

Prevalence of depression, anxiety, and stress among the general population during COVID-19 pandemic: A systematic review

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ABSTRACT

The emergence of Coronavirus Disease 2019 (COVID-19) has resulted in significant impacts on individuals and the whole world. It can lead to severe health outcomes that may lead to death. It also affects the psychological status and mental health of the individuals due to fear of infection, isolation, and quarantine. To assess the prevalence of depression, anxiety, and stress among the general population during the COVID-19 pandemic by reviewing the previous studies and original articles published on this subject. Both PubMed and Google Scholar databases were searched for scientific articles that reported the prevalence of depression, anxiety, and/or stress among the general population during the COVID-19 pandemic. The included terms used for the search process were "Prevalence, Anxiety, Depression, Stress, COVID-19, Pandemic, Psychological impact." The inclusion criteria were original articles written in the English language and conducted on the general population and reported the prevalence of depression, anxiety, and/or stress during COVID-19. A total of 2204 articles were obtained; only nine articles were eligible for the inclusion criteria. The included studies involved a total number of 19,277 participants and covered eight countries. The age range of participants was less than 18 years to 90 years, and female participants were more dominant compared to male participants in the majority of the studies. The prevalence of depression, anxiety, and stress was varied based on the region of studies and affected factors; however, the COVID-19 pandemic increased the prevalence of the three items.

Keywords: Anxiety, COVID-19, depression, general population, prevalence, stress

Introduction

In December 2019, the first case in Wuhan, China, was affected by a novel coronavirus that has spread among all the

countries in the world and has become a global health threat. It was named COVID-19 and was declared by the WHO as a global pandemic.^[1] COVID-19 results in a disease ranging from common cold to a more severe illness.^[2] Symptoms of COVID-19 include cough, chills, fever, diarrhea, sore throat, nausea, vomiting, and myalgia.^[3] Severe cases of COVID-19 can progress to the acute respiratory syndrome, respiratory failure, and even death.^[4]

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The emergence of the COVID-19 pandemic has raised questions about the impact of the pandemic on the mental health of individuals,^[5] as it is not only causing physical impacts but also causing serious impacts on the mental health of individuals, even non-affected individuals.^[6] A wide range of psychological outcomes has been noted during the outbreak of COVID-19 across all levels, including individual, community, national, and international levels. The individuals' impacts involve the fear of getting infected, or dying, and feeling helpless.^[7] It was shown that COVID-19 is strongly associated with mental health problems in the general population and medical healthcare providers.^[8] Mental disorders are one of the leading causes of health-related burdens. It was shown that depression and anxiety were the most disabling mental diseases among the top 25 leading causes of global burden in 2019.^[9,10] Depression and stress weaken the immune system^[11] as well as the ability of the body to fight the infection.^[12]

Stress and anxiety further affect the psychological and physical health status and result in negative health outcomes such as high blood pressure, heart disease, and diabetes.^[13] Further neuropsychiatric complications involve affective, cognitive decline, disturbance of behavior, and perceptual domains.^[14] So, it is necessary to identify the prevalence and extent of depression, anxiety, and stress during the COVID-19 pandemic.

During the pandemic, several studies were conducted to investigate depression, emotional distress, mood swings, stress, anxiety, irritability, and insomnia in different countries as a result of the pandemic. However, the prevalence varied between different studies due to variations in the population under study, the region of study, and the time of the study.^[1] So, this systematic review was performed to investigate the prevalence of depression, anxiety, and stress during the COVID-19 pandemic among the general population by reviewing the previous studies conducted on this subject.

Methods

The writing of this systematic review follows the PRISMA checklist guidance for systematic review and meta-analysis.^[15] Two scientific and electronic databases were revised for the search process to select eligible research articles, including PubMed and Google Scholar databases. The search process involved searching articles published between the years 2020 and 2021 when the COVID-19 infection emerged.

Various keywords were used for searching purposes, including a combination of "Prevalence, Anxiety, Depression, Stress, COVID-19, Pandemic, Psychological impact." All the keywords were used in various combinations to obtain all possible related articles. All the titles produced from this primary exploration were revised to exclude articles conducted on the subject before the COVID-19 pandemic and articles conducted during the pandemic but not focusing on the current subject.

