

Study of Behaviors and Psychological Indicators in Iranian Medical Students During the COVID-19 Pandemic Self-Quarantine

ABSTRACT

Background and Objective: Following the sudden and global outbreak of Coronavirus disease 2019 (Covid-19), called an infectious pandemic by the WHO, Iran also began fighting against this disease from February 19. One of the most important issues in this situation is the adherence to self-quarantine behaviors and its psychological impacts on community health. To date, it is not clear how the Iranian medical students have been adapted with self-quarantine neither and their psychological impacts. The purposes of this study were to investigate effect of self-quarantine on medical student's behaviors and their psychological health during the COVID-19 pandemic in 2020.

Materials and Methods: During the early stage of the nationwide lockdown, a total 607 Iranian medical students (63.4% females, range 18-51 years), who were in self-quarantine, participated in an online cross-sectional survey. The valid and reliable questionnaires included covid-19 self-quarantine behaviors, general health (GHQ-28), and impact of events-revised (IES-R) were used to collect data. Series of analysis tests like t-tests, one way-ANOVA and Pearson's correlation coefficient were conducted via SPSS v.25.

Results: The results indicated suitable behaviors (57.09 ± 22.36) and higher-level of adherence in females and married students that there is no member in their family affected with COVID -19 (P -value < 0.05). Respondents exhibited significant levels of mental disturbance (29.33 ± 16.11) and PTSD symptoms (28.96 ± 15.40) and also Pearson correlation test indicated a significant positive correlation between self-quarantine behaviors with psychological disturbance and PTSD symptoms ($r = 0.208$ and 0.215 , P -value $= 0.01$).

Conclusion: Despite observing the appropriate behaviors in students during self-quarantine, but significant psychological effects due to self-quarantine condition have affected them. The results of this study can help professional health policy makers to determine special strategies for promoting appropriate behaviors during COVID-19 pandemic self-quarantine, controlling the resulting psychological impacts in medical students who considered as one the most important academic population.

Paper Type: Research Article

Keywords: Adherence, Psychological impacts, Self-quarantine behaviors, Covid-19.

► **Citation:** Pourghaznein T, Salati S, Jamali J, Rangani F, Khazaei E. Study of Behaviors and Psychological Indicators in Iranian Medical Students During the COVID-19 Pandemic Self-Quarantine. *Journal of Health Literacy*. Spring 2021; 1(6): 61-71.

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Received: 20 February 2021

Accepted: 25 May 2021

Doi: 10.22038/jhl.2021.55831.1151

Introduction

Since the start of widespread outbreak of the covid-19 pandemic from china, many countries have investigated various type of health measures and indicators (1). In March 2020, World Health Organization (WHO) announced an acute pandemic and warned its widespread physical, mental and psychological effects on community health. Infectious pandemics have always caused a significant level of psychological problems in societies (2) as high levels of anxiety and emotional distress were reported during the SARS outbreak in China (3), and now the covid-19 has caused a wide range of psychological problems (4). In this situation, mental health was considered as the main threat due to Coronavirus 2019. However, some health measures can also affect the occurrence and exacerbation of such problems. One of these measures is quarantine, which is used to prevent potentially infected and at-risk individuals from coming into contact with other members of a society (5). In the current health crisis, this method has been taken as one of the first measures, although it is able to break the 2019 Coronavirus transmission chain as the best available solution (6). It also has many psychological impacts on some people and can lead to widespread psychological crises in individuals. As Tang et al (2020) have reported a significant level of psychological disruption in Chinese students during the quarantine period (7) and some studies have acknowledged the emotional and psychological effects of quarantine on medical students (8). Nonetheless what is more important than quarantine is adherence to it, which always faced with different challenges, such as various studies declared low-adherence to quarantine during the outbreak of SARS (9). Based on previous studies, some demographical variables, such as gender, age, education and marital status, were selected as factors, which

could influence the individual's adaptation during quarantine (10). On the other way due to the significant level of psychological problems in medical students because of covid-19 (1), potential role of medical students in their family members and society (11), their academic social responsibility, the necessity to gain knowledge about quarantine experiences to reduce its side effects (5), and lack of similar research in Iran, this study was conducted to investigate effect of self-quarantine on medical student's behaviors and their psychological health during the COVID-19 pandemic in 2020.

