Original Article

COVID-19 Fear Association with Depression, Anxiety, and Insomnia: A National Web-Based Survey on the General Population

Samaneh Akbarpour[1,2], Amin Nakhostin-Ansari[3], Khosro Sadeghniiat Haghighi[1,2], Farnaz Etesam[4,5], Zahra Banafsheh Alemohammad[1,2], Faezeh Aghajani[6], Arezu Najafi[1,2*]

Abstract

Objective: COVID-19 pandemic has influenced almost every country worldwide. Being in a pandemic situation can cause psychological distress to people, which can lead to sleep disorders. The present study aimed to assess prevalence of depression, anxiety, and insomnia among Iranian people and their relations with COVID-19 fear in the early stages of COVID-19 pandemic.

Method: A cross-sectional and population-based online study was designed. We created an online form and used Fear of COVID-19 scale (FCV-19), Generalized Anxiety Disorder 2 scale (GAD-2), Patient Health Questionnaire-2 (PHQ-2), and Insomnia Severity Index (ISI), to assess fear of COVID-19, anxiety, depression, and insomnia, respectively. We sent the link to the online survey to Iranians interested in participating in the study via social media, and 1223 Iranian completed the form.

Results: A total of 1223 individuals with a mean age of 39.82 ± 10.75 years participated in the study. Prevalence of insomnia, depression and anxiety among our participants were 55.2%, 61.5%, and 50.9%, respectively. The mean FCV-19 score among the participants was 19.70 ± 5.08. Insomnia was more common among those who were 50 years or older. Fear of COVID-19 was related to a more risk of progression toward depression, anxiety, and insomnia.

Conclusion: Fear of COVID-19 has a considerable association with depression, anxiety, and insomnia in the pandemic, and strategies to reasonably decrease people's fears can help to reduce incidence of psychological issues during the pandemic.

Key words: *Anxiety; COVID-19; Depression; Fear; Insomnia*

1. Sleep Breathing Disorders Research Center (SBDRC), Tehran University of Medical Sciences, Tehran, Iran.
2. Occupational Sleep Research Center, Baharloo Hospital, Tehran University of Medical Sciences, Tehran, Iran.
3. Sports Medicine Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran.
4. Baharloo Hospital, Tehran University of Medical Sciences, Tehran, Iran.
5. Department of Psychiatry, Psychosomatic Medicine Research Center, Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran.
6. School of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

*Corresponding Author:
Address: Occupational Sleep Research Center, Baharloo Hospital, Tehran University of Medical Sciences, Tehran, Iran, Postal Code: 1339973111.
Tel: 98-21 55460184, Fax: 98-21 55648189, Email: najafeeaz@gmail.com

Coronavirus disease 2019 (COVID-19) was first recognized in Wuhan, China (1). Although the town underwent lockdown, the disease spread throughout the world and led to a devastating pandemic (2, 3). To date, no effective drug or vaccine against it have been found; therefore, prevention remains the primary strategy to fight COVID-19 (4, 5). Until mid-July 2020, COVID-19 has affected about 14 million people worldwide, and about 400,000 people have lost their lives due to COVID-19 (6).

COVID-19 affects physical health and causes psychological distress among the general population and healthcare workers (HCWs) (7). Thus, we should consider the intangible harms of the pandemic as well. Prevalence of self-reported depression and anxiety during the COVID-19 pandemic has been about 16-28%, and 8% of people have experienced stress (8); however, in some populations, prevalence of psychological problems was estimated to be higher. In a study in China, prevalence of depression and anxiety was estimated to be 43.7% and 37.4%, respectively (9). Some groups, including younger adults, females, unemployed people, and students have been at a higher risk of psychological issues during the pandemic (10). Psychological distress can lead to sleep disorders. In a study on Chinese general population, about 34% of people reported to have poor sleep quality during the pandemic, and this problem was more common among HCWs. In their study, depression and anxiety had a significant association with poor sleep quality (11). Another online survey in China revealed that being at risk of COVID-19 infection may contribute to posttraumatic stress symptoms and sleep problems (12). One of the immune boosters is salubrious sleep. Stress, fear, and lack of sleep due to anxiety could weaken and attenuate the immune system and increase susceptibility to the disease (13, 14). A study on Bangladeshi people during the COVID-19 pandemic revealed that insomnia is an independent of suicidal ideation (15). Also, prevalence of suicidal ideation and impulsivity are found to be higher in people with pre-existing psychological issues (16).

Fear of COVID-19 can act as a double-edged sword. First, fear is a cornerstone of theories explaining people's adherence to protective measures (17). Harper *et al.* found that fear of COVID-19 is associated with people's engagement regarding protective measures, including hand hygiene and social distancing (18). However, fear of COVID-19 may lead to psychological issues, which may subsequently decrease people's satisfaction with their life during the pandemic (19).

