Original

Clinical-epidemiological profile and outcome of old people hospitalized for COVID-19

Perfil clínico-epidemiológico e desfecho de pessoas idosas hospitalizadas por COVID-19
Perfil clínico-epidemiológico y resultado final de la enfermedad en ancianos hospitalizados con COVID-19

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Abstract
Objective: to describe the clinical-epidemiological profile and outcome of old people hospitalized for COVID-19 at the University Hospital of Piauí. **Methods:** An observational, cross-sectional study was carried out with secondary data involving 137 medical records of old patients hospitalized for COVID-19 in the UH during the period from April to December 2020. Data were collected in August and September 2021. A form consisting of questions equivalent to the sociodemographic and epidemiological data of old patients was used. Data were analyzed using SPSS statistical software version 25. **Results:** It was observed that the "use of mechanical ventilation" (Odds Ratio: 35.96 [10.23-126.47]) and "type of hospitalization bed" (Odds Ratio: 9.40 [2.69-32.82]) were the variables that best explain the deaths being independent predictors for this outcome. There was a statistically significant association between the number of comorbidities (p=0.007), the presence of clinical manifestations (p=0.003), the number of clinical manifestations (p=0.003) and death. The shorter survival time was associated with ICU admission and use of mechanical ventilation (p=0.000). **Conclusion:** The results of the study show that the presence of risk factors for COVID-19, clinical manifestations of the disease, to be admitted to ICU beds, using MV and those who were older had worse outcomes.

Descriptors: Health profile; Health of old people; Coronavirus; COVID-19.

Whats is already known on this?
The occurrence of severe cases of COVID-19 and worse outcomes in the old population.

What this study adds?
The present study reinforces the impact of COVID-19 on the old people based on the records of one of the main treatment centers in the state in the face of the new coronavirus pandemic.

Resumo

Objetivo: *descrever o perfil clínico-epidemiológico e desfecho de pessoas idosas hospitalizados por COVID-19 no Hospital Universitário do Piauí. Métodos: realizou-se um estudo observacional, transversal, realizado com dados secundários envolvendo 137 prontuários de pacientes idosos internados por COVID-19 no HU durante o período de abril a dezembro de 2020. Os dados foram coletados nos meses de agosto e setembro de 2021. Utilizou-se um formulário formado por questões equivalentes aos dados sociodemográficos e epidemiológicos dos pacientes idosos. Os dados foram analisados utilizando o Software estatístico SPSS versão 25.* **Resultados:** *observou-se que o "uso de ventilação mecânica" (Odds Ratio: 35,96 [10,23-126,47]) e "tipo de leito de internação" (Odds Ratio: 9,40 [2,69-32,82]) foram as variáveis que melhor explicam os óbitos sendo preditoras independentes para esse desfecho. Houve associação estatisticamente significativa entre a quantidade de comorbidades (p=0,007), a presença de manifestações clínicas (p=0,003), a quantidade de manifestações clínicas (p=0,003) e óbito. O menor tempo de sobrevida foi associado à internação em UTI e uso de ventilação mecânica (p=0,000).* **Conclusão:** *os resultados do estudo evidenciam que a presença de fatores de risco para a COVID-19, manifestações clínicas da doença, estavam internados em leitos de UTI, em uso de VM e os que apresentavam idade superior tiveram piores desfechos.*

