





Sleep Disturbances and Their Association With Quality of Life in Older Psychiatric Patients During the COVID-19 Pandemic

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Abstract

Aims: The negative effect of the COVID-19 pandemic on sleep quality of clinically stable psychiatric patients is unknown. This study examined the prevalence of sleep disturbances and their association with quality of life (QOL) in clinically stable older psychiatric patients during the COVID-19 pandemic. **Methods:** This multicenter, cross-sectional study involved older patients attending maintenance treatment at outpatient departments of four major psychiatric hospitals in China. Patients' socio-demographic and clinical characteristics were collected. Sleep disturbances, depressive symptoms, and QOL were assessed with the Insomnia Severity Index, the 9-item Patient Health Questionnaire, and 2 items of the World Health Organization Quality of Life-Brief version, respectively. Binary logistic regression analysis was conducted to examine the independent associations of socio-demographic and clinical variables with sleep disturbances, while the association between sleep disturbances and QOL was explored with analysis of covariance. **Results:** A total of 941 patients were recruited. The prevalence of sleep disturbances was 57.1% (95% CI: 53.9–60.2%). Analysis of covariance revealed that QOL was significantly lower in patients with sleep disturbances compared to those without. Multivariate logistic regression analysis showed that sleep disturbances were positively and independently associated with more severe depressive symptoms (OR = 1.32, 95% CI: 1.26–1.37). Compared to patients with major depressive disorder, those with other psychiatric diagnoses had a significantly higher prevalence of sleep disturbances (OR = 1.44, 95% CI: 1.00–2.08). **Conclusion:** Sleep disturbances were common among clinically stable older psychiatric patients during the COVID-19 pandemic. Considering the negative association with QOL, this subpopulation needs regular assessment and timely treatment to reduce their sleep disturbances and improve their QOL.

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Keywords

older patients, psychiatric disorder, sleep disturbances, quality of life, COVID-19

Introduction

The Coronavirus Disease 2019 (COVID-19) was first reported in China at the end of 2019, and subsequently was found in over 200 countries.¹ Compared to the general population, psychiatric patients are arguably one of the most vulnerable subpopulations affected by the COVID-19 outbreak. Psychiatric patients have a higher risk of contagion due to their sedentary lifestyle, limited awareness of self-protection, and non-adherence to preventive public health measures.² In addition, patients with psychiatric disorders, such as major depressive disorder (MDD), schizophrenia, and bipolar disorder, require long-term treatment. Due to the under-developed community mental health services in China, clinically stable patients need to regularly attend psychiatric outpatient departments located in urban hospitals for maintenance treatment.^{3,4} Traveling during the outbreak of any infectious disease inevitably increases the risk of infection. A significant proportion of patients had difficulties attending their psychiatric outpatient appointments due to quarantine and traffic restrictions for prevention and control of the COVID-19 outbreak.⁵ These public health preventive measures interrupted treatment leading to relapse and undesirable behaviors such as self-harm and aggression.

Among those individuals affected by the COVID-19 outbreak, special attention should be given to older psychiatric patients. Compared with other age groups, older adults infected with COVID-19 have poor treatment outcomes and higher mortality rates.^{6,7} Older adults are have fear of COVID-19, which could worsen their pre-existing mental health problems.⁸ Patients with MDD and anxiety disorder are exceptionally vulnerable.⁹ Most mental health services and education related to the COVID-19 (e.g., psycho-education and psychological counseling) are primarily delivered online.¹⁰ Thus, many older psychiatric patients could not benefit from these online services due to their limited access to smartphones and broadband internet, and poor digital health literacy.⁸

Sleep disturbances constitute a major health problem worldwide.¹¹ During the COVID-19 outbreak, sleep disturbances were found to be very common in the general population¹² and subpopulations, such as frontline clinicians¹³ and patients with COVID-19.¹⁴ However, to the best of our knowledge, no study has focused on older adults, especially those with psychiatric disorders. Sleep disturbances are associated with treatment with psychotropic medications,¹⁵ impaired cognitive function,¹⁶ increased risk of psychiatric disorders¹⁷ and cardiovascular

and metabolic diseases,¹⁸ poor quality of life (QOL),¹⁹ increased consumption of health care services, and economic burden.²⁰ Sleep disturbances are also risk factors for deterioration and relapse of psychiatric disorders.¹⁷ In order to reduce the negative impact of sleep disturbances on health outcomes and daily life, it is important to understand their patterns and associated factors.

