

The Impact of COVID-19 Pandemic on Mental Health among Individuals infected with Corona virus, in Qassim Region, Saudi Arabia, October-December 2020

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Abstract

Introduction: The COVID-19 pandemic symbolizes many overwhelming stresses. Such as loss of family members, friends, or colleagues, financial uncertainty; and isolation from others, mostly in those who live alone. That's why the physician must sort out demoralization from depression.

Aim: This study aimed to determine the impact of COVID-19 pandemic on mental health among individuals infected with Corona virus, in Qassim region, Saudi Arabia.

Materials and Methods: This is a cross-sectional study conducted among individuals infected with Corona virus in Qassim region. A pre-designed questionnaire was distributed among all the individuals infected with COVID-19 using available communication methods provided by the COVID-19 committee. A total response of 800, when applying the inclusion and exclusion criteria, only 580 participants have met the criteria. The questionnaire contains socio-demographic characteristics of the participants, anxiety, panic disorder and depression. The collection of data was during the period from October to December of 2020. All statistical data were calculated using SPSS version 21.

Results: A total of 580 COVID-19 patients were enrolled. The most common age group was 20 – 29 with 52.6% were males. The prevalence of patients with anxiety was 14.0% while the prevalence of depression 20.7% and those with panic disorder was 43.1%. In multivariate regression model. Those who developed symptoms at the time of diagnosis were the independent factors associated with both anxiety and depression while family income negatively affected by the pandemic was the independent factor associated with anxiety, depression and panic disorder.

Conclusion: Impact of COVID on mental health was high. Panic disorder in people infected with COVID-19 found to be higher than anxiety and depression, lastly panic disorder provided greater negative effect with their mental health. These results require more investigation and further research, in addition patient who was infected with COVID-19 should be reviewed with the psychiatrist.

Keywords— COVID-19, mental health, depression, anxiety, panic disorder

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Reference of Qs – Valid + Arabic
Statistic

Introduction

By the end of 2019, the world health organization (WHO) China Country Office was first informed of pneumonia of unknown a etiology in Wuhan, Hubei Province of China. ⁽¹⁾ In the beginning of 2020, the WHO announced “COVID-19”, short for “coronavirus disease 2019”, as the name of this new disease. ⁽²⁾ Coronaviruses are a family of enveloped single positive-stranded RNA. ⁽³⁾ ⁽⁴⁾ The mode of transmission of COVID-19 is not confirmed yet. Some possibility to be feco-oral or by body fluids besides the respiratory droplets, airdrops, and contaminated surfaces. ⁽⁵⁾ The WHO reported the first case of COVID-19 in Saudi Arabia on the 3rd of March 2020. ⁽⁶⁾ The spread was rapid around the world to reach more than 14.5 million in confirmed cases of COVID-19 reported to WHO Globally, synchronal in Saudi Arabia there are 255,825 confirmed cases, 2,557 were deaths, 46,009 of them are active cases and 207,259 cases have total recovered, by the date of written this paper on 22 July 2020. ⁽⁷⁾ ⁽⁸⁾ Criteria to diagnose COVID-19 are: (a) epidemiological history; and (b) clinical features such as (i) fever over 38.5°C with /or respiratory tract symptoms, (ii) radiograph evidence, (iii) decreased or normal WBCs or decreased lymphocyte count in the initial period. Cases are confirmed by detecting: (a) SARS-CoV-2 by respiratory or serum specimens examined along with a RT-PCR; or (b) full genomic sequence. ⁽⁹⁾