Eligibility criteria

The remaining findings were further included in the second

stage to select the eligible studies based on the chosen criteria. Articles written in non-English language were excluded as well as those non-original articles including review articles, case reports, meta-analyses, and letters to the editor. The remaining articles were original articles written in the English language and conducted on depression, anxiety, and stress during the COVID-19 pandemic and conducted on the general population. The third stage was the selection of included articles by reviewing the abstracts of the remaining findings. Duplicate articles, non-full text articles, and articles with overlapped or incomplete data were excluded, whereas the remaining articles were included for the final analysis. The full description of the search strategy is shown in Figure 1.

Data review, collection, and analysis

The first stage involved reviewing data in the chosen articles by analyzing the abstracts of chosen articles and the full articles to extract the data of interest. The data of interest were collected using a specially designed excel sheet to extract and collect data in one sheet. The chosen data from eligible research articles were then revised via the excel sheet and then transferred to a pre-designed table under main titles to facilitate the analysis of data.

Results

This systematic review included nine articles that met the eligible criteria, shown in Table 1.^[16-24] The included studies were mostly published in 2020,^[17-24] whereas only one article was published in 2021^[16] In three investigations, the research design was cross sectional. One study was cross sectional and descriptive,^[17] another was descriptive 20, and in other four investigations^[18,21,23] did not specify the study design. All of the included studies involved the general public, with participants ranging from 343 to 10,754,^[20,21] the participants' ages ranged from 17 to 90 years; in one study, the mean age of participants—rather than the participants' age range—was stated to be 37.16 years. Only three research found that there were more male than female participants overall.^[17,19,20]

The nine studies came from eight different nations, including two each from China^[22,24] and New Zealand,^[16] Saudi Arabia,^[17] Iraq,^[18] Turkey,^[20] Iran,^[21] and Nepal.^[19] Three studies 17, 18, and 23 reported the three factors together—depression, anxiety, and stress—whereas two research works also included positive mood 16 and co-morbidities.^[19] Contrarily, four studies found evidence for some of the three factors, including depression, anxiety, and health anxiety,^[20] anxiety alone 21, and depression and anxiety.^[22,24]

The predominance of the three items was reported as a mean and standard deviation in three investigations.^[16,18,21] Stress had a mean SD between 6.3 and 9.38. Anxiety had a mean SD of 6.26 and 5.416 and 7.6 and 6.5, 18 respectively. The average SD for depression ranged among 7.88 and 9.3 and 6.46. According to prevalence rates, stress prevalence ranged from 12% to 18%, anxiety prevalence from 8.3% to 47%, and depression prevalence from 14.6% to 45%.

