The Association between Sleep Quality and the Psychological Domain of Health-Related Quality of Life among Adults in Jazan region, Saudi Arabia, A Cross-Sectional Study

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Abstract

Background: Sleep is an essential physiological process that accounts for about one-third of human life. Poor sleep quality is associated with many adverse effects, and can negatively affect the psychological domain of health-related quality of life. So, this study aimed to investigate the association between sleep quality and the psychological domain of health-related quality of life among adults in Jazan region, Saudi Arabia.

Participants and Method: A descriptive cross-sectional type of epidemiological study was carried out through an online web-based survey using a convenient type of sampling. A snowball sampling technique was used to collect data from 406 adults between 18-60 years old living in Jazan region. The data was collected using semi-structured questionnaire containing demographic data, Pittsburgh Sleep Quality Index (PSQI), and WHOQOL-BREF the short form.

Results: The age range of the participants was from 18 to 60, with mean, median, and mode of 30.92, 27, and 21 years, respectively (SD ± 11.402). Females constituted 230 (56.7%) of the study population, while males accounted for 176 (43.3%). The age of the participants was highly correlated with their psychological domain scores (r = 0.197; p < 0.0001). According to PSQI results, the majority of participants 279 (68.7%) reported poor sleep quality. Females were more correlated with higher PSQI scores reflecting their poorer sleep quality compared to males (r= 0.115; p = 0.020). Sleep quality and the psychological domain were significantly negatively correlated (r = -0.280; p < 0.0001).

Conclusion: Poor sleep quality has a significant negative correlation with the psychological domain of health-related quality of life among adults living in Jazan region. Future health educational programs are needed to improve the quality of sleep and psychological domain of health-related quality of life among adults in Jazan region.

Keywords: Sleep quality, Pittsburgh Sleep Quality Index, Psychological domain, HRL, Jazan.

Introduction

Sleep is an essential physiological process which accounts for about one third of human life (1). Sleep consists of two phases: rapid eye movement (REM), that is associated with active dreams, and non-rapid eye movement (NREM) (2). Sleep quality was found to be a strong independent predictor of physical and psychological health (3). Getting sufficient sleep is crucial for cognitive, mood, and memory maintenance (4).

Sleep plays a role in stimulating several activities in different parts of the brain enabling better thinking, learning, and memory during each stage of sleep (5). Furthermore, emotional brain activity is dependent on the normal sleep-wake regulation. Accordingly, poor sleep quality can affect moods and emotional reactivity (6). Patients with insomnia are more susceptible to have depression. In addition, anxiety is another common disorder in patients with insomnia (7, 8). It has been reported that increased anxiety levels are one of the most serious consequences of sleep deprivation (9). On the other hand, excessive fear or worry can make falling asleep difficult. So, the relationship between sleep deprivation and psychiatric disorders is a two-way direction (5). The psychological domain of health-related quality of life of an individual with a poor quality of sleep can be affected.

Quality of life is a multidimensional concept. It includes subjective assessments of both positive and negative aspects of an individual's life. According to WHOQOL-BREF, quality of life is measured by four specific domains; physical health, psychological wellbeing, social relationships and environmental factors (10). On the other hand, an individual's health-related quality of life (HRQOL) refers to their appreciation of their own physical and mental health while responding to changes in the physical and social environment under the effect of life experience, beliefs, and expectations (11). The psychological domain of health-related quality of life which will be measured in this study includes six items assessing areas such as; positive and negative feelings, cognitive functions, self-esteem, body image and physical appearance (10). Studies have found that assessing HRQOL is useful when discussing policies designed to improve health and reduce inequalities within the population (11).

According to the current evidence, poor sleep quality resulted from sleep disorders is prevalent among Saudis, including Jazan's population. Many studies have been published in Saudi Arabia including Jazan region showing the relationship between sleep and depression, stress and anxiety among students and their academic performance (12-14). However, there was a bias towards college students. This bias creates a knowledge gap, so there is still a lot to be learned. We think that poor sleep quality is negatively affecting the psychological domain of HRQOL among adults in Jazan region. As far as we know, there is no relevant study that has been published concerning this subject among the general adult population in Jazan region. This study aimed to assess the prevalence of poor sleep quality and to determine the association of sleep quality with the psychological domain of health-related quality of life among adults in Jazan region.

