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Clinical and epidemiological profile of COVID-19 patients in the state of Maranhão

Perfil clínico e epidemiológico dos pacientes acometidos por COVID-19 no estado do Maranhão

Perfil clínico y epidemiológico de los pacientes con COVID-19 en el estado de Maranhão

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ABSTRACT

Introduction: The COVID-19 is characterized by a severe acute respiratory syndrome with a high fatality rate. **Aim:** To describe the clinical and epidemiological profile of patients affected by COVID-19 in the state of Maranhão. **Outlining:** This is an observational, descriptive epidemiological study with quantitative variables collected from the use of the computerized data system of COVID-19 case notifications in the state of Maranhão, during the period between January 1st and August 8th, 2020. **Results:** Approximately 151,612 confirmed cases of COVID-19 were reported, with a slight predominance of females (55.14%), however the mortality rate was higher among the male population (61.55%). The age group most affected in relation to the contamination rate was adults aged 30 to 39 years (21%), however the death rate from COVID-19 was predominant among elderly people over 70 years of age (55.48%). Regarding the associated comorbidities, there was a greater predominance of cases with arterial hypertension (44.94%) and diabetes mellitus (31.32%). **Implications:** The rate of infected cases and deaths by COVID-19 in the state of Maranhão is increasing, so the results presented can support the planning of strategies to reduce cases in the target audience identified as most vulnerable.

DESCRIPTORS

Coronavirus; Health Profile; Public Health.

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INTRODUCTION

The year 2020 had its beginning marked by a public health emergency of international importance, the infestation of the novel coronavirus, the disease was classified as a pandemic by the World Health Organization (WHO) on March 11, 2020, caused by the SARS-CoV-2.[1]

The disease named COVID-19 is characterized by an acute respiratory syndrome with high lethality, it is worrisome not only because it is a deadly disease, but also because of the high contamination degree it displays, the virus reached intercontinental propagation levels quickly. This disease was first identified in Wuhan, in the Hubei province, China, on December 1, 2019, but the first case was reported on December 31 of the same year.[2]

From the identification of the first COVID-19 cases in other countries, an information giving process, for the population, about the to the virus and the disease had started in Brazil. Through the confirmation of the first case in Brazil, the Ministry of Health (MH) started campaigns for the sensibilization of the community aiming the reduction of the effects of the pandemic by the infectious agent.[3]

The SARS-CoV-2 is a high transmissibility virus. It is worth highlighting the present limitations in the deep understanding of SARS-CoV-2 pathogenesis in humans, which makes it difficult to detect viral and host factors. Thus, there is a hard mission for the development and performing of antiviral tests that could eventually control COVID-19 in humans.[4]

The coronaviruses are members of Coronavirinae Subfamily, Coronaviridae Family, Nidovirales Order. Of this subfamily, the (sars-cov) and (MERS-CoV) are two types of coronaviruses which cause severe acute respiratory syndrome with high mortality rates, the other four know species of the virus are (HCoV-NL63, HCoV-229E, HCoV-OC43 e HKU1), which induce only mild respiratory illness in immunocompetent hosts, with a possibility of causing serious infections in infants, children, and the elderly.[5]

The SARS-CoV-2, previously named 2019 novel coronavirus (2019-nCoV), is a positive single-stranded RNA enveloped virus, with size from 50 to 200nm, and is the newest human coronavirus identified. The viruses of the Coronavirinae subfamily, which can cause severe respiratory syndrome, were first isolated in 1937 and described as such in 1965, due to their profile, under microscopy, resembling a crown.[6]

According to the Center of Control and Prevention of Diseases (CDC), the virus spreads from one person to another through personal contact (at a up to 6 feet distance), through respiratory droplets that a person can expel when coughing, sneezing, or talking. Spread can also happen through contact with contaminated surfaces.[7]

Countless laboratory parameters of a non-specific nature are modified during COVID-19 infection, some, in turn, have prognostic value for monitoring the evolution of the infection, demonstrating additional value, which permeates the presence of SARS-CoV-2, clinical diagnosis or evaluation of the immunological status in specific tests. Thus, laboratory analysis plays an essential role in defining the diagnosis, evaluating the development, and more objectively predicting the prognosis of patients with COVID-19. It is worth noting the importance of laboratory investigations for epidemiological studies, guiding the strategy government strategies, guiding government strategies more effectively that relate to health, providing subsidies for evidence-based medical decision-making.[8]

In view of the listed considerations and considering the relevance of this public health problem as a pandemic, this work aims to describe the clinical and epidemiological profile of patients affected by COVID-19 in the state of Maranhão.

