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EPIDEMIOLOGICAL PROFILE OF PATIENTS WITH COVID-19 AT HOSPITAL DAS CLÍNICAS OF UNIVESITY OF MEDICINE OF MARÍLIA

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ABSTRACT

A case of pneumonia with unknown etiology appears in China, where the cause was identified as a new coronavirus.Diagnostic tests for COVID-19 have stood out in the pandemic as an essential tool for tracking the spread of the disease. The present work aims to trace the epidemiological profile of the new coronavirus in patients who sought care at the Hospital das Clínicas of the University of Medicine of Marilia.1200 records of individuals who underwent the COVID-19 test at HC FAMEMA were analyzed, from August to February 2021. A statistically significant difference was observed in the mean age between patients with detectable and undetectable tests. A significant association was also observed in the analysis of the relationship of frequency distribution between age group and COVID-19 test. A significant association between detectable testing and hospitalization was observed, as well as a significant association between detectable testing for COVID-19 and the presence of diabetes, high blood pressure and obesity. Through the present work, it was possible to better understand the practical interrelationships of the pandemic focused on the clinical and epidemiological aspects of patients and employees treated at HCFAMEMA.

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INTRODUCTION

In December 2019, a case of pneumonia with unknown etiology appears in Wuhan, China, where the cause was identified on January 9, 2020, being a new coronavirus temporarily named with 2019-nCov (Wu *et al*., 2020). The World Health Organization (WHO) named the disease as COVID-19 and the virus was named SARS-COV-2 (WHO, 2020). Prior to December 2019, only two strains of the coronavirus caused outbreaks of severe respiratory disease in humans: severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) (WHO, 2020 b.) The transmission of the virus from person to person is by droplets, when the virus is transported in small droplets originating from the nose and mouth of infected individuals when talking, exhaling, coughing or sneezing. Infection can also occur when a person touches contaminated surfaces or objects and thus touches their eyes, nose, or mouth.

The incubation period for SAR-COV-2 is estimated to be 14 days, with a median of 4 to 6 days (Bai *et al*., 2020). Diagnostic tests for COVID-19 have stood out in the pandemic as an essential tool for tracking the spread of the disease. (Pan *et al*., 2020) For individuals who have symptoms, the diagnostic test must have high sensitivity and specificity, as a false negative result can increase the morbidity and mortality rate and the transmission rate. However, when the purpose of the test is to identify previous exposure to SARS-CoV-2, serological tests may be used to detect IgG or IgM. (Bonilla-Aldana *et al*. 2020). Due to the great demand for carrying out the tests and for the results to be released quickly, the Antigen Test is started, which is a rapid immunological test, capable of detecting the SARS-CoV-2 viral capsid core protein in the body. The samples obtained for the antigen test are usually from the nasopharynx (Li *et al*., 2020). The virus causing COVID-19 was identified in late 2019 with the subsequent emergence of a range of variants. As a result, the WHO, in order to prioritize the monitoring and research of these variants, classified them into three categories: variants of concern (VOCs),

variants of interest (VOIs) and variants under monitoring (VUMs) (WHO, 2021). A mild flu syndrome makes up the majority of symptomatic cases and clinical manifestations of SARS-CoV-2 infection. Only a minority rapidly progresses to a critical condition with acute respiratory distress syndrome, respiratory failure, multiple organ failure, and even death (Lake, 2020). A study by Guan *et al*. (2020), quantifies in percentage the prevalence of the most common symptoms found in 1099 patients confirmed with the disease, being fever (88.7%), cough (67.8%) and fatigue (38.1%). Other symptoms such as shortness of breath, sore throat and headache accounted for 18.6%, 13.9% and 13.6%, respectively.(Guan *et al*. (2020) In another study by Singual (2020), a symptom found was conjunctivitis (Singha, 2020). A study done by the United States, in which it observed about 7000 patients with COVID-19, showed a significantly lower hospitalization rate in those individuals who did not have any associated diseases and were younger than 60 years. The associated diseases that led to greater clinical complications were: chronic kidney and lung diseases and diabetes.(Dong *et al*.2022) In Brazil, in addition to these comorbidities, it was observed by the Ministry of Health that hypertensive, immunosuppressed, obese, heart disease people and who had some neurological disease had greater complications associated with COVID-19 (Brasil, 2020). Due to this scenario, the present work has the objective globally analyze (laboratory and clinical aspects) the data of patients who were diagnosed with COVID-19 by RT-PCR at Hospital das Clínicas of University of Medicine of Marília (HCFAMEMA).

