



Comparison of the Psychological Impact of COVID-19 Pandemic on Saudi Nationals Arriving from Abroad During Institutional Quarantine and a Year Later: An Analytical Cross-Sectional and Follow-Up Study

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors made important contributions to conception and design of the study, managed the literature searches, performed the statistical analysis and interpretation, and critically revised the draft. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To assess the psychological impact of COVID-19 pandemic and estimate the prevalence of depression, anxiety, and stress on individuals during institutional quarantined in 2020 and reassess a year later to compare outcomes and investigates different associated factors.

Study Design: An analytical cross-sectional and a follow-up study

Place and Duration of Study: An institutional COVID-19 quarantine center, in Jeddah, Saudi Arabia, between May 2020 and July 2021

Methodology: A sample of 138 participants were recruited. After obtaining the participants

demographics date and consent, an electronic questionnaire was distributed to assess participants psychological well-being using the 42-item depression, anxiety, and stress scales (DASS) twice, at the end of quarantine period and one year later, to compare outcomes and associated factors.

Results: Out of all the sample (n=138), male represented 64.5% while female accounted for 35.5%. Half the participants (50.7%) were married comparing to 40.6% single and bachelor's or higher degrees holders accounted for 61.6% while 26.8% had high school degree. The psychological health was assessed for all participants twice, resulting with prevalence of depression, anxiety, and stress during quarantine period of 34%, 33%, and 22% respectively and a decreased prevalence a year late (20%, 13%, and 9, respectively). The differences between the two psychological assessments were significant (depression: $P = .02$, anxiety: $P < .001$, stress: $P = .005$). Educational level was associated with stress at time of quarantine ($P = .03$). Marital status and employment status were significantly associated with participants depression levels a year after quarantine ($P = .03$, $P = .04$, respectively).

Conclusion and Recommendations: The psychological well-being of quarantined participants was negatively impacted during this unlikable experience. Numerous demographic factors were significantly associated with the undesirable effects. We propose implementing a psychological assessment program in future quarantine centers to prevent further mental health impacts.

Keywords: COVID-19; Quarantine; depression; Anxiety; Stress.

LIST OF ABBREVIATION

IQR : Interquartile range
COVID-19 : Corona virus disease-19
DASS : Depression, Anxiety, and Stress Scales

1. INTRODUCTION

Coronaviruses (CoV) became known to the world during the past decades as a group of viruses attacking human being and some types of animals with symptoms varying from common cold to middle east respiratory syndrome (MERS-CoV) and severe acute respiratory syndrome (SARS-CoV). The recent discovered virus, Corona virus disease 2019 (COVID-19), appeared first during the end of 2019 in Wuhan city, China as a form of acute pneumonia [1]. COVID-19 symptoms range from common symptoms such as fever, dry cough, and tiredness, to less common symptoms including diarrhea and loss of taste or smell [2]. A systematic review and meta-analysis study concluded that the weighted pool of asymptomatic COVID-19 cases ranged from 16-38% [3]. It can be transmitted from an infected person to another through direct contact, droplet, airborne, and fecal-oral [4].

Isolation and quarantine are preventive measures done to protect the public by stopping and controlling further exposure from persons having or suspecting to have an infectious disease [5]. These two terms are usually used interchangeably but as a matter of fact isolation restricts infectious persons from

contacting other healthy persons while quarantine restricts persons with any possible contact to an infectious disease from others for a specific period of time to control further spread [6]. During the pandemic, as control and prevention measures, the Saudi government had assigned several hotels and converted them into quarantine centers to accommodate persons arriving from abroad for a duration of 14 days under the supervision of the Ministry of Health to contain the coronavirus disease (COVID-19). Individuals going through quarantine end up with an unpleasant experience especially when separating them from family and loved ones, restricting freedom, and growing fear of unknown outbreaks outcome. Some studies showed that there was high prevalence of mental illnesses during quarantine which range from stress, depression, post-traumatic stress symptoms, irritability, low mood, and insomnia [7-9].

A study was done in South Korea showed that individuals who has been isolated for two weeks due to their contact with confirmed MERS patients ended up with greater anxiety symptoms, fear, and social stigma [10]. A study conducted in the Kingdom of Bahrain assessed the quarantine and isolation impacts on persons going through it during COVID-19 resulted with 40% of the participants presented with depression, 20% had posttraumatic distress, and 53.4% had stigma [11]. A cross sectional study was done in the Kingdom of Saudi Arabia to measure the mental impact of a two-weeks involuntary institutional quarantine on subjects

showed that 25.7% had stress, 21.5% had anxiety, and 32.7% had depression [12]. In order to have an effective quarantine during public health prevention measures, it requires to have good understanding of its impact and to deal with the negative outcomes associated with it [13].