Participants and Methods

Study setting, Design, and Population:
This study was a descriptive cross-sectional design of epidemiological studies carried out from September 2021 to April 2022 and was conducted in Jazan region. Jazan is a coastal city on the Red Sea coast and the capital of it is called Jizan. It is located in the southwest corner of the Kingdom of Saudi Arabia and has a population of 1.6 million as per the 2020 census. The study targeted Jazan resident adults between 18-60 years old during the year 2021-2022 using an online web-based survey addressing different social media (WhatsApp, Twitter, Facebook, Instagram, and Snapchat) distributed in Jazan region.

Sampling Procedure:
A total of 406 adults were selected using the sample size formula for cross-sectional studies (15). The study used the parameters of p = 50% to compute the maximum sample size, 95% confidence interval, and an error not exceeding 5%. Additionally, a refusal rate of 20% was assumed in this study. The sampling design used was convenience, and non-random sampling. Also, Snowball sampling technique was used. The participants were selected through an electronic questionnaire that was sent to all residents of Jazan region.

Data Collection:
The study team distributed the study questionnaire to the participants. Adults living in the Jazan population between 18–60 years old, who were mentally healthy, and who agreed to participate were included. While those residents who refused to participate or complained of any mental illness, physical problem, used any psychotic medications, or were under 18 or older than 60 years old were excluded. Data in this study were collected through a self-administered electronic questionnaire requiring participant admission, using the Pittsburgh Sleep Quality Index (PSQI), and the WHOQOL-BREF questionnaire which is an abbreviated version of WHOQOL-100. The first section of the questionnaire started with an explanation of the study objectives and informed consent as a prerequisite for participation. The second section contained questions about social and demographic characteristics: Gender, age, education level, marital status, housing, occupation, and monthly income. The third and fourth sections contained questions regarding sleep quality during the past month using PSQI. The final part involved questions assessing the psychological domain of health-related quality of life using WHOQOL-BREF.

The Demographic Characteristics of All Participants
The gender of the study participants was analyzed and correlated with the other demographic variables with their percentages by using the cross-tabulation method. Gender was coded as (1 = Male), and (2 = Female). Age groups of the participants was coded as (1 = 18-25 years

old), (2 = 26-35 years old), (3 = 36-45 years old), (4 = 46-55 years old), and (5 = 56-60 years old). The marital status coding was (1 = Single), (2 = Married), (3 = Separated), (4 = Divorced), and (5 = Widowed). Level of education was coded as (1 = None at all), (2 = Secondary school), (3 = High school), (4 = University or college), and (5 = Post-graduate). The occupation of the participants was coded as (1 = Student), (2 = Employee), (3 = Unemployed), (4 = Retired), and (5 = Others including; freelancers and housewives). Monthly income (Saudi Riyals; SAR) of the participants was coded as (1 = < 5000 SAR), (2 = 5000 – 10,000 SAR), (3 = 10,000 – 20,000 SAR), and (4 = > 20,000 SAR). The residency of the participants was coded as (1 = City), and (2 = Village). The housing was coded as (1 = Owned house), (2 = Rented house), and (3 = Others such as; family house).

