ORIGINAL ARTICLE

https://doi.org/10.1590/1806-9282.20210769

Prevalence of molecular and serological tests of the new coronavirus (SARS-CoV-2) in Carlos Chagas laboratory – Sabin group in Cuiabá

Cristiane Coimbra de Paula[1,2*], Walkiria Shimoya-Bittencourt[1], João Pedro Castoldo Passos[1], Caroline Aquino Vieira De Lamare Paula[3], Karuppusamy Arunachalam[4], Cor Jesus Fernandes Fontes[5], Ruberlei Godinho de Oliveira[6]

SUMMARY

BACKGROUND: Coronavirus disease 2019, which is caused by the new severe acute respiratory syndrome coronavirus 2, became a pandemic in 2020 with a mortality rate of 2% and high transmissibility, thus making studies with an epidemiological profile essential.

OBJECTIVES: The aim of this study was to characterize the population that performed the severe acute respiratory syndrome coronavirus 2 molecular and serological tests in Carlos Chagas Laboratory – Sabin Group in Cuiabá.

METHODS: A retrospective cross-sectional study was carried out with all the samples collected from nasal swab tested by RT-PCR and serological for severe acute respiratory syndrome coronavirus 2 IgM/IgG from the population served between April and December 2020.

FINDINGS: In the analysis period, 23,631 PCR-coronavirus disease 2019 examinations were registered. Of this total number of cases, 7,649 (32.37%) tested positive, while 15,982 (66.31%) did not detect viral RNA and 374 of the results as undetermined. The peak of positive RT-PCR performed in July (n=5,878), with 35.65% (n=2,096). A total of 8,884 tests were performed on serological test SOROVID-19, with a peak of 1,169 (57.16%) of the positive tests for severe acute respiratory syndrome coronavirus 2 in July.

MAIN CONCLUSIONS: Molecular positivity and serological tests, both peaked in July 2020, were mostly present in women aged 20–59 years, characterizing Cuiabá as the epicenter of the Midwest region in this period due to the high rate of transmissibility of severe acute respiratory syndrome coronavirus 2.

KEYWORDS: Coronavirus. Reverse Transcriptase PCR. Serology. Immunoglobulin G. Immunoglobulin M.

INTRODUCTION

Coronavirus disease 2019 (COVID-19), which is caused by the new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), became an alarming threat to public health in 2020, despite global efforts to prevent its spread[1]. SARS-CoV-2 spread rapidly, reaching more than 100 countries in five continents, forcing the World Health Organization (WHO) to declare COVID-19 as a pandemic on March 11, 2020[2,3,18].

It is an RNA virus that can cause sickness in the upper and lower respiratory tracts in immunocompromised patients with chronic conditions, the elderly, and, on rare occasions, adolescents and teenagers[4]. After this contact, there is an average infection incubation period of 3–5 days following a known exposure to someone with suspected or confirmed COVID-19, with an interval of up to 12 days[5]. COVID-19 is a new disease that deserves special attention and care because the symptoms among infected people, from mild to severe, with mortality estimated at just over 2%[3].

The transmission of this virus occurs quickly through aerosols in patients undergoing airway procedures, such as orotracheal intubation or airway aspiration. Thus, some population groups are more vulnerable to being affected by the disease, due to general conditions, ranging from health conditions to the way of life to which they are exposed[6]. Patients who meet the criteria for suspected cases should be tested for SARS-CoV-2,

[1]Centro Universitário de Várzea Grande – Varzea Grande (MT), Brazil.
[2]Laboratório Carlos Chagas – Grupo Sabin – Cuiabá (MT), Brazil.
[3]Scan Rastreamento em Medicina Diagnóstica – Cuiabá (MT), Brazil.
[4]Chinese Academy of Sciences, Kunming Institute of Botany, Key Laboratory of Economic Plants and Biotechnology and the Yunnan Key Laboratory for Wild Plant Resources – Kunming, China.
[5]Universidade Federal de Mato Grosso, Hospital Universitário Júlio Müller – Cuiabá (MT), Brazil.
[6]Universidade Federal de Mato Grosso, Hospital Universitário Júlio Müller, Mestrado em Ciências Aplicadas a Atenção Hospitalar – Cuiabá (MT), Brazil.
*Corresponding author: cristianepaula4@gmail.com
Conflicts of interest: the authors declare there is no conflicts of interest. Funding: none.
Received on October 30, 2021. Accepted on December 20, 2021.

using samples collected from the nasopharyngeal mucous by the nasal swab[6,7]. The SARS-CoV-2 RNA is detected by reverse transcription-polymerase chain reaction (RT-PCR) and a positive SARS-CoV-2 test confirms the diagnosis of COVID-19[8].

