

COVID-19 pandemic: stress level and quality of life in contaminated and non-contaminated cases

Pandemia do COVID-19: nível de estresse e qualidade de vida em casos contaminados e não contaminados

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Vila HV, Crege DRXO. COVID-19 pandemic: stress level and quality of life in contaminated and non-contaminated cases / *Pandemia do COVID-19: nível de estresse e qualidade de vida em casos contaminados e não contaminados*. Rev Med (São Paulo). 2022 Nov-Dec;101(6):e-199108.

ABSTRACT: *Introduction:* The coronavirus pandemic (COVID-19) has not only impacted physical health, as result of the severe acute respiratory syndrome caused by the virus, but has also impacted mental health, the economic and social areas. In addition, the focus of pandemic scenario was the COVID-19 contingency, which led to the appearance or worsening of other diseases. Besides the scopes originated from the pandemic became potential triggers of stress and interference in the population's quality of life. *Proposition:* to evaluate the perceived stress index and the population's quality of life in two groups of people: first, those who had a confirmed diagnosis of COVID-19 and, second, individuals who did not contract the disease. *Materials and methods:* 66 individuals participated in the research, between 18 and 60 years old, being 33 people without contamination and 33 people who had a confirmed diagnosis. Participants answered two questionnaires: The Perceived Stress Questionnaire (QEP) to assess stress and another questionnaire to assess quality of life (SF-36). *Results:* The analysis of the results showed that the QEP of non-contaminated individuals was lower (0.64 ± 0.04) than that of individuals who tested positive for the disease (0.73 ± 0.02) ($p = 0.0484$), statistically significant difference, which shows that positive cases are perceived to be more stressed. In the analysis of SF-36, only the Functional Capacity domain showed statistically significant difference, and the volunteers who did not have the disease presented higher value ($93.3 \pm$

2.0) than contaminated individuals (73.0 ± 3.6) ($p < 0.0001$), suggesting better quality of life. *Conclusion:* The study presents results that indicate the pandemic negatively impacted the health of the population, as participants diagnosed with COVID-19 had greater perceived stress and lower quality of life, compared to non-contaminated ones.

Keywords: Coronavirus; COVID-19; Perceived stress; Quality of life.

RESUMO: *Introdução:* A pandemia de coronavírus (COVID-19) impactou não apenas a saúde física, em decorrência da síndrome respiratória aguda grave causada pelo vírus, mas também impactou a saúde mental, as áreas econômica e a social. Além disso, o foco do cenário pandêmico foi a contingência do COVID-19, o que propiciou o aparecimento ou o agravamento de outras doenças. Dessa forma, os escopos originados da pandemia tornaram-se potenciais desencadeantes de quadros de estresse e de interferência na qualidade de vida da população. *Proposição:* avaliar o índice de estresse percebido e a qualidade de vida da população em dois grupos de pessoas: primeiro, as que tiveram diagnóstico confirmado de COVID-19 e, segundo indivíduos que não contraíram a doença. *Materiais e métodos:* Participaram da pesquisa 66 indivíduos, entre 18 e 60 anos, sendo 33 de pessoas sem contaminação e 33 pessoas que tiveram diagnóstico

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confirmado. Os participantes responderam dois questionários: O questionário de estresse percebido (QEP), para avaliar o estresse e outro questionário para avaliação da qualidade de vida (SF-36). *Resultados:* A análise mostrou que o QEP dos indivíduos não contaminados foi menor ($0,64 \pm 0,04$); em comparação aos indivíduos que tiveram o resultado positivo para doença ($0,73 \pm 0,02$) ($p = 0,0484$), diferença estatisticamente significativa, o que mostra que os casos positivos têm percepção que estão mais estressados. Na análise do SF-36, apenas o domínio Capacidade Funcional apresentou diferença estatisticamente significativa,

INTRODUCTION

The new coronavirus, COVID-19, more precisely named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), it has a phylogenetic similarity to SARS-CoV, represents the most recent viral pathogen and was identified early in December 2019 in Wuhan, capital of Hubei province, China, as a new betacoronavirus RNA¹. About three months later, the World Health Organization (WHO) declared it a pandemic² and countries around the world began to focus their actions on containing this disease, which has a global impact in several sectors³.

