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Research Article

MENTAL HEALTH BEFORE AND DURING THE COVID-19 PANDEMIC: A LONGITUDINAL PROBABILITY SAMPLE SURVEY OF THE SAUDI POPULATION

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Abstract:

Introduction: Public health emergencies such as COVID-19 pandemic has a negative effect on the physiological and mental health of both general population and communities. These negative effects appeared as emotional reactions, unhealthy behaviors, and noncompliance with public health guidelines the aim of this study was to investigate the psychological effect and to determine the depression prevalence among the Saudi population during the COVID-19 outbreak in Saudi Arabia.

Methodology: this cross-sectional study included Saudi populations who are older than 16 years. The sample size was calculated according to Raosoft Website Sample Size Calculator. The questionnaire contains three parts. The first part includes sociodemographic information. The second part contains information about past COVID-19 infection among participants or their relatives, and past history of depression. The third part contains information about mental health which was assessed using the 9-itemed patient health questionnaire. Chi-square test was used to assess the statistical significance. A p-value <0.05 was considered significant.

Result: 200 Saudi participated in the study. Out of them 119 (59.5%) were males and 81 (40.5%) were females. The mean age of the participants was 32.17 ± 9.48 years. The percentage of the participants who had mild to severe symptoms of depression was 62.5%. 24.5% had mild depression, 13% had moderate depression, 13% had moderately severe depression symptoms and 13.5% had severe depression symptoms. A significant relationship was found between depression symptoms and educational level, history of personal COVID-19 infection or infection among relatives, and history of depression (p-value < 0.05)

Conclusion: The prevalence of depression among the study population was slightly higher than what was reported in regional studies in Saudi Arabia, which might be due to different assessment tools used in the previous studies. This study clearly demonstrates a relationship between COVID-19 pandemic and depression symptoms as evident by the strong statistical relationship between depression and COVID-19 infection among participants and/or one of their relatives. Strategies and policies need to be implemented to protect vulnerable groups of participants from mental health effects of COVID-19 pandemic.

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INTRODUCTION:

At the beginning of 2020, coronavirus disease had originated from Wuhan in China and spread worldwide (1). As a result of the rapidly increasing numbers of confirmed cases and deaths, both health care providers and the general population have been experiencing a range of psychiatric morbidities, including depression, anxiety, panic attacks, stress, psychomotor excitement, fear, frustration, psychotic symptoms, and delirium (2,3).

Public health emergencies such as COVID-19 pandemic has a negative effect on the physiological and mental health of both general population and communities. These negative effects appeared as emotional reactions, unhealthy behaviors, and noncompliance with public health guidelines (4,5).

COVID-19 Patients may experience fear of the consequences of disease with a potentially severe new virus, and people in quarantine may experience stress, boredom, depression, loneliness, anxiety and anger (6). Moreover, symptoms of the disease, such as fever, hypoxia, cough, and adverse effects of some therapies that could lead to anxiety and mental disorders. COVID-19 was described as a killer virus that has induced the sense of danger and uncertainty among the medical staff and the general population (7).

People during the curfew associated with the COVID-19 pandemic experienced anxiety and stress about the consequences of virus infection, quarantine, and stigma on their relatives and friends (8).

The medical staff of patients with confirmed or suspected COVID-19 disease are sustained to high risk of contagion and mental health disorders. They may also be afraid from infection and spreading the contagion to their relatives and friends (9).

In Saudi Arabia, the first confirmed COVID-19 case was explored on March 2. During the pandemic, 4,033 confirmed cases have been reported to the WHO by the government (10). As of April 13, 2020, all institutions are closed, and a 24-hr curfew was carried out in many cities in the kingdom (11).

There are several predictive factors associated with depression symptoms during the COVID-19 pandemic. COVID-19 patients from the younger age group below 40 years suspected to more depressive symptoms (12,13). Student status was also found to be a significant associated factor for having more depressive symptoms than the employed or retired

(6,14).

