The psychological impact of the COVID-19 pandemic among the Sudanese population in Khartoum state, 2020

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Abstract: Background: *The consequences of coronavirus disease (COVID-19) extend further than the physical domain.* ***Objectives:*** *The existing study intended to probe the risk factors and the prevalence of anxiety and depression in Sudanese inhabitants in Khartoum districts.* ***Methods and subjects:*** *An online survey version of the 9-item Patient Health Questionnaire (PHQ-9), the7-item Generalized Anxiety Disorder (GAD-7), and data on demographic characteristics, social media usage, financial stress, social support, quarantine status, and COVID-19 infection were used to investigate the anxiety depression and symptoms of 712 respondents.* ***Results:*** *The prevalence of anxiety and depression was determined to be 65.3% and 78.2% respectively. Comorbid anxiety/depression was 94.2% and 78.6%, correspondingly. Age, male gender, significant social support, and lower financial pressure were all found to be protective factors against depression and anxiety. Increased time spent on social media was a risk factor for COVID-19. Only a history of chronic illness, mental illness, or quarantine were risk factors for depression. Being a student and freelancing was only protective against anxiety when compared to being unemployed and never being exposed to COVID-19 on TV/radio.* ***Conclusions and Recommendations:*** *The current study proposed that further monitoring and interventions for the population's mental health be implemented.*

Keywords: Anxiety, Depression, Financial stress, social media, social suppor

Introductions

In March 2020 the World Health Organization (WHO) declared coronavirus disease (COVID-19)– acute infectious pneumonia as a global pandemic.[1] Hence, governments around the world implemented many public health measures to restrict disease transmission including encouraging personal hygiene (handwashing and cough etiquette), quarantine of suspected cases, isolation of confirmed cases, complete country lockdowns, and social distancing. [2,3] In Sudan, the government declared a complete lockdown of Khartoum state on April 13, shutting down schools and universities, suspending public gatherings, and implementing gradual curfew measures. [4,5]According to the Sudanese Federal Ministry of Health, there are more than 13000 confirmed cases and 800 deaths in Sudan as of 2 September 2, 2020. [6]

This pandemic brought not only the risk of death from the viral infection but also serious psychological problems for the public.[6]Beyond the fear of the risk of getting infected, mass home confinement, decreased social support, financial hardness, and conflicting messages through media contributed to the risk of spreading mental diseases.[7]Some groups are even more susceptible; in particular, those who had the disease, Healthcare workers, and people with pre-existing medical or psychiatric illnesses[8,9]Similar previous outbreaks (SARS, MERS, and Ebola) caused severe mental illnesses in their affected populations.[10–14] Many researchers around the world reported high percentages of anxiety, depression, and post-traumatic stress disorder (PTSD) during the COVID-19 pandemic.[15–18]

In Sudan, still there is a scarcity in data about the psychological impact of COVID-19 on the general population. The contemporaneous study, aimed to measure the prevalence of depression and anxiety among a cohort of Sudanese people living in Khartoum state. The existing study is also planned to investigate possible risk factors of contracting a psychiatric disease.

Subjects and Method
Study design and population

A cross-sectional observational study conducted in the period from the 20th of May to the 1st of August 2020. A community-based approach was not feasible during this period due to the complete lockdown of Khartoum state, so we followed a web-based approach. We targeted people living in Khartoum state during the time of the outbreak as it is the first and most affected one by the disease in Sudan. We excluded those below the age of 15 years old. 712 individuals participated in the study.

Data collection technique

An online survey was conveniently performed through the most used social media platforms in Sudan (Facebook, twitter, telegram, and WhatsApp). Additionally, we disseminated it to selected groups of which their members were encouraged to pass it on to others (snowballing technique). Only those who meet the eligibility criteria are asked to fill the survey. For all participants, we explained the aim of the study and took informed consent on the first page. To ensure that only Khartoum residents would participate in the study we asked, "Do you live in Khartoum state?" and if not, the survey automatically ends directly, and the response is considered invalid. After the participant accepts and meets eligibility criteria a list of questions will appear consecutively to be answered. To minimize the missing data, all the questions were marked as required to be filled in to move to the next page of the questionnaire.

Data collection tool

An online survey was designed using Google Forms. We used Arabic language as it is the official, and the most understandable language in Sudan. The survey assessed three main domains:

Demographic characteristics

The demographic characteristics was included the Age, sex, educational level, occupation, marital status, and living arrangement.

