








# Clinical-epidemiological profile of individuals with schistosomiasis in Pernambuco state



## Perfil clínico-epidemiológico de indivíduos portadores de esquistossomose no estado de Pernambuco

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### Abstract

**Objective:** This study aimed to describe the clinical-epidemiological profile of schistosomiasis reported between 2017 and 2021 in Pernambuco state.

**Methods:** This cross-sectional study was conducted using data from the Notifiable Diseases Information System, obtained from DATASUS, concerning schistosomiasis cases reported between 2017 and 2021 in Pernambuco, Brazil. Clinical-epidemiological variables analyzed were sex, age, ethnicity, level of education, clinical form, disease progression, quantitative analysis (colposcopy), and qualitative analysis (serological tests). Data was analyzed with descriptive statistics using Microsoft Excel® software.

**Results:** A total of 906 cases of schistosomiasis were reported in Pernambuco, predominantly in males (53.1%) aged between 40 and 59 years (33.3%) and with Black ethnicity (68.7%). The most common clinical presentation was intestinal (31.6%), and 48.3% progressed to cure, while 11.0% died. Quantitative analysis showed the absence of eggs in 57.4% of individuals, and 39.9% tested positive in qualitative analysis. **Conclusion:** This study highlights schistosomiasis as a public health concern in Pernambuco state. Focus on educational efforts and control measures for vulnerable individuals is crucial to early detection, appropriate treatment,

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and review strategies of public health to fight schistosomiasis effectively in different regions.

**Keywords:** Schistosomiasis, Epidemiology, Neglected diseases, Brazil.

## Resumo

**Objetivo:** Este trabalho objetivou descrever o perfil clínico-epidemiológico dos casos notificados de esquistossomose no estado de Pernambuco (PE) entre 2017 e 2021. **Métodos:** Esse estudo transversal utilizou dados do Sistema de Informação de Agravos de Notificação (Sinan), obtidos no TABNET DATASUS, referentes a todos os casos de esquistossomose notificados em Pernambuco entre 2017 e 2021. Para o estudo, foram designadas variáveis clínico-epidemiológicas, como sexo, idade, raça/cor, escolaridade, forma clínica, evolução da doença, análise quantitativa (exame coproscópico) e análise qualitativa (testes sorológicos). Para a análise dos dados utilizou-se estatística descritiva simples, calculada no software de planilha eletrônica Microsoft Excel®. **Resultados:** Durante o período, houve 906 casos de esquistossomose em Pernambuco, com predominância em homens (53,1%), na faixa etária de 40 - 59 anos (33,3%) e em indivíduos negros (68,7%). A forma clínica mais comum foi a intestinal (31,6%). Do total, 48,3% evoluíram para a cura e 11,0% para o óbito. A análise quantitativa revelou que 57,4% dos casos não apresentaram ovos no exame, enquanto 39,9% tiveram resultado positivo na análise qualitativa. **Conclusão:** Este estudo evidenciou a esquistossomose como um problema de saúde pública em Pernambuco. É essencial direcionar esforços educativos e ações de controle para grupos vulneráveis, priorizando a detecção precoce e o tratamento adequado, além de revisar estratégias de saúde pública em diferentes regiões para combater a esquistossomose prontamente.

**Palavras-chave:** Esquistossomose, Epidemiologia, Doenças negligenciadas, Brasil.

## INTRODUCTION

Schistosomiasis is a parasitic disease with chronic progression caused by the helminth *Schistosoma mansoni*, also known as bilharziasis, snail fever, and water belly in Brazil<sup>1</sup>. Transmission requires a favorable environment and susceptible hosts. Humans are the definitive hosts, and infection occurs with skin penetration of cercariae, which evolves and migrates to the heart, lungs, and liver via circulatory and lymphatic systems. After maturation in the host, adult schistosomes reproduce, and the eggs become widespread in the environment with feces. These eggs are the active infective stage for the intermediate host, the snails of the genus *Biomphalaria*, which restart the transmission cycle when cercariae is release into freshwater<sup>1, 2, 3</sup>.