Women were more suspected to develop depressive symptoms as compared to men. Women infected with coronavirus tended to have more mental disorders symptoms, including depression, anxiety, and stress (15,16). This was explained as women represent a higher percentage of the workforce that may be negatively affected by pandemic, such as hospitals, shops, service industry, and healthcare (6). Additionally, it was indicated that women exhibit more significant neurobiological responses when exposed to stressors (17).

Objectives:

- To investigate the psychological effect of the COVID-19 pandemic on the general population of Saudi Arabia
- To determine the depression prevalence among the Saudi population during the COVID-19 outbreak in Saudi Arabia

Literature review:

The fears associated with the Coronavirus outbreak during the pandemic, causing an increase in the mental disorders and may lead to suicide (18). That was reported a dramatic increase in suicide in Canada due to joblessness during the COVID-19 Pandemic. Suicide was also reported in many countries during the pandemic, such as USA, France, Germany, Pakistan, India, and Italy (19). An increase in psychological distress was found in patients with pre-existing mental disorders and medical staff (20). Huang et al. (2019) reported a higher prevalence of adverse psychiatric symptoms among the general population during and after the COVID-19 pandemic (21).

In study performed in China during COVID-19 pandemic, more than half of participants are showing moderate to severe psychological disorders, 16.5% reported moderate to high depressive, 28.8% reported mild to high anxiety symptoms, and 8.1% were reported as moderate to high levels of stress (22). The mental disorder's symptoms showed no decline one month after the COVID-19 pandemic.

Alkhamees et al. (2020) carried out a cross-sectional study on the general public of Saudi Arabia during the COVID-19 pandemic, about one-quarter of the population reported moderate or severe psychological symptoms, including depression, anxiety, and stress symptoms.

Women, high-school students, health care providers

were significantly correlated with a high level of IES-R and DASS scales. Headache, fever, breathing difficulty and dizziness were associated with higher IES-R and DASS subscales. Participants who practiced precautionary measures showed a protective effect against mental disorders symptoms. Social distancing found to be protective on stress and anxiety subscales; and hand hygiene on depression subscale(23).

AlAteeq et al. (2020) carried out a cross-sectional study among healthcare providers in Saudi Arabia during COVID-19. More than half of the participants had mild to severe depressive disorder. Half of the sample had a generalized anxiety disorder. males were significantly less predicted to have anxiety, 30–39 years age group were substantially more showed to have depression and anxiety, and nurses had significantly higher mean scores of anxiety. The study found that depression and anxiety are prevailing conditions among healthcare providers (24).

AlHumaid et al. (2020) reported that the Saudi population is responding well to the threat of psychological trauma imposed by Coronavirus disease and follows the instructions of their government and health guidelines (11).

METHODOLOGY:

Study design:

Cross-sectional study.

Study population:

Saudi population who are suspected or diagnosed with the COVID-19

Inclusion criteria: population older than 16 years old and Saudi citizen and residents.

Exclusion criteria; population below the age of 16 years old and non-Saudi residents or citizens.

Sample size:

200 according to Raosoft Website Sample Size Calculator.

Study Tool:

The questionnaire contains three parts. The first part include sociodemographic information such as age, gender, educational level, marital status, occupational status, and residency. The second part contains information about past COVID-19 infection among participants or their relatives, and past history of depression. The third part contains information about mental health.

Mental health was assessed using the 9-itemed Patient Health Questionnaire (PHQ-9) (25). The PHQ-9 assessment tool is a validated, 9 questions used to assess for the degree of depression symptoms present in an individual. Each question has 4 answers scale and is scored accordingly from 0 to 4. The PHQ-9 total score is used to stratify the severity of depression into mild moderate, moderately severe, and severe.

Statistical Analysis:

Collected data was analyzed using SPSS Statistics 23. The frequencies, percentages, means, and standard deviations were calculated for the variables, as appropriate, and their associations were analyzed via chi-square tests or fisher exact test. The associations were considered significant whenever a two-sided p-value was less than 0.05. All results were summarized in tables and graphs.

