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# Psychological Impact of the Pandemic on Ambulatory Cardiometabolic Patients Without Evidence of SARS-CoV-2 Infection. The CorCOVID Latam Psy Study

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**Abstract: Background:** The COVID-19 pandemic's mental health consequences remain unknown. **Aim:** To

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assess the mental health status of ambulatory cardiometabolic patients during COVID-19 pandemic lockdown in Spanish speaking Latin American countries. **Methods:** Cardiometabolic patients without COVID-19 evidence in 13 Latin American countries answered a survey between June 15th and July 15th, 2020. The *Diagnosis Manual of Mental Disorders* fifth edition was used to identify the presence of major depressive symptoms. **Results:** The sample included 4216 patients, 1590 (37.71%; IC95% 36.24-39.19) were considered suffering major depression. Female gender, consuming  $\geq 5$  medications day, physical activity  $< 100$  minutes weekly, low fruits and vegetables intake, poor treatment adherence, reduced food consumption were independently associated to the presence of major depressive symptoms. **Conclusions:** The CorCOVID Latam Psy study showed that one-third of the Latin American Spanish speaking population is suffering from major depressive symptoms during the COVID-19 outbreak. (Curr Probl Cardiol 2021;46:100737.)

## Introduction

**O**n December 2nd, 2019, a new epidemic of severe acute respiratory syndrome (SARS-CoV2) broke out in Wuhan, China, which was declared a pandemic by the World Health Organization on March 11th, 2020 and named coronavirus-19 disease (COVID-19).<sup>1</sup> Sociocultural, economic and health-system factors limited the implementation of adequate preventive measures and led Latin America to become one of the foci of the pandemic.<sup>2</sup>

Many strict preventive measures were taken by governments in the form of social distancing, quarantining of people coming from highly affected areas or countries, isolation of the infected or suspected individuals or with vulnerable conditions. In Latin American countries, various aspects of life have been affected and impacted by the pandemic, including the economy, industry, global markets, agriculture, human health, and health care. Protocols and changes in lifestyle were established by the political and health authorities to limit population mobility and disease propagation. These changes in routines and behaviors disrupted normal social, economic, occupational, leisure, and religious activities. Most of the population confronted several simultaneous changes that were

challenging and stressful, inducing the appearance or worsening of a diversity of both physical and mental symptoms such as anger, irritability, depression, anxiety, insomnia, loss of interest and emotional exhaustion, among others. Moreover, millions of people were made unemployed. The quarantine curtailed the movement of people potentially exposed to a contagious disease and resulted in a range of psychological conditions and post-traumatic stress symptoms.<sup>3-5</sup>

The WHO had expressed concerns over the pandemic's mental health and psycho-social consequences of self-isolation and quarantine that could affect usual activities, routines, and livelihoods of people that may lead to an increase in loneliness, anxiety, depression, insomnia, and increase in the intake of alcohol and other recreational drugs of abuse.<sup>6</sup> This scenario requires an evaluation of how the pandemic and restrictive measures are affecting the mental health and well-being of people.

The aim of CoRCOVID Latam Psy study was to assess the mental health of individuals during COVID-19 pandemic lockdown in a Spanish speaking population from Latin American countries and its relationship to socio-cultural and demographic factors such as gender, lifestyle, psychosocial stressors and family structure, among others.

## Methods

The project CorCOVID Latam is a research initiative of the Inter-American Society of Cardiology which invited cardiologists of Spanish-speaking Latin American countries to join as collaborators of the study on June 1st, 2020. Sixty-six cardiologists from 13 of the 21 Spanish speaking countries in Latin America agreed to participate. A detailed explanation of the study design has been previously published.<sup>7</sup>

The main objective of the CorCOVID Latam Psy was to evaluate the impact of the pandemic on psychological and social aspects in Spanish speaking Latin American individuals with cardiometabolic disorders by screening for the presence of depressive symptoms during the last 30 days. Secondary goals of the study were: (1) to determine the presence and magnitude of the association between demographic variables and the presence of symptoms of major depression during the pandemic, and (2) to determine the presence and magnitude of the association between education level and economic and socio-cultural status on the presence of symptoms of major depression during the pandemic.