Pandemic Impact on mental health

Evidence from the past studies of SARS, MERS, influenza, and Ebola epidemics on population at-risk showed a link between the outbreak of acute respiratory infections and mental disorders. Psychiatric comorbidities such as depression, panic attack, and anxiety symptoms are reported in the early phase of SARS. ⁽¹⁰⁾ Also, studies on SARS and Ebola showed an induced over-reactive behavior of the public due to increase in

severe emotional distress. ⁽¹¹⁾ ⁽¹⁰⁾ ⁽¹²⁾ A study was done At MERS time on quarantined patients, they had higher impact events scale-revised scores during the initial phase of MERS. The results are coherent with a study on Ebola virus's impact on affected individuals, which aimed to examine the psychological distress of the survivors. Another study on SARS on the terminal psychiatric disorders among the survivors, showed that 15.6% of the patients had worsening depression. ⁽¹¹⁾ COVID-19 is a threat to mental health by elevating rates of anxiety, and depression. Either confirmed or suspected cases of the COVID-19 may experience anxiety, and depression due to the fear of severe disease consequences and the contagion which may lower treatment adherence. ⁽¹¹⁾ ⁽¹³⁾ Since there is no current cure COVID-19, fear has spread to individuals on a societal level which led to several mental health issues and the need to be contained instantly in its initial phase with physical health precautions. ⁽¹¹⁾ Besides, lockdown and social distancing increase stress level, causing generalized anxiety disorder and or depressive disorder exacerbation or relapse, and increasing rehospitalization risk. ⁽¹⁴⁾ Anxiety can precipitate paranoia and nihilistic delusions. According to the American Psychiatric Association, 36% of Americans' mental health became impacted by corona-virus, and about 62% of them are suffering from anxiety symptoms related to COVID-19. ⁽¹⁵⁾ ⁽¹⁶⁾ ⁽¹⁷⁾ A study highlighted that nearly (40 %) of the participants were paranoid with the thought of catching the COVID-19 infection. Another study conducted on SARS Survivors in 2007 found higher stress levels among SARS survivors compared to control subjects, and a high incidence of depression and anxiety in individuals with previous histories of psychiatric illness. ⁽¹⁸⁾ ⁽¹⁹⁾ On a nationwide study from China on the psychological distress among the Chinese population during the COVID-19 pandemic, the investigators reported that around 35% of

respondents were psychologically affected by COVID-19. ⁽²⁰⁾ Furthermore, in early 2020, a study conducted in Turkish society during the COVID-19 pandemic found that (23.6%) of the population scored above the depression cut-off point, and (45.1%) scored above the cut-off point for anxiety. Their result suggests that individuals living in urban areas, and those with an accompanying chronic disease were more psychologically affected. ⁽²¹⁾ The COVID-19 pandemic and nationwide lockdown may result in increasing the new onset of anxiety disorder and causing exacerbation of symptoms in diagnosed cases. Any simple flu-like symptom increases anxiety under present circumstances. ⁽²⁰⁾ ⁽¹⁵⁾ The COVID-19 pandemic implies an overwhelming stress. Such as loss of family members, friends, or colleagues, financial uncertainty; and isolation from others, mostly in those who live alone. That's why the physician must sort out demoralization from depression. ⁽²²⁾ In research done by dr. Cuiyan Wang reported that during the initial psychological responses from the general public, a 16.5% of respondents have reported moderate to severe depressive symptoms. ⁽²³⁾ Also, it was found that the general community with no past education had a higher likelihood of depression through the epidemic. Results revealed that the general people presenting with precise symptoms including chills, coryzal, cough, dizziness, muscle pain, and sore throat, in addition to those with pitiable self-rated health status and history of chronic illness, experienced a higher psychological impact of the outbreak and greater levels of depression, stress & anxiety. ⁽²³⁾ Depression scores were higher in females, people living in urban area, people with friends or relatives suffering COVID-19, individuals with existing or past psychiatric illness history, and people with chronic disease. ⁽²¹⁾ Female sex, health workers, student, and specific symptoms were related to a higher psychological impact of

the pandemic outbreak and greater levels of stress, anxiety, and depression. ⁽²³⁾