Descritores: *Perfil de saúde; Saúde do idoso; Coronavirus; COVID-19.*

Resumén

Objetivo: *describir el perfil clínico-epidemiológico y la evolución de los ancianos hospitalizados por COVID-19 en el Hospital Universitario de Piauí. Métodos: Se realizó un estudio observacional, transversal, con datos secundarios de 137 historias clínicas de pacientes ancianos hospitalizados por COVID-19 en la HU durante el período de abril a diciembre de 2020. Los datos fueron recolectados en los meses de agosto y septiembre de 2021. Se utilizó un formulario compuesto por preguntas equivalentes a los datos sociodemográficos y epidemiológicos de los pacientes ancianos. Los datos fueron analizados mediante el software estadístico SPSS versión 25.* **Resultados:** *Se observó que el "uso de ventilación mecánica" (Odds Ratio: 35,96 [10,23-126,47]) y el "tipo de cama de hospitalización" (Odds Ratio: 9,40 [2,69] -32,82]) fueron las variables que mejor explican las muertes, siendo predictores independientes de este resultado. Hubo asociación estadísticamente significativa entre el número de comorbilidades (p=0,007), la presencia de manifestaciones clínicas (p=0,003), el número de manifestaciones clínicas (p=0,003) y la muerte. El menor tiempo de supervivencia se asoció con el ingreso en UCI y el uso de ventilación mecánica (p=0,000).* **Conclusión:** *Los resultados del estudio muestran que la presencia de factores de riesgo para COVID-19, manifestaciones clínicas de la enfermedad, estar hospitalizados en camas de UCI, utilizando VM y aquellos ancianos de más edad tuvieron los peores resultados.*

Descriptores: *Perfil de salud; Salud de las personas mayores; Coronavirus; COVID-19.*

INTRODUCTION

The beginning of 2020 was marked worldwide by the appearance and subsequent outbreak of a pathology, a previously unknown pneumonia, called *Coronavirus Disease* 2019 (COVID-19), caused by the new virus, called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The first detected case of this virus in the world was in December 2019 in the city of Wuhan, China.[1]

The increase in the number of cases occurred rapidly, which led to the characterization of an outbreak, so that at the end of January 2020, the World Health Organization (WHO) announced the scenario as a health emergency of international interest.[2]At this juncture, on March 11, 2020, the WHO declared COVID-19 a pandemic and instituted prevention and coping measures to be taken. However, its rapid spread to many cities in the country led the government to declare, through Legislative Decree number 6 of March 20, 2020, a situation of public calamity in the country.[3]

Studies carried out in Wuhan indicate that people aged ≥ 70 years had shorter average days (11.5 days) from the onset of symptoms to death compared to those under 70 years (20 days), corroborating that the older people were exposed to having the fastest progression of the pathology compared to younger people.[4] Thus, it was understood that the old people deserve greater attention and protection in order to avoid infection by the virus, making it necessary to comply with strict hygiene measures, physical distancing and frequent hand hygiene.[5]

In Brazil, according to Barbosa *et al*. (2020) [6], 70% of patients who died were individuals over 60 years of age and of these, 64% had at least one associated risk factor. In a research carried out by the Oswaldo Cruz Foundation (Fiocruz)[2020] [7], three out of four deaths from the disease occurred in old people (over sixty years old), with 70 to 79 years being the most affected age group, concentrating 33% of deaths from the pathology in the first pandemic year.

In the state of Piauí, the first cases of infection with the new coronavirus were recorded on March 19, 2020. The state has worrying health indicators in relation to poverty and less access to health services, being one of the states with the highest risk of social inequality impacts on the COVID-19 pandemic[8]. Deaths from COVID-19 were mostly old people with associated chronic diseases, as well as in other regions of the country and the world, which can be understood by the fact that the aging process naturally makes individuals more exposed to comorbidities and complications.[9]

This study is relevant to highlight the clinical and epidemiological profile of old patients hospitalized for COVID-19 in a university hospital in Piauí. It is understood as necessary, therefore, in the context of the new coronavirus, to carry out research on this theme, as well as to understand the factors associated with unfavorable outcomes and is justified because it is a current theme of significant relevance. Given the above, the objective of the present study was to describe the clinical-epidemiological profile and outcome of old people hospitalized for COVID-19 at the University Hospital of Piauí.

METHODS

This observational, cross-sectional study with a quantitative approach, carried out with secondary data on COVID-19 cases in old people hospitalized at the University Hospital of the Federal University of Piauí (UFPI), for which the Equator STROBE checklist was used. The selected period was between April and December 2020, in which there were 211 consultations of old people, in which the sample size was calculated to characterize epidemiologically in the old population was performed using the Epi Info software version 5.3 through the calculation formula for finite samples by stratified proportion. A usual confidence level of 5% (0.05) was considered, so for the analysis of the statistical tests, p-value <0.05 was considered significant, totaling 137 individuals, who were randomly selected.

