

Psychological Consequence of the Corona Virus Disease Pandemic in Kinshasa, Democratic Republic of the Congo. A Population-Based Cross-Sectional Survey

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Background: The coronavirus disease 2019 (COVID-19) pandemic is impacting the mental health of the population, but data on its impact in developing countries are lacking. The purpose of this study is to assess the psychological aspects of the COVID-19 pandemic in the population of Kinshasa.

Methods: This cross-sectional and analytical study included 456 randomly selected respondents in the Ngafani district of the municipality of Selembao during the period from August 1 to October 30, 2020. Socio-demographic data, and data concerning COVID-19 and its impact on mental health, were studied. Anxiety and depression were studied using the Hospital Anxiety and Depression Scale (HADS).

Results: The two genders were represented in equal proportions; the patients had a mean age of 40.4±17.2 years with a high frequency of patients aged over 50 years. All had agreed to observe social distancing, but only 36.8% had accepted isolation. Using the HADS, 47.4% had a doubtful anxiety state and 23.7% had a definite anxiety state; 36.8% had a doubtful depressive state and 25% had a definite depressive state. Old age (≥50 years), female gender, lack of occupation, and isolation were independent determinants associated with anxiety and depression.

Conclusion: The frequency of anxiety and depression during the COVID-19 pandemic was high. Older age, female gender, lack of a profession, and isolation were associated with anxiety and depression.

Keywords: COVID-19 pandemic, anxiety, depression, Kinshasa

Introduction

The coronavirus disease 2019 (COVID-19) pandemic began in China in December 2019, and reached the Democratic Republic of the Congo (DRC) on March 10, 2020. The COVID-19 pandemic has had several consequences, including the high rate of death and high rates of physical, psychological, and social morbidity.^{1,2} This pandemic is continuing to induce adverse mental consequences, leading to psychiatric morbidity both in patients and in the general population.³⁻⁵ In the DRC, as in other countries of the world, there was a progression of the COVID-19 pandemic throughout 2020 without any improvement.⁶ During this COVID-19 pandemic, clear differences have been observed compared to the adult severe respiratory syndrome (SARS), which appeared in 2003, with regard to mortality

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and the rate of transmission.¹ There is symptomatic complexity of COVID-19 compared to SARS. For instance, in COVID-19, there are not high numbers of patients with sequelae of pulmonary fibrosis, which were observed during the SARS epidemic.^{6,7} But there are several points in common between the two epidemics: they are both caused by a similar but genetically different coronavirus; and they have had consequences in societies around the world.^{8,9} Because the 2003 epidemic resulted in people developing mental problems that required emergency help, it is important to learn lessons and prevent psychiatric disorders during the COVID-19 pandemic.^{7,10,11} Several studies around the world have been conducted to describe the psychiatric and mental disorders in the population linked to the coronavirus pandemic. In Hong Kong, in a population-based study, the frequency of psychiatric disorders was 58.9% during the epidemic.¹² A meta-analysis in the Middle East combining data from the SARS and COVID-19 epidemics found prevalences of depression and anxiety of 14.9% and 14.8%, respectively.¹³ Several other studies carried out in health-care professionals and hospital patients have also shown high frequencies of psychiatric disorders.¹⁴⁻²¹

Apart from the psychosocial stressors related to SARS and COVID-19,^{22,23} the cytokine storm and other immunological factors may also contribute to the post-infection psychiatric morbidity.²⁴ In addition, the long-term adverse health outcomes for SARS survivors could be a risk factor for psychiatric morbidity.²⁵ Therefore, we hypothesized that the COVID-19 pandemic is associated with an increased risk of developing psychiatric disorders, and we conducted this population-based survey to test this hypothesis. The aim of this study is to assess the psychological aspects of the COVID-19 pandemic on the population of Kinshasa.

Methods

Study Setting and Design

This is an analytical cross-sectional study based on a population survey in the city province of Kinshasa, Commune of Selembao, Ngafani district, DRC, during the period from October to November 2020.