Ethical consideration:

Confidentiality was assured to all participants who agreed to participate in the study. The respondents were given a brief description of the study and its objectives.

RESULTS:

Characteristics of the participants:

A total of 200 individuals completed the questionnaire. Out of them 119 (59.5%) were males and 81 (40.5%) were females. The mean age of the participants was 32.17 ± 9.48 years. Regarding the age groups, 49 (24.5%) of the participants were 16 to 24 years of age, 84 (42.0%) were 25 to 34 years, 34 (17.0%) were 35 to 44 years, and 33 (16.5%) were older than 44 years. The majority of the participants were either single (48.0%) or married (45.0%), and two third of them (67.5%) were employed. The study included 180 rural residents (90.0%) and 20 urban residents (10.0%). The highest educational level was university for 77.5% of participants, and secondary school for 22.5% of them. **Table 1**

96 (48%) of the participants in this study said they have been diagnosed or exposed to COVID-19 during the pandemic and 158 (79%) claimed having a relative who is diagnosed with COVID-19. In addition, 81 (40.5%) of the participants have a past history of depression during COVID-19 lockdown.

Table 2

Table 1: Sociodemographic characteristics of the participants. N = 200

Variable	Categories	Frequency	Percentage
Gender	Male	119	59.5%
	Female	81	40.5%
Age in years	16 – 24	49	24.5%
	25 – 34	84	42.0%
	35 – 44	34	17.0%
	> 44	33	16.5%
Marital status	Single	96	48.0%
	Married	90	45.0%
	Divorced	10	5.0%
	Widowed	4	2.0%
Occupation	Unemployed	65	32.5%
	Eemployed	135	67.5%
Residence	Rural	20	10.0%
	Urban	180	90.0%
Educational level	Secondary school	45	22.5%
	University	155	77.5%

Table 2: Medical history of the participants. N = 200

Variable	No (%)	Yes (%)
Have you ever been diagnosed with COVID-19?	104 (52.0%)	96 (48.0%)
Have a relative of you been diagnosed with COVID-19?	42 (21.0%)	158 (79.0%)
Did you had depression due to COVID-19 lockdown?	119 (59.5%)	81 (40.5%)

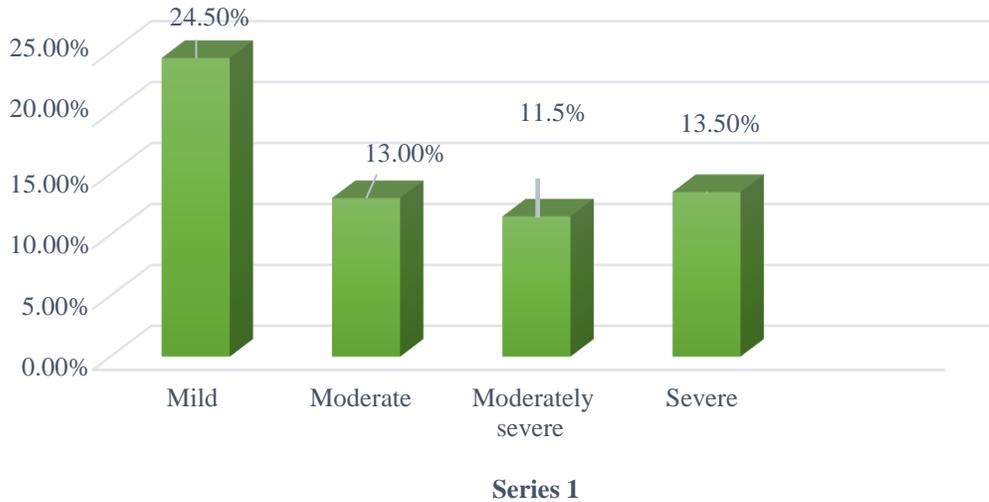
The prevalence of depression during COVID-19 pandemic:

Our results showed more than half of the participants showed symptoms of depression which ranged from mild to severe symptoms. 49 (24.5%) had mild depression symptoms, 26 (13%) had moderate depression symptoms, 23 (13%) had moderately severe depression symptoms and 27 (13.5%) had severe depression symptoms. The percentage of the participants who had mild to severe symptoms of depression was 62.5%. **Table 3, Figure 1** summarize this result.