Data collection took place from August to September 2021, through visits to the Hospital of the Federal University of Piauí (UH-UFPI), located in the city of Teresina, capital of Piauí, which currently offers services in 32 medical specialties (high and medium complexity, not including urgency and emergency services), has 190 hospital beds, 15 Intensive Care Unit (ICU) and 10 operating rooms.

As eligibility criteria, the medical records of hospitalized old people diagnosed with COVID-19, of both sexes, from 60 years of age, from April to December 2020, were included in the hospitalization wards of COVID-19 at UH-UFPI and the collection followed the sample calculation. All medical records that presented incomplete data, both clinical and laboratory aspects, were disregarded. The data of this investigation are of the secondary type, as they consist of the recorded cases of hospitalization of old people due to COVID-19 in the UH-UFPI obtained through the patients' clinical records.

For data collection, a form formed by questions equivalent to the sociodemographic and epidemiological data of old patients was used, according to the proposed objectives. The form was composed of the following data: gender, age, race/color, length of hospital stay, whether there are risk factors/comorbidities (if so, which ones? Systemic Arterial Hypertension (SAH); Chronic Cardiovascular Disease; Chronic Hematological Disease; Diabetes mellitus (DM); Chronic Liver Disease; Asthma; Immunodeficiency/ Immunodepression; Chronic Neurological Disease; Chronic Pneumopathy; Chronic Kidney Disease; Obesity; Others), clinical manifestations (if yes, which ones? Fever; Sore throat; Nausea and/or vomiting; Dry cough; Diarrhea; Dyspnea; Tiredness; Headache; Loss of speech or movement; Pain and discomfort; Loss of taste and/or smell; Others), treatment, type of bed, invasive mechanical ventilation (IMV) and outcome (hospital discharge; transfer; or death) were used.

Data were organized and tabulated in Microsoft Excel 2016 software and, for statistical analysis, the SPSS version 25 software. To characterize the sample, exploratory descriptive analysis was used, while measures of central tendency (mean and median) and dispersion (standard deviation and standard error of the mean) were used for quantitative analysis. The Shapiro-Wilk normality test was applied to verify the normality of the quantitative data and to compare age and length of hospital stay with gender and outcome, we applied the Mann Whitney U test.

For categorical variables, Pearson's chi-square test and Fisher's exact test were used. Binary logistic regression analysis was used initially to investigate some points of the instrument associated with death, through univariate logistic regression and then multivariate logistic regression. For patient survival analysis, we used the Kaplan-Meier survival curve. In all analyses, a significance level of 5% and a confidence level of 95% were used. The research was approved by the Ethics and Research Committee of UH-UFPI, under opinion 4,795,883.

RESULTS

We analyzed 137 medical records of old patients diagnosed with COVID-19 admitted to the UH-UFPI from April to December 2020. The clinical characteristics associated with the outcome are presented in Table 1. There was a higher proportion of men in the sample (56.94%) and a predominance of individuals who had at least one risk factor (94.2%), both in cases of hospital discharge (96.8%) and in cases of death (92.0%). Regarding the presence and number of clinical manifestations, 98.7% of the cases of death and

83.9% of the cases of hospital discharge had clinical manifestations, and 51.4% of the cases of death had three clinical manifestations and 48.1% of the patients who were discharged had two clinical manifestations.

Of the total participants, 89.3% were hospitalized in Intensive Care Unit beds and under use of IMV. The mean age was 70.58 years in cases of hospital discharge and 76.72 years in cases of death and the length of stay in days, the cases of discharge had an average of 13 days and deaths 10 days.

Table 1. Association between clinical characteristics and outcome. Teresina, PI, Brazil, 2023.