Study Population

Study participants were adult inhabitants of the city province of Kinshasa.

An adult patient was defined as greater than or equal to 18 years of age. This age cut-off was selected based on local practice in most cities. Adults presenting during the survey and giving their written or verbal consent to participate in the study were included. Simple probability and random sampling with a sample step of 3 was used to collect data for the study. The sample size was calculated from Fisher's formula: $n \geq (Z^2 \times (p)(1-p))/d^2$, where n = sample size, $Z = 1.96$ (confidence coefficient), p = previous prevalence, and $d = 0.05$ (margin of error or range of imprecision reflecting the degree of absolute precision desired). Because of the probable non-responding subjects, 10% of the number calculated at the height should be added. We estimated that the negative impact of the COVID-19 pandemic has reached 50% of homes, as described in the literature, in the absence of the prevalence of such a documented consequence in the country. The sample size thus calculated was $n \geq (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2 = 384$. By including the 10% of non-respondents, we obtained 422 heads of household to be interviewed. Sampling was carried out in three stages. In the first stage, a district was chosen in a reasoned way, guided by budgetary constraints, geographic accessibility, and security considerations for the data collectors. The Ngafani neighborhood was thus selected. The second-stage sampling procedure concerned the choice of avenues. Eight streets/avenues were selected. In the third stage, households were selected by systematic sampling after a plot survey carried out in each of the selected avenues. In each household, the head of the household or his spouse was interviewed.

Data Collection

Data were obtained using a structured survey form. Respondents were admitted consecutively by interviews conducted by the principal investigator and her team. Those who had consented were informed of the purpose of the study and the reasons for which they were approached. An information sheet with detailed explanations was read for them. The measuring instrument that was used was the structured survey form. This sheet is entitled: "Psychological consequence of the Corona virus disease pandemic in Kinshasa, in the Democratic Republic of Congo". It is made up of several closed and open questions with short answers. The first part of the questionnaire made it possible to collect information on the socio-demographic characteristics of the respondents. The second part of the sheet made it possible to identify aspects of COVID-19. The third part gives a score which describes the

psychological state of the respondents. Psychological aspects were measured using the Hospital Anxiety and Depression Scale (HADS) score.²⁶

The following definitions were used in the present work. Depression was defined as a HADS score greater than 7, doubtful depression as a HADS score between 8 and 10; and certain depression as a HADS score greater than or equal to 11. Anxiety was defined as a HADS score greater than 7, doubtful anxiety as a HADS score between 8 and 10, and certain anxiety as a HADS score greater than or equal to 11. In this study, we considered all respondents with a score greater than 7 as presenting an anxiety and depressive disorder.²⁶

The level of education was categorized into two groups: high level and low level. Any respondent with no education, or primary and secondary education, was considered to have a low level of education, while respondents with a higher or university level were considered to have a high level of education.

Statistical Analysis

Analyses were performed using SPSS 21.0. Descriptive statistics consisted of calculating the mean and standard deviation for quantitative data and the proportions for categorical data. Pearson's chi-squared test or Fisher's exact test was used to compare the proportions, while the Student's *t*-test was used to compare the means. The search for the determinants of psychological aspects (anxiety and depression) was carried out by the logistic regression test in univariate analysis. When differences were observed between anxiety or depression and the independent variables, the effect of potential confounders was investigated by logistic regression adjustment in multivariate analysis. Finally, the odds ratios (ORs) and their 95% confidence intervals (95% CIs) were calculated to determine the degree of association between anxiety or depression and the independent variables. A *p* value <0.05 was considered to be the threshold of statistical significance.

Ethical Considerations

The data were collected anonymously and confidentially. The privacy and confidentiality of the respondents were safeguarded. The three fundamental principles of ethics were respected at the time of the study, namely: the principle of respect for the person, that of beneficence, and that of justice. The protocol for this research study was conducted in accordance with the Declaration of Helsinki and approved by the ethics committee of the Protestant University in Congo under approval no. CEUPC0037.

