Chapter #21

ANXIETY AND DEPRESSION IN POST ACUTE MYOCARDIAL INFARCTION PATIENTS DURING COVID-19 PANDEMIC

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ABSTRACT

Introduction: Anxiety and depression are common in post-infarction patients. In the current state of uncertainty in the world during the COVID-19 pandemic, these feelings may be heightened in the entire population, especially in those considered high-risk groups. **Objective:** To estimate the prevalence of anxiety and depression among infarcted patients at a cardiological Hospital of South of Brazil and to compare the case group with a community control group. **Methods:** Case-control study with post-myocardial infarction patients who were attending at a Cardiological hospital were considered eligible. A control group from the same community were added for comparative analysis. The anxiety and depression were evaluated by the HADS (Hospital Anxiety and Depression Scale). **Results:** A total of 52 patients and 104 matched controls were interviewed. The prevalence of anxiety was 36.5% and of depression 28.8% in the case group and was 31.7% and 28.8% in the control one. **Conclusions:** The prevalence of anxiety and depression was higher than those described in the literature for infarcted patients, which corroborates the hypothesis that the pandemic may be aggravating the patient's emotional state, however, the control group also presented a high prevalence of these emotional states, demonstrating that the pandemic affected the entire population.

Keywords: anxiety, depression, myocardial infarction, COVID-19.

1. INTRODUCTION

Patients with heart disease generally experience negative psychological states (Mal, Awan, Ram, & Shaukat, 2019). The acute myocardial infarction (MI), popularly known as heart attack, occurs due to thrombosis and sudden occlusion of a coronary artery due to atherosclerotic plaque rupture, fracture or erosion (Libby, 2001).

Despite the great medical advances in relation to the physical sequelae of post myocardial infarction (MI) patients, the sequelae psychological causes are still not fully recognized. MI causes a severe impact to the patient, significantly reducing the quality of life, increasing the subject's rehospitalization rate as well as their levels of stress and exhaustion (Kumar & Nayak, 2017). Increasingly, attention is being paid to mood disorders in patients recovering from acute myocardial infarction, especially since depression was first reported to be associated with increased mortality in this group of patients (Rosengren et al., 2004).

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Depression is three times more common in patients after a myocardial infarction than those who have never suffered one (Thombs et al., 2006). A study reported that about 31% of patients in post-MI experience anxiety, with women presenting a higher incidence (Kumar & Nayak, 2017).

The World Health Organization (WHO) recognized the coronavirus disease (COVID-19) pandemic on March 11th, 2020 (Buss, Alcázar, & Galvão, 2020). In Brazil, the first confirmed case was in the state of São Paulo, on February 26th.

The COVID-19 pandemic has changed the reality of people's lives and will have long-lasting ramifications for the health of the population and the health system (Khera et al., 2020). The worsening of mental health has been documented worldwide in this period, with symptoms of post-traumatic stress, panic disorder, depression, anxiety, and self-perceived stress on the rise, even after adjustments for previous psychiatric illnesses and a history of childhood trauma, suggesting that the COVID-19 pandemic is having an independent effect on the mental health of the population (Rossi, et al., 2020).

Generally, in the event of a pandemic, people's physical health and the fight against the pathogenic agent are the primary focus of attention for managers and health professionals (Ferguson, et al., 2020). However, measures that may reduce the psychological impacts of the pandemic cannot be overlooked at this time (Wang, et al., 2020).

The present study aims to estimate the prevalence of anxiety and depression in patients suffering a myocardial infarction attended during the covid-19 pandemic at the Institute of Cardiology of Rio Grande do Sul, Brazil. This study compared clinical characteristics and risk factors between groups of infarcted patients with and without anxiety and depression symptoms. It also compared the prevalence of those psychological states within a sample of the general population.

2. BACKGROUND

The Interheart study (Rosengren et al., 2004), a large population-based case-control study on risk factors for acute myocardial infarction, had one of its "arms" in psychosocial risk factors. In an article published in the *Lancet* in 2004, which included 11,119 cases and 13,648 controls from 52 countries, the researchers demonstrated that both depression and stress are independent risk factors for acute coronary syndrome. This study was the first to demonstrate that permanent stress at home or at work doubles the chances of a heart attack (odds ratio = 2.17), while the presence of depressive feelings increases by 55% and the diagnosis of depression can increase the risk to 65%.