Risk Factor	Hospital discharge n = 62	Death (n=75)	Total (n = 137)	p
Yes	96.8% (60)	92.0% (69)	94.2% (129)	0.293
No	3.2% (2)	8.0% (6)	5.8% (8)	
Clinical Manifestations				
Yes	83.9% (52)	98.7% (74)	92.0% (126)	**0.003***
No	16.1% (10)	1.3% (1)	8.0% (11)	
Number of clinical manifestations				
One	15.4 (8)	10.8% (8)	12.7% (16)	
Two	48.1% (25)	28.4% (21)	36.5% (46)	**0.003***
Three	19.2% (10)	51.4% (38)	38.1% (48)	
Four or more	17.3% (9)	9.5 (7)	12.7% (16)	
Bed Type				
ICU	17.7% (11)	89.3% (67)	56.9% (78)	**0.000***
Nursery	82.3% (51)	10.7% (8)	43.1% (59)	
Mechanical ventilation				
Yes	8.1% (5)	89.3% (67)	52.6% (72)	**0.000***
No	91.9% (57)	10.7% (8)	47.4% (65)	

Source: Research data (2023).
*Values in bold represent statistically significant data. Data compared in relation to the category: outcome (Pearson's Chi-square Test and Fisher's Exact Test).

Table 2. Mean values and standard deviations of age and median and standard error of the mean length of stay of patients in relation to the outcome. Teresina, PI, Brazil, 2023.

Variables	Hospital discharge n = 62	Death (n=75)	p
Age (n = 137) Mean ± SD	70.58 ± 8.764	76.72 ± 9.319	**0.000***
Hospitalization period (days) (n = 137) Median ± SEM	13.00 ± 2.206	10.00 ± 1.420	**0.018***

Source: Research data (2023).
*Values in bold represent statistically significant data. Data compared in relation to the category: outcome (Spearman's test).

Based on table 3, it was observed that the variables "type of hospitalization bed" and "use of mechanical ventilation" were the variables that best explain the deaths and that only they were independent predictors for this outcome. Table 3 presents the multivariate binary logistic regression analysis for independent factors at death. It is observed that patients undergoing MV were 35.96 times more likely to die and those who were admitted to the ICU were 9.40 times more likely to die.

Table 3. Multivariate binary logistic regression analysis for independent factors associated with death. Teresina, PI, Brazil, 2023.

| Variables	Death	p
	OR (95%CI)	
Mechanical ventilation		
Yes	35.96 (10.23-126.47)	**0.000***
No	1.0	
Type of hospitalization		
ICU	9.40 (2.69-32.82)	**0.000***
Ward	1.0	

Source: Research data (2023).
Legend: OR: odds ratio; 95% CI: 95% confidence interval, *p<0.001 (Wald test).
*Values in bold represent statistically significant data. Data compared in relation to the category: death.

Finally, the survival analysis of old patients with Covid-19 was performed. This curve does the same function of logistic regression, however, it does not have the same ability to make an association, but to show whether or not there was an influence of the predictor variables on the outcome. Graph 1 shows the survival curve according to the type of hospitalization bed. At the significance level (p=0.000), there is an estimate of median survival in days of hospitalization equal to 18.000 (CI 14.827 – 21.173).

Graph 2 shows the survival analysis in relation to the use of MV. At the significance level of (p=0.000), we highlight an estimated median survival of days using MV equal to 18.000 (CI 14.827 – 21.173). In the survival analysis, the findings of this research indicate that 89.3% of patients submitted to IMV and admitted to the ICU died and that although they are not isolated variables for this outcome, they should be cited as important risk factors for the death of the old people.

Graph 1. Survival curve according to the type of hospitalization bed. Teresina, PI, Brazil, 2023.

