Original Research

Effect of Self-Care Education on Sleep Quality and Psychological Disorders in Post-Discharged Patients with COVID-19

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Received: 22 Sep. 2020 Accepted: 10 Apr. 2021

Abstract

Background and Objective: The coronavirus disease 2019 (COVID-19) affects the physiologic and psychological systems of humans and can lead to different degrees of depression, stress, anxiety, and insomnia. This study aimed to evaluate the effect of self-care education on sleep quality and psychological disorders in patients with COVID-19 following discharge.

Materials and Methods: This study was performed on 50 patients with COVID-19, who were educated via telephone. The average time for each interview and education was 20-40 minutes. The education included effective ways to reduce stress, anxiety, and depression as well as sleep hygiene. Data collection tools included three sections: demographic information, Pittsburgh Sleep Quality Index (PSQI) questionnaire, and Depression, Anxiety, and Stress Scale (DASS). These questionnaires were completed by three nurses once 2-3 days after discharge and again one month later by telephone. Data were analyzed using SPSS software.

Results: 69% of patients were men with a mean age of 59 years old. Significant difference was observed in each of the subscales of depression, anxiety, and stress, and their total mean ($P < 0.0500$), in addition, a significant difference was observed in sleep quality of patients with COVID-19 ($P < 0.0500$) between 2-3 days after discharge and 1 month later after education.

Conclusion: People with COVID-19 had less sleep quality and higher levels of depression, anxiety, and stress. The self-care education regarding sleep hygiene and ways to deal with stress to improve these factors had a significant impact and led to a significant level.

Keywords: COVID-19; Self-care; Education; Sleep quality; Anxiety; Depression

Citation: Moradian G, Doozandeh Tabarestani N, Esmaeili Dolabi S, Monjazebi F, Farahanipour M, Mojarad N. **Effect of Self-Care Education on Sleep Quality and Psychological Disorders in Post-Discharged Patients with COVID-19.** J Sleep Sci 2021; 6(1-2): 11-18.

Introduction

In December 2019, an unknown pneumonia was reported in Wuhan, China, with clinical symptoms similar to those of viral pneumonia. After deep sequencing analysis from lower respiratory tract samples, it was determined that the cause of this pneumonia was a new coronavirus called the novel coronavirus 2019 (2019-nCoV) (1). The World Health Organization (WHO) has officially named the disease Covid-19, and the International Committee for the Classification of Viruses calls it " Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" (2). Ac-

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cording to data published by the WHO, from late December 2019 to late February 2020, 79394 confirmed cases of SARS-CoV-2 infection and 2838 deaths due to this disease were reported (3).

Although the clinical symptoms of the disease are nonspecific, fever (87.9%), cough (67.7%), fatigue (38.1%), diarrhea (3.7%), nausea, and vomiting (5.0%) are common in these patients (4, 5). A great number of patients have shown varying degrees of respiratory distress, with the period between the onset of symptoms to the progression of the acute respiratory syndrome being just nine days (1). The sudden onset of this acute respiratory disorder in China as well as its rapid and widespread prevalence in other parts of the world led prompted researchers to study this disease and isolate the virus without any delay. Lack of clarity and uncertainty concerning this disease was the main reason for psychological stress among people. In March 2020, the WHO declared this disease as a pandemic, and this issue led to a rapidly excessing attitude of fear and stress among the people (6).

The COVID-19 virus not only can have some effect on the physiological condition of the body, but also can affect a person's psychological state. Moreover, due to the diversity of educational backgrounds, occupations, and regions, people experience different levels of COVID-19 virus threat, which can expose them to varying degrees of stress and insomnia (7).

The appearance of sleep disorders and changes in the sleep patterns in reaction toward stressful events, such as natural disasters or wartime, and in diseases has already been documented (8, 9).

The outbreak of the COVID-19 epidemiological and economic crisis has prompted serious challenges and caused significant stress, anxiety, and worries regarding health, social quarantine, employment, financial problems, and also the challenge of combining work with family commitments for many people (10). On the other hand, the circadian rhythm that keeps us awake during the day and keeps us sleepy during the night, not only is affected by daylight, but is also affected by the timing of meals and exercise. Exposure to light increases melatonin release, a hormone that plays a key role in sleep. Too low activity (depression and quarantine), as well as extremely high levels of activity (such as stress and overwork) have negative effects on sleep (11, 12).

