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Mental Health Status of COVID-19 Survivors: Post-COVID-19 Challenges

Arezou Kiani^{1*}, Sima Masudi², Sima Ghafari¹¹Department of Psychiatry, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran²Department of Epidemiology and Biostatistics, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran**Abstract**

Background: Coronavirus pandemics are associated with high levels of mental stress. This study investigated the incidence of mental health problems in patients who recovered from coronavirus disease 19 (COVID-19).

Methods: This cross-sectional study was conducted on COVID-19 survivors in Urmia, Iran, from January 2020 to December 2020. Recovered COVID-19 patients were included in the study by simple random sampling. All eligible participants were interviewed in person and were given a questionnaire about demographic, personal, and clinical characteristics, as well as stressors related to COVID-19. The participants completed the General Health Questionnaire (GHQ-28) and the 42-item Depression, Anxiety, and Stress Scale (DASS-42) to report depression, anxiety, and stress/tension levels.

Results: Of 340 participants, 167 (49.1%) were males and 173 (50.9%) were females, with a mean age of 43.8 ± 11.3 years. Based on the results, 17 (2.1%) patients had severe symptoms of psychosomatic illness, and 28 (8.2%) were in a moderate physical health status. In addition, 2 (0.6%) patients had severe anxiety symptoms, and 54 (15.9%) had moderate anxiety symptoms. Mild and moderate depression were present only in 46 (13.5%) and 4 (1.2%) patients. Univariate logistic regression analysis a noticeable relationship between psychiatric variables and age, female gender, low/no educational level, hospitalization, retirement, being a housewife, being widowed or divorced, and having more than four children ($P < 0.05$).

Conclusion: Anxiety, depression, and stress levels remained significant after the outbreak instead of abating with time. It could be suggested that psychological support may be necessary for the rehabilitation phase and should not be overlooked in developing different episodes of pandemic diseases.

Keywords: COVID-19, Stress, Depression, Pandemic, Anxiety, Mental health

***Correspondence to**

Arezou Kiani,
Email: arezoukiani@yahoo.
com



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Background

The World Health Organization declared the emergence of coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2, as a public health emergency of international concern on January 31, 2020 (1). Post-COVID health conditions entail circumstances that arise subsequent to recuperation from COVID-19, wherein individuals are anticipated to endure prolonged health complications post-infection. Presently, medical experts worldwide are concentrating their research efforts on studying the short-term and long-term health impacts of COVID-19 (2).

Pandemics are linked to a heightened prevalence of mental and social disorders that can disrupt population activities (3). Engagement in social interactions and daily life routines plays a crucial and positive role in individual well-being, contributing to aspects such as life satisfaction and social welfare (4). Insufficient social

connections can result in anxiety, loneliness, depression, panic, mental health issues, and various other challenges in individuals' lives, impacting society at large (5). The prolonged periods of social distancing and quarantine may lead to psychological stress reactions (6). Individuals who have been confined to their homes often resort to social media for information regarding the pandemic, exposing them to misinformation and unverified narratives (7). Increased mortality rates post-pandemic provoke concerns within communities, stemming from misinformation, stress, and sorrow, permeating societies with emotional turmoil and potentially inciting unruly behaviors. In such circumstances, policymakers must implement suitable measures to enhance the mental well-being of individuals (8).

While numerous studies have been globally conducted to evaluate the mental well-being of individuals who have recuperated from COVID-19, these studies

have predominantly focused on the local and national contexts of developed nations (9-12). Limited research has addressed the psychological repercussions and stress induced by the coronavirus crisis on the Iranian population, with these psychological aspects remaining largely unexplored (13-15). Accordingly, this study endeavors to examine the prevalence of mental health issues among COVID-19 survivors in Urmia, aiming to conduct a comprehensive and in-depth analysis of mental health dimensions and ascertain the scope of mental health challenges associated with COVID-19.

Methods

This cross-sectional study was performed on individuals who had survived COVID-19 in Urmia, Iran, from January 2020 to December 2020. Both genders, who had tested positive for COVID-19 confirmed through real-time reverse transcriptase-polymerase chain reaction from a nasopharyngeal and/or throat swab and chest computed tomography scans, and subsequently recovered (at least 6 months post-recovery), were selected for the study through simple random sampling. Using random allocation software, a list of randomly generated numbers was created to facilitate the sampling process. The sampling frame comprised the contact numbers of living patients who had been discharged. From this frame, 359 patients were selected through the random sampling method. Individuals with concurrent systemic or mental disorders, active malignancies, upper/lower motor disorders, incapacity to provide consent, and those undergoing psychological therapies were excluded from participation in the study.

