*Original Article*

# Effects of Quarantine on Mental Health Among Residents of Riyadh, Saudi Arabia

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**Abstract**

**Background:** People practicing quarantine experience many psychiatric symptoms such as nervousness, anxiety, depression that often go unacknowledged. The aim of this study was to analyse the effects of quarantine due to the Coronavirus Disease 2019 (COVID-19) pandemic on the mental health of residents of Saudi Arabia.

**Methodology:** A cross-sectional analysis using an online survey was conducted by using Patient Health Questionnaire-9 and the brief symptom inventory (BSI) in our study to analyse the effects of quarantine on mental health. Demographic variables such as age, gender, educational level, marital status, number of children, financial situation, working from home and its effects were also interrogated.

**Results:** The female gender, age groups from 20-24 years of age, single and widowed and participants no children or more than 7 children had higher scores for PHQ-9 and BSI with moderately severe and severe depression. Participants who had only received high school education also scored high for PHQ-9 and BSI. Participants working from home experienced acknowledged of negative effects such as low productivity and lack of enthusiasm towards work.

**Conclusion:** Public health strategies of quarantine and isolation are essential to break the transmission and infectivity of COVID-19, however these measures may have a deleterious impact on the mental health of people implementing quarantine and isolation. Policies on regular psychological evaluation and assessment of individuals practicing quarantine should be implemented and practiced thus ensuring peak mental health of communities.

**Key words:** mental health, COVID-19, quarantine, isolation, effect.

## Introduction

Quarantine and isolation are public health strategies that prevent the transmission of infectious diseases among disease-free individuals and communities. Both quarantine and isolation aim to prevent the spread of infection, however isolation aims to separate people who are sick with an infectious disease from healthy disease or symptom free people whereas, quarantine separates and restricts the movement of people who are not sick yet were exposed to or in close contact with an infected person to monitor for progression of symptoms or development of the disease (1). The word quarantine is derived from an Italian word " quaranta giorni" which translates to 40 days The practice of quarantine began during the 14th century in an effort to protect coastal cities from the epidemic of the great plague. As a public health measure, quarantine became increasingly used in other parts of Europe as well as around the world (1)With the advent of Coronavirus Disease 2019 (COVID-19) as a pandemic and the rising the death toll across the world, the virus has become a major concern for global health, therefore the world's countries are implementing quarantine as strategy to prevent the transmission of COVID-19. These events have brought the attention of the scientific community to quarantine, isolation, and other preventive measures that may protect health and save lives around the world.

Although quarantine and isolation are measures implemented to protect the public from the spread of infectious diseases, it is essential to consider the mental health implications for those individuals practicing these restrictions. The World Health Organization (WHO) defines mental health as more than just the absence of mental disorders or disabilities mental health as a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to contribute to his or her community (2). Conditions such as stress, depression, and anxiety can affect mental health and disrupt a person's routine. Achieving peak mental health is not only avoiding active conditions but also looking after continuous wellness and happiness. They also emphasize that preserving and restoring mental health is crucial among individuals, as well as throughout different communities and societies all over the world. The high rate of suicide deaths among the elderly coincided with the majority of SARS cases in April 2003 which raises speculations on the association between SARS and the act of suicide, especially among older adults in Hong Kong. The results of the quantitative analysis showed that separation and fear of SARS infection were more prevalent among older SARS-related suicide victims than non-SARS suicide victim (3). A cross-sectional study was conducted in July 2015, to evaluate the impact of Ebola experiences and risk perception on mental health in Sierra Leone. A national sample of 3564 participants was selected through multistage cluster sampling. Symptoms of anxiety-depression were measured by Patient Health Questioner. Post-Traumatic Stress Disorder (PTSD) was measured by six items from the impact of events scale-revised. perceived Ebola threat and mental health symptoms were examined through binary logistic regression. The results showed that the prevalence of any anxiety-depression symptom was 48%, and of any PTSD symptom was 76%. Perceiving Ebola as a threat and knowing someone was quarantined for Ebola were independently associated with anxiety-depression symptoms and PTSD symptoms. Thus, symptoms of PTSD and anxiety-depression were common after one year of Ebola response and psychological support was recommended to improve their mental health (4). As compared to the previous pandemics such as SARS, EBOLA and H1N1, COVID-19 is more transmissible than SARS, with a mortality rate (2.3%) higher than the seasonal influenza (5). A range of mental health symptoms such as post-traumatic stress disorder (PTSD) symptoms of fatigue, depression and anxiety occur in COVID-19 patients. In this research, we will analyse the effects of quarantine on the mental health of people in our society and population groups highly vulnerable to the negative effects and impact of quarantine.