Vaccination is one of the most public health interventions to protect from infectious diseases. Several COVID-19 vaccines have been developed, approved, and now have been widely available for individuals to receive. Pfizer/BioNTech and Oxford/AstraZeneca COVID-19 vaccines have been approved by the Saudi Food and Drug Authority for adults and adolescents aged 12 years and above [14,15]. A national prospective cohort study conducted in Scotland of one-dose Pfizer/BioNTech vaccines resulted in a 91% reduction in COVID-19 related hospitalization and 88% reduction with one-dose Oxford/AstraZeneca [16]. The availability of COVID-19 vaccines impacted positively on individuals with COVID-19-related anxiety and fear to be more acceptable and willing to take the vaccine [17].

Several studies evaluated the psychological effects of quarantine on individuals, nevertheless, little is known about whether the psychological impacts are solely due to being quarantined or to other factors. Moreover, with the availability of approved COVID-19 vaccines worldwide, populations are expected to recover from the pandemic's various impacts and return into their preimpact status, therefore, further assessment is needed

For the previous concerns, the current study conducted to assess the psychological impact of COVID-19 pandemic and estimate the prevalence of depression, anxiety, and stress on individuals during institutional quarantine in 2020 and reassess a year later to compare outcomes and investigate different associated factors.

2. MATERIALS AND METHODS

2.1 Study Design

An analytical cross-sectional and follow up study.

2.2 Population

All quarantined individuals at an institutional COVID-19 quarantine center in Jeddah,

Kingdom of Saudi Arabia were included in the study. The inclusion criteria were limited only to Saudi nationals who returned to Jeddah after travelling abroad, have been placed in a designated institutional quarantine center during their 14-days quarantine period, and have not been diagnosed with psychological disorders prior to enrollment. The study included only one quarantine site due to the time limit.

2.3 Sample Size

A total of 473 Individuals have been quarantined in the selected center, but only 213 satisfied the inclusion criteria (18 years and above, clinically free from mental illness, and completed 14-days quarantine period) and accepted to participate. Using the Raosoft website with a population of 213 individuals, a confidence interval of 95%, a margin of error of 5%, and a response distribution of 50%, the sample size was calculated to be 138.

2.4 Sampling Technique

Simple random sampling was used on the line list of the institutional quarantined individuals to select the participants accordingly.

2.5 Data Collection Tool

Using a validated and reliable questionnaire is the Depression, Anxiety, and Stress Scales (DASS). Translation and validation of the questionnaire from English to Arabic have been done in Sydney, Australia; it was used in multiple studies and provided universality of the scale across different cultures [8]. The tool was delivered in open copyrights. DASS questionnaire consists of 42 items which are divided into three scales, namely, depression, anxiety, and stress (14 items per scale). Each item is ranked 0-3 by the respondents, when 0 means "Did not apply to me at all", and 3 means "Applied to me very much, or most of the time". Scores were computed for each scale, and normal level was labeled in depression when total score is 0-9, while in anxiety it is considered normal when a total score is 0-7, and normal stress was identified when a total score is equal to 0-14. Scores above these ranges indicated the degree of the three mental illnesses, ranging from mild to extremely severe.

2.6 Data Collection Technique

After obtaining the participants demographic data upon recruitment, a self-administered web-based questionnaire were distributed using Google Forms to the participants through their preferred contact (WhatsApp, SMS, or e-mail) at the end of their 14-days quarantine period (May – June 2020). Each participant was provided with a unique serial number to be identified throughout the study and be matched correctly when reassessed again one year later. During the second assessment, (June – July 2021), participants were contacted and asked to update their vaccination and COVID-19 infections status and to complete the follow up web-based questionnaire.

2.7 Statistical analysis

Data were analyzed using the statistical package for the social sciences (SPSS, version 23.0). First, the descriptive analysis was conducted to present the summary of the data set by presenting all the numerical data as median \pm interquartile range and categorical data as frequency and proportions. To test the differences between the two assessments, McNemar-Bowker test was conducted. Furthermore, to test the influence of different

factors with different parameters, Fisher's-Freeman-Halton test was carried out, and p -values were obtained for each test. A p -value < 0.05 was considered significant.