MATERIALS AND METHODS

Records of patients who presented symptoms that met the criteria for clinical diagnosis (CDC) and the Ministry of Health in relation to COVID-19 were used, who sought HCFAMEMA in Marília from August 2020 to February 2021 in addition to its collaborators, that is, employees, professors, residents and undergraduate students of FAMEMA. As exclusion factors were the records of patients who did not have the necessary data for this study. Data on sex, age, presence of symptoms, time from presentation of clinical signs until collection of the exam, comorbidities, hospitalization, therapeutic data and the test result were obtained from the records.

Based on this information, medical records were analyzed to verify the presence of underlying diseases, such as diabetes, chronic lung and heart diseases, kidney and neurological diseases; in addition to weight and height data to determine body mass index; verify drug and non-drug treatment; the use of usual medications; body temperature; oxygenation; blood count; C-reactive protein and other biochemical tests and disease course. All patients who met the diagnostic criteria for COVID-19 underwent RTPCR at the HC FAMEMA SARSCov-2 Diagnostic Laboratory to confirm the same. It is also worth noting that the aforementioned Laboratory does not only act as a diagnosis, but as an interface of information with the clinic, including COVID ICUs and wards. Based on the analysis and results of RT PCR, isolation and even therapeutic criteria were drawn up for patients affected by different strains of COVID-19 at different times throughout the pandemic. The research was carried out using data obtained from medical records and referral forms for the test. The statistical treatment of the quantitative data was carried out with the support of a statistical program. The data were presented in tables of frequency, in absolute numbers and in percentage and the statistical analysis was according to their nature. The probability of significance considered was 5% ($p<0.05$) for operations performed. Quantitative variables were described by mean and standard deviation (SD) or 95% confidence interval (95%CI). The homogeneity of variances was analyzed by Levene's test. To analyze the interaction between age group and COVID on the number of symptoms, the Anova-two-way test was performed followed by the Bonferroni Post-Hoc test. Qualitative variables were described by the absolute and relative frequency distribution (%). The association between qualitative variables was analyzed using the chi-square test. The significance level adopted was 5% and the data were analyzed using SPSS software (version 24.0).

RESULTS

One thousand and two hundred files of individuals who underwent the RT-PCR test for the detection of COVID-19 at HC-FAMEMA, from August 2020 to February 2021, were analyzed. Of these, 464 files were included in this study, which presented all the data necessary for the intended analyzes. Detectable result for COVID-19 was verified in 226 subjects (48.7%). There was a significant difference in mean age ($p<0.001$) between patients with a detectable test (50.0 ± 16.3 years) and non-detectable (37.5 ± 19.0 years). In the analysis of the relationship between the frequency distribution between age group and COVID-19 test, a significant association was observed. Among the detectable cases, the highest proportion was in the age group from 40 to 59 years and among the negative cases the highest proportion was in the age group from 18 to 39 years. Among the age groups <18 years and 18 to 39 years, a higher proportion of negative cases was observed. However, in the age groups from 40 to 59 years and >59 years, a higher proportion of detectable cases was observed. No significant association was observed between sex and COVID-19 testing, although women had a higher proportion of detectable cases (Table 1). A significant association was observed between detectable testing and hospitalization. Among the patients with a detectable test, 48.7% required hospitalization in the ward, higher than those with a negative test (31.4%), as well as 17.9% with a positive test required hospitalization in the ICU, against 9.8% in the patients with a negative result (Table 1). The diagnosis of diabetes, arterial hypertension (AH), obesity and chronic obstructive pulmonary disease (COPD) was not significantly associated with the result of the COVID-19 test (Table 2), as well as with the presence of comorbidities and the need for treatment. hospitalization, either in the ward or in the ICU. Sore throat, diarrhea, and abdominal pain symptoms were not significantly associated with testing for COVID-19. All other symptoms observed were significantly associated with a higher proportion among patients with a detectable test, except for the vomiting symptom. Among the main symptoms observed, the most prevalent was cough followed by fever, dyspnea and O2 saturation below 95%. Although there was no significant association with detectable test, sore throat was present in 45.5% of patients with detectable test. The symptoms with the greatest difference in proportion between detectable and undetectable patients were coryza (28.6%), O2 saturation (27.8%), fatigue (27.7%), headache (23.7%),