Table 3: Prevalence of depression among the participants stratified by severity. N = 200

Depression	N	percentage
None	75	37.5%
Mild	49	24.5%
Moderate	26	13.0%
Moderately severe	23	11.5%
Severe	27	13.5%

Figure 1: Prevalence of depression during COVID-19 pandemic

**Factors associated with depression symptoms among youth:**

A chi-square test of independence showed that there is a significant relationship between depression symptoms and educational level, history of personal COVID-19 infection or infection among relatives, and history of depression (p -value < 0.05). Participants who had COVID-19 infection or who had a family member with COVID-19 infection had more incidence of depression symptoms (71.9% and 67.7% respectively) compared to those who did not have COVID-19 infection among themselves or among their relatives (53.8% and 42.9% respectively). Also, depression was more common among those who had secondary school as their highest educational level compared to university level (77.8% vs 58.1% respectively). In addition, history of depression was associated with more incidence of depression symptoms compared to those who did not have a history of depression (49.6% vs 81.5% respectively). More information is provided in **Table 4**.

Table 4: Factors associated with depression symptoms. N = 200. Chi-square test was used to calculate the p-values.

Personal risk factors	Categories	Depression		P-value
		No	Yes	
Gender	Male	50 (42.0%)	69 (58.0%)	0.110
	Female	25 (30.9%)	56 (69.1%)	
Age in years	16 – 24	18 (36.7%)	31 (63.3%)	0.854
	25 – 34	30 (35.7%)	54 (64.3%)	
	35 – 44	15 (44.1%)	19 (55.9%)	
	> 44	12 (36.4%)	21 (63.6%)	
Marital status	Single	37 (38.5%)	59 (61.5%)	0.371
	Married	33 (36.7%)	57 (63.3%)	
	Divorced	5 (50.0%)	5 (50.0%)	
	Widowed	0 (0.0%)	4 (100%)	
Occupation	Unemployed	20 (30.8%)	45 (69.2%)	0.213
	Eemployed	55 (40.7%)	80 (59.3%)	
Residence	Rural	5 (25.0%)	15 (75.0%)	0.330
	Urban	70 (38.9%)	110 (61.1%)	
Educational level	Secondary school	10 (22.2%)	35 (77.8%)	0.022
	University	65 (41.9%)	90 (58.1%)	
Have you ever been diagnosed with COVID-19?	No	48 (46.2%)	56 (53.8%)	0.009
	Yes	27 (28.1%)	69 (71.9%)	
Have a relative of you been diagnosed with COVID-19?	No	24 (57.1%)	18 (42.9%)	0.004
	Yes	5 (32.3%)	107 (67.7%)	
Did you had depression dueto COVID-19 lockdown?	No	60 (50.4%)	59 (49.6%)	0.000
	Yes	15 (18.5%)	66 (81.5%)	

DISCUSSION:

It is well established in the literature that any public health emergency, especially infectious diseases, can have negative psychological effect on the mental health of the affected populations. These negative psychological effects can be expressed in different ways including depression, anxiety, worries and acute stress among other things (26,27). The rapid emergence of COVID-19 pandemic across the globe has initiated a huge amount of psychological distress that have not only affected the diseased populations, but also have effects which reached the vulnerable populations like elderlies, those who have chronic illnesses, and those who were affected by the policies which were meant to control this public health emergency like lockdown and curfew (28).

In this study, we investigated the prevalence of depression symptoms among the Saudi population during COVID-19 pandemic. We also explored factors that can influence these depression symptoms. This study included 200 Saudi individuals in the age range from 16 to 57 years from different regions across Saudi Arabia. The main result indicated that more than half of the study population were afflicted with the symptoms of depression during COVID-19 lockdown, which ranged from mild to extremely severe symptoms. Of these, 24.5% had mild depression symptoms, 13% had moderate depression symptoms, 13% had moderately severe depression symptoms and 13.5% had severe depression symptoms.

