

Editorial

Characterization of *Spirometra* Species and Seroprevalence of Sparganosis in Humans Intanzania

Nicholas J. Kavana*

Department of Parasitology and Entomology, St. Francis University College of Health and Allied Sciences, Ifakara, Tanzania

*Corresponding author

Nicholas J. Kavana, Department of Parasitology and Entomology, St. Francis University College of Health and Allied Sciences, Ifakara, Tanzania, Email: nkavana@yahoo.com

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EDITORIAL

Spirometra is a pseudophyllidean tapeworm of Canidae and Felidae [1] with worldwide distribution. This cestode is of medical importance as its larvae, the plerocercoid can infect humans causing sparganosis. Sparganosis is endemic in many countries with the majority of cases reported from Southeast Asia, China, Japan and Eastern Africa [2-6] The life-cycle of *Spirometra* sp. is dependent of two types of intermediate hosts. The first intermediate host is a *Cyclops* in which the proceroids are found and the second intermediate host comprises of frogs, snakes, birds and mammals in which the spargana is found. The definitive hosts are canidae and felidae in which the adult worm develops while human is accidental host. Man becomes infected by three possible routes. The first route is through drinking unboiled water contaminated with infected *Cyclops*. Second route is the ingestion of raw, undercooked or uncooked meat of second intermediate hosts such as frogs, snakes and mammals. A third route is through practice of applying raw frog flesh as a poultice on open wounds or sore eyes. In humans, the larvae migrate to various visceral organs and subcutaneous tissues and fatality when the brain is involved. There are three species of *Spirometra* which are of medical importance: (i) *Spirometra mansonioides* (ii) *Spirometra erinacei* and (iii) *Spirometra proliferum*.

In Tanzania the parasite was first reported by Schmid [2] who recovered spargana from a Maasai in the Masailand. Opuni [7] recovered spargana from the warthog. He reported that *Spirometra* species present in Tanzania was *Spirometra theileri*. [8] reported *Spirometra theileri* in lions of Serengeti National Park and Ngorongoro Crater basing on the eggs collected from their faeces and Kavana [9] recovered *Spirometra* eggs from faeces of lions of Tarangire National Park and faeces of naturally infected dogs from Minjingu village bordering with Tarangire National Park. The parasite was characterized by using traditional parasitological methods and molecular biology techniques and determined seroprevalence of spargana antibodies, knowledge, attitudes and practices on sparganosis infection among humans in selected districts of Manyara and Arusha Regions, Tanzania. The investigation was conducted through targeted experimental life-cycle, molecular biology, serology and questionnaire survey.

Eggs were cultured by modified Harada-Mori method [10-12] Hatched coracidia were experimentally fed to *Cyclops* to develop to proceroid. Infected *Cyclops* were orally fed to mice, rat, guinea pigs, New Zealand rabbit, pig and goat to develop to plerocercoids. The adult worm recovered from naturally infected dog from Minjingu village was used for morphological description after staining with Carmine. Polymerase Chain Reaction (PCR), DNA sequencing and phylogeny were used for identification and genetic characterization of the worm. A total of 216 serum samples obtained from normal inhabitants of Babati and Monduli districts were tested by enzyme-linked immunosorbent assay (ELISA) for anti *Spirometra* plerocercoid IgG. Questionnaire was used to collect information on knowledge, attitude and practices for sparganosis among inhabitants from the two selected districts.

Coracidia hatched out of *Spirometra* eggs developed to proceroid in *Cyclops*. Plerocercoid was not obtained in both naturally and experimentally infected animals. Identification of Tanzanian *Spirometra* spp. using morphological studies and molecular techniques confirmed to be *Spirometra erinacei*. Serum samples revealed 62.5% (n =135) positive anti *Spirometra* plerocercoid IgG. All (100%) participants (n = 345) had no knowledge about sparganosis and mode of transmission of the disease. This study revealed inadequate knowledge, attitudes and practices on sparganosis among inhabitants in the two districts.

INNOVATIVE FINDINGS

(i) Wild lions and domestic dogs are definitive hosts in the life cycle of Tanzanian *Spirometra* species. Morphology and measurements of eggs recovered from faeces of naturally infected lions and dog were suggestive of *Spirometra* species.

(ii) The eggs developed after incubation at laboratory Temperature 26-29°C in presence of light and 27-30°C in darkness, hatched coracidia were oval in shape, covered with cilia on the body surface which used to swim and had hooks. Viability studies of the *Spirometra* eggs showed eggs to be viable. Survival studies of coracidia showed to be at most 54 hours of survival in water.

(iii) *Cyclops* collected from ponds in Tarangire National

Park were examined for natural infection with proceroids. The *Cyclops* were found to be infected with proceroids. Experimental infection of *Cyclops* with coracidia was carried out in the laboratory. Coracidia developed to proceroid in the body cavity of *Cyclops*. This indicated that *Cyclops* in Tarangire National Park are used as first intermediate host of the *Spirometra* species.

(iv) Determination of second intermediate host in which various animals mice, guinea pigs, rats, New Zealand rabbit, goat and pig were experimentally infected with *Cyclops* infected with proceroids. The plerocercoids were not recovered from these animals. Determination of plerocercoid from naturally infected wild animals as second intermediate host was carried out. A few animals, rats and birds from around Tarangire National Park were killed and searched for plerocercoids. All were free from plerocercoids.

(v) Adult worm was recovered from small intestine of a naturally infected domestic dog from Minjingu village bordering Tarangire National Park. Morphological data and measurements of the whole worm were taken. To study the internal sexual organs some proglottids were stained with Carmine. The uterus showed to be centrally located, spiral with male genital opening. However, uterine and vaginal openings were not clearly seen. To determine the species of *Spirometra* which exist in Tanzania, molecular biology studies of the adult worm was carried out. PCR and sequencing revealed to be *Spirometra erinaceieuropaei*. The species of *Spirometra* in Tanzania is now characterized.

(vi) The reconstructed phylogenetic tree using 11 representative nucleotide sequences displayed close genetic relatedness to *Spirometra erinaceieuropaei*.

(vii) Seroprevalence for spargana antibodies among inhabitants in two districts of Babati and Monduli was determined. The results showed (62.5%) positive reactions with adult worm antigen. This shows that some inhabitants in the two districts of Babati and Monduli are infected with spargana.

(viii) Questionnaire survey was conducted among the inhabitants in two districts of Babati and Monduli. The aim was to determine the knowledge, attitudes, practice related to sparganosis. The study showed that inhabitants in the two districts of Babati and Monduli have no knowledge on sparganosis, the mode of transmission of the disease is not known to them. They have no knowledge of risk of drinking unsafe water and eating of game meat which is not inspected by the authorized meat inspectors.

RECOMMENDATIONS

(i) The communities surrounding the national parks are advised to boil water and use clean clothes to filter water for drinking to avoid ingesting *Cyclops* infected with proceroids which can be the source of infection.

(ii) The Government is advised to provide clean and safe water to the communities surrounding the national parks.

(iii) The communities surrounding the national parks are advised to cook properly game meat to avoid eating meat contaminated with plerocercoids which can be the source of infection

(iv) Health education regarding sparganosis infection is needed to the communities surrounding the national parks.

(v) There is a need for research to be carried out in order to establish the second intermediate host.

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