Table 1. Analysis of frequency distribution and comparison of gender, age group, admission to the ward and ICU according to the COVID-19 test

Variables		Test of COVID-19		Total	p-value
		Positive (n=226)	Negative (n=238)		
Group Age	<18 years old	1 (0.4)	28 (11.8)	29 (6.3)	<0.001*
	From 18 to 39 years old	68 (30.1)	112 (47.1)	180 (38.8)	
	From 40 to 59 years old	86 (38.1)	71 (29.8)	157 (33.8)	
	> 59 years old	71 (31.4)	27 (11.3)	98 (21.1)	
Gender	Feminine	168 (31.4)	73 (11.3)	241 (54.03)	0.092
	Masculine	134(44.2)	89 (36.6)	223 (45.96)	
Hospitalization Infirmary		109 (48.7)	69 (31.4)	178	<0.001*
ICU admission		40 (17.9)	23 (9.8)	63	0.012*

Note: * indicates a significant association by the chi-square test for p-value ≤ 0.05. Absolute frequency and relative frequency (%). The relative frequency was calculated within the categories for the COVID-19 test. ICU: Intensive Care Unit

Table 2. Analysis of the frequency distribution and association with comorbidities according to the COVID-19 test of patients hospitalized in the ward

Comorbidities		COVID-19 TEST		Total	p-value
		Positive	Negative		
		N (%)			
Diabetes	Present	3 (2.8)	0 (0)	3 (1.7)	0.166
	Absent	106 (97.2)	69 (100)	175 (98.3)	
AH	Present	3 (2.8)	0 (0)	3 (1.7)	0.166
	Absent	106 (97.2)	69 (100)	175 (98.3)	
Obesity	Present	3 (2.8)	0 (0)	3 (1.7)	0.166
	Absent	106 (97.2)	69 (100)	175 (98.3)	
COPD	Present	1 (0.9)	0(0)	1 (06)	0.426
	Absent	108 (99.1)	69 (100)	177(99.4)	

AH: Arterial hypertension. COPD: Chronic Obstructive Pulmonary Disease. P-value calculated by the chi-square test. Absolute frequency and relative frequency (%). The relative frequency was calculated within the categories for the COVID-19 test.

Tabele 3. Analysis of the frequency distribution and association of symptoms according to COVID-19 test

Symptoms	COVID-19 TEST		Total	p-value
	Positive	Negative		
	N (%)			
Fever	99 (44.2)	71 (30.2)	170 (37.0)	0.002*
Cough	179 (79.9)	147 (62.6)	326 (71.0)	<0.001*
Headache	53 (23.7)	0 (0)	53(11.5)	<0.001*
Dyspnea	107 (47.8)	59 (25.1)	166 (36.2)	<0.001*
Respiratory Discomfort	89 (39.7)	47(20)	136 (29.6)	<0.001*
O_2 Saturation	109 (48.7)	49 (20.9)	158 (34.4)	<0.001*
Nausea	4 (1.4)	0 (0)	4 (0.9)	0.039*
Vomit	7 (3.1)	22 (9.4)	29 (6.3)	0.006*
Myalgia	63 (28.1)	14 (6)	77 (16.8)	<0.001*
Coryza	64 (28.6)	0 (0)	64 (13.9)	<0.001*
Chills	5 (2.2)	0 (0)	5 (1.1)	0.021*
Adynamia	8 (3.6)	0 (0)	8 (1.7)	0.003*
Mental Confusion	5 (2.2)	0 (0)	5 (1.1)	0.021*
Chest Pain	7 (3.1)	0 (0)	7 (1.5)	0.006*
Conjunctival Congestion	10 (4.4)	0 (0)	10 (2.2)	0.001*
Nasal Congestion	6 (2.7)	0 (0)	6 (1.3)	0.011*
Fatigue	62 (27.3)	0 (0)	62 (13.4)	<0.001*
Anosmia	33 (14.7)	6 (2.6)	39 (8.5)	<0.001*
Ageusia	26 (11.6)	4 (1.7)	30 (6.5)	<0.001*