Methods

Participants

In this study census sampling method was used to 607 students from in the Faculty of Nursing and Midwifery of Mashhad University of Medical science with access to a networked computer or smartphones. Students were included if they were study at this faculty, willingness to participate in the study, and have physical ability to complete the questionnaires. They excluded if they did not fill the questionnaires completely. After achieving the ethics code at" IR.MUMS.REC.1399.066" from the university ethics committee, the link of the electronic questionnaire in Google form and the necessary information about the study was sent to students via WhatsApp messaging software and email. At the beginning of the study, the consent forms were obtained from eligible participants. This cross-sectional survey was initiated on 2th May 2020 at and closed on 21th May 2020, during high Covid-19 prevalence in Iran.

Demographical information

Demographic data were collected using a questionnaire designed for all participants include: age, gender, marital status, field of study, degree

level, psychiatric illnesses history, individual free time activities, and infectious status by covid-19 in their family members.

Covid19 self-quarantine behaviors

To evaluate the Covid19 self-quarantine behaviors, a researcher designed questionnaire, which included 20 items based on the World Health Organization, the Centers for Disease Control and the Ministry of Education, and Health and Medical Medicine of Iran criteria. This questionnaire includes various dimensions of behaviors (social distance, traveling, the ways of Transportation, referral to medical centers and gatherings). Respondents were asked about their behaviors during quarantine and these items were examined based on a 5-point Likert scale (from 1 "never" to 5 "always"). This score was ranged between 0 to 100, (0-24 scores indicate poor level, 25-49 the average level, 50-74 indicate the satisfying level, and 75-100 indicate the excellent level self-quarantine behaviors). The validity of this questionnaire was quantified through content validity. In this study, 9 health education specialist who work in Mashhad University of Medical Sciences (Nursing, Infectious Diseases specialist and Epidemiologist) examined the validity of this tools and its validity was confirmed by CVR: 0/99 and CVI: 0.83. Likewise, its reliability was tested by test-re-test with 10-days interval and the Pearson correlation coefficient was 0.84 and ICC was 0.78, indicating the stability of this tool and its appropriateness for use in this research studies.

General health questioner (GHQ-28)

To evaluate the psychological distress in students, we use the general health questioner with 28 behavioral items. This tool scored based on this 4-point Likert scale (from not at all "0" to "3" much more than usual). It was ranged between 0 to 88. The cut of point for this tool was categorized as

follow: score ≤ 23 have been identified without psychological disruption and scores > 24 means having psychological disruption (12). The validity and reliability of the questionnaire has been measured by Taghavi(2002) and Cronbach's alpha was 0.90 for this tool (13).

Impact of events-revised (IES-R)

We used the IES-R questionnaire with 22 items to evaluate PTSD¹ symptoms in students. There are 3 domains in this questionnaire that include Intrusion, Avoidance, and Hyperarousal. The higher score indicates a more pronounced presence of PTSD symptoms. This questionnaire was scored based on this 5-point likert scale (from 0 "never" to 4 "always"). The validity and reliability of the questionnaire has been measured by Moradi et al (2008) and its Cronbach's alpha was 0.75 to 0.92 (14). However, we examined the validity of this tool in the period of Covid-19 and its CVR and CVI were 0.94 and 0.81, respectively. Also its reliability was tested by test-re-test with 10-days interval and the average of correlation coefficient was 0.81. Indicating the stability of the tool and its appropriateness for use in Covid-19 period.

