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Epidemiological characteristics of reported schistosomiasis cases in the administrative region of Sorocaba

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ABSTRACT

OBJECTIVE

To analyze the epidemiological characteristics of reported cases of schistosomiasis in the Sorocaba administrative region between 2010 and 2022.

METHOD

Data analysis was performed using databases from Brazil's Ministry of Health systems, Tabnet/DATASUS, to identify reported cases during the study period, cross-referencing "municipality of notification" with "autochthonous" and other variables such as "gender," "age group," "race," "education level," "gestational status," and "disease outcome".

RESULTS

A total of 317 cases of schistosomiasis were reported at Sorocaba administrative region between 2010 and 2022, spanning 25 municipalities (32.46%). The city with the highest number of cases was Sorocaba (35.33%), followed by Itu (13.56%), Tietê (10.73%), and Tatuí (7.89%). During this period, only four cases (1.39%) were considered autochthonous, reported in Botucatu, Itapetininga, Itu, and Sorocaba. However, 18 other cases (5.68%) were classified as indeterminate in municipalities such as Ibiúna, Itu, Porto Feliz, Salto de Pirapora, São Roque, Sorocaba, Tatuí, and Votorantim. Overall, schistosomiasis primarily affected men (50.4%), aged 20–39 years (42.5%), of white ethnicity (42.3%), with a high school education (17.4%), and most cases resulted in recovery (58.4%). Additionally, there were reports of 12 pregnant women diagnosed with schistosomiasis during their first or second trimester.

CONCLUSION

Notification and investigation of cases are essential for municipal and state public authorities to implement preventive measures. Despite the low number of autochthonous cases, the presence of the parasite and its intermediate host at Sorocaba administrative region indicates potential for new cases to emerge.

KEYWORDS

Schistosomiasis; Sorocaba administrative region; Epidemiology.

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INTRODUCTION

Notifiable diseases are records that mandate and universalize reporting, aiming for the rapid control of events that require immediate intervention. Mandatory reporting analyzes the occurrence of disease or condition under epidemiological surveillance. Consequently, the information obtained through notifications is systematically compiled into dedicated information systems, enabling comprehensive monitoring of their distribution and trends. Mandatory reporting is required for physicians, other healthcare professionals, or those responsible for public and private health services who attend to patients. Its primary objective is to reduce the incidence and severity of the disease.[1]

For the development of the Sistema de Informação de Agravos de Notificação (SINAN), a list of notifiable diseases, conditions, and public health events is established for public and private healthcare services across the national territory. These diseases are those that may pose a risk to public health and are selected based on specific criteria, including magnitude, potential for dissemination, significance, vulnerability, availability of control measures, and international commitments to eradication programs, among others.[2]

Due to frequent changes in the epidemiological profile, methods such as the implementation of new epidemiological surveillance techniques, the identification of emerging diseases, or the reemergence of others are necessary for the continuous revision of the list of notifiable diseases. This ensures that it remains up to date, as the reporting process is dynamic.[1]

In light of the above, SINAN has been the primary tool for epidemiological surveillance. This strategy is maintained and continuously improved by incorporating scientific and technological advancements over time, as its effectiveness depends on the efficiency of epidemiological surveillance. Furthermore, reporting regulations consider various contextual factors, including temporal and spatial aspects, the content of the information, the geographic areas covered, case definition criteria, the regularity of data transmission, reporting modalities, and the sources of information used.[1,2]

Thus, schistosomiasis is classified as a notifiable disease in non-endemic areas, according to SVS/MS Ordinance No. 5 of February 21, 2006, which was later repealed by Ordinance No. 2,472 of August 31, 2010. Despite this definition, there is a recommendation that all severe endemic cases should be reported, in addition to all cases diagnosed in endemic areas with isolated foci, such as Rio de Janeiro and São Paulo. In endemic regions, *the Sistema de Informações do Programa de Vigilância e Controle da Esquistossomose (SISPCE)* is used to record operational and epidemiological data from coproscopic examinations.[3]

