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Sleep quality and mediating factors among schizophrenic patients attending mental health hospital in Jeddah, KSA, 2022: A cross sectional study

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ABSTRACT

Background: Sleep disturbance is one of the major problems schizophrenic patients' faces that worsen their symptoms and lead to serious morbidities and even increased mortality. We assessed the sleep quality and associated factors among schizophrenic patients. *Methods:* We conducted a cross-sectional study using interviews of patients with questionnaires. Using the Pittsburgh Sleep Quality Index (PSQI) and Morisky Green test (MGT), we assessed sleep quality and antipsychotic medication adherence, respectively. *Results:* We enrolled 377 participants who were mostly male (76.7%), Saudi nationals (93.4%) and unemployed (79.3%), with a mean age of 36.38 ±10.59 years. The mean age of diagnosis of schizophrenia was 24.8± 8.30 years. Most earned less than 3,000 Saudi riyals (SAR) per month (77.5%) and were using two or more medications (92.3%). The majority (82%) of participants scored > 5 on the PSQI, indication poor quality of sleep (PSQI score > 5), while (18%) had good quality of sleep (PSQI score < 5) and more respondents with a poor sleep were significantly male (p=0.018), < 3000 SAR/ month earners (p = 0.006) and unemployed (p=0.001). Only female gender was a significant independent predictor for poor sleep quality (AOR=2.21, 95% CI: 1.00-4.88) (p=0.048) of all Participants 72.3% were not adhering to their medications. *Conclusion:* We found poor sleep quality among participants with poor adherence to medications, indicating the necessity for measures to help them have good sleep quality by addressing factors identified in order to ensure successful care outcomes.

Keywords: Sleep quality, schizophrenia, factors, treatment adherence.

1. INTRODUCTION

Schizophrenia is a chronic and serious mental health illness affecting approximately 1% of the global population and caused by a variety of genetic and environmental factors (Orrico et al., 2020). Abnormal behavior, hallucinations and delusions, also called positive symptoms, are usually the

first to appear, while negative symptoms, which affect how patients feel and behave, may take years before developing (Hany et al., 2021). Studies highlighted that schizophrenia especially chronic, is associated with poor quality of life, including sleep disturbances (Durgoji et al., 2019). Sleep is a vital part of maintaining healthy wellbeing since it is a restorative process for homeostatic management and correct physiological functioning (Kiwan et al., 2019). Schizophrenia leads to poor sleep quality in 80% of patients (Kaskie et al., 2017) and commonly seen complaints are insomnia, reduction in sleep time and efficacy, increased daytime sleepiness along with difficulty falling asleep (Kaskie et al., 2017; Kiwan et al., 2019). In somnia is the most common sleep disturbance caused by schizophrenia and is associated with poor clinical and economic outcomes (Mulligan et al., 2016).

Studies have revealed that patients with a poor sleep often experience severe symptoms of the illness, particularly the positive symptoms (Ered et al., 2018). Furthermore, suicidal behaviors (ideation, attempt and death) increased by more than 10 % in patients with poor quality of sleep and hence lead to high morbidity and mortality (Bernert et al., 2015). Also, schizophrenia patients with poor sleep quality are at increased risk for developing other medical conditions such as restless leg syndrome and obstructive sleep apnea (Kaskie et al., 2017). Therefore, this study assessed schizophrenic patients' sleep quality and associated factors in Jeddah, Saudi Arabia. To our knowledge, no previous study of this nature has been carried out in Saudi Arabia. Our study findings will assist policy makers and healthcare workers in providing evidence-based services and lay foundation for future investigations.

2. METHODS

Study design

An analytic cross sectional was conducted patients diagnosed with schizophrenia receiving follow up treatment for at least 1 year in the outpatient clinic at Eradah and Mental Health complex in Jeddah, Saudi Arabia. All schizophrenic patients aged 18-65 years who could communicate were included. Unstable patients, unable to communicate, and patients with other mental disorders comorbidities or primary drug addiction were excluded. It was conducted between 1st November 2021 to 30th June 2022.

Sampling

The sample size was calculated using http://www.raosoft.com/samplesize.html, with a marginof error of 5% and a 95% confidence level and assuming that 50% of schizophrenic patients have sleep quality problems. Then, the sample size was 377. A consecutive sampling technique was utilized to recruit eligible participants until the intended sample size was reached.

Data collection tool (instrument) and procedure

We used a questionnaire for data collection. Data collected included demographics, such as age, gender, educational level, work status, income, BMI and current smoking habits. Data about the presence of physical illnesses, diagnosis of schizophrenia, number of medications used and type of follow up medication were collected from medical files. We used The Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality. The PSQI measures seven domains to distinguish "poor sleep" from "good sleep," including sleep duration, disturbances and latency, as well as the use of medications, dysfunction during the day, sleep efficiency, and subjective quality of sleep over the previous month. The scoring system is based on a 3-point Likert scale, with a higher score indicating poorer sleep quality and a cutoff level of 5 was used in this study. Morisky Green test (MGT) assessed antipsychotic medication adherence.

