Evaluation of the Relationship between Stress and Severity of Covid-19 Symptoms and Sleep Quality in Covid-19 Patients

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ABSTRACT

Introduction and aim: Coronavirus 2019 (Covid-19) is a viral disease that appeared in late 2019 in China. Different factors can cause psychological problems in Covid-19 patients. Stress is one of the most common problems in people with communicable diseases. The aim of the present study was to investigate the relationship between stress and the severity of symptoms and sleep quality in Covid-19 patients.

Methods: This was a descriptive-analytical study. The sample size included 300 Covid-19 patients. Demographic information form, Pittsburgh Sleep Quality Index (PSQI) and researcher-made questionnaire were used to collect data. Data analysis was carried out using SPSS ver.16.

Results: The majority of participants obtained a stress score between 4 and 6 (moderate). Most of them felt stressed regarding the risk of transmitting the disease to their family members (63%) and more than half (56.3%) had the highest stress level during the first week of the disease because they were frightened by the Covid-19 infection and its prognosis. With regard to sleep, most participants had between six and 10 hours of sleep (53.7%).

Conclusion: The results of the present study showed that perceived stress among Covid-19 patients had a direct effect on the severity of respiratory and neurological symptoms and affected their sleep quality.

Keywords: stress, Covid-19, symptoms, sleep quality.

INTRODUCTION

Coronavirus 2019 (Covid-19) is a viral disease that emerged in China in late 2019 and was declared a pandemic disease by the World Health Organization.

Until June 21, 2021, the global rate of Covid-19 cases, related deaths, and recovered cases was close to 180 million, four million, and 165 million people, respectively. So far, in Iran, the same figures are approximately three million, 83,000 and about 2.8 million people, respectively (1, 2.) After their outbreak, viral epidemics such as H1N1, Ebola, etc caused many psychological problems, and given that the coronavirus was a global pandemic, it could cause psychological problems in patients (3, 4).

It is speculated that the disease first started in the seafood market in Wuhan, China, but after a while, it was commonly transmitted through direct person-to-person contact, respiratory droplets and contact with contaminated objects. According to previous studies in China, risk factors for this disease included old age, high sequential organ failure assessment (SOFA) score, D-dimer above 1 μg/mL, high blood pressure, diabetes, and cardiovascular diseases (5). Results of a study conducted on about 72314 Chinese patients showed that approximately 87% of them were aged between 30 and 79 years old, 81% had mild symptoms, and 49% of patients with critical symptoms died. The same study found a mortality rate of 2.3%, and no deaths were recorded among individuals aged under nine years, with fatal cases being recorded in a higher proportion among people aged over 80. In this study, among deceased patients, 10.5% had cardiovascular diseases, 7.3% diabetes, 6.3% respiratory disease, 6% hypertension and 5.6% cancer. Also, out of these patients, 3.8% were medical staff, of which 14.8% had severe critical symptoms. According to this study, the disease can be transmitted from one city to the whole country within 30 days, which surprises the Healthcare Center in China. According to studies, the symptoms of the disease usually included fever, cough with or without sputum, and fatigue. Related tests usually indicate lymphopenia (6, 7). According to epidemiological studies, Covid-19 patients have a variety of symptoms, and the most common ones include fever, dry cough, and fatigue (8). They also experience sleep disturbances due to respiratory problems, anxiety, and pain (9). Liu *et al* (2020) showed that Covid-19 patients also had poor sleep quality scores (10).

Different factors can cause psychological problems in Covid-19 patients, including direct impact of the coronavirus on the central nervous system, impaired social breathing, isolation and isolation from relatives which can lead to mental disorders (11, 12).

Previous studies in China had shown a high prevalence of psychological disorders such as anxiety fear, depression and emotional changes, insomnia and post-traumatic stress disorder in Covid-19 patients (13, 14).

Numerous studies investigated the effect of stress on the immune system and showed that stress affected B and T lymphocytes, macro-phages, monocytes, catecholamines, etc, and changed the function of these cells and hormones (15, 16).

Since Covid-19 infection was a new and unpleasant experience for all societies, we sought to answer the question of whether the level of stress experienced by Covid-19 patients affected the severity of symptoms and sleep patterns of these patients. ❏

METHODS

This was a descriptive-analytical study and the study population included all Covid-19 outpatients referred to healthcare centers in Kermanshah province.