Note: * indicates a significant association by the chi-square test for p-value ≤ 0.05.
O2 saturation: oxygen saturation below 95%.

Table 4. Analysis of the frequency distribution and association of symptoms with the need for ICU admission among patients with a positive COVID-19 test

	UTI (N %)		Total	p-value
	Present	Absent		
Fever	32 (50.80)	138(34.80)	170 (37.00)	0.015*
Sore throat	17 (27.00)	202 (51.10)	219 (47.80)	<0.001*
Headache	1 (1.60)	52 (13.10)	53 (11.50)	0.008*
Dyspnea	47 (74.60)	119 (30.10)	166 (36.20)	<0.001*
Respiratory Discomfort	52 (82.50)	84 (21.20)	136 (29.60)	<0.001*
Saturation below < 95%	54 (85.70)	104 (26.30)	158 (34.40)	<0.001*
Fatigue	18 (28.60)	44 (11.10)	62 (13.50)	<0.001*
Loss of Smell	10 (15.90)	29 (7.30)	39 (8.50)	0.024*

Note: * indicates a significant association by the chi-square test for p-value ≤ 0.05.

dyspnea (22.7%) and myalgia (22.2%) (Table 3). Table 4 shows the analysis of the association between symptoms and the need for ICU admission. Although sore throat and headache showed a significant association by the chi-square test, a higher proportion was found among detectable patients who did not need to be hospitalized. O2 saturation below 95%, respiratory distress and dyspnea were the symptoms that were most associated with the need for hospitalization, followed by fever, fatigue and loss of smell. Although sore throat is associated with a greater chance of not being admitted to the ICU, 27% of the patients admitted to the ICU had this symptom.

DISCUSSION

As a result of the SARS-Cov-2 virus, the COVID-19 pandemic was one of the deadliest pandemics in history. The pandemic has hit the entire globe, on an alarming scale.

According to published data, the United States of America is the country with the highest number of cases, followed by Brazil and India. Even the least affected countries were Vatican, Marshall Islands and Antarctica.[100] It is extremely important to understand the role of population age in relation to the spread and severity of the disease so that precautionary measures and early treatment can be evaluated. In our study, we observed that the age group with the highest prevalence for COVID-19 was from 40 to 59 years old. In China, the epicenter of the disease, the highest incidence was around 50 years of age, which corroborates the age found in our research. However, research carried out in Brazil showed a higher incidence in the age group of 30 to 49 years old.(Shen et.al. 2020 ; Machado *et al*.,2021) A study by Devid, *et al*.,(2022) reports that populations under the age of 20 appear to be less vulnerable to COVID-19 than adults, accounting for only 2% of reported cases. However these notifications are not reliable because as children have an immune system in formation and more effective.

The difference in these data can be explained by the greater number of Brazilian individuals aged between 40 and 49 years old. In our study, females had a higher incidence of detectable tests for COVID-19, the same was observed in studies carried out in Maranhão (Almeida *et al*., 2020). However, although the present study shows a higher prevalence of women in the number of confirmed cases of COVID-19, two studies carried out in Wuhan, China, found that the most affected sex was male (Chen *et al*., 2021). This difference could be explained due to the social profile of Brazil, in which there is a prevalence in the female population and this is the one who most frequently seeks health services. However, although females showed a greater number of positives, according to Reis *et al*., (2020) males are more likely to have the disease, as the X chromosome and sex hormones such as estrogen play an important role in women's immunity. Worsening COVID-19 prognosis has been associated with the presence of comorbidities, specifically cardiovascular disease, diabetes, respiratory disease and smoking. (Vardavas *et al*., 2020)

