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Original Research

Performing rapid metabolite tests (IgG-IgM) for SARS-CoV-2 infection in community pharmacies: A cross sectional-study from Brazil

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Abstract

Background: Immunochromatographic rapid tests in pharmacies allow the discovery of specific antibodies against SARS-CoV-2 or viral antigens and provide a broader and more effective screening of the virus. However, in many countries, this process is still not well defined. In this sense, the perception of pharmacists about these screening practices presents an overview of how the service is being carried out in the country. **Objective:** This study was to evaluate the performance of rapid immunochromatographic tests and their clinical results in community pharmacies in northern Brazil. **Method:** A retrospective study was carried out between May 2020 and December 2021 in community pharmacies in the northern region of Brazil. Participants were 18 years of age or older, of both sexes, who spontaneously sought the SARS-CoV-2 rapid testing service at pharmacies located in the municipality of Belem and who had had close contact with the virus or symptoms infection-related. Data were expressed as median and range or as frequency of occurrence. Chi-square t-test and Fisher's exact test were used to compare variables. The accepted significance level was 5%. This study was approved by the Research Ethics Committee (number: 4,865,206). **Results:** A total of 78,849 patients were recruited into the study. Most patients, 37,847 (48%), were tested antibody positive for SARS-CoV-2. There were no severe signs and symptoms of the disease. The results showed the great demand for carrying out the rapid test in pharmacies and these places could contribute to the understanding of this health establishment, to curb the speed of SARS-CoV-2 dissemination. **Conclusion:** This study showed the demand for rapid tests for SARS-CoV-2 in pharmacies, as well as the large number of patients identified with the disease. Thus, these places must exercise a workforce and obtain organized actions to collaborate with the rest of the health system, reducing the overload of urgent and emergency units, as well as the risk of contamination that seek them.

Keywords: pharmaceutical care; pharmaceutical services; community pharmacies; SARS-Cov-2

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INTRODUCTION

Considering the international public health emergency related to SARS-CoV-2, the National Health Surveillance Agency (NHSA) of Brazil, through Resolution of the Collegiate Board (RCB) of NHSA nº 377 of April 29, 2020, consented to the employment of rapid tests (immunochromatographic assays) for the search for antibodies to the new coronavirus (SARS-CoV-2), without the purpose of confirmatory diagnosis, in a pharmacy with a health license and authorization to operate.[1]

Immunochromatographic rapid tests allow the discovery of specific antibodies against SARS-CoV-2 or viral antigens, providing opportunities for health professionals to make clinical decisions.[2] These are intended for health screening and may be useful in analyzing the epidemiological profile of

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the disease. The detection of antibodies also allows for the consideration of the patient's immunological status at the time of its performance.[3,4]

The relevance of the rapid test, in these establishments, as a process to combat the pandemic lies in the fact that they facilitate the rapid recognition of the disease among patients, especially among asymptomatic patients or those with non-visible symptoms of SARS-CoV-2.[5] Continents such as Asia and Oceania that have instituted extensive testing behavior, associated with preventive measures, have shown satisfactory results in controlling the infection of their population. On the other hand, European countries that decided on this methodology late, had different results and the number of patients affected was quite expressive, resulting in overload of health services, as well as greater difficulty in containing the spread of the new coronavirus.[6,7]

In this way, pharmacies, which are health establishments at the primary care level and are sometimes seen as the first place where patients are taken in search of care, mainly due to their immense geographic distribution and provision of clinical services, were very important for combating SARS-CoV-2 in Brazil.[8] In addition, these places are classified as a health establishment in accordance with Federal Law nº 13,021/2014, where they have a qualified pharmaceutical professional, working full time, offering sets of actions and services that aim to guarantee comprehensive therapeutic assistance. and the promotion, protection, and recovery of patients' health.[8-10] In this context, the study aimed to evaluate the performance of rapid immunochromatographic tests and their clinical results in community pharmacies in northern Brazil.

METHODS

Study population

A total of 78,849 subjects were included in this retrospective study. They were residents of the municipality of Belem, state of Para, Brazil. The study took place between May 2020 and December 2021, corresponding with the first and second wave of SARS-CoV-2 infection in the region. Participants were 18 years of age or older, of both sexes, who spontaneously sought the SARS-CoV-2 rapid testing service at pharmacies located in the municipality of Belem and who had had close contact with the virus or symptoms infection-related.