The researchers conducted a minimum 6-minute telephone follow-up with participants, during which the study's objectives were clarified. Each participant provided informed consent by signing a consent form. The study received approval from the Ethics Committee of Urmia University of Medical Sciences (IR.UMSU.REC.1401.097). All procedures were conducted in compliance with the guidelines set forth by the Ethics Committee of Urmia University of Medical Sciences and adhered to the principles outlined in the Declaration of Helsinki.

Trained physicians conducted face-to-face interviews with all eligible COVID-19 survivors, and the follow-up questionnaires consisted of two parts. The initial section aimed to gather demographic information, such as gender, age, education level, employment status, place of residence, marital status, number of offspring, and duration of hospital stay. The second part included the General Health Questionnaire (GHQ-28), which assessed depression, physical health status, anxiety, social dysfunction, and mental health status. Based on evidence, the GHQ-28 demonstrates robust reliability and validity in emerging nations. The Persian version of the GHQ-

28 has demonstrated strong internal consistency (Cronbach's $\alpha=0.70-0.90$) according to previous studies (16, 17).

Sample Size Method

In this study, the sample size was calculated to be 323 people, considering a depression and anxiety prevalence of 30%, the first type error of 0.50, and a 95% confidence interval and using the formula $n=z^2pq/d \ 95^2$. Taking into account the possibility of the lack of a response, the sample size increased by 10% to 359 people.

Statistical Analysis

Means and standard deviations (SD) were computed for continuous variables, while frequencies were assessed for categorical variables. Demographic characteristics were evaluated using the chi-square or Fisher's exact test. Subsequently, patients' responses to the GHQ-28 questionnaire items were consolidated following the questionnaire guidelines, and scores were calculated for each of the four dimensions of the questionnaire. Based on the study by Hjelle et al (2019), scores 0–6 indicate a favorable or healthy condition, while scores 7–11, 12–16, and 17–21 represent mild, moderate, and severe problems/symptoms, respectively.

The groups of severe and moderate symptoms were combined due to the low frequency of patients in the fourth category (severe symptoms). For depression, the last three categories were merged to form a group of individuals without depression symptoms and those with mild-to-severe depression levels. Backward multivariate logistic regression analysis was utilized to identify factors influencing each mental health dimension. Data analysis was conducted using IBM SPSS 20 software (SPSS Inc., Chicago, IL, USA), and a P -value of <0.05 was considered statistically significant.

Results

Overall, 340 survivors of COVID-19 were involved in this research, with 167 (49.1%) males and 173 (50.9%) females. The participants were in the age range of 17–87 years old, with a mean age of 43.8 ± 11.3 years. In general, 67% of the patients resided in urban areas, while the remainder lived in rural regions (the residence of one individual was unknown). The majority of participants held a bachelor's degree ($n=136$, 40.2%), followed by those with a high school diploma ($n=95$, 28.1%), and the highest proportion of participants were married ($n=231$, 68.1%).

In terms of occupation, individuals engaged in housekeeping, unemployed individuals, and clerks had the highest frequencies ($n=109$, 32.2%; $n=102$, 30.1%; $n=80$, 23.6%). Additionally, 61.2% of the participants had between one and three children, 18.8% had more than three children, and 20% had no children. Regarding

hospitalization, 32.2% of the participants were admitted to the hospital following a COVID-19 diagnosis (Table 1).

The breakdown of participants within different physical health categories revealed that only 17 (2.1%) individuals exhibited severe symptoms of psychosomatic illness, while 28 (8.2%) were classified as being in a moderate physical health state. Among the participants, 2 (0.6%) experienced severe anxiety symptoms, 54 (15.9%) reported moderate anxiety symptoms, and 100 (29.4%) had mild anxiety symptoms. In terms of personal relationships, 185 participants (54.4%) were deemed to have excellent health, whereas 32 (9.4%) and 6 (1.8%) individuals faced moderate and severe issues, respectively. Mild and moderate levels of depression were observed in 46 (13.5%) and 4 (1.2%) patients, respectively, with no

participants showing signs of severe depression (Table 2).