Source: Research data (2023).
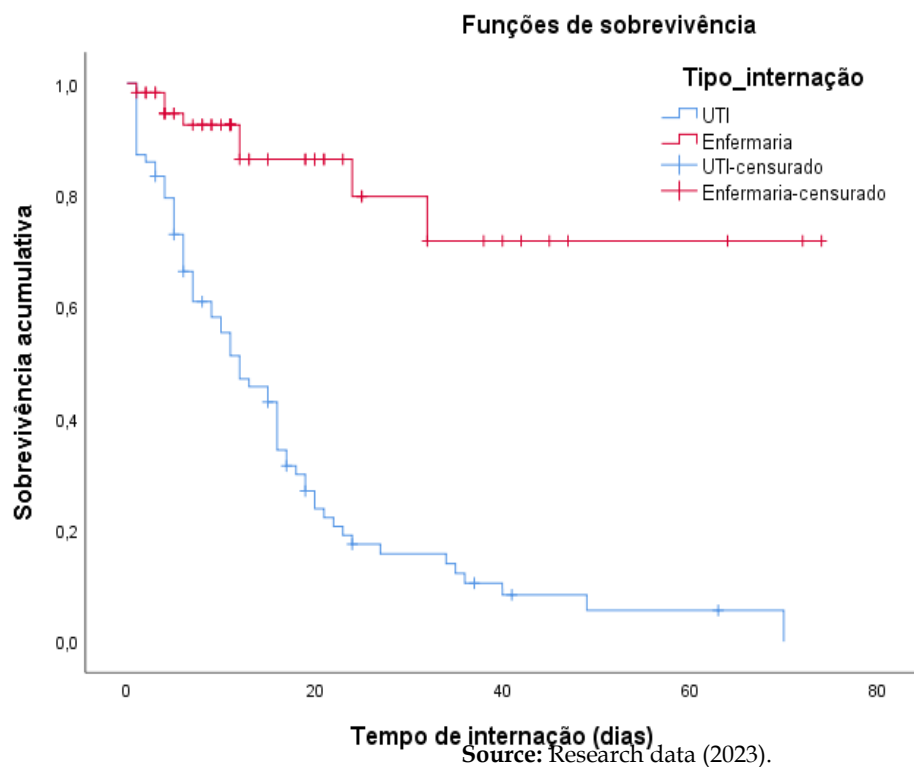
Graph 2. Survival curve according to the use of mechanical ventilation. Teresina, PI, Brazil, 2023.
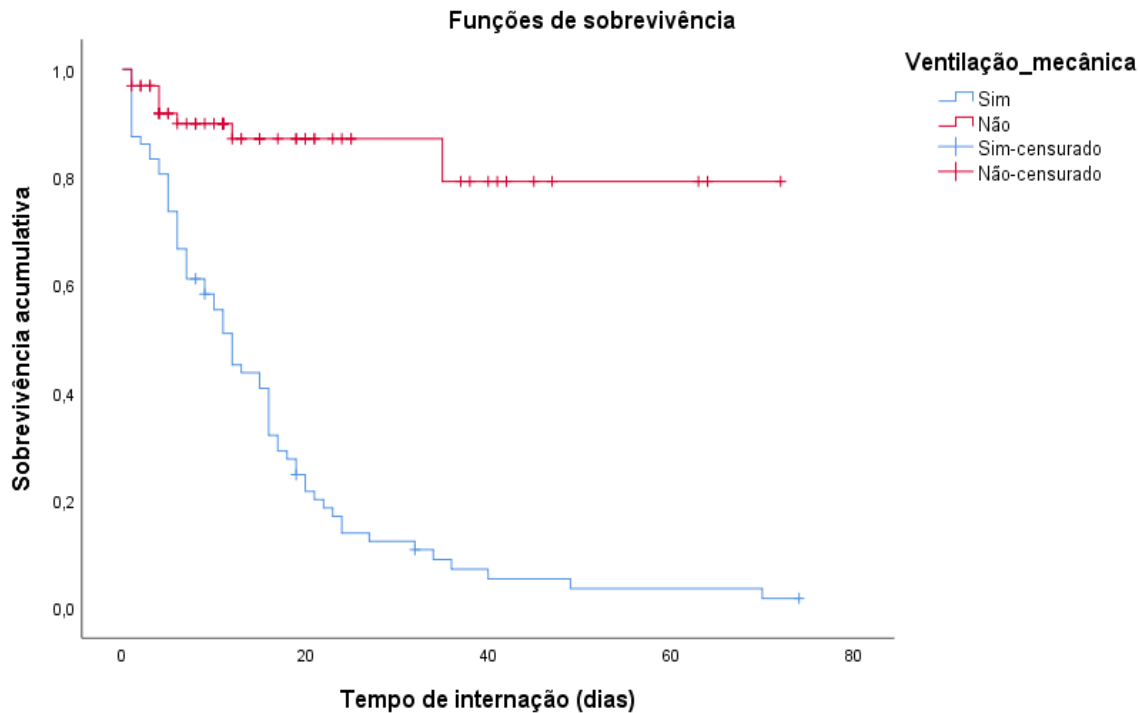
Source: Research data (2023).