Quality of life is a standard health outcome, which reflects individuals' general perception on their physical and mental health.^{21,22} Thus, this study examined the prevalence of sleep disturbances and their association with QOL in a sizeable cohort of clinically stable older psychiatric patients.

Methods

Participants

This was a cross-sectional study conducted between May 22 and June 23, 2020, in four major tertiary psychiatric hospitals located in the northern (Beijing), southern (Fujian province), eastern (Jiangsu province), and western parts (Gansu province) of China. All older patients attending outpatient departments of the four psychiatric hospitals for maintenance treatment were consecutively invited to participate in the study. To be eligible, patients should be: (1) aged 50 years and above; (2) have a principal diagnosis of any type of psychiatric disorders diagnosed according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) confirmed by their treating psychiatrists; (3) clinically stable judged by their treating psychiatrists. Following previous studies,^{23,24} patients with changes in doses of psychotropic medications of less than 50% in the past three months were considered "clinically stable." This criterion has been used in clinical practice in the participating hospitals; and (4) able to give written informed consent. Patients who had difficulty understanding the survey's content, such as those with dementia, were excluded. The study protocol was approved by the Ethics Committees of the Xiamen Xianyue Hospital, Guangji Hospital Affiliated to Soochow University, Lanzhou University Second Hospital, and Beijing Anding Hospital.

Measurements

Participants' basic socio-demographic and clinical data were collected including age, gender, marital status, education, and current severe medical conditions affecting

the cardiovascular, respiratory, digestive, hematological, endocrine, urinary, connective tissue, and nervous systems.²⁵ Three additional COVID-19 related questions were also asked, namely, whether participants were concerned about the COVID-19 outbreak during the past months, whether they had difficulty attending psychiatrists during the COVID-19 pandemic, and whether they had difficulty attending psychiatric hospitals/departments during the COVID-19 pandemic.

The severity of depressive symptoms was evaluated with the Chinese version of the 9-item Patient Health Questionnaire (PHQ-9).^{26,27} Each item of the PHQ-9 is scored from 0 (“not at all”) to 3 (“nearly every day”). This scale has been validated in Chinese populations.²⁸ The total score of PHQ-9 that ranges between 0 and 27 was calculated by adding up all its item scores. The PHQ-9 total score of <5, ≥ 5 , and ≥ 10 indicated “no depressive symptoms,” “mild depressive symptoms,” and “moderate to severe depressive symptoms,” respectively.²⁹ The severity of sleep disturbances was assessed with the 7-item Insomnia Severity Index (ISI), a Likert scale with each item between 0 and 4.³⁰ The ISI has satisfactory psychometric properties in China.³¹ The ISI total score ranges from 0 to 28, with higher total scores representing more severe sleep disturbances. The cutoff value of ≥ 8 was considered as the presence of some form of “sleep disturbances.”³² The aggregate score of the two items on the overall QOL of the World Health Organization Quality of Life-Brief Version (WHOQOL-BREF)³³⁻³⁵ was used to evaluate patients’ QOL. The QOL score range between 0 and 10, with a higher score representing higher QOL.