The univariate logistic regression analysis revealed that the likelihood of experiencing risks related to physical health (odds ratio [OR] = 1.046, 95% confidence interval [CI]: 1.024–1.068), depression (OR = 1.042, 95% CI: 1.016–1.069), anxiety (OR = 1.048, 95% CI: 1.026–1.070), and social function (OR = 1.021, 95% CI: 1.002–1.041) had a significant association with the age of the participants (Table 4). Furthermore, the probability of facing risks associated with physical health (OR = 2.706, 95% CI: 1.734–4.223), depression (OR = 1.042, 95% CI: 1.016–1.069), and social function (OR = 1.875, 95% CI: 1.217–2.890) increased among females (Table 3).

The likelihood of risks concerning physical health (OR = 2.022, 95% CI: 1.113–3.672), (OR = 3.837, 95% CI: 1.381–10.659) showed a significant correlation with having a low/no educational level ($P=0.021$) and being a housewife ($P=0.010$), respectively. The probability of experiencing anxiety-related risks (OR = 3.859, 95% CI: 1.154–12.910) was significantly linked to retirement ($P=0.028$). Additionally, risks associated with physical health (OR = 2.621, 95% CI: 1.464–4.692, $P<0.001$), depression (OR = 7.758, 95% CI: 4.000–15.045, $P<0.001$), anxiety (OR = 4.262, 95% CI: 2.260–8.036), and social function (OR = 2.434, 95% CI: 1.355–4.371, $P=0.003$) were notably related to being widowed or divorced.

The probability of physical health risks (OR = 2.514, 95% CI: 1.247–5.069) was significantly associated with having more than four children ($P=0.010$). Additionally,

Table 1. Distribution of Demographic Characteristics of the Participants

Variable	N	%
Gender		
Male	167	49.1
Female	173	50.9
Mean age (years)	43.8 ± 11.3	
≤34	69	20.3
35–44	118	34.7
45–49	104	30.6
55 ≥	49	14.4
Education		
No/low education	58	17.2
High school/diploma	95	28.1
University	185	54.7
Job		
Student	21	6.2
Clerks	80	23.6
Unemployed	102	30.1
Housewife	109	32.2
Retired	27	7.9
Marital status		
Single	50	14.7
Married	231	68.1
Widowed	32	9.4
Divorced	26	7.7
Residential area		
Urban	227	67.0
Rural	112	33.0
Number of children		
0	68	20.0
1–3	208	61.2
4 ≥	64	18.8
Hospitalization		
No	229	67.8
Yes	109	32.2

Table 2. Frequency of Participants in Terms of Categories of General Health Subscales

General Health Subscales	N	%
Physical		
Healthy	195	57.4
Mild	110	32.4
Moderate	28	8.2
Severe	17	2.1
Depression		
Vitality	290	85.3
Mild	46	13.5
Moderate	4	1.2
Severe	0	0.0
Anxiety		
Healthy	184	54.1
Mild	100	29.4
Moderate	54	15.9
Severe	2	0.6
Social function		
Healthy	185	54.4
Mild	117	34.4
Moderate	32	9.4
Severe	6	1.8

Table 3. Results of Univariate Logistic Regression Analysis of the Relationship of the Participants' Demographic Characteristics With Health Subscales of GHQ-28