Owing to these results, people began to pay attention to psychosocial factors. Many studies have been published on the prevalence of these and other emotional states correlating with morbidity and mortality. Some prevalence studies before and during the pandemic in both infarcted and healthy patients are cited below.

Larsen, Christensen, Nielsen & Vestergaard (2014) showed a prevalence of 23.6% of anxiety and 18.6% of depression approximately 3 months after a myocardial infarction in a cohort of 896 people, evaluated with the HADS scale. They followed the participants for 3 years to check the occurrence of cardiovascular events and mortality. In models fully adjusted for traditional risk factors, anxiety was not an independent risk predictor, neither for mortality nor for events, and depression was a risk predictor for mortality.

Kala et al. (2016) conducted a year-follow-up with 79 postinfarction patients undergoing primary percutaneous coronary intervention. Patients were evaluated in the first 24 hours post-intervention, at discharge, and at 3, 6, and 12 months using the Beck

Depression Inventory (BECK-II) and the Self-rating Anxiety Scale (SAS). The prevalence of depression within 24 hours was higher on both scales, decreasing at discharge, gradually increasing up to 6 months, and then decreasing again. Depression in 24 hours decreased by 21.5% to 9.2% at hospital discharge and increased to 10.4%, 15.4%, and 13.8% at 3, 6, and 12 months, respectively. Anxiety followed the same trend, with a prevalence of 8.9% after the intervention and 4.5%, 10.8%, and 6.2% in the follow-ups.

Another study with patients undergoing primary percutaneous coronary intervention found a prevalence of depression of 19.7% and anxiety of 22.9% by HADS. This study aimed to assess the predictive value of these psychological characteristics in terms of 10-year mortality. Anxiety at baseline was associated with an increase in the 10-year mortality rate after PCI. Depression was also associated with a higher 10-year mortality; however, this association disappeared after further adjustment for anxiety. This finding was more pronounced in patients with stable angina than in those with acute coronary syndrome in which there was no association between depression or anxiety and 10-year mortality (de Jager el al., 2018).

We found a study from Singapore on health-related quality of life that evaluated 81 patients with cardiovascular disease in the period before and during the pandemic. Patients were evaluated with the EQ-5D, a generic health status instrument with five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression). The authors demonstrated an increase in the anxiety and depression scores during the pandemic: from 12.5% pre-pandemic to 23.5 during pandemic. (Lim et al., 2020)

In contrast, mental health in healthy subjects was less studied before the pandemic. A WHO survey estimated that in 2015 about 3.6% of the global population had anxiety disorders and 4.4% depression.

In addition to this global survey, in healthy people, we found studies with varied samples, such as in the elderly (Yu et al., 2016) and graduate health sciences students (Hoying, Melnyk, Hutson, & Tam, 2020) just to illustrate. We can also cite a systematic review and meta-analysis of the prevalence of depression and depressive symptoms in different clinical departments. Overall, the prevalence of depression or depressive symptoms among outpatients was 27.0%. (Wang et al., 2017).

The COVID-19 pandemic caused by the new coronavirus (SARS-CoV-2) has been one of the greatest global health challenges of this century. Insufficient scientific knowledge about the new coronavirus, its high dissemination and mortality have generated uncertainties about what would be the best strategies to be used to fight it in different parts of the world. As we have already stated, in a pandemic context, people's physical health and combating the pathogen are the main focus of attention, as well as the development of vaccines and medicines. However, understanding the psychological impact on health cannot be ignored.

Never before has the population's mental health received so much emphasis. Psychological factors have been extensively studied around the world. Robb et al. (2020) conducted a registry of people over 50 who had consented to be contacted for research related to aging. A total of 7,127 men and women participated in the baseline survey and answered the HADS scale. They found a prevalence of 12.8% for anxiety and 12.3% for depression. Another study (Salari et al., 2020) showed higher values of 31.9% for anxiety and 33.7% for depression. The differences are justified by the study sample and the diversity of the instruments. The HADS scale seems to be the most widely used scale. To understand the influence of the pandemic on the prevalence of these psychosocial risk factors in patients with acute myocardial infarction, we conducted this study.