In brief, the COVID-19 pandemic affects both psychological and physical health of people. These psychological issues may lead to devastating consequences such as suicide. Fear of COVID-19 may increase the risk of psychological issues, and these issues, altogether, may affect people's sleep duration and sleep quality. There is no study available on sleep difficulties in Iran throughout the COVID-19 pandemic; thus, the present study aimed to assess prevalence of anxiety, depression, and insomnia among Iranian people and their relations with COVID-19 fear in the early stages of COVID-19 pandemic.

Materials and Methods

We designed a cross-sectional population-based online study. Ethics committee of Tehran University of Medical Sciences approved the study protocol (ethics code: IR.TUMS.VCR.REC.1399.233). Because of health measures and to avoid close contact with participants, we conducted the study via an online survey using ePoll (www.epoll.pro) in April 2020. We designed a form and included a short explanation of the study objectives at its beginning. Iranians who were interested could complete it voluntarily and anonymously. We did not collect any personal information in this survey, and participation was utterly anonymous and voluntary. Our inclusion criteria were as follows: 1) born in Iran, 2) living in Iran at the time of the study, 3) Age of 18 years or older, 4) ability to read and write in Persian, and 5) provide consent to participate in the study. We targeted a sample size of at least 385 Iranians, considering a 5% margin of error, confidence level of 95%, total population of 80,000,000, and sample proportion of 50%. We used convenience sampling in this study and sent the form to the popular groups and channels on social platforms such as WhatsApp. The questionnaire had different sections, including questions on demographic characteristics, anxiety, depression, insomnia, and fear of COVID-19.

Patient health questionnaire-2 (PHQ-2)
PHQ-2 is a questionnaire for screening depression. This questionnaire evaluates depressive symptoms and anhedonia in the past two weeks, with two questions that can be answered on a Likert scale from 0 to 3. The total score is the sum of all items and is calculated from 6 (20). A total score of 3 points or more indicates a depressed mood in the subject, which has an 83% sensitivity and a 92% specificity in detection of patients with depressive disorder (21). PHQ-2 was translated and was culturally adapted to the Persian language. Persian version of PHQ-2 is a reliable tool with a Cronbach alpha coefficient of 0.74, and there was a high association between item scores and total score. PHQ-2 total scores also have a high correlation with Patent Health Questionnaire-9, indicating its reliability (22).

Insomnia Severity Index (ISI)
ISI is a questionnaire that is designed for the screening of insomnia. It consists of seven questions, and each can be answered on a Likert scale from 0 to 4. The total score is the sum of all items and is calculated from 28. A total score of 0-7 is would be not significant insomnia, 8-14: subthreshold insomnia, and 15-21: moderate clinical insomnia, and 22-28 is severe clinical insomnia.

ISI is a reliable tool for evaluating insomnia, considering Cronbach's alpha of 0.74. ISI total scores also have acceptable correlations with a sleep diary, polysomnography, and physicians' ISI, which indicate its validity (23). The Persian version of ISI is also a reliable tool for evaluating insomnia among Iranians (Cronbach's alpha = 0.82). Persian version of ISI has a significant correlation with Pittsburg Sleep Quality Index (PSQI), which indicates its validity (24). ISI is shown to be reliable in online surveys with acceptable internal consistency (25).

Generalized anxiety disorder 2 scale (GAD-2)

GAD-2 is a questionnaire designed to detect anxiety and consists of two questions on anxiety symptoms during the past two weeks. Each question has a 4-point scale from 0 to 3. The total score is calculated by summing all items' scores and is calculated from 6. Total scores of 3 or higher are indicative of anxiety in respondents, with a sensitivity of 0.65 and specificity of 0.88 (26). This questionnaire has good internal consistency to assess anxiety in the Iranian population with Cronbach's alpha of 0.75. A total score of 3 or higher in the Persian version can determine presence of anxiety in the respondent with a sensitivity of 0.92 and specificity of 0.82 (27). ISI is also a reliable and valid tool for online surveys (28).

Fear of COVID-19 scale (FCV-19)

FCV-19 is a questionnaire designed to assess fear of COVID-19. It has 7 item that can be answered on a Likert scale from 1 to 5 as higher scores indicate more fear of COVID-19. Total score is calculated by summing all items' scores, and ranges between 7 to 35. Online version of FCV-19 is a valid instrument for evaluation of fear of COVID-19. All FCV-19 items' scores have an acceptable correlation with the total score, ranging between 0.47 to 0.56. It also has Cronbach's alpha of 0.82 (29).

Statistical analysis

The characteristics of the participants are presented as mean ± SD or frequency and percent for continuous and qualitative variables, respectively. The differences in characteristics were assessed using chi-squared test for categorical variables and Student's independent t-test for continuous variables.

Univariate and Multivariate logistic regression models were applied to calculate the Odds Ratio (OR) with 95% confidence interval (95% CI) of different risk factors for development of interesting outcomes. The main exposure was Fear of COVID-19 and Insomnia, Depression, and Anxiety were used as the outcomes of interest in the logistic regression models. Gender, age, marital status, occupation and education were defined as confounders and were entered in the multiple logistic regression to control their effects.

