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Abstract

Background: Sequelae from COVID-19 are increasingly being reported, but sleep disturbances after recovery from the disease have had little attention.

Aims: This study aimed to identify and compare sleep disturbances and associated correlates among adults who have recovered from COVID-19 with those who have never been infected with the disease.

Methods: The sample included 85 adults who have recovered from COVID-19 and 85 adults who have never been infected (matched on age, sex, education and socioeconomic level). Individuals were recruited from Zagazig University Hospitals, Egypt from 1 September to 29 November 2020. Participants were interviewed using a sociodemographic and clinical checklist, the Pittsburgh Sleep Quality Index and the Hospital Anxiety Depression Scale.

Results: Most (77%) of the recovered cases had experienced sleep disturbances, compared with 46% of controls. Individuals who had recovered from COVID-19 were more likely to have poor subjective sleep quality (odds ratio (OR) 1.5, 95% confidence interval (CI): 1.1–2.1), prolonged sleep latency (OR 1.8, 95% CI: 1.3–2.6), shorter sleep duration (OR 1.6, 95% CI:

1.1–2.2), reduced sleep efficiency (OR 3.8, 95% CI: 2.0–7.1), frequent daytime dysfunction (OR 1.9, 95% CI: 1.2–3.1) and poor global Pittsburgh Sleep Quality Index score (OR 3.0, 95% CI: 1.5–6.0). Depressive (P = 0.002) and anxiety (P = 0.003) symptoms were associated with a poor global Pittsburgh Sleep Quality Index score among recovered female participants (P = 0,034) who had low-to-medium education level (P = 0.004).

Conclusions: Further studies (e.g. population-based longitudinal studies) are needed on sleep disturbances as a potential sequelae of COVID-19, because it can impair mental and physical well-being.

Keywords: COVID-19, sleep disorders, depression, anxiety, Egypt

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Introduction

COVID-19 was first detected in Wuhan, China, in late 2019 and it spread rapidly across the globe. It is a respiratory illness caused by a newly discovered severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) (1,2). In March 2020, the World Health Organization (WHO) declared it a global pandemic (3). The causative virus was thought to be primarily transmitted through respiratory droplets and close contact. However, there no conclusive evidence yet about the nature and course of this new, rapidly transmissible and potentially fatal virus (4).

With the increasing COVID-19-related morbidity and mortality, many people are experiencing COVID-19-related fears, depression and burnout symptoms and increased levels of physical

and psychological distress (5,6). The pandemic itself, the social restrictions and lockdown regulations imposed to halt the spread of the virus, and the resulting financial problems caused to people are affecting mental health and well-being negatively (7). Based on previous outbreaks such as the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), recent studies have claimed that COVID-19 patients may suffer from neuropsychiatric sequelae (8), such as depression, anxiety and sleep disturbances (9). Even after stabilization of a good number of people have reported post-recovery sequalae. According to a recent Italian study, several patients who survived the COVID-19 experienced at least one psychiatric disorder, such as anxiety, depressive disorders or post-traumatic stress disorder, which was diagnosed during follow-up one month after hospital treatment or home isolation (10).

Sleep is essential for a person's physical and mental health (11,12). Interrupting the normal sleep cycle can result in prolonged wakening or insomnia, shortened sleep cycle, nightmares and daytime somnolence and fatigue (11). Potential factors associated with sleep disturbances include severe stressful conditions, emotional disturbances (e.g. depression and anxiety), trauma (either physical or psychological) and/or overuse of technology, especially social media (13,14). Despite the high prevalence of sleep disturbances and other psychiatric symptoms among COVID-19 patients (prevalence 34%) (9) to date, limited data exist on the psychopathological effects of COVID-19 on people in the early post-illness remission period. Thus, this study aimed to investigate the prevalence and potential risk factors for sleep disturbances in people who had recovered from COVID-19 and their control counterparts.