**Inclusion criteria:** All subjects at cardiology consultation with cardiovascular or metabolic disease without evidence or suspicion of being sick from SARS-CoV2.

Exclusion criteria: Patients less than 18 years old, a previous diagnosis of SARS-CoV2, recent hospital stay, or not willing to provide the information contained in the survey.

A survey was created in the Google Forms platform (Mountain View, CA). The questionnaire was divided into 7 clusters including basic demographic data and psychological assessments and consisted of 38 questions. Informed consent was obtained from all the participants in accordance with the requirements of Inter-American Society of Cardiology Ethics Committees. Following government measures to limit population mobilization in some countries, the survey was conducted either by face-to-face visits or by phone or video chat in which case informed consent was verbally taken. The basic demographic profile included educational level, income, occupation, family structure and habitat, cardiovascular disease, and treatment. The second part examined the patient's behavior during the last 30 days regarding physical activity, nutrition, body weight, alcohol intake and tobacco habits, treatments accessibility, mood, and quality of sleep.

Questions contained opposite multiple options. Questions were not forced, and respondents were permitted to select multiple responses depending on the question.

Participants were screened for the presence of depressive symptoms. They were asked the following: if they had lost interest in what they usually like to do and had been feeling depressed (both considered as main criteria of major depression), if in their perception they had gained or lost weight, had felt tired or less energetic, had trouble concentrating on work or watching television, had trouble getting proper sleep due to wakefulness or insomnia, experienced subjective poor sleep, if they were doing less physical activity than in previous months, or had not done new things in the last month such as arts and crafts, reading books or hobbies. All of the latter were considered as additional criteria. Following the diagnostic criteria for major depression according to the Diagnosis Manual of Mental Disorders, fifth edition (DSM-5), a positive answer to one of the main criteria questions and 3 or more positive answers to the additional criteria were considered the threshold to be classified as suffering from major depression.<sup>8</sup>

## Statistical Analysis

Continuous variables are presented as means and standard deviations if normally distributed or as medians and interquartile ranges if asymmetrically distributed. Normality of data distribution was tested using the

Kolmogorov–Smirnov test. Bivariate comparisons between patients with and without major depression were performed by  $\chi^2$  or Fisher’s exact tests for categorical variables and by an unpaired  $t$  test or a Mann–Whitney test for continuous data. Analysis of variance (ANOVA) was used to analyze the differences among group means. The potentially associated factors with major depression were explored using logistic regression analysis. Bivariate and multivariate logistic regression were carried out to investigate variables independently associated with the presence of major depression. As adjusted variables, significant parameters were included in bivariate analysis and those with clinical relevance because of potential confounding. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for each independent covariate, and a probability  $P$  value  $< 0.05$  was regarded as significant. Analysis was conducted in Stata version 13 (StataCorp LP, College Station, TX, USA), using 2-sided significance tests at the 5% significance level.

## Results

The CorCOVID Latam Psy study included 4216 patients diagnosed with cardiometabolic diseases. A total of 1590 (37.71%; IC 95% 36.24–39.19) were considered as having major depression. The most frequent symptoms of major depression were diminished interest or pleasure in activities, followed by psychomotor changes and sleep disturbances (Table 1).