Methodology

This is a cross-sectional study conducted among individuals infected with Corona virus in Qassim region. A pre-designed reliable and validated Arabic version of Patient Health Questionnaire (PHQ) adapted from ⁽¹¹⁾ PHQ-GAD7, ⁽²⁰⁾ PHQ-9, and ⁽²¹⁾ PHQ-panic disorder was distributed among all the individuals infected with COVID-19 using available communication methods provided by the COVID-19 committee REF. The questionnaire has multiple sections. In the first part, we will collect basic demographic information about the participant as gender and age, also there is a multiple-choice question about COVID-19 for selecting the data if infective, relative, or none of these. The second part of the questionnaire has scale to assess the severity of depression in the last 2 weeks, for example, decrease the interest or joyous when doing something, and decrease or increase appetite. The third part of the questionnaire is focusing on panic disorders by using yes or no questions. This part has 2 sections; the first about panic in general while the second about the last panic attack. The fourth and the last part of the questionnaire, has questions about scale for assessing the general anxiety disorder (GAD) in the last 4 weeks, for example, difficulty in relaxing and easily to agitated and annoyed. Distribution of the questionnaire started at November to December 2020. A total response of 800, when applying the inclusion and exclusion criteria, only 580 participants have met the criteria. Inclusion criteria includes All individuals who previously or currently diagnosed with COVID-19 in Qassim region, aged 20 years old and more, do not have history of psychiatric disorder, and not work in medical filed. On the other hand, exclusion criteria include any patient (<20 years old), or patient with history or has psychiatric

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AlHadi, A.N., AlAteeq, D.A., Al-Sharif, E. *et al.* An arabic translation, reliability, and validation of Patient Health Questionnaire in a Saudi sample. *Ann Gen Psychiatry* **16**, 32 (2017).

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disorder, and individuals work in medical field. The questionnaire contains socio-demographic characteristics of the participants, anxiety, panic disorder and depression. Descriptive statistics has been presented using counts, proportions (%), mean and standard deviation whenever appropriate. Anxiety, depression and panic disorder had been compared to the socio demographic characteristics and other related characteristics of the patients during COVID-19 by means of Chi square test. Significant results generated in Chi-square tests had been placed in the multiple regression model to determine the independent significant predictors associated with anxiety, depression and panic disorder where the odds ratio as well as 95% confidence interval were also being reported. $P < 0.05$ was considered statistically significant. All data analyses were performed using Statistical Packages for Software Sciences (SPSS) version 21 Armonk, New York, IBM Corporation.

All the data will be saved on software for at least 3 years. Only research team can get access to these data.

Results

Table 1: Socio demographic characteristics of patients (n=580)

Study Data	N (%)
Age group	
• 20 – 29 years	243 (41.9%)
• 30 – 39 years	167 (28.8%)
• 40 – 49 years	111 (19.1%)
• 50 – 59 years	43 (07.4%)
• ≥60 years	16 (02.8%)
Gender	
• Male	305 (52.6%)
• Female	275 (47.4%)
Nationality	
• Saudi	533 (91.9%)
• Non-Saudi	47 (08.1%)
Marital Status	
• Single	211 (36.4%)

• Married	354 (61.0%)
• Divorced or widowed	15 (02.6%)
Family monthly income (SAR)	
• <3,000	67 (11.6%)
• 3,000 – 5,000	109 (18.8%)
• 5,000 – 10,000	158 (27.2%)
• 10,001 – 15,000	130 (22.4%)
• 15,001 – 20,000	72 (12.4%)
• >20,000	44 (07.6%)
Occupation	
• Employed	278 (47.9%)
• Unemployed	197 (34.0%)
• Student	105 (18.1%)
Educational level	
• Primary	16 (02.8%)
• Intermediate	19 (03.3%)
• Secondary	102 (17.6%)
• Diploma	74 (12.8%)
• Bachelor	335 (57.8%)
• Master or PhD	34 (05.9%)

We enrolled 580 patients to examine the impact of COVID-19 pandemic on mental health. Table 1 presented the socio demographic characteristics of the patients. The most common age group was 20 – 29 years old (41.9%) with more than a half were males (52.6%) and nearly all were Saudis (91.9%). With regards to their marital status, nearly two-third were married (61%). With respect to family monthly income, 27.2% were earning 5,000 – 10000 SAR per month and 22.4% were earning 10,001 to 15,000 SAR per month. Furthermore, nearly half of the patients (47.9%) were working and nearly 60% were bachelor's degree.