DISCUSSION

In contexts such as Brazil, where the impact of the pandemic caused by the new coronavirus was extremely marked in all regions, it is relevant to investigate the clinical and epidemiological characteristics of the population most affected by the virus, the old people, as well as their characteristics, in a state in northeastern Brazil at the beginning of the pandemic period, including as a way to obtain answers for the population in relation to the effects of the pathology on the old people. The variables that showed a positive association were: presenting risk factors, presenting clinical manifestations, the number of clinical manifestations, the type of hospitalization bed, use of mechanical ventilation and very old people showed a higher mortality rate.

The present study showed that old people with death outcome had a higher mean age (76.72 years) than those who were discharged from hospital (70.58 years) and that the median length of stay of discharged cases was higher (13.00 days) in relation to death cases (10.00). This result corroborates the data presented in the studies conducted by Swamya *et al.*, (2022) and Yang *et al.*, (2020) [10-11] that point to advanced age as a determining factor for the development of severe forms and an increase in the mortality rate from COVID-19.

It is noteworthy that although the difference in the mean age presented is small, a retrospective cohort study carried out by Deerga *et al.*, (2022)[12] revealed that the asymptomatic and symptomatic groups had similar ages, and symptomatic men were five years old than asymptomatic men, reaffirming old age as a high risk factor for more severe outcomes of individuals with COVID-19, as well as in the findings of the study by Guan *et al.*, (2020)[13] where the most severe cases had mean of seven years more when compared to the less severe ones. Research carried out by Cavalcanti (2021) [14] points out that one year of age increases the risk of death of the infected patient by 1.02 times.

Regarding the risk factors associated with the outcome, both cases of hospital discharge (35.0%) and deaths (39.1%), the most recurrent pathologies were SAH, DM, chronic cardiovascular disease, and chronic kidney disease. Similar data were demonstrated by Guan *et al.*, (2020)[13] where 23.7% of the general population of the study had at least one underlying pathology, for example, SAH and COPD, indicating as more frequent the presence of previous comorbidities in patients who had severe conditions (38.7%) compared to non-serious ones (21.0%). Richardson *et al.*, (2020) [15] point out that advanced age and certain

factors that make up the metabolic syndrome, such as SAH, diabetes were related to an increased risk of developing severe forms and death in patients with COVID-19.

Attention should be drawn to the data referring to the clinical manifestations in relation to the outcome; it is observed that 126 of the 137 medical records of patients who composed this research presented some clinical manifestation. Data consistent with those found in a study by Niu *et al.*, (2020) [16] in which old patients initially presented fever, fatigue, myalgia, dry cough and dyspnea, and developed acute respiratory distress syndrome (ARDS) and septic shock, which caused death.

Also in agreement with the presence of clinical manifestations, a study by Guan *et al.*, (2020)[13] points to frequent fever in 43.8% of patients at admission and 88.7% during hospitalization and cough (67.8%) as the most frequent symptoms among the sample. It was observed that the data found in a study carried out by Deerga et al., (2022)[12] indicate that symptomatic patients were more likely to have febrile, hypoxic conditions and tachycardia and, as a consequence, a greater risk of death.. It is also noteworthy the variable "number of clinical manifestations" associated with the outcome, which indicate that both in cases of hospital discharge and in cases of death had two or more comorbidities; these data are in agreement with those found in a similar study by Chavolla *et al.*, (2021) [17], in which 24% (p<0.001) of the old individuals in his research had two or more comorbidities.

