LUMEN ET VIRTUS

Health conditions, incidence rate and lethality by Covid-19 in institutionalized elderly after the first year of the pandemic in Maceió-AL

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ABSTRACT

This study aimed to identify the sociodemographic, clinical, and nutritional profile, as well as to determine the incidence and lethality rate for COVID-19 in elderly residents in Long-Term Care Institutions for the Elderly in the municipality of Maceió – Alagoas, in the period 2020 and 2021. In the first year of the pandemic in Maceió, the reported incidence of COVID-19 was 31/100 residents in LTCFs, while the lethality rate was 6.56%, with elderly males representing the largest number of deaths (62.5%), the variables that presented as risk factors were sex, age, previous diagnosis of DM and low weight ($p < 0.050$) and the variable education ($p = 0.081$). The data from this research reinforce results presented by other researchers where the previous diagnosis of diabetes is associated with the outcome death and male gender, age, low education and BMI are associated with the occurrence of the disease.

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INTRODUCTION

SARS-CoV-2 infection has caused concern in the scientific community and society due to its high virulence, transmission capacity, and high mortality rates (Zhou, *et al.,* 2020). According to the DATASUS database on COVID-19 as of January 2022, there were 23.1 million confirmed cases of the disease and more than 621,000 deaths in Brazil, with the Northeast being the second region of the country with the highest number of cases, behind only the Southeast region (Brazil, 2022).

The most common clinical manifestations presented by the disease are fever, cough, fatigue, muscle pain, anosmia, dysgeusia, pneumonia, and can progress to severe conditions such as acute respiratory distress syndrome, metabolic acidosis, septic shock, coagulation dysfunction, and organ failure (Chen, *et al.,* 2020; Huang, *et al.,* 2020).

A recent review suggests that COVID-19 may accelerate the organic aging process, favor the progression of preexisting diseases, compromise the immune response, and reduce the frequency and duration of physical activity, favoring the reduction of functional capacity in the elderly and making the elderly even more fragile (Boreskie, *et al.,* 2020).

The risks of complications from Covid-19 are increased with age, especially in individuals who have other comorbidities, such as diabetes, systemic arterial hypertension (SAH), asthma, chronic obstructive pulmonary disease (COPD), among other chronic diseases. Infection caused by SARS-CoV-2 has a higher mortality rate in this age group (Machado, *et al.,* 2020). In Brazil, 70% of deaths occurred in people over 60 years of age, and of these, 64% had at least one risk factor (Barbosa, *et al.,* 2020).

Therefore, it is evident that individuals living in long-term care institutions (LTCFs) for the elderly make up the main risk group for clinical complications associated with COVID-19, in addition to the age factor, other common pathologies in this age group (Banerjee, 2020).

The change in the age profile associated with changes in family structure led many families to refer their loved ones over 60 years of age to live in LTCFs, especially those who are more fragile, with greater functional dependence and who require greater attention. Such particularities place this population group with greater difficulty for organic recovery from infectious external aggressions, such as SARS-CoV-2 infection (Moraes, *et al.,* 2020).

The estimates of the lethality of the disease in institutionalized elderly people in the state of Washington, in the United States, alone was 33.7% (Machado, *et al.*, 2020). The study by Lai et al (2020) on COVID-19 reported that older adults living in LTCFs have greater susceptibility to the disease and demonstrate the worst results of this infection. In countries in Europe, Asia, and Oceania,

about 30% to 60% of deaths in the elderly occurred among residents of LTCFs (Moraes, *et al.,* 2020). In Brazil, these data are still scarce or non-existent.

Thus, this study aimed to identify the sociodemographic, clinical, and nutritional profile, as well as the incidence and lethality rate for COVID-19 in elderly people living in LTCFs in the municipality of Maceió - Alagoas.

MATERIAL AND METHODS

This was a longitudinal, prospective cohort study conducted from April 2020 to April 2021 in the city of Maceió – Alagoas. The population of this study consisted of the universe of elderly people living in all 15 LTCFs in Maceió, registered in the Home Care Service (SAD) of the Maceió Municipal Health Department (SMS), which totaled 401 elderly people.

People of both sexes, aged equal or over 60 years of age and living in LTCFs located in the municipality of Maceió, AL. Data collection was carried out in three moments, two in person and one by telephone. Researchers and health professionals, duly trained and qualified, were responsible for data collection. The first data collection took place approximately 30 days after the first case of COVID-19 was recorded in Alagoas (April 2020). At this time, sociodemographic data, clinical history, blood pressure assessment, anthropometric assessment and functional capacity assessment were collected.