Therefore, the COVID-19 pandemic as an extraordinarily stressful event in life may disrupt sleep and circadian rhythms, precisely when high-quality sleep is essential to counteract this crisis (10).

This study aimed to evaluate the effects of sleep hygiene education and the ways to deal with the stress on the depression, anxiety, and stress levels and also sleep quality in patients with COVID-19 infection within 48-72 hours after discharge from the hospital and one month later.

Materials and Methods

The present study was a cross-sectional study and the participants randomly included 100 patients with a diagnosis of COVID-19. They were hospitalized in Masih Daneshvari Hospital, Tehran, Iran, from March 2020 to May 2020 (for 3 months) and were discharged after symptom improvement.

The study proposal was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran with Ethics NO: IR.SBMU.NRITLD.REC.1399.026 and Research code: 23145 dated 16.4.2020. The researchers completely explained the study protocol to the patients and then obtained written informed consent from all participants. The study inclusion criteria were COVID-19 diagnosis by positive real-time polymerase chain reaction (RT-PCR) and chest computed tomography (CT) scan (13), Persian speaking, consciousness, answering the phone, and patient satisfaction. Data were collected via telephone call through questionnaires that were completed by three nurses.

Denying illness, reasoning, patient's anger, and crying due to feeling rejected during hospitalization, and patient's hatred and irritation from family and community due to COVID-19 all were signs of fear and anxiety felt by the patient and their family in the early days of the pandemic. Therefore, it caused difficulties for the interviewer, and the number of cases reduced from 100 to 85. Out of the 85 chosen patients, 35 had no significant depression, anxiety, stress, or sleep disorder during and after discharge from the hospital, so they were excluded.

The data collection tool included three parts. The first part consisted of 6 items related to patients' demographic information such as gender, age, marital status, education level, body mass index (BMI), and comorbidities.

The second part was the Pittsburg Sleep Quality Questionnaire (PSQI). Many studies have shown the high validity and reliability of this

questionnaire (0.36). The questionnaire consists of 18 items in 7 components or subscales (14), with the internal consistency and reliability coefficient (Cronbach's alpha) obtained respectively about 0.83 and 0.36 for each of the seven subscales. The first subscale is related to subjective sleep quality, which is determined by item number 18. The second subscale is related to sleep latency, the score of which is determined by the sum of the score of item 2 and the score of item 6. The third subscale is related to sleep duration, which is determined by item number 4. The fourth subscale is related to sleep efficiency, the score of which is determined by dividing the total sleep hours by the sum of hours spent in bed.

The fifth subscale is related to sleep disturbances and is obtained by calculating the average scores of items 6 to 15. The sixth subscale is related to the use of sleeping medications, which is identified by item number 15 and finally, the seventh subscale is related to daytime dysfunction, which is determined by calculating the total scores of items 16 and 17. Each of the 7 subscales has a score of 0-3, indicating none, weak, medium, and strong, respectively. The total score of the questionnaire is in the range of 0 to 21. Higher scores indicate poor sleep quality (15, 16).

The validity and reliability of this questionnaire have already been investigated in Iran ($\alpha = 6.89$ and correlation coefficient 0.88) (17).

The third part of this study included the Depression, Anxiety, and Stress Scale (DASS) questionnaire, which has been translated into several languages. The original DASS version included 42 items.

DASS-21 is a modified and shortened version with three self-report subscales (18). Each subscale contains 7 items, which includes dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia.

The anxiety scale contains the sense of apprehensive, panicky, worry, possible loss of control, and situational anxiety. The stress subscale represents expressions such as difficulty in achieving calmness, nervousness, irritability, and inability to relax. Notably, the stress scale symptoms in DASS are remarkably similar to the anxiety symptoms (19). The component severity degree in this questionnaire is graded using a 4-point scale (between 0 and 3). On this scale, scores 0-3 mean lack of experience, experiencing to some degree, experiencing to a great degree, and experiencing a lot, respectively (18).