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3. METHODS

3.1. Participants

Case-control study with post-myocardial infarction patients, according to the V Guideline of the Brazilian Society of Cardiology for the treatment of acute myocardial infarction with ST-segment elevation (Sociedade Brasileira de Cardiologia, 2015). Exclusion Criteria: Previous documented history of dementia, cognitive difficulties, or psychiatric diagnosis. In the control group, surveys that were incomplete were excluded.

Post-myocardial infarction patients attending a Cardiology Hospital of South of Brazil were contacted between February and June 2020, via telephone calls, in order to explain the purpose of the present study. The interviews were carried out after the consent form was read to the patient and the patient consented to participate. All interviews were conducted by a psychologist. The patient sent an SMS message with the word "yes" to the researchers' phones, expressing their agreement to participate in the study.

The control group was evaluated between May and June 2021 using an electronic form built in REDCap® (**R**easerch **E**lectronic **D**ata **Cap**ture). Invitations were distributed by social media along with a link to access the form. Men and women with over 50 years and no cardiovascular disease were invited to participate. Inside the form there was a Consent Form to be accepted by the participant. Risk factors for cardiovascular disease were recorded. This study was approved by the institution's ethics committee.

3.2. Instrument

The instrument used was the HADS (Hospital Anxiety and Depression Scale), a scale translated and validated by Botega, Bio, Zomignani, Garcia Jr. and Pereira (1995). The goal is to screen mild degrees of affective disorders in non-psychiatric environments and that is why it has been used in patients with organic illness. It consists of 14 multiple choice items, seven of which are aimed at assessing the anxiety (HADS-A) and seven for assessing depression (HADS-D). Each item can be scored from 0 to 3, reaching a maximum of 21 points in each subscale. Scores of 8 to 11 points denote possible and from 12 to 21 denote probable cases of anxiety or depression. In this study, the cut-off points assumed was a score equal to or greater than 8. The HADS was used in the electronic format and answered by the control group.

3.3. Statistical analysis

The sample calculation was performed in the WINPEPI program, version 11.65, considering a power of 80% and a significance level of 5% and a proportion of 0.6 between the groups with and without depression. The data were based on the article by Thombs et al (2006) that showed several prevalences of depression in studies with the HADS scale. There is a variation of 11% to 17% in one study and, in another, 15.5% (CI-13 to 18%). So, considering a 0.6 ratio between depressed and non-depressed, 49 participants were required.

Patients were divided into groups with and without anxiety and depression according to the HADS scale. A control group was added for comparative analysis. Continuous variables were shown as mean and standard deviation and categorical variables using frequency. They were compared using the Student's t-test or Chi-square. The data were analyzed using SPSS software, version 26.0.

3.4. Ethical and legal considerations

This protocol is in accordance with the Helsinki declaration and was approved by the local ethics committee.