## Methodology

A cross-sectional analysis on the effects of quarantine ranging from 4 to 12 weeks during the COVID-19 pandemic on the mental health of adults between the ages of 21 to 55 years old residing in Riyadh, Saudi Arabia. The survey was conducted by using an online close ended questionnaire designed through Google forms. We used two valid and reliable tools in our questionnaire to analyse the effects of quarantine on mental health. The PHQ-9 questionnaire and the brief symptom inventory (BSI). For BSI 3 out of the 9 domains for the effects of quarantine on mental health namely interpersonal sensitivity domain, the depression domain and the anxiety domain were included. Demographic questions including age, gender, educational level, marital status, number of children, nationality, if they live in Saudi, which region in Saudi, type of housing, number of people living at home, if participants act as care takers for

someone, work status, financial situation, social personality type, Questions regarding the quarantine period, number of people in the participants were quarantining with, working from home during quarantine were also included. Questions regarding pre-existing mental illnesses, and any medications for mental health issues, or overcoming stress and anxiety during quarantine period for COVID-19. We used all (9) questions included in the PHQ-9 questioner however for the brief symptom inventory BSI we only used (16) questions related to our topic (4) questions from the interpersonal sensitivity domain, (6) questions from the depression domain and (6) questions from the anxiety domain. The survey was circulated as a bilingual questionnaire so it could be completed by both English and Arabic speakers. The survey was circulated via various social media platforms such as Twitter, WhatsApp and Snapchat to include larger number of participants.

*Statistical Analysis*

Data analysis was conducted using SPSS version 22. Descriptive statistics were used for the calculation of proportions and the chi square test was applied to examine the relation between the demographic characteristics and PHQ-9 and BSI scores. Analysis of variance (ANOVA) was performed to find the correlation between time spent in quarantine with PHQ-9 and BSI scores. The p-values were calculated, and the significant value was kept at $p < 0.05$.

## Results

*Demographic Characteristics of Participants*

This study analysed a total of 673 participants, of which 524 were females (78%) and 149 were males (22%).

Fig.2 shows the age distribution of participants with 38% of participants between 21 to-25 years. The marital status of the participants revealed 54.4% of them were single while 39.4% were married. Furthermore, 61.7% of the participants had no children while 38.3% have children of which 24.8% had 1-3 children; 12.5% had 4-6; and 2.4% had more than 7 children). Most of the participant lived in the city (94.1%) and 90% participants lived with other family members. Based on educational background, 65.4% had a bachelors' degree, 21.8% had high school education, 7.7% had masters' degree whereas 4.3% had a PhD. In this study, 67.3% of the participants were ambivert, 26.7% were extrovert and 5.9% were introvert.

The mean score of PHQ-9 was 7. Based on PHQ-9 scores, our study reported minimal depression in 37% participants, mild depression in 33%, moderate depression in 18%, moderately severe depression in 8% participants whereas severe depression was reported in 3% participants. The mean score on BSI was 12.66%. Based on BSI scores, our study reported 12% participants had not at all, 62% mild, 18% moderate, 5% moderately severe and 3% had severe. One-way ANOVA test shows a significant relation ($p < 0.05$) between time spent in quarantine and PHQ-9 and BSI scores.

*Demographic variables in association with PHQ-9 and BSI*

**Table 1 and 2** showed the distribution of participants based on their response to various demographic questions showing minimal, mild, moderate, moderately severe and severe depression scores on PHQ-9 scale and BSI respectively.