PSQI and WHOQOL-BREF
The Pittsburgh Sleep Quality Index (PSQI) consists of 19 self-reported questions, as well as five questions rated by a roommate or bed partner (if applicable). It measures the 7 components which are: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, the use of sleeping medication, and daytime dysfunction. However, only self-rated questions were included in the score, which ranges from 0 to 3 points. A score of 0 does not represent any difficulty, while a score of 3 represents extreme difficulty. The overall score can range from 0 to 21 giving the global PSQI score, where lower scores represent good sleep quality. A global score of 5 or more indicates poor sleep quality, the higher the score, the poorer the sleep. The overall reliability of Cronbach's alpha coefficient of the Arabic version of PSOI's seven component scores was 0.77 (16). On the other hand, the WHOQOL-BREF questionnaire contains 6 questions that are included in the psychological domain concerning positive and negative feelings, spirituality and personal belief, cognitive functions, self-esteem, and body image and appearance (17). Each question is rated from 1 (very dissatisfied/very poor) to 5 (very satisfied/very good) points. The five questions assessing the positive feelings, spirituality and personal belief, cognitive functions, self-esteem, and body image and appearance were scored as (1=1), (2=2), (3=3), (4=4), and (5=5), while the question that assessed the negative feelings was negatively framed so we transformed it to be positively framed and scored it as (1=5), (2=4), (3=3), (4=2), and (5=1). The mean score of these questions within the psychological domain was multiplied by 4 to calculate the domain score. The first transformation method converts the raw scores to a range between 4-20, to be comparable with the WHOQOL-100 scale. The second transformation method converts domain scores to a 0-100 scale (18).

The scores of the psychological domain are scaled in a positive direction where higher scores indicate a higher quality of life. The psychological domain score of the Arabic version of WHOQOL-BREF Cronbach's alpha was 0.77 (19). In our semi-structured questionnaire, Cronbach's alpha of PSQI score was 0.81, while for the psychological domain, WHOQOL-BREF was 0.66. The Cronbach's alpha value for the full questionnaire was 0.74. A pilot study was conducted on 20 participants. The results of the pilot study analysis were not included in the final results.

Data Presentation and Analysis:
The statistical data entry and analysis were performed using the Statistical Package for Social Science (SPSS) version 24. Continuous variables are expressed as means, and respective standard deviations and categorical variables are expressed as frequencies and percentages. The association between sleep quality and the psychological domain of health-related quality of life scores was evaluated using Spearman's correlation coefficient; 2-tailed. P-values of < 0.05 were considered statistically significance. Finally, there were no missed data.

Ethical Consideration:
Ethical approval was obtained from Jazan University Ethical Committee (REC-43/05/103). The first page of the study's questionnaire contained a statement about the study's importance and objectives and was used to get an acceptance to informed consent as a prerequisite to participate in the study. All data provided by the participants were used only for research purposes and a written guarantee for keeping confidentiality was provided. All team members agree to be held accountable for any scientific or ethical breaching in this study.

Results

Characteristics of All Participants
A total of four hundred and six participants completed the questionnaire, giving a response rate of 100% (406 out of 406). The age range of the participants was from 18 to 60, with mean, median, and mode of 30.92, 27, and 21 years, respectively (SD ± 11.402). An overview of the characteristics of the 406 of the study population is given in Table 1. Among the participants, there were 230 females (56.7%) and 176 males (43.3%). Half of the participants were single 203 (50%), while 188 (46.3%) of them were currently married. A total of 221 (54.4%) from the study population have completed a high school education, followed by 175 (43.1%) who had a bachelor's degree or higher.

Table 1: Characteristics of Participants (n = 406).