Table 2: Characteristics of patients who were diagnosed with COVID-19 (n=580)

Variables	N (%)
Duration since diagnosed with COVID-19	
• 3 months	451 (77.8%)
• >3 months	129 (22.2%)
Developed symptoms at the time of diagnosis	
• Yes	481 (82.9%)
• No	99 (17.1%)
Place of quarantine	
• Home	565 (97.4%)
• Hospital	08 (01.4%)
• Quarantine facility	07 (01.2%)
How concerned are you about infection with the new Coronavirus (Covid-19)?	
• No concerned	61 (10.5%)
• Little concerned	148 (25.5%)
• Concerned	207 (35.7%)
• Very concerned	164 (28.3%)
Was the family's income affected negatively due to the lockdown?	
• Yes	183 (31.6%)
• No	397 (68.4%)
Any family members had been infected with the new COVID-19?	
• Yes	422 (72.8%)
• No	158 (27.2%)
Numbers of family members that had been infected by COVID-19 (n=422)	
• One	74 (17.5%)
• Two	83 (19.7%)
• Three or more	265 (62.8%)
Have you lost a member of your family to the new Corona virus (Covid-19)?	
• Yes	27 (04.7%)
• No	553 (95.3%)
Is there any family member suffering from mental illness?	
• Yes	44 (07.6%)
• No	536 (92.4%)

Table 2 described the characteristic of patients who were diagnosed with COVID-19. Following

the results, majority of the patients (77.8%) had been diagnosed with COVID-19 3 months back. The proportion of patients who developed symptoms at the time of diagnosis was 82.9% while nearly all (97.4%) were quarantined at home. Furthermore, more than one third (35.7%) showed concerned about the infection brought by the COVID-19 and 31.6% expressed that their income had been negatively affected by the lockdown. The proportion of patients who had family members been infected by the virus was 72.8% with 62.8% expressed that the frequency of infected family members was three or more. In addition, the proportion of patients who stated that their lost family member due to COVID-19 infection was 4.7% while the proportion of patients who declared that they had family member suffering from mental illness was 7.6%.

Table 3: Prevalence of Anxiety, Depression and Panic disorder among patients infected with COVID-19 (n=580)

Variables	N (%)
Anxiety diagnosis	
• Yes (>10 points)	81 (14.0%)
• No (<10 points)	499 (86.0%)
Severity of anxiety	
• No anxiety	387 (66.7%)
• Mild	112(19.3%)
• Moderate	49(8.4%)
• Severe	32(5.5%)
Depressive diagnosis	
• Yes (>4 points)	120 (20.7%)
• No (≤4 points)	460 (79.3%)
Severity of depression	
• No depression	443 (76.4%)
• Mild depression	83 (14.3%)
• Moderate depression	40 (6.9%)
• Severe depression	14 (2.4%)
Panic disorder	
• Yes	250 (43.1%)
• No	330 (56.9%)

In table 3, the prevalence of clinically anxiety symptoms experienced by the patients was 14% of whom 19.3% were mild, 8.4% were moderate, and 5.5% were severe. With regards to depression, clinically depressive symptoms were experienced by 20.7% of whom 14.3% were mild, 6.9% were moderate, and 2.4% were severe. Furthermore, the prevalence of patients who experienced panic disorder was 43.1%.

Table 4: Relationship between panic disorder in regards to anxiety and depression (n=580)

Mental health disorder	Panic Disorder		X2	P-value §
	Yes N (%) (n=250)	No N (%) (n=330)		
Anxiety symptoms				
• Yes (>10 points)	63 (25.2%)	18 (5.5%)	46.156	<0.001 **
• No (<10 points)	187 (74.8%)	312 (94.5%)		
Depressive symptoms				
• Yes (>4 points)	181 (72.4%)	113 (34.2%)	82.857	<0.001 **
• No (≤4 points)	69 (27.6%)	217 (65.8%)		

§ P-value has been calculated using Chi-square test.