Statistics

All analyses were carried out using the Statistical Package for the Social Sciences (SPSS), version 21. All Continues variables are presented as mean \pm standard deviation. Group differences in demographical data were evaluated using the independent sample t-tests and one way-ANOVA. The Pearson correlation tests were used to investigate the relationship between self-quarantine behaviors, general health and impact of events-revised scores. All results were quoted as 2-tailed P values, with statistical significance set at $P < 0.05$.

1. . Post-traumatic stress disorder

Results

Demographical characteristics

The demographical and selected characteristics of the study population are shown in Table 1. Among the sample of 607 students (22.57 ± 4.56 years), the majority of them were females 385 (63.4%), single 430 (70.8%), and without psychological illness 520 (85.66%). The 78 (12.86%) of our sample declared to be infected by Covid-19 and 122 (20.1%) had got at least one infected person by Covid-19 in their family.

Table 1: Study Sample Demographic Characteristics (n=607).

Variables	subcategory	Number	Percentage
Age	18-22	427	70.34
	23-27	111	18.28
	28-32	40	6.58
	33-37	18	2.96
	38-42	7	1.15
	43-47	3	1>
	48-52	1	1>
Sex	Female	385	63.4
	Male	222	36.6
Marital status	Single	430	70.8
	Married	177	29.2
Field of study	Nursing	322	53
	Midwifery	158	26
	Operation room	79	13
	Emergency medical care	48	8
Degree level	Undergraduate	521	85.8
	Master science	68	11.2
	PhD	18	3
Have you ever had been infected by Covid-19	No	529	87.14
	Yes	78	12.85
	Healed	55	Of total infected)70.51
	In therapy	23	Of total infected)29.49
Have any of your family members ever been infected by Covid-19	Yes	122	20.1
	No	485	79.9

How did you spend most of your free time	Using social media	414	68.20
	Watching TV	62	10.21
	Educational and Research activities	45	7.41
	Gaming	32	5.27
	Outing	28	4.61
	Rest and sleeping	26	4.28
Do you currently have a mental illness? (if so, mention it)	No	520	85.66
	Yes	87	14.34
	Depression	49	56.32
	Obsessive-compulsive disorder	19	21.83
	Panic disorder	12	13.79
Have you ever used sleeping pills or sedatives since the onset of Covid-19	No	406	66.9
	Yes	201	33.1

Level of Covid-19 self-quarantine behaviors in students

Table 3 shows a suitable behaviors level (57.09 ± 22.36) during self-quarantine. In Table 2 shows the self-quarantine behaviors. The highest score was related to "I observe distance and health measures if I have to deal with infected people Covid-19" (4.58 ± 0.61) and the lowest score was in "I limit all entertainment activities to the home environment" item (2.46 ± 1.38). Based on the independent t-test and one way-ANOVA in table 3, suitable behaviors (57.09 ± 22.36) and higher-level of adherence in females and married students that there is no member in their family affected with COVID -19 (P -value < 0.05), and PhD students had higher adherences than others significantly ($p < .01$).

Table2: Covid-19 Self-quarantine behaviors items

Standard deviation	Mean	Items
1.32	3.59	I observe 1.5 meters distance with other people in public places.
1.34	2.78	I cancel the necessary trips.
1.41	3.35	If I travel, I use a personal vehicle.
1.41	3.01	I limit family relationships with relatives (except those who live with me).
1.38	2.90	I avoid participating in family and friendly gatherings and parties.
1.37	3.35	I refrain from making unnecessary purchases.
1.22	2.47	I make the necessary purchases by going to the stores.
1.41	3.28	I use not crowded stores to make the necessary purchases.
1.43	3.18	I use nearby stores to make necessary purchases.
1.47	3.23	I postpone the necessary purchases to low traffic times.
1.32	3.44	I decrease the time interval between necessary purchases
1.44	3.37	I decrease the number of times I go out for entertainment activities.
1.46	3.18	I choose not crowded places to do entertainment activities.
1.32	2.71	I Go out for entertainment activities alone.
1.38	2.46	I limit all entertainment activities to the home environment.
1.44	3.86	In general, I exclude visits to non-emergency health centers.
1.06.	4.01	In emergencies health conditions, I only choose private offices or negative covid19 hospitals.
1.52	3.34	I use personal vehicles to Commute
1.56	3.14	In social interactions, I observe a safe distance of 1.5 meters from others.
0.61	4.58	I observe distance and health measures if I have to deal with infected people by Covid19.

