OSAS and they observed, the patients with OSAS received significantly lower scores on the quality of life questionnaire than healthy individuals(38).

Our results showed a significant direct relationship between PSQI and anxiety/depression/ stress. According to the results, increasing the PSQI increases the chances of having anxiety/depression/ stress. In a cross sectional study which assessed sleep quality with PSQI to investigate the association between depression symptoms and quality of sleep showed poor sleep quality increases the symptoms of depression (39).

PSQI encompasses all factors of sleep disorders, including sleep duration, sleep latency and sleep efficiency(40). More than fifty percent of subjects with anxiety disorders suffer from sleep problems(41). The majority of people with anxiety disorders suffer from neck and back pain, which can be a factor in sleep disturbance (15). Therefore, in this research, the relationship between depressive disorders and sleep problems was investigated.

Conclusion

In conclusion, depression, anxiety and stress were found to be associated with RLS, ESS, insomnia, PSQI and QoL. The current study showed an independent and significant association of depression with RLS, PSQI and QoL in men. In addition, anxiety was shown to have linkage between RLS, ESS, and QoL.

Furthermore, stress correlate with insomnia and

QoL in men independent of age. But, in women depression pointed out to be in parallel with insomnia and PSIQ. Although, stress is just related with insomnia independent of age. Anxiety reported to have connection just with QoL in women after age adjusting and non-survivors with COVID-19 and are associated with death in these patients.

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