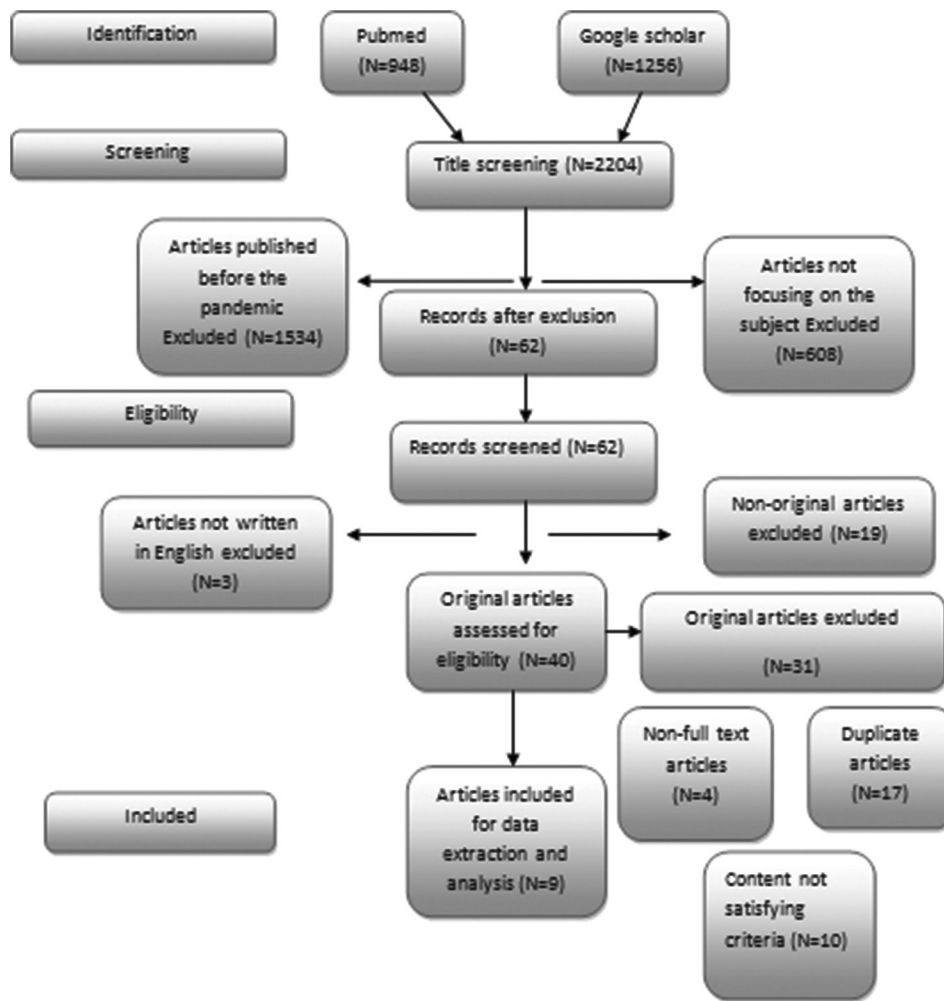


Figure 1: Planning of eligible criteria

The prevalence of normal, mild, moderate, severe, and extremely severe depression was reported to be 55.1%, 17.5%, 18.9%, and 8.4%, respectively. The prevalence of anxiety was reported to be 52.9%, 9.5%, 26.3%, and 11.3%, while the prevalence of stress was reported to be 82.5%, 8%, 7.3%, and 2.2%, respectively. About 17.1% of people reported having moderate to severe depressive symptoms, while 10% and 12%, respectively, of people reported having anxiety or stress symptoms. Another study found that among 49.1%, 10.5%, 21.3%, 9.3%, and 9.8% of participants, anxiety was normal, mild, average, severe, and very severe, respectively.^[21]

Another study indicated that the prevalence of depression was average, high, and very high in 67.2%, 17%, and 15.8% of people, respectively. The prevalence of anxiety was average, high, and very high in 81.3%, 7.2%, and 11.5% of people, respectively.^[23] According to one study, co-morbidity between depression and anxiety affected 23.2% of people. Comparing two groups of people affected by the quarantine, it was discovered that those affected had higher levels of anxiety (12.9%) and depression (22.4%) than those who weren't affected by the quarantine (6.7% anxiety and 11.9% sadness).^[24]

Factors associated with depression

The factors associated with depression included younger age,^[16,17] individuals who are most at risk of COVID-19,^[16] female gender,^[17-19,23] healthcare providers,^[17,19] smokers, singles, non-working individuals,^[17] postgraduate education or bachelor degree,^[18,22] living alone,^[19] accessing information about COVID-19,^[19] living in urban areas,^[20] industrial service workers,^[22] negative affect, detachment, having an acquaintance infection, history of stressful situations, medical problems,^[23] lower average household income, lower education level, having a higher self-evaluated level of knowledge, being more worried about being infected, having no psychological support, greater property damage, and lower self-perceived health condition.^[24]

Anxiety factors

The factors associated with anxiety included younger age,^[16,17,21,23] older age,^[22] being at risk of COVID-19, smoking, alcohol consumption,^[16] female gender,^[17-23] healthcare providers,^[17,19] contacting with COVID-19 positive cases,^[17,21] previously quarantined,^[17] having chronic health problem,^[17,20] postgraduate education,^[18] living alone,^[19] accessing information about

Table 1: Relevant studies (Meta Analysis)