The second evaluation was performed approximately 6 months after the first and the same variables as the first visit were collected, following the same instruments and evaluation protocols.

The third stage consisted of collecting information, by telephone, on the records of new cases and deaths due to COVID-19, considering the interval between the second assessment and the moment of the call that occurred 12 months after the beginning of this research.

All elderly people were tested for COVID-19 in the first and second visits, regardless of whether they had symptoms of the disease, through the "rapid" immunological test based on chromatographic immunoassay, rapid and qualitative for the detection of IgG and IgM anti-coronavirus antibodies in a whole blood sample. If the positive result for IgM (Hoffman, *et al.*, 2020).

The report of COVID-19 reported in any of the three evaluations, duly proven by medical record, was also recorded.

The sociodemographic data of all the elderly were collected on the first visit to the LTCFs. In this study, the following sociodemographic variables were collected: Age, gender, education and marital status.

Alcoholics were considered to be all elderly people who reported using alcoholic beverages, even if rarely (< 1 time/month). Likewise, those who reported never drinking or those who reported

having suspended the use of alcoholic beverages for at least one month were considered non-consumers.

Regarding smoking, smokers were classified as those who reported smoking use, regardless of frequency; nonsmokers: those who had quit smoking for at least one month or had never used any type of smoke.

Physically active elderly individuals were considered to be physically active if they practiced physical activity at LTCFs, of moderate intensity at least 30 min/day for 5 days a week, or intense activities for at least 20 min/day, three times a week, reported by the elderly themselves or their caregivers, following the criteria of the *American College of Sports Medicine* and the *American Heart Association* (Haskell, *et al.*, 2007).

Information on signs and symptoms associated with SARS-CoV-2 infection, such as difficulty breathing, cough, dysgeusia, anosmia, diarrhea, nausea, vomiting, fever, headache, sputum production, and others, was collected in the two face-to-face evaluations.

The histories of preexisting chronic diseases such as hypertension, diabetes, chronic obstructive pulmonary disease (COPD), cardiovascular disease, dementia syndrome and other diseases with a previously established medical diagnosis were also collected, in addition to the continuous use of medications.

Blood pressure (BP) was measured in duplicate, with the individual seated and after 5 minutes of rest, using Omron HEM-742 digital devices (OMRON Corp., São Paulo, Brazil). For this evaluation, some criteria were established before verification: 1) individual did not have a full bladder; 2) not having practiced physical exercise for at least 60 minutes; 3) not have ingested alcoholic beverages or tobacco within 30 minutes before. BP was checked three times and an average of these measurements was considered as resting BP. The values of the Update of the Cardiovascular Prevention Guideline of the Brazilian Society of Cardiology, which considers individuals with systolic blood pressure (SBP) ® $\geq$ 140 mmHg and/or diastolic blood pressure $\geq$ 90 mmHg as hypertensive (Barroso, *et al.,* 2021), were adopted as hypertensive (Barroso, et al., 2021).

Weight was estimated based on the equation validated for elderly residents in LTCFs by Jung et al., 2004, which considers the values of LA (Knee height) and CO (Arm circumference) for men and women, according to the following equation: 1) Men - Weight = (LA × 0.928) + (CO × 2.508) – (Age × 0.144) – 42.543; 2) Women - Weight = (AJ × 0.826) + (CB × 2.116) – (Age × 0.133) – 31.486.

Height was estimated from the measurement of knee height and applied in a formula, according to Chumlea et al. (1985), according to the following equation: 1) Men - Height = (2.02 × AJ) – (0.04 × I) + 64.19; 2) Women - Height = (1.83 × AJ) – (0.24 × I) + 84.88.

Knee height was measured with the aid of an anthropometric ruler with a Sanny® metal rod.

The elderly man remained with his leg bent, forming a 90º angle with the knee. The fixed part of the ruler was placed under the heel and the mobile part was brought to the suprapatellar region.

Arm circumference was measured at the midpoint of the non-dominant arm, using an inextensible and flexible tape measure, and the results were evaluated according to the reference values of the *Third National Health and Nutrition Examination Survey* – NHANES III (1988 – 1994).

Calf circumference was assessed at the largest circumference between the ankle and the knee, with an inextensible and flexible tape measure, without compressing the tape, in a perpendicular position in relation to the calf. Next, the cut-off point established by the World Health Organization (WHO) in 1995 was adopted, where values $\leq$ 31 cm indicated loss of muscle mass.