Data Analysis

All data analyses were performed with the Statistic Package for Social Science (SPSS), Version 24.0. The normality of continuous variables was examined with the Kolmogorov–Smirnov test. Socio-demographic (age, gender, marital status, education) and clinical characteristics (severe medical diseases, concerns about the COVID-19 outbreak, difficulties attending psychiatrists and/or attending psychiatric hospitals/departments, principal psychiatric diagnoses, and severity of depressive symptoms) were compared between patients with and without sleep disturbances. Normally distributed continuous variables were compared with the two independent samples *t*-tests, while variables that did not follow normal distribution were compared using Mann–Whitney *U* tests. Categorical variables were compared using χ^2 tests. Independent associations of socio-demographic and clinical variables with sleep disturbances were examined applying binary logistic regression analysis with the “enter” method. All socio-demographic and clinical variables were entered

as independent variables, and the presence of sleep disturbances was the dependent variable. The QOL between patients with and without sleep disturbances was compared using analysis of covariance (ANCOVA) after controlling for variables with significant group differences in univariate analyses. The level of significance was set at $P < .05$ (two-tailed).

Results

A total of 946 patients were invited to participate in the study; 941 met the eligibility criteria, yielding a response rate of 99.5%. The mean age of participants was 62.9 (Standard Deviation (SD)): 9.4) years and 32.4% ($n = 305$) were men. The prevalence of sleep disturbances was 57.1% (95% confidence interval (CI): 53.9–60.2%). The mean ISI total score was 8.94 (SD: 6.30). The prevalence of no, mild, and moderate to severe depressive symptoms was 37.4% (95% CI: 34.3–40.5%), 32.7% (95% CI: 29.7–35.7%), and 29.8% (95% CI: 26.9–32.7%), respectively.

Univariate analyses revealed that participants with sleep disturbances were younger ($P = .02$), had shorter education ($P < .01$) and higher PHQ-9 total scores ($P < .01$). The prevalence of sleep disturbances was significantly different across the principal psychiatric diagnoses ($P < .01$). There was no significant difference in the prevalence of sleep disturbances between male and female patients (58.0% (95% CI: 52.4–63.6%) vs 56.6% (95% CI: 52.7–60.4%), $\chi^2 = .17$, $P = .68$). Binary logistic regression analysis found that the presence of sleep disturbances was positively and independently associated with more severe depressive symptoms ($P < .01$, OR = 1.32, 95% CI: 1.26–1.37). Compared to participants with MDD, those with other psychiatric diagnoses were more likely to have sleep disturbances ($P = .04$, OR = 1.44, 95% CI: 1.00–2.08) (Table 1). ANCOVA revealed that participants with sleep disturbances had a significantly lower overall QOL compared to those without them ($F_{(1, 941)} = 18.10$, $P < .01$).

Discussion

This study investigated the prevalence of sleep disturbances in clinically stable older psychiatric patients (≥ 50 years) and their association with QOL during the COVID-19 outbreak in China. Over half (57.1%, 95% CI: 53.9–60.2%) of the participants suffered from sleep disturbances, which is higher than the corresponding figures reported in other populations using the same measure and cutoff value during the COVID-19 outbreak, such as frontline clinicians (28.75–38.4%),³⁶⁻³⁸ psychiatric inpatients with COVID-19 (42.8%),¹⁴ breast cancer patients (36.2%),³⁹ and the general population (28.5%).⁴⁰ The prevalence of sleep disturbances in this study was also much higher than the figures in both the general population

Table 1. Participants' socio-demographic and clinical characteristics and their associates with sleep disturbances.