Variables		Males (n = 176)		Females (n = 230)		Total (n = 406)	
		No.	%	No.	%	No.	%
Age Groups	18-25	80	45.5%	111	48.3%	191	47.0%
	26-35	32	18.2%	51	22.2%	83	20.4%
	36-45	27	15.3%	42	18.3%	69	17%
	46-55	35	18.8%	20	9.6%	55	13.5%
	56-60	4	2.3%	4	1.7%	8	2%
Marital Status	Single	95	54%	108	47%	203	50%
	Married	76	43.2%	112	48.7%	188	46.3%
	Separated	3	1.7%	3	1.3%	6	1.5%
	Divorced	1	0.6%	7	3.0%	8	2%
	Widowed	1	0.6%	0	0.0%	2	0.2%
Level of Education	Illiterate	1	0.6%	0	0.0%	1	0.2%
	Secondary school	2	1.1%	7	3.0%	9	2.2%
	High school	101	57.4%	120	52.2%	221	54.4%
	University or college	28	15.9%	54	32.5%	82	20.2%
	Post-graduate	44	25.0%	49	21.3%	93	20.9%
Occupation	Student	72	40.9%	109	47.4%	181	44.6%
	Employee	87	49.4%	55	23.9%	142	35.0%
	Unemployed	7	4.0%	49	21.3%	56	13.8%
	Retired	10	5.7%	10	4.3%	20	4.9%
	Others (Freelancer, Housewife)	0	0.0%	7	3.0%	7	1.7%
Monthly Income (Saudi Riyals; SAR)	<5000 SAR	72	40.9%	139	60.6%	211	52.0%
	5000 – 10,000 SAR	43	24.4%	52	22.6%	95	23.4%
	10,000 – 20,000 SAR	43	24.4%	34	14.8%	77	19.0%
	>20,000 SAR	18	10.2%	5	2.2%	23	5.7%
Residency	City	116	65.9%	134	58.3%	250	61.6%
	Village	60	34.1%	96	41.7%	156	38.4%
Housing	Owned house	145	82.4%	186	80.9%	331	81.5%
	Rented house	28	15.9%	43	18.7%	71	17.5%
	Others (Family house)	3	1.7%	1	0.4%	4	1.0%

The Prevalence of Poor Sleep Quality among the Study Population

The prevalence of poor sleep quality according to gender among the study population is shown in Table 2. The majority of the adult population in Jazan region had poor sleep quality (68.7%), while only (31.3%) of the participants reported good sleep quality. However, female participants had higher PSQI scores (72.6%) than male participants (63.6%), which indicate that females have poorer sleep quality compared to males.

Table 2: Sleep Quality According to Gender among Study Participants (n = 406). PSQI = Pittsburg Sleep Quality Index.

Sleep Quality	Male (n = 176)		Female (n = 230)		Total (n = 406)	
	No.	%	No.	%	No.	%
Good PSQI < 5	64	36.4%	63	27.4%	127	31.3%
Poor PSQI ≥ 5	112	63.6%	167	72.6%	279	68.7%

The Correlation of the Demographic Variables with the Psychological Domain of Health-Related Quality of Life

As shown in Table 3 gender had no significant difference when it is correlated with the psychological domain of health-related quality of life (r = 0.021; p = 0.680), whereas as one gets older the psychological domain significantly improves (r = 0.197; p < 0.0001). There was a correlation between a higher educational level and better psychological domain scores (r = 0.164; p = 0.001). Also, higher monthly income is correlated with higher psychological domain scores (r = 0.129; p = 0.009). A correlation was also found between marital status, occupation, and the psychological domain of health-related quality of life. The psychological domain scores were higher in singles and married participants (r = 0.159; p = 0.001), as well as in those who were students and employed (r = 0.132; p = 0.008).

Table 3: Correlation between World Health Organization Quality of Life-Brief (WHOQOL-BREF) psychological domain of health-related quality of life (HRQOL) and the demographic variables among study participants (n = 406).

Variables	The Psychological Domain of HRQOL	
	r	P
Age (years)	0.197	< 0.0001
Gender (Male/Female)	0.021	0.680
Marital Status (Single, Married, Separated, Divorced or Widowed)	0.159	0.001
Level of Education (None at all, Secondary school, High school, University or college, or Post-graduate)	0.164	0.001
Occupation (Student, Employee, Unemployed, Retired or Others)	0.132	0.008
Monthly Income (Saudi Riyals)	0.129	0.009

The Correlation of the Demographic Variables with Sleep Quality

The demographic variables that correlated with sleep quality among the study population are shown in Table 4. Participant's sleep quality differed significantly based on their gender (r = 0.115; p = 0.020). Female participants were highly correlated with higher global PSQI scores which indicate their poor sleep quality. Aside from that, monthly income demonstrates a significant negative correlation with sleep quality. The lesser the monthly income of an individual the higher the global PSQI score, indicating their poor sleep quality (r = -0.106; p = 0.033) compared to individuals with higher monthly income. Other demographic variables show no significant correlation between them and sleep quality among these study participants.