BMI was calculated by dividing weight (in kilograms) by height squared (in meters), resulting in a value expressed in kg/m². The Lipschitz (1994) criterion was adopted to classify the nutritional status of the elderly based on BMI values, i.e., normal BMI between 22 and 27 kg/m²; thinness BMI < 22 kg/m² and overweight BMI > 27 kg/m².

Functional capacity was assessed using the Barthel index in association with the questionnaire that assesses Basic Activities of Daily Living (BADL), as recommended by Lawton (Lawton; Brody, 1969) and classified as dependent (those who were dependent for one or more activities) or independent.

The incidence rate was calculated using the ratio between the number of new cases of COVID-19 between April 1, 2020 and April 1, 2021), divided by the number of institutionalized elderly people in Maceió (considering that all elderly people are equally exposed to the risk of infection), and the value multiplied by 100, according to the equation: Incidence rate = number of new cases of COVID-19 / number of institutionalized elderly) x 100.

The case fatality rate of confirmed cases was calculated from the ratio between the number of deaths caused by the disease and the number of elderly people who tested positive for COVID-19, multiplied by 100, according to the equation: Case fatality rate = (number of deaths from COVID-19 / number of confirmed cases of the disease) x 100.

STATISTICS

For the statistical analysis, the Jamovi software, version 8.1.2.0, will be used. The behavior of the variables, regarding the distribution of normality, was identified by means of the *Kolmogorov-Smirnov* test with *Lilliefors correction* and the homogeneity of the variance of the residuals was evaluated using the Levene test.

The sample was described by means of relative and absolute frequencies or by presenting measures of central tendency (median) with their respective dispersion values (Interquartile Ranges -

IQR) for continuous variables. To verify the association between the frequency of categorical variables among the elderly with and without a diagnosis of COVID-19, Pearson's chi-square test or Fisher's exact *test was performed*. The difference in the means of the variables with normal distribution, evaluated between the elderly with and without COVID-19, was identified using the t-test for independent variables, while for the variables that did not meet the assumptions, it was using the *Mann Whitney test*. Logistic regression analysis (crude oil - unadjusted) was performed to verify the association with sociodemographic variables and the risk of having a positive diagnosis for COVID-19. Similarly, a logistic regression model, adjusted for age, sex, family income, schooling, and BMI, was performed to identify a possible association between clinical variables and the outcome death. For all analyses, a value of $p<0.05$ was considered statistically significant.

ETHICAL ASPECTS

The research project was submitted to the Research Ethics Committee (CEP) of the Federal University of Alagoas, via the Brazil platform, and approved with opinion number 4.314.080/2020.

RESULTS

In Maceió, 15 LTCFs are registered with the Municipal Health Department of the municipality, welcoming 401 elderly people, most of whom are women (n = 248; 61.84%), with ages ranging from 67 to 85 years (median = 76 years; IQ = 18). Most of the institutionalized elderly in Maceió had studied for less than 5 years (n = 228; 63.33%), and had a record of some pre-existing chronic disease (n = 296; 73.81%). About 41 (10.2%) of the 401 elderly people did not have a record of schooling.

Regarding the use of medications, it was observed that 17.46% of the elderly used 5 or more medications per day (n = 70). Table **1** presents the characterization of the sample in terms of sociodemographic and lifestyle variables, while **Table 2** presents the health conditions and nutritional status of this population.

Table 1. Sociodemographic characterization and lifestyle of institutionalized older adults in Maceió – AL, according to COVID-19 diagnosis.

Variables			COVID negative (n= 277)		COVID positive (n= 124)			
		Total no	n	%	n	%	OR	p
Age*	< 80 years ≥ 80 years	401	172 105	62,1 37,9	68 56	54,8 45,2	1,35	0,171
Gender*	Male Female	401	92 185	33,2 66,8	61 63	49,2 50,8	1,95	0,002
Estado Civil*	With partner No companion	401	30 247	10,8 89,2	13 111	10,5 89,5	0,96	0,917
Schooling*	≤ 5 years > 5 years	360	148 99	59,9 40,1	80 33	70,8 29,2	1,62	0,047
Styling*	Yes No	401	9 268	3,2 96,8	6 118	4,8 95,2	1,51	0,438
Smoking*	Yes No	401	34 243	12,3 87,7	22 102	17,7 82,3	1,54	0,144
Physical Activity*	Yes No	401	86 191	31,0 69,0	35 89	28,2 71,7	1,03	0,904

Legend: OR = Odds ratio; COVID = Coronavirus Disease;
* Pearson's chi-square;

It is noteworthy that low education and male gender were risk factors for COVID-19, increasing the risk of the elderly having COVID-19 by approximately 1.9 and 1.5 times, although a balance between the sexes was observed in terms of the incidence of COVID-19, being among the elderly who had COVID-19, 50.8% (n = 63) were women and 49.2% (n = 61), men.