4. RESULTS AND FUTURE RESEARCH DIRECTIONS

In Figure 1 is shown a flowchart of the study, containing both groups.
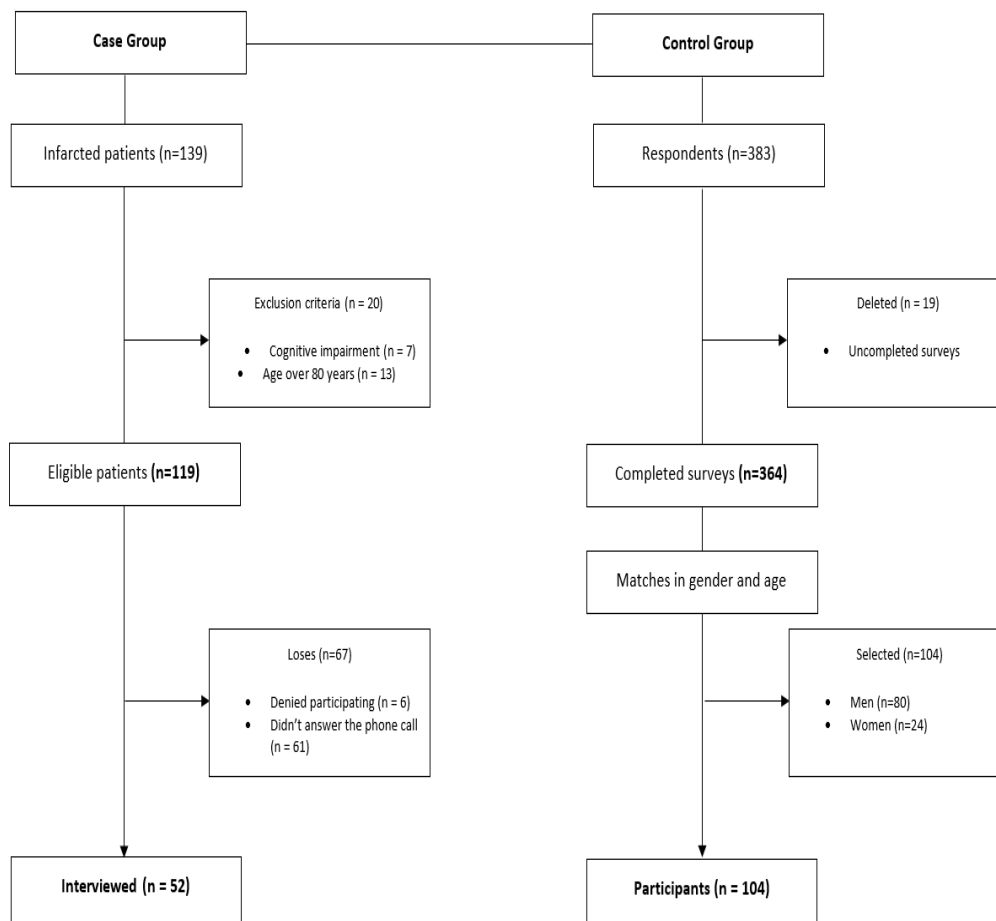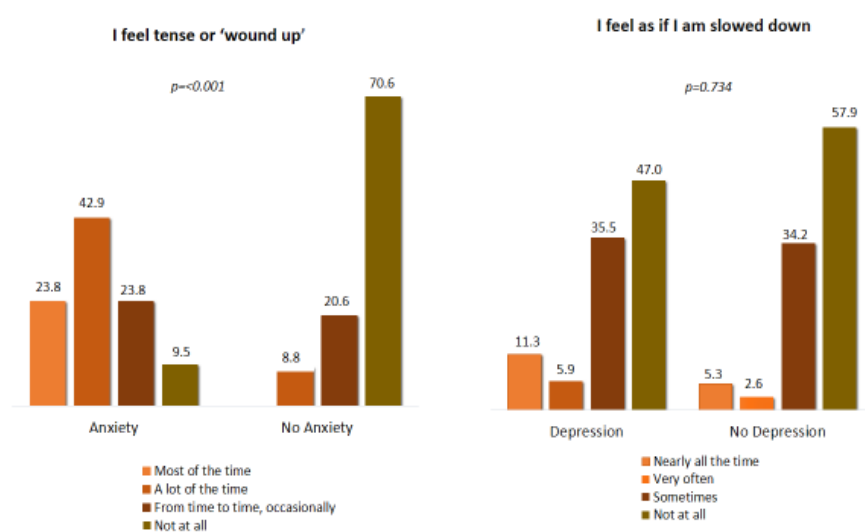
Figure 1:
Study Flowchart.

Table 1.
Anxiety and depression rates according to previous medical history in post-infarction patients.

	Anxiety	No Anxiety	p	Depression	No Depression	p
Sex						
Male	36.60%	63.40%	0.677	29.30%	70.70%	0.652
Female	42.90%	57.10%	0.677	35.70%	64.30%	0.652
Risk Factors						
Smoking	42.90%	41.20%	0.948	41.20%	42.10%	0.304
Hypertension	47.10%	50.00%	0.389	47.10%	57.90%	0.456
Diabetes	33.30%	44.10%	0.428	41.20%	39.50%	0.905
Dyslipidemia	9.50%	29.40%	0.083	11.80%	26.30%	0.227
Premature Family History for CAD	19.00%	21.00%	0.890	18.00%	21.00%	0.770
Chronic Kidney Failure	9.50%	0.00%	**0.067**	5.90%	2.60%	0.552
Acetylsalicylic treatment	28.60%	9.10%	**0.061**	28.60%	16.20%	**0.061**
Three vessel disease	23.80%	15.60%	**0.088**	23.50%	16.70%	0.134

Regarding the HADS scale, it was observed that the patients suffering from anxiety felt tense and wound up for a significant period of time compared with those not suffering from anxiety (42.9% vs 8.8%) (Figure 2). Among those suffering from depression, the majority (58.9% vs 5.3%) felt pleasure occasionally while watching or listening to a TV or radio program or while reading something. All questions were statistically significant among participants with and without anxiety and depression, with the exception of one iten on the depression scale which affirmed: "I feel as if I am slowed down" (Figure 2).