SARS-CoV-2 represents the largest outbreak of atypical pneumonia since the occurrence of severe acute respiratory syndrome (SARS) in 2003⁴ and considered the most severe viral respiratory syndrome since the H1N1 influenza pandemic in 1918, known as “Spanish flu”. The current pandemic has impacted not only the health area, but also the social and economic spheres. To reduce the impacts of the pandemic, the peak incidence and the number of deaths, some countries have adopted protective measures. Among them are the isolation of suspected cases, the closure of schools, universities and non-essential businesses, social distancing, in addition to the quarantine of the entire population. In order to reduce the transmission of the disease and avoid filling hospital beds, respirators and other necessary supplies⁵.

In general, during pandemics, people’s physical health and the fight against the pathogenic agent are the primary focuses of health care, and the implications for the mental health of the population tend to be neglected⁶. However, in previous situations, it is evident that the implications for mental health last longer and are more prevalent than the epidemic itself since the psychosocial impacts reverberate in other sectors of society and intensify the impact generated⁷.

Fear of the unknown increase anxiety levels in healthy individuals as well as those with preexisting mental health conditions. Expected consequences for the mental/physical health of populations are likely to include extreme fear and uncertainty. These experiences can evolve to include a wide range of public mental health concerns, including distress reactions (insomnia, anger, extreme fear

sendo que os voluntários que não tiveram a doença apresentaram um maior valor ($93,3 \pm 2,0$), que os contaminados ($73,0 \pm 3,6$) ($p < 0,0001$), o que sugere melhor qualidade de vida aos primeiros. *Conclusão:* O estudo apresenta resultados que indicam que a pandemia impactou negativamente a saúde da população, pois os participantes diagnosticados com COVID-19 tiveram maior estresse percebido e menor qualidade de vida, em comparação aos não contaminados.

Descritores: Coronavírus; COVID-19; Estresse percebido; Qualidade de vida.

of illness even in those not exposed), health risk behaviors (increased use of alcohol and tobacco, social isolation), health disorders (post-traumatic stress disorder, anxiety disorders, depression, somatization) and decreased health perception⁸.

The coping response to the stressor event, selected from the cognitive, behavioral and physiological components, if it manages to eliminate or solve the stressful situation, it will cause a decrease in the activated physiological cascade. If the stress response generates frequent, lasting or intense physiological activation, it can precipitate a depletion of the subject’s resources with the appearance of various psychophysiological disorders, in addition to predisposing to the appearance of anxiety disorders and other mental disorders. In addition to having a direct impact on the functioning of the human body systems, such as cardiovascular, metabolic and immunological¹⁰.

In addition, frequent stress and maintained for a long time can compromise the body generating diseases. Several neurochemical studies suggest that chronic stress increases the excitability of the hypothalamic-pituitary-adrenal axis and the sympathetic-adrenomedullary system. With chronic stress, new stressors begin to facilitate adrenocorticotrophic hormone and cortisol responses, in addition to inducing sensitization in the frequency of locus coeruleus loads and greater release of noradrenaline. The relationship between stress and health problems has been proven by numerous studies¹¹.

The effects of excessive and continuous stress are not limited to compromising health. Stress can, in addition to having a triggering effect on the development of numerous diseases, can affect the quality of life and productivity of human beings, which generates great interest in the causes and methods of reducing stress¹².

Therefore, in this pandemic, the human being was negatively affected in different aspects, including economic, social and health. In this way, this research evaluated the perceived stress index and the quality of life of people affected by confirmed COVID-19 infection, in addition to people who were not contaminated and had no suspicion of the disease.