Variable	Physical Health			Depression			Anxiety			Social Function		
	OR	95% CI	P-Value	OR	95% CI	P value	OR	95% CI	P Value	OR	95%CI	P Value
Age	1.046	1.024-1.068	<0.001	1.042	1.016-1.069	0.002	1.048	1.026-1.070	<0.001	1.021	1.002-1.041	0.032
Gender												
Male	1			1			1			1		
Female	2.706	1.734-4.223	<0.001	2.308	1.221-4.366	0.010	1.306	0.851-2.003	0.221	1.875	1.217-2.890	0.004
Education												
University	1			1			1			1		
Diploma	1.302	0.788-2.151	0.303	0.587	0.265-1.300	0.189	0.893	0.543-1.470	0.657	0.975	0.592-1.606	0.920
No/low education	2.022	1.113-3.672	0.021	1.620	0.776-3.383	0.199	1.261	0.698-2.275	0.442	1.580	0.873-2.861	0.131
Job												
Student	1			1			1			1		
Clerk	1.500	0.525-4.284	0.499	0.857	0.213-3.442	0.828	1.264	0.472-3.385	0.641	0.733	0.279-1.927	0.529
Unemployed	0.900	0.317-2.556	0.843	0.511	0.123-2.111	0.353	1.092	0.416-2.868	0.585	0.626	0.243-1.614	0.332
Housewife	3.837	1.381-10.659	0.010	1.605	0.435-5.923	0.478	1.538	0.590-4.007	0.378	1.451	0.569-3.702	0.378
Retired	3.125	0.929-10.516	0.066	1.714	0.374-7.855	0.488	3.859	1.154-12.910	0.028	1.185	0.378-3.710	0.771
Marriage status												
Single/married	1			1			1			1		
Widowed/divorced	2.621	1.464-4.692	<0.001	7.758	4.000-15.045	<0.001	4.262	2.260-8.036	<0.001	2.434	1.355-4.371	0.003
Residential area												
Urban	1			1			1			1		
Rural	1.272	0.806- 2.007	0.302	1.292	0.693-2.406	0.420	1.204	0.765-1.895	0.423	1.101	0.699-1.733	0.678
Number of children												
0	1			1			1			1		
1-3	1.119	0.636-1.971	0.969	1.215	0.527-2.802	0.648	1.724	0.968-3.069	0.064	0.639	0.369-1.108	0.111
4>	2.514	1.247-5.069	0.010	1.912	0.735-4.976	0.184	3.485	1.701-7.139	0.001	0.889	0.449-1.760	0.735
Hospitalization												
No	1			1			1			1		
Yes	3.542	2.198-5.709	<0.001	3.253	1.759-6.014	<0.001	5.198	3.147-8.586	<0.001	2.922	1.821-4.689	<0.001

Note. OR: Odds ratio; CI: Confidence interval; GHQ-28: The General Health Questionnaire.

risks linked to physical health (OR=3.542, 95% CI: 2.198–5.709, $P<0.001$), depression (OR=3.253, 95% CI: 1.759–6.014, $P<0.001$), anxiety (OR=5.198, 95% CI: 3.147–8.586, $P<0.001$), and social function (OR=2.922, 95% CI: 1.821–4.689, $P<0.001$) were significantly connected to hospitalization (Table 3).

The multivariate logistic regression analysis results demonstrated that within the variables considered in the model, female gender, age, and hospitalization were associated with the physical health of patients ($P<0.001$). Specifically, women were more likely to experience physical symptoms (OR=2.551) compared to men, and the likelihood of physical health issues increased (OR=1.038) with each year's increment in the patients' age. Patients who had been hospitalized for COVID-19 were more prone (OR=2.772) to exhibit physical health concerns compared to those not hospitalized (Table 4).

Being widowed or divorced and having been hospitalized were significantly linked to experiencing

depressive symptoms among recovered COVID-19 patients ($P<0.001$). Moreover, the likelihood of depressive symptoms in widowed and divorced patients was notably higher (OR=6.201) than in single and married patients. Additionally, patients hospitalized for COVID-19 displayed a higher likelihood (OR=2.139) of suffering from depression compared to non-hospitalized patients.

Age, state of being widowed or divorced, and hospitalization were significantly associated with the symptoms of anxiety disorder in recovered COVID-19 patients ($P<0.001$). The likelihood of anxiety in patients increased (OR=1.033) with each year of age. Widowed and divorced patients exhibited a higher probability of having the symptoms of anxiety disorder (OR=3.968) than single and married patients, and those hospitalized for COVID-19 were more likely to have anxiety disorder (OR=2.609) than non-hospitalized patients.