Psychological impacts

Anxiety and depression were assessed by using the 7-item GAD7.[17–19] & the 9-item PHQ9.[20-25] standardized questionnaire translated to Arabic. The questionnaires items were based on core symptoms of the conditions and inquiries about the frequency with which the respondent suffered from these symptoms within the last two weeks using a Likert scale ranging from 0 (not at all) to 3 (almost every day). The total score ranges from 0 to 21 for anxiety and from 0 to 27 for depression.

Risk factors:

include being a healthcare worker, directly treating COVID-19 patient, personal or family history of COVID-19 infection or quarantine, pre-existing medical or psychiatric condition, financial stress, living arrangement, Media usage, and degree of social support using 5-item perceived social scale (PSS) .[26] translated to Arabic. Each item is scored from 1 to 5; the higher the total score the better the social support the participant receives

Pilot study and validation:

A pilot study was carried out on 34 participants before the study took place to rate the validity and reliability of the questionnaire with Cronbach's α of 0.7. We ensured that all questions are understandable for the participants, and we resolved any confusion. The Cronbach's α levels of the PHQ9, GAD7, and PSS scale were 0.897, 0.799, and 0.832 respectively.

Statistical analysis:

Analyses were performed using SPSS 25.0 Demographic data of the participants were described as descriptive statistics (Mean and standard deviation (SD) for continuous variables and percentages and frequencies for categorical ones).[27] Mean and SD is used to describe the scores of depressions and anxiety in the study cohort. Correlation and crosstab analyses were used to examine the relationship between anxiety and depression. Univariate analyses (T-test and ANOVA tests) were used to explore significant association between the cohort demographics and other selected risk factors with depression and anxiety. Statistically significant variables in univariate analysis were included in multivariate ordinal regression analysis using generalized linear model (GLM). Social support was correlated with anxiety and depression scores.[28]

Ethics approval and consent to participate:

Ethical approval was taken from the ethical committee of the faculty of Medicine university of Khartoum. Consent to participate was taken through a yes or no question in the beginning of the Google form used to collect responses

Consent for publication: Not applicable.

Availability of data and materials:

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interest: There is no conflict of interest to declare.

Authors' contribution: Attached to the supplementary documents.

Disclosure statement: No potential conflict of interest was reported by the authors.

Declarations: The authors declare that this work has been composed solely by themselves and that it has not been submitted, in whole or in part, in any previous application for publishing. Except where states otherwise by reference or acknowledgment, the work presented is entirely our own.

RESULTS:

Table 1 shows the demographic characteristics of the study population. Among the 712 participants in Khartoum state, the majority were females, students, university educated, single and living with their parents. Among those identified as health care workers (23.5 %) were in contact with COVID-19 patients. The majority also used social media to search about COVID-19, often exposed to it in TV or radio, experienced increased financial stress, didn't contract COVID-19 infection nor did experience quarantine, neither had an infected nor quarantined family member/friend, had no prior history of chronic, mental, or family history of mental illness. The mean age was 24.4 years, the mean time spent on searching was 3.37 hours, and the mean social support scale was 16.7.

Levels of depression and anxiety among Sudanese citizens in Khartoum state:

Table 2 shows the psychological status of the participants with varying severity. Of the 712 participants, (78.2%) were depressed and (65.3%) were anxious. Most of them experienced mild symptoms. (78.6%) of those depressed had concomitant anxiety and (94.2%) of the anxious had concomitant depression (p <.001). Both depression and anxiety scales correlated strongly with each other (spearman's correlation coefficient 0.710, p <.01).

FACTORS ASSOCIATED WITH DEPRESSION AND ANXIETY DURING COVID-19:

Univariate analysis:

exposed to COVID-19 news in TV or Radio, quarantined, those with a family member/ friend infected with COVID-19 or quarantined (p < .05). The educational level, occupation and COVID-19 infection had significant effect on anxiety only, such that those with post-university education, infected with COVID-19 and other occupational choices had increased anxiety levels (p < .01). Age, marital status, living arrangement, contact with COVID-19 patients (for health workers) and family history of mental illness had no effect on depression and anxiety (p > .05).

ORDINAL REGRESSION ANALYSIS:

Statistically significant variables in univariate analysis were screened and included in multivariate ordinal logistic regression analysis (in addition to age, time spent on media and social support as covariates).

Table 3 displays the factors associated with depression and anxiety.

Old age, male gender, excellent social funding, and lower financial stress were defending factors against both anxiety and depression (OR < 1). However, increasing the number of hours spent on social media to search for COVID-19 was a risk factor (OR > 1).