Author and publication year	Study design	Sample size and age of participants	Country	Main items reported	Results and main findings
Gasteiger <i>et al.</i> 2021 ^[16]	Cross-sectional	-N=681 adults -Age ≥18 years -Male=6810% -Female=60889.3%	-New Zealand	Depression PHQ-9 Anxiety GAD-7 Stress PSS-4 Positive mood	*Mean±SD of depression was 7.88±6.4 *Mean±SD of anxiety was 6.26±5.4 *Mean±SD of stress was 6.31±3.3 *Depression and anxiety significantly exceeded population norms $P<0.0001$. *Being younger $P<0.0001$ and most at risk of COVID-19 $P<0.05$ were associated with greater depression, anxiety, and stress. *Greater positive mood, lower loneliness, and greater exercise were protective factors for all outcomes $P<0.0001$. *Smoking $P=0.037$ and alcohol consumption $P<0.05$ were associated with increased anxiety. *Pet ownership was associated with lower depression $P=0.006$ and anxiety $P=0.008$. *The New Zealand population had higher depression and anxiety compared with population norms. Younger people and those most at risk of COVID-19 reported poorer mental health
Alamri <i>et al.</i> 2020 ^[17]	Descriptive cross-sectional	-N=1597 -Age<18->65 years -Male=871 54.5% -Female=72645.5%	Saudi Arabia	Depression Anxiety Stress Using DASS-21	*17.1% reported moderate to severe depressive symptoms *10% reported moderate to severe anxiety symptoms *12% reported moderate to severe stress levels *Depression, anxiety, and stress were significantly higher among females, younger respondents, and healthcare providers *Depression was higher among smokers, singles, and non-working respondents *Anxiety was higher among those reporting contacts with COVID-19 positive cases, previously quarantined, and those with chronic health problems.
Kamal and Othman 2020 ^[18]	-----	-N=548 adults -Age≥18 years->55 years -Male=27249.6% -Female=27550.4%	Iraq	Depression Anxiety Stress Using DASS-21	*Mean±SD of depression was 9.3±7.6 *Mean±SD of Anxiety was 7.6±6.5 *Mean±SD of Stress was 9.3±7 *Prevalence of any severity levels of depression, anxiety, and stress was 45%, 47%, and 18% respectively. *The prevalence of depression was normal 55.1%, mild 17.5%, moderate 18.9%, severe and extremely severe 8.4% *The prevalence of anxiety was normal 52.9%, mild 9.5%, moderate 26.3%, severe and extremely severe 11.3% *The prevalence of stress was normal 82.5%, mild 8%, moderate 7.3%, severe and extremely severe 2.2% *Female gender was a significant independent factor for higher levels of depression $P<0.05$, anxiety $P<0.001$, and stress $P<0.05$ *Postgraduate education and other occupations were significantly associated with depression, anxiety, and stress *There were high levels of common mental health disorders during the pandemic

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Table 1: Contd...