Initial filling of the DASS and PSQI questionnaires was performed by nurses, 48-72 hours after discharge. All 50 patients with significant depression, anxiety, stress, and sleep disorder during and after discharge from the hospital, were educated via the telephone. The average time for each interview and education was 20-40 minutes. The education included effective ways to reduce stress, anxiety, and depression as well as sleep hygiene (20, 21). A contact number was given to patients to call in case of any questions. Teaching impact was assessed by completing the questionnaires once, 48-72 hours after discharge with the initial answers after 30 days later. Figure 1 shows the allocation algorithm of this study. The data were analyzed with SPSS software (version 22, IBM Corporation, Armonk, NY, USA).

Results

The demographic characteristics of the patients included gender, age, marital status, level of education, BMI, and comorbidities (Table 1). The patients with COVID-19 in this study were mainly male and married and most of them were over 50 years old. 77% of the patients had a diploma or less. The majority of these patients were overweight [BMI greater than 25 ($\frac{kg}{m^2}$)] and also the most common comorbidity among these patients was diabetes mellitus (DM) and then hypertension. The findings revealed no significant differences between the demographic variables, including gender, age, marital status or educational levels, BMI, and comorbidity in patients with and without depression, anxiety, stress, and sleep disorder.

Of participants, 35 (41.1%) had no symptoms of depression, anxiety, and stress on DASS questionnaire and had score zero on the PSQI questionnaire. Therefore, they were excluded from data presented in tables 2 and 3.

The findings showed a significant difference in the sleep quality of patients with COVID-19 at 48-72 hours after discharge and 1 month after discharge ($P < 0.0500$). This significant difference was also observed in the subscales of sleep latency, sleep disturbance, sleep medication, and daytime dysfunction ($P < 0.0500$) (Table 2) (Figure 2).

The results showed a significant difference in the subscales of depression, anxiety, and stress in their total mean between 48-72 hours after discharge and 1 month later ($P < 0.0500$).