The sample size comprised 300 Covid-19 patients, which were selected according to inclusion criteria (hospitalization, patients with confirmed Covid-19 based on laboratory and CT scan documents, and literacy) and exclusion criteria (unwillingness to continue cooperation and increased disease severity that demands hospitalization).

The demographic information form that included questions on variables such as age, sex, method of diagnosis, cause of disease, level of education, full-time job, blood type, etc was used for data collection. Since there were no Covid-19-related stress questionnaires, it was no possible to follow the goals established by researchers of the present study, and therefore a researcher-made questionnaire was used to assess Covid-19-relaed stress. The questionnaire included 15 questions regarding individual stress score during the course of disease, the cause of stress, disease symptoms, and time when patients experienced the most stress. Pittsburgh sleep quality index was used to assess sleep quality. This questionnaire was given to 10 physicians and professors of medical sciences after being validated, and necessary corrections were made after obtaining their opinions.

After determining the reliability of the questionnaire, we used a pilot group for which Cronbach's alpha coefficient of 0.87 was obtained, indicating an acceptable reliability.

In order to collect data after obtaining the necessary permissions, a total of 300 outpatients referring to Kermanshah healthcare centers within a one month period were included in the study using random number tables. First, each

patient signed an informed consent form. After obtaining patients' consent, the relevant questionnaires were completed by patients in person and by telephone.

Data analysis was carried out using SPSS ver. 22 and statistical tests such as absolute and relative frequency and correlation coefficient were used to investigate the age relationship between variables.

TABLE 1. Absolute frequency and relative frequency of demographic variables in patients with Covid-19

Variable		N (%)
Gender	Man	166 (55.3)
	Woman	134 (44.7)
Job	Employee	70 (23.3)
	Freelance	58 (19.3)
	Housewife	52 (17.3)
	Student	48 (16)
	Treatment Staff	44 (14.7)
	Retired	19 (6.3)
	Unemployed	9 (3)
Education	Bachelor	141 (47)
	Diploma	69 (23)
	Masters	54 (18)
	Primary education	25 (8.3)
	Illiterate	11 (3.7)
Marital status	Married	189 (63)
	Single	111 (37)
Blood group	O	114 (38)
	B	67 (22.3)
	A	60 (20)
	AB	59 (19.7)
Hair loss	YES	127 (42.3)
	NO	173 (57.7)
Duration of illness	7 to 10	63 (21)
	10 to 14	169 (56.3)
	14 to 21	68 (22.7)

Ethical considerations
The present study is the result of a research project approved in Kermanshah University of Medical Sciences, Iran, under the registration number of 3010847 and Ethics Code of IR.KUMS.REC.13990928.

RESULTS

The results of the present study showed that participants had a mean ± SD age of 37.74 ± 1.51 years. The majority of them (55.3%) were males; 23.3% were government employees 19.3% self-employed, which could put them at risk for Covid-19 infection when leaving home. With regard to the level of education, results showed that 47% of participants had a bachelor's degree and 63% were married. The course of disease was 10 to 14 days in most subjects (56.3%), among which 38% had blood type O, and 42.3% experienced hair loss after recovery (Table 1).

Stress scores were divided into three categories: mild (1-3), moderate (4-6) and severe (7-10). Results showed that most of the study participants had moderate stress (scores 4-6), which was mainly due to the fear of transmitting the infection to their family members (63%); most Covid-19 patients had the highest stress level within the first week of the disease due to fear of being infected and poor prognosis (56.3%) (Table 2). Regarding sleep, most participants had

TABLE 2. Absolute frequency and relative frequency of stress variables in patients with Covid-19

Variable		N (%)
Stress score	1 to 3	84 (28)
	4 to 6	137 (45.7)
	7 to 9	79 (26.3)
Stress factor	Infection of the family	189 (63)
	Fear of death	51 (17)
	Fear of disease	32 (10.7)
	Fear of symptoms	23 (7.7)
	Fear of treatment costs	5 (1.7)
The week with the most stress	Week one – Disease stress	169 (56.3)
	Week one – Stress symptoms	75 (25)
	Week two – Hospitalized stress	20 (6.7)
	Week two – Stress symptoms	36 (12)

TABLE 3. Absolute and relative frequency of sleep variables in patients with Covid-19

Variable		N (%)	
Sleep time	Less than six (hours)	91 (30.4)	
	Six to 10 (hours)	161 (53.7)	
	More than 10 (hours)	48 (16)	
Sleep disorder		Yes	No
Sleep disorder	Sleeping late	240 (80%)	60 (20%)
	Waking up during sleep	265 (88.33%)	35 (11.67%)
	See nightmares	160 (53.33%)	140 (46.67%)