According to the Secretary of Health of the State of Para, 84,5277 cases of SARS-CoV-2 infection were confirmed in the state, resulting in 18,887 deaths. The City of Belem is the most populous municipality in the state of Para and the second in the northern region of Brazil, with an estimated population of 1,506,420 inhabitants, there is a territory of 1,059,458 Km^2, with an estimated HDI of 0,746, in a latitude of -1,45502 and longitude of -48,5024.[11]

SARS-coV-2 testing

The LFIA Cassette COVID-19 IgG/IgM Rapid Test (Menarini, Florence, Italy) is a rapid chromatographic immunoassay for the qualitative detection of IgG and IgM antibodies to SARS-CoV-2 in human whole blood, serum, or plasma, as an aid in diagnosis of primary and secondary SARS-CoV-2 infections. The detection procedure was performed according to the manufacturer's instructions. Briefly, approximately 10 µL of capillary blood was collected and added to the sample well, followed by two drops of buffer solution (about 80 µL) into the sample device. The result is determined by the appearance of colored bands, drawn as positive (controls and IgM and/or IgG bands) or negative (control band only). Results were read in 10 minutes. The presence of certain bands was observed with the naked eye and recorded. A procedural control included in the test and provided by the manufacturer was used. A colored line appearing in the control region (C) is considered a procedural intent control. This confirms sufficient specimen volume, adequate membrane drainage, and correct procedural technique.

The positive result for IgG and IgM occurs when, a control line (C), and two-colored lines appear in the IgG test region and in the IgM test line, which is indicative of secondary infection of SARS-CoV-2. For positive IgG, a colored line should be in the control region (C), and a colored line appears in the IgG test region. The result is positive for specific IgG test, probably indicative of secondary SARS-CoV-2 infection. In the case of positive IgM, a colored line should be in the control region (C), and a colored line appears in the IgM test line region. A positive result for IgM antibodies is indicative of primary SARS-CoV-2 infection. The result is considered as negative if it presents a colored line in the control region (C) and no other line appears in the test region (T). When the control line does not appear, the result is classified as invalid.[11]

Ethical considerations

The study was treated in accordance with the Declaration of Helsinki, 2008, and was approved by the Research Ethics Committee of the Institute of Health Sciences of the Federal University of Para, under number 4,865,206. Participants were informed about the objectives of this research and had the option to withdraw from the study at any time without any obligation. Patients were also assured that their identity and personal data will not be disclosed, and the data obtained will be used exclusively for the present study.

Statistical analysis

Data are expressed as median and range or as the frequency of occurrence. Chi-square t-test and the Fischer exact test were used to compare the variables. The significance level accepted was 5%.

RESULTS

A total of 78,849 patients were recruited for the SARS-CoV-2 pharmacy case-tracking study. The baseline characteristics of the patients are presented in Table 1.

The study patients were mostly adults, female and brown. The signs and symptoms presented were characteristic for SARS-CoV-2. There were no reports of sepsis, acute respiratory distress syndrome, severe respiratory failure, multiple

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organ dysfunction, severe pneumonia, need for respiratory support, and intensive care unit admissions. Pharmaceutical establishments reported that in positive cases, they directed the medical professional for a more accurate assessment.

Capillary blood from all patients was tested for SARS-CoV-2 using a rapid chromatographic immunoassay for the qualitative detection of IgG and IgM antibodies (LFIA cassette (Menarini, Florence, Italy). Of 78,849 tests performed, 37,847 (48%) were positive antibodies for SARS-CoV-2 were tested, with 24,356 (31%) positive for IgG and IgM; and 13,491 (17%) positive only for IgG. Several 20,135 (26%) negative IgG and IgM cases were identified; therefore, the possibility of infection cannot be ruled out (Table 2).

DISCUSSION

Mass testing of SARS-CoV-2 is extremely important for containing the pandemic and for identifying new cases, especially with the advancement of Omicron variants, whose transmissibility is much higher compared to other strains of the coronavirus.[12] With the population tested, health authorities were able to observe the behavior of the virus more efficiently, and, with that, outlined management strategies to reduce infection rates in the locality.[13] As a mitigating factor in the process, pharmacies provided broader and more effective screening for SARS-CoV-2. These places are a gateway for the population to health services and should be understood as an outpost of primary health care.[8,14]

In our study, females, brown and with a median age of 39.7 years were the ones who most sought the rapid testing service for SARS-CoV-2. Investigations in the field of collective health report that gender relations suggest the way men and women establish and deal with theirs.[15-17] A study carried out in the United States of America (USA) indicates that there is a multicausal condition that keeps men away from health prevention actions. Among them, the culture of neglecting health by men, the feeling of invulnerability, the search for health services only to relieve symptoms already installed and hours that are not accessible for health promotion services stand out.[18]

According to the World Health Organization (WHO), the initial signs and symptoms of the disease suggest a common flu condition, but differ from person to person, and can be evidenced in a calm way, in the form of pneumonia, severe pneumonia and in a Respiratory Syndrome Acute (SARS).[19] According to Bhatraju et al. the conceptions of suspected cases, initially, consisted of the occurrence of fever and at least one respiratory sign or symptom. However, fever would not necessarily be present in all affected individuals. In any case, the most common signs and symptoms are fever, cough, sore throat, runny nose, dyspnea.[20,21]