3. RESULTS

Among all participants quarantined, the sample median age was 29 years old with an interquartile range (IQR) of 12 years. Male individuals represented 64.5% while female respondents accounted for 35.5% of the total sample. Half of the participants (50.7%) were married and 40.6% were single. Individuals holding a bachelor's or higher degrees accounted for 61.6% of the participants while 26.8% had a high school degree. Most of the participants were employed (61.6%) followed by students (24.6%), however, 5.1% participants were unemployed at the time of the study Table 1.

One year post quarantine, only 13.8% of the participants were diagnosed with COVID-19 infection, whereas the remaining 86.2% did not acquire the infection up to their knowledge Fig. 1. Regarding the vaccination status, 65.9% of the participants have already taken the vaccine while 34.1% responds they have not taken COVID-19 vaccine at the time of contact Fig. 2.

Table 1. Demographic characteristics of quarantined participants

n = 138		Frequency (n)	Percentage (%)
Age	≤ 30 years	81	58.7
	31 – 50 years	52	37.7
	≥ 51 years	5	3.6
Gender	Male	89	64.5
	Female	49	35.5
Marital Status	Single	56	40.6
	Married	70	50.7
	Divorced	10	7.3
	Widowed	2	1.4
Educational Level	Less than high school	3	2.2
	High school	37	26.8
	Diploma	13	9.4
	Bachelor's degree	64	46.4
	Master's degree	16	11.6
	PhD	5	3.6
Employment Status	Employed	85	61.6
	Self-employed	11	8.0
	Student	34	24.6
	Retired	1	0.7
	Unemployed	7	5.1

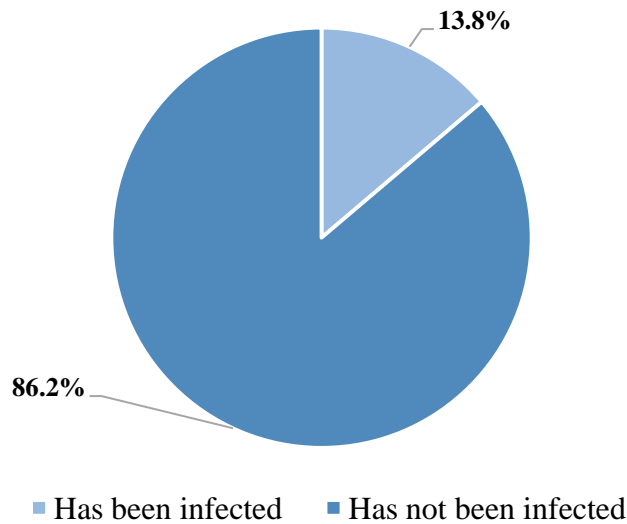


Fig. 1. COVID-19 Infection status of participants post Quarantine

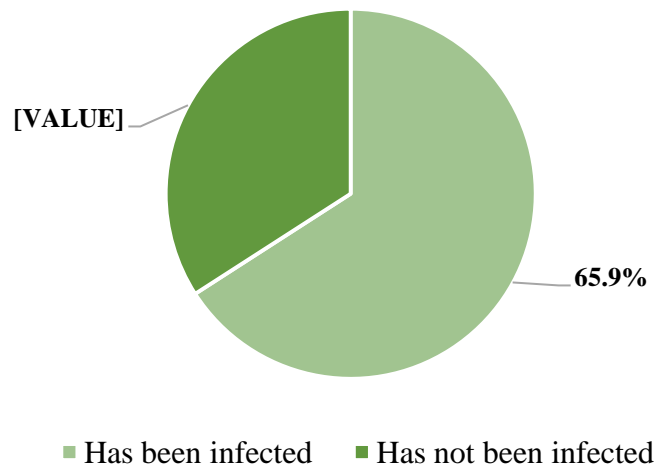


Fig. 2. Vaccination status of participants post Quarantine

Forth psychological assessments (DASS), out of all participants (n=138), 91 (66%) participants depression score was normal while 47 participants (34%) showed different levels of depression. Where 24 and 13 participants scored mild and moderate, respectively. On the other hand, 9 participants showed severe depression score and only 1 participant was marked as extremely severe depression.

A year after, the participants were reassessed again, in which normal level increased to 111 participants (80%) and the remaining

27participants (20%) had other levels of depression ranging from mild to extremely severe. The difference between depression scores at time of quarantine and a year after was compared and showed statistical significance ($P = .02$) Table 2.