** Significant at p<0.05 level.

We used Chi square test at table 4 to measure the relationship between panic disorder, in regards to anxiety and depression. It was found that anxiety symptoms (X2=46.156; p<0.001) and depressive symptoms (X2=82.857; p<0.001) showed significant relationship with panic disorder. In addition, 62 patients (10.7%) were being affected by the three dimension of mental health disorders.

Table 5: Relationship between anxiety and depression (n=580)

Mental health disorder	Anxiety symptoms		X2	P-value §
	Yes N (%) (n=81)	No N (%) (n=499)		
Depressive symptoms				
• Yes (>4 points)	78 (96.3%)	216 (43.3%)	78.345	<0.001 **
• No (≤4 points)	3 (3.7%)	283 (56.7%)		

§ P-value has been calculated using Chi-square test.

** Significant at p<0.05 level

We also used Chi-square test at table 5 to determine the relationship between depressive symptoms and anxiety symptoms. It was revealed that the relationship between depressive symptoms and anxiety symptoms was statistically significant (X2=78.345; p<0.001) (Table 5).

Table 6: Comparison between the anxiety, depression and panic disorder in relation to the Socio demographic characteristics of patients (n=580)

Factor	Anxiety symptoms		Depressive Symptoms		Panic disorder	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Age group						
• <40 years	42 (51.9%)	201 (40.3%)	135 (47.2%)	108 (38.8%)	114 (45.6%)	129 (39.1%)
• ≥40 years	39 (48.1%)	298 (59.7%)	151 (52.8%)	170 (61.2%)	136 (54.4%)	201 (60.9%)
X²; P-value	3.833; 0.050		3.962; 0.047 **		2.476; 0.116	
Gender						
• Male	35 (43.2%)	270 (54.2%)	128 (43.5%)	177 (61.9%)	122 (48.8%)	183 (55.5%)
• Female	46 (56.8%)	229 (45.9%)	166 (56.5%)	109 (38.1%)	128 (51.2%)	147 (44.5%)
X²; P-value	3.320; 0.068		19.580; <0.001 **		2.526; 0.112	
Nationality						
• Saudi	78 (96.3%)	455 (91.2%)	274 (93.2%)	259 (90.6%)	233 (93.2%)	300 (90.9%)
• Non-Saudi	3 (3.7%)	44 (8.8%)	20 (6.8%)	27 (9.4%)	17 (6.8%)	30 (9.1%)
X²; P-value	2.447; 0.118		1.355; 0.244		1.002; 0.317	
Marital Status						
• Unmarried	36 (44.4%)	190 (38.1%)	121 (41.2%)	105 (36.7%)	106 (42.4%)	120 (36.4%)
• Married	45 (55.6%)	309 (61.9%)	173 (58.8%)	181 (63.3%)	144 (57.6%)	210 (63.6%)
X²; P-value	1.188; 0.276		1.203; 0.273		2.179; 0.140	
Family monthly income						
• ≤10,000 SAR	55 (67.9%)	279 (55.9%)	174 (59.2%)	160 (55.9%)	155 (62.0%)	179 (54.2%)
• >10,000 SAR	26 (32.1%)	220 (44.1%)	120 (40.8%)	126 (44.1%)	95 (38.0%)	151 (45.8%)
X²; P-value	4.101; 0.043 **		0.623; 0.430		3.505; 0.061	
Occupation						
• Employed	33 (40.7%)	245 (49.1%)	133 (45.2%)	145 (50.7%)	108 (43.2%)	170 (51.5%)
• Unemployed	29 (35.8%)	168 (33.7%)	112 (38.1%)	85 (29.7%)	91 (36.4%)	106 (32.1%)
• Student	19 (23.5)	86 (17.2%)	49 (16.7%)	56 (19.6%)	51 (20.4%)	54 (16.4%)
X²; P-value	2.599; 0.273		4.576; 0.101		4.099; 0.129	
Educational level						
• Diploma or below	20 (24.7%)	191 (38.3%)	101 (34.4%)	110 (38.5%)	84 (33.6%)	127 (38.5%)
• Bachelor or higher	61 (75.3%)	308 (61.7%)	193 (65.6%)	176 (61.5%)	166 (66.4%)	203 (61.5%)
X²; P-value	5.557; 0.018 **		1.057; 0.304		1.466; 0.226	
Family income negatively affected by COVID-19						
• Yes	37 (45.7%)	146 (29.3%)	112 (38.1%)	71 (24.8%)	100 (40.0%)	83 (25.2%)
• No	44 (54.3%)	353 (70.7%)	182 (61.9%)	215 (75.2%)	150 (60.0%)	247 (74.8%)
X²; P-value	8.701; 0.003 **		11.821; 0.001 **		14.521; <0.001 **	
Chronic diseases						
• Yes	58 (71.6%)	419 (84.0%)	63 (21.4%)	40 (14.0%)	52 (20.8%)	51 (15.5%)
• No	23 (28.4%)	80 (16.0%)	231 (78.6%)	246 (86.0%)	198 (79.2%)	279 (84.5%)
X²; P-value	7.293; 0.007 **		5.498; 0.019 **		2.783; 0.095	