A history of chronic illness (OR = 1.79, 95% CI = 1.06

– 3.05), mental illness (OR = 3.63, 95% CI = 1.88 – 7.01) and quarantine (OR = 2.04, 95% CI = 1.14 – 3.64) were risk factors for depression only. While Students and freelancers (compared to unemployed) were protected from anxiety (OR = 0.34, 0.32, respectively and 95% CI = (0.17 – 0.71), (0.12 – 0.85), respectively), and those who never been exposed to COVID-19 news on TV or radio were also protected (OR=0.40, 95% CI = 0.18 – 0.88).

Table: 1. Univariate analysis of the Sudanese population's demographic characteristics with anxiety and depression during COVID -19 Pandemic (N=712)

Variables	N (%) or Mean ± SD	Depression		Anxiety	
		Mean	p	Mean	p
Age (years)	**24.4 ± 6.41**				
Gender			.011[a]		.02[a]
Male	317 (44.5)	9.57		7.21	
Female	395 (55.5)	10.9		8.21	
Educational level			.179[b]		.006[b]
Secondary school	31 (4.4)	10.8		7.79	
University	569 (79.9)	10.3		7.50*	
Post university	112 (15.7)	10.7		9.24*	
Occupation			.068[b]		.001[b]
Student	442 (62.1)	9.96		7.06*	
Healthcare worker	68 (9.6)	12.21		9.13	
Governmental employee	36 (5.1)	8.47		8.36	
Freelancer	36 (5.1)	10.97		7.86	
Others	82 (11.5)	11.15		9.40*	
Unemployed	48 (6.7)	10.27		8.94	
Marital status			.625[b]		.937[b]
Single	698 (98)	10.3		7.77	
Divorced	13 (1.8)	10.46		7.31	
Widow/widower	1 (0.1)	17		9	
Dealing directly with COVID 19 patients(for Health care workers)			.733[a]		.748[a]
Yes	16 (23.5)	11.63		8.69	
No	52 (76.5)	12.39		9.27	
Living arrangement			.733[b]		.560[b]
Alone	30 (4.2)	10.47		6.43	
With family	664 (93.3)	10.29		7.81	
With friends	9 (1.3)	12.67		8.89	
Others	9 (1.3)	9.22		7.44	
Using social media for searching about COVID19 information			.008[a]		.002[a]
Yes	539 (75.7)	10.7		8.14	
No	173 (24.3)	9.1		6.58	
Time spent on media (for COVID-19 searchers), (Hours)	3.37 ± 4.52				
Exposure to COVID19 news on TVor radio			.027[b]		.001[b]
Never	53 (7.4)	8.64*		6.06*	
Once every now and then	243 (34.1)	9.72		7.06	
Usually	170 (23.9)	10.35		7.86	
Often	246 (34.6)	11.23*		8.75*	
Financial stress			<.001[b]		<.001[b]
Increased	331 (46.5)	11.63*		8.86*	
Not changed	231 (32.5)	8.77		6.47	
Decreased	150 (21)	9.77*		7.33*	
Perceived social support (scale)	16.76 ± 3.79				
History of chronic illness			0.007[a]		0.022[a]
Yes	78 (11)	12.29		9.32	
No	634 (89)	10.07		7.57	
History of mental illness			<.001[a]		<.001[a]
Yes	54 (7.6)	14.8		9.76	
No	658 (92.4)	9.94		7.6	
Family history of mental illness			.538[a]		.158[a]
Yes	66 (9.3)	10.41		6.62	
No	646 (90.7)	9.87		7.66	
History of confirmed COVID-19 infection			.379[a]		.020[a]
Yes	22 (3.1)	11.59		10.55	
No	690 (96.9)	10.27		7.67	
Previous quarantine in-home or quarantine center			.001[a]		.033[a]
Yes	77 (10.8)	12.75		9.06	

a T-test, b ANOVA, * post hoc

Table 2: Anxiety and Depression levels of the Sudanese population living in Khartoum state.

during the COVID-19 pandemic (N=712).

Severity	Frequency (n)		Percent (%)
Depression (Mean ± SD)	10.31 ± 6.9		
Normal		155	21.8
Mild		212	29.8
Moderate		161	22.6
Moderately severe		96	13.5
Severely severe		88	12.4
Anxiety (Mean ± SD)	7.76 ± 5.6		
Normal		247	34.7
Mild		214	30.1
Moderate		149	20.9
Severe		102	14.3

Table :3. Ordinal logistic regression analysis of factors associated with Sudanese anxiety and depression during COVID-19.