Some factors contribute to the incidence and prevalence of schistosomiasis, such as the lack of basic sanitation, health education, control of snail populations, and contamination of water

sources of recreation, domestic activities, or agriculture. Additionally, adequate sunlight and high temperatures are favorable environmental conditions, contributing to transmission cycle<sup>1, 2, 3, 4</sup>.

The World Health Organization estimates that schistosomiasis affects 240 million people worldwide, with over 700 million living in endemic areas at risk of disease<sup>3</sup>. Schistosomiasis is a neglected tropical disease associated with poverty and lack of resources for its eradication<sup>4</sup>.

Schistosomiasis is prevalent in the Northeast and Southeast regions of Brazil, mainly in Alagoas, Bahia, Pernambuco, Rio Grande do Norte, Paraíba, Sergipe, Espírito Santo, Maranhão, and Minas Gerais<sup>5</sup>. In Pernambuco, the transmission of *S. mansoni* is endemic in 102 of the 186 municipalities, especially in coastal rainforest zones and coastal regions<sup>6</sup>.

The Schistosomiasis Surveillance and Control Program Information System records data in endemic areas. Whereas, in non-endemic areas, a positive diagnosis requires mandatory notification by the Notifiable Diseases Information System using the schistosomiasis investigation form. Monitoring enhances the understanding of the epidemiological scenario to improve public policies<sup>5</sup>. Therefore, this study aimed to describe the clinical-epidemiological profile of schistosomiasis cases between 2017 and 2021 in Pernambuco state.

## METHODOLOGY

This cross-sectional study used secondary data from the Notifiable Diseases Information System, obtained from DATASUS, to analyze all reported cases of schistosomiasis between 2017 and 2021 in Pernambuco, Brazil. Clinical-epidemiological variables (sex, age, ethnicity, level of education, clinical form, disease progression), quantitative analysis (colposcopy), and qualitative analysis (serological tests) were analyzed.

After data collection, tabulation was followed by simple descriptive analysis using Microsoft Excel® software. Absolute and relative frequency were calculated and presented in tables. Given the exclusive use of data from the public domain, this study was free from submission to the research ethics committee. All procedures followed resolution no. 466/2012 of the National Health Council of Brazil.

## RESULTS

A total of 906 cases of schistosomiasis were identified, 481 (53.1%) were males, 302 (33.3%) aged between 40 and 59 years, and 622 (68.7%) self-identified as Black (Table 1). Regarding level of education, 306 (33.7%) had completed or incomplete elementary school, 79 (8.7%) were illiterate, and 348 (38.4%) did not answer.

**Table 1.** Epidemiological profile of individuals with schistosomiasis between 2017 and 2021 in Pernambuco state

| Variables                     | N=906 | %    |
|-------------------------------|-------|------|
| <b>Sex</b>                    |       |      |
| Male                          | 481   | 53.1 |
| Female                        | 425   | 46.9 |
| <b>Age group (years)</b>      |       |      |
| <1 ano                        | 4     | 0.4  |
| 1-4                           | 5     | 0.5  |
| 5-9                           | 15    | 1.7  |
| 10-14                         | 18    | 2.0  |
| 15-19                         | 15    | 1.7  |
| 20-39                         | 257   | 28.4 |
| 40-59                         | 302   | 33.3 |
| 60-64                         | 81    | 8.9  |
| 65-69                         | 80    | 8.8  |
| 70-79                         | 71    | 7.9  |
| 80+                           | 57    | 6.3  |
| Not answered                  | 1     | 0.1  |
| <b>Ethnicity <sup>1</sup></b> |       |      |
| Balck                         | 622   | 68.7 |
| Non-black                     | 183   | 20.2 |

Source: Notifiable Diseases Information System - DATASUS

<sup>1</sup> Ethnicity: 9 Yellow (1.0%), 2 Indigenous (0.2%), 90 did not answer (9.9%).