Among the individuals who sought the service, they exhibited the mild form of the disease, with some symptoms such as cough, sore throat, runny nose, diarrhea, fever, and dyspnea. Studies with 41 proven cases in China identified that fever was present in 98% of them, followed by cough (76%), dyspnea (55%), sore throat (30%) and runny nose (27%).[22-24] Wang et al. They also found 69 cases in China and observed that about 15% of the individuals examined exhibited the triad of fever, cough, and dyspnea. The case report from Seattle, USA, revealed that 50% of them did not manifest fever, with cough, sore throat and runny nose being the most reported signs and symptoms. All this information corroborates the study presented. [25]

To help identify SARS-CoV-2, a rapid diagnostic test is used because it is produced quickly and inexpensively. These tests do not assess the number of antibodies in the patient's serum or whether these antibodies are able to defend against future infections, but they do have the ability to detect exposures and can recognize asymptomatic people and people who have cleared the virus. [26,27]

Our study was able to observe that 48% of individuals had detectable antibodies, like the clinical validation that occurred in China. The negative results of the tests can be explained by their low sensitivity, not allowing their use alone, as a front-

Table 1. Baseline characteristics of patients

Characteristics	**Patients (n=78,849)**
Feminine, n (%)	43,622 (55)
Age, years	39.74 (18-105)
Color/Ethnicity	
White	22,934 (29)
Brown	44,285 (56)
Black	2,835 (4)
Not declared	8,795 (11)
Signs/Symptoms	
Cough	16,658 (21)
Sore throat	14,635 (18)
Runny nose	13,775 (17)
Diarrhea	6,606 (8)
Fever	6,140 (8)
Dyspnoea	5,820 (7)
Chest pain	4,822 (6)
Loss of smell or taste	3,851 (5)
Cyanosis (face or extremity)	453 (1)

Results are expressed as mean (standard deviation) and percentage

Table 2. Qualitative testing of IgG and IgM antibodies to SARS-CoV-2

Test		**n (%)**
Positive	IgG+/IgM+	24,356 (31)
	IgG-/IgM+	20,867 (26)
	IgG+/IgM-	13,491 (17)
Negative	IgG-/IgM-	20,135 (26)
Subtotal		78,849 (100)
	Total IgM	45,223 (57)
	Total IgG	37,847 (48)

line test for the diagnosis of SARS-CoV-2, since it can lead to false-negative results.[27] Therefore, rapid tests are not for confirmatory diagnostic purposes and should not be used as the sole basis for treatment or other patient management decisions and should be interpreted by a healthcare professional in association with clinical data, other confirmatory laboratory tests, and epidemiological information.[25,28]

In SARS-CoV-2, IgM-type antibodies appear after 7 days of infection and can remain in our body for about 2 to 3 months.[27-28] The IgG type appear after 14 days of illness and can remain active in the body for up to 8 months. In the study, it was seen that 31% of all individuals who sought the testing service for SARS-CoV-2 in pharmacies obtained positive IgG and IgM results. Generally, this result indicates that the person had contact with the virus for at least two weeks. Meanwhile, 20,867 had the disease or had the infection in a very short time.[29] The North region of Brazil, especially due to the complexity of the Amazonian context, presented high rates of infection and mortality by SARS-CoV-2.[30] This became clearer because the region has intense social inequality and limited access to health services. Study by Croda et al. found in the Amazon, high social inequality in access to health services, which is a common reality for populations living in remote access regions and indigenous lands, whose social and economic vulnerability restricts their spatial mobility in the territory, making them more susceptible to dramatic spread of SARS-CoV-2 in the region.

As a limitation of the study, it was not possible to carry out more specific tests, such as RT-PCR for a more accurate detection of SARS-Cov-2.

CONCLUSION

The present study observed the demand for rapid tests for SARS-CoV-2 in pharmacies, as well as the large number of patients identified with the disease. The data obtained can contribute to the understanding of this health facility, to curb the speed of SARS-CoV-2 dissemination. Thus, these places must exercise a workforce and obtain organized actions to collaborate with the rest of the health system, reducing the overload of urgent and emergency units, as well as the risk of contamination that seek them.

DECLARATION OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest to disclose.

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AUTHOR ROLES

The study was conceptualized by LWPS, JLFV, CHMAR, MFRS and MPMS. CMO and AGNCM contributed to methodology, investigation, data curation, formal analysis of quantitative and qualitative data, validation, visualization, writing of the original draft, review and editing. CAS and RBCM contributed to methodology, investigation, formal analysis of qualitative data, visualization, writing of the original draft, review and editing. RBCM, LWPS, MPMS, AGNCM and CMO contributed to the validation, visualization, revision and editing of the manuscript. LWPS contributed, methodology, supervision, validation, visualization, review and editing.

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