

## **Anxiety-related psychological impacts in the COVID-19 pandemic on cardiovascular diseases and diabetes**

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## **Abstract**

Patients and the general public are under insurmountable psychological pressure which may lead to various psychological problems, such as anxiety, fear, depression, and insomnia, causing, consequently, the impaired quality of life. Psychological crisis intervention plays a pivotal role in the overall deployment of health-related quality of life and disease control. A novel Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), a pathogen of the new coronavirus disease (COVID-19), has affected several sector activities, including people's health. To enhance infection control methods, appropriate interventions, and public health policies, the present study aims to assess the fear and peri-traumatic stress during the Covid-19 in Brazil. **Method:** A cross-sectional survey has been conducted from April 12th to 18th using the Peri-Traumatic Distress Scale (CPDI) and the Fear Scale (FCV-19S) aiming to measure the peri-traumatic stress and fear as psychological reactions during the COVID-19 pandemic. For that purpose, an online spreadsheet was used to send the questionnaire and scales to a sample of 1844 participants as a collecting information tool. After the data analysis, the individuals were separated into 4 groups: Group 1 (1232) population without chronic health conditions; group 2 (298) patients with previous psychological suffering, group 3 (229) patients with cardiovascular diseases, group 4 (71) patients with diabetes. For analysis, G1 and were considered control for comparison with groups 2, 3 and 4 in accordance with One-Way Anova followed by Bonferroni test. **Results:** All the groups showed the CPDI and FCV-19S increased in comparison with the G1 group. Concerning CPDI, the G 3 was increased when compared to G1, G2 and G4. The G3 had the FCV-19S higher in comparison with G1, G2 and G4. **Conclusion:** The COVID-19 pandemic had a significant impact on the Brazilian population, with patients with heart disease and hypertension presenting the highest numbers of stress and fear, with numbers comparable and even higher than those who reported previous psychological distress.

**Keywords:** Mental Health; Anxiety Reactions; Fear; Peri-Traumatic Stress; Covid-19; Pandemic.

## **Introduction**

The COVID-19 pandemic of the new coronavirus (SARS-CoV-2) has presented itself as one of the greatest health challenges on a global scale this century. By mid-April, a few months after the outbreak in China in late 2019, there had been more than 2 million cases and 120,000 deaths worldwide from COVID-19.

No one can predict how things will evolve in the coming months, or when a return to some semblance of 'normal' activity might resume (Danese et al. 2020), this can lead the population to experience stress, fear, anguish for a long time.

Previous research has revealed a profound and wide range of psychosocial impacts on people at the individual, community, and international levels during outbreaks of infection. On an individual level, people are likely to experience fear of falling sick or dying themselves, feelings of helplessness, and stigma (Wang et al. 2020).

Pre-existing comorbidities such as hypertension, diabetes, and cardiovascular disease are associated with greater severity and higher fatality rate of covid-19. Furthermore, COVID-19 contributes to cardiovascular complications, including acute myocardial injury as a result of acute coronary syndrome, myocarditis, stress-cardiomyopathy, arrhythmias, cardiogenic shock, and cardiac arrest (Kang et al, 2020).

In a systematic review that included six studies with a total of 1527 patients, Li et al, 2020, evaluated the proportions of hypertension, cardio-cerebrovascular disease and diabetes in patients with COVID-19. The incidences of hypertension, cardio-cerebrovascular disease and diabetes were two to three times and twice, respectively, higher in ICU / severe cases than in non-ICU / severe patients. At least 8.0% of patients with COVID-19 suffered an acute cardiac injury. The incidence of acute cardiac injury was about 13 times higher in ICU / severe patients compared to non-ICU / severe patients (Yang, et al, 2020).

Studies show that individuals with severe illness or multiple comorbidities present higher levels of psychological symptoms in the face of this COVID-19 pandemic situation. In a study that assessed the impact of the COVID-19 pandemic in Spain, Santamaria et al, 2020, showed that individuals who reported chronic diseases had higher average levels of stress, anxiety and depression compared to those who did not report such diseases.