Anxiety score of 46 participants (33%) resulted with different levels of anxiety. 15of whom had moderate anxiety and 6 others had severe anxiety at time of quarantine. A year later, only 18 participants (13%) had a score demonstrating other levels of anxiety in which 1 participant had

severe anxiety and 3 had moderate anxiety. A McNemar-Bowker test was conducted to compare the scores and the difference achieved statistical significance ($P < .001$) Table 3.

Additionally, for the stress assessment, 30 participants (22%) had different level of stress ranging from mild ($n=19$) to moderate stress ($n=11$). As stress in participants was reassessed a year later, the total number of participants with any level of stress decreased to 12 (9%). While mild stress was prevalent in participants ($n=10$), only 2 participants had moderate stress. The scores at time of quarantine and a year later were compared and showed statistically significant difference ($P = .005$) Table 4.

Possible association between DASS and participants' demographic factors was studied. Stress at time of quarantine was associated the

educational level of the participants and was statistically significant ($P = .03$). On the other hand, Depression, and anxiety at time of quarantine were not associated with any of the demographic characteristics Table 5.

A year later, association between DASS and the demographic factors were assessed. Depression was significantly associated with participants' marital and employment status ($P = .03$, $P = .04$, respectively) while stress was associated with the educational level of the participants ($P = .04$) Tables 6 & 7.

Possible association between infection and vaccination status of the participants and their scores in depression, anxiety, and stress scales (DASS) were studied. Although, differences between groups were observed, however these differences were not statistically significance.

Table 2. Depression scoring at time of quarantine and after one year

Depression at Time of Quarantine	Depression After One Year					Total	p-value
	Normal	Mild	Moderate	Severe	Extremely Severe		
Normal	78	12	1	0	0	91	.02*
Mild	16	7	0	1	0	24	
Moderate	11	1	0	1	0	13	
Severe	6	1	1	0	1	9	
Extremely Severe	0	1	0	0	0	1	
Total	111	22	2	2	1	138	

*McNemar-Bowker Test

Table 3. Anxiety scoring at time of quarantine and after one year

Anxiety at Time of Quarantine	Anxiety After One Year				Total	p-value
	Normal	Mild	Moderate	Severe		
Normal	85	7	0	0	92	< .001*
Mild	19	4	2	0	25	
Moderate	13	1	1	0	15	
Severe	3	2	0	1	6	
Total	120	14	3	1	138	

*McNemar-Bowker Test

Table 4. Stress scoring at time of quarantine and after one year

Stress at Time of Quarantine	Stress after One Year			Total	p-value*
	Normal	Mild	Moderate		
Normal	103	4	1	108	.005
Mild	15	3	1	19	
Moderate	8	3	0	11	
Total	126	10	2	138	

*McNemar-Bowker Test

Table 5. Association between stress scoring at time of quarantine and demographic factors

Factor	Normal	Mild	Moderate	p-value*
Gender				.95
Male	69	13	7	
Female	39	6	4	
Educational level				.03
Less than high school	2	1	0	
High school	27	9	1	
Diploma	10	3	0	
Bachelor's degree	53	4	7	
Master's degree	14	1	1	
PhD	2	1	2	
Employment status				.11
Employed	69	7	9	
Self-employed	8	2	1	
Student	25	8	1	
Retired	0	1	0	
Unemployed	6	1	0	

Fisher's-Freeman-Halton Test

Table 6. Association between depression scoring a year after quarantine and demographic factors

Factor	Normal	Mild	Moderate	Severe	Extremely Severe	p-value*
Gender						.11
Male	75	13	1	0	0	
Female	36	9	1	2	1	
Marital status						.03
Single	48	6	2	0	0	
Married	52	16	0	1	1	
Divorced	10	0	0	0	0	
Widowed	1	0	0	1	0	
Employment status						.04
Employed	71	12	1	0	1	
Self-employed	8	3	0	0	0	
Student	26	7	1	0	0	
Retired	0	0	0	1	0	
Unemployed	6	0	0	1	0	

Fisher's-Freeman-Halton Test

4. DISCUSSION

The current study assessed the psychological impact of COVID-19 pandemic and estimated the prevalence of depression, anxiety, and stress on individuals during institutional quarantined in 2020 and showed a notable decrease in prevalence a year later with some significant association.

Using DASS tool, three parameters were measured which were depression, anxiety, and stress. The three scales were remeasured a year later, and the findings showed significant difference between the prevalence at time of quarantine and one-year post quarantine.