| Table 1. showed the distribution of participants based on their response to various demographic question showing minimal, mild, moderate, moderately severe and severe scores on PHQ-9 scale | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Item** | **Category** | **PHQ-9** | | | | | **P-value** |
| | | **Minimal %** | **Mild %** | Moderate % | Moderately Severe % | Severe % | |
| Gender | Male | 52% | 26% | 18% | 3% | 1% | **0.000*** |
| | Female | 33% | 35% | 18% | 9% | 4% | |
| Age | 20-25: | 28% | 35% | 20% | 11% | 6% | **0.000*** |
| | 26-30: | 36% | 33% | 25% | 5% | 1% | |
| | 31-35: | 44% | 27% | 16% | 9% | 3% | |
| | 36-40: | 49% | 33% | 5% | 11% | 2% | |
| | 41-45: | 43% | 40% | 14% | 3% | 0% | |
| | 46-50: | 46% | 42% | 13% | 0% | 0% | |
| | 51-55: | 69% | 10% | 17% | 0% | 3% | |

| Item | Category | | | | | | P-value |
|---|---|---|---|---|---|---|---|
| Educational level | High school: | 36% | 32% | 15% | 13% | 4% | 0.09 |
| | Bachelor's Degree: | 35% | 35% | 20% | 6% | 3% | |
| | Master's Degree: | 50% | 27% | 10% | 12% | 2% | |
| | PhD: | 52% | 17% | 21% | 7% | 3% | |
| | Home school: | 60% | 20% | 0% | 20% | 0% | |
| Marital status | Single: | 30% | 33% | 21% | 10% | 5% | **0.000*** |
| | Married: | 49% | 31% | 14% | 5% | 1% | |
| | Divorced: | 34% | 34% | 24% | 5% | 3% | |
| | Widowed: | 0% | 100% | 0% | 0% | 0% | |
| how many children do you have | 0:00 | 30% | 34% | 21% | 10% | 5% | **0.000*** |
| | 1-3: | 53% | 24% | 16% | 6% | 1% | |
| | 4:06 | 38% | 48% | 11% | 4% | 0% | |
| | 7+: | 63% | 13% | 13% | 6% | 6% | |
| Where do you live (city-town-countryside) | City: | 38% | 33% | 18% | 7% | 3% | 0.23 |
| | Town: | 0% | 0% | 0% | 0% | 0% | |
| | Countryside: | 28% | 28% | 25% | 15% | 5% | |
| What is your housing situation | Villa: | 37% | 33% | 18% | 8% | 4% | 0.111 |
| | Apartment: | 40% | 33% | 17% | 8% | 2% | |
| | Compound: | 31% | 38% | 24% | 3% | 3% | |
| | Room: | 33% | 0% | 0% | 67% | 0% | |
| How many people do you live with | 0:00 | 41% | 18% | 23% | 9% | 9% | 0.377 |
| | 1-3: | 46% | 28% | 19% | 5% | 2% | |
| | 4:07 | 34% | 35% | 18% | 9% | 3% | |
| | 8:12 | 39% | 33% | 17% | 6% | 4% | |
| Do you take care of someone | Yes: | 34% | 35% | 18% | 9% | 4% | 0.142 |
| | No: | 43% | 30% | 18% | 7% | 2% | |
| Work status before covid-19 | Government: | 41% | 32% | 18% | 7% | 2% | 0.244 |
| | Private: | 40% | 34% | 18% | 6% | 2% | |
| | Own Business: | 35% | 31% | 31% | 4% | 0% | |
| | Without Work: | 33% | 33% | 18% | 10% | 6% | |
| Did you suffer negatively or positively | Positive: | 49% | 27% | 27% | 27% | 27% | **0.000*** |
| | Negative: | 30% | 37% | 37% | 37% | 37% | |
| What type of social personality are you | Ambivert: | 35% | 34% | 19% | 8% | 3% | **0.000*** |
| | Extrovert: | 45% | 35% | 13% | 4% | 2% | |
| | Introvert: | 28% | 10% | 33% | 18% | 13% | |