Figure 2.
HADS Scale response example.

Regarding the control group (Figure 1) 19 forms were excluded for being incomplete. Of the 364 forms, we selected two controls for each case, matched for gender and age. Thus, of the 52 patients, 40 men and 12 women, we obtained 104 controls, 80 men and 24 women, with the same age range (56 ± 11 years, p =659). The control group had a low prevalence of cardiovascular risk factors (36% Hypertension, 7% diabetes, 11% Dyslipidemia and 12% Smoking).

In the control group, 31.7% of the participants presented anxiety, and 28.8% presented depression during the current COVID-19 pandemic. There was no statistically significant difference between the prevalence of anxiety and depression between post infarction patients and their controls. Comparing specifically to anxiety issues, we found a difference in relation to "I feel tense or wound up" where 23.1% of patients responded "occasionally" compared to 64.4% of the control group (p<0.001). Another statistically significant question was "Worrying thoughts go through my mind" in which 23.1% of cases responded "only occasionally" compared to 5.8% of the control group (p=0.013) (Figure 3). Finally, the question "I can sit at ease and feel relaxed", the patients group answered 9,6% "not at all", while the control group answered zero points (p=0.009).

In relation to depression, 25% of patients answered "sometimes" for "I feel cheerful", while 51% of the control group answered the same thing (p=0.002). The patients didn't lost interest in their appearance, as they take just as much care as before, while the control group seems more affected (63.5% vs 46.2%, p=0.017) (Figure 4). Finally, patients felt "slowed down" nearly all the time more often than the control group (53.8% vs 18.3% p<0.001).

Figure 3.
Comparison of percentage of HADS-A scale responses between case and control groups.
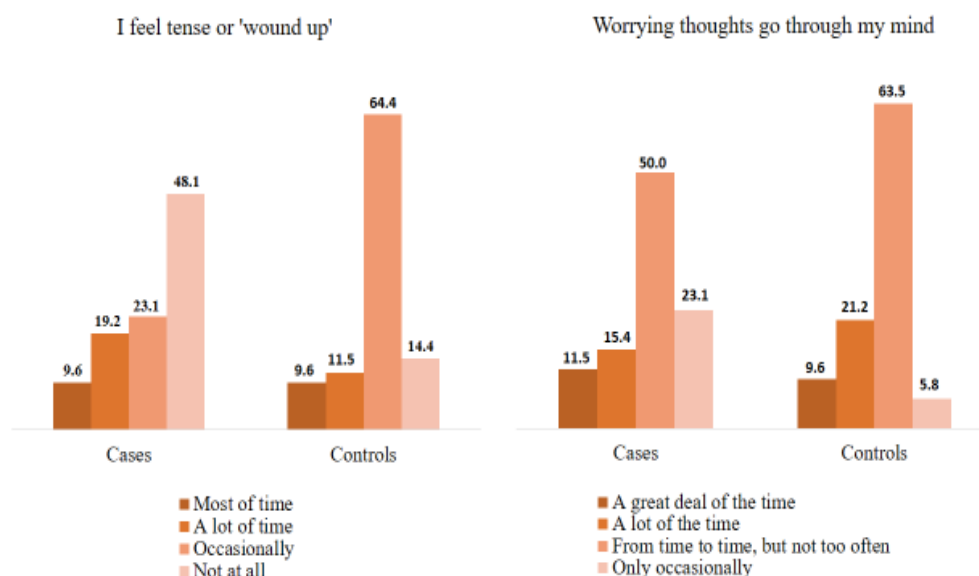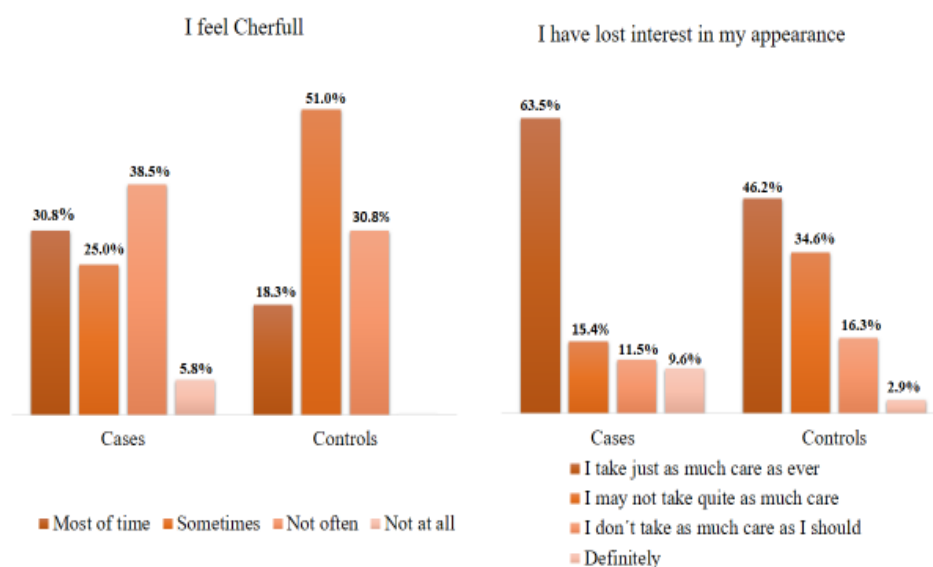
Figure 4.
Comparison of percentage of HADS-D scale responses between case and control groups.