Factors	Depression OR [b] (95% CI [c])		Anxiety OR [b] (95% CI [c])	
Age (years)	0.97 (0.93 – 0.99)*		0.97 (0.93 – 0.99)*	
Gender				
Male	0.69 (0.49 – 0.96)*		0.66 (0.47 – 0.92)*	
Female [a]		1		1
Educational level				
Secondary school	1.33 (0.52 – 3.38)		1.19 (0.48 – 2.92)	
University	1.24 (0.75 – 2.08)		0.86 (0.51 – 1.47)	
Post university [a]		1		1
Occupation				
Student	0.71 (0.35 – 1.43)		0.34 (0.17 – 0.71)**	
Healthcare worker	1.09 (0.48 – 2.49)		0.55 (0.24 – 1.27)	
Governmental employee	0.79 (0.30 – 2.09)		0.69 (0.26 – 1.85)	
Freelancer	1.11 (0.43 – 2.86)		0.32 (0.12 – 0.85)*	
Others	1.66 (0.75 – 3.67)		1.01 (0.44 – 2.31)	
Unemployed [a]		1		1
Using social media for searching about COVID-19 information				
Yes	1.20 (0.33 – 4.42)		1.77 (0.38 – 8.35)	
No [a]		1		1
Time spent on media (for COVID-19 searchers),(Hours)	1.11 (1.07 – 1.16)***		1.12 (1.08 – 1.17)***	
Exposure to covid-19 news in TV, radio or social media				
Never	0.82 (0.39 – 1.70)		0.40 (0.18 – 0.88)*	
Once every now and then	0.70 (0.47 – 1.04)		0.60 (0.40 – 0.89)*	
Usually	0.74 (0.49 – 1.11)		0.82 (0.55 – 1.23)	
Often [a]		1		1
Financial stress				
Decreased	0.51 (0.28 – 0.91)*		0.35 (0.17 – 0.74)**	
Not changed	0.32 (0.20 – 0.51)***		0.34 (0.22 – 0.54)***	
Increased [a]		1		1
Perceived social support (scale)	0.88 (0.84 – 0.92)***		0.89 (0.85 – 0.94)***	
History of chronic illness				
Yes	1.79 (1.06 – 3.05)*		1.37 (0.80 – 2.33)	
No [a]		1		1
History of mental illness				
Yes	3.63 (1.88 – 7.01)***		1.62 (0.86 – 3.05)	
No [a]		1		1
History of confirmed covid-19 infection				
Yes	0.99 (0.33 – 2.97)		1.43 (0.44 – 4.71)	
No [a]		1		1
Previous quarantine in home or center				
Yes	2.04 (1.14 – 3.64)**		0.91 (0.52 – 1.62)	
No [a]		1		1
Having family member/friend with confirmed covid-19 infection				
Yes	1.22 (0.81 – 1.85)		0.99 (0.65 – 1.51)	
No [a]		1		1
Having family member/friend being quarantined before				
Yes	1.43 (0.97 – 2.13)		1.47 (0.98 – 2.19)	
No [a]		1		1

[a] Reference group, [b] Odd ratio, [c] Confidence Interval,* $p <.05$, **$p < .01$, *** $p <.001$.

Discussion:

To the best of our knowledge, this is the first study to examine the psychological impact of the SARS-CoV-2 outbreak and the associated factors among people living in Khartoum state, Sudan.

Our web-based study showed that the prevalence of depression and anxiety were (78.2 %) and (65.3 %) respectively, a finding that is substantially higher than recent compiled recently published researches in Italy[25,29] , China[30,31], Bangladesh [32] and the evidence in a systematic review of meta-analysis.[33] One possible explanation for the high prevalence is that some Sudanese are denying the existence of COVID-19 in the country, this was observed by the staff working in COVID-19 related hotline service[34], as a result, the implementations of strict lockdown and curfew measures are viewed as infringing upon their quality of life, therefore creating stress and other mental health symptoms. On the other hand, those with adequate awareness about the COVID-19 situation might be distressed by the threats posed by the outbreak on an already fragile health system in Sudan.[35]