Results

During the survey, 456 men and women agreed to answer the questionnaire out of 569 respondents, giving a response rate of 80.1%. Fear of divulging information was the main reason given for not answering our questions.

General Characteristics of the Study

Population

The description of the population is shown in Table 1. This shows the average age of the population to be 40.4±17.2 years, with a predominance of people aged over 50 years (30.3%). There was no male/female predominance. The majority of participants were students or pupils (46%), single people (46.1%), academics (48.7%), and Kimbanguist (35.5%). Regarding the characteristics related to COVID-19, all respondents were informed about the pandemic and respected social distancing; 67.1% had agreed to be tested for COVID-19, 56.6% abstained from meeting people, and 36.8% had accepted isolation (Table 1).

Psychological Aspects of the Study

Population

The results on the psychological aspects showed that 28.9% and 38.2% of respondents did not have anxiety and depression, respectively (Table 2). On the other hand, 71.1% had anxiety, of which 47.4% were doubtful and 23.7% certain; 61.8% had depression, of which 36.8% were doubtful and 25% certain.

General Characteristics and Psychological Aspects

The frequency of anxiety was significantly elevated in respondents over 50 years old ($p<0.001$), in women ($p<0.001$), those without a profession ($p<0.001$), married or widowed/divorced people ($p<0.001$), those without education, or primary and secondary education ($p<0.001$), and those of the Kimbanguist religion or with no religious conviction ($p<0.001$) (Table 3). However, this frequency was lower among those who had accepted isolation ($p=0.010$). Likewise, the frequency of depression was significantly elevated in respondents aged over 50 ($p<0.001$), those with no profession ($p<0.001$), married or widowed/divorced people ($p<0.001$), those without education, or primary and secondary ($p<0.001$), and Catholics ($p=0.015$). On the other hand, this frequency was lower among those who had accepted isolation ($p=0.023$) and had agreed to take a COVID-19 test ($p=0.036$).

Table 1 General Characteristics of the Study Population

| Variable | Number (n=456) | Percent |
|-------------------------------------|----------------|---------|
| Age | | |
| Mean ± SD | 40.4±17.2 | 18–78 |
| ≤20 years | 60 | 13.2 |
| 21–30 years | 114 | 25.0 |
| 31–40 years | 90 | 19.7 |
| 41–50 years | 54 | 11.8 |
| ≥51 years | 138 | 30.3 |
| Gender | | |
| Male | 228 | 50.0 |
| Female | 228 | 50.0 |
| Profession | | |
| No occupation | 72 | 15.8 |
| Official | 12 | 2.6 |
| Student | 210 | 46.0 |
| Liberal occupation | 126 | 27.6 |
| Health worker | 36 | 7.9 |
| Marital status | | |
| Single | 210 | 46.1 |
| Married | 198 | 43.4 |
| Widowed/divorced | 48 | 10.5 |
| Educational level | | |
| None | 24 | 5.3 |
| Primary | 30 | 6.6 |
| Secondary | 180 | 39.5 |
| Higher and university | 222 | 48.7 |
| Religion | | |
| Catholic | 78 | 17.1 |
| Protestant | 78 | 17.1 |
| Revival Church | 120 | 26.3 |
| Kimbanguist | 162 | 35.5 |
| No religion | 18 | 3.9 |
| Characteristics related to COVID-19 | | |
| Informed about the pandemic | 456 | 100.0 |
| Agreed to take COVID-19 test | 306 | 67.1 |
| Respected social distancing | 456 | 100.0 |
| Refrained from meeting | 258 | 56.6 |
| Isolation | 168 | 36.8 |

Determinants of Anxiety and Depression in the Study Population

In univariate analysis, female gender, age ≥50 years, low education level, and non-acceptance of isolation emerged as determinants of anxiety in the study population. After