Taking into consideration that hypertensive and diabetic patients are part of the group at risk for the severity of coronavirus infection and that research shows that people with chronic diseases have high levels of psychic suffering caused by COVID-19, it is necessary to evaluate the impact of the pandemic in patients with chronic diseases, especially cardiovascular and diabetes.

In short, in a pandemic of proportions never seen before in Brazil as the one we are now facing, it is important to investigate the psychological impact of the pandemic on real populations so that health authorities can develop strategies to reduce psychological symptoms in a targeted manner to the most vulnerable population. Thus, this study measured stress levels and fear in a sample of adults from all regions of Brazil during the pandemic by COVID-19, making it possible with the data collected to analyze the psychological needs of those facing the pandemic and the possible predictive factors.

## **Methods**

A cross-sectional survey has been conducted from April 12th to 18th using the Peri-Traumatic Distress Scale (CPDI) and the Fear Scale (FCV-19S) aiming to measure peri-traumatic stress and fear as psychological reactions during the Covid-19 pandemics. For that purpose, an online spreadsheet was used to send the questionnaire and scales to a sample of 1844 participants as a collecting information tool. After the data analysis, the individuals were separated into 4 groups: Group 1 (1232) population without chronic health conditions, group 2 (298) patients with previous psychological suffering, group 3 (229) patients with cardiovascular diseases, group 4 (71) patients with diabetes. For analysis, G1 and G2 were considered control for comparison with groups 3 and 4.

Participants first answered a socio-demographic survey that included specific questions about chronic disease prevalence and social isolation levels during the COVID-19 pandemic. Then, we assessed distress by the Peri-Traumatic Distress Index (CPDI), designed as a self-report questionnaire that measures depression, anxiety, avoidance, compulsive behaviour, specific phobias, cognitive change, physical symptoms, and loss of social functioning (Qiu, Shen, Zhao, Wang, Xie & Xu, 2020). The twenty-four questions were presented in a Likert format in five categories of responses (never, occasionally,

sometimes, often, most of the time). CPDI content has been validated by Psychiatrists from the Shanghai Mental Health Center considering its Cronbach's alpha 0.95 ( $p < 0.001$ ) (Qiu, Shen, Zhao, Wang, Xie & Xu, 2020).

We measured fear with the COVID-19 Fear scale (FCV-19S) presented in a Likert format in five categories of responses (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree). It consists of a seven-item unidimensional scale with robust psychometric properties (Cronbach's alpha internal consistency 0.82) reliable and valid in assessing and relieving fears of COVID-19 among individuals (Ahorsu, Lin, Imani, Saffari, Griffiths & Pakpour, 2020). Both scales, FCV-19S and CPDI were authorized by the authors to be used in the research and were translated and adapted to the Brazilian Portuguese language. Concerning the statistical analyses, the data are presented as median, 25th to 75th percentiles. First, the Shapiro-Wilk normality test was performed to check the normal distribution of all data. Data regarding the Fear scale and Peri-traumatic distress were subjected to a one-way repeated-measures analysis of variance (split-plot ANOVA), followed, when appropriate, by Tukey's post hoc test (GraphPad Prism software version 7.0).

## **Results**

First, it was showed the proportion of the interviewees who have health problems, who were in Social isolation, and who have physical disabilities and proportion who practice some sport activity and proportion by age groups. The Wilcoxon-Mann-Whitney test showed a statistical difference between the control group in comparison with 2 and 3 groups (Mann-Whitney  $p < 0.05$ ), as shown in table 1.