Regarding the type of hospitalization bed, whether ICU or ward bed, and also regarding the use of MV, several statistical analyses were performed and all presented statistical significance and association with unfavorable outcomes, especially the multivariate analysis for the independent factors associated with death, in which the type of bed (OR 9.398, 95% CI 2.691-32.815, *p* 0.000) and use of MV (OR 35.960, 95% CI 10.225-126.468, *p* 0.000) were the variables that best explained the death outcome. In a study conducted by Guan *et al.*, (2020)[13] points out that of 5.0% of their sample that was admitted to the ICU, 2.3% underwent MV and 1.4% of these died. Among the entire research sample, the risk of an unfavorable outcome between the need for ICU admission and the use of MV was 3.6%, and for severe cases, the risk reached 20.6%.

It was observed that Lian *et al.*, (2020) [18] in their study report that symptomatic old patients were more likely to develop ARDS (16.9% vs 5.4%, p<0.001) and required ICU admission (9.6% vs 1.4%, p < 0.001) when compared to patients under 60 years of age. It is noteworthy that age is not considered an isolated risk factor of death for old people in the ICU. Several relevant factors are also mentioned, such as the functional status prior to admission, existence of comorbidities, level of disease severity, use of MV and others, are factors that contribute to the increase in the mortality rate for the old population [19]. It is noteworthy that in a study by Chavolla *et al.*, (2021)[17], in old people without comorbidities (n=5746), the age variable alone was not mentioned as a significant risk factor for the need for ICU admission or for the use of invasive MV.

The survival curve in this study indicated an increased risk of death associated with ICU admission and use of mechanical ventilation (p=0.000). Data consistent with those found in a study by Önder *et al.*, (2021)[20] who, when analyzing the prognostic factors that interfere with overall survival, points out that the need for hospitalization in intensive care and use of MV increased the mortality rate by 11.1 times (p<0.001) and 6.48 times (p<0.001) respectively. In a similar study carried out in the state of Piauí by Sousa *et al.*, (2022) [8] points out that among individuals aged 60 years or more who required intensive care, 45% of those hospitalized in the capital and 55.4% of those hospitalized in the countryside evolved to death and among the group of old people when submitted to MV, mortality reached 88.9% in the capital and 98.3% in the countryside.

Thus, it is evident the need for advances in research that will contribute to knowledge about the epidemiological profile of COVID-19, especially in the old population. In addition, as a perspective, it is suggested to deepen studies on the clinical characteristics of patients with COVID-19, such as prospective studies that analyze them during their hospitalization period.

An important point to mention is the existence of some limitations in the conduct of this study, although the study population covered a wide variety of sociodemographic data, it is a relatively small sample, as this is a survey carried out in a single reference center for the treatment of COVID-19 in the state of Piauí. Associated with this, this is a retrospective study that makes it impossible to assess more accurately certain clinical and laboratory parameters of patients. In addition, due to the nature of the study, monitoring of patients could not be performed. Thus, the results and conclusions found in this research should be interpreted with caution.

CONCLUSION

The present study produced relevant data on the clinical-epidemiological profile and outcome of old people hospitalized for COVID-19 at the University Hospital of Piauí, which was configured as a reference in the treatment of the pathology in the state. The results of the study show that the presence of comorbidities/risk factors for COVID-19, clinical manifestations of the disease, were admitted to ICU beds, using MV and those who were older had worse outcomes. It is noteworthy that it is of paramount importance to draw up a care plan for the treatment of COVID-19, especially the old population, considering its weaknesses and specificities, aiming at improving the physiological and psychological functions of this public, outlining methods that minimize the degrading effects of the pandemic, reducing the advent of mental, social and physical discomfort in this population.

CONTRIBUITIONS

Study conception or design: Sousa VTS, Paiva JS, Nogueira MRN, Vasconcelos PF. Data collection: Sousa VTS, Paiva JS, Nogueira MRN.Data analysis and interpretation: Sousa VTS, Paiva JS, Nogueira MRN. Writing of the article or critical review: Sousa VTS, Paiva JS, Nogueira MRN, Leite ACRM, Costa EC, Araújo TM, Vasconcelos PF. Final approval of the version to be published: Sousa VTS, Paiva JS, Nogueira MRN, Leite ACRM, Costa EC, Araújo TM, Vasconcelos PF.

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