However, if the initial test is negative, but suspected of COVID-19, WHO recommends resampling and testing of various airway locations, as well as testing for antibodies[9]. The tests are based on the principle of lateral flow immunoassay for the detection of IgG/IgM antibodies against SARS-CoV-2 in whole blood, serum, and plasma of humans, requiring quantification according to the onset of symptoms reported by the patient to avoid false-negative results[10]. Thus, identifying the magnitude of the health problem in the population is the first step toward the development of effective decision-making strategies in evidence-based public health situations[11,12], as well as understanding the spatial distribution of the disease is fundamental for the development of strategies during the early stages of the COVID-19[13] emergency.

In this regard, among the clinical and laboratory repercussions of the patient with COVID-19, the aim of the present study was to characterize the population that performed the SARS-CoV-2 molecular and serological tests in Carlos Chagas Laboratory – Sabin Group in Cuiabá from April to December 2020.

METHODS

This is a retrospective cross-sectional study with samples from the secondary database of Carlos Chagas Laboratory – Sabin Group, in Cuiabá – MT, collected between April and July 2020. To verify the prevalence of molecular and serological tests for SARS-CoV-2, all samples from people seen in the laboratory of both sexes were included, without age restriction; and the reports of the molecular tests performed by qPCR-RT through the extraction of the genetic material of the nasal swab virus, as well as serological tests SOROVID-19 (IgM and IgG) for the detection of antibodies to SARS-CoV-2. Rapid IgG or IgM test data were excluded from the study.

Data were expressed as absolute frequency and percentages with tabulation in Microsoft Excel. The time trend and the age distribution of the COVID-19 cases detected in the study laboratory were plotted using GraphPad version 5.04 software (Windows®). Cuzik test was used to analyze the time trend across the month.

Data in tables represent the mean and respective standard deviation, with 95% confidence interval (95%CI) within tabulation.

This study was approved by the Ethics Committee of UNIVAG "Centro Universitário" under protocol number CAAE: 37320320.1.0000.5692.

RESULTS

This study results demonstrate the data between April and December 2020, and 23,631 PCR-COVID-19 tests were registered in Carlos Chagas Laboratory – Sabin Group laboratories located in Cuiabá. Out of the total number of cases, 7,649 (32.37%) tested positive, while 15,982 (66.31%) did not have the disease and 324 (1.36%) of the visits resulted in an indeterminate (data not shown) (Table 1).

In the same period, 8,884 SOROVID-19 tests (IgG and IgM) were recorded at the Carlos Chagas Laboratory – Sabin Group laboratory in the municipality of Cuiabá. In the overall cases, 1,993 (22.43%) tested positive for both tested groups and/or just IgG or IgM, with IgG being detected late in the disease progression, immunity against viruses, and IgM recent contact with viruses that the sick person transmits when in contact with other people who live together, while 6,891 (77.57%) of the tests were nonreactive (Table 2).

There was a predominance of 5,258 (59.18%) cases in women, reaching the majority between the age group of 20 and 59 years. Positive cases registered with a peak (27.48%) in July (n=2.102) totaling 5,778 examinations performed in that month for PCR-COVID-19 test, undetected (n=3,676) and undetermined (n=374; data not shown) (Table 2).

Of the total number of cases, 4,296 (56.2%) were women and 3,353 (43.8%) were men, individuals between 20 and 59 years of age were the ones who most performed the examinations in that month. In the results of July, 5,778 tests were recorded; of these, 2,102 (36.38%) were confirmed positive for PCR COVID and 3,676 (63.62%) were confirmed negative for the disease. Of the total cases in July, 3,468 (60.0%) were women and 2,310 (40.0%) were men, remaining in the same range of individuals aged 20–59 years (Table 2).

The total of 2,008 reagent tests performed by SOROVID-19 at the Carlos Chagas Laboratory – Sabin Group Laboratory experienced a significant increase in the total number of tests collected per month, after subsequent to April, due to the high

Table 1. Prevalence of PCR-COVID-19 tests (molecular and serological) performed in Carlos Chagas Laboratory – Sabin Group laboratory in Cuiabá from April to December 2020.

PCR-COVID-19	N=23,631	%
Positive	7,649	32.37
Negative	15,982	67.63
SOROVID-19 (IgM and IgG)	N=8,884	%
Reagent	1,993	22.43
Non-reagent	6,891	77.57

Table 2. Prevalence of cases of COVID-19 disease caused by the new coronavirus (SARS-CoV-2) performed in Carlos Chagas Laboratory – Sabin Group Laboratory in Cuiabá per month, gender, and age group.