Schistosomiasis mansoni is a parasitic infection caused by *Schistosoma mansoni*, a digenetic trematode helminth that, in its adult form, inhabits the mesenteric blood vessels of humans, who serve as the definitive hosts. Infection occurs through the penetration of cercariae into the skin of a susceptible host.[4,5]

Following its establishment, the parasite spread throughout the country, with the Northeast region and the state of Minas Gerais being the first endemic areas. Subsequently, isolated foci emerged in the Southeast region.[6,7] With the growth of industrial production in urban centers, particularly in São Paulo, migration patterns were influenced, leading to a significant increase in the population of medium- and large-sized cities. Amid the rapid and unplanned urban expansion, a vulnerable segment of society, immigrants, was disproportionately affected by poor living conditions. During this period, the estimated number of individuals affected by schistosomiasis reached approximately 450,000 in the Greater São Paulo area.[8]

Since the identification of the first transmission foci of *Schistosoma mansoni* in the state of São Paulo, the endemic has manifested in a distinct form due to urbanization, which in São Paulo appears to be on the rise, with the exception of the Vale do Ribeira region. In other areas, where indigenous cases of schistosomiasis occur, the urbanization rate is around 50%, reaching the highest level in the Baixada Santista region, where 90% of the foci are located in urban and periurban areas.[6]

In light of this scenario, the objective of this study was to analyze the epidemiological characteristics of the reported cases, including information on location and autochthony, in order to establish a profile based on gender, age group, race, education level, gestational status, and disease progression in the reported cases of the parasitosis at Sorocaba administrative region.

METHODS

Study Design

This is a descriptive, epidemiological, and retrospective study based on the analysis of data published on the virtual platforms of the Brazilian Ministry of Health.

Data Collection, Variables, and Analysis of Results

General analyses were conducted based on the relative frequency of reported cases, obtained through data collection from Tabnet/DATASUS. This survey covered reported cases from 2010 to 2022 in the municipalities of Sorocaba administrative region.

The variables “municipality” and “autochthonous” were initially cross-referenced. Subsequently, the variables “gender,” “affected age group,” “race,” “education level,” “gestational status,” and “disease progression” were selected. Based on this, information on schistosomiasis at Sorocaba administrative region was analyzed, compared, and presented.

RESULTS

Analysis of Prevalence and Autochthonous Cases at Sorocaba Region

It was observed that from 2010 to 2022, a total of 317 cases of schistosomiasis were reported at Sorocaba administrative region, accounting for 3.87% of the 8,191 cases reported in the state of São Paulo. Cases were recorded in only 25 municipalities within the region (32.46%).

The city with the highest number of cases was Sorocaba (35.33%), followed by Itu (13.56%), Tietê (10.73%), and Tatuí (7.89%) (Table 1).

Table 1 - Relative Frequency of Reported Cases in the Municipalities of Sorocaba Administrative Region (2010-2022).

Municipality	Frequency (%)
Sorocaba	35,3
Itu	13,6
Tietê	10,7
Tatuí	7,9
Cerquilho	4,4
São Roque	4,1
Boituva	3,5
Jumirim	3,5
Salto	3,5
Ibiúna	2,2
Botucatu	1,9
Itapetininga	1,6
Laranjal Paulista	1,3
Araçariguama	0,9
Mairinque	0,9
Avaré	0,9
Capela do Alto	0,6
Porto Feliz	0,6
Salto de Pirapora	0,6
Capão Bonito	0,3
Conchas	0,3
Iporanga	0,3
Itatinga	0,3
São Miguel Arcanjo	0,3
Votorantim	0,3

Source: (Authors, 2024).

Over the years, only 4 cases (1.39%) were considered autochthonous, with reports from Botucatu, Itapetininga, Itu, and Sorocaba. However, 18 other cases (5.68%) were classified as indeterminate by the municipalities of Ibiúna, Itu, Porto Feliz, Salto de Pirapora, São Roque, Sorocaba, Tatuí, and Votorantim.

