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TITLE

GRANULOMETRIC APPROACH TO CHARACTERIZE FECAL SEDIMENT SPREADING ONTO MICROSCOPE SLIDES FOR DETECTION OF SCHISTOSOMA MANSONI EGGS BY HELMINTEX METHOD

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ABSTRACT

In the current context, where there is a low presence of parasites due to repeated schistosomiasis treatments, it becomes important to study methods with higher sensitivity for detecting eggs in feces. This research is part of efforts to improve Helmintex (HTX), a highly sensitive method mainly proposed as “reference method”. HTX involves several sieving steps and a unique feature—magnetic properties of S. mansoni eggs and their isolation in a magnetic field. Granulometry is a well-established procedure for analyzing soil sediments in geology and has also been used in studies of digestive physiology in animals. We used granulometry to analyze the spatial distribution of debris obtained from the feces of different individuals, who underwent different sequences of filtering procedures. Human feces were processed using sieves with openings of 500, 150, and 45 micrometers. For slide preparation, 10 µL of the debris obtained from each sieve, 70 µL of 0.9% saline solution, and 20 µL of 5% Tween 20 were used. Fresh preparations were examined under a photomicroscope. Ten random images were captured and analyzed using ImageJ software to count the number of granules and measure the size of all fragments in pixels. The fragments were categorized based on their size into six groups: A) 0-200 px, B) 201-400 px, C) 401-600 px, D) 601-800 px, E) 801-1000 px, and F) >1000 px for further analysis. We observed that the highest number of granules was found in category A across all sieves, followed by a consecutive decrease in the number of granules in the subsequent categories, except for category F, where an increase in granules was observed compared to category E. This may suggest a hypothesis of particle aggregation after sieving. An ANOVA test ($p \leq 0.05$) was performed to compare the categories, demonstrating a significant difference between the mean values of the categories, which indicates variation in the distribution of particles retained by the sieves. The confirmed extreme complexity of fecal sediments poses a challenge for standardization, but preliminary results suggest that there may be windows in the distribution analysis that can provide better characterization of the sieving procedures as part of coproparasitological examinations. We anticipate that this improvement will positively impact not only egg detection methods but also DNA or antigen detection methods in feces. Diagnosis is one of the pillars for the successful control of schistosomiasis and other intestinal parasitic infections.

KEYWORDS

Schistosoma mansoni; Helmintex; fecal debris; granulometry

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