Month	Gender	Age group (year)																					
		0–9		10–19		20–29		30–39		40–49		50–59		60–69		70–79		80–89		90–100		101–109	
		(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)	(+)	(−)
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
April (n=324)	Male	0	12 (3.7)	0	5 (1.5)	0	12 (3.7)	2 (0.6)	28 (8.6)	1 (0.3)	27 (8.3)	0	17 (5.2)	1 (0.3)	15 (4.6)	0	5 (1.5)	0	3 (0.9)	0	0	0	0
	Female	0	5 (1.5)	0	3 (0.9)	0	29 (9.0)	2 (0.6)	68 (21.0)	2 (0.6)	38 (11.7)	1 (0.3)	30 (9.3)	1 (0.3)	12 (3.7)	0	3 (0.9)	0	2 (0.6)	0	0	0	0
May (n=1,127)	Male	5 (0.4)	18 (1.6)	4 (0.4)	21 (1.9)	18 (1.6)	42 (3.7)	28 (2.5)	111 (9.8)	13 (1.2)	111 (9.8)	13 (1.2)	71 (6.3)	4 (0.4)	30 (2.7)	1 (0.1)	10 (0.9)	0	2 (0.2)	0	0	0	0
	Female	5 (0.4)	12 (1.1)	5 (0.4)	16 (1.4)	11 (1.0)	87 (7.7)	39 (3.5)	163 (14.5)	22 (2.0)	119 (10.6)	10 (0.9)	71 (6.3)	4 (0.4)	40 (3.5)	3 (0.3)	14 (1.2)	0	2 (0.2)	0	1 (0.1)	0	1 (0.1)
June (n=3,784)	Male	38 (1.0)	53 (1.4)	26 (0.7)	58 (1.5)	97 (2.6)	129 (3,4)	219 (5.8)	255 (6.7)	153 (4.0)	200 (5.3)	102 (2.7)	109 (2.9)	46 (1.3)	63 (1.7)	25 (0.7)	25 (0.7)	5 (0.1)	9 (0.2)	4 (0.1)	1 (0.03)	1 (0.03)	1 (0.03)
	Female	25 (0.7)	45 (1.2)	31 0.8)	76 (2.0)	172 (4.5)	220 (5.8)	281 (7.4)	413 (10.9)	161 (4.3)	275 (7.3)	130 (3.4)	133 (3.5)	59 (1.6)	64 (1.7)	23 (0.6)	22 (0.6)	13 (0.3)	15 (0.4)	1 (0.03)	3 (0.1)	1 (0.03)	2 (0.1)
July (n=5,778)	Male	46 (0.8)	108 (1.8)	49 (0.8)	92 (1.6)	150 (2.6)	223 (3.8)	267 (4.5)	373 (6.3)	207 (3.5)	241 (5.8)	109 (1.9)	171 (2.9)	57 (1.0)	117 (2.0)	28 (0.5)	52 (0.9)	7 (0.1)	10 (0.2)	1 (0.02)	1 (0.02)	0	1 (0.02)
	Female	33 (0.6)	105 (1.8)	47 (0.8)	122 (2.1)	233 (4.0)	379 (6.4)	348 (5.9)	613 (10.4)	236 (4.0)	485 (8.3)	145 (2.5)	288 (4.9)	75 (1.3)	186 (3.2)	42 (0.7)	71 (1.2)	20 (0.3)	29 (0.5)	2 (0.03)	8 (0.1)	0	1 (0.02)
August (n=2,994)	Male	19 (1.4)	62 (4.7)	23 (1.7)	60 (4.6)	72 (5.5)	124 (9.5)	100 (7.7)	236 (18.2)	101 (7.8)	184 (14.2)	67 (5.1)	98 (7.5)	35 (2.7)	48 (3.7)	8 (0.6)	37 (2.8)	3 (0.2)	9 (0.6)	1 (0.06)	6 (0.4)	0	0