Table 2 Psychological Aspects of the Study Population

| Variable | Anxiety (n=456) (%) | Depression (n=456) (%) | p |
|----------|---------------------|------------------------|-------|
| Absence | 132 (28.9) | 174 (38.2) | 0.135 |
| Doubtful | 216 (47.4) | 168 (36.8) | 0.458 |
| Certain | 108 (23.7) | 114 (25.0) | 0.897 |

multivariate adjustment, all univariate factors persisted as independent determinants of anxiety. Being female multiplied the risk of anxiety by 7 (aOR: 6.6, 95% CI: 3.83–11.57, *p*<0.001), age ≥50 years multiplied this risk by 17 (aOR: 16.96, 95% CI: 7.06–40.75, *p*<0.001), and a low level of education and the non-acceptance of isolation multiplied the risk by 3 (aOR: 2.72, 95% CI: 1.62–5.84, *p*=0.008) and 2 (aOR: 1.64, 95% CI: 1.15–3.19, *p*=0.025), respectively (Table 4).

In univariate analysis, age ≥50 years, having no profession, being married or widowed/divorced, and low educational level emerged as determinants of depression in the study population. After adjusting for all univariate factors, only age ≥50 years and jobless status persisted as independent determinants of depression. Age ≥50 years multiplied this risk by 14 (aOR: 13.64, 95% CI: 6.17–30.14, *p*<0.001) and the status of being without a profession multiplied the risk by 3 (aOR: 3.21, 95% CI: 1.40–7.738, *p*=0.006) (Table 5).

Discussion

The COVID-19 pandemic has aggravated psychological burdens across cohorts throughout the entire world, and is also contributing to the rise in anxiety and depression.^{27–29} For suppressing suicidality, early detection of mental health disorders is beneficial. Therefore, the present study was carried out among a large population in Kinshasa to facilitate policy-level data, and a high prevalence rate of both depression and anxiety was found. These significant psychiatric issues were more likely to be present among elderly people, particularly women, and having no occupation, low educational level, and lack of knowledge about COVID-19 were independent risk factors.

The present study identified two distinct groups (absence of anxiety or depression; state of anxiety or depression) that differ in anxiety or depression symptoms, including reliving, avoiding, and negative alterations in cognition. The prevalence of anxiety was 71.1% and that