General health (GHQ-28) and Impact of events scale-revised (IES-R)

Table 3 and table 4 show how the mental health of students was affected during the outbreak. A statistically significant difference was found in general health between students as single, infected person and students with infected

person by Covid19 in their family had higher psychological disturbance than others ($p < 0.05$). Also as observed on Table 3, higher level of PTSD symptoms was observed in single and infected students ($p < .05$).

Table3: Comparative analysis of the self-quarantine behaviors, GHQ-28 and IES-R Score Mean (SD)

variables		Impact of events-revised (IES-R)	General health (GHQ-28)	Self-quarantine behaviors
Total		28.96(5.40)	29.33(16.11)	57.09(22.36)
SEX	Female	29.41(5.58)	29.33(16.05)	59.37(21.94)
	Male	28.18(5.08)	28.86(16.22)	53.14(22.58)
Independent T-test		t= -3.33; p=0.001	t= -0.84; p=0.895	t= -0.94; p=0.346
Marital status	Married	28.12(4.89)	27.95(16.01)	60.02(20.20)
	single	30.98(6.42)	32.67(15.90)	55.89(23.11)

Table3: Comparative analysis of the self-quarantine behaviors, GHQ-28 and IES-R Score Mean (SD)

Independent T-test		= 2.08; p=0.037 t	t= 3.30; p=0.001	t= 2.19; p=0.029
Personal Covid19 status	Yes	39.71(9.79)	41.46(21.29)	50.47(25.17)
	No	28.51(5.05)	28.83(15.68)	57.36(22.22)
Independent T-test		= -2.73; p=0.011 t	t= -2.87; p=0.008	t= 1.48; p=0.139
Family Covid19 status	Yes	31.05(5.36)	33.76(16.75)	50.79(21.44)
	No	28.65(5.39)	28.67(15.92)	58.2(22.36)
Independent T-test		= -1.28; p=0.198 t	t= -2.61; p=0.009	t= 2.62; p=0.008
Degree level	PhD	30.33(8.45)	32.56(7.61)	68.84(15.59)
	MSc	29.25(5.30)	29.34(16.40)	66.81(15.69)
	undergraduate	26.35(7.36)	28.37(15.51)	55.22(22.7)
One way-ANOVA		F= 0.330; p=0.321	F= 0.481; p=0.318	F= 13.43; p<0.001

Table4: Impact of event scale-revised (IES-R) domains

Domains	Mean	Standard deviation
Intrusion	13.83	7.2
Avoidance	10.11	6.4
Hyperarousal	5.02	2.6
Total	28.96	5.4

Correlation between the COVID-19 self-quarantine behaviors, general health and the impact of events scale

Based on Pearson correlation test self-quarantine behaviors were positively related to the levels of psychological disturbance in students ($r = 0.208$, $P < 0.01$). Moreover, PTSD symptoms were also positively correlated with self-quarantine behaviors ($r = 0.215$, $P < 0.01$) (Table 5).

Table5: Correlation between the self-quarantine behaviors, GHQ-28 and IES-R

Self-quarantine behaviors	
General health	$r=0/208$ $P<0/01$
Impact of event scale	$r=0/215$ $P<0/01$

Discussion

Studies have suggested that the various impacts of quarantine on individuals should be considered (15). The purposes of this study were to investigate effect of self-quarantine on medical

student's behaviors and their psychological health during the COVID-19 pandemic in 2020.