	Female	10 (0.2)	54 (3.1)	29 (1.7)	64 (3.7)	77 (4.5)	178 (10.4)	147 (8.6)	304 (17.8)	118 (6.9)	256 (15.0)	63 (3.7)	144 (8.4)	42 (2.4)	105 (6.1)	16 (0.9)	55 (3.2)	3 (0.2)	30 (1.7)	1 (0.04)	5 (0.2)	0	0
September (n=2,427)	Male	12 (1.2)	59 (6.0)	11 (1.0)	39 (3.9)	59 (6.0)	105 (10.7)	99 (10.1)	171 (17.4)	62 (6.3)	135 (13.4)	46 (4.6)	64 (6.5)	22 (2.2)	43 (4.3)	15 (1.5)	22 (2.2)	2 (0.2)	10 (1.0)	1 (0.06)	3 (0.20)	0	0
	Female	12 (0.8)	37 (2.5)	21 (1.4)	59 (4.1)	78 (5.4)	193 (13.3)	110 (7.6)	319 (22.1)	80 (5.5)	197 (13.6)	46 (3.2)	113 (7.8)	27 (1.8)	86 (5.9)	14 (0.9)	34 (2.3)	9 (0.6)	10 (0.7)	0	2 (0.1)	0	0
October (n=2,040)	Male	10 (1.6)	38 (6.3)	8 (1.3)	44 (7.3)	28 (4.6)	91 (15.1)	27 (4.5)	151 (25.1)	45 (7.5)	132 (21.9)	21 (3.5)	72 (11.9)	14 (2.3)	51 (8.5)	6 (0.99)	20 (3.3)	2 (0.3)	4 (0.7)	0	0	0	0
	Female	6 (0.5)	27 (2.2)	16 (1.3)	54 (4.3)	64 (5.1)	186 (14.9)	104 (8.4)	284 (22.8)	54 (4.3)	188 (15.1)	43 (3.4)	102 (8.2)	14 (1.1)	83 (6.7)	4 (0.3)	32 (2.6)	4 (0.3)	8 (0.6)	1 (0.04)	2 (0.09)	0	0
November (n=1,626)	Male	5 (0.7)	49 (7.6)	7 (1.1)	53 (8.2)	31 (4.8)	94 (14.6)	42 (6.5)	112 (17.4)	38 (5.9)	116 (18.0)	20 (3.1)	42 (6.5)	12 (1.8)	27 (4.2)	7 (11)	9 (1.4)	0	3 (0.5)	0	0	0	0
	Female	5 (0.5)	48 (4.9)	15 (1.5)	52 (5.4)	26 (2.7)	169 (17.5)	69 (7.2)	210 (21.8)	46 (4.7)	114 (11.8)	30 (3.0)	82 (8.5)	10 (1.0)	37 (3.8)	8 (0.8)	27 (2.8)	3 (0.3)	6 (0.6)	1 (0.04)	1 (0.04)	0	0
December (n=3,531)	Male	17 (1.2)	67 (4.6)	38 (2.6)	112 (7.7)	89 (6.1)	167 (11.4)	155 (10.6)	231 (15.8)	108 (7.4)	165 (11.3)	89 (6.1)	80 (5.5)	35 (2.4)	58 (3.9)	12 (0.8)	25 (1.7)	2 (0.1)	4 (0.2)	0	2 (0.14)	0	0
	Female	18 (0.8)	65 (3.1)	50 (2.4)	114 (5.5)	137 (6.6)	254 (12.2)	218 (10.5)	383 (18.4)	138 (6.6)	276 (13.3)	68 (3.3)	168 (8.1)	32 (1.5)	80 (3.8)	18 (0.9)	37 (1.8)	8 (0.4)	8 (0.4)	0	3 (0.14)	0	0
N=23,631		266	864	380	1,044	1,342	2,682	2,257	4425	1,585	3,259	1,003	1,855	490	1145	230	500	81	164	13	38	2	6

