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EPIDEMIOLOGICAL PROFILE OF DEATHS FROM COVID-19 IN A NORTHERN MUNICIPALITY OF MINAS GERAIS/BRAZIL

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ABSTRACT

Objective: to describe the epidemiological profile of deaths from COVID-19 in the municipality of Montes Claros, Minas Gerais/Brazil, which occurred from the record of the first death until February 2, 2021. **Methodology:** this is an epidemiological, descriptive study, with secondary data extracted from the COVID-19 Epidemiological Bulletin, through the Epidemiological Surveillance of the Municipal Health Department of Montes Claros/MG. The variables evaluated were sex, age group, place of death, types of comorbidities and the main symptoms of COVID-19. Data extraction was performed on February 3, 2021. The data were grouped in Microsoft Excel® and *Statistical Package for the Social Sciences* (SPSS) version 24.0 for descriptive analyses with the presentation of absolute (n), relative frequencies (%), mean and standard deviation and bivariate analysis. **Results:** there were 258 deaths, of which 65.9% were male, the average age was 70 years (SD ± 17.2 years), 76.0% of deaths occurred in the age group 60 years old, 92.6% had some comorbidity, especially heart disease (48.9%), diabetes (37.6%) and hypertension (29.1%). The most prevalent symptoms were respiratory (dyspnea, saturation 95% and cough). **Conclusion:** the death profile of this study will subsidize public policies for decision making in the COVID-19 context in Montes Claros, Minas Gerais/Brazil, mainly focusing on elderly men with comorbidities.

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INTRODUCTION

By the end of December 2019, the first cases of the outbreak of a new severe acute respiratory syndrome, caused by a new virus (coronavirus 2 or SARS-COV-2), were recorded, named COVID-19, in Wuhan city, China (Xiao et al., 2020). The initial signs and symptoms of the disease are similar to a common flu condition, and may present with a nonspecific symptomatology and vary from person to person. Most infected people present its mild form, with some symptoms such as fever, malaise, cough, fatigue, mild dyspnea, sore throat or nasal congestion, headache, body pain, changes in smell and taste, and diarrhea, nausea and vomiting may also be present (WHO, 2000; Rothan, 2020). The increasing transmission rate caused COVID-19 to be considered a pandemic on March 11, 2020 (PAHO, 2020). As of February 2, 2021, the World Health Organization had counted 103,377,424 records, of which 2,236,454 were cases of death from the disease worldwide (WHO, 2020b). In Brazil, the first case of the disease was detected on February 26, 2020 (Macedo et al., 2020) and on February 2, 2021, the Ministry of Health indicated 9,283,418 people infected with coronavirus and 226,309 deaths (WHO, 2020b). In the state of Minas Gerais, up to the second day of February 2021, 15,126 coronavirus deaths were recorded (SES-MG, 2020a).

The Municipal Health Department of Montes Claros, in Northern Minas Gerais, on April 5, 2020 confirmed its first death from the new coronavirus, being a senior, who was also the first confirmed case of the disease in the municipality (Montes Claros, 2020a). Almost a year later, on February 2, 2021, the municipality of Montes Claros had 16.806 confirmed cases, of which 258 died from COVID-19, of which 196 occurred in the age group over 60 years (Montes Claros, 2021b). Mortality from COVID-19 has grown greatly since the onset of the virus, and many of these cases have been due to the presence of comorbidities and risk factors, which intensify the virus, and include advanced age, heart disease, hypertension, diabetes, obesity, liver complications, pediatric, hematological, respiratory and immunosuppressed people, being these factors associated with increased risk of death (Guan et al., 2020). He present study aimed to describe the epidemiological profile of deaths caused by COVID-19 in the municipality of Montes Claros, Minas Gerais/Brazil, between the first death occurred in April 2020 until February 2, 2021, in order to add scientific data to the existing national and international literature on COVID- 19.