This survey indicated that student's behaviors is at a suitable level during self-quarantine which can be related to some factors such as appropriate scientific information about Covid-19 and country health policies. This finding is consistent with some studies (16). Although, Saurabh and Ranjan (2020) who conducted a study in India, stated that the quarantine adherence rate was low (17). This discrepancy can be attributed to some reasons like the diversity of the population and the differences in health policies by governments. Similarity, several studies have declared that the rate of adherence to healthy protocols by the medical community is higher than others (18). According to the study, the least amount of self-quarantine behaviors was observed in

"I limit all entertainment activities to the home environment" item, which indicates that students did not consider the home as appropriate space to perform entertainment activities. Attention to the necessity during the outbreak of Covid-19 and their free time in such days, remind the need to plan for satisfactory home-based activities for students. Also the highest score in self-quarantine behaviors was given to "I observe distance and health measures if I have to deal with infected people by Covid-19" item, which declared the high student's awareness in dealing with Covid-19 patients. In fact, it seems that students pay more attention to disease prevention by focusing on active management of dealing with infected people and do not pay enough attention to other health measures. The self-quarantine behaviors level in female is significantly higher than in male, which is consistent with most studies (16, 19). Since this virus has a high emission power and lethality, and also that women experience a higher level of fear and anxiety in the face of Covid-19 for similar reasons (20). Also, according to the results, there was a significant difference in the self-quarantine behaviors level between degree levels, as PhD students significantly showed the better behaviors compared the undergraduate, which is consistent with some studies (16) and in conflict with some others (10). As matter of fact, PhD students have been more inclined to follow quarantine roles due to their higher scientific information about health-critical issues and their deeper understanding of the need for quarantine. Some studies have highlighted a lack of sufficient scientific information about quarantine as one of the reasons for its non-compliance (9). According to results, we expected students, who have infected member in their family, were less likely to adhere to quarantine behaviors and also those who were personally

infected too (although this difference was not significant). In fact, in the absence of definitive treatment and effective vaccine for covid-19 yet, quarantine is the best way to break the transmission chain (6). Finally, the results of the study showed that the self-quarantine behaviors level in married students is significantly higher than singles, which is consistent with several studies (21, 22). This due to importance of the children and spouse's health. It was evidenced that one of the most important concerns in health care workers in such situations was the fear of transmitting the disease to their family members (23).

Consistent with our hypothesis, survey indicated that the presence of psychological distress in students during quarantine which was consistent with several studies (7, 8, 20) and in conflict with some other (24). Actually, covid-19 lead medical students face to mental disorders as greater risk because attending at hospitals (5) and unpredictable sudden quarantine (25). Among the reasons that lead students face to mental disorders during quarantine is the time that they are separate from their friends, inability to move freely, lack of awareness about the course of the disease (8), lack of anticipation of long and sudden quarantine (25), the effect of Covid-19 on the educational course (26) and their employment status (27). Also a high level of PTSD symptoms was observed in students, which can be acknowledged that quarantine itself is a traumatic factor for individuals (5). The psychological disturbance and PTSD symptoms of female students were higher than male (although this difference was not significant), which was consistent with other studies (28, 29) and was not in line with some (30). This finding can be explained that because women are more dependent on their inner feelings in the face of acute conditions, they are more at risk of

psychological trauma than men (31) and they were exposed to the psychological hazards. Also, it can also be acknowledged that female students were more exposed to psychological dangers than male due to their more self-quarantine behaviors. The results of the present study showed that the psychological disturbance and PTSD symptoms are significantly higher in infected students by Covid-19. In explaining this finding, Coughlin (2012) has acknowledged that there is an important relationship between mental disorders and viral diseases (32) and also this psychological disturbance can be attributed to the lack of definitive treatment and high mortality rate of Covid-19 (33). The study also found that mental disorders in students with infected person by Covid19 in family were significantly higher than in those without a family member infected. This result was in consistent with various research studies (29, 30) that can be caused by family members' concerns about being infected with the virus, due to the high potency of the virus (34), as well as fear and anxiety caused by the possible death of the infected person. Although, this finding was inconsistent with some studies, they also have reported a high level of concern about the health status of members (27). The results indicated that the mental disorders and PTSD symptoms in married students is significantly lower than single students, which are in line with several studies (30, 35). As a matter of fact a successful marriage significantly can reduce the risk of mental illness (36). This due to spouses' emotional support for each other.