The research is relevant in public health and clinical practice, as it provides information about the perception

of stress and possible physical/functional changes that may arise as a consequence of the COVID-19 infection. From this survey, it is possible to create strategies and interventions for these individuals, in order to assist in the maintenance of population health.

MATERIAL E METHODS

The research is an observational, analytical and cross-sectional study with a quantitative approach. It included the participation of 66 people, 33 who showed confirmation through a diagnostic test for the coronavirus and 33 who did not detect infection. The participants were medical students from a college in the interior of São Paulo, and the selection of participants was probabilistic. For the recruitment of these volunteers, an online form was initially sent to all students of the course, explaining the research proposal and asking who would be interested in participating. If they chose to participate, in the form, the individual should tick the option if they had a confirmed diagnosis of COVID-19 or not, in addition to sending an email or telephone contact, so that the links of the questionnaires used could be forwarded later.

The questionnaires were associated with the Google Forms tool and contained in the header the guidelines on how the participants should proceed. After completing the questionnaire, the answers were automatically saved on the platform, to be tabulated by the researchers. The research inclusion criteria were: Individuals aged between 18 and 60 years, who agreed to participate in the research, in addition to signing the free and informed consent form and who answered the questionnaires in full. Individuals who did not prove contamination by a diagnostic test or who did not wish to participate in the research were excluded from the research, as well as participants who did not completely answer any of the questionnaires applied.

The research was approved by the Ethics Committee of Faculdade São Leopoldo Mandic with the number (CAAE: 38798420.5.0000.5374).

The individuals answered two questionnaires: Perceived Stress Questionnaire (QEP), in the version validated for Portuguese, to assess stress¹³ and which contains questions regarding thoughts and feelings that the individual experienced, and the participant should respond by indicating a frequency between 0 and 4, where 0 is never and 4 is very often. The second questionnaire applied consisted of the SF-36 (Medical Outcomes Study 36 – Item Short – Form Health Survey). This represents a well-designed questionnaire with 26 questions divided into four domains: physical, psychological, social relationships and environment. Likewise, its measurement properties, such as reproducibility, validity and susceptibility to alterations, have been well demonstrated in several works. The translation into Portuguese of the SF-36 and its

adaptation to the socioeconomic and cultural conditions of our population, as well as the demonstration of its reproducibility and validity, make this instrument a useful additional parameter, which can be used in the evaluation of several diseases¹⁴.

The collected data were analyzed using the Graph Pad Prisma software, using the Student's t test and statistically significant differences were observed if $p < 0.05$.

RESULTS

In the analysis of the QEP, it is considered that the perceived stress index is directly proportional to the index obtained, and the higher the index, the greater the stress index. The mean value of the group of confirmed COVID-19 cases was 0.73 ± 0.02 and the value of the non-contaminated group was 0.64 ± 0.04 , which showed a statistically significant higher value ($*p = 0.0484$) for the group that had the disease (Table 1).

Table 1 – Perceived Stress Questionnaire for individuals contaminated or not contaminated by the coronavirus

	Contaminated	Not Contaminated
QEP	$0.73 \pm 0.02^*$	0.64 ± 0.04

QEP results for individuals contaminated or not with the coronavirus. Values are expressed as mean + Standard Error of the Mean (SEM). Statistical analysis of data was performed using Student's t test, considering significant differences for $p < 0.05$. ($*p = 0.0484$) Contaminated vs. Not Contaminated.

In the analysis of the SF-36, a view of each domain of the questionnaire is considered: Physical functioning, Function limitations due to physical health, Function limitations due to emotional problems, Energy/fatigue, Emotional well-being, Social functioning, Pain and General Health. Thus, the quality of life index is directly proportional to the index obtained by each domain and varies from 0 to 100, and the closer to 100, the better the quality of life index and, therefore, the health status.