METHODOLOGY

This research is an observational, descriptive epidemiological study, based on secondary data extracted from the COVID-19 Daily Epidemiological Bulletin of Montes Claros/MG, accessed through the Epidemiological Surveillance of the Municipal Health Department of Montes Claros, Minas Gerais/Brazil. The study was carried out in the municipality of Montes Claros, located in northern Minas Gerais and in southeastern Brazil. The estimated population for the year 2020 was 413,487 in habitants, population density of 101.41 in habitants/km² and Human Development Index (HDI) of 0.770 (IBGE, 2020). The inclusion criteria consisted of all deaths from COVID-19 in individuals living in Montes Claros, of any age, which occurred between April 5, 2020 and February 2, 2021, with confirmation of COVID-19 in the Death Certificate (DC), registered in the Mortality Information System (MIS) and reported in the epidemiological bulletin of the municipality. The exclusion criteria were cases of deaths from other comorbidities or suspected COVID-19. The collection period stipulated by this study is because of the first case of death by COVID-19 registered in the municipality, which occurred on April 5, 2020, and the update of the Epidemiological Bulletin, until the moment of data collection, which happened for the last time on February 2, 2021, at 06:00 p.m. Data were collected on February 3, 2021 after the bulletin update. After that, the data were grouped in Microsoft Excel® and later in the Statistical Package for the Social Sciences (SPSS) version 24.0, to perform descriptive analyses of the variables, with the presentation of absolute (n) and relative (%) frequencies, mean and standard deviation. Subsequently, a bivariate analysis stratified by sex was conducted. The variables evaluated were: sex, age group, comorbidities (yes/no), type of comorbidities and main symptoms of the disease. As it is a public domain database, according to Resolution No. 510/16, of the National Health Council, there was no need to submit the project to the Research Ethics Committee. However, all ethical aspects described in Resolution No. 466/2012 were respected.

RESULTS AND DISCUSSION

Of the 79,497 suspected reports of COVID-19, 21.1% (16,806) were positive cases and of these 1.5% (258) died from the same cause. This result is lower than the study developed in China, which showed a mortality of 2.3% of positive cases (Xie et al., 2020). The first death recorded from COVID-19 in Montes Claros/MG was on April 5, 2020, reaching a total of 258 deaths by February 2, 2021 (Figure 1). There was an increase in deaths between July and October 2020, which can be explained due to the greater circulation of the virus possibly caused 30 days after relaxation of the measures to contain the disease in the same period in the municipality under study. In this scenario, the Municipal Decree No. 4059 of June 15, 2020 stands out, of the municipal plan *"Advance MOC, with responsibility",* which

regulates the flexibilization of the operation of economic, assistance, cultural, religious and public services activities in the municipality (Montes Claros, 2020c) stands out. An international study pointed out that in the first 60 days of circulation of the new coronavirus, dissemination is faster, possibly associated with high transmissibility, relaxation of social distancing, late adoption of measures of social distancing and the large number of asymptomatic/underreporting (Rothan and Byrareddy, 2020). Regarding the lethality and mortality rate, Montes Claros/MG has the lowest rates when compared to other municipalities of similar size in the state of Minas Gerais (Chart 1). It is necessary to highlight that the lethality from COVID-19 is determined by specific characteristics such as age, previous diseases, life habits, as well as the supply/availability of hospital beds and health care (Ruan et al., 2020). In Montes Claros/MG, the rate of ICU beds did not exceed 90%, a "safety" index recommended by the Minas Gerais State Department (SES/MG, 2020b), since the first record of the positive case in the municipality. This datum is extremely important, since it measures the quality of hospital care, revealing that there was no collapse in the Unified Health System (UHS) in this pandemic period, evidencing the quality of care provided and the controlled occupation of clinical and intensive care beds in the municipality. The mortality rate is a strong social and health indicator. It increases with longevity and with the worst health and life conditions. It is noteworthy that the prior adoption of government actions such as early detection and isolation of cases, social distancing, reduction of population interaction and expansion of personal hygiene can reduce dissemination and modify the behavior of the disease avoiding the explosion of cases and, consequently, deaths (Galbadage et al., 2020). In the present study, the prevalence of male deaths was 65.9% (170), 76.0% (196) were ≥ 60 years, mean age of 70 years with a standard deviation of ±17.2 years; 92.6% (239) had some comorbidity (Table 1).