It was observed that there was a decline in the reporting of cases from 2010 to 2022. However, in the Ministry of Health's system, data from 2019 to 2022 were only updated on October 3, 2022, and are still subject to revision. This raises the possibility that there may be additional unreported cases in the region and, consequently, in the state as a whole.

Epidemiological characteristics of schistosomiasis cases in the Sorocaba administrative region

Table 2 below presents information on gender, age group, race, education level, gestational status, and disease progression for the reported cases of schistosomiasis in the Sorocaba administrative region. Many data points were incomplete, and the analyses were conducted based on the available information presented in Tabnet/DATASUS.

Table 2 - Epidemiological Characteristics of Reported Schistosomiasis Cases at Sorocaba Administrative Region from 2010 to 2022.

Gender	n (%)
Male	160 (50,4)
Female	157 (49,6)
Age group	**n (%)**
1 to 4 years	1 (0,4)
5 to 7 years	8 (3,4)
8 to 14 years	10 (4,3)
15 to 19 years	19 (8,2)
20 to 39 years	99 (42,5)
40 to 59 years	63 (27,0)
60 to 64 years	9 (3,9)
65 to 69 years	2 (0,9)
70 to 79 years	7 (3,0)
More than 80 years	15 (6,4)
Race	**n (%)**
Ignored/Blank	22 (10,6)
White	88 (42,3)
Black	19 (9,1)
Yellow	3 (1,4)
Brown	61 (29,3)
Indigenous	15 (7,2)
Education	**n (%)**
Ignored/Blank	70 (32,0)
Illiterate	4 (1,8)
1st to 4th grade incomplete	17 (7,8)
1st to 4th grade complete	13 (5,9)
5th to 8th grade incomplete	32 (14,6)
Complete elementary education	20 (9,1)
Incomplete high school	14 (6,4)
Complete high school	38 (17,4)
Incomplete higher education	2 (0,9)
Complete higher education	6 (2,7)
Not applicable	3 (1,4)
Pregnant woman	**n (%)**
1st quarter	8 (66,7)
2nd quarter	4 (33,3)
Evolution	**n (%)**
Ignored/Blank	73 (31,3)
Cure	136 (58,4)
Not cure	4 (1,7)
Death	1 (0,4)
Death from other causes	19 (8,2)

Source: (Authors, 2024).

Regarding the gender of individuals who presented cases of schistosomiasis in the analyzed cities, it was found that approximately 50.4% of the records refer to men. The corresponding value for women is around 49.6%. Two cities stand out in terms of the number of cases, as the municipalities of Sorocaba and Itu reported 59 and 36 cases, respectively, between 2010 and 2022, with the majority being male individuals.

When examining the age group, it was observed that the majority of individuals affected are between 20 and 39 years old (42.5%), followed by those between 40 and 59 years old (27.0%). A significant number of elderly individuals over 80 years old (6.4%) and adolescents between 15 and 19 years old (8.2%) were also affected.

In terms of race, a higher incidence of the disease was observed among white individuals (42.3%), followed by mixed-race (brown) individuals (29.3%) and black individuals (9.1%). The indigenous population accounted for 7.2%, while individuals of Asian descent (yellow) represented 1.4%.

With regard to education level, the majority of notifications were higher among those with completed high school education (17.4%), followed by individuals with incomplete 5th to 8th grade education (14.4%), and then those with completed elementary school (9.1%). In contrast, there was a significant number of individuals with incomplete 1st to 4th grade education (7.8%), as well as those with incomplete high school (6.4%) and others with only up to the 4th grade completed (5.9%) recorded in the notification forms. Meanwhile, individuals with higher education or those who did not complete it had a much lower incidence, at 2.7% and 0.9%, respectively.

It was also possible to retrieve some information regarding the analysis of records of pregnant women. Of the 77 municipalities covered, only 8 reported cases of pregnant women with the disease. Notably, the city of Salto reported an infection during the first trimester of pregnancy in 2013, as well as Sorocaba, which recorded 8 cases in the first and second trimesters of pregnancy between 2013 and 2014. Additionally, the municipality of Tietê also reported schistosomiasis cases between 2013 and 2016, with 4 pregnant women affected by the disease.