The values obtained from the mean and standard deviation of each domain, of the contaminated and non-contaminated groups are expressed in the following table (Table 2). Among the analyzed values of each domain, the only one with a statistically significant difference was the domain "functional capacity" ($*p < 0.0001$). For the comparison of the other domains, no statistically significant differences were found: Limitation due to physical aspects ($p = 0.0564$), limitation due to emotional aspects ($p = 0.4484$), energy/fatigue ($p = 0.4473$), mental health ($p = 0.2335$), social aspects ($p = 0.5805$), pain ($p = 0.1566$), general health status ($p = 0.2942$).

Table 2 – Quality of Life of individuals contaminated or not contaminated by the coronavirus.

SF-36	Functional capacity	Limitation due to physical aspects	Limitation due to emotional aspects	Energy / Fatigue	Mental health	Social aspects	Pain	General health status
Contaminated	73.0 + 3.6*	56.8 ± 7.2	56.9 + 6.9	49.8 + 3.7	57.7 + 3.5	62.1 ± 4.9	65.9 ± 4.0	66.2 ± 3.7
Not contaminated	93.3 ± 2.0	74.2 ± 5.2	49.4 ± 6.8	54.0 ± 4.1	63.5 ± 3.2	65.9 ± 4.7	74.0 ± 3.9	71.3 ± 3.0

Results of the SF-36 Quality of Life Questionnaire for individuals contaminated or not by the coronavirus. Values are expressed as mean + “EPM”. Statistical analysis of data was performed using Student’s t test, considering significant differences for $p < 0.05$. * $p < 0.0001$ Contaminated vs. Not contaminated for the Functional Capacity domain.

DISCUSSION

In view of the results, people who had COVID-19 had a higher Perceived Stress Index and lower functional physical capacity than people who were not contaminated. Such values indicate that, in some way, contaminated people have been negatively impacted, either by the infection and its complications, or by the multiple consequences imposed by the pandemic.

The objective of analyzing individuals who were infected by SARS-CoV-2, compared to people who did not have the disease, aimed to assess the negative impact that the disease and the entire global crisis could have on the contaminated population. The assessment of quality of life and the perceived stress index allow us to identify possible weaknesses in the perception of these variables, which compromise the health of individuals and, from this, it becomes possible to devise strategies for this population affected by COVID-19.

According to Shigemura⁸, in addition to a concrete fear of death, the COVID-19 pandemic has implications for other spheres: family organization, closure of schools, businesses and public places, changes in work routines, isolation, leading to feelings of helplessness and abandonment. Furthermore, it can increase insecurity due to the economic and social repercussions of this large-scale tragedy. In this way, these factors lead to changes in the mental health of the population with increased levels of stress and anxiety, for example, in healthy individuals and intensify the symptoms of those with pre-existing psychiatric disorders.

Chaolin et al.⁹ have identified in their studies symptoms of depression, anxiety and stress in the general population during this pandemic. Faced with this whole scenario of health, social and economic crisis, feelings

of fear and concern remain high for a long time, causing harmful physiological changes to our body.

The term stress denotes the state generated by the perception of stimulus, which cause emotional excitement, and when disturbing homeostasis, trigger an adaptation process characterized by increased adrenaline secretion, producing several systemic manifestations with physiological and psychological disorders. The stressor term defines the event or stimulus that causes or leads to stress.

Margis et al.¹⁰ emphasize that the stress response is the result of the interaction between the person’s characteristics and the demands of the environment, that is, the discrepancies between the external and internal environment and the individual’s perception of their ability to respond. This response to the stressor comprises cognitive, behavioral and physiological aspects, aiming to provide a better perception of the situation and its demands, as well as a faster processing of the available information, enabling a search for solutions, selection of appropriate behaviors and preparation of the organism to act quickly and vigorously. The overlap of these three levels (physiological, cognitive and behavioral) is effective up to a certain limit, and when this is exceeded, it may lead to changes in homeostasis. Thus, different stressful situations occur over the years, and the responses to them vary between individuals in their form of presentation, and different psychopathological manifestations may occur, such as nonspecific symptoms of depression or anxiety, or defined psychiatric disorders, such as Post Traumatic Stress.