METHOD

This is a transversal and descriptive study, with variables collected from the computerized data system of the COVID-19 case notifications in the state of Maranhão, covering the period from January 01 to August 08, 2020.

The state of Maranhão is located in the Western portion of Brazil's Northeast region, with an 331,935.507 km² area, split into 217 municipalities, and a population of 6,574,789 inhabitants, in accordance with data from the 2010 Demographic Census, provided by the Brazilian Institute of Geography and Statistics.

It is important to highlight that the regionalization of the health system in the state was stablished in 2011 by the Bipartite Interagency Commission (CIB-MA), which divided the state into 19 health regions and 8 macro-regions, aiming to ensure a better capability to solve in the health system, meeting the organizational demands of health actions and services.

Therefore, to smooth the comprehension about the transmission of the disease, the distribution of COVID-19 cases was analyzed, in the state of Maranhão, by health macro-regions, being possible to obtain the data contained in the epidemiological bulletins of the State Health Department (SES-MA). Furthermore, the official documentation of SES-MA was analyzed to verify the index of confirmed cases and the rate of registered deaths in the studied period.

Thus, the variables included in the study were: sex, age range and presence of comorbidities. However, the cases notified from January 1 to August 8, 2020, were selected, to trace an epidemiological and clinical profile of the disease and to observe the trajectory of the contagion line in the state of Maranhão.

The collected data were input in Excel™ version 19, then were transferred for TABWIN™, reaching the statistical results of descriptive nature which allowed the elaboration of tables and graphics.

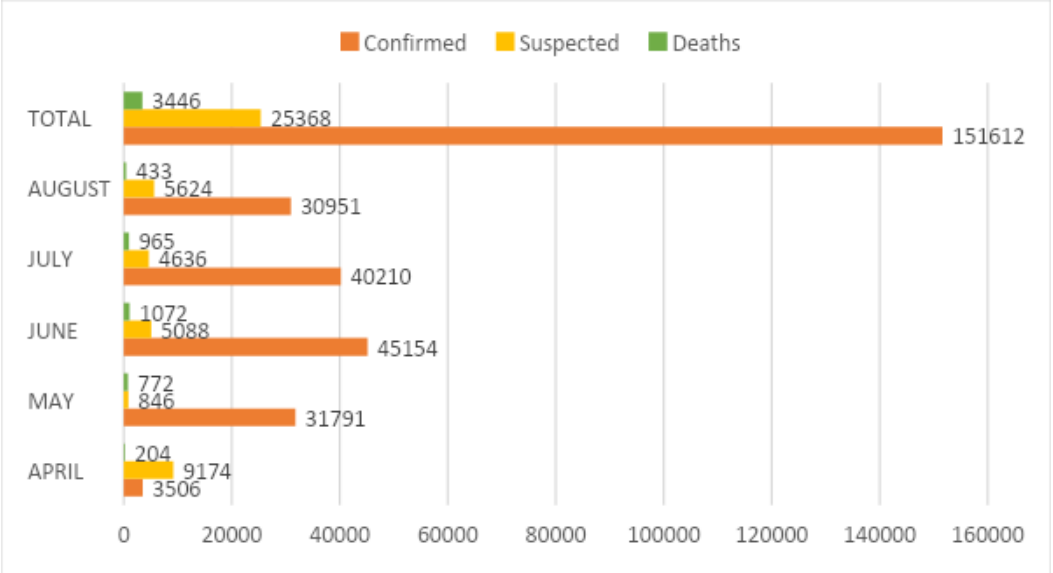
The present work dispensed the evaluation by the Research Ethics Committee due being a survey of epidemiological data which are publicly available, not infringing the Resolutions nº 466/2012 e 510/2016 of the National Health Council (CNS), which guide the researches involving human beings.

RESULTS

The results emphasized that in February 2020, the state of Maranhão, through the State Health Department (SES), carried out the screening of suspected COVID-19 cases, identifying only two cases. On March 20, 205 suspected cases were notified, besides of confirming the first case in the state, and, shortly after the 31st of the same month, that number increased to 21 confirmed cases.

As of April, SES began to issue daily regional monitoring bulletins on COVID-19 cases all over the state of Maranhão. In the time interval considered in this study, from the notified cases, 151,162 were confirmed, 25,368 suspected and 3,446 deaths (Graph 1).