*Significant value of p-value <0.05*

| Table 2. showed the distribution of participants based on their response to various demographic questions showing minimal, mild, moderate, moderately severe and severe scores on BSI scale | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Category** | **BSI MANAGEMENT** | | | | | **P-value** |
| | | **Minimal %** | **Mild %** | Moderate % | Moderately Severe % | Severe % | |
| Gender | Male | 17% | 64% | 15% | 3% | 2% | 0.08 |
| | Female | 10% | 62% | 19% | 6% | 3% | |
| Age | 20-25: | 6% | 56% | 25% | 6% | 6% | **0.000*** |
| | 26-30: | 12% | 69% | 16% | 3% | 0% | |
| | 31-35: | 17% | 54% | 17% | 8% | 4% | |
| | 36-40: | 16% | 75% | 4% | 4% | 2% | |
| | 41-45: | 14% | 69% | 16% | 2% | 0% | |
| | 46-50: | 17% | 67% | 8% | 8% | 0% | |
| | 51-55: | 21% | 69% | 7% | 0% | 3% | |
| Educational level | High school: | 10% | 60% | 20% | 5% | 6% | **0.000*** |
| | Bachelor's Degree: | 12% | 63% | 19% | 4% | 3% | |
| | Master's Degree: | 15% | 67% | 4% | 13% | 0% | |
| | PhD: | 7% | 72% | 14% | 3% | 3% | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Home school: | 60% | 20% | 20% | 0% | 0% | |
| Marital status | Single: | 7% | 59% | 22% | 7% | 5% | **0.000*** |
| | Married: | 18% | 67% | 12% | 2% | 1% | |
| | Divorced: | 8% | 61% | 26% | 5% | 0% | |
| | Widowed: | 0% | 50% | 0% | 50% | 0% | |
| how many children do you have | 0:00 | 8% | 59% | 23% | 6% | 4% | **0.000*** |
| | 1-3: | 17% | 66% | 11% | 4% | 1% | |
| | 4:06 | 18% | 70% | 8% | 4% | 0% | |
| | 7+: | 25% | 56% | 13% | 0% | 6% | |
| Where do you live (city-town-countryside) | City: | 12% | 62% | 18% | 5% | 3% | 0.44 |
| | Town: | 0% | 0% | 0% | 0% | 0% | |
| | Countryside: | 5% | 65% | 18% | 10% | 3% | |
| What is your housing situation | Villa: | 11% | 64% | 16% | 5% | 4% | 0.08 |
| | Apartment: | 15% | 59% | 21% | 4% | 1% | |
| | Compound: | 0% | 66% | 24% | 10% | 0% | |
| | Room: | 33% | 0% | 67% | 0% | 0% | |
| How many people do you live with | 0:00 | 5% | 68% | 14% | 9% | 5% | 0.87 |
| | 1-3: | 12% | 63% | 18% | 3% | 3% | |
| | 4:07 | 11% | 63% | 17% | 6% | 3% | |
| | 8:12 | 13% | 60% | 21% | 3% | 3% | |
| Do you take care of someone | Yes: | 13% | 61% | 18% | 4% | 4% | 0.09 |
| | No: | 10% | 64% | 18% | 7% | 1% | |
| Work status before covid-19 | Government: | 15% | 63% | 18% | 3% | 1% | **0.04*** |
| | Private: | 11% | 66% | 15% | 7% | 2% | |
| | Own Business: | 15% | 62% | 15% | 8% | 0% | |
| | Without Work: | 9% | 60% | 20% | 6% | 6% | |
| Did you suffer negatively or positively | Positive: | 13% | 64% | 14% | 4% | 4% | 0.19 |
| | Negative: | 10% | 61% | 20% | 6% | 3% | |
| What type of social personality are you | Ambivert: | 11% | 64% | 18% | 5% | 2% | **0.000*** |
| | Extrovert: | 16% | 62% | 16% | 4% | 2% | |
| | Introvert: | 3% | 48% | 23% | 10% | 18% | |

*Significant value of p-value <0.05*

The variables of gender, age, marital status, and number of children were highly statistically significant for PHQ-9 and BSI scores. A highly statistically significant association was found between PHQ-9 scores and the female gender (p=0.000) as shown in Table 1, with a higher number of females exhibiting moderately severe (9%) and severe depression (4%) scores on PHQ-9 scale as compared to males where 3% participants had moderately severe and 1% had severe depression). Age showed a p value of p=0.000 for PHQ-9 and BSI scores and thus was highly statistically significant where participants from the younger age group (20-24 years) showed a higher percentage with moderately severe and severe scores for depression (6%). Marital status had a high statistically significant effect on PHQ-9 and BSI scores (p=0.000), wherein single and widowed participants showed a higher percentage for moderately severe and severe depression. Number of children had statistically highly significant effect on PHQ-9 and BSI scores (p=0.000). A higher percentage of moderately severe and severe scores were found in participants that had no children. Also, the participants that had more than

7 children showed higher percentage of moderately severe and severe scores. A negative impact on financial status was reported in 59% participants. Educational level had statistically significant effect on BSI scores (p=0.003), with participants having a high school education showed a higher percentage of severe scores (6%) on BSI scale.