Methods

Study design and participants

This was a comparative cross-sectional study conducted from 1 September to 29 November 2020. A total of 85 adults were selected consecutively who had recovered from COVID-19 and were discharged according to the WHO discharge criteria (15) adopted by the Zagazig University committee for COVID-19 isolation hospitals.They had been diagnosed with COVID-19 based on the presence of viral nucleic acid in the nasopharyngeal swab and had either been hospitalized or had isolated at home. An equal number of volunteers, who had never been found positive for SARS-CoV-2, were included as a control group. They were first-degree relatives of participants who had recovered from COVID-19 and they were matched on age, sex, education and socioeconomic level. First-degree relatives were chosen to differentiate between the shared genetic, environmental and potential COVID-19-related effects on their mental health status. None of the investigators who interviewed the participants for this study had been involved in the treatment of the participants All recovered COVID-19 participants were interviewed in outpatient clinics at least one month after completing their home isolation or being discharged from hospital.

The sample size was calculated using Epi Info 6.0, assuming a prevalence of psychological symptoms of 41% and 21%, respectively (16), in those who had COVID-19 and the general population at 80% power of the study and 95% confidence level. This gave a sample size of 170 participants (85 COVID-19 cases and 85 controls) (17). The following people were excluded: those younger than 18 years or older than 60 years, those with major physical (e.g. heart failure, renal failure and hepatic failure) or mental illness (e.g. acute psychosis, dementia and mental retardation), illiterate people and those who declined to participate.

Data collection

The participants were requested to complete a semi-structured checklist designed to collect relevant sociodemographic and clinical data. The checklist included questions about age, sex, marital status, residence, level of education, occupation, and history of psychiatric illness and/or medical illness. Low-to-medium educational level was defined as attaining a basic or secondary education, while high educational level included those with university or postgraduate education.

Questionnaires

We used the Structured Clinical Interview for DSM-5 Axis I Disorders (SCID-5) (18) – a semi-structured tool – to help exclude the presence of current major acute or chronic primary mental illnesses (e.g. psychosis, mental retardation or dementia) in our participants, as these could affect the results if present. Several studies have established the validity and reliability of this tool (19,20). Thus, all participants enrolled in our study for further psychometric assessment had no history of major psychiatric illnesses.

The Hospital Anxiety and Depression Scale is a self-report tool used to screen for symptoms of anxiety and depression. It consists of seven questions each on depressive and anxiety symptoms, with a four-point Likert scale scoring rage 0 to 3. The total score of each subscale ranged from 0 to 21 (21). Participants were considered to have comorbid anxiety or depressive symptoms if their scores on this scale were ≥ 11 points. We used a validated Arabic version of this scale (22).

The Pittsburgh Sleep Quality Index (PSQI) questionnaire is a self-report questionnaire to assess sleep quality in the past month. It consists of 19 items assessing seven domains of sleep quality – subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleeping medication and daytime dysfunction. Each domain is scored equally on a 0–3 scale. Scores for all seven domains are summed to produce a global Pittsburgh Sleep Quality Index score, ranging from 0 to 21. Poor global sleep quality was defined as a global Pittsburgh Sleep Quality Index score of ≥ 5, and the higher the score, the worse the sleep quality (23). We used a

validated Arabic version of this scale (24).

Ethical considerations

The protocol of this study was approved by the institutional review board of Zagazig University (no. 6304-2-9-2020), and all study procedures were conducted within the ethical guidelines of the Declaration of Helsinki and its later amendments. Written informed consent was obtained from all the participants after explaining the study objectives and confirming confidentiality.

Statistical analysis

We used SPSS, version 16 to analyse the data. The chi-square test was used to compare proportions of categorical variables, while continuous variables were analysed using the independent sample t-test to compare the means of two groups. The Mann-Whitney-U test was used for data that were not normally distributed. Conditional logistic regression analysis was used to obtain odds ratios (OR) and 95% confidence intervals (CI) of sleep disturbances among COVID-19 and control participants after adjusting for associated anxiety and depressive symptoms. Associations were considered statistically significant at P