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## RESEARCH ARTICLE

## Prevalence and associated factors of depression, anxiety and stress among coronavirus disease 2019 (COVID-19) patients in Herat, Afghanistan

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## ABSTRACT

**Objectives:** Coronavirus disease 2019 (COVID-19) pandemic has been associated with a great level of psychological distresses in people around the world. This study aims to assess the prevalence of depression, anxiety and stress among COVID-19 patients and identify the associated factors, in Herat Province of Afghanistan.

**Methods:** This cross-sectional study was conducted on 459 hospitalized patients between May and September 2021. Data was collected with a structured questionnaire on depression, anxiety and stress scale, which was the validated Dari-version. Chi-square test was adopted to analyze the associations of the prevalence of the mental disorders and the factors.

**Results:** The mean age of participants was 38.05; 51.9% (238/459) were male and 84.1% (386/459) were married. Median scores for depression, anxiety and stress were 5.0, 8.0, and 10.0, respectively. Gender, general health condition, nutritional status, COVID-19 clinical manifestation and concurrent comorbidities (except diabetes and hypertension) were significantly associated with mental disorders; while association between marital status and these psychological disorders was not significant. Moreover, a significant difference was observed in the level of anxiety between healthcare workers and other respondents.

**Conclusion:** This is the first study to report the high prevalence of depression, anxiety and stress among COVID-19 patients in Herat, which indicates the negative effect of mental health for COVID-19 patients globally and highlights the need for urgent and appropriate interventions to improve mental health of people during the pandemic.

## 1. Introduction

The coronavirus disease 2019 (COVID-19) was first reported in Wuhan City of China at the end of 2019.<sup>1</sup> On 11 March 2020, the disease which is caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was characterized as “pandemic” by the World Health Organization (WHO).<sup>2</sup> In Afghanistan, the first case of COVID-19 was diagnosed on 24 February 2020, in Herat Province (hereafter referred as Herat).<sup>3,4</sup>

The pandemic rapidly spreads in the world, affecting more people day by day. As of 1 February 2022, over 360 million COVID-19 cases and 5.6 million deaths have been confirmed in the world, of which over 160 000 cases and 7 400 deaths come from Afghanistan.<sup>5</sup>

Due to the rapid spread and negative impacts on economy, health and well-being of people, many studies assessed the impact of COVID-19 pandemic on psychological status of the patients, mainly including impulsivity, insomnia, cognitive impairment, persistent fatigue and mood disorders.<sup>6–10</sup> Accumulating evidence suggests that COVID-19

can cause many mental illnesses such as depression, anxiety, stress and suicidal behavior.<sup>9–14</sup> This highlighted the need for a thorough understanding of the magnitude of these mental illnesses during the pandemic.

Several studies have assessed the prevalence of depression, anxiety and stress among COVID-19 patients. These studies reported the prevalence of depression to be about (22.6%–64.7%), anxiety (16.4%–51.6%) and stress (17.8%–41.2%).<sup>9,14–19</sup> Additionally, these studies have also examined factors associated with mental illnesses in COVID-19 patients. Limited access to health care, having pre-existing comorbidities, general health,<sup>15–18</sup> employment and economic status,<sup>19–21</sup> marital status,<sup>15,16,22</sup> being female,<sup>15–17,19–20,22–27</sup> and education<sup>20,28–29</sup> have been identified as associated factors of depression, anxiety and stress in COVID-19 patients in general population.

Considering the paucity of research on assessing the prevalence and consequence on psychological status of COVID-19 patients in Afghanistan, this study aims to identify the magnitude and associated factors of these common mental illnesses among COVID-19 patients in

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Herat, which can serve as a baseline reference for future work in this field in the region.

## 2. Methods

### 2.1. Study design

This cross-sectional study recruited COVID-19 patients who from May to September 2021 attended Shahid Basim’s COVID-19 Hospital in Herat. This hospital provides COVID-19 tertiary care services for Herat’s residents.

### 2.2. Eligibility criteria and participants

The eligibility criteria were: (1) Dari-speaker; (2) living in Herat; (3) polymerase chain reaction-test was positive. A total of 459 COVID-19 patients, aged 18–80 years, and hospitalized at Shahid Basim’s COVID-19 Hospital were included in this study.