To assess the prevalence trend of depression, anxiety, and insomnia, we generated quantile boundaries for distribution of the COVID-19 fear scale and determined their prevalence in each quantile. Approximately 2.64%

of the data cells had not been recorded and were known as missing data. So, the missing values were imputed by the single imputation method and regression model in mice package using the R software (30). Stata (Stata Corp. 14 SE) was used for analysis of data, and a P-value < 0.05 was considered as statistically significant.

Results

A total of 1223 individuals with a mean age of 39.82 ± 10.75 years participated in the study. 827 (67.62%) of them were female. Sociodemographic characteristics of participants are shown in Table 1.

Prevalence of insomnia, depression and anxiety among participants was 55.2%, 61.5%, and 50.9%, respectively. The mean FCV-19 score was 19.70 ± 5.08. Means and SDs of PHQ-2, GAD-2, ISI, and FCV-19 and prevalence of depression, anxiety, insomnia, and COVID-19 fear are shown in Table 2 and Table 3 based on age and gender. Prevalence of depression, anxiety, insomnia, and fear of COVID-19 was statistically more among females in present study (P < 0.05).

Association of sociodemographic characteristics and COVID-19 fear with insomnia, depression, and anxiety are shown in table 4. Fear of COVID-19 was associated with a greater risk of depression, anxiety, and insomnia. Older age was related to a higher risk for insomnia (OR = 1.49, CI-95% = 1.06-2.11). Being married was associated with higher risk for anxiety (OR = 1.41, CI-95% = 1.01-1.98) but less risk for insomnia (OR = 0.69, CI-95% = 0.52-0.91).

Figure 1 illustrates an increasing trend for depression, anxiety disorders, and insomnia percentages among participants with a rising fear of COVID-19 (P < 0.001).

Table 1. Socio-Demographic Characteristics and Employment Status of Study Participants in Term of Gender

	Total (n = 1223)	Males (n = 396)	Females (n = 827)	P-value*
Age, year (Mean ± SD)	39.82 (10.75)	40.09 (11.05)	39.69 (10.60)	0.543
	N (percent)	N (percent)	N (percent)	
Age				
50 years >	984 (80.5)	315 (79.5)	669 (80.9)	0.578
50 years ≤	239 (19.5)	81 (20.5)	158 (19.1)	
Marital status				
Married	844 (69)	284 (71.7)	560 (67.7)	0.157
Single	379 (31)	112 (28.3)	267 (32.3)	
Occupation				
Self-employment	505 (41.3)	184 (46.5)	321 (38.8)	
Government employee	434 (35.5)	147 (37.1)	287 (34.7)	<0.001
Un-employed or student	284 (23.2)	65 (16.4)	219 (26.5)	
Education				
Under diploma	179 (14.6)	61 (15.4)	118 (14.3)	
diploma	280 (22.9)	83 (21)	197 (23.8)	0.517
Higher than diploma	764(62.5)	252(63.6)	512(61.9)	

*X-Square test was used for all comparison and student T-test was used for age comparisons

Table 2. Fear of COVID-19, Insomnia, Anxiety, and Depression in General Population during the COVID-19 Pandemic among Iranian Males and Females

	Range of score	Total (n = 1223) Mean ± SD	Males (n = 396) Mean ± SD	Females (n = 827) Mean ± SD	P-value*
GAD-2 score	0-6	2.73 ± 1.82	2.49 ± 1.87	2.84 ± 1.78	0.001
PHQ-2 score	0-6	2.85 ± 1.74	2.67 ± 1.80	2.93 ± 1.71	0.012
ISI score	0-27	9.6 ± 5.80	9.11 ± 5.70	9.93 ± 5.83	0.020
FCV-19 score	0-35	19.70 ± 5.08	18.79 ± 5.22	20.13 ± 4.95	<0.001
		N (percent)	N (percent)	N (percent)	P-value
Anxiety					
Yes	≥ 3	622 (50.9)	171 (43.2)	451 (54.5)	<0.001
No	< 3	601 (49.1)	225 (56.8)	376 (45.5)	
Depression					

Yes	≥ 3	752 (61.5)	228 (57.6)	524 (63.4)	0.042
No	< 3	471 (38.5)	168 (42.4)	303 (36.6)	
Insomnia					
479 (57.9)	196 (49.5)	675 (55.2)	≥ 8	Yes	0.028
348 (42.1)	200 (50.5)	548 (44.8)	< 8	No	
Severity of insomnia					
No clinically significant insomnia	0-7	548 (44.8)	200 (50.5)	348 (42.1)	
Subthreshold insomnia	8-14	342 (28)	106 (26.8)	236 (28.5)	0.021
Clinical insomnia (moderate severity)	15-21	275 (22.5)	73 (18.4)	202 (24.4)	
Clinical insomnia (severe)	22-28	58 (4.7)	17 (4.3)	41 (5)	

* Student's T-test was used for comparison of scores and the X-Square test was used for other qualitative variables

