

Relationship between COVID-19 infection and hypertensive emergencies

RESUMO | Objetivo: Verificar associação entre COVID-19 e emergências hipertensivas. Método: Estudo transversal, realizado em um hospital público durante cinco meses, dentre os meses de abril de 2020 a agosto de 2020, através da análise de 89 prontuários, após aplicação dos critérios de elegibilidade. Os dados incluíram mês de internação, setor de admissão, sexo, idade, histórico de comorbidades, resultado do teste de COVID-19 e desfecho clínico. Os dados foram analisados por meio do software estatístico SPSS @ 22.0. Resultado: A presença de EH no momento da admissão foi observado em 22,47% dos casos, sendo IRA, IAM, AVE as mais relatadas. Pacientes que foram submetidos a intubação corresponderam a um total de 48,3% dos casos. Em relação ao desfecho, 8,3% dos casos foram transferidos para enfermaria ou cuidados intensivos. Conclusões: Não foi possível comprovar a relação entre SARS-CoV2 e emergência hipertensiva.

Descritores: Cardiopatias; Emergências; Covid-19.

ABSTRACT | Objective: To verify the association between COVID-19 and hypertensive emergencies. Method: A cross-sectional study, carried out in a public hospital for five months, between April 2020 and August 2020, through the analysis of 89 medical records, after applying the eligibility criteria. Data included month of hospitalization, admissions department, gender, age, history of comorbidities, COVID-19 test result, and clinical outcome. Data were analyzed using SPSS @ 22.0 statistical software. Result: The presence of HE at the time of admission was observed in 22.47% of the cases, with ARI, AMI, and CVA being the most reported. Patients who underwent intubation corresponded to a total of 48.3% of cases. Regarding the outcome, 8.3% of the cases were transferred to the ward or intensive care. Conclusions: It was not possible to prove the relationship between SARS-CoV2 and hypertensive emergency.

Keywords: Heart diseases; Emergencies; Covid-19.

RESUMEN | Objetivo: Verificar la asociación entre COVID-19 y emergencias hipertensivas. Método: Estudio transversal, realizado en un hospital público durante cinco meses, entre abril de 2020 y agosto de 2020, mediante el análisis de 89 historias clínicas, previa aplicación de los criterios de elegibilidad. Los datos incluyeron el mes de hospitalización, el departamento de admisiones, el sexo, la edad, el historial de comorbilidades, el resultado de la prueba de COVID-19 y el resultado clínico. Los datos se analizaron con el programa estadístico SPSS@ 22.0. Resultado: Se observó la presencia de EH al momento del ingreso en el 22,47% de los casos, siendo los más reportados IRA, IAM y ACV. Los pacientes que fueron sometidos a intubación correspondieron a un total de 48,3% de los casos. En cuanto al desenlace, el 8,3% de los casos fueron trasladados a sala o cuidados intensivos. Conclusiones: No fue posible comprobar la relación entre el SARS-CoV2 y la emergencia hipertensiva.

Palabras claves: Enfermedades del corazón; emergencias; COVID-19.

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INTRODUCTION

At the end of 2019, a new pathogen was discovered, its spread began in Wuhan, China, later affecting the whole world. After the isolation of this pathogen, it was identified that it was an already known virus, but with important variants, being called coronavirus or SARS-CoV-2.⁽¹⁾

Manifestations of respiratory symptoms occur due to a preference for alveolar epithelial cells. In general, patients with cardiovascular diseases (CVD) have more severe symptoms, which may be associated with increased secretion of angiotensin-converting enzyme 2 (ACE2), this increase may be related to the use of inhibitors of the renin-angiotensin-aldosterone system.⁽²⁾ After entering the cell, through the receptors, SARS-CoV-2 changes the availability of ACE2, preventing it from exerting.

ACE2 is critical in the cardiovascular and immune system.⁽²⁾ Some studies show an interaction between COVID-19 with the cardiovascular system, due to ACE2 being a functional receptor for the virus and SARS-CoV-2 infection is associated with the union of the viral protein with ACE2, being expressed in the heart, lung and among other organs.⁽³⁻⁴⁻⁵⁾

In this context, several complications can occur, which constitute a group of diseases or situations resulting from the elevation of blood pressure, the most common pathologies are hypertensive encephalopathy, cerebrovascular accident (CVA), Acute pulmonary edema (APE), Acute coronary syndrome (ACS), Acute aortic dissection (AAD), Acute myocardial infarction (AMI), Acute kidney injury (AKI), Adrenergic crisis (AC), Eclampsia/preeclampsia, acute papilledema and others.⁽⁶⁾

Hypertensive crises can be classified as Hypertensive emergencies, which are situations in which there is a marked increase in DBP greater than 120 mmHg. The second group would be the Hypertensive Emergencies (HE), where there is DBP>120mmHg, being differentiated by



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the occurrence of target organ damage.⁽⁷⁾

The present study is important to develop epidemiological studies, contextualizing the disease in the world, with the aim of establishing adequate care, in addition to creating protocols to facilitate the entire management of COVID-19 and with the objective of increasing the survival of all those affected.