Table 3 General Characteristics According to Anxiety and Depression

| Variable | No Anxiety (n=132) | Anxiety (n=324) | p | No Depression (n=174) | Depression (n=282) | p |
|------------------------------|-----------------------|--------------------|--------|--------------------------|-----------------------|--------|
| Age | 33.0±11.8 | 43.4±18.1 | <0.001 | 32.5±11.4 | 45.2±18.3 | <0.001 |
| ≤20 years | 24 (18.2) | 36 (11.1) | | 24 (13.8) | 36 (12.8) | |
| 21–30 years | 36 (27.3) | 78 (24.1) | | 66 (37.9) | 48 (17.0) | |
| 31–40 years | 48 (36.4) | 42 (13.0) | | 60 (34.5) | 30 (10.6) | |
| 41–50 years | 18 (13.6) | 36 (11.1) | | 12 (6.9) | 42 (14.9) | |
| ≥51 years | 6 (4.5) | 132 (40.7) | | 12 (6.9) | 126 (44.7) | |
| Gender | | | <0.001 | | | 0.315 |
| Male | 102 (77.3) | 126 (38.9) | | 84 (48.3) | 144 (51.1) | |
| Female | 30 (22.7) | 198 (61.1) | | 90 (51.7) | 138 (48.9) | |
| Profession | | | <0.001 | | | <0.001 |
| No occupation | 12 (9.1) | 60 (18.5) | | 12 (6.9) | 60 (21.3) | |
| Official | 6 (4.5) | 6 (1.9) | | 0 (0.0) | 12 (4.3) | |
| Student | 96 (72.7) | 114 (35.2) | | 108 (62.1) | 102 (36.2) | |
| Liberal occupation | 18 (13.6) | 108 (33.3) | | 36 (20.7) | 90 (31.9) | |
| Health worker | 0 (0.0) | 36 (11.1) | | 18 (10.3) | 18 (6.4) | |
| Marital status | | | <0.001 | | | <0.001 |
| Single | 102 (77.3) | 108 (33.3) | | 108 (62.1) | 102 (36.2) | |
| Married | 30 (22.7) | 168 (51.9) | | 60 (34.5) | 138 (48.9) | |
| Widowed/divorced | 0 (0.0) | 48 (14.8) | | 6 (3.4) | 42 (14.9) | |
| Educational level | | | <0.001 | | | <0.001 |
| None | 0 (0.0) | 24 (7.4) | | 0 (0.0) | 24 (8.5) | |
| Primary | 12 (9.1) | 18 (5.6) | | 6 (3.4) | 24 (8.5) | |
| Secondary | 36 (27.3) | 144 (44.4) | | 66 (37.9) | 114 (40.4) | |
| Higher and university | 84 (63.6) | 138 (42.6) | | 102 (58.6) | 120 (42.6) | |
| Religion | | | <0.001 | | | 0.015 |
| Catholic | 36 (27.3) | 42 (13.0) | | 18 (10.3) | 60 (21.3) | |
| Protestant | 30 (22.7) | 48 (14.8) | | 36 (20.7) | 42 (14.9) | |
| Revival Church | 36 (27.3) | 84 (25.9) | | 54 (31.0) | 66 (23.4) | |
| Kimbanguist | 30 (22.7) | 132 (40.7) | | 60 (34.5) | 102 (36.2) | |
| No religion | 0 (0.0) | 18 (5.6) | | 6 (3.4) | 12 (4.3) | |
| Agreed to take COVID-19 test | 90 (68.2) | 216 (66.7) | 0.422 | 126 (72.4) | 180 (63.8) | 0.036 |
| Respected social distancing | 84 (63.6) | 174 (53.7) | 0.061 | 102 (58.6) | 156 (55.3) | 0.277 |
| Isolation | 60 (45.5) | 108(33.3) | 0.010 | 72 (41.4) | 96 (34.0) | 0.023 |

of depression was 61.8%. In a systematic review of mental health disorders in Bangladesh, prevalence rates of 6.5–31.0% (among adults) and 13.4–22.9% (among children) were reported.³⁰ These figures are compatible with another study in which the pooled prevalence of depression was 25.3%.³¹ Therefore, the prevalences of 71.1% of anxiety and 61.1% of depression in the present study are higher and of concern. Such rates should prompt healthcare providers to be particularly aware of the psychological

responses in the communities they serve during the COVID-19 pandemic. Many studies have shown that the COVID-19 pandemic is a major factor associated with mental depression and anxiety.^{32–34} The causes of these mental states include the isolation of people with the disease and the socio-economic effects of the pandemic on households.³⁵

The present study aimed to identify risk factors that would enable healthcare systems to act accordingly, and

Table 4 Independent Determinants of Anxiety in the Study Population

| Independent Factor | p | Unadjusted OR (95% CI) | p | Adjusted OR (95% CI) |
|-----------------------------|--------|------------------------|--------|----------------------|
| Gender | | | | |
| Male | | 1 | | 1 |
| Female | <0.001 | 5.34 (3.36–8.50) | <0.001 | 6.66 (3.83–11.57) |
| Age | | | | |
| <50 years | | 1 | | 1 |
| ≥50 years | <0.001 | 14.44 (6.18–33.7) | <0.001 | 16.96 (7.06–40.75) |
| Educational level | | | | |
| High | | 1 | | 1 |
| Low | <0.001 | 2.36 (1.55–3.58) | 0.008 | 2.72 (1.62–5.84) |
| Non-acceptance of isolation | | | | |
| Yes | | 1 | | 1 |
| No | 0.015 | 1.67 (1.10–2.52) | 0.025 | 1.64 (1.15–3.19) |