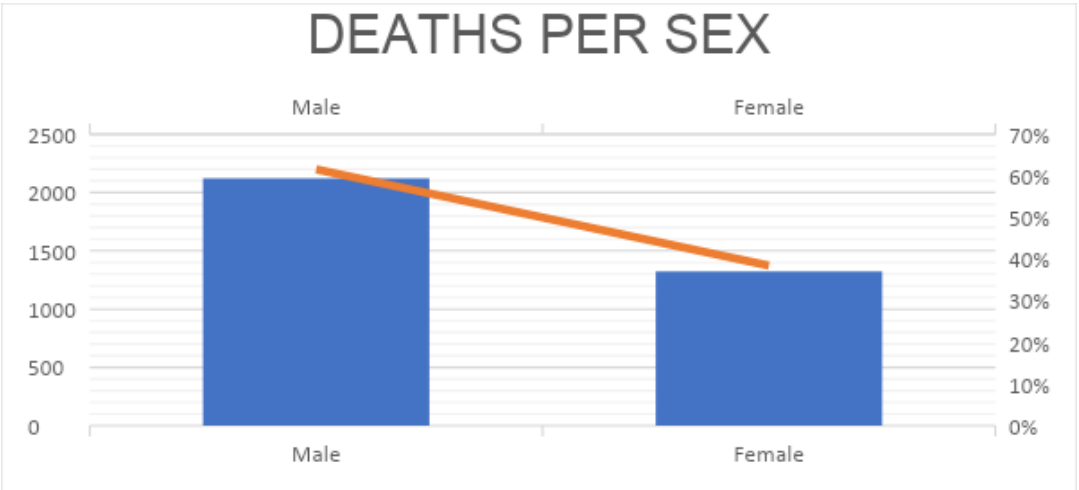
Graph 1 – Number of suspected, confirmed cases and deaths of COVID-19 in the state of Maranhão, Brazil, 2020. Coroatá, Maranhão, Brazil, 2021.



Source: Epidemiological Bulletins of the state of Maranhão /SES-MA.

As to the profile of COVID-19 confirmed cases in the state of Maranhão, as for sex, there was a slight predominance of female over male, 55.14% of the cases were female and 44.86% were male. It was noted that, despite the predominance of female cases, the death index was higher among male population, corresponding to 61.55% (Graph 2).

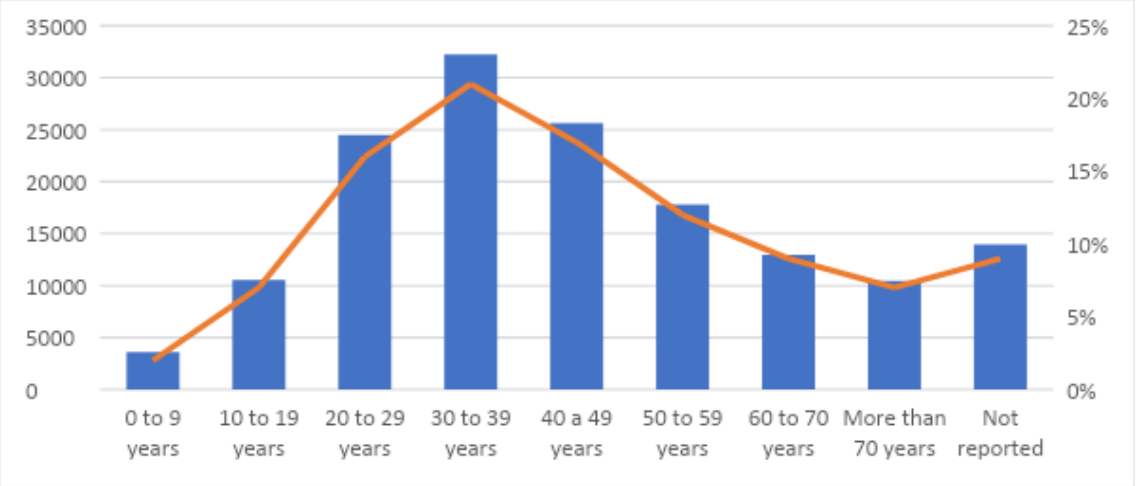
Graph 2 – Prevalence of COVID-19 mortality as to the sex in the state of Maranhão, 2020. Coroatá, Maranhão, Brazil, 2021.



Source: Epidemiological Bulletins of the state of Maranhão /SES-MA.

Regarding age range, it was observed that the contamination curve was significantly lower among 0 to 9 years-old children (2%). In relation to the middle age adults, 30 to 39 years-old, there was a predominance of 21% of cases recorded during the study period (Graph 3).