It was observed in our study that among the detectable cases, the most prevalent comorbidities were diabetes, AH, obesity and COPD, but there was no positive correlation with ICU admission. These comorbidities were found in previous studies Carvajal *et al*.(2022) and Lima *et al*. (2020) in which they observed that 30% of hospitalized patients with COVID-19 had hypertension and diabetes and concluded that these comorbidities are a risk factor for increased ICU admissions, need for ventilation, and death. When we think about the diabetic patient and detectable for COVID-19, the increase in the rate and length of ICU stay can be explained by the body's difficulty in fighting the infection due to high blood glucose levels. This does not only occur in Covid but as observed for other more or less serious infections (Katulanda *et al*., 2022). However, in a study carried out by Fernandes *et al*. (2022), in addition to the aforementioned comorbidities, cardiovascular disease was evidenced as prevalent. Checking pre-existing conditions is of paramount importance as they can directly interfere with the body's immune response. Another condition with high rates of complications is obesity, an extremely prevalent comorbidity that is related to excess adipose tissue and high levels of pro-inflammatory cytokines. Due to this, there is a functional impairment of the organism, which causes changes in the innate immune response, perpetuation of the chronic inflammatory response and consequent increase in the need for ventilatory assistance, maintaining a strong correlation with those infected by COVID-19 (Zhou *et al*., 2021). In this research, it was found that obese individuals did not have complications due to this comorbidity, but these same individuals had a higher proportion of detectable tests for COVID-19. This higher proportion can be explained by the fact that obese patients have a lower lung compliance, which leads to more excessive respiratory distress and, consequently, a greater demand for medical care. This greater demand can also be explained because this population has a greater fear of life. Chronic obstructive pulmonary disease (COPD), which compromises lung function, confers a greater chance of admission to ICUs of patients detectable for COVID-19 (Guan *et al*. 2020).Although this comorbidity is directly associated with complications of COVID-19, in the present study there was no significant difference in the association of COPD and ICU admissions, this may have occurred due to a low rate of patients who had COPD as a comorbidity.

It is known that the virus initiates the infection of human target cells by binding to angiotensin-converting enzyme 2 (ACE2) receptors, which are present in several human cells, such as lung epithelium, biliary and liver epithelial cells, and enterocytes, especially from the ileum and colon. (Michelon *et al*. 2020) Thus, the gastrointestinal tract can be affected by SARS-CoV-2 and possibly act as a route of infection, with diarrhea, vomiting and abdominal pain as the main symptoms. This explains the results found in this study, which also showed a significant difference between patients who tested positive and had diarrhea, nausea, and vomiting. Studies show that gastrointestinal symptoms can affect 3% to 79% of children, adolescents and adults with COVID-19 and are more common in severe cases of the disease (Cloete J *et al*. (2022). It is known that vomiting is more frequently reported in pediatric populations, while diarrhea is the most common symptom in children and adults as a whole, and may be the first symptom before the diagnosis of the disease (Choobianzali *et al*. 2022). The WHO recognized as a symptomatology of COVID-19 changes in the perception of smell and taste (WHO, 2021). Previous research pointed out that 85.6% of the evaluated patients reported changes in smell and 11.8% had anosmia before the other symptoms, which corroborates the findings of the present study in which these symptoms showed a significant difference in relation to patients who tested positive for COVID-19 (Lechien *et al*., 2020). Cough was the most prevalent symptom in the present study. Studies carried out in the southern region of Brazil showed the same result (Mesenburg *et al*., 2021), however, in central Brazil, cough was the second most prevalent symptom (Ferreira *et al*., 2022). This may occur due to climatic differences in the different regions of Brazil. One of the most important and alarming global public health events in recent years was the COVID-19 pandemic, which directly or indirectly affected a large part of the world's population in the most different regions. Due to this fact, tracing the epidemiological profile is of paramount importance as it makes it possible to quantify and determine the severity in different age groups and sex, in addition to the most relevant comorbidities and the most frequent symptoms in order to support planning and control actions in health, from the involvement and home care in the hospital environment with a focus on wards and ICUs in the most serious cases of the disease.

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