### 2.3. Ethical consideration

The Human Ethics Committee of Herat University approved the study protocol (Approval number #200,221). A written informed consent was obtained prior to the conduct of interview and acquisition of data. Privacy and confidentiality of information was maintained throughout the study.

### 2.4. Survey instrument

Sociodemographic data including patients’ gender, age, marital status, education, employment, respondents’ self-perceived economic status, general health and nutritional status, along with clinical presentations and the existence of comorbidities were collected by a psychiatrist, at Shahid Basim’s COVID-19 Hospital, using a paper-based structured questionnaire. Depression, anxiety and stress scale (DASS) questionnaire was employed in this study,<sup>30</sup> because it was recently used to assess psychological responses during COVID-19 pandemic in many countries, including China, Spain, the USA, Poland, Iran, the Philippines and Vietnam.<sup>31–36</sup> This DASS questionnaire was the validated Dari-translated version of 42-item. Each item was rated on a 4-point severity using 0–3 scale; with 0 implying “it did not apply to me” and 3 “it applied to me very much”. Scores for each subscale were calculated by summing the scores of all items in relevant subscale. Therefore, the highest possible scores were 42 for each depression, anxiety and stress subscales. Patients considered “normal”, when their scores were 0–7 for depression, 0–4 for anxiety and 0–10 for stress, respectively.

### 2.5. Statistical analyses

Statistical analyses were performed with SPSS 27.0 Statistics (IBM). Continuous variables with normal distribution were presented as means ± standard deviation ( $\bar{x} \pm s$ ). Non-normally distributed variables were shown as median and inter-quartile range (IQR). Categorical variables were presented as numbers and percentages. The association between categorical variables was assessed by Chi-square tests. The level of significance was set to  $P < 0.05$ .

## 3. Results

### 3.1. Socio-demographic characteristics of the participants

A total of 459 patients were included in this study, which were aged 18 to 80 ( $38.05 \pm 13.20$ ) years. Socio-demographic characteristics of those patients were displayed in Table 1. About 51.9% (238/459) of the patients were male, 84.1% (386/459) were married, and 19.0% (87/459) were illiterate. Nearly 16.8% (77/459) of the participants

**Table 1**  
Socio-demographic characteristics of study participants.

Variables	Number	Percentage
Gender		
Male	238	51.9
Female	221	48.1
Age		
≤ 35 years	234	51.0
> 35 years	225	49.0
Education level		
Illiterate	87	19.0
Primary	77	16.8
School graduate	67	14.6
Undergraduate	192	41.8
Master degree	36	7.8
Marital status		
Single	73	15.9
Married	386	84.1
Employment		
Governmental employee	110	24.0
Self-employed	216	47.1
Healthcare worker	77	16.8
Unemployed	56	12.2
Economic status		
Poor	65	14.2
Fair	341	74.3
Good	53	11.5
General health condition		
Weak	76	16.6
Good	346	75.4
Excellent	37	8.1
Nutrition		
Weak	92	20.0
Good	256	55.8
Excellent	111	24.2

**Table 2**  
The prevalence of depression, anxiety and stress among study participants [n (%)].

Variable	Normal	Mild	Moderate	Severe	Extremely severe
Depression	270 (58.8)	43 (9.4)	57 (12.4)	36 (7.8)	53 (11.5)
Anxiety	94 (20.5)	45 (9.8)	79 (17.2)	47 (10.2)	194 (42.3)
Stress	236 (51.4)	26 (5.7)	80 (17.4)	60 (13.1)	57 (12.4)

were healthcare workers, while 12.2% (56/459) were unemployed, and 14.2% (65/459) had a weak economic status. Of all participants, 75.4% (346/459) had good health, and 55.8% (256/459) had good nutrition.

### 3.2. Prevalence of depression, anxiety and stress

Of all participants in this study, 31.7% (146/459) reported moderate to extremely severe depression, 42.9% (197/459) reported moderate to extremely severe stress, and 69.7% (320/459) reported moderate to extremely severe anxiety. Of a significant interest was the high percentage (42.3%, 194/459) of extremely severe anxiety among study participants. Table 2 shows the levels of depression, anxiety and stress among study participants. The median and IQR of depression, anxiety and stress in this study were 5 (1–12), 8 (4–13), and 10 (5–18), respectively.