Continue...

Table 2. Continuation.

Month	Gender	Age group (year)																					
		0–9		10–19		20–29		30–39		40–49		50–59		60–69		70–79		80–89		90–100		101–109	
		R	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R	NR
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
April (n=202)	Male	0	8 (4.0)	0	2 (0.5)	1 (0.5)	7 (3.5)	2 (1.0)	18 (8.9)	0	22 (10.9)	1 (0.5)	17 (8.4)	0	10 (5.0)	0	2 (1.0)	0	0	0	0	0	0
	Female	0	0	1 (1.0)	6 (3.0)	0	7 (3.5)	3 (1,5)	33 (16.3)	1 (0.5)	21 (10.4)	0	14 (6.9)	1 (0.5)	19 (9.4)	2 (1.0)	4 (2.0)	0	0	0	0	0	0
May (n=498)	Male	0	8 (1.6)	0	14 (2.8)	1 (0.2)	27 (5.4)	6 (1.2)	54 (10.9)	2 (0.4)	46 (9.3)	2 (0.4)	16 (3.2)	0	16 (3.2)	0	6 (1.2)	0	2 (0.4)	0	0	0	0
	Female	0	6 (1.2)	0	12 (2.4)	2 (0.4)	26 (5.2)	0	82 (16.5)	4 (0.8)	78 (15.7)	4 (0.8)	38 (7.7)	3 (0.6)	35 (7.7)	0	6 (1.2)	0	0	0	0	0	0
June (n=1,446)	Male	6 (0.4)	28 (1.9)	4 (0.3)	16 (1.1)	4 (0.3)	42 (2.9)	22 (1.5)	122 (8.4)	28 (1.9)	124 (8.6)	20 (1.4)	68 (4.7)	8 (0.6)	60 (4.1)	0	22 (1.5)	0	4 (0.3)	0	0	0	0
	Female	0	14 (1.0)	3 (0.3)	33 (2.3)	13 (0.9)	87 (6.0)	36 (2.5)	224 (15.5)	29 (2.0)	175 (12.1)	20 (1.4)	104 (7.2)	14 (1.0)	76 (5.3)	4 (0.3)	24 (1.7)	4 (0.3)	8 (0.6)	0	0	0	0
July (n=4,248)	Male	12 (0.3)	36 (0.8)	12 (0.3)	38 (0.9)	53 (1.2)	151 (3.6)	90 (2.3)	281 (6.6)	111 (2.6)	266 (6.3)	91 (2.1)	234 (5.5)	55 (1.3)	133 (3.1)	38 (0.9)	69 (1.6)	6 (0.1)	8 (0.2)	0	0	0	0
	Female	12 (0.3)	38 (0.9)	17 (0.4)	63 (1.5)	75 (1.8)	287 (6.8)	138 (3.2)	446 (10.5)	160 (3.8)	399 (9.4)	121 (2.8)	325 (7.7)	102 (2.4)	216 (5.1)	38 (0.9)	58 (1.4)	10 (0.2)	32 (0.8)	0	0	0	0
August (n=1,247)	Male	10 (1.9)	12 (2.2)	8 (1.5)	14 (2.6)	16 (3.0)	35 (6.6)	30 (5.6)	79 (14.9)	36 (6.8)	69 (12.9)	38 (7.1)	64 (12.0)	27 (5.1)	43 (8.1)	13 (2.4)	7 (1.3)	1 (0.2)	7 (1.3)	1 (0.2)	3 (0.6)	0	0
	Female	8 (1,11)	16 (2.7)	10 (1,4)	14 (1.9)	13 (1.8)	52 (7.3)	41 (5.7)	111 (15.5)	40 (5.6)	116 (16.2)	37 (5.2)	86 (12.0)	31 (4.3)	75 (10.5)	14 (1.9)	19 (2.6)	5 (0.7)	19 (2.6)	1 (0.1)	3 0.4)	0	0
September (n=414)	Male	3 (1,5)	6 (3.1)	2 (1,0)	5 (2.6)	3 (1.5)	11 (5.6)	6 (3.1)	29 (14.9)	10 (5.1)	32 (16.4)	10 (5.1)	30 (15.4)	6 (3.1)	23 (11,8)	0	6 (3.1)	3 (1,5)	6 (3,1)	0	2 (2.0)	0	0
	Female	0	6 (2.7)	2 (0,9)	7 (3.2)	5 (2.3)	19 (8.7)	7 (3.2)	34 (15.5)	9 (4.1)	36 (16.4)	7 (3.2)	29 (13.2)	8 (3.6)	21 (9.6)	4 (1.8)	6 (2.7)	2 (0.9)	6 (2.7)	0	1 (0.5)	0	0
October (n=331)	Male	1 (0.7)	2 (1.4)	0	5 (3.5)	2 (1.4)	4 (2.8)	7 (4.9)	17 (11.9)	5 (3.5)	31 (21.8)	5 (3.5)	23 (16.1)	5 (3.5)	23 (16.1)	0	9 (6.3)	0	2 (1.4)	0	0	0	0
	Female	1 (0.5)	1 (0.5)	1 (0,5)	3 (1.6)	4 (2.1)	14 (7.4)	4 (2.1)	32 (16.9)	5 (2.6)	36 (19.0)	5 (2.6)	34 (18.0)	5 (2.6)	21 (11.1)	2 (1.0)	15 (7.9)	0	5 (2.6)	0	1 (0.5)	0	0
November (n=184)	Male	0	4 (5.7)	1 (1,4)	2 (2.8)	1 (1.4)	2 (2,8)	1 (1.4)	9 (12.8)	1 (1.4)	18 (25.7)	1 (1.4)	11 (15.7)	3 (4.3)	12 (17.1)	0	4 (5.7)	0	0	0	0	0	0
	Female	0	2 (1.7)	0	5 (4.4)	0	19 (16.7)	1 (0.9)	20 (17.5)	5 (4.4)	19 (16.7)	3 (2.6)	15 (13.1)	6 (5.2)	15 (13.1)	0	1 (0.9)	2 (1.8)	0	0	1 (0.9)	0	0
December (n=379)	Male	1 (0.5)	5 (2.6)	0	8 (4.1)	2 (1.0)	15 (7.6)	4 (2.0)	24 (12.2)	6 (3.0)	27 (13.8)	5 (2.5)	27 (13.8)	4 (2.0)	17 (8.7)	0	10 (5.1)	0	2 (1.0)	0	0	0	0
	Female	0	4 (2.2)	0	8 (4.4)	2 (1.1)	18 (9.8)	5 (2.7)	43 (23.5)	12 (6.5)	41 (22.4)	7 (3.8)	28 (15.3)	6 (3.3)	26 (14.2)	2 (1.1)	12 (6.5)	1 (0.5)	6 (3.3)	0	1 (0.55)	0	0
N=8,884		54	196	61	255	197	823	403	1,658	464	1,556	377	1,163	284	841	117	280	34	107	2	12	0	0

R: reagent; NR: no reagent.

rate of transmission and community circulation of SARS-CoV-2. There was a predominance of 5,258 (59.18%) tests in women, reaching the majority between the age group of 20 and 59 years. The reagent results were registered with a peak in July (n=1,169; 57.16%), entitled as the first wave of infection in Brazil, totaling 4.21 examinations performed in that month for IgM and IgG, undetected (n=6,981) (Table 2).