Author and publication year	Study design	Sample size and age of participants	Country	Main items reported	Results and main findings
Sigdel <i>et al.</i> 2020 ^[19]	Cross-sectional	-N=349 participants -Age<20-≥40 years -Male=18954.2% -Female=16045.8%	Nepal	Depression PHQ-9 Anxiety GAD-7 Depression-anxiety co-morbidity	*The prevalence rates of depression was 34%, anxiety 31%, and depression-anxiety co-morbidity 23.2% *Female gender, those living alone, health professionals, and those who spent more time in accessing information about COVID-19 were significantly more likely to have depression, anxiety, and depression-anxiety co-morbidity *High rates of depression and anxiety and co-morbidity were found to be prevailing among the general population during the COVID-19 pandemic lockdown in Nepal
Özdin and Bayrak Özdin 2020 ^[20]	Descriptive	-N=343 -Age mean=37.16 -Male=174 50.7% -Female=16949.2%	Turkey	Depression Anxiety Using HADS Health anxiety Using HAI	*23.6% of the population scored above the depression cut-off point, and 45.1% scored above the cut-off point for anxiety *Female gender, living in urban areas, and previous psychiatric illness history were found as risk factors for anxiety; living in urban areas was found as risk factor for depression *Female gender, accompanying chronic disease, and previous psychiatric history were found as risk factors for health anxiety.
Moghanibashi-Mansourieh 2020 ^[21]	-----	-N=10754 -Age <20->50 years -Male=368134.2% -Female=707365.8%	Iran	Anxiety	*Mean±SD of anxiety was 8.61±6.95 *The prevalence of anxiety was normal 49.1%, mild 10.5%, Average 21.3%, severe 9.3%, very severe 9.8% *The level of anxiety was higher among women $P<0.001$, people who more followed corona-related news $P<0.001$ and the age group of 21–40 years $P<0.001$, among people who had at least one family member, relative, or friend who contracted COVID-19 disease $P<0.001$.
Wang <i>et al.</i> 2020 ^[22]	-----	-N=600 -Age 18->41 -Male=26744.5% -Female=33355.5%	China	Depression SDS Anxiety SAS	*Non-anxiety and non-depression rates were 93.67% and 82.83%, respectively. *There were anxiety in 6.33% and depression in 17.17%. *Females' anxiety risk was 3.01 times compared to males *The anxiety risk of people above 40 years old was 0.40 times *SDS results indicated that the difference between education level and occupation was statistically significant $P=0.024$, 0.005. *Compared to people with a master's degree or above, those with a bachelor's degree group had a depression risk of 0.39 times *Compared with professionals, industrial service workers and other staff had a depression risk of 0.31 times
Mazza <i>et al.</i> 2020 ^[23]	-----	-N=2812 -Age 18-90 years -Male=78428.4% -Female=198271.6%	Italy	Depression Anxiety Stress Using DASS-21	*The prevalence of depression; average 67.2%, high 17%, very high 15.8% *The prevalence of anxiety; average 81.3%, high 7.2%, very high 11.5% *The prevalence of stress; average 72.8%, high 14.6%, very high 12.6% *Female gender, negative effect, and detachment were associated with higher levels of depression, anxiety, and stress

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Author and publication year	Study design	Sample size and age of participants	Country	Main items reported	Results and main findings
Lei <i>et al.</i> 2020 ^[24]	Cross-sectional	-N=1593 -Age 18-≥50 years -Male=61738.7% -Female=97661.3%	China	Depression SDS Anxiety SAS	*Having an acquaintance infected was associated with increased levels of both depression and stress *History of stressful situations and medical problems was associated with higher levels of depression and anxiety. *Those with a family member infected and a young person who had to work outside their domicile presented higher levels of anxiety and stress, respectively. *Affected individuals by quarantine represented 26.36% *The prevalence of depression was 14.6% *The prevalence of anxiety was 8.3% *The prevalence of anxiety and depression in the affected group 12.9%, 22.4% was significantly higher than that in the unaffected group 6.7%, 11.9%. *Lower average household income, lower education level, having a higher self-evaluated level of knowledge, being more worried about being infected, having no psychological support, greater property damage, and lower self-perceived health condition were significantly associated with higher scores on the SAS and SDS. *The prevalence of anxiety and depression of the affected group by quarantine are higher than in the unaffected group during the COVID-19 outbreak in southwestern China in early Feb 2020.

COVID-19,^[19,21] psychiatric history,^[20] negative affect, detachment, history of stressful situations, medical problems, and having infected family members.^[23]

Stress factors

The factors associated with stress included younger age,^[16,17,23] being at risk of COVID-19,^[16] female gender,^[17,18,23] healthcare providers,^[17] postgraduate education,^[18] negative affect, detachment, having an acquaintance infected, and having an infected family member.^[23] Pet ownership was associated with a lower level of depression and anxiety.^[16]

Discussion

Spread of COVID-19

The spread of COVID-19 affected the mental health of the general population in different communities. It is necessary to identify the extent of such mental impact of COVID-19, such as assessing the prevalence of depression, anxiety, and stress among the general population.