### 3.3. Association of socio-demographic characteristics with depression, anxiety and stress

More female participants were suffering from depression, anxiety and stress than males ( $P < 0.001$ ). Also, a significant association was observed between general health condition and nutritional status with depression, anxiety and stress (all  $P < 0.001$ ). No significant difference was observed between depression, anxiety and stress and marital status. Table 3 displays the association of participants’ socio-demographic

**Table 3**  
Association of socio-demographic factors with depression, anxiety and stress among study participants [n (%)].

Variables	Total number	Depression	Anxiety	Stress
<b>Gender</b>				
Male	238	70 (29.4)	171 (71.8)	84 (35.3)
Female	221	119 (53.8)	194 (87.8)	139 (62.9)
<i>P</i>		< 0.001	< 0.001	< 0.001
<b>Age</b>				
≤ 35 years	234	101 (43.2)	190 (81.2)	124 (53.0)
> 35 years	225	88 (39.1)	175 (77.8)	99 (44.0)
<i>P</i>		0.378	0.0364	0.054
<b>Role in the family</b>				
Father	190	64 (33.7)	136 (71.6)	69 (36.3)
Mother	173	93 (53.8)	154 (89.0)	110 (63.6)
Child	96	32 (33.3)	75 (78.1)	44 (45.8)
<i>P</i>		< 0.001	< 0.001	< 0.001
<b>Educational level</b>				
Illiterate	87	46 (52.9)	78 (89.7)	51 (58.6)
Primary	77	28 (36.4)	63 (81.8)	35 (45.5)
School graduate	67	33 (49.3)	56 (83.6)	36 (53.7)
Undergraduate	192	71 (37.0)	146 (76.0)	89 (46.4)
Master degree	36	11 (30.6)	22 (61.1)	12 (33.3)
<i>P</i>		0.032	0.004	0.083
<b>Employment</b>				
Government employee	110	38 (34.5)	82 (74.5)	46 (41.8)
Self-employed	216	101 (46.8)	186 (86.1)	116 (53.7)
Healthcare worker	77	32 (41.6)	54 (70.1)	42 (54.5)
Jobless	56	18 (32.1)	43 (76.8)	19 (33.9)
<i>P</i>		0.083	0.008	0.017
<b>Marital status</b>				
Single	73	27 (37.0)	60 (82.2)	32 (43.8)
Married	386	162 (42.0)	305 (79.0)	191 (49.5)
<i>P</i>		0.428	0.537	0.376
<b>Economic status</b>				
Weak	65	36 (55.4)	55 (84.6)	39 (60.0)
Middle	341	135 (39.6)	273 (80.1)	160 (46.9)
High	53	18 (34.0)	37 (69.8)	24 (45.3)
<i>P</i>		0.032	0.125	0.135
<b>General health condition</b>				
Weak	76	50 (65.8)	73 (96.1)	53 (69.7)
Good	346	124 (35.8)	272 (78.6)	154 (44.5)
Excellent	37	15 (40.5)	20 (54.1)	16 (43.2)
<i>P</i>		< 0.001	< 0.001	< 0.001
<b>Nutritional status</b>				
Weak	92	60 (65.2)	88 (95.7)	62 (67.4)
Good	256	88 (34.4)	202 (78.9)	113 (44.1)
Excellent	111	41 (36.9)	75 (67.6)	48 (43.2)
<i>P</i>		< 0.001	< 0.001	< 0.001

characteristics with depression, anxiety and stress among study participants.

### 3.4. Association of clinical manifestations with depression, anxiety and stress

The majority of patients in this study presented with fatigue (78.2%), body-ache (73.0%), fever (70.2%), headache (69.7%), and cough (62.7%). Table 4 shows the association between clinical manifestations with depression, anxiety and stress among study participants. There were insignificant associations between fever and stress, cough and depression, and diarrhea and depression ( $P > 0.05$ ). Beside, significant associations were observed between all other clinical manifestations with depression, anxiety and stress ( $P < 0.05$ ).