The cases confirmed by PCR-COVID-19 data between April and December 2020, and data series represent the mean and respective 95%CI of PCR-COVID-19 cases for each age group, and data series represent the positive numbers of SOROVID-19 (IgG/IgM) between April and December 2020 in Carlos Chagas Laboratory – Sabin Group in Cuiabá (Figure 1).

No temporal trend was observed with either SOROVID (p=0.561) or PCR (p=0.289) (Figure 1).

DISCUSSION

According to our results, there was a first wave of COVID-19 in Cuiabá in July and later a severe decrease in molecular and serological positivity, with the beginning of a second wave, starting in December 2020, which in fact was observed in Brazil from January 2021. Our data are in accordance with the high rate of transmission and community circulation of SARS-CoV-2 in Cuiabá during the analyzed period (Figure 1A–D), characterizing the month of July as the epicenter of COVID-19 the central west region of Brazil[14,15].

The results of the 23,631 tests performed for SARS-CoV-2 in the period from April to December detected 32.37% of the positive tests by the molecular test (RT-PCR) (Table 1) and 47.51% of the serological tests by the SOROVID-19 test (IgG/IgM); of the positive tests, 1,169 (57.16%) for SARS-CoV-2

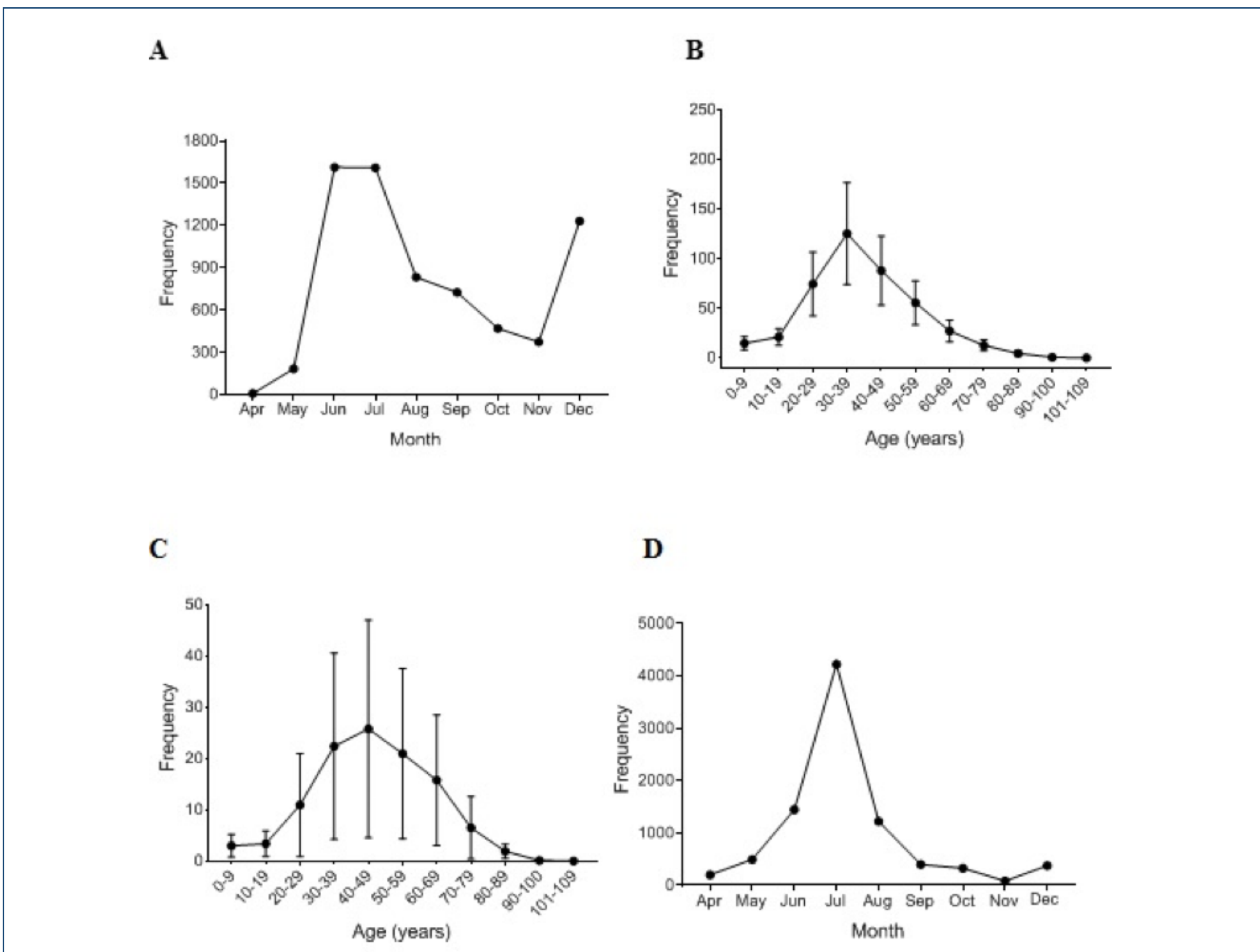

Figure 1. **(A)** Cases confirmed by PCR-COVID-19 between April and December 2020 in Carlos Chagas Laboratory – Sabin Group in Cuiabá. p=0.289 (time trend, Cuzik test). **(B)** Frequency of COVID-19 cases detected by RT-PCR in Carlos Chagas Laboratory – Sabin Group in Cuiabá, from April to December 2020. Data series represent the mean and respective 95%CI. **(C)** Data series represent the mean and respective 95%CI of PCR-COVID-19 cases for each age group in Carlos Chagas Laboratory – Sabin Group in Cuiabá. p=0.561 (time trend, Cuzik test). **(D)** Data series represent the positive numbers of SOROVID-19 (IgG/IgM) between April and December 2020 in Carlos Chagas Laboratory – Sabin Group in Cuiabá.

in July, with women in the age group of 20–59 years being predominant (Figure 1).

Regarding gender, the incidence of SARS-CoV-2 was more positive in women, similar to the findings in another study conducted in Mato Grosso and Rio de Janeiro[10] which also reported the majority of cases in women (51.4%), whereas in men it was 47.7%. In contrast to our study in Wuhan Province, China[19], the prevalence was higher in men (56%) with mortality 56.5 and 38.0% of female deaths[10].

According to data from the State Department of Health, Cuiabá, Várzea Grande, and 13 other cities in Mato Grosso are classified as "very high" risk for the new coronavirus. This risk classification points to cities with more than 150 active cases on that date, such as Sorriso with 24.81%, Barra do Garças with 19.92%, and Paranatinga with 14.83%, the other cities in the State are between 2 and 11%. In Cuiabá, there are 13,958 confirmed cases with 636 deaths and the city Várzea Grande with a high mortality rate, as there are 5,234 confirmed cases with 337 deaths and a 7% lethality rate, confirming that the Baixada Cuiabana has a lethality rate above the national average[14,15].