Table 3. Fear of COVID-19, Insomnia, Anxiety, and Depression among General Population during the COVID-19 Pandemic in Different Age Groups

	Range of score	Age < 50 (n = 984)	Age ≥ 50 (n = 239)	P-value
		Mean ± SD	Mean ± SD	
GAD-2 score	0-6	2.71 ± 1.79	2.87 ± 1.91	0.199
PHQ-2 score	0-6	2.89 ± 1.73	2.67 ± 1.76	0.086
ISI score	0-27	9.43 ± 5.71	10.65 ± 6.10	0.003
FCV-19 score	0-35	20.34 ± 4.78	19.54 ± 5.14	0.029
		N (percent)	N (percent)	P-value
Anxiety				
Yes	≥ 3	495 (50.3)	127 (53.1)	0.432
No	< 3	489 (49.7)	112 (46.9)	
Depression				
Yes	≥ 3	607 (61.7)	145 (60.7)	0.772
No	< 3	377 (38.3)	94 (39.3)	
Insomnia				
Yes	≥ 8	529 (53.8)	146 (61.1)	0.031
No	< 8	455 (46.2)	93 (38.9)	
Severity of insomnia				
No clinically significant insomnia	0-7	455 (46.2)	93 (38.9)	0.046
Subthreshold insomnia	8-14	270 (27.4)	72 (30.1)	
Clinical insomnia (moderate severity)	15-21	219 (22.3)	56 (23.4)	
Clinical insomnia (severe)	22-28	40 (4.1)	18 (7.5)	

Table 4. Association of Socio-Economic Variables and Fear of COVID-19 with Insomnia, Anxiety, and Depression among General Population in Univariate and Multivariate Logistic Regression

		Anxiety (n = 1223, e = 622)		Depression (n = 1223, e 752)		Insomnia (n = 1223, e = 675)	
		Univariate - OR* (95% CI)	Multivariate - OR** (95% CI)	Univariate - OR* (95% CI)	Multivariate - OR** (95% CI)	Univariate - OR* (95% CI)	Multivariate - OR** (95% CI)
Age	<50 years	1	1	1	1	1	1
	≥50 years	1.12 (0.84-1.48)	1.04 (0.70-1.54)	0.95 (0.71-1.28)	0.92 (0.51-1.04)	1.35 (1.01-1.70)	1.49 (1.06-2.11)
Gender	Men	1	1	1	1	1	1
	Women	1.57 (1.24-2.01)	1.22 (0.88-1.67)	1.27 (0.99-1.62)	0.94 (0.71-1.25)	1.40 (1.10-1.78)	1.17 (0.89-1.53)
Marital status	Single	1	1	1	1	1	1
	Married	1.35 (1.07-1.76)	1.41 (1.01-1.98)	1.05 (0.81-1.34)	0.85 (0.62-1.12)	0.90 (0.70-1.14)	0.69 (0.52-0.91)
Occupation	Un-employment or student	1	1	1	1	1	1
	Self-employment	1.52 (1.12-2.06)	0.71 (0.47-1.06)	0.93 (0.68-1.25)	1.12 (0.78-1.32)	1.02 (0.76-1.37)	1.10 (0.78-1.53)
	Government employee	1.20 (0.92-1.55)	0.68 (0.45-1.01)	0.76 (0.56-1.04)	0.94 (0.76-1.26)	0.96 (0.71-1.30)	1.22 (0.87-1.71)
Education	Under diploma	1	1	1	1	1	1
	diploma	1.77 (1.21-2.58)	1.02 (0.72-1.50)	1.77 (1.21-2.61)	1.26 (0.80-1.97)	1.52 (1.04-2.23)	1.18 (0.88-1.61)
	Upper diploma	1.44 (1.04-2.00)	0.99 (0.74-1.44)	1.41 (1.01-1.96)	1.05 (0.72-1.55)	1.35 (0.98-1.87)	1.12 (0.76-1.58)
	Fear of covid-19	1.37 (1.32-1.43)	1.31 (1.25-1.36)	1.21 (1.18-1.25)	1.12 (1.08-1.16)	1.17 (1.14-1.20)	1.11 (1.08-1.15)
	Insomnia	3.65 (2.28-4.63)	1.70 (1.26-2.29)	3.16 (2.28-4.01)	1.74 (1.32-2.29)		
	Depression	4.21 (2.83-4.32)	3.32 (2.43-4.52)			1.59 (1.47-1.72)	1.72 (1.30-2.17)
	Anxiety			4.21 (2.81-4.23)	3.48 (2.56-4.72)	1.56 (1.45-1.68)	1.71 (1.27-2.30)
Fear of COVID-19 was interested exposure and Insomnia, Depression, and Anxiety was interested outcomes in the logistic regression models.							