### 3.5. Association of comorbidities with depression, anxiety and stress

With regard to comorbidities, 24.4% (112/459) vitamin D deficiency, 13.9% (64/459) hypertension, 11.8% (54/459) kidney diseases, 9.4% (43/459) respiratory diseases, 7.0% (32/459) had diabetes, and 7.0% (32/459) cardiovascular diseases. No significant association was observed between diabetes and depression, anxiety, and stress

( $P > 0.05$ ). Also, the association between hypertension and anxiety was not significant, as well with stress ( $P > 0.05$ ). However, the association between hypertension and depression was significant ( $P < 0.05$ ). Besides, the association between other comorbidities with depression, anxiety and stress were all significant ( $P < 0.05$ , Table 5).

### 3.6. Comparison of levels of depression, anxiety and stress between healthcare workers and other study participants

The chronic exposure of healthcare workers to occupational stresses may predispose them to different levels and severity of mental illnesses. Although no significant association was observed in the levels of depression and stress between healthcare workers and other participants ( $P > 0.05$ ), the difference in anxiety between them was significant ( $P < 0.05$ ).

## 4. Discussion

This is the first study that reported the prevalence and contributing factors of depression, anxiety and stress in general population suffering from COVID-19, in Afghanistan. The prevalence of depression, anxiety and stress in this study were 41.2% (189/459), 79.5% (365/459) and

**Table 4**  
Association of clinical features with depression, anxiety and stress among study participants [n (%)].

Clinical feature	Total number	Depression	Anxiety	Stress
Fever				
Yes	322	147 (45.7)	278 (86.3)	163 (50.6)
No	137	42 (30.7)	87 (63.5)	60 (43.8)
P		0.003	< 0.001	0.181
Cough				
Yes	288	128 (44.4)	251 (87.2)	151 (52.4)
No	171	61 (35.7)	114 (66.7)	72 (42.1)
P		0.065	< 0.001	0.032
Headache				
Yes	320	148 (46.3)	275 (85.9)	173 (54.1)
No	139	41 (29.5)	90 (64.7)	50 (36.0)
P		0.001	< 0.001	< 0.001
Diarrhea				
Yes	156	74 (47.4)	136 (87.2)	89 (57.1)
No	303	115 (38.0)	229(75.6)	134 (44.2)
P		0.051	0.004	0.009
Body-ache				
Yes	335	151 (45.1)	287 (85.7)	175 (52.2)
No	124	38 (30.6)	78 (62.9)	48 (38.7)
P		0.005	< 0.001	0.010
Fatigue				
Yes	359	160 (44.6)	312 (86.9)	186 (51.8)
No	100	29 (29.0)	53 (53.0)	37 (37.0)
P		0.005	< 0.001	0.009
Sore throat				
Yes	218	105 (48.2)	193 (88.5)	123 (56.4)
No	241	84 (34.9)	172 (71.4)	100 (41.5)
P		0.004	< 0.001	0.001
Dyspnea				
Yes	222	107 (48.2)	206 (92.8)	125 (56.3)
No	237	82 (34.6)	159 (67.1)	98 (41.4)
P		0.003	< 0.001	0.001
Severity of features				
Mild	116	31 (26.7)	65 (56.0)	38 (32.8)
Moderate	229	85 (37.1)	193 (84.3)	105(45.9)
Severe	114	73 (64.0)	107 (93.9)	80 (70.2)
P		< 0.001	< 0.001	< 0.001

**Table 5**  
Association of patient's comorbidities with depression, anxiety and stress among study participants [n (%)].