These data made it possible to establish psychological post infarction care routines at hospital, reducing the impact of psychological factors. Public measures of psychological assistance to the population must be taken too. On our part, for the controls ones, at the end of the questionnaire, the participants viewed a message of thanks for their participation, with a suggestion to take care of their mental health, looking for a professional they trust or through the suggestions of the researchers which were written, and we informed the contact numbers of psychology clinics linked to universities and public services.

5. DISCUSSION/CONCLUSION

In this study we found 36.5% of the infarcted patients displayed anxiety, and 28.8% displayed depression during the current COVID-19 pandemic. The study conducted by Kala et al (2016) in which he evaluated patients after the infarction episode, found three months after AMI, 10.4% had levels of depression and 4.5% of anxiety. In another study that measured the presence of anxiety and depression in infarcted patients using HADS, it was found that 23.3% of patients had anxiety and 18.6% depression (Larsen et al., 2014). Both studies displayed a lower prevalence of anxiety and depression than that was found in this study. It is possible that the knowledge among cardiovascular patients that they belong to the group at highest risk of complications for COVID-19 causes a constant state of alertness and anxiety. This hypothesis is supported by a nationally representative survey of an American study that found out that the prevalence of depression symptoms in the US increased more than 3-fold during the COVID-19 pandemic. Additionally, the authors emphasized that people with more exposure to stressors had greater odds of depression symptoms. (Ettman et al, 2020).

It was also possible to perceive a greater tendency towards anxiety in patients with chronic renal failure, three-vessel disease and those in continuous treatment with acetylsalicylic. The emotional state of patients with chronic diseases has been extensively studied (Lebel et al., 2020). Since they have to deal with the persistence and unpredictability of their illness, they often report feeling anxious and worried. With respect to depression, the levels of depression were higher in those who use acetylsalicylic acid, which may indicate chronic heart disease, as shown in the literature the association between depression and comorbidities (Carvalho et al., 2016). Similar results were reported by de Jager et al (2018) in which the majority of patients with depression were women, had a past history of infarction or cardiac surgery and diabetes.

As we found all the statistically significant issues among the participants with and without anxiety and depression, we can assume that the test is valid to dignify them from the cut-off point of 8, which proposes to classify the subjects with possible anxiety or depression. The screening process was adequate and provided sufficient suitable candidates. With reference to "I feel as if I am slowed down", this was not significant as it may be a common symptom in post-infarction patients, due to the fear of overexertion and suffering another infarction or some other complication.

The experience of acute myocardial infarction is often traumatic for the subject and may have sequelae in addition to the physical. The COVID-19 pandemic appears as yet another risk factor for mood disorders, as the population has seen their lives change completely from one day to the next: physical and social isolation, unemployment, constant fear of an unknown and potentially fatal virus. We found prevalences of anxiety and depression higher than those described in the literature for this population, which corroborates the hypothesis that the pandemic may be aggravating the emotional state of patients after a heart attack.