Duration since diagnosis						
• 3 months	68 (84.0%)	383 (76.8%)	228 (77.6%)	223 (78.0%)	199 (79.6%)	252 (76.4%)
• >3 months	13 (16.0%)	116 (23.2%)	66 (22.4%)	63 (22.0%)	51 (20.4%)	78 (23.6%)
X²; P-value	2.087; 0.149		0.015; 0.903		0.861; 0.353	
Place of quarantine						
• Home	79 (97.5%)	486 (97.4%)	288 (98.0%)	277 (96.9%)	242 (96.8%)	323 (97.9%)
• Hospital/Quarantine facility	02 (2.5%)	13 (2.6%)	06 (02.0%)	09 (03.1%)	08 (03.2%)	07 (02.1%)
X²; P-value	2.542; 0.281		0.747; 0.688		0.735; 0.693	

P-value has been calculated using Chi-square test.

** Significant at p<0.05 level.

Table 7: Comparison between the anxiety, depression and panic disorder in relation to the Socio demographic characteristics of patients (cont'd.) (n=580)

Factor	Anxiety symptoms		Depressive Symptoms		Panic disorder	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Developed symptoms at the time of diagnosis						
• Yes	76 (93.8%)	405 (81.2%)	261 (88.8%)	220 (76.9%)	216 (86.4%)	265 (80.3%)
• No	05 (06.2%)	94 (18.8%)	33 (11.2%)	66 (23.1%)	34 (13.6%)	65 (19.7%)
X²; P-value	7.896; 0.005 **		14.387; <0.001 **		3.735; 0.053	
Family with COVID-19						
• Yes	63 (77.8%)	359 (71.9%)	230 (78.2%)	192 (67.1%)	196 (78.4%)	226 (68.5%)
• No	18 (22.2%)	140 (28.1%)	64 (21.8%)	94 (32.9%)	54 (21.6%)	104 (31.5%)
X²; P-value	1.197; 0.274		9.009; 0.003 **		7.055; 0.008 **	

P-value has been calculated using Chi-square test.

** Significant at p<0.05 level.

When measuring the relationship between anxiety symptoms, depressive symptoms and panic disorder among the socio demographic of the patients, it was found that age group (X²=3.962; p=0.047) and gender (X²=19.580; p<0.001) was statistically significant at depressive symptoms but not with anxiety and panic disorder. We also observed that family monthly income was statistically significant with anxiety symptoms (X²=4.101; p=0.043) but insignificant with depressive symptoms and panic disorder (p>0.05). Furthermore, educational level was statistically significant at

anxiety symptoms (X²=5.557; p=0.018) and family income negatively affected by the lockdown showed significant relationship with anxiety symptoms (X²=8.701; p=0.003), depressive symptoms (X²=11.821; p=0.001) and panic disorder (X²=14.521; p<0.001). Similarly, chronic disease showed significant relationship with anxiety symptoms (X²=7.293; p=0.007). Also, developed symptoms at the time of diagnosis exhibited positive relationship with anxiety symptoms (X²=7.896; p=0.005) and depressive symptoms (X²=14.387; p<0.001). Additionally, family members infected with

COVID-19 were observed to have significant ($X^2=9.009$; $p=0.003$) and panic disorder relationship with depressive symptoms ($X^2=7.055$; $p=0.008$) (Table 7).