Previous studies on the general population

The previous studies have been conducted on the general

population and assessed depression, anxiety, and stress among the general population; however, one of them was conducted only in China,^[25] another evaluated the prevalence of depression, anxiety, and stress among the frontline healthcare workers,^[26] and one meta-analysis was conducted on studies from China and Singapore.^[27]

Variation in prevalence

The prevalence rate varied between studies as some studies reported the degree of severity of the disease and other studies reported the overall prevalence; however, the least prevalence rate of depression, anxiety, and stress was mild or average level, and was 17.5%, 9.5%, and 8%, respectively.^[18] On the other hand, the higher levels of severity of the three items were highly prevalent; these high rates of prevalence indicated that the COVID-19 pandemic adversely affected the mental status of the general population, put them under a higher level of stress, made them more anxious, and increased their depression symptoms. Moreover, we found that the quarantine affected the psychology of individuals and resulted in an increase in depression and anxiety among individuals who were affected by the quarantine.^[24]

A previous meta-analysis assessed the prevalence of depression, anxiety, stress, and insomnia during COVID-19 among health

professionals. A total of 83 studies were included, and it was found that the prevalence of depression, anxiety, stress, and insomnia was 37.12%, 41.42%, 44.86%, and 43.76%, respectively.

Severity of mental health

The severity of the mental health problem increased among health professionals over time.^[1] A previous Chinese study investigated the mental health burden of the COVID-19 pandemic on the general population and found that there were 20.1% and 35.1% with depressive symptoms and anxiety disorder, respectively.^[6]

Meta analysis

A previous meta-analysis explored the prevalence of depression, anxiety, and sleep disturbance during the COVID-19 pandemic and focused on COVID-19 patients. It was found that pooled prevalence of depression, anxiety, and sleep disturbance was 45%, 47%, and 34%, respectively. The analysis did not find any gender variation regarding the prevalence, but depression and anxiety varied based on the different screening tools used.^[28] In our analysis, the female gender was a significant risk factor for depression, anxiety, and stress.

Previous systematic reviews

Although previous systematic reviews were conducted on our current subject, they did not report the risk factors of the three items and reported the prevalence only.^[7,29] The prevalence of stress, anxiety, and depression was 29.6%, 31.9%, and 33.7%, respectively, among the general population.^[7] Another analysis reported the prevalence to be 28% for depression, 26.9% for anxiety, and 36.5% for stress.^[29] However, it should be noted that the studies included in our analysis and previous analysis used different screening tools for depression, anxiety, and stress which may affect the overall estimation of prevalence. However, from our analysis and the previous analysis, we could conclude that the COVID-19 pandemic negatively affected the mental health of individuals and led to an increase in stress, anxiety, and depression.

Another previous systematic review explored the global prevalence and burden of depression and anxiety only during the COVID-19 pandemic. The analysis revealed that the rate of COVID-19 daily infection and reduction in human mobility was associated with the increased prevalence of depression and anxiety. Also, female participants and younger age individuals were commonly affected by depression and anxiety compared to male participants and older age individuals, respectively.^[30]

Risk factors

By exploring the risk factors and factors associated with depression, anxiety, and stress among the general population during COVID-19 in our analysis, we found that female gender and younger age were the major risk factors for the prevalence of depression, anxiety, and stress among the general population. Being postgraduate or having a bachelor's degree was associated

with depression and stress, whereas accessing information about COVID-19 and contact with COVID-19 were associated with anxiety. There were other uncommon risk factors; however, these risk factors varied between different studies, whereas female gender, younger age, post-graduation, and accessing information about COVID-19 were the major reported risk factors. In a systematic analysis conducted on the general population in the early phase of the pandemic, it was found that academic delay, economic loss, the influence of daily life symptoms related to infection, and worrying were stressors of depression and anxiety.^[20,31] The previous factors totally varied from that found in our analysis. The authors of the previous analysis also reported that a lot of inconsistent results were found due to diverse measuring instruments, as we also reported and suggested.

Conclusion

The COVID-19 pandemic affected the mental health of the general population and resulted in an increase in the severity of depression, anxiety, and stress among such population. The prevalence of depression, anxiety, and stress were variously based on the region of studies, the screening tools used, and affecting factors. This may require deep further investigations and analysis using a unified screening tool for each investigated item.

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Conflicts of interest

There are no conflicts of interest.

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