**Table 1** - Descriptive table of the interviewees' health data

Variable	Classes	Proportion (%)	Proportion Confidence Interval (IC) – 95%
With health problem	No	65,40	63,17 – 67,57
	Yes	34,60	32,43 – 36,83
	TOTAL	100,00	–
Social isolation	No	12,96	11,48 – 14,60
	Yes	87,04	85,40 – 88,52
	TOTAL	100,00	–
Physical disability	No	98,43	97,72 – 98,93
	Yes	1,57	1,07 – 2,28
	TOTAL	100,00	–
Practices sports activity	No	52,01	49,70 – 54,31
	Yes	47,99	45,69 – 50,30
	TOTAL	100,00	–
Age group	Less than 25	21,20	19,37 – 23,16
	26 a 50 years	63,07	60,81 – 65,27
	51 or more	15,73	14,11 – 17,49
	TOTAL	100,00	–

The CPDI scores of the comparison between the study groups, the Wilcoxon-Mann-Whitney test showed that people with psychological problems or who reported psychological suffering and heart disease and/or hypertension had the highest scores in the comparison with people who reported no health problems (Mann-Whitney  $U = 6399,5$ ;  $p < 0.05$ ), and an important finding is the highest score of hypertensive people compared to all other groups, with higher scores even than those with psychological problems or who reported psychological suffering. Also, diabetic patients had similar values to those who did not report health problems (Mann-Whitney  $U = 42672$ ;  $p < 0.05$ ). These data are shown in table 2.

**Table 2 - CPDI Score – Comparison between groups**

Variable	Class	Media	Media Confidence Interval (IC) – 95%	Minimum Value	1st quartile	Median	3rd quartile	Maximum Value	p-value
CPDI Score	Diabetics	37,93	34,05 – 41,80	10,00	25,00	35,00	47,00	91,00	0,88
	No health problems	37,33	36,49 – 38,18	4,00	25,00	36,00	48,00	85,00	
CPDI Score	Hypertensive/Cardiac Diseases	58,89	51,10 – 66,68	19,00	50,00	61,00	70,50	93,00	0,00
	No health problems	37,33	36,49 – 38,18	4,00	25,00	36,00	48,00	85,00	
CPDI Score	With psychological distress	51,62	49,87 – 53,44	11,00	41,75	54,00	62,00	93,00	0,00
	No psychological distress	37,28	36,52 – 38,05	4,00	25,00	36,00	47,00	92,00	

In Table 3, is referring to the FEAR scale scores. The G3 had the FCV-19S higher in comparison with G1, G2 and G4. The Wilcoxon-Mann-Whitney test showed that the comparison between the study groups shows behaviour similar to the data in Table 2 referring to the CPDI scale (Mann-Whitney  $p < 0.05$ ), except in comparisons between diabetics and no health problems, where there is a tendency to have a greater impact on diabetic patients Mann-Whitney  $U = 47572$ ;  $p < 0.05$ ).

**Table 3 – Fear Score – Comparison between groups**

Variable	Class	Media	Media Confidence Interval (IC) – 95%	Minimum Value	1st quartile	Median	3rd quartile	Maximum Value	p-value
Fear Score	Diabetics	18,90	17,19 – 20,61	7,00	13,00	18,00	23,75	35,00	0,07
	No health problems	17,28	16,92 – 17,64	7,00	12,00	16,00	22,00	35,00	
Fear Score	Hypertensive/Cardiac Diseases	23,78	20,86 – 26,69	7,00	19,00	25,00	29,50	34,00	0,00
	No health problems	17,28	16,92 – 17,64	7,00	12,00	16,00	22,00	35,00	
Fear Score	With psychological distress	20,84	20,06 – 21,62	7,00	15,00	21,00	26,00	35,00	0,00
	No psychological distress	17,56	17,23 – 17,89	7,00	13,00	17,00	22,00	35,00	

## **Discussion**

Psychiatric disorders and impairment of the psychological reactions have been related to cardiovascular diseases, especially hypertension, which is also observed in diabetic patients. Moreover, in a pandemic situation, little is known about the impacts of an event of the magnitude of COVID-19 pandemic on the mental health of hypertensive and diabetic patients. Studies including systematic reviews have shown that people with chronic diseases are more impacted by COVID-19 in comparison with healthy people, then the risk of contracting the severe form of Sars-CoV-2 (Wang et al, 2020; Liu et al, 2020), and the psychological consequences of the pandemic by COVID-19 (Santamaria et al, 2020), but specific data on patients with cardiovascular diseases and diabetes are scarce.