Variables	Total (N=941)		No sleep disturbances (N=404)		Sleep disturbances (N=537)		Univariate analyses			Multivariate logistic regression ³		
	N	%	N	%	N	%	χ^2	df	P	OR	95% CI	P
Gender							.17	1	.68	Ref	—	—
Female	636	67.6	276	68.3	360	67.0				1.10	.77–1.56	.58
Male	305	32.4	128	31.7	177	33.0				.68	.38–1.22	.19
Married	847	90.0	367	90.8	480	89.4	.54	1	.46	1.12	.69–1.80	.62
Severe medical conditions ¹	172	18.3	73	18.1	99	18.4	.21	1	.89			
Concern about the COVID-19 outbreak							.84	2	.66	Ref	—	—
None	405	43.0	170	42.1	235	43.8				1.04	.71–1.52	.83
Sometimes	353	37.5	150	37.1	203	37.8				1.02	.63–1.63	.93
Frequently	183	19.4	84	20.8	99	18.4				.80	.53–1.21	.30
Difficulty attending psychiatrists	350	37.2	150	37.1	200	37.2	<.01	1	.97	.79	.52–1.20	.28
Difficulty attending psychiatric hospitals/departments	352	37.4	138	34.2	214	39.9	3.19	1	.07	Ref	—	—
Principal psychiatric diagnosis ²							14.13	3	<.01			
Major depressive disorder	433	46.0	179	44.3	254	47.3				.57	.28–1.16	.12
Schizophrenia	59	6.3	38	9.4	21	3.9				1.21	.58–2.53	.60
Organic mental disorders	57	6.1	29	7.2	28	5.2				1.44	1.00–2.08	.04
Other psychiatric diagnoses	392	41.7	158	39.1	234	43.6						
	Mean	SD	Mean	SD	Mean	SD	Z		P			
Age (years)	62.89	9.43	63.71	9.57	62.28	9.29	-2.31	—	.02	.99	.97–1.01	.85
Education (years)	7.90	4.01	8.36	3.96	7.56	4.01	-4.21	—	<.01	.99	.95–1.04	.89
PHQ-9 total score	7.66	6.63	3.82	4.36	10.55	6.58	-16.72	—	<.01	1.32	1.26–1.37	<.01
Quality of life	6.20	1.54	6.82	1.44	5.72	1.43	-11.39	—	<.01			

¹Current severe medical disease affecting the cardiovascular, respiratory, digestive, hematological, endocrine, urinary, connective tissue, and nervous systems.

²Only psychiatric diagnoses with the percentage >5% are presented separately; those with percentage of <5% were included in "others".

³The independent variables were all socio-demographic and clinical variables: age, gender, marital status, education years, severe physical diseases suffering, concerns about the COVID-19 outbreak, difficulty attending psychiatrists, difficulty attending psychiatric hospitals/departments, principal psychiatric diagnoses, and PHQ-9 total score and study sites that were controlled, while the dependent variable was sleep disturbances.

Bold values: <.05.

Abbreviations: COVID-19 = Coronavirus Disease 2019; CI = Confident Interval; MDD = major depressive disorder; PHQ-9 = 9-item Patient Health Questionnaire; Ref = reference group; SD = standard deviation.

(15.0%, 95% CI: 12.1–18.5%)⁴¹ and older psychiatric patients (27.0%, 95% CI: 24.5–29.4%)⁴² in China before the COVID-19 outbreak, although measures on sleep disturbances were different.

The reasons for the high frequency of sleep disturbances in older psychiatric patients are complex. Psychiatric disorders and sleep disturbances often co-exist because sleep rhythm changes in many psychiatric disorders as well as with the use of psychotropic medications.^{43,44} Besides, age is a risk factor for sleep disturbances such as insomnia.⁴⁵ In older adults, sleep and circadian rhythm changes occur along with the physiologic changes, presenting as gradually decreased sleep efficiency and total sleep time. Unrealistic expectations about sleep duration and quality could elevate the risk of sleep disturbances.⁴⁶ Moreover, increased prevalence of medical conditions (e.g., nocturia and physical disability)⁴⁷ and treatment (e.g., beta-blockers, glucocorticoids, and non-steroidal anti-inflammatory drugs)⁴⁶ also contributes to the occurrence of sleep disturbances. Aging women including those with psychiatric disorders are more likely to suffer from sleep disturbances^{44,50} than men. However, no gender difference was found in the current study, probably because of the increased prevalence of sleep disturbances in both genders during the COVID-19 outbreak, which may have offset the gender difference reported earlier.