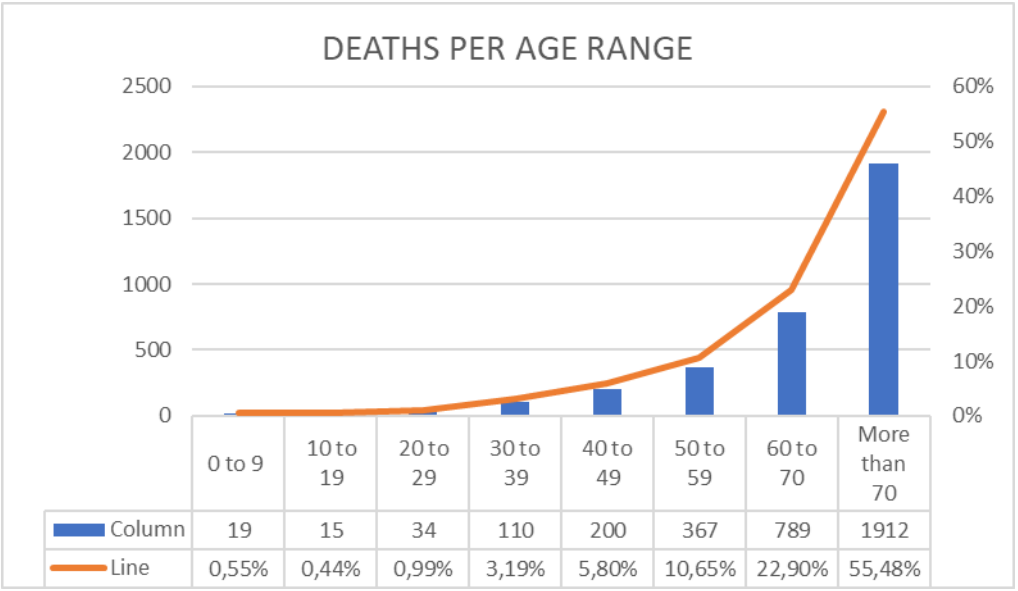
Graph 3 – The COVID-19 contamination curve as to age range in the state of Maranhão, Brazil, 2020. Coroatá, Maranhão, Brazil, 2021.



Source: Epidemiological Bulletins of the state of Maranhão /SES-MA.

Even with the highest number of cases in adults between 30 and 39 years old (21%), the predominance of COVID-19 deaths was in the elderly population aged over 70 years, corresponding to 55.48% of cases. However, the mortality rate in children aged 0 to 9 was only 0.55% (Graph 4).

Graph 4 – COVID-19 mortality rate by age range in Maranhão, Brazil, 2020. Coroatá, Maranhão, Brazil, 2021.

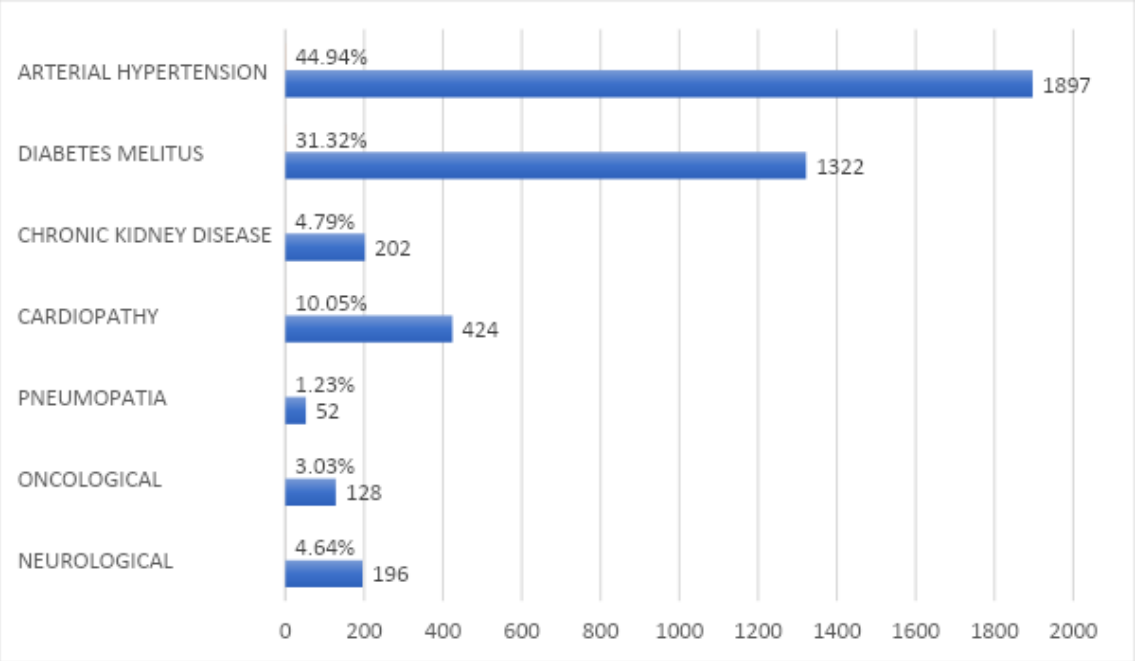


	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 70	More than 70
Column	19	15	34	110	200	367	789	1912
Line	0,55%	0,44%	0,99%	3,19%	5,80%	10,65%	22,90%	55,48%

Source: Epidemiological Bulletins of the state of Maranhão /SES-MA.