Regarding the assessment of nutritional status, 38.2% of the elderly were underweight (n = 120), 42.04% were eutrophic (n = 132) and about 14.74% (n = 62) were overweight. It was also observed that 47.77% (n = 150) of the elderly had muscle mass depletion, assessed by calf circumference, although no difference was observed in the frequency of nutritional status classifications between the groups ($p > 0.05$).

Mean NC, median percentage of unintentional weight loss, creatinine, and aspartate aminotransferase were associated with the diagnosis of COVID-19 (**Table 2**).

Table 2. Clinical and nutritional characterization of institutionalized older adults in Maceió – AL, according to COVID-19 diagnosis.

	Variables		COVID negative (n= 277)		COVID positive (n= 124)			
		n total	n	%	N	%	OR	p
Hypertension	Yes No	401	124 153	44,8 55,2	64 60	51,6 48,4	1,32	0,204
Diabetes mellitus	Yes No	401	58 219	20,9 79,1	34 90	27,4 72,6	1,43	0,154
Cardiovascular disease	Yes No	401	12 265	4,3 95,7	11 113	8,9 91,1	2,15	0,071
Chronic obstructive pulmonary disease	Yes No	401	6 271	2,2 97,8	5 119	4,0 96,0	1,90	0,326
Dementia	Yes No	401	22 255	7,9 92,1	10 114	8,1 91,9	1,02	0,967
Heart disease	Yes No	401	55 255	19,9 80,1	31 93	25,0 75,0	1,35	0,246
Medications in use	≥ 5 < 5	401	52 225	18,8 81,2	18 106	14,5 85,5	-	-
			Average/ Median	DP/IQ	Average/ Median	DP/IQ	IC 95%	p
IMC		314	23,74	5,22	23,49	6,42	-	0,419#
Unintentional weight loss (%)		401	2,0	2,10	3,00	3,55	-	0,002#
CP (cm)		401	31,61	5,63	30,07	4,97	1,08 - 1,87	0,043*
SBP (mmHg)		401	114,0	41,00	120,00	37,00	-	0,223#
PAD (mmHg)		386	57,26	23,28	61,45	24,54	-12,75 - 0,375	0,065*
FC (bpm)		386	76,12	11,88	77,53	14,76	-4,97 - 2,15	0,435*
Hemoglobina (g/dL)		386	13,38	2,71	13,32	2,66	-	0,977#
Leukocytes (mm^3)		386	6350,0	2776,5	6542,0	2435,0	-	0,394#
Lymphocytes (mm^3)		386	1952,0	1130,0	1946,0	897,25	-	0,246#
Ureia (mg/dL)		386	28,75	14,92	29,10	17,50	-	0,835#
Creatinina (mg/dL)		386	0,70	0,30	0,80	0,020	-	0,043#
Glicose (mg/dL)		386	77,00	34,00	75,00	31,5	-	0,532#
AST (U/L)		386	17,00	8,50	18,00	12,00	-	0,109#
ALT (U/L)		386	12,00	8,00	14,00	14,00	-	0,045#

CI= confidence interval; * t-test; # Mann-Whitney

To calculate the incidence rate, the entire population of institutionalized older adults in Maceió (n = 401) was considered, of which 124 were diagnosed with COVID-19 throughout 2021. Thus, in Maceió, Alagoas, the estimated incidence rate was 30.92%.

To calculate the lethality rate, the elderly from 13 LTCFs participating in the study were considered, since two of these institutions did not provide mortality data. In these institutions, 124 cases of COVID-19 and 8 deaths from the disease were observed during the first year of the pandemic. Thus, the case fatality rate observed was approximately 6.56% and a higher frequency of deaths was observed among men, who represented 62.5% of the cases (n = 5) and women 37.5% (n = 3).

The elderly who had all the variables of interest for the study duly filled in were included in a multiple logistic regression analysis that was performed to identify possible associations between the explanatory variables of this study and the outcomes of positive diagnosis for COVID-19 and death. The variables that were presented as risk factors for having a positive diagnosis for COVID-19 (gender, age, previous diagnosis of DM, and low weight) ($p < 0.050$) **(Table 3)**.