The most prevalent clinical presentation observed was the intestinal form, with 286 (31.6%) cases, followed by hepatosplenic, with 122 (13.5%) cases. The disease progression showed 438 individuals (48.3%) that evolved to cure and 100 (11%) to death. Due to missing data (marked as not answered), the disease outcome was unknown in 266 (29.4%) cases.

Regarding quantitative analysis, 520 (57.4%) individuals with schistosomiasis did not present fecal eggs in the examination, indicating a low parasite load. Qualitative analysis showed that 362 (39.9%) results were positive, while 190 (21%) did not perform the serological test (Table 2).

**Table 2.** Clinical profile of individuals with schistosomiasis between 2017 and 2021 in Pernambuco state

| Variables                     | N=906 | %    |
|-------------------------------|-------|------|
| <b>Notified clinical form</b> |       |      |
| Intestinal                    | 286   | 31.6 |
| Hepatointestinal              | 82    | 9.0  |
| Hepatosplenic                 | 122   | 13.5 |
| Acute                         | 24    | 2.6  |
| Other forms                   | 67    | 7.4  |
| Not answered                  | 325   | 35.9 |
| <b>Disease progression</b>    |       |      |
| Cure                          | 438   | 48.3 |
| No Cure                       | 63    | 7.0  |
| Death due to schistosomiasis  | 100   | 11.0 |
| Death due to other causes     | 39    | 4.3  |
| Not answered                  | 266   | 29.4 |
| <b>Quantitative analysis</b>  |       |      |
| Zero egg                      | 520   | 57.4 |
| One or more eggs              | 386   | 42.6 |
| <b>Qualitative analysis</b>   |       |      |
| Positive                      | 362   | 39.9 |
| Negativ2                      | 59    | 6.5  |
| Not analyzed                  | 190   | 21.0 |
| Not answered                  | 295   | 32.6 |

Source: Notifiable Diseases Information System - DATASUS

## DISCUSSION

The results of this study emphasize the persistence of schistosomiasis cases in Pernambuco state. The male population was the most prevalent, corroborating previous studies<sup>7, 8</sup>. The distribution of cases by sex may be attributed to behavioral differences or risk exposure, such as cultural resistance to health education initiatives among male and their prevalence in agriculture and fishing activities, with more exposure to potentially contaminated water<sup>8, 9</sup>.

Regarding age group, most cases occurred between 40 and 59 years. However, studies in the Northeast region of Brazil indicated a prevalence between ages of 20 and 39 years, with ages of 31 to 40 years being the most affected in Pernambuco<sup>8, 10</sup>. Despite differences among data, these ages encompass economically active individuals and might be related to the riverside population, which is more exposed to contamination factors due to their occupation<sup>11</sup>.

The assessment of ethnicity showed a predominance of Black individuals. Furthermore, the level of education demonstrated that individuals had complete or incomplete primary education. These results are consistent with previous studies, emphasizing their importance to the de-

velopment of public policies and highlighting the need for broader and more effective educational campaigns since a lower level of education may increase susceptibility to diseases<sup>6, 12, 13</sup>.

The most prevalent clinical presentation of schistosomiasis was the intestinal form, followed by the hepatosplenic form, which is more complex and severe, affecting intestine, liver, and spleen. Both forms occur in the chronic phase of the disease, leading to late diagnosis or ineffective treatment<sup>1</sup>. A study conducted between 2011 and 2020 in Minas Gerais state reported similar rates, with prevalence of intestinal form<sup>13</sup>.

Concerning disease progression, cure was observed in most cases, which was consistent with other studies<sup>12, 14</sup>. Vale ressaltar que os indivíduos curados continuam suscetíveis à reinfecção, visto que, Cured individuals remain susceptible to reinfection since usually the only available water source in the region is contaminated<sup>10</sup>. These findings highlight the importance of early detection, proper treatment, health education, and the need to eliminate the intermediate host.