TABLE 4. Absolute frequency and percentage of relative frequency of symptoms in patients with Covid-19

Variable	Yes N (%)	No N (%)
Restlessness	230 (76.7)	70 (23.3)
Body pain	170 (56.7)	130 (43.3)
Diarrhea	90 (30)	210 (70)
Fever	135 (45)	165 (55)
Nausea	105 (35)	195 (65)
Headache	208 (69.3)	92 (30.7)
Sore throat	150 (50)	150 (50)
Anosmia	61 (20.3)	239 (79.7)

TABLE 5. Correlation between blood groups and symptoms in patients with Covid-19

Blood type / Variable	A	B	AB	O
Cough	$P= 0.01$	$P= 0.17$	$P= 0.05$	$P= 0.13$
Headache	$P= 0.07$	$P= 0.001$	$P= 0.001$	$P= 0.001$
Fever	$P= 0.8$	$P= 0.27$	$P= 0.69$	$P= 0.06$
Body pain	$P= 0.43$	$P= 0.06$	$P= 0.09$	$P= 0.57$
Restlessness	$P= 0.001$	$P= 0.001$	$P= 0.001$	$P= 0.001$
Diarrhea	$P= 0.02$	$P= 0.001$	$P= 0.05$	$P= 0.001$

(35%), diarrhea (30%) and loss of taste and smell (20.3%) (Table 4).

When the correlation between patients' symptoms and blood type was investigated, a significant relationship between blood type A and the presence of cough was revealed (Table 5).

Results of investigating the relationship between stress score and patient problems highlighted a significant relationship between stress and sleep disorders, cough, headache, hair loss, nausea, diarrhea and body ache, but no relationship between stress score and sleep duration, fever and loss of smell or taste (Table 6). ❑

DISCUSSION

A total of 300 patients were included in the present study, among which the majority (55.3%) were males, 23.3% of subjects were employed, and 38% had O negative blood type.

With regard to the symptoms of the disease, results showed that hair loss was experienced by 42.3% of patients following Covid-19 infection. Since the emergence of Covid-19, most attention has been paid to the respiratory and cardiac complications of the disease. However, patients have experienced common skin problems such as hair loss. Trüeb et al (2021) found telogen effluvium in Covid-19 patients who had experienced hair loss and identified a link between post-disease onset and severity of hair loss with the clinical severity of the disease and fever (17). Also, Mieczkowska et al (2020) reported excessive hair loss and thinning hair in Covid-19 women (18).

The disease duration was 10 and 14 days in 56.3% of patients and most subjects (63%) had moderate stress (scores 4-6). Also, most people felt stressed about transmitting the infection to other family members, and 56.3% of subjects had the highest level of stress within the first week of the Covid-19 infection.

Most patients (53.7%) had a sleep duration between six and 10 hours, and the majority of them had sleep disorders. Also, 80% of them had

between six and 10 hours of sleep (53.7%) (Table 4).

Results also showed that patients had the following symptoms: restlessness (76.7%), headache (69.3%), cough (60.3%), body pain (56.7%), sore throat (50%), fever (45%), nausea

TABLE 6. Correlation between stress score and symptoms in patients Covid-19

Variable	Sleep disorder	Sleeping time	Cough	Anosmia	Sore throat	Headache	Hair loss	Nausea	Fever	Diarrhea	Body pain
Stress (p)	$P=0.001$	$P=0.15$	$P=0.001$	$P=0.6$	$P=0.001$	$P=0.001$	$P=0.008$	$P=0.001$	$P=0.83$	$P=0.001$	$P=0.02$

delayed sleep phase syndrome, 88.33% woke up during sleep, and 53.33% had had nightmares.

The most common symptoms included weakness (76.7%), headache (69.3%), and body pain (56.7%).

The results of the present study showed a significant association of sleep disorders with the level of stress and respiratory symptoms such as cough and sore throat, and neurological symptoms such as headache and gastrointestinal symptoms, nausea, vomiting and body pain (P≤0.05), and higher stress scores led to an increase in the rate of sleep disorders and symptoms in Covid-19 patients. ❑

CONCLUSION

According to the results of the present study, perceived stress among Covid-19 patients had a direct effect on the severity of their respiratory and neurological symptoms, and has also affected their sleep quality. ❑

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