Bio data	Total number	Depression	Anxiety	Stress
Diabetes				
Yes	32	11 (34.4)	27 (84.4)	17 (53.1)
No	427	178 (41.7)	338 (79.2)	206 (48.2)
P		0.418	0.480	0.594
Hypertension				
Yes	64	34 (53.1)	56 (87.5)	34 (53.1)
No	395	155 (39.2)	309 (78.2)	189 (47.8)
P		0.036	0.888	0.433
Cardiovascular diseases				
Yes	32	19 (59.4)	30 (93.8)	21 (65.6)
No	427	170 (39.8)	335 (78.5)	202 (47.3)
P		0.030	0.039	0.046
Kidney diseases				
Yes	54	33 (61.1)	50 (92.6)	40 (74.1)
No	405	156 (38.5)	315 (77.8)	183 (45.2)
P		0.002	0.011	< 0.001
Respiratory diseases				
Yes	43	27 (62.8)	41 (95.3)	28 (65.1)
No	402	151 (37.6)	310 (77.1)	185 (46.0)
I do not know	14	11 (78.6)	14 (100.0)	10 (71.4)
P		< 0.001	0.003	0.013
Vitamin D deficiency				
Yes	112	61 (54.5)	95 (84.8)	77 (68.8)
No	165	50 (30.3)	120 (72.7)	58 (35.2)
I do not know	182	78 (42.9)	150 (82.4)	88 (48.4)
P		< 0.001	0.023	< 0.001

48.6% (223/459), respectively. Our results indicate that the most prevalent mental health disorder in this study was anxiety; which is consistent with the findings of other studies from Ecuador,<sup>16</sup> China,<sup>18</sup> and Iran,<sup>25</sup> in which anxiety was reported the most common mental health disorder among study participants. However, studies from Saudi Arabia,<sup>15</sup> Turkey,<sup>22</sup> and China,<sup>19</sup> found that depression was the most prevalent mental disorder among study participants.

Our findings indicated that female was significantly associated with higher levels of depression, anxiety and stress, which is in accordance with the findings of many other studies around the world.<sup>15–17,19,20,24–27</sup> However, it should be noted that females were also susceptible to higher levels of depression even before the pandemic.<sup>37</sup>

We found that educational level was not significantly associated with depression, anxiety and stress. This is similar to the findings of studies from Saudi Arabia,<sup>15</sup> and China,<sup>19,20</sup> but is in contradiction with the results reported from Japan<sup>28</sup> and Iran<sup>29</sup> in which a significant association was found between educational level and mental illnesses under study. Unlike the popular belief that individuals with higher education levels may suffer from greater magnitude of psychological disorders due to their higher levels of self-awareness regarding their health, our study found that well over half the illiterate participants suffer from depression, anxiety and stress.

This study also found that marital status was not significantly associated with mental illnesses. A similar finding was reported from China.<sup>19,20</sup> This is unlike similar studies from Saudi Arabia,<sup>15</sup> Turkey,<sup>22</sup> and Ecuador,<sup>16</sup> that reported a significant association between marital status and depression, anxiety and stress, i.e. significantly higher rates of mental illnesses among single populations.

This study also found that respondents' employment status was significantly associated with depression and stress but not with anxiety. Higher and statistically significant number of self-employed respondents was suffering from anxiety and stress. This may be due to the fact that government employee and healthcare workers were certain that their wages would have been paid, regardless of their COVID-19 infection. Also, there was no considerable change in the income of unemployed participants before and during COVID-19 pandemic. Hence, self-employed individuals were more concerned about their income and living costs, making them susceptible to mental disorders. A similar study in Saudi Arabia reported that the employment status of the participants was associated with depression, but not with anxiety and stress.<sup>15</sup>

We also found that a poor health status of respondents was significantly associated with depression, anxiety and stress. This is in line with a study from Saudi Arabia which reported that poor health condition was associated with anxiety and stress,<sup>15</sup> while another study from India found that chronic health condition was associated with stress.<sup>18</sup>

Our results indicate that economic status was associated with depression, but not with anxiety and stress. A study from China reported a significant association between household income with depression and anxiety,<sup>19</sup> while another study from Japan stated that economic status was associated with all three mental illnesses under study.<sup>28</sup> Another study in China reported that depression and anxiety were insignificantly associated with monthly income.<sup>20</sup>

We found that COVID-19 symptoms in our participants were significantly associated with depression, anxiety and stress. Similarly, a study from Japan reported that respondents with COVID-19 symptoms were significantly more prone to mental health illnesses.<sup>28</sup> These indicate that being infected with COVID-19 can be an important correlate of psychological illnesses, due to its rapid progression, its consequences on health, economy and interpersonal relationship.