Table 8: Multiple regression analysis to predict the effect of anxiety, depression and panic disorder from the selected socio demographic characteristics of patients (n=580)

Anxiety Symptoms	AOR	95% CI	P-value
Family monthly income			
• ≤10,000 SAR	Ref		
• >10,000 SAR	1.639	0.944 – 2.846	0.079
Educational level			
• Diploma or below	Ref		
• Bachelor or higher	0.358	0.197 – 0.650	0.001 **
Family income negatively affected by COVID-19			
• No	Ref		
• Yes	2.089	1.231 – 3.547	0.006 **
Chronic diseases			
• No	Ref		
• Yes	0.352	0.192 – 0.647	0.001 **
Developed symptoms at the time of diagnosis			
• No	Ref		
• Yes	3.554	1.349 – 9.358	0.010
Depressive Symptoms			
Age group			
• <40 years	Ref		
• ≥40 years	1.377	0.840 – 2.255	0.204
Gender			
• Male	Ref		
• Female	0.526	0.364 – 0.762	0.001 **
Family income negatively affected by COVID-19			
• No	Ref		
• Yes	1.845	1.247 – 2.730	0.002 **
Developed symptoms at the time of diagnosis			
• No	Ref		
• Yes	2.224	1.377 – 3.591	0.001 **
Family infected with COVID-19			
• No	Ref		
• Yes	0.752	0.500 – 1.131	0.170
Panic Disorder			
Family income negatively affected by COVID-19			
• No	Ref		
• Yes	1.934	1.318 – 2.838	<0.001 **
Family infected with COVID-19			
• No	Ref		
• Yes	0.664	0.439 – 1.006	0.053

AOR – Adjusted Odds Ratio; CI – Confidence Interval.

** Significant at $p < 0.05$ level.

Multivariate regression analyses were subsequently performed to determine the factors associated with anxiety, depression and panic disorder. For anxiety, it can be observed that family income was negatively affected by the pandemic were 2 times more likely to be associated with anxiety (AOR=2.089; 95% CI=1.231 – 3.547; $p=0.006$). Furthermore, the risk of anxiety for those who developed symptoms at the time of diagnosis was 3.5 times higher (AOR=3.554; 95% CI=1.349 – 9.358; $p=0.010$). For depression, we have known that the risk of developing depression is less in females than males (AOR=0.526; 95% CI=0.364 – 0.762; $p=0.001$). We further observed that the risk of depression for those who stated that their family income was negatively affected by the pandemic was 1.8 times higher (AOR=1.845; 95% CI=1.247 – 2.730; $p=0.002$) while those who developed symptoms at the time of diagnosis was 2.224 times more likely to being associated with depression (AOR=2.224; 95% CI=1.377 – 3.591; $p=0.001$). Finally, for panic disorder, the risk of having panic disorder for those who declared that their family income was negatively affected by the pandemic was 1.934 times higher (AOR=1.934; 95% CI=1.318 – 2.838; $p < 0.001$) (Table 8).

