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TITLE

ASSESSING RISK FACTORS AND HOTSPOTS IN A RURAL ENDEMIC AREA FOR SCHISTOSOMIASIS MANSONI IN BRAZIL DURING THREE CROSS-SECTIONAL STUDIES BETWEEN 2014-2022

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ABSTRACT

Januária is a historically known endemic municipality for schistosomiasis mansoni in northern Minas Gerais, Brazil. Brejo do Amparo, one of its seven districts, holds the rural communities of Pé da Serra, Tocantins, and Santana on the banks of the Tocantins stream, where it previously registered a positivity rate of over 50% for schistosomiasis and the presence of Biomphalaria glabrata infected with Schistosoma mansoni. To identify spatial changes in these communities, we compared parasitological data, sociodemographic data, water contact patterns, and spatial distribution of positive cases in 2014 (T0), 2015 (T12), and 2022 (T96). After ethics approval (CAAE 21824513.9.0000.5091; CAAE 55239522.3.0000.5149), fecal samples were collected from individuals of two years of age or older in 2014 and 2015, and between six and 70 years of age in 2022. The material was processed by Kato-Katz and Helmintex methods. Questionnaires to assess sociodemographic and water contact data were applied and the risk of infection associated with the variables was measured by Odds Ratio (OR) in univariate and multivariate models. For the spatial analysis, the residences were georeferenced (GPS, GARMIN 64s) and the Kernel Density Estimator (KDE) was used to identify potential hotspots. A flexible spatial scan statistic was conducted to confirm these and determine the most likely clusters. The number of participants was 257, 260, and 265 in 2014, 2015 and 2022, respectively; mostly female (2014: 52.9%; 2015: 52.7%; 2022: 52.5%) and between 21-40 years old (2014: 26.5%; 2015: 25%; 2022: 35.1%). There was a decline in prevalence from T0 (45.9%) to T12 (10.38%) after the intervention, followed by an increase in T96 (26.03%). Overall, there was a 43% reduction in prevalence in Brejo do Amparo from 2014 to 2022. Regarding the risk factors, proximity of the residences of less than 200m from the stream (2014: OR=2.93; 95%CI 1.27-6.76; p-value=0.01. 2022: 2.46; 95%CI 1.08-5.59; p-value=0.03) and the absence of bathrooms (2014: OR=10.35; 95%CI 1.90-56.39; p-value<0.01. 2022: OR=6.52; 95%CI 1.13-37.77; p-value=0.03) were significant risk factors for T0 and T96. As for 2022, the lack of water treatment for drinking was also a risk factor (OR=2.27; 95%CI 1.21-4.28; p-value=0.01), while using water for irrigation of gardens or crops was marginally significant (OR=1.85; 95%CI 0.92-3.73; p-value = 0.08). From our spatial analysis, a cluster in Tocantins remained statistically significant in all three periods, with a relative risk varying from 2.03 in 2014 to 4.18 in 2022. From our results, we can verify that even considering the diminishing schistosomiasis prevalence in the rural communities, the district Brejo do Amparo still presents significant risk areas for S. mansoni infection, corroborating the need for WASH (Water, Sanitation, and Hygiene) interventions integrated to local health systems, and adequate health education to mitigate the occurrence of schistosomiasis in the region.

KEYWORDS

Schistosomiasis; Kernel Density Estimator; FleXScan; Multivariate Analysis; Water Contact

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