Moreover, 11% of cases evolved to death. According to the epidemiological bulletin of 2022, schistosomiasis caused 6,130 deaths from 2010 to 2022 in Brazil, with 472 deaths per year<sup>5</sup>. Schistosomiasis continues to present in severe forms that lead to death<sup>1, 2, 15</sup> despite being an easily diagnosed and treatable disease (single oral dose of praziquantel). This underscores the negligence regarding this parasitic disease, which occurs in areas of low visibility and limited political support, adding to the lack of interest of the pharmaceutical industry to develop more effective treatments despite advances in medicine<sup>2, 16</sup>.

Regarding quantitative analysis, 42.6% of positive cases demonstrated a low parasite load (one to four eggs). This finding corroborates studies performed in Paraíba<sup>16</sup> and Bahia<sup>17</sup> from 2004 to 2014 and from October 2016 to November 2016, respectively. Parasite load, determined using the Kato-Katz method, is essential to confirm the diagnosis and assess the intensity of the disease, monitoring treatment efficacy. Individuals with low parasite load (below 16 eggs per gram of feces) frequently experience intestinal symptoms, such as bleeding and diarrhea. Conversely, high parasite load (above 17 eggs per gram of feces) frequently presents severe symptoms, including hepatosplenomegaly and pulmonary and renal impairment<sup>1, 2, 17, 18</sup>.

Furthermore, qualitative analysis indicates only the presence or absence of parasite eggs and relies on indirect methods, depending on clinical, immunological, and biochemical parameters associated with the disease. Complementary serological tests (e.g., enzyme-linked immunosorbent assay and indirect immunofluorescence for immunoglobulin M) are recommended in non-endemic and low-prevalence areas, especially for individuals with immunodeficiency or lower parasitemia<sup>1, 15, 18</sup>.

Due to a lack of data, the outcome of parasitic disease was not answered in 29.4% of cases. This absence of information could be associated with changes in policies and engagement of

individuals, in addition to the focus of health services on the COVID-19 pandemic between 2020 and 2022<sup>6, 19</sup>. Incompleteness of data should not be underestimated, resulting in null or ignored values in records of the Integrated Health System<sup>20,21</sup>

Data on the level of education and clinical profile variables<sup>21,22</sup> demonstrated a gap that may compromise the accuracy of analyses and interpretations, highlighting the importance of complete and consistent data collection and analysis. The appreciation of these stages improves quality of notification systems providing an accurate and comprehensive overview of schistosomiasis that guides effective interventions and health policies in prevention and treatment.

## CONCLUSION

The epidemiological profile of schistosomiasis in Pernambuco state was characterized by Black male individuals aged between 40 and 59 years with completed or incomplete elementary school. Additionally, the intestinal form was the most prevalent, with low parasite load, and individuals evolved to cure. Therefore, schistosomiasis remains a public health issue in Pernambuco state. Consequently, educational efforts and control actions need to target the identified vulnerable individuals, reducing the incidence and promoting preventive education.

Furthermore, besides medical aspects, socioeconomic and behavioral factors significantly influence disease spread. Consequently, prevention and control strategies need to incorporate approaches that consider these factors and aim to mitigate inequalities and promote universal access to healthcare.

Therefore, continuous epidemiological surveillance and completeness of information systems are essential for a comprehensive and effective response, allowing a flexible and agile reaction to changes in disease profile and socioeconomic conditions of individuals.

## CONFLICT OF INTEREST

Nothing to disclosure.

## AUTHOR CONTRIBUTIONS

**AVF** - conceptualization, methodology development, results validation, drafting of the original manuscript, article review and editing; **COB** - literature review, data collection, and validation, and article writing; **ACLC** - participated in the conceptualization of introduction; **JBSN** and **VVFP** - data validation, supervision and guidance of execution of the article, correction and final drafting of the manuscript. All authors approved the final version.

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