The clinical variables that were associated with the outcome were death, after adjustments, were the previous diagnosis of diabetes and the initial leukocyte concentrations ($p < 0.050$) **(Table 4).**

Table 3. Logistic regression models to identify factors associated with positive COVID diagnosis.

Variables	N	B	Adjusted OR	IC 95%	P
Outcome: COVID positive/Incidence#	288				
Gender (Male)		1,36	3,88	2,23 – 6,75	<0,001
Age (years)		0,04	1,04	1,01 – 1,07	0,011
Diagnosis of DM		0,74	2,08	1,15 – 3,78	0,015
BMI (Low Weight)		0,62	1,86	1,05 – 3,33	0,036
Education (≤ 5 years)		-0,48	0,621	0,364 – 1,06	0,081

Table 4. Logistic regression models to identify factors associated with the outcome death from COVID-19.

Variables	N	B	Adjusted OR	IC 95%	P
Outcome: Death/Lethality*	97				
Hypertension		1,32	12,34	0,03 – 15,35	0,425
Diabetes Mellitus		2,92	18,55	2,09 – 164,61	0,009*
Chronic Obstructive Pulmonary Disease		-0,85	2,53	0,23 – 29,35	0,632
Dementia		0,82	1,01	0,22 – 3,21	0,429
Heart disease		0,92	1,81	0,92 – 14,52	0,524
Hemoglobin		-0,48	0,62	3,65 – 1,06	0,078
Leukocytes		0,01	1,01	1,01 – 1,02	0,020*
Lymphocytes		0,02	1,25	0,85 – 11,23	0,625
Urea		0,06	0,82	0,02 – 19,53	0,231
Creatinine		0,04	0,46	0,62 – 3,21	0,432
Glucose		0,13	1,02	0,82 – 65,23	0,542
AST		-0,13	0,88	0,76 – 1,02	0,083
OLD		-0,05	0,62	0,09 – 11,21	0,425

Unadjusted raw data; *Adjusted for: sex, age, education, diagnosis of chronic diseases and BMI.

DISCUSSION

The data from this research reinforce results presented by other researchers where the previous diagnosis of diabetes is associated with the outcome death and male gender, age, low education and BMI are associated with the occurrence of the disease.

A higher prevalence of institutionalized elderly women than men was observed in Maceió-AL, a result consistent with different studies in the literature (Güths, *et al.,* 2017; Pinheiro, *et al.,* 2016; Araújo, Neto & Bós, 2016). According to Goldani (1999), it is probably because elderly women experience a greater probability of being widowed, in a disadvantaged socioeconomic situation and with special needs.

Despite the predominance of women, it was observed that institutionalized elderly men with low education had a higher risk factor 1.5 and 1.9 times higher for having a positive diagnosis for COVID-19, respectively. On the other hand, it was found in a study conducted by Jin *et al* (2020) that identified that men and women had the same prevalence of COVID-19, and that male patients had higher mortality.

Possibly, the higher probability of occurrence of the disease among men is due to some behavioral aspects, such as the non-adoption of COVID-19 prevention and control measures and the low adherence to self-care measures (Souza, *et al.,* 2021), making elderly men more exposed to the disease and susceptible to more serious repercussions compared to women. Hogan *et al* (2020), reaffirm that the female public is significantly more likely to have greater health care, especially during the COVID-19 pandemic, being considered a protective factor.

Research conducted by Galasso *et al* (2020) indicated that men are more reluctant than women to wear protective masks and respect social distancing, for example. Low education contributes to increasing the difficulty of care for the elderly, by reducing their understanding, making it difficult to recognize risk situations and health problems, compromising the ability to make informed decisions about their health and consequently reducing the demand for and use of health services (Saadi, *et al.,* 2017).

It was observed that of the total number of elderly people living in LTCFs in Maceió, almost 74% had some pre-existing disease, with arterial hypertension being one of the most prevalent. Other authors also identified that hypertension was the most frequent disease among institutionalized older adults (Fallon, *et al.,* 2020; Güths, *et al.,* 2017). In addition to hypertension and other cardiovascular diseases, diabetes has been the second most frequent comorbidity associated with clinical worsening of COVID-19, leading many elderly people to death (Etard, 2020).

Considering that older institutionalized older adults are more fragile and dependent on care, it is plausible to imagine that caregivers may be vectors for cross-contamination among LTCF older adults, putting the older age group at greater risk for COVID-19 contamination.