The COVID-19 outbreak was associated with increased risk of sleep disturbances in older psychiatric patients for several reasons. First, more severe consequences including higher mortality rates in older adults with COVID-19 spread fear and psychological distress. Second, quarantine measures lead to loneliness, fatigue, and daytime sleepiness^{48,49} and thus affect sleep and circadian rhythm. Third, older psychiatric patients have frequent comorbid chronic medical conditions and require long-term medication. Difficulties in attending hospitals during the COVID-19 outbreak further aggravated patients' distress about the discontinuation of treatment and further contributed to the development of sleep disturbances.

As expected, patients with sleep disturbances reported more severe depressive symptoms in this study. The association between sleep disturbances and depressive disorders is bidirectional: sleep disturbances are risk factors of depressive disorders,^{50,51} while depression increases the likelihood of sleep disturbances.⁵² In meta-analyses, sleep disturbances significantly predicted the onset of depressive episodes^{51,53,54} with an overall odds ratio (OR) of up to 2.83 (95% CI: 1.55–5.17).⁵¹ Another study found that sleep deprivation can negatively influence the brain areas that process emotionally salient information, such as amygdala and the medial-prefrontal cortex, which are associated with increased risk of depressive symptoms.⁵⁵ Furthermore, the association between sleep disturbances and depressive symptoms might be related to shared pathomechanisms, for

example, similar alterations of arousal state^{56–58} and in the level of inflammatory markers.⁵⁹ In this study, patients with other psychiatric diagnoses, mainly schizophrenia and organic mental disorders, were more likely to suffer from sleep disturbances than those with MDD. The diagnostic heterogeneity makes it difficult to interpret the reasons for the unexpectedly significant group difference. Head-to-head comparative studies between different psychiatric diagnoses with respect to sleep disturbances are warranted to replicate or refute this finding.

Patients with sleep disturbances had a lower overall QOL than those without sleep disturbances, which is consistent with previous findings.^{60,61} According to the distress/protection QOL model,⁶² QOL is determined by the interaction between protective (e.g., good social support and economic status) and distressing factors (e.g., poor health). Sleep disturbances are associated with impaired daytime functioning,⁶³ attention deficits, and impairment of working memory and executive functions,⁶⁴ poor physical health,¹⁸ and psychiatric symptoms,⁶⁵ all of which could lower QOL.

The strengths of this study include the multicenter study design and the large sample size. However, several methodological limitations need to be addressed. First, the study only included clinically stable patients, which limits the generalizability of the findings to patients at different stages of their illness. Second, due to logistical reasons related to the COVID-19 outbreak, clinical stability was judged by the treating psychiatrists, rather than assessed by standardized rating instruments. Third, the causal relationships between demographic and clinical characteristics and sleep disturbances could not be examined due to the cross-sectional study design. Fourth, other factors potentially associated with sleep disturbances (e.g., use of sedative-hypnotics, level of social support, and economic status) and COVID-19-related factors (e.g., having relatives/friends infected with COVID-19) were not examined in this study.

In conclusion, sleep disturbances were common in clinically stable, older psychiatric patients during the COVID-19 outbreak. Given the potentially negative impact of sleep disturbances on QOL and daily functioning, regular assessment of sleep duration and quality should be given particular attention in the routine clinical care of this vulnerable population. A variety of treatment modalities, such as cognitive-behavioral therapy,⁶⁶ repetitive transcranial magnetic stimulation,⁶⁷ neurofeedback,⁶⁸ promotion of sleep hygiene and sleep medications⁶⁹ are available and should be offered to patients presenting with sleep disturbances.

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Author Contributions

Study design: QZ, Y-TX. Data collection, analysis and interpretation: XX, WL, SZ, YL, HW, XY, XD, LZ, QZ. Drafting of the article: WL, TC, Y-TX. Critical revision of the article: GSU. Approval of the final version for publication: all co-authors.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Data Availability Statement

The Clinical Research Ethics Committee of participating hospitals that approved the study prohibits the authors from making the research dataset of clinical studies publicly available. Readers and all interested researchers may contact Dr YT Xiang (Email address: xyutly@gmail.com) for details. Dr Xiang will apply to the Clinical Research Ethics Committee of participating hospitals for the release of the data.

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