Regarding the evolution of schistosomiasis, it was observed that 58.36% resulted in cure, while only 1 (0.4%) case progressed to death.

DISCUSSION

Schistosomiasis, a parasitic disease caused by flatworms, remains a global public health issue, particularly in areas with inadequate sanitation infrastructure and poor or non-existent healthcare services. For control, treatment, and improvements in the quality of life of affected communities to be effective, it is essential to correctly identify and report diagnosed cases of the parasitosis so that the generated indicators can be used appropriately.[5]

The reliability of notification systems largely depends on the ability of local healthcare services to correctly diagnose diseases and conditions. It is essential to have resources in place that allow for the continuous updating of the epidemiological situation of diseases and the factors that influence them. This includes providing basic epidemiological knowledge for health planning and programming, as well as training and forming the human resources necessary for the proper functioning of the mandatory notification system.[3]

For an information system to function under ideal conditions, the United Nations recommendations, considered the most important for processing vital statistics, should be followed. These recommendations include the need for standardized data collection procedures; operation manuals that account for all possible situations; individuals responsible for the activities must understand the importance of their actions within the overall system; and there must be adequate supervision and support.[1-3,5,9]

According to the World Health Organization (WHO)[5], schistosomiasis affects more than 200 million people worldwide, with prevalence concentrated in tropical and subtropical countries. In Brazil, although historically associated with the Northeast and Southeast regions, the dynamics of urbanization, migration, and the occupation of peripheral areas have expanded the disease's distribution to previously non-endemic regions such as the state of São Paulo.

National data indicate that Sorocaba administrative region accounted for 3.87% of the state's notifications. However, only 1.39% of the cases were autochthonous. These data support studies that suggest a trend of migration of cases from endemic areas to regions with better living conditions, yet still maintaining zones of vulnerability9. The proportion of autochthonous cases of this parasitosis in the Sorocaba region may reflect the impact of human mobility on the disease's epidemiology, a phenomenon also documented in other urbanized areas.[10]

In this study, it was observed that the balanced distribution of cases between the male (50.4%) and female (49.6%) genders diverges from studies that often associate this parasitosis with men, due to their greater exposure to risky environments such as bodies of water. However, the prevalence in young adults (20 to 39 years – 42.5%) supports the literature, as this age group is commonly reported as the most affected, due to increased exposure to labor or recreational activities involving contact with contaminated water.[11]

The fact that individuals who are white, with completed high school education, and with inconsistent autochthony are the most affected by the parasitosis points to the socioeconomic context of the population in the state of São Paulo. This reflection reveals that the infections are indeed imported, and that facilitated tourism and migrations contribute to the spread of infections. Furthermore, it is important to emphasize that race and education may indirectly influence prevalence, with factors related to housing conditions and sanitation being the most relevant.[12]

The diagnosis of infection in pregnant women is concerning, as there are potential significant consequences that may affect the fetus. Municipalities with such cases should improve their diagnostic systems and establish targeted care policies for pregnant women, focusing on the management of anemia, low birth weight, and increased risk of neonatal mortality.[13]

A decline in the number of schistosomiasis cases over the years is expected. In Brazil, there have been long-term and significant investments in basic sanitation, particularly in the southeastern region, where 80.9% of the population has access to sewage treatment. However, this figure is quite different from other regions in Brazil.[14] It is still important to emphasize that schistosomiasis is in full territorial expansion, but with patients presenting a low parasitic load.

CONCLUSION

Notification and investigation of cases are essential for decision-making in preventive actions by municipal and state public authorities. It is observed that, even with a low number of autochthonous cases, the establishment of the parasite and its intermediate host at Sorocaba administrative region still exists, which may lead to new cases. Overall, the epidemiological profile of schistosomiasis at Sorocaba administrative region affects both men and women in similar proportions, primarily individuals aged 20 to 39 years, white, with completed high school education, and who have experienced recovery from the disease.

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