In relation to the prevalence of comorbidities associated with the rate of COVID-19 mortality, as demonstrated in the graph 5 below, it was observed a higher predominance of cases with arterial hypertension (44.94%), followed by diabetes mellitus (31.32%), heart diseases (4.79%), chronic kidney illnesses (4.79%), neurological problems (4.64%), oncologic problems (3.03%) and lung disease (1.23%).

Graph 5 – Prevalence of comorbidities associated with COVID-19 mortality rate in the state of Maranhão, Brazil, 2020. Coroatá, Maranhão, Brazil, 2021.



Source: Epidemiological Bulletins of the state of Maranhão /SES-MA.

DISCUSSION

Study pointed out that South, North Plateau and Northeast macro-regions displayed the worst results as to the number of deaths, suspected and confirmed cases. This may be related to the result of municipal policies aimed at the pandemic, considering the municipalities had autonomy about decisions about measures for preventing and controlling the disease, based on state determinations.[9]

The COVID-19 pandemic has been causing concern for the departments that manage public health policies in the state, since the first cases arose. The underreporting is considered high in the country, and this can be associated to the non-accessibility to serological tests, considering the limited availability, or even due the mild symptoms it causes in most of the infected ones, leading to low demand for health services.[10]

It should be noted that the number of cases of SARS-CoV-2 infection has grown worldwide and given global statistics, it is considered that they have underreporting, which can increase the number of sick individuals and deaths. According to the WHO, as of April 23, 2020, there were 2,544,792 confirmed cases of the disease worldwide. In Brazil, as of April 23, 2020, confirmed cases throughout the territory reached 49,492 people, with a fatality rate of 6.7%.[11]

Regarding COVID-19 indicators in the Brazilian Northeast, a study pointed out that, during the period from February 26 to June 24, 2020, the state of Maranhão ranked the second in COVID-19 cases,[12] presenting a population in extreme poverty with an incidence rate higher than the national and regional averages. However, the lethality of the disease was below the average established by the WHO, justified by the increase in testing throughout the state.[13]

A study carried out aiming to describe patients hospitalized for severe acute respiratory syndrome (sars) due to COVID-19 (sars-covid), in Brazil, as to the demographical features and comorbidities until the 21st Epidemiological Week (ES) of 2020, pointed out divergent results while evaluating the distribution by sex among hospitalized

individuals, noting a predominance of males (60%).[14] However, another study in the state of Maranhão found data similar to this regarding the female sex, highlighting a predominance of 52% of the reported cases, beyond, showed that the age range of highest prevalence was the 30-39 one (28.4%).[15]

The differential in terms of sex, analyzed through the ratio between the mortality rates, is increasing with age, considering that the male death risk is twice high than the female one, mainly in the 50-59 and 70-79 age ranges. The reasons for explaining results like these can be defined by biological characteristics distinct between the sex, as the immunological response and cell composition, and behavioral characteristics, as man's lack of interest in seeking health services and male predisposition to tobacco. However, the association between smoking and the prevalence or severity of COVID-19 has not yet been scientifically proven.[16]

Although there is an increase in the number of affected municipalities and in the number of hospitalizations and death by COVID-19 in Brazil, the information on the characterization of the cases is still limited. Studies carried out in other countries, such as China, Italy, and United States, analyzed the profile of COVID-19 patients and observed and high prevalence of elderly individuals, male and with previous comorbidities as hypertension and diabetes.[17-19] According to the Ministry of Health (MS), Brazil has the fifth largest elderly population in the world, with around 28 million people aged 60 and over.[20]

Changes in human metabolic pathways because of aging may, in part, explain the higher rate of morbidity and mortality from COVID-19 in patients with advanced age. One of these limitations is related to the renin-angiotensin system, considering the important role of this system in viral transmissibility. One of the Angiotensin Converting Enzymes 2 (ACE2) acts as a receptor for the structural protein S (spike) of SARS-CoV-2, where the virus gains access to the host cell. With aging, there is a reduction in the expression of ACE2, considering that it is the gateway for the virus, so it is worth noting that the lower the expression of this enzyme in the cell membrane, the greater the probability of infectivity.[21]