Finally, our results showed a positive and significant relationship between the level of self-quarantine behaviors and the mental disturbance and PTSD symptoms. Explaining this finding, it can be acknowledged that the more adherence to self-quarantine behaviors caused more negative psychological impacts in

student. Although there is no enough evidence to measure the correlation between self-quarantine behaviors and its psychological impacts during the outbreak of Covid-19, but in line with this finding, some studies have achieved similar results (5, 9). On the other hand, some researchers do not consider quarantine to be a factor influencing on students' mental health (7).

According to mentioned points, we now face two major challenges, each of which is examined:

Firstly, the suitable adherence to self-quarantine behaviors, which is not an acceptable due to the study population and beginning of the re-emergence of Covid-19 in Iran. Therefore, it is necessary to seek solutions to increase the observance of self-quarantine behaviors in students. In order to achieve such a goal, it is necessary to identify the factors affecting these behaviors and take effective measures based on them, and this requires further research in this field. However, one of the reasons why people do not follow quarantine is the lack of scientific information about the reason for quarantine (5). Thus, we suggest hold regular online sessions for students by university professors to professionally discuss scientific and logical reasons of quarantine. Likewise, according to Rogers' theory of motivation and protection (TMP), which argues that people move toward healthy behaviors when they are well aware of the sensitivity and severity of the problem (37). It is another factor influence self-quarantine behaviors that can be adequately help us to understand the Sensitivity and severity of Covid-19 (38). In this regard, it is suggested that universities provide updated electronic content in different fields such as the form of photos, videos and audio files for each faculty and according to the student' characteristics of their students. This can increase their sensitivity by mentioning the latest information about Covid-19 and it has the

positive effects on behaviors during quarantine.

Secondly, negative and widespread psychological impacts of quarantine in students, which may lead students to face various problems such as dysfunction in educational courses and high tendency to alcohol and drug abuse (8, 39). In this regard, various styles of solutions can be done such as electronic methods, which seem more efficient than others because it not only due to the quarantine conditions that practically lead most activities to the use of cyberspace, but also the majority of students society has access to social-media. In the present study, 414 (68.20%) students in free time have used social-media. In fact, universities can teach students about pandemic management strategies by providing up-to-date online guidelines (40) and by providing up-to-date and accurate health information about Covid-19 to reduce the negative psychological effects on students (41). Finally, to cover all of the mentioned purposes, we suggest that providing a national software, including various educational, healthy news and game sections are effective ways to manage student' free time.

Limitations: This study was conducted first time based on the comprehensive tools in Iranian medical students during a critical period, the early stage of the Covid-19 outbreak in Iran. Nevertheless, the predominance of women and undergraduate students (due to their lesser experience and perhaps have more emotional making-decision), limit our ability to generalize these findings to a wider population. Also, due to students' self-reporting and lack of questions about disease-specific diagnostic tests, the number of infected students may differ from the reported rate.

Conclusions

student' behaviors were suitable during self-quarantine, and it lead significant psychological

disruption and PTSD symptoms in students. There was also a significant relationship between students' self-quarantine behaviors and mental health disorders. Gender, degree level, personal infectious status, family infectious presence and marital status were the factors influencing students' levels of self-quarantine behaviors and mental health. Given the conditions of quarantine during the long-term outbreak of Covid-19, it is recommended that university officials use their facilities to encourage students to further adherence to self-quarantine behaviors and reduce its negative psychological impacts in them. Our results also provide a suitable platform for health decision makers in the face of subsequent pandemics.

Acknowledgment: We would like to thank all participants for their contributions to this study. Declaration of competing interest: The authors have declared that no competing interests exist.

Funding: This work was supported by the Mashhad University of Medical science.

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