Table 5 Independent Determinants of Depression in the Study Population

| Independent Factor | p | Unadjusted OR (95% CI) | p | Adjusted OR (95% CI) |
|--------------------|--------|------------------------|--------|----------------------|
| Age | | | | |
| <50 years | | 1 | | 1 |
| ≥50 years | <0.001 | 10.90 (5.80–20.51) | <0.001 | 13.64 (6.17–30.14) |
| Profession | | | | |
| Student | | 1 | | 1 |
| Official | 0.257 | 0.67 (0.33–1.34) | 0.157 | 0.52 (0.21–1.29) |
| Liberal occupation | 0.063 | 2.00 (0.96–4.15) | 0.542 | 1.27 (0.59–2.74) |
| No occupation | <0.001 | 2.65 (1.62–4.24) | 0.006 | 3.21 (1.40–7.38) |
| Marital status | | | | |
| Single | | 1 | | 1 |
| Married | <0.001 | 2.44 (1.62–3.66) | 0.839 | 1.07 (0.54–2.14) |
| Widowed/divorced | <0.001 | 7.41 (3.02–18.18) | 0.833 | 1.15 (0.31–4.27) |
| Educational level | | | | |
| High | | 1 | | 1 |
| Low | 0.001 | 1.91 (1.30–2.81) | 0.199 | 1.35 (0.86–2.12) |

provide the necessary strategic and localized interventions to reduce such risk. Among the various risk factors identified, several are comparable to prior reported findings. For example, old age was associated with psychiatric morbidities during the SARS outbreak.³⁶ Being female, having a low educational level and no occupation have also been found to carry a generally higher risk of developing psychological problems during both the COVID-19 pandemic period³⁷ and other non-COVID-19³⁸ pandemic periods. This study also found that participants included in the anxiety or depression group had significant correlations with aspects of the COVID-19 pandemic. However,

there was an association between respondents' isolation and anxiety or depression. The effects of anxiety or depression due to COVID-19 exposure could lead to severe mental disorders or suicide.^{39–43} Notably, the different states of anxiety or depression were best distinguished by the associations between the regulation of emotions and the COVID-19 pandemic. Consistent with this interpretation, the participants in the present study with anxiety or depression were older, female, and tended to refuse isolation (independent determinants). Old people tend to be more sensitive to the perceived judgment of others. Given that the disease kills more elderly people,

because of their status and having more comorbidity, having popular role models wearing masks may help in this case.³⁴ Lockdown and its sudden implications for future studies, ubiquitous social distancing affecting interpersonal relationships, and contagious infodemics on social media act as factors intensifying the psychological response of the elderly.^{35,44} In agreement with previous studies,^{2,45–47} this work has revealed a greater risk of anxiety in women than in men. This fact suggests that we should pay more attention to vulnerable groups (old people, women, and people with a morbid history). Therefore, any circumstances in which preventive measures against the pandemic appear to fail owing to a variety of circumstances, and lead to a surge in COVID-19 cases, may further exacerbate the occurrence of such serious psychological problems.

Study Limitations

Although the present study contributes important data to our understanding of the psychological impacts of an epidemic, there are still several limitations. First, the study gathered data, without drawing any conclusions about the causal relationships between exposure to COVID-19 and psychological aspects. Second, the study only examined concepts reflecting psychopathology using a HADS score and did not include other measures of functioning resilience. Despite its limitations, the present study describes a strong model trio for participants during a stressful epidemic. Moreover, the results demonstrate that more attention needs to be paid to vulnerable groups such as the elderly, women, and people with a history of disease.

Conclusion

This study shows that more than half of the population surveyed during the COVID-19 pandemic had anxiety and depression. Old age, female gender, lack of occupation, and isolation are independent determinants of anxiety and depression.

Acknowledgments

We thank all who participated in the study.

Author Contributions

All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors declare no conflicts of interest for this work.

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