Interest in the subject arose through clinical practice in the adult emergency room, considering the low amount of research on the occurrence of HE associated with COVID-19.

The study hypothesis is that COVID-19 infection increases the risk that the patient will have HE.

Given the above, the objective of the present study was to verify the association between COVID-19 and hypertensive emergencies.

METHOD

This is a cross-sectional and retrospective study with a quantitative approach. Initially, 600 electronic patient records were analyzed (150 had incomplete information; 93 were duplicates; 68 were not located; 200 did not meet the inclusion criteria), 89 electronic records remained in the study after applying the inclusion and exclusion criteria.

The inclusion criteria used were: patients treated at this urgency and emergency service, over 18 years of age, through their period of hospitalization within the study period, after being duly classified and assigned to the research sectors. The exclusion criteria used were: electronic medical records with incomplete information and patients already hospitalized outside the established study period and patients who had a hospital stay of less than 12 hours; diagnosis not established or with interrogation during the hospitalization period, duplication of hospitalization passage.

The instrument consists of the following data: month of hospitalization, admission sector, sex, age, history of comorbidities,

COVID-19 test result and clinical outcome. Data were analyzed using SPSS® 22.0 statistical software. The analysis plan comprised obtaining absolute and relative frequencies.

The present study was approved in 2020 by the Ethics Committee under CAAE 45383221.1.0000.5553 opinion number 4783137 of 2020. The research was conducted in accordance with all required ethical standards strictly following Resolution 466 of December 12th, 2012.

RESULTS

The following is the characterization table of the clinic of the population studied in Brasília-DF, from April 2020 to August 2020.

Regarding age, there is a predominance of elderly people over 60 years old (69.66%). Most of the sample was composed of males (53.9%). Based on the presence of comorbidities, there is a predominance of three or more with a percentage of (37%). In relation to the history of hypertensive emergency at some point in life, there was a percentage of 26.9%, with the most mentioned being CVA, AMI, HF ARI, among others.

The presence of HE at the time of admission or during hospitalization was observed in (22.47%) of the cases, with ARI, AMI, and CVA being the most reported. Patients who underwent intubation corresponded to a total of (48.3%) of the cases. Regarding the outcome, a higher percentage of patients undergoing transfer was verified in 48.3% of the cases. Based on length of hospital stay, 94.3% of cases spent less than 1 month in hospital. In the table below, we can observe a comparison between two groups of patients: those who presented and who did not present a hypertensive emergency on admission, the patients represented below, are aged over 60 years.

According to table 2, 70% of the patients who had HE on admission are unaware of the previous occurrence of other episodes of HE. 57.14% of them were intubated

Table 1- Characterization of the study sample population (n=89).

| Characteristics of the population | N | % |
|--|----|-------|
| Age | | |
| Up to 25 y/o | 00 | 00 |
| 26 to 40 y/o | 02 | 2,25 |
| 41 to 59 y/o | 25 | 28,09 |
| Over 60 y/o | 62 | 69,66 |
| Gender | | |
| Female | 41 | 46,07 |
| Male | 48 | 53,93 |
| Past comorbidity | | |
| None | 07 | 7,87 |
| Just one | 18 | 20,22 |
| Two | 26 | 29,21 |
| Three or more | 33 | 37 |
| Don't know/not informed/not applicable | 05 | 5,62 |
| History of HE in life | | |
| Yes | 24 | 26,97 |
| No | 44 | 49,44 |
| Don't know/not informed/not applicable | 21 | 23,6 |
| EH na internação | | |
| Yes | 20 | 22,47 |
| No | 69 | 77,53 |
| Don't know/not informed/not applicable | 00 | 00 |
| OTI | | |
| Yes | 43 | 48,31 |
| No | 46 | 51,69 |
| Outcome | | |
| Hospital discharge | 12 | 13,48 |
| Transfer to ICU | 32 | 35,95 |
| Transfer to ward | 21 | 23,6 |
| Death | 24 | 26,97 |
| Length of stay | | |
| Less than 1 month | 84 | 94,38 |
| Up to 2 months | 5 | 5,62 |
| More than 2 months | 00 | 00 |

SOURCE: Prepared by the authors themselves, 2022.

and 25% died. And of those who reported previous HE, 66.67% underwent OTI and 25% died. Of the patients who had HE on admission, 3 also had ACS, were intubated and died. Of the patients who did not have HE at admission, 26.09% had a history of HE, 50% of them were intubated and 44.45% died.