Population exposure to trauma, such as witnessing and caring for severely ill people, perceived life-threatening, mortality and bereavement, deaths of health professionals, may impair the population's mental health, increasing the risks of developing psychic suffering and progression to psychopathology, among them post-traumatic stress disorder (PTSD) (Neria et al, 2011; Shultz et al., 2015).

People react to stressful psychological factors such as fear, indifference, fatalism, anxiety, depression and the like very differently from each other (Taylor, 2019). Besides, hypertension, diabetes and cardiovascular diseases have been identified as possible risk factors for more severe in patients with Sars-CoV-2 (Martinez-Ferran et al, 2020), this may lead this part of the population to present higher levels of psychological symptoms since COVID-19 tends to present more severely in individuals with multiple comorbidities.

Wang and collaborators (2020), evaluated 1210 volunteers through the Depression, Anxiety and Stress Scale (DASS-21). In total, 53.8% of the interviewees classified the psychological impact of the outbreak as moderate or severe; 16.5% reported moderate to severe depressive symptoms; 28.8% reported moderate to severe anxiety symptoms, and 8.1% reported moderate to severe stress levels.

Furthermore, to deal with and eliminate the stigma associated with the epidemic, it is necessary to create strategies to deal with the psychological stress of the post-pandemic period (Wang et al, 2020), especially people with chronic diseases.

In our study we found a high level of psychological suffering in patients with cardiovascular and diabetic diseases, which can be explained in part by the high levels of psychological suffering found in hypertensive and diabetic patients even at non-pandemic times, however, there is evidence of a greater impact of the pandemic by COVID-19 on the mental health of this part of the population.

In a study of 52,095 hypertensive patients from 19 countries, Stein et al, 2014 describe that depression, anxiety and eating disorders were significantly associated with the subsequent diagnosis of hypertension.

Li et al, 2015 in a meta-analysis of 10,194 hypertensive patients in 27 studies using self-evaluation scales of depression found a high prevalence of depression (29.8%), similar numbers to those found by Gebre et al, 2020 in a study of 310 hypertensive patients (24.7%).

Diabetic patients, on the other hand, present similar levels of psychological suffering, ranging from 17 to 28.8% in different studies and countries (Alajmani et al, 2019, Park et al, 2015). In our study, people with diabetes had high levels of stress and fear, but with no statistical difference to volunteers without diabetes, however, both have high levels of stress and fear in the face of the pandemic by COVID-19.

Studies show that individuals with severe illness or multiple comorbidities present higher levels of psychological symptoms in a crisis. In a study that assessed the impact of the COVID-19 pandemic in Spain, Santamaria et al, 2020, showed that individuals who reported chronic diseases had higher average levels of stress, anxiety and depression compared to participants who did not report such diseases.

Yang et al, 2020, in a study that evaluated 1099 patients with COVID-19, of which 173 had the severe form of the disease having as risk factors comorbidities, being arterial

hypertension (23.7%), diabetes mellitus (16.2%), coronary diseases (5.8%) and cerebrovascular disease (2.3%).

In fact, in our study, individuals with cardiovascular diseases, including hypertension, had significantly higher levels of peri-traumatic fear and stress than individuals who do not have chronic diseases. The scores assessed by the Fear scale (FCV-19S) were 23.78, indicating a mean level of fear, which is repeated with the evaluation of peri-traumatic stress by the Peri-Traumatic Distress Index (CPDI) with a score of 58.89 indicating a severe score. This shows that this population should receive special attention from public health agencies with the implementation of policies aimed at mental health monitoring during the pandemic and post-pandemic periods.

In conclusion, it was evidenced that two main factors lead hypertensive and diabetic patients to have such high levels of psychic suffering during the pandemic by COVID-19, first that this population already suffers from higher levels of depression and other psychic problems, according to the knowledge and constant disclosure that these people belong to the group at risk for development of severe form and evolution to death by COVID-19.

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