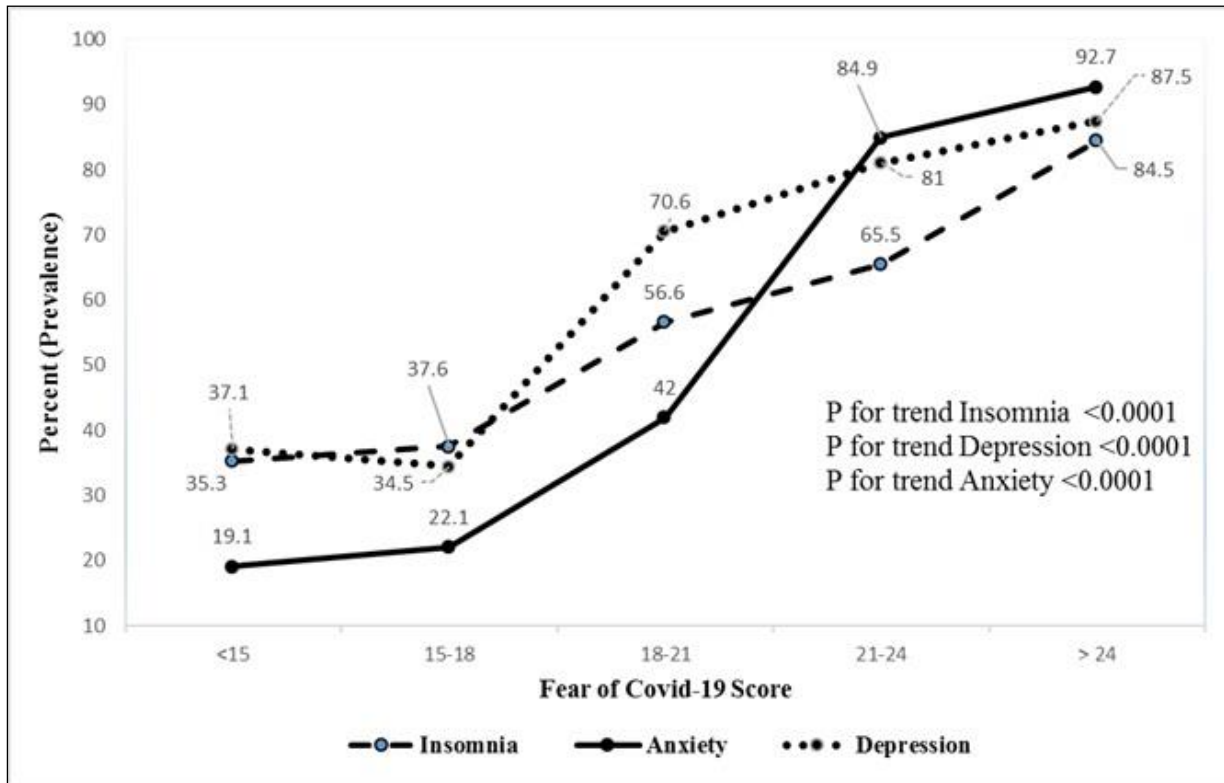*Crude Odds ratio
** Adjusted Odds ratio

Figure 1. Trend for Prevalence of Depression, Anxiety, and Insomnia by Increasing Fear of COVID-19 among General Population

Discussion

In this study, we assessed fear of COVID-19, anxiety, insomnia, and depression in the general Iranian population throughout the COVID-19 pandemic. We found that fear of COVID-19 was associated with a greater prevalence of depression, anxiety, and insomnia. Also, COVID-19 can be a major contributing factor for psychological issues during the pandemic. More than half of our participants felt uncomfortable thinking about COVID-19 and half of them were afraid of losing their lives because of this disease. Generation of myths and false beliefs are inevitable during such a crisis and could be a reason for people's fear of COVID-19. Keeping people's knowledge current, being in touch with people and keeping them informed can help battle fallacies, resulting in reduction of people's fear of COVID-19. Besides, allotted health strategies to control the epidemic can result in people's reassurance and lessening of their fears. In our study, prevalence of depression, anxiety, and insomnia were higher among females. Besides, there was no relationship between gender and the risk of progression toward depression, anxiety, and insomnia. Wang *et al.* found that the COVID-19 epidemic has greater psychological impact on females compared to males (31). Also, females had significantly higher FCV-19 scores than males in our study. Prevalence of depression, anxiety, and insomnia was higher in people with higher levels of fear of COVID-19. It seems that fear of COVID-19 can result in psychological consequences and cause a higher prevalence of insomnia, depression, and anxiety among females in our study. Huang *et al.* also reported that the frequency of depressive symptoms was not statistically different between genders (11).The mean PHQ-2 score was 2.85 in our study. About 61% of participants in our study had PHQ-2 scores of 3 or more, indicating a depressed mood. Prevalence of depression among the general Iranian population has been reported between 9.5% to 12.7% in previous studies (32, 33). Beck Depression inventory and Diagnostic and Statistical Manual of Mental Disorders fourth edition (DSM IV) criteria were used in several investigations to assess prevalence of depression in Iran. We used PHQ-2, a screening tool (20), and there is a need for more definitive tests to confirm the diagnosis of any depressive disorder. As a result, the exact number of participants with depressive disorders may differ from the participants who had a positive screening test. For two reasons, it seems that the prevalence of depression is higher after the COVID-19 pandemic among Iranians compared to pre-pandemic situation. First, we found a positive association between fear of COVID-19 and depression. Hence psychological impacts of the pandemic may alone play a role in rise of depressive symptoms. Second, taking the association between fear of COVID-19 and higher prevalence of depression into account, a higher incidence of depression increases the positive predictive value of PHQ-2. As a result, compared to the pre-pandemic situation, more