According to the Epidemiological Bulletin of the State of Mato Grosso, the profile of patients with COVID-19 is predominantly women (52%), as well as the prevalence of deaths is also higher in women (59.3%)[14,15]. However, this distribution differs between the states, as in Maranhão where the death due to COVID-19 was predominant in men (62%)[16]. It is believed that women seek health services more frequently than men, and there may be underreporting of cases in the male population, as, historically, men seek health services less, which can lead to the worsening of the disease, late treatment, and evolution to death.

Regarding the age group, there was a predominance of cases of patients between 20 and 59 years for both tests, i.e., molecular and serological, for the detection of SARS-CoV-2. Those findings are similar to the ones found in a study carried out in Maranhão (28.4%)[16] and in Wenzhou (China), which presented 58.9% of cases in the same age group[17]. Likewise, individuals aged 30–59 years were more prevalent among the cases studied in Rio de Janeiro[10]. It is worth emphasizing the need to endorse nonpharmacological measures, in order to reduce the number of people with the disease in the same age group, which characterizes the economically active population and reinforces the adoption of assertive socioeconomic measures and preventive measures with the epidemiological surveillance of each citizen to decrease the transmissibility of SARS-CoV-2[19].

The serological methods have public health value for monitoring and responding to the COVID-19 pandemic and clinical utility in providing care for patients. Our results showed that the detection of antibodies was mostly in July due to the effect of the first wave COVID-19 in Brazil and characterized of the immunological window period. Moreover, the serological tests may be negative in asymptomatic patients or those who did not report the onset period of symptoms for SARS-CoV-2 IgM/IgG positivity as recommended by the Ministry of Health (10–12 days)[12].

Among the limitations, despite the secondary data of this study being collected in a locally and nationally known laboratory, the samples are representative and descriptive only from the city of Cuiabá and the region roundabout. This in fact precludes a statewide coverage of the epidemiology of COVID-19, as well as the possibility that the population may have performed tests for SARS-CoV-2 in other laboratories available in the capital. However, it is one of the first studies describing the cases of COVID-19 and the type of approach carried out in Cuiabá which directly contributes to decision-making by requiring notification to the surveillance and health control bodies.

CONCLUSION

Therefore, we conclude that the prevalence of COVID-19 in Cuiabá – MT was higher in women aged 20–59 years and the number of confirmed cases was higher from June to July 2020. The amount of detection of examinations by RT-PCR and reagents for SOROVID (IgM and IgG) monthly increased, having its peak in July 2020, which in fact reflects the high transmissibility rate and first wave of infection of SARS-CoV-2 in Cuiabá with a public health emergency.