The COVID-19 infection affects all age groups.[22] However, studies[23-25] show that the elderly is more vulnerable and susceptible to developing severe symptoms of the disease, including individuals with chronic diseases and immunosuppression. The severity of symptoms is directly related to the presence of pre-existing diseases.[7]

A study carried out in the State of Maranhão from March to April 2020, aiming to analyze the epidemiological profile of reported cases and deaths of patients caused by the novel coronavirus (SARS-CoV-2), identified that amongst the comorbidities associated with mortality from COVID-19, there was a higher occurrence of cases of Hypertension associated with Diabetes Mellitus and other comorbidities (14.1%), followed by Systemic Arterial Hypertension (12.8%), Hypertension and Diabetes Mellitus put together (11.5%) and Hypertension associated with other comorbidities (11.5%).[26]

The non-transmissible chronic diseases, such as diabetes, cardiovascular diseases and other, increase the risks for the development of clinical complications, given that affected patients are more vulnerable.[27] Historical data on general mortality, in the state of Maranhão, reveal the predominance of cases in the 50+ age range and deaths related to diseases of the circulatory system, which can culminate in morbidity of vital organs, such as kidneys, lungs, and immune system.[9]

LIMITATIONS

In this manner, it is highlighted that the current study has limitations, considering it involves analysis of secondary data obtained from the health information systems, which may display failures as to the cases' notifications. However, it is known that

they are official data and must be completed in all health units, so even if inconsistency can be found in the data, this cannot cancel out the results obtained, and the scope of the objective proposed in this study.

CONCLUSION

The epidemiological profile of coronavirus cases in the state of Maranhão indicates that, since the registration of the first case of the disease, the number of infected and deaths has been increasing. However, COVID-19 has affected more women, in the young adult age group with preexisting comorbidities, and, among the pathologies related to registered deaths, there was a greater predominance of chronic diseases of the cardiovascular and immune system.

Thus, this study portrays the importance of updating vital statistics in to outline the epidemiological profile and highlight the COVID-19 scenario in Maranhão, as well as assist in the decision-making of health managers in relation to actions to combat the pandemic. Although the present study has some limitations, regarding the constant change of information about COVID-19 worldwide, and mainly, such as the definition of confirmed cases of the disease, which has changed throughout the pandemic and progression knowledge about the coronavirus.

Therefore, the findings indicate that, based on the epidemiological profile outlined, it is possible to plan and consequently follow up on the proposed actions, as well as the implementation of specific preventive measures to combat COVID-19 in the State of Maranhão.

RESUMO

Introdução: A COVID-19 caracteriza-se por uma síndrome respiratória aguda grave com alto índice de letalidade. **Objetivo:** Descrever o perfil clínico e epidemiológico dos pacientes acometidos por COVID-19 no estado do Maranhão. **Delineamento:** Trata-se de um estudo epidemiológico observacional, descritivo com variáveis quantitativas coletadas a partir da utilização do sistema informatizado de dados das notificações de casos de COVID-19 no estado do Maranhão, durante o período entre 01 de janeiro a 08 de agosto de 2020. **Resultados:** Foram notificados cerca de 151.612 casos confirmados de COVID-19, com discreto predomínio do sexo feminino (55,14%), no entanto o índice de mortalidade foi mais elevado entre a população masculina (61,55%). A faixa etária mais acometida em relação ao índice de contaminação foi de adultos de 30 a 39 anos (21%), entretanto a taxa de óbitos por COVID-19 foi predominante entre idosos com idade superior a 70 anos (55,48%). Em relação às comorbidades associadas observou-se maior predomínio de casos com hipertensão arterial (44,94%) e diabetes mellitus (31,32%). **Implicações:** O índice de casos de infectados e óbitos por COVID-19 no estado do Maranhão apresenta-se crescente, desse modo os resultados apresentados podem subsidiar o planejamento de estratégias para redução de casos no público-alvo identificado como de maior vulnerabilidade.

DESCRITORES

Coronavirus; Perfil de Saúde; Saúde Pública.

RESUMEN

Introducción: El COVID-19 se caracteriza por un síndrome respiratorio agudo severo con una alta tasa de letalidad. **Objetivo:** Describir el perfil clínico y epidemiológico de los pacientes afectados por COVID-19 en el estado de Maranhão. **Diseño:** Se trata de un estudio epidemiológico observacional, descriptivo, con variables cuantitativas recolectadas a partir del uso del sistema informatizado de datos de notificaciones de casos de COVID-19 en el estado de Maranhão, durante el período comprendido entre el 1 de enero y el 8 de agosto de 2019. 2020. **Resultados:** Se reportaron alrededor de 151.612 casos confirmados de COVID-19, con ligero predominio del sexo femenino (55,14%), sin embargo la tasa de mortalidad fue mayor entre la población masculina (61,55%). El grupo de edad más afectado en relación a la tasa de contagio fue el de adultos entre 30 y 39 años (21%), sin embargo la tasa de muerte por COVID-19 predominó entre los ancianos mayores de 70 años (55,48%). En cuanto a las comorbilidades asociadas, hubo un mayor predominio de casos con hipertensión arterial (44,94%) y diabetes mellitus (31,32%). **Implicaciones:** La tasa de casos infectados y muertes por COVID-19 en el estado de Maranhão está aumentando, por lo que los resultados presentados pueden apoyar la planificación de estrategias para reducir los casos en el público objetivo identificado como más vulnerable.