The mortality data found in this study follow the same pattern as the national (Montes Claros, 2020a; Galbadage et al., 2020; Caló et al., 2020) and international data (Cockerham et al., 2020; Onder et al., 2020) with males and ≥ 60 years representing the highest number of deaths. This context may be related to male population's higher rate of comorbidities due to low healthy behavior, such as smoking and alcohol consumption, besides being more resistant to the sanitary measures imposed, such as the act of washing hands or performing social isolation (Gebhard et al., 2020). There is also the culture of the low use of health services by men and the neglect of health care that may have reflected in this result (Silva et al., 2012). Regarding the age group, China (Ruan et al., 2020) and Italy (Onder et al., 2020) also identified in their death records, association with advanced age. With increasing age and declining immune function, the elderly have increased susceptibility for infections (Caló et al., 2020) and constitute the group with the highest prevalence of comorbidities (Cockerham et al., 2020; Onder et al., 2020), including cardiovascular ones, associated with a worse prognosis of those infections (Gebhard et al., 2020), which may justify deaths from COVID-19 in this group (Caló et al., 2020). Thus, the COVID-19 pandemic places older individuals in a situation of greater vulnerability. In the present study, 96.1% (248) of deaths were in the hospital environment and, of these, 65.7% (163) occurred among men (Table 1). In line with the literature, men presented a higher number of daily hospitalizations when compared to women, which may be related both to the development of more severe forms, and to greater exposure to risk situations (Galbadage et al., 2020; Gebhard et al., 2020). Regarding the type of comorbidities most prevalent in this study, deaths occurred in patients with heart disease 48.9% (108), diabetes 37.6% (97) and hypertension 29.1% (75), highlighting that they also had more than one comorbidity (Table 1). COVID-19 can disproportionately affect individuals with cardiovascular diseases, increasing the risk with advanced age and, consequently, more likely to death (Cockerham et al., 2020; Wu and McGoogan, 2020). This results corroborate the studies developed in Europe and China, epicenters of the pandemic in 2020 (Xie et al., 2020; Wu and McGoogan, 2020) in which the most frequent comorbidities in patients who died were hypertension, diabetes mellitus, cardiovascular disease and age over 70 years (Xie et al., 2020).

Chart 1. Lethality and Mortality Rate by COVID-19 of cities in Minas Gerais with a population similar to that of Montes Claros, Minas Gerais/Brazil, 2021

Cities in the state of Minas Gerais/Brazil	Population*	Number of contaminated	Number of deaths	Lethality rate	Mortality rate
Montes Claros	413,487	16,806	258	1.53%	62.39/100 thousand
Uberaba	337,092	12,397	281	2.26%	86.36/100 thousand
Betim	444,784	13,734	406	2.95%	91.28/100 thousand
Juiz de Fora	573,285	17,525	719	4.10%	125.41/100 thousand

*IBGE/2020 Source: Minas Gerais State/Brazil epidemiological bulletin, 01/02/2021.

Table 1. Bivariate evaluation in relation to the sex of deaths that occurred in Montes Claros, Minas Gerais/Brazil in the period from April 1, 2020 to February 2, 2021 (n=258)

Variables	Total		Male		Female	
	n	%	n	%	n	%
Age group						
0-9 years	1	0.4	1	0.6	0	0.0
10-19 years	1	0.4	1	0.6	0	0.0
20-29 years	4	1.6	2	1.2	2	2.3
30-39 years	10	3.9	5	2.9	5	5.7
40-49 years	21	8.1	17	10.0	4	4.5
50-59 years	25	9.6	16	9.4	9	10.2
60 years	196	76.0	128	75.3	68	77.3
Place of death						
Hospital	248	96.1	163	65.7	85	34.3
Home	10	3.9	7	30.0	3	70.0
Comorbidities						
Yes	239	92.6	156	65.3	83	34.7
No	19	7.4	14	73.7	5	26.3
Types of Comorbidities						
Heart disease						
Yes	108	41.9	72	61.7	36	33.3
No	150	58.1	98	65.3	52	34.7
Diabetes						
Yes	97	37.6	64	66.0	33	34.0
No	161	62.4	106	65.8	55	34.2
Hypertension						
Yes	75	29.1	54	72.0	21	28.0
No	183	70.9	116	63.4	67	36.6
Pneumopathy						
Yes	23	8.9	13	56.5	10	43.5
No	235	91.1	157	66.8	78	33.2
Obesity						
Yes	32	12.4	20	62.5	12	37.5
No	226	87.6	150	66.4	76	33.6
Kidney disease						
Yes	26	10.1	18	69.2	8	30.8
No	232	89.9	152	65.5	80	34.5
Smoking						
Yes	9	3.5	7	77.8	2	22.2
No	249	96.5	163	65.5	86	34.5
COVID-19 Symptoms						
Headache						
Yes	17	6.6	12	70.6	5	29.4
No	241	93.4	158	65.6	83	34.4
Nasal discharge						
Yes	12	2.8	9	75.0	3	25.0
No	246	97.2	161	65.4	85	34.6
Diarrhea						
Yes	16	6.2	11	68.8	5	31.2
No	242	93.8	159	65.7	83	34.3
Dyspnea						
Yes	164	6.2	105	64.0	59	36.0
No	94	93.8	65	69.1	29	30.9
Saturation 95%						
Yes	162	62.8	100	61.7	62	38.3
No	96	37.2	70	72.9	26	27.1
Cough						
Yes	178	69.0	121	68.0	57	32.0
No	80	31.0	49	61.2	31	38.8
Anosmia						
Yes	245	95.0	12	92.3	1	7.7
No	13	5.0	158	64.5	87	35.5
Ageusia						
Yes	247	95.7	10	90.9	1	9.1
No	11	4.3	160	64.8	87	35.2