Individuals with depressive symptoms were more likely to be female (945 – 59.43%), and reporting a low or very low income (892 – 56.1%). The frequency of hypertension in subjects with major depression was 72.7% (1156), dyslipidemia 37.67% (599), and diabetes 22.64% (360). Coronary artery disease was present among 291 (18.3%), stroke 81 (5.09%), and heart failure 208 (13.08%) among those considered as

**Table 1.** Symptoms of major depression in the CorCOVID Latam sample

Major depression symptoms	Overall n: 4216 (n%)
<i>Main symptoms</i>	
Diminished interest or pleasure in activities	3349 – 79.4%
Depressed mood	1751 – 41.5%
<i>Additional symptoms</i>	
Fatigue or loss of energy	2219 – 52.6%
Diminished ability to think or concentrate	1219 – 28.9%
Sleep disturbances	2598 – 61.6%
Weight change	2274 – 55.1%
Psychomotor changes	2700 – 64%

**Table 2.** Clinical and social-demographic characteristics of the CorCOVID sample (total vs major depressive symptoms)

Variable	Total n: 4216	Major depressive symptoms n 1590
Mean age (years $\pm$ SD)	60.35 $\pm$ 15.39	60.61 $\pm$ 16.01
Female gender (n-%)	2069 – 49.07	945 – 59.4
Unemployed (n-%)	194 – 4.60	90 – 5.6
Very low income (social support required) (n-%)	422 – 10.01	232 – 14.5
Stroke (n-%)	168 – 3.98	81 – 5
Peripheral artery disease (n-%)	181 – 4.29	87 – 5.4
Coronary artery disease (n-%)	769 – 18.24	291 – 18.3
Heart failure (n-%)	436 – 10.34	208 – 13
Cardiac valvular disease (n-%)	346 – 8.21	150 – 9.4
Arrhythmias (n-%)	714 – 16.94	293 – 18.4
Diabetes (n-%)	899 – 21.32	360 – 22.6
Hypertension (n-%)	3071 – 72.84	1156 – 72.7
Dyslipidemia (n-%)	1555 – 36.88	599 – 37.6
Smoking tobacco (n-%)	606 – 14.37	229 – 14.4
Alcohol consumption (n-%)	1797 – 42.62	603 – 37.9
Previous hospitalization (n-%)	2051 – 48.65	846 – 53.2
Less than 4 medications/day (n-%)	2825 – 67.01	1004 – 63.1
Less than 100 minutes week physical activity (n-%)	2728 – 64.71	1163 – 73.1
Low fruits and vegetables consumption (n-%)	326 – 7.73	152 – 9.5
Reduced food consumption (n-%)	1177 – 27.92	636 – 40
Poor treatment adherence (n-%)	1330 – 31.55	636 – 40

suffering from major depression. Most of the sample with evidence of depressive symptoms was at some point hospitalized (846 p – 53.21%) and receiving less than 4 medications/day (1004 p – 63.14%) (Table 2).

In the bivariate logistic regression analysis, the group that was associated with symptoms of major depression was more likely to be female, be unemployed, report a very low income, and were more likely to have a previous history of stroke, peripheral artery disease, heart failure, cardiac valvular disease, arrhythmias, previous hospitalization, treatment with more than 5 different medications/day, conduct less than 100 minutes per week of physical activities, have a lower fruit and vegetable consumption, have reduced food consumption, and demonstrate poor treatment adherence (Table 3).

After adjusted by age, gender, educative level, income, type of job, cardiovascular disease, previous hospitalization, medication, alcohol consumption, fruit and vegetable intake, treatment adherence, and vaccines a multivariate analysis showed that female sex, taking  $\geq 5$  medications per

**Table 3.** Bivariate association of demographic, behavior, and health status variables with major depressive symptoms

Variable	Crude OR	95% CI	P value
Female gender	1.73	1.52-1.96	0.0001
Unemployment	1.45	1.09-1.94	0.011
Very low income	2.26	1.84-1.78	0.001
Stroke	1.56	1.14-2.13	0.004
Peripheral artery disease	1.55	1.15-2.10	0.004
Heart failure	1.58	1.29-1.93	0.0001
Cardiac valvular disease	1.29	1.03-1.61	0.024
Arrhythmias	1.18	1.01-1.39	0.045
Previous hospitalization	1.34	1.18-1.51	0.008
Consuming $\geq 5$ medications/day	1.32	1.15-1.50	0.0001
Physical activity less than 100 minutes per week	1.84	1.61-2.11	0.0001
Low fruits and vegetables consumption	1.48	1.18-1.86	0.001
Poor treatment adherence	1.85	1.62-2.11	0.0001
Reduced food intake	2.56	2.23-2.94	0.0001