DESCRIPTORES

Coronavirus; Perfil de Salud; Salud Pública.

REFERENCES

1. Organização Pan-Americana da Saúde. Folha informativa COVID-19 - Escritório da OPAS e da OMS no Brasil. 2020. Available from: https://www.paho.org/pt/COVID19/historico-da-pandemia-COVID-19

2. Organização Mundial da Saúde. Doenças por coronavírus (COVID-19) Atualização Epidemiológica Semanal e Atualização Operacional Semanal. 2020. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/

3. Lindemann IV, Simonetti AB, Amaral CP, Riffel RT, Simon TT, Stobbe JC, et al. Percepção do medo de ser contaminado pelo novo coronavírus. J Bras Psiquiatr [internet]. 2021 Mar [cited 2022 Mar 31]; 70 (1): 3-11. Available from: https://doi.org/10.1590/0047-2085000000306

4. Souza ASR, Amorim MMR, Melo ASO, Delgado AM, Florêncio, ACMCC, Oliveira TV, et al. Aspectos gerais da pandemia COVID-19. Rev Bras Saude Mater Infantil [internet]. 2021 fev [cited 2022 Mar 31]; 21 (supl.1):547-64. Available from: https://doi.org/10.1590/1806-93042021005100003

5. Cui J, Li F, Shi ZL. Origin and Evolution of Pathogenic Coronaviruses. Nat Rev Microbiol [internet]. 2019 [cited 2022 Mar 31]; 17: 181-92. Available from: https://doi.org/10.1038/s41579-018-0118-9

6. Organização Mundial da Saúde. Doenças por coronavírus (COVID-19) O que é coronavírus? 2020. Available from: https://www.gov.br/saude/pt-br/coronavirus/perguntas-e-respostas

7. Centers For Disease Control And Prevention (CDC). Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19)—United States, February 12–March 16, 2020. MMWR [internet]. 2020 Mar [cited 2022 Mar 31]; 69 (12):343-346, 2020. Available from: http://dx.doi.org/10.15585/mmwr.mm6912e2

8. Xavier AR, Silva JS, Almeida JPCL, Conceição JFF, Lacerda GS, Kanaam S. COVID-19: manifestações clínicas e laboratoriais na infecção pelo novo coronavírus. J Bras Patol Med Lab [internet]. 2020 Jun [cited 2022 Mar 31]; 56: 1-9. Available from : https://doi.org/10.5935/1676-2444.20200049

9. Borges TDP. Santa Catarina: o agravamento da pandemia e os desafios da descentralização no enfrentamento. Associação brasileira de Ciência Política; 2020. Available from: https://googleweblight.com/sp?u=https://cienciapolitica.org.br/analises/especial-abcp-4a-edicao-governosestaduais-e-acoes/artigo/especialabcp-acoessanta-catarinaenfrentamento&grqid=jPxeCmFQ&hl=pt-BR

10. Brasil. Ministério da Saúde. Relatório Inquérito COVID-19 SES/UFMA. Prevalência de infecção pelo vírus SARS-COV-2 no Maranhão, Brasil Relatório Final de Pesquisa Fase II. Brasília: MS; 2020. Available from: https://www.saude.ma.gov.br/wp-content/uploads/2020/11/Inquerito-Sorologico-Maranhao-Fase-2.pdf

11. Brasil. Ministério da Saúde. Painel de casos de doença pelo coronavírus 2019 (COVID-19) no Brasil pelo Ministério da Saúde – versão v1.2. Brasília: MS; 2020. Available from: https://COVID.saude.gov.br/

12. Governo do Maranhão. Coronavírus Maranhão. São Luís: Governo do Maranhão; 2020. Acesso em: 20 de Julho de 2020. Available from: https://www.corona.ma.gov.br/

13. Moraes BQS, Félix ICG, Quirino TRL, Machado MF. Análise dos indicadores da COVID-19 no Nordeste brasileiro em quatro meses de pandemia. Vigil Sanit Debate [internet]. 2020 Jul [cited 2022 Mar 31]; 8(3):52-60. Available from : https://doi.org/10.22239/2317-269x.01690