The current study highlighted an association between the age of respondents and anxiety, but not depression and stress. This aligns with the findings of a study from Japan,<sup>28</sup> which reported a significant association between age and anxiety, but not with stress and depression. This indicates that age can be a significant contributing factor for development of anxiety in COVID-19 patients.

#### 4.1. Limitations

The current study had a few limitations. Firstly, a baseline pre-pandemic data was not available on the magnitude of depression, anxiety and stress for comparison. Therefore, we could not be certain whether there was a considerable increase in the level of these mental illnesses in study participants. Secondly, our data was collected from patients who were hospitalized at Shahid Basim's COVID-19 Hospital in Herat, not involving patients with mild illnesses under self-isolation at home. Thirdly, though COVID-19 was reported to impair the olfactory function<sup>38–40</sup> and specific questionnaires as well as a smell identification test were recently developed to assess it,<sup>41,42</sup> the 42-item questionnaire which we used in this study did not cover the olfactory function issues yet. Fourthly, although studies revealed that COVID-19 causes hemorrhagic changes in the brain,<sup>38</sup> we only used a self-reported questionnaire to assess the magnitude and severity of depression, anxiety, and stress among participants in this study. At last, we restricted this study to Dari-speaking patients, because our instrument (DASS questionnaire) was only validated for Dari-speaking people. Therefore, COVID-19 patients with other languages were not included into this study.

#### 4.2. Recommendation

Considering the high prevalence of depression, anxiety and stress among COVID-19 patients, accumulating evidence recommends psychological and behavioral interventions, particularly digital cognitive behavior therapy (CBT) and online psychological counselling,<sup>43–45</sup> as adjuvant therapy to help COVID-19 patients and their families.

### 5. Conclusion

Depression, anxiety and stress are very prevalent in general COVID-19 patients in Herat. Females, those with poor health condition and poor nutritional status, those with apparent COVID-19 symptoms, and concurrent comorbidities were at higher risk of developing these mental disorders. Considering global research evidence, including this study, it seems that COVID-19 negatively affects the mental health of people around the world. Public health sectors and policy makers should pay particular attention to mental health of COVID-19 patients as well as health workers, and minimize the pandemic's impact on mental health of all populations.

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#### CRedit author statement

**Aziz-ur-Rahman Niazi:** Conceptualization, Methodology, Formal analysis, Data curation, Writing—Original draft, Writing—Reviewing & Editing, Supervision, Funding acquisition. **Mina Alekozay:** Conceptualization, Methodology, Data curation, Writing—Original draft, Writing—Reviewing & Editing. **Abdul Fattah Najm:** Conceptualization, Methodology, Formal analysis, Data curation, Writing—Original draft, Writing—Reviewing & Editing, Funding acquisition.

#### Ethical approval and consent to participate

The Human Ethics Committee of Herat University of Afghanistan approved the study protocol (Approval number #200,221). Written informed consents were obtained from the participants prior to this study.

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## Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References