**Table 4.** Multivariate association of demographic, behavior, and health status variables with major depressive symptoms

Variable	Adjusted OR (#)	95%CI	P value
Female gender	1.72	1.40-2.11	0.0001
Consuming $\geq 5$ medications/day	1.29	1.00-1.66	0.044
Physical activity less than 100 minutes per week	1.36	1.10-1.67	0.004
Low fruits and vegetables consumption	1.46	1.05-2.03	0.024
Poor treatment adherence	1.43	1.10-1.85	0.007
Reduced food intake	2.10	1.68-2.62	0.0001

day, performing <100 minutes per week of physical activity, low fruit and vegetable consumption, poor treatment adherence, and reduced food consumption still remained associated with symptoms of major depression (Table 4).

## Discussion

The CorCOVID Latam Psy included individuals from Spanish speaking Latin American countries with differences in race, ethnicity, social support, behavior, and income. The study results demonstrated that one-third of its total sample suffered from symptoms of major depression during the COVID-19 outbreak. Basic information about sociodemographic variables like age, gender, education, and employment status was included in the survey. This information serves as a cross-sectional assessment of the current status of the population during the pandemic,



and included characteristics that both do not change over time such as sex and others more dynamic which may be relevant to mental health status.

A meta-analysis of 43 studies that included 20,293 patients showed that the prevalence of depression after a stroke was 29% (95% CI 25-32) and remains stable up to 10 years after the event.<sup>9</sup> In a retrospective cross-sectional study from the 2015 Behavioral Risk Factor Surveillance System (BRFSS) that included adults 50 years or older with a myocardial infarction, a sample of 24,483 subjects was collected, and 26.19% reported having depression.<sup>10</sup>

The Global Burden of Diseases Study 2015 showed that depression is the third leading cause of disability-adjusted life years in Latin America, and in Tropical Latin America (Brazil and Paraguay) depression is the second leading cause.<sup>11</sup> Epidemiological evidence on the prevalence of depression in Latin America is scarce. CESCAS (Centro de Excelencia en Salud Cardiovascular para América del Sur), a population-based cross sectional study with 7524 participants recruited from randomly selected samples in 4 Latin American cities, evaluated the presence of major depressive episodes assessed using the Patient Health Questionnaire (PHQ) - 9. The overall prevalence was 14.6% (95% CI 13.6-15.6).<sup>12</sup> A study that is part of the 10/66 Dementia Research Group's population survey included 11,472 adults from Cuba, Dominican Republic, Mexico, Peru, Puerto Rico, and Venezuela. After receiving a semistructured psychiatric interview that elicited information about ICD-10 depression and subsyndromal depression, the prevalence was 5.4% and 20.6%, respectively.<sup>13</sup>

As supported by several previous studies, our results confirm that major depression was more frequent in patients of female gender (60.61%).<sup>14</sup> These data could be explained in part by the diagnosis of cardiometabolic disease at older ages in women and because men tend to underreport depressive symptoms compared to women and are less likely to seek treatment.<sup>15-17</sup> The presence of major depression was independently associated with demographic and behavior variables during the pandemic lockdown such as physical activity, food consumption, and treatment adherence. The most frequent depressive symptoms detected were diminished interest or pleasure in activities, sleep disturbances, and psychomotor changes. Lockdown had a major effect on lifestyle and increased psychosocial stress, people experienced a fear of developing COVID-19, and therefore some habits were modified.<sup>18</sup>

