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TITLE

DEVELOPMENT OF A SPECTROPHOTOMETRIC MODEL FOR EARLY DIAGNOSIS OF SCHISTOSOMA MANSONI INFECTION IN BIOMPHALARIA GLABRATA

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ABSTRACT

Schistosomiasis mansoni is a waterborne parasitic infection caused by the trematode Schistosoma mansoni and transmitted by planorbid snail of the Biomphalaria spp. In Brazil, this disease continues to represent a significant public health issue, making it essential to have prior and effective diagnosis of transmission areas from an epidemiological perspective. Understanding the dynamics of the host-parasite interaction is crucial for maintaining the parasite's life cycle and developing more effective control strategies. In this context, the aim of this work is to develop a spectrophotometric model for parasitological diagnosis of Biomphalaria glabrata infected with S. mansoni throughout the infection process. A total of 150 live specimens of B. glabrata from the Belo Horizonte (MG, Brazil) and Sumidouro (RJ, Brazil) strains, maintained in the laboratory. The specimens were individually infected with 7 to 10 miracidia of S. mansoni BH strain and divided into two groups: BgBH - sympatric S. mansoni infection; BgSu - allopatric S. mansoni infection. The spectra were obtained weekly, from infection until the 8th week. To obtain the spectra, the mollusks were dried on absorbent paper, and individual spectra were obtained using the ABB Boomen FT-NIR equipment with a resolution of 16 cm $^{-1}$. The chemometric analyses were carried out using unscrambler software, where the raw spectra were pre-processed and an exploratory data analysis, principal component analysis (PCA), was used. The spectrophotometric model, elaborated from the weekly analysis of infected mollusks, demonstrated differences between the spectra obtained in the 2nd and 3rd week of infection, based on PC-1 (88%) for BgBH and PC-1 (79%) for BgSu. Therefore, these results corroborate the occurrence of metabolic changes in mollusks infected by S. mansoni even before the cercariae shedding, the 2nd and 3rd weeks being the period of differentiation of the cercariae in the digestive gland and their release into the hemolymph. Thus, near-infrared spectroscopy (NIRs) stands out as an innovative, fast, and non-destructive tool, with potential applicability for the diagnosis of schistosomiasis in the prepatent period of infection, allowing for the detection of S. mansoni infection even before the mollusks start the cercariae shedding period (patent period). NIRS is therefore a promising technique for optimising diagnostic measures and controlling schistosomiasis transmission in Brazil.

KEYWORDS

Schistosomiasis; Near Infrared Spectroscopy; Freshwater Snails; Biomphalaria

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