Discussion

The purpose of the present study is to determine the impact of COVID-19 pandemic on mental health of patients who were infected by the virus. In this study, the prevalence of anxiety was 14% with mild, moderate and severe anxiety were detected among 19.3%, 8.4%, and 5.5%, respectively. This prevalence is consistent from the paper of Dai et al. (24) The study measured the anxiety and depressive symptoms among COVID-19 patients in Jiangnan Fangcang Shelter Hospital in Wuhan, China. Based on their accounts, 18.6% of the patients detected of

having anxiety symptoms. Other papers reported higher prevalence rate of anxiety varying from 42% to 90% (21,25-28). Similarly, Alamri and colleagues (29) documented that 10% of the general population were having moderate to severe anxiety which was comparable with our results. Likewise, Alkhamees et al. (30) as well as Solomou and Constantinidou (31), accounted that the severity of anxiety was moderate to severe identified among 24% and 23.1%, respectively which was also consistent with our reports. Also, we found that 62 individual (10.7%) were being affected by all the three mental health disorders. Further findings of our study indicated that being more educated, having family income negatively affected by the pandemic, having associated chronic disease, those who developed symptoms at the time of diagnosis were the independent significant predictors of increased risk of anxiety. On the other hand, literatures suggested that females were more associated with increased risk of anxiety than males (21,25,28-29,32). However, in our study, the prevalence rate between females and males were not significantly different which was consistent from the study of Apisarntharak et al. (27) Similarly, Alamri and associates (29) as well as Solomou and Constantinidou (31) noted that younger age were at higher risk for increased anxiety. This has not been the case in our study as the difference between the age group (<40 years vs ≥ 40 years) were not statistically significant ($p > 0.05$). Depression is another branch of mental health disorder where many of the COVID-19 patients were likely experienced it. In our study, the prevalence of depressive symptoms was detected among 20.7% of the study population. This prevalence rate was lower than the paper conducted in Tukey (21), they reported that the prevalence of depression in the general population was 23.6% which was consistent with the study from Italy. (28) Furthermore, based on PHQ-9 criteria, we

accounted that 14.3% were classified into mild depression 6.9% were moderate and 2.4% were severe which were similar from Solomou and Constantinidou study ⁽³¹⁾. On the other hand, studies conducted in Saudi Arabia ⁽²⁹⁻³⁰⁾, and in Ecuador ⁽³²⁾, reported higher prevalence rate of depression severity range from moderate to severe depression. In our multivariate regression model, the independent significant factors that predicted with increased risk of depression were; female gender, family income negatively affected the by the pandemic, and those who developed COVID-19 symptoms at the time of diagnosis. In a study conducted by Dai et al.⁽²⁴⁾, they accounted that having family member with confirmed COVID-19 showed positive relationship with depression. This is similarly reported in our study which were calculated by the Chi-square test, although in the regression model, this did not reach statistical significance ($p=0.103$). Furthermore, we noticed that the prevalence of depression was statistically significantly higher on females ($p=0.018$) which is consistent from the paper published in Saudi Arabia ⁽²⁹⁾, China ⁽²⁴⁾, Cyprus ⁽³¹⁾ and Ecuador ⁽³²⁾. Another indicator of mental health disorder was panic disorder. It can be seen that the prevalence of panic disorder in this study was 43.1% which was consistent from the paper of Apisarnthanarak and colleagues ⁽²⁷⁾. We further observed that those with family income negatively affected by the pandemic and those with family members being infected by the virus were the factors independently associated with increased risk of panic disorder. These results are more significant than the study conducted in Thailand ⁽²⁷⁾, as they found no significant factor associated with it. It is important to highlight that the prevalence of infected family member was 72.8% with mostly were siblings (51.2%) and parents (43.6%). Moreover, 4.7% reported that they lost family member due to COVID-19 infection and 7.6% indicated that their close family were suffering from mental illness. These

indicators might also contribute to the increased risk of mental illness among the study participants which may need immediate intervention by the psychological experts or medical practitioners.

Conclusion

The depression of COVID-19 patients is higher than their anxiety but panic disorder provided greater negative effect with their mental health. It is further predicted that the family income issues were responsible to negatively affect the three dimensions of mental health while having onset of the disease likely contributed to the increased risk of both anxiety and depression and the conscientious of having family members infected by the virus adversely influenced both depression and panic disorder. It is important to detect early possible mental illness among this group of population. Medical healthcare professionals had the vital role in identifying these people. Early intervention is necessary to protect patients from serious mental illness with precautions from possible transmission of the COVID-19 infection.

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