ACKNOWLEDGMENTS

We thank Carlos Chagas Laboratory – Group Sabin in Cuiabá, MT, Brazil, for technical support during the analysis and Ethics Committee for the approval of the project.

AUTHOR'S CONTRIBUTIONS

CCP: Designed the study, wrote the manuscript, coordinated the study. **WS-B:** Performed the experiments, wrote the manuscript. **JPCP:** Performed the experiments. **CAVDLP:** Designed the study. **KA:** Language correction, manuscript writing and drafting. **CJFF:** Statistical analysis (Cuzik test was used to analyse the time trend across the month). **RGO:** Designed the study, wrote the manuscript, coordinated the study.

REFERENCES

1. Pizzichini MMM, Patino CM, Ferreira JC. Medidas de frequência: calculando prevalência e incidência na era do COVID-19. J Bras Pneumol. 2020;46(3):243. https://doi.org/10.36416/1806-3756/e20200243
2. Roberto P, Stephens S. Virologia. Conceitos e Métodos para a Formação Profissionais em Laboratórios Saúde. 2010;(2):125-220.
3. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med. 2020;382(8):727-33. https://doi.org/10.1056/NEJMoa2001017
4. Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. Nat Rev Microbiol. 2019;17(3):181-92. https://doi.org/10.1038/s41579-018-0118-9
5. World Health Organization. Novel Coronavirus (2019-nCoV) technical guidance. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance
6. Patel A, Jernigan DB. Initial Public Health Response and Interim Clinical Guidance for the 2019 Novel Coronavirus Outbreak – United States, December 31, 2019-February 4, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(5):140-6. https://doi.org/10.15585/mmwr.mm6905e1
7. Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons Under Investigation (PUIs) for Coronavirus Disease 2019 (COVID-19). February 14, 2020. [cited on 2020 Jul 21]. Available from https://www.cdc.gov/coronavirus/2019-nCoV/lab/guidelines-clinical-specimens.html
8. WHO. Coronavirus disease (COVID-19) technical guidance: surveillance and case definitions. [cited on 2020 Jul 21]. Available from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/surveillance-and-case-definitions
9. Hallal PC, Horta BL, Barros AJD, Dellagostin OA, Hartwig FP, Pellanda LC, et al. Evolução da prevalência de infecção por COVID-19 no Rio Grande do Sul, Brasil: inquéritos sorológicos seriados. Ciênc. Saúde Coletiva. 2020. 25(Supl.1):2395-401. https://doi.org/10.1590/1413-81232020256.1.09632020
10. Cavalcante JR, Abreu AJL. COVID-19 no município do Rio de Janeiro: análise espacial da ocorrência dos primeiros casos e óbitos confirmados. Epidemiol. Serv. Saúde. 2020;29(3):e2020204. https://doi.org/10.5123/S1679-49742020000300007
11. Chinazzi M, Davis JT, Ajelli M, Gioannini C, Litvinova M, Merler S, et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. Science. 2020;368(6489):395-400. https://doi.org/10.1126/science.aba9757
12. Ministério da Saúde. Secretaria de Atenção Primária à Saúde - SAPS. Protocolo de manejo clínico do coronavírus (covid-19) na atenção primária à saúde. Brasília: Ministério da Saúde; 2020. p 40 [cited on 2021 Jul 21]. Available from https://www.unasus.gov.br/especial/covid19/pdf/37
13. Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020;6(382):1708-20. https://doi.org/10.1056/NEJMoa2002032
14. Ministério da Saúde. Centro de Operações de Emergências em Saúde Pública | COE-COVID-19. Plano de contingência nacional para infecção humana pelo novo coronavírus COVID-19. Brasília: Ministério da Saúde; 2020. p 24 [cited on 2021 Jul 21]. Available from https://portalarquivos2.saude.gov.br/images/pdf/2020/agosto/11/plano-contingenciacoronavirus-COVID19.pdf
15. Croda JHR, Garcia LP. Respuesta inmediata de la vigilancia en salud a la epidemia de COVID-19. Epidemiol Serv Saúde. 2020;29(1):e2020002.
16. Almeida JS, Cardoso 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. 2020;6:10477. https://doi.org/10.1590/SciELOPreprints.314
17. Han Y, Liu Y, Zhou L, Chen E, Liu P, Pan X, et al. Epidemiological Assessment of Imported Coronavirus Disease 2019 (COVID-19) cases in the Most Affected City Outside of Hubei Province, Wenzhou, China. JAMA Network Open. 2020;3(4):e206785. https://doi.org/10.1001/jamanetworkopen.2020.6785
18. Rezer F, Faustino WR, Maia CS. Incidence of COVID-19 in the mesoregions of the state of Mato Grosso: confirmed and notified cases. Rev Pre Infec e Saúde. 2020;6:10317.
19. Li Q, 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. 2020;26(382):1199-207. https://doi.org/10.1056/NEJMoa2001316