DISCUSSION

Considering the age of patients affected by COVID-19, the data from the present study corroborate the research by Goyal, who observed an average of 62.2 years. (8) Differing from the results of both studies, Tian's research, which analyzed 262 cases, averaged 47.5 years. (9) The risk of dying from COVID-19 increases with age, especially those with chronic diseases. (10) In the gender variable, corroborating the results of this study, Meneses' research carried out with 127 patients showed that the majority of those affected were male (59.3%). (11) Regarding comorbidities, in a study carried out in Wuhan, China, which observed a percentage of 48% of comorbidities, corroborating the results of this study, which had a dominance of 86.4% of cases of at least one comorbidity present, there is a greater emphasis on diabetes, hypertension, as in this study. (12) In general, the existence of at least one comorbidity is associated with a higher risk of worse prognosis. In general, the presence of a hypertensive emergency, specifically those with acute coronary syndrome (ACS) and who were affected by COVID-19, tend to have a worse prognosis, because the cardiac functional reserve may be reduced due to ischemia or myocardial necrosis. (13) Age also follows this trend of poor prognosis, that is, elderly people over 60 years old when compared to patients who are younger. (14) In this study, a low number of patients with HE at admission was found in patients with COVID-19 (22.47%). No literature was found to explain the relationship between COVID-19 and hyper-

Table 2 - Comparison between groups with and without hypertensive emergency on admission.

| GROUP 1 | | |
|---|----|-------|
| | N | % |
| WITH HE IN ADMISSION | | |
| Did not have/did not know about previous HE | 14 | 70 |
| OTI | 8 | 57,14 |
| Death | 2 | 25 |
| Had previous HE | 6 | 30 |
| OTI | 4 | 66,67 |
| Death | 1 | 25 |
| GROUP 2 | | |
| WITHOUT HE IN ADMISSION | | |
| Did not have/did not know about previous HE | 51 | 73,91 |
| OTi | 22 | 43,14 |
| Death | 6 | 27,27 |
| Had previous HE | 18 | 26,09 |
| OTI | 9 | 50 |
| Death | 4 | 44,45 |

SOURCE: Prepared by the authors themselves, 2022.

tensive emergencies. It is probably related to the pathophysiological mechanism of ACE2 release in infected patients, generating physiological changes in healthy patients or intensifying it in patients with heart disease. (2) In a survey in Wuhan, of the 30% of infected patients, 8% had CVDs. (8) Hypertension is one of the necessary factors for the occurrence of HE. A meta-analysis in China showed that the most common comorbidity among 46,248 infected patients was hypertension. (15) In a cohort survey of 1099 outpatients and inpatients, 15% had hypertension (36% among those with intubation or death); 2.5% had CVD (9% among those with intubation or death). (16) The presence of cardiovascular diseases is more frequent in patients with COVID-19, this group has a high rate of morbidity and mortality, but it is not known whether CVD is an independent risk or is mediated by other factors. Myocardial damage occurred in more than a quarter

of the cases. (17) Observing the need to use invasive mechanical ventilation, this study identified that 48.31% underwent intubation, corroborating the research by Bhatraju, where 65% of patients underwent invasive mechanical ventilation. (18) Based on the outcome of the covid-19 cases, this study showed a predominance of transfer cases around 59.55%, of which 63.37% required intensive care in the ICU, which reflects the severity of the cases. In another study, the most prevalent outcome was hospital discharge (52.8%) and death with (47.2%). (11) Regarding the length of stay, the predominance in this study was less than 1 month. According to Teich's research, who divided the length of stay according to the intensity of care, for patients who needed intensive care, there was an average time of 15.25 days, for patients who did not require intensive care unit (ICU) care, it was 22 days. (19) There was a need for IOT in 7 patients,

who had HE and ACS on admission. This may be related to ischemia or necrosis, which is associated with a worse prognosis⁽¹³⁾, and when associated with older age, there is an association with poor prognosis⁽¹⁴⁾, may be related to longer hospital stay⁽²⁰⁾, as well as OTI and/or death.

Based on the death rate regardless of the group (previous HE or not), they had at least one comorbidity, in addition to the hypertensive emergency. The presence of at least one comorbidity is associated with a risk of worse prognosis.⁽²¹⁾

CONCLUSION

This study showed us a significant relationship between some factors, among which we can conclude that males are likely to spend less time hospitalized, that the elderly are more likely to develop COVID-19, the absence of ACS within this group may be associated with the absence of alterations in the imaging exam and the lack of need for orotracheal intubation.

The predominance of more than one comorbidity, that its presence is associated with worse outcomes, that in the presence of heart disease there is an absence of



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hypertensive emergency, and that the presence of heart disease is associated with the irregular use of ACE inhibitors and BRAS, positive diagnosis for covid-19, associated with greater chances of death and that the need for OTI, has a greater probability of death.

We cannot conclusively state whether covid-19 contributes to the development of hypertensive emergencies, due to the low number of publications regarding this specific association. Therefore, special attention should be paid to cardiovascular protection during treatment for COVID-19.

More studies of an epidemiological nature should be developed, in order to understand the reality of the disease in the world, with the aim of establishing adequate care, in addition to creating protocols to facilitate the entire management of COVID-19 and with the aim of increasing the survival of all those affected.

This study helps to identify problems related to the topic, as well as to guide nursing care for the most common groups, races and complications related to covid-19, contributing to the generation of knowledge.

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