Our results are close to what was reported in a Saudi study conducted by Al-Qadhi *et al.* which reported that nearly half of patients (49.9%) who visited primary healthcare centers in Saudi Arabia showed symptoms of depression which ranged from mild to severe (29). In addition, a 2010 systematic review showed that the overall prevalence for depression across different regions of Saudi Arabia was 41% (30). However, some newer studies which were conducted during COVID-19 pandemic reported much lower prevalence for depression. One of these studies, conducted by Alyamia *et al.*, which included more than 2000 participants, found that depression and anxiety were present among only 9.4% and 7.3% of the Saudi population. In addition, a recent online study in Jazan region which used the same PHQ-9 questionnaire reported a depression prevalence of 26% only (31). Furthermore, a previous international systematic review that explored the effect of COVID-19 pandemic on mental health in the general population reported a much higher rates of depression symptoms that ranged from 14.6% to 48.3% in different countries such as Spain, China, Iran, the US,

Turkey, Italy, Nepal and Denmark (32).

There are different reasons for the wide range of reported prevalence's across different regions and within the same country. One of these reasons could be the different assessment tools that were used in these different studies. Another important influencing factor is the timing of each study, as the psychological impact was expected to be much more profound at the beginning of COVID-19 pandemic since there were little information available to the public about the seriousness of this disease. This might have provoked fear among the general public in addition to other psychological and mental symptoms. During any stressful condition, fear and anxiety about the disease can be so overwhelming and consuming that it may cause diseases such as depression and anxiety (33,34).

There are different factors that can be linked to the development of depression among the Saudi population during COVID-19 pandemic, which includes the effect of the pandemic on their daily social life activities and duties (35,36). Various studies indicated that depression can be caused the gradual increase in social distancing measures that resulted from the total lockdown policies, which subsequently led to the detachment of their social cycles and deprived the population from doing their daily social life activities. Furthermore, it is well documented in the literature that major depressive disorders are more likely to happen in the absence of interpersonal communication (37,38). In addition, the fear of contracting this disease and losing admirable ones is another predisposing factor that may result in such a condition (39). In addition, the shortage of face masks and disinfectants during the outbreak, and the misleading news reports have also added to anxiety and fear among the population (40).

Various studies indicated that worries have been elicited by the increasing number of patients with COVID-19 infection and number of suspected cases of COVID-19. All these concerns have raised the public population worries about being infected during the outbreak, which has increased the susceptibility to developing psychiatric disorders (41). On the same context, this study found that depression has a significant relationship with history of COVID-19 infection among participants and/or one of their relatives. Alzaid *et al.* also reported that history of COVID-19 infection is an important contributor to mental illness and showed that healthcare workers in Dammam, Saudi Arabia, who have a history of COVID-19 infection reported higher level of mental symptoms including anxiety (11)

Another finding in this study was the impact of the past history of depression and its relationship with the current depressive symptoms. Compared to those with no previous history of depression, participants with a history major depressive disorder had more incidence of depression symptoms during COVID-19 pandemic. This result is consistent with a series of international studies conducted by Bell et al., in which a case-controlled study in Netherlands found that although a past history of mental illness predisposes the individual to a higher risk of depression, this rates did not increase in response to COVID-19 pandemic (42,43).

CONCLUSION:

The prevalence of depression symptoms among the study population was slightly higher than what was reported in regional studies in Saudi Arabia, which might be due to the different assessment tools used in the previous studies. This study clearly demonstrates a relationship between COVID-19 pandemic and depression symptoms as evident by the strong statistical relationship between depression and COVID-19 infection among participants and/or one of their relatives. Strategies and policies need to be implemented to protect vulnerable groups of participants from mental health effects of COVID-19 pandemic.

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