Elaborating, the number of individuals having severe depression at time of quarantine was 9 participants and that number dropped to only 2 a year later. Similarly, participants who were suffering from severe anxiety during quarantine period decreased by 83% one year later. None of the included individuals had severe stress during quarantine or one year later, however, a significant reduction of 8% was observed in the prevalence of moderately stressed persons between the two measurements. These noteworthy differences, which achieved statistical significance, may indicate a presence of an association of negative psychological impact with quarantine during COVID-19 pandemic. Similar findings were obtained in

another study employing parents to assess their psychological well-being during and after strict protocols related to the pandemic, and the perceived results showed significant decrease in depression and anxiety symptoms [18].

The current study investigated possible associated factors with the psychological outcomes. At time of quarantine, participants' stress levels were significantly associated with their educational levels. The results showed none of the individuals with degrees less than high schools had moderate stress, likewise diploma holders were normally or mildly stressed but none of them was moderately stressed. On the other hand, 50% of individuals with PhDs suffered from moderate stress while being quarantined. This can be attributed to the fact that highly educated participants might have a wider scope and were much aware of the pandemic consequences on an individual level and global level, too. However, the included PhDs participants did not represent a high number of the total sample. Depression and anxiety levels during the time of quarantine were investigated but not statistically significant was associated with the outcome. In contrast, a Saudi study which recruited 214 quarantined/isolated individuals found a significant association between all three scales (depression, anxiety, stress) and female gender [12].

One-year post quarantine, depression levels were significantly associated with both marital and employment status of the study participants while stress levels were significantly associated with participants' educational levels as illustrated in the results section. These two factors were radically affected due to COVID-19 pandemic, and apparently there is an association between one's marital status, employment status and their psychological health as implied in the present study and other studies with agreed findings [18,19]. On the contrary, a conducted study in Nepal reported different results as they found anxiety and depression were independent of the participants sociodemographic factors [20].

Other factors were investigated in the literature and showed significant association with individuals psychological well-being. A study surveyed 316 participants found that disruption of daily routine was associated with worse depression and anxiety symptoms [21]. Furthermore, social support of peers was associated with milder stress and depression during quarantine, additionally females were more likely to be anxious while less probably to be depressed during this unpleasant experience [22]. Moreover, inadequate health services and low quality quarantine centers in Nepal negatively affected respondents' psychological health [23].

Table 7. Association between stress scoring a year after quarantine and demographic factors

Factor	Normal	Mild	Moderate	p-value*
Gender				.07
Male	84	5	0	
Female	42	5	2	
Educational level				.04
Less than high school	2	0	1	
High school	36	1	0	
Diploma	13	0	0	
Bachelor's degree	58	6	0	
Master's degree	12	3	1	
PhD	5	0	0	
Employment status				.06
Employed	76	8	1	
Self-employed	11	0	0	
Student	33	1	0	
Retired	0	1	0	
Unemployed	6	0	1	

Fisher's-Freeman-Halton Test

5. CONCLUSION AND RECOMMENDATIONS

COVID-19 pandemic impacted governments, organizations, and individuals regardless of their socioeconomic classes. Mental health is one of the aspects that suffered a profound influence. Participants of this study reported different levels of depression, anxiety and stress while being quarantined and one year after this experience. Certain demographic characteristics, namely, marital status, educational level, and employment status were found associated with individuals' psychological well-being. Despite the importance of the study results, certain limitations could be addressed. First, the recruited participants were selected from one quarantine center only therefore generalizability cannot be ensured. Another limitation concerns the self-reported assessment tool (DASS) as it measures depression, anxiety, and stress based on personal feelings. Hence diagnostic criteria such as DSM-5 could be carried further to classify mental health accordingly. Nonetheless, as presented by this study, the prevalence of the psychological impact of COVID-19 was higher during quarantine period comparing to a later year, therefore we recommend planning and implementing a tailored psychological assessment program in future quarantine centers to prevent possible mental health impacts. Nevertheless, a subsequent community-based study is needed to represent the general population mental health impact of the pandemic during the settings of home-quarantine.

CONSENT AND ETHICAL APPROVAL

The study objectives, the option to withdraw from the study at any given anytime, privacy, and anonymity of the collected information were explained to the participants prior to enrollment and obtained their consent. Consent was obtained from all participants in this study in compliance with the ICMJE uniform disclosure form. Confidentiality was ensured throughout all steps of the study. The local Institutional Review Board (IRB), Jeddah Research Committee Ethical and Scientific Support provided the research ethical approval (Approval A01165).

DISCLAIMER

Authors have declared that no competing interests exist. The products used for this

AND research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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