Despite all that was said about the infarcted patients and the pandemic, we have not been able to demonstrate a significant difference between them and the general population. Similarly, patients in the control group had similar levels of anxiety and depression. This may have been due to the pandemic, as in previous studies with the Brazilian population, such proportions contrasted with what is now reported. The general population rates showed an average of 13.6% for disorders anxiety-related and 4.4% for those related to depression (WHO, 2017).

The pandemic brought insecurity and fear to the population, especially to older adults (Ornell, Schuch, Sordi, & Kessler, 2020). The pandemic caused several stressful events, such as fear of contamination, hospitalization, death and loss of loved ones by COVID-19. Besides the aspects of the virus, it also brought relationship difficulties; changes in work routines; unemployment, financial, supply or housing problems (Mimoun, Ari, & Margalit, 2020; Rossi et al., 2020). In addition, long-term social isolation caused frustration, boredom, loneliness, and the lack of adequate information from public health authorities were also documented as stressful events (Brooks, et al., 2020)

In a systematic review with meta-analysis, about the stress, anxiety and depression in the general population during the period of the pandemic, it was revealed that the prevalence of anxiety in 17 studies in a sample of 63,439 people was 31.9% and the prevalence of depression in 14 studies totaling a sample of 44,531 was 33.7% (Salari et al., 2020).

The CHARIOT COVID-19 Rapid Response Study was designed to investigate the impact of COVID-19 and associated social isolation on mental and physical wellbeing in individuals aged 50 years and over. This study investigated changes on the 14 components of the Hospital Anxiety Depression scale (HADS) after lockdown was introduced in the London, United Kingdom. The authors found that a total of 12.8% of participants reported

feeling worse on the depression components of HADS (7.8% men and 17.3% women) and 12.3% reported feeling worse on the anxiety components (7.8% men and 16.5% women). (Robb et al., 2020).

In the "ConVid Behavior Research" a cross-sectional study with 45,161 adult Brazilians, 53.6% female and the majority young (45.7% between 18 and 39 years old), revealed that 52.6% frequently felt anxious or nervous, 40.4% felt sad or depressed, with higher prevalence in women compared to men. (Barros et al, 2020). This increased in Brazilian rates in relation to the others due to the study's sample, predominantly of younger and women, which were more affected by anxiety and depression. It was known that women tend to suffer more from anxiety and depression when compared to men (Thombs et al., 2006). Similarly, in the London study, female younger participants, who were single/widowed/divorced, reported poor sleep, feelings of loneliness and the ones who reported living alone were more likely to indicate feeling worse on both the depression and/or anxiety components of the HADS. There was a significant negative association between subjective loneliness and worsened components of both depression and anxiety. (Robb et al., 2020).

In relation to young people, we can consider the hypothesis that they may have suffered more directly the economic impacts of the pandemic, with temporary or permanent loss of employment (Mimoun et al., 2020). The interruption of professional activity in the pandemic has been reported as a factor that can generate loss of confidence, self-esteem, and control, especially when the person perceives himself as a burden on society and feels a lack of belonging that contributes to emotional suffering (Brooks et al., 2020). The COVID-19 pandemic has increased the situation of vulnerability of the Brazilian population, with high rates of unemployment and reduced income (Werneck & Carvalho, 2020)

This study has some limitations, such as: 1) Interviews with patients were conducted over the phone and not in person. Due to the pandemic, the circulation of researchers in the hospital was suspended. 2) Although we performed age-sex matching in order to make the groups more comparable and minimize distortions, other uncontrolled confounding factors may be related to anxiety and depression both among patients and in the community sample. 3) Still, although we requested that only participants over 50 years of age and without cardiovascular disease complete the questionnaire, there may have been information bias since no method was used to prove the absence of the disease, we only assessed the prevalence of risk factors.

The prevalence of anxiety and depression found in the sample of post-infarction patients were higher than described in the literature, which corroborates the hypothesis that the pandemic may be aggravating the patient's emotional state. These results made it possible to establish post-infarction psychological care routines at hospital, reducing the impact of these psychological factors on health. This study indicate that MI patients should have been taking psychological support whether pandemic or not. However, the control group also presented a high prevalence of these emotional states, demonstrating that the pandemic affected the entire population. Mental health care of the population needs to be established.

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