people who had positive screening tests would be diagnosed with any depressive disorder, and the difference between the number of patients with depressive disorders and those who had a positive screening test would be less. In a study in China, prevalence of depression among general population was found to be 20.1% (11), far less than our study (61%). In another study before the COVID-19 pandemic, prevalence of depression was 4.1% in Chinese people (34) which is also less than the Iranian population (32, 33). Differences in prevalence of depression in the two populations may be attributable to pre-existing depressive disorders among the Iranian population. In another study by Wang *et al.* in China, prevalence of depression during the COVID-19 epidemic was 30.3% (31). As Wang's study was conducted before Huang's, the difference between the two studies' results may be because of people's adaptation to the situation. We conducted our study 6 weeks after diagnosing the first cases of COVID-19 in Iran, in the later stages of the epidemic compared to Huang's and Wang's studies. Even after people's relative adaptation to the situation, the prevalence of depressive symptoms was higher in our study. Female gender, occupational status, and marital status had relations with incidence of depression in previous studies (35). In the pandemic situation of our study, fear of COVID-19 was the only variable that had a relation with depression. Change in priorities may be the reason for this shift as people's health may become their top priority, which they are most concerned about during such a life-threatening pandemic. Our participants' mean GAD-2 score was 2.73 (*SD* = 1.82). Prevalence of generalized anxiety disorder was 50.9% among our participants. Prevalence of generalized anxiety disorder based on DSM IV criteria was 5.2% among the general Iranian population (36). The difference between Hajebi *et al.*'s findings and ours indicates a noticeable increase in frequency of anxiety during the COVID-19 pandemic. The same result was seen in China as the prevalence of anxiety in the general population was 36.4% during COVID-19 compared to 5% before the outbreak (37). Fear of COVID-19 was related to a greater prevalence of anxiety in our study. Economic problems, possible limited access to self-protection equipment, and uncertainty toward the pandemic's outcome may be the other factors leading to anxiety during the epidemic. Huang *et al.* used the GAD-7 questionnaire to assess anxiety in the general Chinese population throughout the current pandemic of COVID-19. Prevalence of anxiety was 35.1% in their study (11), significantly less than our findings (50.9%). Prevalence of anxiety was about 5% in both Chinese and Iranian populations before the COVID-19 outbreak. Differences in anxiety levels during the pandemic indicates different responses to the epidemic by these two populations (38).

Being married was a risk factor for anxiety in our study, which is in line with previous studies in Iran (36).

COVID-19 pandemic exposes people's health and life to risk, and people are concerned not only for their health but also about their families, which leads to more anxiety among married people than those who are single. Wang *et al.* did not find any relationship between anxiety and marital status during the outbreak (31). Having more life issues among married people such as concern about children's health, etc. may be considered as possible contributing factors of female gender susceptibility in the current pandemic. Although fear and anxiety are disparate traits and emotions (39), there have been relations between them in various studies (40-42). We also found an association of fear of COVID-19 and increased anxiety in our study and it seems that fear of COVID-19 may lead to anxiety.

Our participants' mean ISI score was 9.6. Prevalence of sub-threshold, moderate, and severe insomnia was 28%, 22.5%, and 4.7%, respectively. In a previous study in Kashan, Iran, prevalence of insomnia was 59.2% among the general population (43), which is not much different from the 55.2% prevalence in our study. Fear of COVID-19 and older age were independently related to higher prevalence and severity of insomnia. As Ahmadvand *et al.'s* study evaluated prevalence of insomnia in Kashan, it cannot completely be generalized to Iran. Still, it seems that the current prevalence of insomnia in the Iranian population is attributable to two factors. First, insomnia is more prevalent among middle-aged people (44). Accordingly, pre-existing sleep disorders in middle-aged people may be attributable to insomnia's current prevalence during the pandemic. Besides, as there was a relationship between fear of COVID-19 and insomnia, fear can be another risk factor for insomnia in our study population. Insomnia was more common among our single participants, which follows findings in previous studies (45). There may be pre-existing sleep disorders in single individuals that lead to insomnia and are irrelevant to the pandemic. Prevalence of sleep disorders in China was 18.2% among Chinese people in the COVID-19 pandemic in the Huang *et al.* study (11). Prevalence of insomnia in Greek people throughout the COVID-19 pandemic was 37.6% (46).

Consistent to depression and anxiety, insomnia was more common among Iranians compared to other nationalities. Pre-existing disorders, rapid spread of the disease, higher mortality rate compared to other countries, economic crisis, and uncertainty toward the future of the pandemic can all contribute to higher levels of fear toward COVID-19 and have a role in higher prevalence of psychological issues among Iranians.