Female gender ($P=0.006$), age ($P=0.035$),

Table 4. Results of Multivariate Logistic Regression Analysis Related to the Demographic Determinants of Health Subscales of GHQ-28

Health Subscale	Variable	Multivariate Analysis		
		OR	95% CI	P value
Physical health	Age	1.038	1.015-1.062	0.001
	Gender			
	Male	1		
	Female	2.551	1.590-4.091	<0.001
	Hospitalization			
	No	1		
Depression	Yes	2.772	1.674-4.589	<0.001
	Marital status			
	Single/married	1		
	Widowed/divorced	6.201	3.112-12.355	<0.001
	Hospitalization			
	No	1		
Anxiety	Yes	2.139	1.096-4.178	<0.001
	Age	1.033	1.009-1.058	0.001
	Marital status			
	Single/married	1		
	Widowed/divorced	3.968	2.353-6.692	<0.001
	Hospitalization			
Social function	No	1		
	Yes	2.609	1.137-5.170	<0.001
	Age	1.029	1.002-1.056	0.035
	Gender			
	Male	1		
	Female	1.902	1.203-3.009	0.006
	Hospitalization			
	No	1		
	Yes	2.369	1.440-3.895	0.001
	Number of children			
	0	1		
	1-3	0.443	0.231-0.849	0.014
	4>	0.422	0.166-1.073	0.070

Note. OR: Odds ratio; CI: Confidence interval; GHQ-28: The General Health Questionnaire.

hospitalization ($P=0.001$), and the number of children ($P=0.014$ and $P=0.070$) were significantly associated with social function in improved COVID-19 patients. In addition, women were more likely (OR=1.902) than men to experience issues with social functioning. Additionally, the probability of social function issues increased (OR=1.029) with each year of the patients' age. Patients hospitalized for COVID-19 had a higher likelihood (OR=2.369) of encountering personal behavior problems compared to those not hospitalized. Furthermore, patients with one to two children had a higher probability (OR=0.443) of experiencing individual behavior

problems than those with no children.

Discussion

The lingering effects of the COVID-19 pandemic may persist in impacting individuals both directly, through enduring physical and psychological consequences, and indirectly, via its adverse socio-economic ramifications (18). This research examined the weight of overall mental well-being and the occurrence and intensity of general health conditions, depression, anxiety, and stress among patients who have recovered from COVID-19.

This study indicated a notable inclination toward depression, stress, anxiety, and social well-being among participants who were older and female. Other studies highlighted that key factors contributing to the deterioration of mental health during the COVID-19 pandemic include being female, having a lower level of education, and coping with chronic illnesses (19, 20). Similarly, a study found a significant correlation between gender, marital status, pre-existing medical conditions, history of COVID-19 within respondents' families, and higher GHQ-28 mean scores, without impacting the severity of depression, anxiety, and stress (21). Various reports suggest that women are more susceptible to mental health disorders in response to stressful circumstances (22). However, the high proportion of women (81.8%) among survey respondents could potentially sway the study's outcomes (23). Although online surveys typically attract more female participants due to their higher engagement, our study demonstrated a greater representation of women compared to men (24).

The rates of depression, anxiety, and stress among patients indicated that 2.1% exhibited severe symptoms of psychosomatic illness, 0.6% had severe anxiety symptoms, and 9.4% along with 1.8% experienced moderate and severe challenges in personal relationships, respectively. Mild and moderate levels of depression were observed in only 13.5% and 1.2% of patients. Comparing the severity of psychological symptoms in our study with findings from other research, the prevalence of mild-to-severe depression, anxiety, and stress (18.2%) in our study closely aligns with those reported in other studies (25, 26). Research conducted in Japan and Sweden reported that around 37% of individuals recovering from COVID-19 faced post-COVID issues, including mental health concerns (27). In a subsequent study, depressive symptoms affected 10–69% of recovered individuals, clinically significant anxiety was present in 5–55%, acute stress was evident in 7–37%, and fatigue was experienced by 13–87% (28). The findings of a study involving 895 participants from Brazil revealed significant levels of depression, anxiety, and post-traumatic stress disorder symptoms in 26.2%, 22.4%, and 17.3% of individuals recovering from COVID-19, respectively (29). Overall, several studies demonstrated that the COVID-19

pandemic has enduring repercussions on psychological well-being and distress, heightening the susceptibility to mental illnesses, especially anxiety disorders and depressive conditions, among individuals in recovery (30, 31).