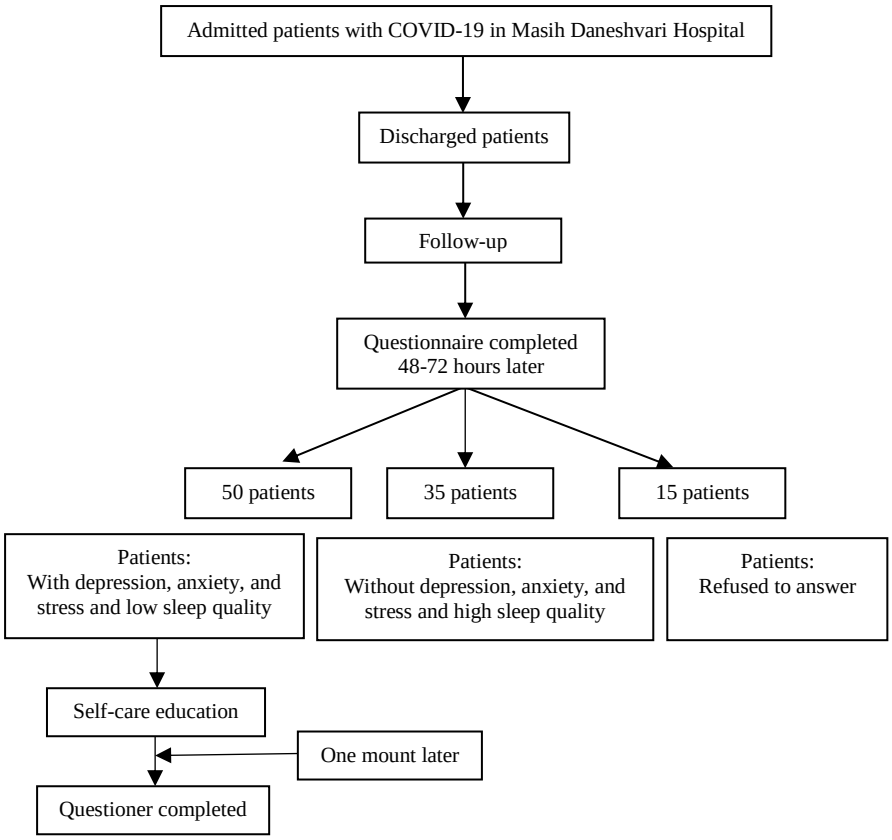

Figure 1. Allocation algorithm

Table 1. Demographic characteristics of study participants

Variables		n (%)
Gender	Male	59 (69.4)
	Female	26 (30.6)
Age (Years)	≤ 29	2 (2.4)
	30-40	14 (16.5)
	41-50	13 (15.3)
	51-60	29 (34.1)
	61 ≤	27 (31.8)
Marital status	Single	12 (14.1)
	Married	73 (85.9)
Education level	Under diploma	32 (37.6)
	Diploma	34 (40.0)
	Post-diploma	5 (5.9)
	Bachelor's degree	4 (4.7)
	Master's degree	8 (9.4)
	Ph.D. and above	2 (2.4)
BMI ($\frac{kg}{m^2}$)	Underweight	-
	Normal	15 (17.6)
	Overweight and obesity	70 (82.4)
Comorbidity	No comorbidity	24 (28.2)
	History of dialysis	2 (2.4)
	DM	45 (52.9)
	SLE	1 (1.2)
	Hypertension	13 (15.3)

DM: Diabetes mellitus; BMI: Body mass index; SLE: Systemic lupus erythematosus

The mean and standard deviation (SD) of each depression, anxiety, and stress subscales, as well as their means through the DASS questionnaire are listed in table 3 (Figure 3).

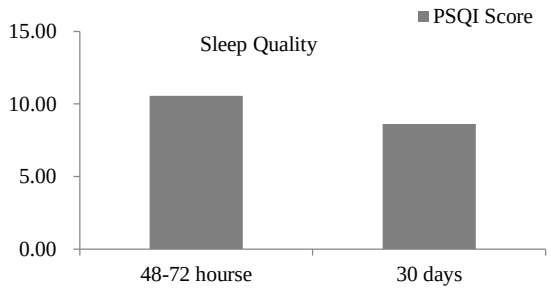

Figure 2. Sleep quality of patients with coronavirus disease 2019 (COVID-19) in 48-72 hours and also 1 month after discharge
PSQI: Pittsburgh Sleep Quality Index

Discussion

This study aimed to evaluate the sleep quality and depression, anxiety, and stress levels in patients with COVID-19 and also the effect of self-care education on these factors. The COVID-19 prevalence among randomly selected patients was more in married men over 50 years old, and a majority of them were overweight or obese (BMI > 25) and had DM.

Table 2. Subscales and total Pittsburgh Sleep Quality Index (PSQI) scores of patients with coronavirus disease 2019 (COVID-19) in 48-72 hours and also 1 month after discharge

Sleep quality components	48-72 hours after discharge (Mean ± SD)	1 month after discharge (Mean ± SD)	P-value
Subjective sleep quality	2.230 ± 0.560	2.200 ± 1.010	0.8700
Sleep latency	2.330 ± 0.797	1.960 ± 0.410	0.0200
Sleep duration	0.210 ± 0.622	0.000 ± 0.000	0.0400
Sleep efficiency	2.820 ± 0.690	2.630 ± 0.640	0.3600
Sleep disturbances	1.610 ± 0.700	0.950 ± 0.630	< 0.0001
Sleeping medications	0.870 ± 0.690	0.370 ± 0.640	0.0050
Daytime dysfunction	0. 850 ± 0.480	0.540 ± 0.820	0.0500
Total PSQI score	10.560 ± 2.700	8.620 ± 2.600	0.0400

SD: Standard deviation; PSQI: Pittsburgh Sleep Quality Index

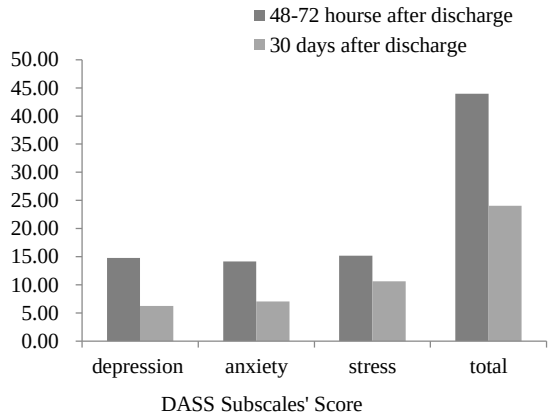

Figure 3. Depression, Anxiety, and Stress Scale (DASS) components of patients with coronavirus disease 2019 (COVID-19) in 48-72 hours and also 1 month after discharge

The findings demonstrated that people with COVID-19 had poor sleep quality and high levels of depression, anxiety, and stress. Therefore, our self-care education on sleep hygiene and ways to deal with stress has had significant impacts on improving these factors.