Similarly, a highly statistically significant relationship was found between effect on financial status and PHQ-9 scores (p=0.000). Higher percentage of moderately severe (37%) and severe (37%) PHQ-9 scores were found in participants who were negatively affected in the financial aspect. A highly statistically significant relationship was found between the type of social personality and PHQ-9 and BSI scores where introverted participants showed a higher percentage as moderately severe (18%) and severe (13%) scores of depression. Regarding employment status, 40.4% participants reported to be unemployed prior to COVID-19. A highly significant relationship was found between this variable and BSI scores, with participants without work showed

higher percentage as moderately severe (10%) and severe (18%) scores on BSI scale. No statistical significance was found between PHQ-9 and BSI scores with other variables such as living area, housing status and number of people in the family.

*Co-relation of quarantine with PHQ-9 and BSI scores*

Table 3 and 4 showed the distribution of participants based on their response to various question related to quarantine showing minimal, mild, moderate, moderately severe and severe depression scores on the PHQ-9 and BSI scale.

| Table 3. the distribution of participants based on their response to various question related to quarantine showing minimal, mild, moderate, moderately severe and severe scores on PHQ-9 scale. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Item** | **Category** | **PHQ-9** | | | | | **P-Value** |
| | | **Minimal %** | **Mild %** | Moderate % | Moderately Severe % | Severe % | |
| How long have you been in quarantine | 0 Weeks: | 69% | 14% | 10% | 7% | 0% | **0.000*** |
| | 4-6 Weeks: | 32% | 36% | 19% | 11% | 2% | |
| | 7-10 Weeks: | 44% | 33% | 17% | 6% | 1% | |
| | 12 Weeks: | 32% | 34% | 20% | 8% | 6% | |
| How many people are you in quarantine with | 0: | 57% | 14% | 20% | 6% | 3% | 0.293 |
| | 1-3: | 43% | 28% | 20% | 6% | 3% | |
| | 4-7: | 34% | 35% | 18% | 10% | 4% | |
| | 8-10: | 37% | 37% | 17% | 6% | 3% | |
| Have you been diagnosed with mental illnesses | Yes: | 20% | 27% | 27% | 13% | 13% | 0.135 |
| | No: | 38% | 33% | 18% | 8% | 3% | |
| Do you work or study from home | Yes, full time: | 30% | 42% | 17% | 8% | 3% | 0.224 |
| | Yes, part time: | 41% | 29% | 19% | 6% | 4% | |
| | Never: | 38% | 32% | 18% | 9% | 3% | |
| Work from effects your enthusiasm and Productivity | Strongly Agree: | 16% | 27% | 40% | 12% | 5% | **0.000*** |
| | Agree: | 30% | 40% | 17% | 9% | 4% | |
| | Neutral: | 50% | 32% | 11% | 5% | 2% | |
| | Disagree: | 52% | 25% | 14% | 7% | 3% | |
| | Strongly Disagree: | | | | | | |
| during this time do you feel nervous | Always: | 8% | 25% | 30% | 19% | 18% | **0.000*** |
| | Sometimes: | 41% | 35% | 17% | 6% | 0% | |
| | Never: | 54% | 35% | 10% | 2% | 0% | |
| Did you take any medication to overcome anxiety during the covid19 pandemic | Yes: | 3% | 50% | 23% | 20% | 3% | **0.001*** |
| | No: | 39% | 32% | 18% | 7% | 3% | |
| Which of the following makes you more anxious during the quarantine | Reading the news related to the virus on the social media: | 33% | 38% | 17% | 9% | 4% | 0.069 |
| | How to avoid being infected by the virus: | 10% | 64% | 18% | 7% | 1% | |
| | Social Distancing: | 44% | 26% | 18% | 6% | 6% | |