We conducted face to face interviews using structured questionnaires. The interviews took place in the outpatient psychiatric clinics during the working hours from 8 a.m. to 4 p.m. on weekdays. The interviewers introduced themselves, explained the study's objective, benefits and process to participants and asked them to participate after providing written consent.

Primary Outcome

The sleep quality of schizophrenia patients is the key outcome of interest in our study (either poor or good).

Secondary Outcome

Include socio demographic variables, such as age, gender, marital status, educational level, income, BMI and current tobacco use.

Data analysis

We analyzed data using Statistical Package for Social Science (SPSS) version 24.0. The characteristics of the respondents were presented in frequencies and PSQI scores were presented as mean with standard deviations. We used Chi square test and logistic

regression to compare categorical variables and examine the relationship between independent and outcome variables. The collinearity test was used to assess the confounder's effects. The statistically significant association was determined using an adjusted odds ratio with a 95% confidence interval (CI) and a p value of less than 0.05.

3. RESULTS

We recruited 377 patients (Table 1), with the majority being males (76.7%) and Saudi nationals (93.4). The mean age of the patients was 35.83 ± 9.59 years. The majority (33.4%) were in the age group of 26 35 years. Most patients were single (65.1%) and those who had completed high schooling were 39.3%. In our study, most patients were unemployed (79.5%).

Table 1 Demographic characteristics of schizophrenic patients (N=377)

Variable	Frequency	%
Gender		
Male	289	76.65
Female	88	23.35
Nationality		
Saudi	352	93.36
Non-Saudi	25	6.64
Age		
18-25 years	66	17.5
26-35 years	126	33.4
36-45 years	119	31.5
46-55 years	47	12.4
56-60 years	19	5.03
BMI (kg/m^2)		
<25	105	27.93
25-29.9	147	39.1
30-34.9	69	18.08
35 and above	56	14.89
Employment history		
student	13	3.19
governmental work	18	4.79
private work	26	6.91
free work	21	5.59
no job	299	79.52
Education Qualification		
primary school	79	21.01
Intermediate school	62	16.49
High school	148	39.36
Diploma	29	7.71
Bachelor	55	14.36
post graduated	4	1.06
Marital Status		
Single	246	65.16
Married	96	25.53
Divorce	35	9.31

Do you have children		
yes	94	24.9
No	283	75.1
Income per month		
less than 3000 SR	292	77.39
3000-7000 SR	64	17.03
7000-10000 SR	17	4.52
11000-16000 SR	2	0.53
More than 16000	2	0.53
Are you smoker		
yes	92	24.67
No	285	75.33
How many medications do you have		
one	29	7.71
two or more	348	92.29

Only 24.9% had children at home, while the rest, 75.1%, had no children. Of all participants, 24.6% were smokers and 77.5% had a monthly income of less than 3,000 Saudi riyals (SAR). The mean age of diagnosis of schizophrenia was 24.8± 8.30 years. Regarding the number of medications used, the majority (92.3%) used two or more medications. The PSQI was used to assess the participants' sleep quality. Based on the PSQI scale, sleep quality overall score was classified as PSQI < 5 for good quality of sleep and PSQI > 5 for the poor quality of sleep. Most participants (82%) had poor quality of sleep (PSQI score > 5), while (18%) had a good quality of sleep (PSQI score < 5) (Figure 1**).** The overall score of each category of PSQI is reported in (Table 2).

Table 2 Overall mean Pittsburgh Sleep Quality Index (PSQI) and Morisky Green Test (MGT) scores among the studied population (N = 377)

Variable	Mean	SD
Duration of sleep	0.936	1.06
Sleep disturbance	1.069	0.526
Sleep latency	2.26	0.788
Day dysfunction due to sleepiness	1.286	1.055
Sleep efficiency	0.94	1.349
Overall sleep quality	1.480	1.427
Use of sleep medication	0.604	0.934
Morisky green test	0.87	1.2

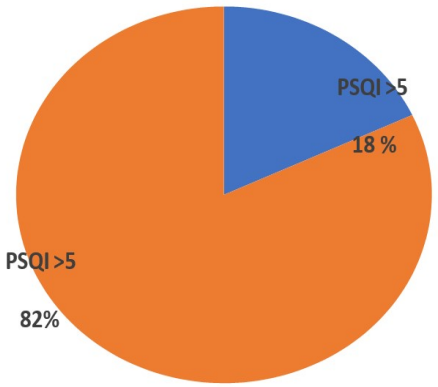

Figure 1 The quality of sleep of the patients based on PSQI (n=377)

Of all participants with poor quality of sleep, the majority (86.8%) were male (p = 0.018), unemployed participants (80.9%) (p=0.001) and less than 3000 SAR monthly income earners (77.7) (p = 0.006). The rest of the variables were not statistically significant (Table 3).