Most of the patients in this study were men and over 50 years old and required to be hospitalized after positive results of COVID 19 by PCR and lung CT scan. Kragholm et al. found that men with COVID-19 had higher risk for mortality, exacerbation of COVID-19, and intensive care unit (ICU) admission than women (22). Consistent with this study, Chen et al. illustrated that men were at further risk of COVID-19 and acute respiratory distress syndrome (ARDS) (23). Another result of demographic information in patients with COVID-19 demonstrated that the number of patients with overweight and obesity, as well as DM, was significantly different from the rest of the study patients. Based on the findings of the study by Wang et al., it was revealed that 68% of the subjects in the group of patients with COVID-19 had at least one comorbidity. Furthermore, this statement is consistent with the Wang et al.'s reports as estimated as 72.2% (24); notably this percentage is even major in other articles (24, 25). However, they reported that similar to previous studies (4, 24), the most common comorbidity in patients with COVID-19 was hypertension, followed by cardiopulmonary disease, high cholesterol, and DM (25). The findings of the study by Simonnet et al. suggested that obesity was one of the aggravating factors of the SARS-CoV-2 disease and had the greatest effect in patients with BMI ≥ 35 ($\frac{kg}{m^2}$); they also recommended that obese people, especially those with excessive obesity should prevent COVID-19 contamination during the current pandemic (26). Given the study conducted by Kassir, really insignificant data is available based on the role of BMI in patients with COVID-19, and the obesity impression in the COVID-19 pandemic should not be overlooked.

Table 3. Subscales and total Depression, Anxiety, and Stress Scale (DASS) scores of patients with coronavirus disease 2019 (COVID-19) in 48-72 hours and also 1 month after discharge

DASS components	48-72 hours after discharge (Mean ± SD)	1 month after discharge (Mean ± SD)	P-value
Depression	14.80 ± 8.92	6.24 ± 9.40	< 0.0001
Anxiety	14.15 ± 8.16	7.05 ± 8.25	< 0.0001
Stress	15.18 ± 8.99	10.63 ± 12.81	0.0300
Total score	43.95 ± 25.87	24.05 ± 29.01	0.0100

DASS: Depression, Anxiety, and Stress Scale; SD: Standard deviation

Obesity plays a substantial role in COVID-19 exacerbation. Moreover, this study illustrated that the immune system, which plays a key role in the development of COVID-19, also plays an essential role in the inflammation of adipose tissue caused by obesity. This inflammation of adipose tissue has led to metabolic dysfunction, which is eventually directed to metabolic syndrome including dyslipidemia, insulin resistance, DM, hypertension, and cardiovascular diseases (CVDs) (27).

The results of the present study demonstrated that patients with COVID-19 suffer from poor sleep quality. However, self-care education regarding sleep hygiene led to a significant decrease in the average sleep quality score, indicating an enhancement in sleep status in these patients. Lin et al. published an article in which they were able to record the acute impact of COVID-19 on sleep and psychological symptoms quickly in Chinese people during the pandemic. They reported that the patients suffered from significant insomnia, stress, anxiety, and depression. They also showed that among the patients, the young women living in the city center had experienced excessive degrees of insomnia. Stress, anxiety, and depression associated with the COVID-19 outbreak certainly impact people's sleep quality, which greatly affects the human quality of life, and early intervention is therefore needed. They also showed that during the COVID-19 outbreak the number of people with sleep disorders increased significantly (7). Finally, they suggested the necessity for rapid and coordinated interventions to help anxious people cope with the effects of this unprecedented crisis.

The findings from the study by Morin and Carrier indicated that sleep disorders such as insomnia and nightmares may remain even after an epidemic. It means that people with sleep disorders during the COVID-19 pandemic may be at risk for long-term side effects. The evidence show that acute insomnia often turns into chronic insomnia, and finally exposes individuals to a higher risk for psychopathology, hence they recommended that solving these difficulties requires coordinated public health interventions. Sleep hygiene, including making the sleep environment restful, avoiding stressful and anxiety-provoking activities before going to bed, and avoiding going to bed thirsty or hungry, should be trained to the general population (10).