Regarding nutritional status, it was identified that underweight was associated as a risk factor for a positive diagnosis for COVID-19. For the other indicators, no significant association was identified in this study. A review by Portela and Cebola (2021) identified that older adults at nutritional risk had worse clinical outcomes. Elderly people affected by COVID-19 may be more susceptible to malnutrition, this may be due to the presence of gastrointestinal symptoms, presented by most infected older adults, which directly interfere with food consumption and nutritional status, or by the deleterious effects of the acute inflammatory response to SARS-CoV-2 (Souza, *et al*., 2021).

Maintaining good nutritional status can contribute to reducing complications resulting from comorbidities and COVID-19 (Barazzoni, *et al.,* 2020).

In the first year of the COVID-19 pandemic in Maceió, Alagoas, a high incidence rate was observed, where for every 100 elderly people living in LTCFs, 31 tested positive for the disease.

A systematic review conducted by Salcher-Konrad *et al* (2020), observed a variation in the incidence rate of COVID-19 in LTCFs ranging from 0.0% to 71.7%. Unlike these findings, in the

study by Wachholz *et al* (2020) that evaluated institutionalized older adults from 11 Brazilian states through secondary data, in the period from April to June 2020, the incidence rate was 6.14% of COVID-19. Preliminary studies indicate that in LTCFs, SARS-CoV-2 infection is high, with a suggested mortality rate for those over 80 years of age higher than 15% (Ouslander, 2020).

Considering the context of LTCFs, it is a high-risk environment for infection, as it predominantly involves the elderly, diverse people with chronic comorbidities and difficulties in activities of daily living, frequent contact with caregivers, professionals, visitors, and living in clusters (Nunes, *et al.,* 2020).

As for the lethality in the LTCFs studied in Maceió, a rate of 6.56% was observed in the first year of the pandemic, with elderly males representing the largest number of deaths (62.5%). In the available literature on the subject presented here, it is discussed that the coronavirus disease (COVID-19) had a particularly important impact among institutionalized older adults classified as long-term care patients in Western countries, where there is a higher prevalence of deaths in these institutions, reaching 35% of COVID-19 deaths in the United States (Faghnipour, 2020).

Lai *et al* (2020), conducted a review of the clinical conditions of COVID-19 carriers and identified that elderly males developed more severe cases of the disease. Other studies such as Li *et al* (2020) and Liu *et al* (2019) describe that in addition to gender, there was an association between advanced age and severe symptoms of COVID-19, while Galvão & Roncalli (2020) identified a higher risk of death from COVID-19 in institutionalized male elderly with comorbidities.

It is noteworthy that the higher mortality among institutionalized older adults is due to the high concentration of the high-risk population (frail, advanced age, and with chronic diseases) especially identified as the most affected by the pandemic in relation to risk factors, in addition to exposure. Since viral transmission rates among these LTCF populations seem to be higher than those of the general population due to frequent close contacts during daily activities and the greater vulnerability of their residents (Watanabe et al., 2020). It is noteworthy that the lack of adequate structure and human resources in LTCFs can hinder the adoption of infectious disease control measures.

Among the factors associated with mortality from COVID-19 in the institutionalized elderly in this study, the previous diagnosis of diabetes stands out. This clinical condition predisposes people to worsening their clinical condition in the face of SARS-COV-2 infection (Etard, 2020). Fallon *et al* (2020), stated that institutionalized older adults are proven to be the age group at highest risk of adverse diagnostic outcomes and mortality in the face of the COVID-19 pandemic.

According to Hussain et al (2020), people with diabetes are at increased risk for severe infections produced by different agents, including SARS-CoV-2; the mechanisms proposed to explain the association between diabetes mellitus and COVID-19 include an exacerbated

inflammatory process, changes in coagulation and immune response, and direct aggression of SARS-CoV-2 to pancreatic islet cells, responsible for glycemic regulation.

CONCLUSION

The findings of the present study can strongly contribute to the development or redirection of health care strategies for the elderly, contributing to the fight against the COVID-19 pandemic and strengthening actions in the field of public health to reduce complications and mortality in this age group. In addition, the results of this research reinforce results presented by other researchers, whose previous diagnosis of diabetes is associated with the outcome death and male gender, age, low education and BMI are associated with the occurrence of the disease, as well as contributing to the scientific literature in order to elucidate some questions involved in the pathophysiological process of SARS-CoV-2 infection in institutionalized elderly.

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