*\* Significant value of p-value <0.05*

| Table 4. the distribution of participants based on their response to various question related to quarantine showing minimal, mild, moderate, moderately severe and severe scores on BSI scale. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Item** | **Category** | **BSI Management** | | | | | **P-Value** |
| | | **Minimal %** | **Mild %** | Moderate % | Moderately Severe % | Severe % | |
| How long have you been in quarantine | 0 Weeks: | 29% | 62% | 7% | 2% | 0% | **0.000*** |
| | 4-6 Weeks: | 7% | 64% | 25% | 5% | 0% | |
| | 7-10 Weeks: | 10% | 69% | 18% | 3% | 1% | |
| | 12 Weeks: | 12% | 59% | 17% | 6% | 6% | |
| | 0: | 11% | 74% | 9% | 6% | 0% | 0.571 |

| | | | | | | |
|---|---|---|---|---|---|---|
| How many people are you in quarantine with | 1-3: | 13% | 61% | 21% | 3% | 2% | |
| | 4-7: | 11% | 62% | 17% | 7% | 4% | |
| | 8-10: | 13% | 63% | 19% | 3% | 3% | |
| Have you been diagnosed with mental illnesses | Yes: | 20% | 13% | 33% | 27% | 7% | **0.000*** |
| | No: | 11% | 64% | 17% | 5% | 3% | |
| Do you work or study from home | Yes, full time: | 9% | 63% | 20% | 5% | 2% | 0.231 |
| | Yes, part time: | 9% | 64% | 18% | 4% | 5% | |
| | Never: | 15% | 61% | 17% | 5% | 2% | |
| Work from effects your enthusiasm and Productivity | Strongly Agree: | 5% | 51% | 32% | 10% | 2% | **0.000*** |
| | Agree: | 5% | 65% | 18% | 6% | 5% | |
| | Neutral: | 16% | 68% | 13% | 2% | 3% | |
| | Disagree: | 29% | 53% | 12% | 4% | 1% | |
| | Strongly Disagree: | | | | | | |
| during this time do you feel nervous | Always: | 3% | 32% | 33% | 18% | 14% | **0.000*** |
| | Sometimes: | 9% | 72% | 16% | 3% | 1% | |
| | Never: | 54% | 57% | 11% | 1% | 0% | |
| Did you take any medication to overcome anxiety during the covid19 pandemic | Yes: | 0% | 43% | 23% | 13% | 20% | **0.000*** |
| | No: | 12% | 63% | 18% | 5% | 2% | |
| Which of the following makes you more anxious during the quarantine | Reading the news related to the virus on the social media: | 11% | 63% | 18% | 5% | 3% | 0.997 |
| | How to avoid being infected by the virus: | 12% | 63% | 18% | 4% | 3% | |
| | Social Distancing: | 11% | 61% | 18% | 6% | 3% | |

*\* Significant value of p-value <0.05*

Our study demonstrated that 52.6% of participants spent more than 12 weeks in quarantine. A highly statistically significant relationship was found between PHQ-9 and BSI score (p=0.000) and period spent in quarantine. The participants who were quarantined for 12 weeks showed higher percentage of moderately severe and severe scores.

On working from home, 53% participants agreed or strongly agreed their enthusiasm and work productivity was affected. A highly statistically significant relationship was found between working from home and PHQ-9 and BSI scores (p=0.000) where enthusiasm and work productivity of participants who agreed or strongly agreed to the negative impacts showed higher percentage of moderately severe and severe scores.

Feelings of nervousness were experienced by 65.4% participants. A highly statistically significant relationship was found between PHQ-9 and BSI scores (p=0.000) and participants experiencing anxiety during the quarantine period with showed a higher percentage of moderately severe and severe scores. Medications to overcome anxiety and nervousness were taken by 95.4% of the participants. A statistically significant relationship was found between PHQ-9 score and participants who took medications to overcome anxiety during the COVID-19 pandemic (p=0.001). A statistically significant relationship was found between BSI scores and participants who have you been diagnosed with

mental illness (p=0.000). Nervousness was experienced by 40.9% of participants when following the news on social media, while 35.8% felt nervous on how to avoid being infected by the virus, and 23.3% felt nervous due to social distancing. No statistically significant relationships were found with other variables such as how many people were you in quarantine and work or study from home.

## Discussion

The COVID-19 pandemic led to several unprecedented events that has had serious consequences on the mental health of the people worldwide. This study analyzed the impact of quarantine on the mental health of the people. The Cronbach's coefficient alpha value was 0.865, suggesting good internal consistency. The overall PHQ-9 and BSI scores in participants indicated a mild stressful impact. This finding coincides with a study conducted by Zhang et al. in which 263 participants completed the Impact to Event Questionnaire with a mean score of 13.6 ±7.7 indicating a mild stressful impact during the COVID-19 pandemic (6).