Altena et al. summarized stress, its association with insomnia, as well as ways to remedy insomnia. Additionally, they showed that the experience of living through the COVID-19 epidemic and quarantine conditions might lead to sleep disorders. They asserted that managing sleep disorders in the optimal possible path during home quarantine can alleviate stress and prevent the possibility of disrupting social relationships (28). None of the existing studies is comparable to the current prevalence of COVID-19. Studies on separation, quarantine, and the ways of improving mental health and sleep quality often require changes in the environment, exposure to light, diet, and temperature. Moreover, the majority of studies related to the psychological effects of quarantine during the outbreak of the COVID-19 did not use sleep questionnaires or focused more on healthcare workers (29).

Other findings of the present study were about depression, anxiety, and stress evaluation in people with COVID-19; so that after training self-care and ways to deal with stress, the average score of each of these subscales decreased. Eventually, this is a sign of improvement in the psychology situation in patients.

A study was conducted by Fatemeyan Rad et al. with the title “The Effect of Education on Coping with Stress, Anxiety, and Depression among Patients with Special Diseases" using the DASS questionnaire. They concluded that teaching coping techniques such as problem-solving steps, the concept and symptoms of stress, stressful situations and their relationship to disease, awareness of life stress, stress reduction techniques, discipline and planning, exercise and entertainment, and relaxation, all were effective in reducing stress and anxiety in certain patients and could reduce the relative depression in these patients (30).

Aminian et al. performed a study on patients with acute coronary syndrome who were hospitalized in selected hospitals of Tehran University of Medical Sciences, Tehran to evaluate the effectiveness of stress management education on their quality of life (QOL). The findings suggested that teaching ways to deal with stress can be applied as a useful intervention method in acute coronary syndrome by reducing patients' stress and increasing their QOL (31).

These findings can be partially compatible with the results of the studies of Trzcieniecka-Green and Steptoe (32), Wong (33), and Blumenthal et al. (34). However, the epidemic impact of this virus on the world's mental health due to its unexpected and novel emergence has not yet

been recorded and measured, but based on previous experiences; similar information may be obtained regarding coronavirus infections (34).

Kim et al. accomplished a study during the MERS-COV outbreak in Korea in which the patients were treated with hemodialysis in an isolated environment. Following two weeks of isolation, they reported decreased changes in hematocrit, calcium, and phosphorus levels and increased changes in indicators of psychological stress in humans, and significantly delayed normalization during hemodialysis compared to the control group. This means that the separation and isolation during the MERS outbreak have led to massive stress in patients under hemodialysis (35).

Wang et al. conducted an online survey of the Chinese public to gather information on the psychological impact of depression, anxiety, and stress in the early stages of the COVID-19 outbreak from January 31 to February 2020; the results demonstrated that in the early stages of the virus outbreak, more than half of the respondents reported severe to moderate psychological effects and about one-third reported moderate to severe anxiety (36).

There are few studies carried out on the mental and physical health of the most vulnerable parts of society (37). Torales et al. stated that the current focus on the transmission of COVID-19 infection may lead to a public attention diversion from the psychosocial consequences of the disease in people with the COVID-19 infection. The emergence of mental health problems can lead to persistent mental health problems and even isolation in the COVID-19 pandemic. Global health needs to take action to address stressors, particularly quarantine, fear, and vulnerability among the general mental health of patients with COVID-19 (38).

Limitations: This study was performed solely on patients admitted to Masih Daneshvari Hospital, which is one of the limitations of the study, so it is suggested that this intervention be performed on a larger scale, especially in people with a history of COVID-19 since most studies have ever been performed on the health care workers or the general public of a country. It is also recommended that education be conducted over extended periods as increased number of telephone calls and continuous follow-up to train and help cure mental illness.

Conclusion

In people with COVID-19, depression, anxiety, and stress were significantly high and consequently, they had less sleep quality. The education of self-care regarding sleep hygiene and ways to deal with stress and improvement of these factors had a significant impact and constructed a significant level.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

This study was supported by Shahid Beheshti University of Medical Sciences, National Research Institute of Tuberculosis and Lung Diseases (NRITLD).

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