Table 4: Correlation between sleep quality measured by Pittsburg Sleep Quality Index (PSQI) and the demographic variables among study participants (n = 406).

Variables	PSQI: Global Score	
	r	P
Age (years)	-0.070	0.161
Gender (Male/Female)	0.115	0.020
Marital Status (Single, Married, Separated, Divorced, or Widowed)	-0.81	0.105
Level of Education (None at all, Secondary school, High school, University or college, or Post-graduate)	-0.070	0.157
Occupation (Student/Employee/Unemployed/Retired/other)	-0.036	0.469
Monthly Income (Saudi Riyals)	-0.106	0.033

The Correlation between Sleep Quality and the Psychological Domain of Health-Related Quality of Life

Based on Table 5, each of the seven PSQI components is shown with their correlation values. A negative correlation was found between the psychological domain of health-related quality of life and the global score of PSQI of the participants (r = -0.280; p < 0.0001). All components of the PSQI show a significant value except two of them; sleep disturbance and the use of sleep medication. However, higher scores were found in the subjective sleep quality of participants with lower scores in the psychological domain, indicating a negative correlation between them (r = -0.271; p < 0.0001), as well as for the 7th component which is the daytime dysfunction giving the result (r = -0.288; p < 0.0001).

Table 5: Correlation between World Health Organization Quality of Life-Brief (WHOQOL-BREF) the psychological domain of health-related quality of life (HRQOL) and quality of sleep (measured by Pittsburg Sleep Quality Index; PSQI) variables among study participants (n = 406).

Variables	The Psychological Domain of HRQOL	
	r	P
C1: Subjective sleep quality	-0.271	< 0.0001
C2: Sleep latency	-0.162	0.001
C3: Sleep duration	-0.154	0.002
C4: Habitual sleep efficiency	-0.155	0.021
C5: Sleep disturbances	-0.054	0.282
C6: Use of sleep medication	-0.064	0.199
C7: Daytime dysfunction	-0.288	< 0.0001
PSQI: Global score	-0.280	< 0.0001

Discussion

This study included 406 of the adult population living in Jazan region, to investigate the association between sleep quality and the psychological domain of health-related quality of life among them. The prevalence of poor sleep quality of adults living in Jazan region was (68.7%). Our study found that sleep quality has a statistically negative correlation with the psychological health-related quality of life among adult participants. Additionally, these two variables were also correlated with the demographic characteristics of the study population. According to the results shown in Table 3, most of the demographic variables including age, gender, marital status, level of education, and monthly income were significantly correlated with the psychological domain scores. The older the age, the higher the level of education, and the higher the monthly income, the better and greater the psychological domain scores. Thus, indicating the interference of those variables with the psychological domain scores in the WHOQOL-BREF questionnaire. Further, sleep was correlated with those variables as well, especially gender and monthly income. The results in Table 2 show us that the majority of those participants had poor sleep quality (68.7%) and more predominantly were females participants who reported higher PSQI scores (72.6%) indicating their poor sleep quality compared to males (63.6%) with a statistical correlation between sleep quality and gender (r = 0.115; p = 0.020) as it's represented in Table 4. Similar findings have been found in another study among Saudi adults in Riyadh that focused on the duration rather than the quality of sleep which reported a reduction in sleep duration by 22 minutes in the female gender (20). Moreover, a study that analyzed the sleep quality association with quality of life among the nurse population mentioned that females were more associated with sleep disturbance than males (OR = 3.40; 95%CI 1.37; 8.40; p = 0.008) (21). However, a study was conducted on Saudi adolescents in Riyadh which found that sleep scores were significantly lower for adolescents and even lower among girls (p = 0.002) than boys (p = 0.19) indicating that severe stress was negatively associated with sleep in girls but not in boys (22). Another paper revealed that nearly half (46%) of adolescent participants have sleep deprivation (less than

7 hours of sleep per day) highlighting that puberty has a major role in biological circadian change (23). Despite the fact that these studies were conducted on a different population, medical students, and adolescents who may have a different set of influencing factors, our study revealed similar results that pointed out the correlation between sleep quality and gender differences in this study population as well.