Our study showed that females had significantly higher PHQ-9 and BSI scores as compared to males which is consistent with a study conducted by Nguyen et al. and is attributed to the fact that females have greater responsibilities towards the household and roles as caregivers as compared to males during a pandemic (7).

In addition, women are impacted by stressful life events and show a higher prevalence of anxiety and depression than males (8)

Our study reported participants from the younger age group (20-24 years) had a significantly higher percentage of severe scores. The changes in daily schedules, social distancing and no interaction with friends can impact the emotional and psychological state of this age group as compared to elderly people. Similar observations were reported in a nationwide study Qiu et al. on the psychological distress due to COVID-19 among the people of China. Out of 52,730 responses from 36 provinces, female respondents exhibited more psychological distress than their male counterparts (p<0.001). Furthermore, participants from the ages of 18-30 years of age and older than 60 scored the highest scores for COVID-19 Peritraumatic Stress Index (CDPI), a questionnaire that assesses psychiatric symptoms in patients suffering from COVID-19 (9).

However, an increased prevalence of PTSD has also been reported in elderly people (10). According to our study, participants having a higher education (Undergraduate degree and higher) or above) showed significantly less scores for depression as compared to those receiving high school education only. Education imparts knowledge and awareness on preventive measures that can limit the spread of the disease, thus educated participants were less fearful of COVID-19 (11). Improving health literacy can help protect the mental health of people and enhance quality of life during the COVID-19- pandemic.

More than half the participants (59%) in our study reported financial hardships during quarantine period. The participant who faced financial issues showed increased likelihood of PTSD symptoms. Cao et al reported similar observations where participants with a stable income had a lower likelihood of psychological problems during the COVID-19 pandemic (12). Single or widowed people, introverts and people having no children reported significantly high scores. which were in contrast to a study in Canada (13). This could be explained by the different socio-cultural norms and characteristics of the local population, which influence people's behaviors and attitudes.

This study showed a significant correlation between the time spent in quarantine with PHQ-9 and BSI scores. The increased length of time spent in quarantine was significantly related to high scores and increased prevalence of PTSD symptoms. To limit the spread of

COVID-19 at workplaces and during commuting to work, various organization transitioned operations for employees to working from home, and thus the new working style has affected their enthusiasm and productivity. The change in routine activities and restriction in the freedom of the people to limit the spread of disease during quarantine had serious consequences on mental health and well-being in both the short- and long-term. Similar findings were demonstrated by Giallonardo et al., (2020) and Hawryluck et al., (2004) where pandemic and physical distancing had serious consequences on mental health.

According to our study reported the pandemic and quarantine has significantly affected the mental health of people with pre-existing mental illness. The physical and social distancing can exacerbate the symptoms and may lead to an increase in the recurrence of episodes of mental illness (13). Our study reported participants who experienced nervousness and took medications to overcome anxiety showed significantly higher scores for depression. Moreover, social isolation and subjective feelings of loneliness are associated with a higher risk of suicidal ideation and suicide attempts (14). Participants also experienced anxiety while following news on social media. The social media can be used to spread awareness on the pandemic and its preventive measures (15). However, a positive or negative effect has yet to be confirmed and thus requires further research.

The main limitations of this research was the small sample size and the study design of a web-based survey which precludes participants who do not have access to the internet.

## Conclusion

During the pandemic a strong focus should be placed on mental health of regardless of whether they have exposed or diagnosed with COVID-19 or not with a priority towards vulnerable populations such as females and young adults. Mental health professionals should devise strategic public health interventions and introduce coping mechanisms to reduce fear and protect the mental health of people and their well-being is strongly desired. Psychological help including telephone, internet and application-based advice or intervention should be widely utilized by local and national mental health institutions. The incorporation of a bio psychosocial model of health can better facilitate the long-term promotion of mental health following COVID-19 pandemic.

## Disclosure

*Statement:*

No conflict of interest.

*Funding:*

No fund.

*Ethical consideration:*

This study was approved by institutional review board of Riyadh Elm University.

*Data availability*

Data that support the findings of this study are embedded within the manuscript.

*Authors' contribution:*

All authors contributed to conceptualization, data drafting, collection, analysis, and final writing of the manuscript.

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