Source: Montes Claros, Minas Gerais State/Brazil epidemiological bulletin, 01/02/2021.
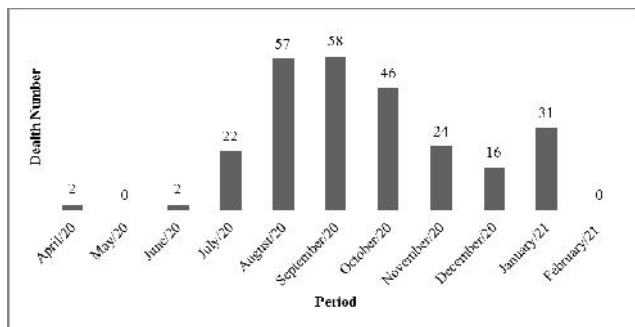
Source: Created by the authors.

Figure 01. Number of deaths from April 1, 2020 to February 2, 2021 in Montes Claros, Minas Gerais/Brazil (n=258)

Other studies have also indicated a higher occurrence of the event, which follow the trends of occurrence of deaths in the elderly with comorbidity (Xie et al., 2020; Ruan et al., 2020; Onder et al., 2020). Regarding the symptoms of COVID-19, this study pointed out that respiratory problems (dyspnea, ≤ 95% saturation and cough) (Table 1) were the most prevalent in patients who died, for both men and women. Respiratory symptoms aggravate the management of patients with COVID-19. This factor, associated with older patients with comorbidity, further increases the chances of progression to death (Ruan et al., 2020; Onder et al., 2020). Recent studies have pointed out similar results related to this epidemiological profile and this has contributed to health managers organizing themselves to meet the demand that the pandemic brought us in a short period of time (Galbadage et al., 2020; Gebhard et al., 2020; Rothan and Byrareddy, 2020). However, we run into the daily lack of complete notifications, undernotifications and delay in the release of test results, as well as problems faced in several Brazilian municipalities (Xie et al., 2020; WHO, 2020c; Escobar et al., 2020). In the case of COVID-19, in particular, it is likely that there is an important underreporting of deaths due to the difficulty in identifying the cases, since many did not have material collection for the real time polymerase chain reaction (RT-PCR) test and, even collected, numerous evolve to death before the release of the results. In addition, problems in the quality of the collection, from the inadequate period of time collection, or the quality in the packaging and transport of the material, may be responsible for false negative results (Escobar et al., 2020; Jombart et al., 2020). Thus, the timely inclusion of confirmed cases of COVID-19 in the MIS depends on the fact that the physician, when filling out the DC, has available and adequate results of confirmatory tests for the disease. Thus, reliable and timely data on mortality are fundamental for the definition of measures to control the spread of the disease and for the better management of health services, because, when a single death occurs in one place, other deaths from the same cause may occur in the population (Jombart et al., 2020). Some limitations and considerations are important for the interpretation of the data found in this study, regarding the use of secondary data that are not unpublished, as well as because it is cross-sectional and descriptive research without causal power. The small and homogeneous sample regarding the health profile did not contribute to an association analysis. The absence of other information (variables) in the bulletins, which notably refer to the incompleteness of the notifications and which could provide a better understanding of the profile of deaths, such as race/skin color, schooling and profession, hinders analyses of association with comorbidities so present in the elderly. Moreover, it is necessary to consider especially the estimation of underreporting and restrictive criteria for the confirmation of cases. However, it is extremely necessary to analyze the profile of deaths in the municipality of Montes Claros/MG considering the current epidemiological scenario.

CONCLUSION

Deaths occurred in the COVID-19 pandemic period in Montes Claros/MG prevailed in male patients, older (≥ 60 years), who presented comorbidities and respiratory symptoms such as dyspnea,

saturation ≤ 95% and cough. Understanding the epidemiology of deaths is fundamental to direct the actions of health services, because this portion of patients required high-complexity hospitalization, and the structuring of this service permeates the prediction of bed occupancy. Thus, the result of this analysis can help managers in the planning of strategic actions for prevention, monitoring and control of the pandemic and, as proposed, the short-term reassessment can adjust current needs and enhance assertive actions that will contribute to the reduction of cases and deaths.

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