In this way, the social, economic and health impacts resulting from the pandemic, work as a stressor agent and the organism responds by adapting its homeostasis, that is, it remains in a state of stress. Zuardi¹¹ considers that stress has primarily deleterious effects on the body, providing, in addition to damage to mental health, changes in the cardiovascular, gastrointestinal, metabolic or immune systems, of psychosocial origin.

The negative effect of stress has a great impact on humans, causing several possible conditions, with consequences for the human body and mind. Sadir et al¹². report that this stressful event can affect the quality of life and the feeling of well-being. The high level of chronic

stress is perceived through sick leaves and absenteeism, the drop in productivity and interpersonal difficulties, various physical illnesses, depression and anxiety.

Quality of life has a polysemic notion and can be defined as a state of physical, mental and social well-being and not just the absence of disease. People who consider themselves happy attribute their happiness to success in four areas (social, affective, health and professional), so having an impact on any of these areas can interfere with the general well-being of the individual.

Studies by Singh et al.¹³, showed that “among adults in the United States of America (USA) (N=898) during the COVID-19 pandemic, the probability of scoring above the clinical threshold for those diagnosed - treated or not - it was more than six times for depression and four to six times for anxiety and post-traumatic stress disorder - PTSD”, which reinforces the idea that negative health scopes during the pandemic are large.

In the study by Pearman et al.¹⁴, 515 adults aged 20-79 in the USA reported their anxiety about developing COVID-19, proactive coping, and COVID-19-related stress in an online survey. Such research is relevant and presents data similar to this study, which reinforces the importance of the research project.

According to Mazza et al.¹⁵, psychiatric symptoms were identified in 402 adult COVID-19 survivors (265 men, mean age 58 years) in a one-month follow-up after hospital treatment. A significant proportion of patients self-rated themselves in the psychopathological range: 28% for PTSD – post-traumatic stress disorder, 31% for depression, 42% for anxiety, 20% for OC symptoms and 40% for insomnia.

These and other studies show similar results: people infected with COVID-19 manifested symptoms or diagnoses related to worsening stress and quality of life. As in the meta-analysis by Salari et al.¹⁶, which demonstrates “The prevalence of stress in five studies with 9074 participants was 29.6% (95% confidence limit: 24.3-35.4),

the prevalence of anxiety in 17 studies with a total of 63,439 people with 31.9% (95% confidence interval: 27.5-36.7) and the prevalence of depression in 14 studies with 44,531 people with 33.7% (interval of 95% confidence: 27.5-40.6). COVID-19 not only causes physical health problems, but also results in various psychological disorders.”

As only individuals who were positive for COVID-19 were evaluated in the study, without any type of separation regarding the severity of the clinical conditions presented by the participants, one of the limitations of this study is the fact that the severity of the infection can be a factor that influenced the answers to the questionnaires. In addition, despite the wide age range considered for participation in the research, as the collection was carried out in a university environment, most volunteers were young people, who usually have milder conditions of the disease, which may also have influenced the results.

In a few months, the COVID-19 pandemic created a global state of emergency. This virus has not only raised public health concerns but has also caused a range of psychological and mental disorders, as well as physical and functional changes. Therefore, this study hopes to contribute with information that can guide actions in the future to combat the consequences of the pandemic, to reduce the social, behavioral and psychological impacts on the population.

CONCLUSION

Our results suggest that the pandemic has affected the mental and physical health of people, especially those infected with COVID-19. Because of this, it is vital to identify individuals prone to psychological disorders from different groups and in different population groups, so that, with appropriate psychological strategies, techniques and interventions, the mental and functional health of the population is preserved and improved.

Authors' participation: *Henrique Villa e Vila* – lead author, responsible for the study design, recruitment of participants, data collection and writing of the manuscript. *Danilo Riberto Xavier de Oliveira Crege* – guiding author, responsible for the statistical analysis and supervision/review of the project.

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Received: June 20, 2022

Accepted: September 27, 2022