Moreover, individuals with lower educational attainment and those who are homemakers represented a notable association with compromised physical health. A study conducted in China reported that individuals in the general population lacking formal education faced an elevated risk of experiencing depression amid the COVID-19 pandemic (32). These findings suggest that individuals with higher educational levels tend to encounter lower levels of stress, and vice versa. Consequently, in times of outbreaks, it is imperative to focus on rural communities and individuals with limited education, offering them essential information in clear and accessible language to enhance their awareness and alleviate stress (33).

In our research, it was observed that patients hospitalized for COVID-19 were more prone to experiencing anxiety disorders compared to non-hospitalized patients. Correspondingly, a recent study indicated that the presence of chronic illnesses and the duration of hospital stay were linked to the development of anxiety disorders in individuals who survived COVID-19 post-discharge (34). Furthermore, Wesemann et al (35) discovered that post-traumatic symptoms were significantly elevated, particularly among high-risk COVID-19 patients requiring hospitalization. Elgohary et al (36) outlined various predictors affecting the occurrence and severity of psychological disorders in COVID-19 patients. These predictors encompassed factors such as youth, reduced sleep duration, female gender, a history of psychiatric conditions, apprehension regarding COVID-19 infection for themselves or loved ones, and the fear of death from COVID-19 for themselves or their close ones.

Khanal et al (37) concluded that females, divorced individuals, university students with a history of chronic illnesses, and high-income earners (≥ 1500 JD) were identified as being at a higher risk of developing anxiety during their COVID-19 infection. Likewise, the current study underscored a significant association between being widowed/divorced and the presence of psychological disorders. An analysis of the study outcomes indicated that divorced or widowed individuals exhibited notably higher average anxiety and depression scores (38). Additionally, Ansari Ramandi et al (39) observed a heightened prevalence of depression and anxiety among widowed individuals. Our research findings are consistent with those of previous studies, demonstrating a significant correlation between retirement and the likelihood of experiencing anxiety. The study findings emphasize the crucial role played by COVID-19-related stress and anxiety as an underlying mechanism in

the interplay between job demands, aligning with the propositions of d'Ettorre et al (40), Giannopoulou et al (41), and Britt et al (42). Employment circumstances can undergo rapid changes due to the pandemic's dynamic nature and the implemented governmental measures. Individuals currently employed may face job loss and its financial repercussions if there is a steep rise in cases, prompting stricter social distancing measures or economic lockdowns enforced by the government.

Limitations of the Study

This study encountered several limitations. Firstly, a significant number of participants were lost to follow up. Secondly, an assessment of the influence of socio-cultural factors (e.g., health service accessibility, economic stability, rehabilitation interventions, and healthcare-seeking behavior) on the quality of life could not be undertaken. Thirdly, the repercussions of persistent and incapacitating symptoms post-COVID-19 were not investigated in this study. Fourthly, there was a lack of true control groups to enable a comparison of the quality of life scores with those of individuals who had not experienced COVID-19. The study primarily relied on structured questionnaires to assess psychiatric symptoms without conducting clinical diagnoses. Hence, it is recommended that future research employ the gold standard method for psychiatric diagnosis, which involves structured clinical interviews and functional neuroimaging for further insights.

Conclusion

The global impact of the COVID-19 pandemic on communities persists, with a growing urgency regarding mental health issues. Our research indicated that the levels of anxiety, depression, and stress have not waned over time following the initial outbreak. It may be proposed that psychological resources are essential during the recovery phase and should not be overlooked as we confront the evolving challenges posed by the delta variant of COVID-19. These results underscore the importance of implementing long-term medical and psychosocial support initiatives for individuals recuperating from COVID-19.

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Authors' Contribution

Conceptualization: Arezou Kiani ·
Data curation: Sima Masudi.
Formal analysis: Sima Masudi.
Funding acquisition: Arezou Kiani ·
Investigation: Sima Ghafari.
Methodology: Sima Masudi.
Project administration: Arezou Kiani.
Resources: Sima Ghafari.

Software: Sima Masudi.

Supervision: Arezou Kiani.

Validation: Arezou Kiani.

Visualization: Arezou Kiani.

Writing—original draft: Sima Ghafari.

Writing—review & editing: Sima Ghafari.

Competing Interests

The authors have no competing interests to declare that are relevant to the content of this article.

Ethical Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Urmia University of Medical Sciences (No. IR.UMSU.REC.1401.097).

Consent to Participate

Informed consent was obtained from all participants included in the study.

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