Limitation
First of all, the PHQ-2 and GAD-2 questionnaire were designed for screening depressive symptoms and anxiety. Psychiatrist or psychologist visits are needed to confirm diagnosis of anxiety and depression in those participants. As a result, prevalence of anxiety and depression may be less than what we found in our study. Another limitation was pre-existing psychological issues which may contribute to the current prevalence of these issues in our study. Also, we used convenience sampling in this study, which increases the risk of selection bias; however, using online forms and convenience sampling was somehow inevitable.

Conclusion
This study indicated high prevalence of psychological issues, including depression, anxiety, and insomnia among the Iranian population, and prevalence of these issues has increased compared to the pre-pandemic situation. Also, high prevalence of psychological issues in Iran compared to other countries indicates an urgent need for comprehensive health strategies to cope with these issues considering the burden of these issues in the COVID-19 pandemic. Fear of COVID-19 is contributing to frequency of depression, anxiety, and insomnia during the pandemic, and strategies to decrease people's fears reasonably can help to reduce the incidence of psychological issues during the pandemic.

Acknowledgment

Conflict of Interest
None.

References
1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med. 2020;382(8):727-33.
2. Jebril N. World Health Organization declared a pandemic public health menace: A systematic review of the coronavirus disease 2019 "COVID-19", up to 26th March 2020. Available at SSRN 3566298. 2020.
3. Lu D. Inside Wuhan's lockdown. New Sci. 2020;245(3268):7.
4. Farnoosh G, Alishiri G, Hosseini Zijoud S, Dorostkar R, Jalali Farahani A. Understanding the 2019-novel coronavirus (2019-nCoV) and coronavirus disease (COVID-19) based on available evidence-a narrative review. J Mil Med. 2020;22(1):1-11.
5. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet. 2020;395(10223):470-3.
6. World Health Organization. Coronavirus disease 2019 (COVID-19): situation report, 146. 2020.
7. Cullen W, Gulati G, Kelly B. Mental health in the Covid-19 pandemic. Qjm. 2020;113(5):311-2.

8. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. Asian J Psychiatr. 2020;52:102066.

9. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ, Chen JC, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. Eur Child Adolesc Psychiatry. 2020;29(6):749-58.

10. Shah SMA, Mohammad D, Qureshi MFH, Abbas MZ, Aleem S. Prevalence, Psychological Responses and Associated Correlates of Depression, Anxiety and Stress in a Global Population, During the Coronavirus Disease (COVID-19) Pandemic. Community Ment Health J. 2021;57(1):101-10.

11. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry Res. 2020;288:112954.

12. Zhang F, Shang Z, Ma H, Jia Y, Sun L, Guo X, et al. High risk of infection caused posttraumatic stress symptoms in individuals with poor sleep quality: A study on influence of coronavirus disease (COVID-19) in China. medRxiv. 2020.

13. Segerstrom SC, Miller GE. Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. Psychol Bull. 2004;130(4):601-30.

14. Taylor DJ, Lichstein KL, Durrence HH. Insomnia as a health risk factor. Behav Sleep Med. 2003;1(4):227-47.

15. Mamun MA, Sakib N, Gozal D, Bhuiyan AI, Hossain S, Bodrud-Doza M, et al. The COVID-19 pandemic and serious psychological consequences in Bangladesh: A population-based nationwide study. J Affect Disord. 2021;279:462-72.

16. Hao F, Tan W, Jiang L, Zhang L, Zhao X, Zou Y, et al. Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and lockdown? A case-control study with service and research implications for immunopsychiatry. Brain Behav Immun. 2020;87:100-6.

17. Adunlin G, Adedoyin ACA, Adedoyin OO, Njoku A, Bolade-Ogunfodun Y, Bolaji B. Using the protection motivation theory to examine the effects of fear arousal on the practice of social distancing during the COVID-19 outbreak in rural areas. J Hum Behav Soc Environ. 2021;31(1-4):168-72.

18. Harper CA, Satchell LP, Fido D, Latzman RD. Functional Fear Predicts Public Health Compliance in the COVID-19 Pandemic. Int J Ment Health Addict. 2021;19(5):1875-88.

19. Satici B, Gocet-Tekin E, Deniz ME, Satici SA. Adaptation of the Fear of COVID-19 Scale: Its Association with Psychological Distress and Life Satisfaction in Turkey. Int J Ment Health Addict. 2021;19(6):1980-8.

20. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003;41(11):1284-92.

21. Löwe B, Kroenke K, Gräfe K. Detecting and monitoring depression with a two-item questionnaire (PHQ-2). J Psychosom Res. 2005;58(2):163-71.

22. Dadfar M, Lester D. Psychometric characteristics of Patient Health Questionnaire-2 (PHQ-2) in Iranian psychiatric outpatients. Austin J Psychiatry Behav Sci. 2017;4(1):1059.

23. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. Sleep Med. 2001;2(4):297-307.

24. Yazdi Z, Sadeghniiat-Haghighi K, Zohal MA, Elmizadeh K. Validity and reliability of the Iranian version of the insomnia severity index. Malays J Med Sci. 2012;19(4):31-6.

25. Thorndike FP, Ritterband LM, Saylor DK, Magee JC, Gonder-Frederick LA, Morin CM. Validation of the insomnia severity index as a web-based measure. Behav Sleep Med. 2011;9(4):216-23.

26. Kroenke K, Spitzer RL, Williams JB, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. Ann Intern Med. 2007;146(5):317-25.

27. Ahmadi SM, Masjedi Arani A, Bakhtiari M, Davazdah Emamy MH. Psychometric Properties of Persian Version of Patient Health Questionnaires-4 (PHQ-4) in Coronary Heart Disease Patients. Iran J Psychiatry Behav Sci.2019;13(4):e85820.

28. Donker T, van Straten A, Marks I, Cuijpers P. Quick and easy self-rating of Generalized Anxiety Disorder: validity of the Dutch web-based GAD-7, GAD-2 and GAD-SI. Psychiatry Res. 2011;188(1):58-64.

29. Ahorsu DK, Lin CY, Imani V, Saffari M, Griffiths MD, Pakpour AH. The Fear of COVID-19 Scale: Development and Initial Validation. Int J Ment Health Addict. 2020:1-9.

30. Van Buuren S, Groothuis-Oudshoorn K. Multivariate imputation by chained equations in RJ Stat. Softw. 2011 Dec 12;45:1-67.

31. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17(5): 1729.

32. Modabernia MJ, Tehrani HS, Fallahi M, Shirazi M, Modabbernia AH. Prevalence of depressive disorders in Rasht, Iran: A community based study. Clin Pract Epidemiol Ment Health. 2008;4:20.

33. Sharifi V, Amin-Esmaeili M, Hajebi A, Motevalian A, Radgoodarzi R, Hefazi M, et al. Twelve-month prevalence and correlates of psychiatric disorders in Iran: the Iranian Mental Health Survey, 2011. Arch Iran Med. 2015;18(2):76-84.

34. Qin X, Wang S, Hsieh C-R. The prevalence of depression and depressive symptoms among

adults in China: estimation based on a National Household Survey. China Econ Rev. 2018;51:271-82.

35. Hammen C. Risk Factors for Depression: An Autobiographical Review. Annu Rev Clin Psychol. 2018;14:1-28.

36. Hajebi A, Motevalian SA, Rahimi-Movaghar A, Sharifi V, Amin-Esmaeili M, Radgoodarzi R, et al. Major anxiety disorders in Iran: prevalence, sociodemographic correlates and service utilization. BMC Psychiatry. 2018;18(1):261.

37. Huang Y, Wang Y, Wang H, Liu Z, Yu X, Yan J, et al. Prevalence of mental disorders in China: a cross-sectional epidemiological study. Lancet Psychiatry. 2019;6(3):211-24.

38. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. Int J Biol Sci. 2020;16(10):1745-52.

39. Sylvers P, Lilienfeld SO, LaPrairie JL. Differences between trait fear and trait anxiety: implications for psychopathology. Clin Psychol Rev. 2011;31(1):122-37.

40. Farris SG, Abrantes AM, Bond DS, Stabile LM, Wu WC. Anxiety and Fear of Exercise in Cardiopulmonary Rehabilitation: PATIENT AND PRACTITIONER PERSPECTIVES. J Cardiopulm Rehabil Prev. 2019;39(2):E9-e13.

41. Kreddig N, Hasenbring MI. Pain anxiety and fear of (re)injury in patients with chronic back pain: Sex as a moderator. Scand J Pain. 2017;16:105-11.

42. McNeil DW, Kennedy SG, Randall CL, Addicks SH, Wright CD, Hursey KG, et al. Fear of Pain Questionnaire-9: Brief assessment of pain-related fear and anxiety. Eur J Pain. 2018;22(1):39-48.

43. Ahmadvand A, Sepehrmanesh Z, Ghoreishi FS, Mousavi SGA. Prevalence of insomnia among 18 years old people and over in Kashan city, Iran in 2008. FEYZ. 2010;13(4):313-20.

44. Stewart R, Besset A, Bebbington P, Brugha T, Lindesay J, Jenkins R, et al. Insomnia comorbidity and impact and hypnotic use by age group in a national survey population aged 16 to 74 years. Sleep. 2006;29(11):1391-7.

45. Kawata Y, Maeda M, Sato T, Maruyama K, Wada H, Ikeda A, et al. Association between marital status and insomnia-related symptoms: findings from a population-based survey in Japan. Eur J Public Health. 2020;30(1):144-9.

46. Voitsidis P, Gliatas I, Bairachtari V, Papadopoulou K, Papageorgiou G, Parlapani E, et al. Insomnia during the COVID-19 pandemic in a Greek population. Psychiatry Res. 2020;289:113076.