- World Health Organization. COVID-19 - China. <https://www.who.int/emergencies/disease-outbreak-news/item/2020-DON233>. Accessed 3 May 2021.
- World Health Organization. WHO director-general's opening remarks at the media briefing on COVID-19, 11 March 2020. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020>. Accessed 3 May 2021.
- Shah J, Karimzadeh S, Al-Ahdal TMA, Mousavi SH, Zahid SU, Huy NT. COVID-19: the current situation in Afghanistan. *Lancet Glob Health*. 2020;8(6):e771-e772.
- Niazi AUR, Basim MI, Amirrajad A, et al. Clinical Features of Patients With COVID-19 in Herat Province of Afghanistan. *Sağlık ve Toplum*. 2020:158-162.
- Cumulative cases by days since 50th confirmed case. Johns Hopkins University website. <https://coronavirus.jhu.edu/data/cumulative-cases>. Accessed 3 May 2021.
- Hao FY, Tam W, Hu XY, et al. A quantitative and qualitative study on the neuropsychiatric sequelae of acutely ill COVID-19 inpatients in isolation facilities. *Transl Psychiatry*. 2020;10(1):355.
- Ceban F, Ling S, Lui LMW, et al. Fatigue and cognitive impairment in post-COVID-19 syndrome: a systematic review and meta-analysis. *Brain Behav Immun*. 2021;101:93-135.
- Renaud-Charest O, Lui LMW, Eskander S, et al. Onset and frequency of depression in post-COVID-19 syndrome: a systematic review. *J Psychiatr Res*. 2021;144:129-137.
- Salari N, Hosseini-Far A, Jalali R, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob Health*. 2020;16(1):57.
- Wang CY, Tee M, Roy AE, et al. The impact of COVID-19 pandemic on physical and mental health of Asians: a study of seven middle-income countries in Asia. *PLoS One*. 2021;16(2):e0246824.
- Nochaiwong S, Ruengorn C, Thavorn K, et al. Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: a systematic review and meta-analysis. *Sci Rep*. 2021;11(1):10173.
- Xiong JQ, Lipsitz O, Nasri F, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affect Disord*. 2020;277:55-64.
- Wang CY, Chudzicka-Czupala A, Tee ML, et al. A chain mediation model on COVID-19 symptoms and mental health outcomes in Americans, Asians and Europeans. *Sci Rep*. 2021;11(1):6481.
- Pappa S, Athanasiou N, Sakkas N, et al. From recession to depression? Prevalence and correlates of depression, anxiety, traumatic stress and burnout in healthcare workers during the COVID-19 pandemic in Greece: a multi-center, cross-sectional study. *Int J Environ Res Public Health*. 2021;18(5):2390.
- Alamri HS, Algarni A, Shehata SF, et al. Prevalence of depression, anxiety, and stress among the general population in Saudi Arabia during Covid-19 pandemic. *Int J Environ Res Public Health*. 2020;17(24):9183.
- Mautong H, Gallardo-Rumbea JA, Alvarado-Villa GE, et al. Assessment of depression, anxiety and stress levels in the Ecuadorian general population during social isolation due to the COVID-19 outbreak: a cross-sectional study. *BMC Psychiatry*. 2021;21(1):212.
- Shevlin M, McBride O, Murphy J, et al. Anxiety, depression, traumatic stress and COVID-19-related anxiety in the UK general population during the COVID-19 pandemic. *BJPsych Open*. 2020;6(6):e125.
- Wang BL, Li RB, Lu Z, Huang Y. Does comorbidity increase the risk of patients with COVID-19: evidence from meta-analysis. *Aging (Albany NY)*. 2020;12(7):6049-6057.
- Qi T, Hu T, Ge QQ, et al. COVID-19 pandemic related long-term chronic stress on the prevalence of depression and anxiety in the general population. *BMC Psychiatry*. 2021;21(1):380.
- Huang C, Xie JY, Owusua T, et al. Is psychological flexibility a mediator between perceived stress and general anxiety or depression among suspected patients of the 2019 coronavirus disease (COVID-19)? *Pers Individ Dif*. 2021;183:111132.
- Ueda M, Stickle A, Sueki H, Matsubayashi T. Mental health status of the general population in Japan during the COVID -19 pandemic. *Psychiatry Clin Neurosci*. 2020;74(9):505-506.
- Elbay RY, Kurtulmuş A, Arpacioğlu S, Karadere E. Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. *Psychiatry Res*. 2020;290:113130.
- Villarreal-Zegarra D, Copez-Lonzoy A, Vilela-Estrada AL, Huaracaya-Victoria J. Depression, post-traumatic stress, anxiety, and fear of COVID-19 in the general population and health-care workers: prevalence, relationship, and explicative model in Peru. *BMC Psychiatry*. 2021;21(1):455.