Also, those participants with a monthly income less than 5000 Riyals were found to have higher PSQI scores indicating their poor sleep quality compared to others with higher monthly income. This elaborates the negative correlation between sleep quality and the monthly income of participants. A recent study conducted on the German community demonstrated that sleep quality was strongly influenced by socioeconomic status and employment situation, and the poorest sleep quality was found in unemployed people (24). Based on the correlations between employment status, monthly income, sleep quality, and psychological domain scores, this may suggest that employment status and income played an important role in influencing the sleep quality and the psychological domain scores among the participants. This might explain why females tend to have poorer sleep quality in our results. However, in our study, we found that psychological domain scores have a strong correlation with most of the demographic characteristics of participants, unlike sleep quality which was significantly correlated with only two of the demographic variables; gender and the monthly income of the study population as is shown in Table 4.

Additionally, the psychological domain of health-related quality of life was found to be strongly correlated with the global score of the PSQI of the participants with a strong statistically significant result (r = -0.280; p < 0.0001) among this study participants. The psychological domain scores of the participants were found to be negatively influenced by their sleep quality. Those who have higher global PSQI scores suffering from poor sleep quality were found to score less in the psychological domain. This reflects the negative correlation between these two variables. Our results show that five of the seven components that are included in The PSQI questionnaire were correlated negatively with the psychological domain scores. Subjective sleep quality

(r = -0.271; p < 0.0001), and daytime dysfunction (r = -0.288; p < 0.0001) were the most influenced categories among those seven components, followed by sleep latency (r = -0.162; p = 0.001), sleep duration (r = -0.154; p = 0.002), and habitual sleep efficiency (r = -0.155; p = 0.021) as documented in Table 5. Similar results were found in a study conducted about the association between sleep quality and quality of life among patients with first-episode psychosis which stated that participants with higher scores in subjective sleep quality, sleep latency, and daytime dysfunction were associated with lower scores in the psychological domain of quality of life (25). Furthermore, this correlation has also been reported in a different paper which revealed that sleep alteration is associated with impaired quality of life domains including the psychological domain (r = -0.51; p < 0.0001) (21). Also, a study among medical students in Jeddah shows an association between stress and poor sleep quality, where the PSQI score (total PSQI score *5) was 76.4%. These studies indicate a strong link between stressful environment and poor sleep quality (value of Cramer's V = 0.371, P < 0.001) (26).

Nevertheless, in our research, we found that the other two components included in the PSQI which are; sleep disturbance and the use of sleep medications show no significant value when they were correlated with the psychological domain scores. In contrast, studies have assessed the effect of psychiatric illnesses on the quality of sleep. According to one study on patients with delusions and hallucinations, they frequently experience sleeping difficulties, difficulty staying asleep, excessive sleeping, and nightmares. In turn, these problems result in low productivity, fatigue, emotional distress, and poor sleep quality

Conclusion

This study revealed that the majority of adults living in Jazan reported poor sleep quality, especially females. Additionally, poor sleep quality was significantly negatively correlated with the psychological domain of health-related quality of life among adults living in Jazan region. In comparison to individuals with higher psychological domain scores, those with lower psychological domain scores were found to have higher PSQI global scores indicating their poor sleep quality. The demographic variables were also significantly correlated with both sleep quality and the psychological domain scores among this study population. The findings of this present study could be used as a basis for future health education programs to improve the quality of sleep and psychological domain of health-related quality of life among adults in Jazan region. Future research on other populations could potentially benefit from a qualitative approach to understand why these correlations exist.

Limitations of the Study
This study relied on descriptive findings derived from a cross-sectional design, which restricted us from drawing any definitive conclusions about the direction of the association between sleep quality and the psychological domain of health-related quality of life among study participants. Consequently, the causal relationships between these two variables couldn't be concluded.

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