Our findings showed that one-third of the respondents experienced moderate to severe anxiety symptoms and nearly half of them experienced moderate to severe depressive symptoms compared to 28.6% and 16.5%, respectively in a Chinese study[36] and 17.3%, 20.8% severe depression and anxiety, respectively in an Italian study.[25] This is specially pertinent during COVID-19, because severe mental illness significantly impairs the personal and cognitive domain, leaving the individual more vulnerable to contract COVID-19 infection[37], this was evident in the reports of COVID-19 infection among 300 psychiatric inpatients in a Chinese hospital. [38]

 Since we observed a strong correlation between depression and anxiety, the prevalence of comorbid depressive/anxiety and anxiety/depressive symptoms was high (78.6% and 94.2% respectively). This is similar to a previous study (85% and 90% respectively) .[39] Other studies showed that the presence of anxiety is the single strongest risk factor for the development of depression and that comorbid symptoms are more disabling, resistant to management, recurrent and pose a significant risk of suicide .[40]

We observed higher depression and anxiety in women compared to men. Also being a male was associated with a lower risk of both (OR = 0.69 and 0.66, respectively). This is similar to studies in Italy, Spain, China, and Turkey(15,20,30,31), and consistent with prior studies showing a high prevalence of mental disorders among women.[41] We also found that postgraduate education had more anxiety than university education, which correlates with the finding of an association of depression and anxiety with higher education in a recent systematic review .[42] Students had lower anxiety symptoms and were protected compared to those unemployed (OR = 0.34, 95% CI = 0.17 – 0.71), this is consistent with a previous study on the impact of unemployment on mental health(33). Moreover, the increase in financial stress was also associated with high depression and anxiety, this is consistent with the finding of high mental disorders, substance use, and suicide rates during the times of economic recessions. [43]

We studied multiple factors related to COVID-19 and measures taken to control it that may precipitate or exacerbate depressive and anxiety symptoms. We found that anxiety was high among individuals infected with Covid-19, and a history of quarantine posed a significant risk for depression (OR = 2.04, 95% CI = 1.14 – 3.64) this is a predictable finding given the unknown status of the disease and the future events the disease withholds on them or their companions. These patients are susceptible to depressive symptoms, insomnia, obsessive-compulsive symptoms or even post-traumatic stress symptoms. This was evident among COVID-19 survivors one month after hospital discharge . [44]

   High depressive and anxiety symptoms were noticed among those affected by the outbreak (being quarantined or having a family member/friend either infected or quarantined), similar to a southwestern Chinese study finding of high depression and anxiety among those quarantined (themselves or their family/friends) compared to non-quarantined. [45]

An intriguing finding was finding no significant difference between health workers who dealt with COVID-19 cases and those who didn't. This could be explained by the mental resilience of health workers in Sudan, who are acclimated to work in harsh and overloaded settings, especially at the capital Khartoum where the health system was already overwhelmed before the COVID-19 outbreak. This correlates with the findings of a Chinese study of lower psychological abnormalities in health workers with more resilience and more experience in public health emergency.[46]

 The tremendous speculations surrounded the novelty of this pandemic aided the spread of fabricated and misleading information on social media, we found higher depression and anxiety among participants who were exposed to COVID-19 in TV or radio and used social media to search about it, this correlates with previous studies in China [47,48] and consistent with the WHO warning of the impact of "infodemics" on mental health. [49]

Multivariate logistic regression showed that old age, male gender, less financial stress, high social support was shared as protective factors against depression and anxiety while an increasing time spent on social media was shared as a risk factor. With regards to age, our finding contradicts a previous study in China showing higher distress among elderly due high

mortality of COVID-19 among them [50,51], a possible explanation in our finding could be the high mental resilience among elderly population since they are less likely to develop mental disorders.[51-53] Those with high social support experienced lower depressive and anxiety symptoms, this is consistent with previous studies showing the importance of family coherence and support in facilitating the early recovery of mental illnesses.[52-55]

However, some limitations should be noted. First, with regards to the psychological impact during the COVID-19 pandemic, only depression and anxiety were assessed. Second, the cross-sectional design and convenient sampling halt the generalizability of the study. Third, the web-based method isn't representative of the whole population, since a significant portion doesn't have internet access. In this study, the Sudanese citizens of Khartoum state experienced depression and anxiety during the COVID-19 pandemic due to multiple factors related to the pandemic. The high prevalence of depression and anxiety is most likely to be an underestimation given the voluntary nature of the study. We urge the Sudanese government, non-governmental organizations. (NGOs) and the civil society to establish online psychological aid as a response to this outbreak to alleviate the problem and subsequent mental health screening and management after the disease outbreak.

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