Table 3 Comparative analysis of demographic characteristics with quality of sleep (n=377) Variable

	Good sleep quality (N=85)	Poor sleep quality (N=29)	p-value
Gender			
Male	59(86.8)	230(74.4)	0.018*
Female	9(13.2)	79(25.6)	
Nationality			
Saudi	62(91.2)	290(93,9)	0.285
Non-Saudi	6(8.8)	19(6.1)	
Age			
18-25 years	12(17.6)	54(17.5)	0.669
26-35 years	18(26.5)	108(35.0)	
36-45 years	23(33.8)	96(31.1)	
46-55 years	11(16.2)	36(11.7)	
>55 years	4(5.9)	15(4.9)	
BMI			
<25	25(36.8)	122(39.5)	0.272
25-29.9	17(25.0)	88(28.5)	
30-34.9	18(26.5)	51(16.5)	
35 and above	8(11.8)	48(15.5)	
Employment history			
Student	3(4.4)	10(3.2)	0.001*
Governmental	10(14.7)	68(2.6)	
Private work	3(4.4)	23(7.4)	
Free work	5(23.8)	16(76.2)	
Unemployment	60(20.1)	239(79.9)	
Education Qualification			
Primary	14(17.7)	65(82.3)	0.328
Intermediate	11(17.7)	51(82.3)	
High school	26(38.2)	122(39.5)	
Bachelor	17(30.9)	38(69.1)	
Postgraduate	3(75)	1(25)	
Marital Status			
Single	42(61.8)	204(66)	0.328
Married	22(32.4)	74(23.9)	
Divorce	4(5.9)	31(10)	
Do you have children			
Yes	16(23.5)	78(25.2)	0.451
No	52(76.5)	231(74.8)	
Income per month			
less than 3000	52(76.5)	240(77.7)	0.006
3000-7000 SR	8(11.8)	56(18.1)	
7000-10000 SR	6(8.8)	11(3.6)	
11000-16000 SR	0(0.0)	2(0.6)	

More 16000	2(2.9)	0(0.0)	
Are you smoker			
Yes	14(20.6)	78(25.2)	0.215
No	54(79.4)	231(74.8)	

**Statistically significant*

Multivariate analysis revealed that only gender had a statistically significant association with poor sleep quality, since female participants had 2.2 times more odds to experience poor sleep quality (AOR = 2.21, 95 % CI: 1.00-4.88) (p=0.048) (Table 4).

Table 4 Factors associated with sleep quality among schizophrenic patients

Variables	Adjusted OR (95CI)	P value
Gender (Female)	2.21 (1.00, 4.88)	0.048*
Nationality	0.709 (0.253, 1.986)	0.513
Age	0.761 (0.555, 1.044)	0.091
BMI	0.955 (0.734, 1.243)	0.734
Jobs	2.278 (0.983, 3.661)	0.067
Education	0.915 (0.722, 1.160)	0.464
Marital status	0.892 (0.523, 1.523)	0.676
Children	0.631 (0.252, 1.576)	0.324
Income per month	0.886 (0.557,1.409)	0.609
Smoking history	1.276 (0.662, 2.459)	0.466

**Statistically significant*

Medication adherence was assessed using the Morisky Green test (MGT), which contains four components. With this scale, 372 (72.3%) of participants were non-adherent to their medication. Most participants (65.8%) reported forgetting to take medications at the right time and with the right dose, had problems remembering to take their medication (67.9%), discontinued their medication when they felt better (78%) and sometimes stopped their medication when their illness becomes worse were (77.7%) (Table 5).

Table 5 Medication adherence using Morisky Green Test (MGT) (n=377)

S. NO.	Morisky Green Test (MGT)	Frequency (%)
1	Do you ever forget to take your medicine? (yes)	248(65.8%)
2	Do you ever have problem remembering to takemedications? (yes)	256(67.9%)
3	When you feel better, do you sometime stop your medicine?(yes)	294(78%)
4	Sometimes if you feel worse when you take your medicine doyou stop taking it? (yes)	293 (77.7%)