- Salazar A, Palomo-Osuna J, de Sola H, Moral-Munoz JA, Dueñas M, Failde I. Psychological impact of the lockdown due to the COVID-19 pandemic in university workers: factors related to stress, anxiety, and depression. *Int J Environ Res Public Health*. 2021;18(8):4367.
- Moghanihashi-Mansourieh A. Assessing the anxiety level of Iranian general population during COVID-19 outbreak. *Asian J Psychiatry*. 2020;51:102076.
- Rodríguez-Hidalgo AJ, Pantaleón Y, Dios I, Falla D. Fear of COVID-19, stress, and anxiety in university undergraduate students: a predictive model for depression. *Front Psychol*. 2020;11:591797.
- Alkhamees AA, Alrashed SA, Alzunaydi AA, Almohimeed AS, Aljohani MS. The psychological impact of COVID-19 pandemic on the general population of Saudi Arabia. *Compr Psychiatry*. 2020;102:152192.
- Hu Q, Umeda M. Stress, anxiety, and depression for chinese residents in Japan during the COVID-19 pandemic. *Int J Environ Res Public Health*. 2021;18(9):4958.
- Hosseinzadeh-Shanjani Z, Hajimiri K, Rostami B, Ramazani S, Dadashi M. Stress, anxiety, and depression levels among healthcare staff during the COVID-19 epidemic. *Basic Clin Neurosci*. 2020;11(2):163-170.
- Shayan NA, Niazi AUR, Waseq AM, Özcebe H. Depression, anxiety, and stress scales 42 (DASS-42) in dari-language: validity and reliability study in adults, Herat, Afghanistan. *Bezmialem Sci*. 2021;9(3):356-362.
- Wang CY, Pan RY, Wan XY, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5):1729.
- Wang CY, López-Núñez MI, Pan RY, et al. The Impact of the COVID-19 pandemic on physical and mental health in China and Spain: cross-sectional Study. *JMIR Form Res*. 2021;5(5):e27818.
- Wang CY, Tripp C, Sears SF, et al. The impact of the COVID-19 pandemic on physical and mental health in the two largest economies in the world: a comparison between the United States and China. *J Behav Med*. 2021;44(6):741-759.
- Wang CY, Chudzicka-Czupala A, Grabowski D, et al. The association between physical and mental health and face mask use during the COVID-19 pandemic: a comparison of two countries with different views and practices. *Front Psychiatry*. 2020;11:569981.
- Le XTT, Dang AK, Toweh J, et al. Evaluating the psychological impacts related to COVID-19 of vietnamese people under the first nationwide partial lockdown in Vietnam. *Front Psychiatry*. 2020;11:824.
- Tee ML, Tee CA, Anlacan JP, et al. Psychological impact of COVID-19 pandemic in the Philippines. *J Affect Disord*. 2020;277:379-391.
- Lim GY, Tam WW, Lu YX, Ho CS, Zhang MW, Ho RC. Prevalence of depression in the community from 30 countries between 1994 and 2014. *Sci Rep*. 2018;8(1):2861.
- Olshewska-Guizzo A, Mukoyama A, Naganawa S, et al. Hemodynamic response to three types of urban spaces before and after lockdown during the COVID-19 pandemic. *Int J Environ Res Public Health*. 2021;18(11):6118.
- Ho RC, Sharma VK, Tan BYQ, et al. Comparison of brain activation patterns during olfactory stimuli between recovered COVID-19 patients and healthy controls: a functional near-infrared spectroscopy (fNIRS) study. *Brain Sci*. 2021;11(8):968.
- Wei GL, Gu JL, Gu ZC, et al. Olfactory dysfunction in patients with coronavirus disease 2019: a review. *Front Neurol*. 2022;12:783249.
- Kim JW, Kim HS, Kim M, Kim SH, Cho SW, Kim JY. Validation of olfactory questionnaire in Koreans: an alternative for conventional psychophysical olfactory tests. *J Korean Med Sci*. 2021;36(6):e34.
- Boscolo-Rizzo P, Menegaldo A, Fabbris C, et al. Six-month psychophysical evaluation of olfactory dysfunction in patients with COVID-19. *Chem Senses*. 2021;46:bjab006.
- Kong XY, Kong FY, Zheng KL, et al. Effect of psychological-behavioral intervention on the depression and anxiety of COVID-19 patients. *Front Psychiatry*. 2020;11:586355.
- Rossi Ferrario S, Panzeri A, Cerutti P, Sacco D. The Psychological experience and intervention in post-acute COVID-19 inpatients. *Neuropsychiatr Dis Treat*. 2021;17:413-422.
- Inchausti F, MacBeth A, Hasson-Ohayon I, Dimaggio G. Psychological intervention and COVID-19: what we know so far and what we can do. *J Contemp Psychother*. 2020;50(4):243-250.