Many attempts have been made to establish a relationship between individuals undergoing social stress and the risk of developing

cardiovascular disease. The CoRCOVID Latam Psy study utilized the diagnostic criteria for major depression of the DSM-5, which requires the presence of sadness or anhedonia with a total of 5 or more symptoms during a period of at least 2 weeks. This information was obtained through a structured survey that included 9 specific questions related to depression.<sup>7,8</sup> Other epidemiological studies applied equally validated methodologies to assess the psycho-emotional state of people. The Social Network Index evidenced a relationship between social and community ties and mortality independently of other co-variables like socioeconomic status, health behavior, or health services accessibility.<sup>19</sup> The PURE study evaluated the association of symptoms of depression with cardiovascular disease and mortality by an adaptation of the Short-Form Composite International Diagnostic Interview (CIDI-SF) for major depressive disorders. Like in CoRCOVID Latam Psy, subjects were asked whether they had felt sad, blue, or depressed for 2 weeks or longer in the previous year and if so, whether they experienced loss of interest in pleasurable activities, tiredness, unintentional weight changes, difficulty sleeping or concentrating, feeling worthless, or thoughts about death during the same period.<sup>17,20</sup> The Danish National Patient Registry demonstrated the bidirectional association between cardiovascular disease and depression in 10 population-based cohorts of patients diagnosed with ischemic heart disease, stroke, self-reported chest pain, depression, or use of antidepressant medications. Participants were evaluated by the Major Depression Inventory. Coronary disease and stroke were associated with subsequent depression (hazard ratio [HR]: 1.79, 95% CI 1.43-2.23, and 2.62, 95% CI 2.09-3.29, respectively), but depression was associated with higher risk of subsequent ischemic heart disease (HR = 1.63, 95% CI 1.36-1.95) and stroke (HR = 1.94, 95% CI 1.63-2.30) after adjustment for co-variables.<sup>21,22</sup>

Socioeconomic instability could be associated with an increase in major depression symptoms, more prevalent in unemployed and very low-income status, which may require social-economic support. This was related to a lack of adherence to nonpharmacological recommendations like less consumption of vegetables and fruits or physical activity, as well as with pharmacological treatment.<sup>23,24</sup>

CoRCOVID Latam Psy supports the notion that depression could be strongly associated with increased cardiovascular risk factors, metabolic syndrome, and an increase in the burden of cardiovascular disease as a high frequency of cardiovascular diseases were observed.<sup>25,26</sup> All these conditions could modify psychosocial status in vulnerable population inducing emotional distress and potential mental disorders. Major

depression should be considered in daily clinical practice and especially during conditions of chronic or longstanding stress such COVID-19.

## Strengths and Limitations

CorCOVID Latam is the first initiative created and carried out in Latin America by a scientific society interested in the prevention of cardiovascular diseases. The results provide valuable information regarding the mental health condition in a large population predominantly from low-middle to middle-high income countries, and the social and psychological situation experienced through the lockdown in the COVID-19 pandemic. However, there are some limitations. In absence of a specific validated major depression questionnaire, the survey was derived from a created and adapted survey from the "Manual of Mental Disorders" DSM-5. Unfortunately, we do not know the mental health and psychological status of this sample before the pandemic outbreak. Finally, the report of major depression was made during the pandemic lockdown period and could be important to evaluate the time-varying effects, when normal or daily activities should be restored. All of this should be an important point of view for futures studies.

## Conclusion

The restriction of many work related, academic, and social activities during the COVID-19 pandemic lockdown promotes an important environmental stress that could induce or worsen major mental illnesses such as depression. More than one-third of this sample of patients with cardio-metabolic syndrome from Latin America reported suffering symptoms of major depression during COVID-19 outbreak. In this situation, it appears that depression is even more prevalent among subjects with cardiovascular risk factors and associated cardiovascular diseases.

## Disclosures

No author or immediate family member has financial relationships with commercial entities that might appear to represent a potential conflict of interest with the material presented.

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