4. DISCUSSION

Sleep quality is a serious issue among schizophrenia patients and studying its quality (either) and associated factors would serve to understand it better and offer quality care to patients for a better outcome. The inadequacy of studies on schizophrenia in Saudi Arabia emphasizes the need for additional research efforts to inform mental health practice. Therefore, we evaluated the sleep quality and associated factors among schizophrenic patients at Jeddah mental health hospital. We found that the mean age of schizophrenia diagnosis was 24.8± 8.30 years, which is a young age probably due to the predominance of male patients who tend to have early onset of schizophrenia symptoms. This is supported by another study that reported the range of onset tobe from 13.78 to 29.28 years (Musk et al., 2020). More than three quarters of schizophrenic patients included in the study were male and earned less than 3,000 SAR. These findings align with previous studies showing that schizophrenia is more prevalent in men than women (Ochoa et al., 2012). Studies have reported that early onset of symptoms, more negative symptoms and substance abuse are seen more in men than in women with schizophrenia, while women tend to have a late onset and more affective symptoms (Li et al., 2016; Ochoa et al., 2012). Of all participants, 79.3% were unemployed, which can increase stress and financial hardship and may lead to more risks for

schizophrenia. This is supported by some studies indicating that financial problems increase the risks of psychosis and people from countries with large income gaps are more likely to have schizophrenia (Burns et al., 2014; Richardson et al., 2018).

The monthly income of less than 3000 SAR is lower than the minimum income in Saudi Arabia, which may expose our study participants to more financial hardship. However, the reason might be that more were unemployed, probably due to the inability to work caused by schizophrenia. Low income was identified as a worsening factor for schizophrenia symptoms (Hakulinen et al., 2019; Richardson et al., 2018). Financial difficulties related to low income and unemployment might be affecting participants' sleep quality, as evidenced by our findings that earning less than 3000 SAR and unemployment have a statistically significant association with poor sleep quality. Therefore, advocacy for more financial support for these patients might contribute to recovery and positive treatment outcomes.

Our study findings showed the sleep quality of more than four-fifths (82%) of participants was poor, with only 18% reporting good sleep quality. These findings are similar to other studies that reported poor sleep quality among the majority of schizophrenic patients (Dule e tal., 2020; Mattai et al., 2006; Noort et al., 2016). Multiple regression analysis showed that only the female gender was a significant independent factor of poor sleep quality, with double more odds of having sleep quality. This aligns with another previous study that assessed gender differences in sleep disturbances among schizophrenic patients (Moura et al., 2008).

Poor sleep quality in schizophrenia is linked to a reduced quality of life in many ways. Poor sleep quality is linked to more suicidal behavior and is suggested to trigger paranoia (Dule et al., 2020). Patients with sleep disturbance are 13 times more likely to consider suicide, suicide attempts or completed suicide (Wu et al., 2018). In addition, it was found that poor sleep impairs memory and makes patients more incapable of performing vital tasks (Noort et al., 2016). Therefore, more efforts should be put into helping patients improve their sleep quality as poor sleep quality might affect behaviors and impair the uptake of medications, further aggravating the severity of the disease.

The impact of sleep quality on adherence to medications was identified. One study found that around three quarters of schizophrenic patients' adherent to medications had good sleep quality (Dule et al., 2020). Our study showed that 72.3% of participants were non adherent to their medication, which might be caused by the higher number of participants who sleep poorly. In addition, 92.3% of participants were taking multiple medications, which can increase the likelihood of forgetfulness and other reasons for poor adherence as indicated by high rates (65.8-78%) of problems in remembering to take medications and stopping medications in our study participants

This study has some limitations: First, only subjective assessments of the patients were considered, with no objective measures such as actigraphy or polysomnography, so we could not eliminate recall bias. Second, sleep abnormalities were not considered, which could affect the results. Finally, other characteristics linked to sleep quality, such as occupation, physical exercises, food and illness related stigma, were not investigated and should be incorporated in future research.

5. CONCLUSION

This study showed that only 18% of schizophrenic patients at Jeddah Eradah and Mental Health complex had a good quality of sleep. Poor sleep quality was significantly more prevalent among low-income earners, unemployed and male participants. However, after adjusting for confounders, the female gender was the single significant independent factor for the poor sleep quality. We also found that most participants were non adherent to medications. These findings highlight the urgent need to incorporate measures for good sleep into the daily management efforts for these patients in order to improve their quality of life, adherence to medications and effective care.

Ethical considerations

This study was approved by the Ethics Committee of Institutional Review Board A01383. Informed consent form was handled to all the participants prior to data collection including the study's objective, selection criteria and advantages. Participants' confidentiality and anonymity were protected by assigning a code number to each response to be utilized for data analyses. All the collected data were used for research purposes only.

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Author Contributions

Mona A Alshehri designed the study's conceptual frame work and drafted the research proposal also did data collection and

analysis. Then he wrote the manuscript draft. Hani A Alghamdi contributed to designing the study's conceptual frame work and supervised the research conduction. Suhail A Khan revised and contributed to the research proposal and manuscript writing and supervised the research conduction.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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