14. Niquini RP, Lana RM, Pacheco AG, Cruz OG, Coelho FC, Carvalho LM, et al. SRAG por COVID-19 no Brasil: descrição e comparação de características demográficas e comorbidades com SRAG por influenza e com a população geral. Cad Saúde Pública [internet]. 2020 Jun [cited 2022 Mar 31]; 36 (7): 1-12. Available from: https://doi.org/10.1590/0102-311X00149420

15. Almeida JS, Cardoso JÁ, Cordeiro EC, Lemos M, Araújo TME, Sardinha AHL. Caracterização epidemiológica dos casos de COVID-19 no Maranhão: uma breve análise. Rev Pre Infec e Saúde [internet]. Jun [cited 2022 Mar 31];2020;6:10477. Available from: https://doi.org/10.26694/repis.v6i0.10477

16. Paiva CI, Nasr AMLF, Magatão DS, Ditterich RG, Guimarães RRM, Piler RA, et al. Perfil epidemiológico da COVID-19 no estado do paraná. Rev Saúde Públ Paraná on-line [internet]. 2020 Dez [cited 2022 Mar 31]; 3(supl 1):39-61. Available from: https://doi.org/10.32811/25954482-2020v3sup1p39

17. Souza LS, Randow R, Siviero P. Reflexões em tempos de COVID-19: diferenciais por sexo e idade. Comunicação em Ciências da Saúde [internet]. 2020 [cited 2022 Mar 31]; 31 (Suppl 1):75-83. Available from: https://doi.org/10.51723/ccs.v31iSuppl%201.672

18. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet [internet]. 2020 Mar [cited 2022 Mar 31]; 395:1054-62. Available from: https://doi.org/10.1016/S0140-6736(20)30566-3

19. Grasselli G, Zangrillo A, Zanella A, Antonelli M, Cabrini L, Castelli A, et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-COV-2 admitted to ICUs of the Lombardy Region, Italy. JAMA [internet]. 2020 [cited 2022 Mar 31]; 323 (16):1574-81. Available from: https://doi.org/10.1001/jama.2020.5394

20. Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. JAMA [internet]. 2020 Abr [cited 2022 Mar 31]; 323 (20):2052-59. Available from: https://doi.org/10.1001/jama.2020.6775

22. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. É preciso envelhecer com saúde. Brasília: MS; 2016. Available from: https://www.gov.br/saude/pt-br/assuntos/noticias/ministerio-recomenda-e-preciso-envelhecer-com-saude

23. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet [internet]. 2020 Fev [cited 2022 Mar 31]; 395 (102):497-506. Available from: https://doi.org/10.1016/S0140-6736(20)30183-5

24. Qun L, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al . Early transmission dynamics in Wuhan, China, of Novel coronavirus-infected pneumonia. N Engl J Med [internet]. 2020 Mar [cited 2022 Mar 31]; 382 (3): 1199-1207. Available from: https://www.nejm.org/doi/full/10.1056/nejmoa2001316

25. Tan W, Zhao X, Ma X, Wang W, Niu P, Xu W, et al. A novel coronavirus genome identified in a cluster of pneumonia cases – Wuhan, China 2019-2020. China: CDC; 2020 Jan [cited 2022 Mar 31]; 2 (1):61-3. Available from: https://www.researchgate.net/publication/342044613

26. Almeida JS, Cardodo JA, Cordeiro EC, Lemos M, Araújo TME, Sardinha AHL. Caracterização epidemiológica dos casos de COVID-19 no maranhão: uma breve análise. Rev Pre Infec e Saúde [internet]. 2020 Mai [cited 2022 Mar 31]; 6:1-11. Available from: https://doi.org/10.1590/SciELOPreprints.314

27. Vincent JM, Koopmans M, Doremalen NV, Riel DV, Wit E. A Novel Coronavirus Emerging in China — Key Questions for Impact Assessment. N Engl J Med [internet]. 2020 fev [cited 2022 Mar 31]; 382:692-694. Available from: https://doi.org/10.1056/NEJMp2000929

COLLABORATIONS

JWSC: Substantial contributions for the conception or design of the study; in the collection, analysis, and interpretations of data; in article's writing or its critical review; and in the final version to be published. GCS: substantial contributions in the collection, analysis, and interpretations of data. FSV: substantial contributions in article's writing or its critical review; and in the final version to be published. **All authors agree and are responsible by the content of this version of the manuscript to be published.**

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CONFLICTS OF INTEREST

There are no conflicts of interest to declare.