

## STRONGYLOIDIASIS: A DREADED YET A NEGLECTED HELMINTHIC INFECTION

## Clinical Microbiology

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| <b>Dr Alisha Acharya</b>            | Senior Resident, Department of Microbiology, Calcutta School of Tropical Medicine, Kolkata.                                |
| <b>Dr Tapas Kumar Bhattacharyya</b> | Associate Professor, JIS School of Medical Science and Research.                                                           |
| <b>Dr Shubhra Chattopadhyay</b>     | Senior Resident, Department of Microbiology, Rampurhat Govt Medical College.                                               |
| <b>Dr Abhishek Sengupta*</b>        | Assistant Professor, Department of Microbiology, Calcutta School of Tropical Medicine, Kolkata *Corresponding Author       |
| <b>Prof Dr Tapashi Ghosh</b>        | Professor & Unit-in-Charge, Helminthology Unit, Department of Microbiology, Calcutta School of Tropical Medicine, Kolkata. |

## ABSTRACT

**Context:** Distinctive characteristics of intestinal *Strongyloides* infection are its ability to persist within hosts for decades and its potential to cause life-threatening infections in immunocompromised hosts, thereby prompting a careful analysis of such cases. **Aims:** Analysis of trend of *Strongyloides stercoralis* infection among patients in stool samples by standard protocol. Settings and Design: A hospital based retrospective cross-sectional study was conducted at Calcutta School of Tropical Medicine, Kolkata, from January 2012 to June 2022. **Methods and Material:** Stool samples received in the aforesaid centre were examined by standard protocol and data were analyzed. **Results:** Out of 5678 samples received, 151 (2.66%) were found to be positive for larvae of *Strongyloides*, among which 57 (37.7%) cases belonged to immunocompromised hosts. **Conclusions:** Strongyloidiasis is a major global health challenge that is underestimated in many countries. A careful analysis of such infections is needed for prevention and treatment of such.

## KEYWORDS

*Strongyloides stercoralis* infection, immunosuppressed hosts

## INTRODUCTION

Calcutta School of Tropical Medicine, Kolkata (CSTM) being the centre of excellence for HIV diagnosis and treatment there are many patients attending the Out-patient department (OPD) on a daily basis. Patients presenting with diarrhea or other clinical features are routinely investigated for Ova, Parasite and Cyst (OPC) from their stool specimen by formol – ether concentration method. Cryptosporidium, Cystoisospora, Entamoeba histolytica, and *Strongyloides stercoralis* are found to be the common enteric parasites present in the immunocompromised patients.

Strongyloidiasis is a disease caused by a nematode, or a roundworm, in the genus *Strongyloides*. *Strongyloides stercoralis* is the primary species which accounts for human disease. The other species, *Strongyloides fuelleborni*, is found sporadically in Africa and Papua New Guinea. [1–3]. It is a soil – transmitted helminth which is mainly diffused in tropical and subtropical regions, but can also be present in small areas of low endemicity in temperate climates [4].

Strongyloidiasis affects anywhere from 30 to 100 million people worldwide and is endemic in Southeast Asia, Latin America, sub-Saharan Africa, and parts of the southeastern United States [2–6]. In India, maximum cases have been reported from Delhi (21.6%), but it was a retrospective study from a single tertiary level referral center where patients from all over the country are referred spanning over a period of 15 years followed from Assam (10.2%). [7]

Strongyloidiasis, endemic in tropical and sub-tropical countries areas, may be asymptomatic in immunocompetent persons, but may cause persistent life-threatening infections in immunocompromised patients. Most infected individuals are asymptomatic or may present with intermittent symptoms, mostly affecting intestines ranging from mild abdominal pain to intermittent or persistent diarrhea to more severe conditions which can affect the bowel, lungs (cough, wheezing and asthma, chronic bronchitis) and skin (pruritus, rash). Systemic symptoms such as weight loss and cachexia can also occur. [8]. The high risk group includes the patients with altered cellular immunity, especially those receiving long-term steroid therapy; patients with lymphoma; kidney allograft recipients; travelers to areas of endemicity; and prisoners and other institutionalized people [1, 2, 6, 9–13].

The unique life cycle of *S.stercoralis* determines the clinical presentations in infected individuals. The alternative pathways between and within the host and the environment encompass both free-living and parasitic stages. Adult female worms nested in the small intestine, most commonly in the duodenum in humans, lay eggs in the mucosa that hatch into rhabditiform larvae, which are shed in the stool, followed by molting twice and then developing into infective 3rd stage filariform larvae (L3), which then infect a new host by penetrating intact skin. The larvae thrive in warm, moist/wet soil and walking barefoot or engaging in work involving skin contact with soil and low sanitary standards are risk factors for infection. [16–18].

The risk factors for the acquisition of the infection are linked to exposure to a combination of 3 elements: 1) soil contamination with human feces 2) environmental conditions that allow survival and 3) contact of human skin with contaminated soil.

Early diagnosis is life saving and should be done which mostly relies on microscopy, ELISA and rapid tests such as antigen detection by immunochromatographic test (ICT); but the sensitivity and specificity varies with different methods and different kits being used. Repeated examinations of stool specimens improve the chances of finding parasites; in some studies, diagnostic sensitivity increases to 50% with 3 stool examinations and can approach 100% if 7 serial stool samples are examined [14, 15].

This study was conducted to determine the burden of *Strongyloides* intestinal parasitic infection profile over a span of 10 years in patients and to note the incidence other associated infections.

## AIM AND OBJECTIVES

Analysis of trend of *Strongyloides stercoralis* infection among patients in stool sample by standard protocol and distribution of monoinfections and concurrent infections amongst them.

## MATERIAL AND METHODS

A hospital based retrospective cross-sectional study was conducted at Helminthology Unit, CSTM, Kolkata, West Bengal, for a study period ranging over ten years from January 2012 to June 2022.

All the stool specimens from suspected cases were collected in grease

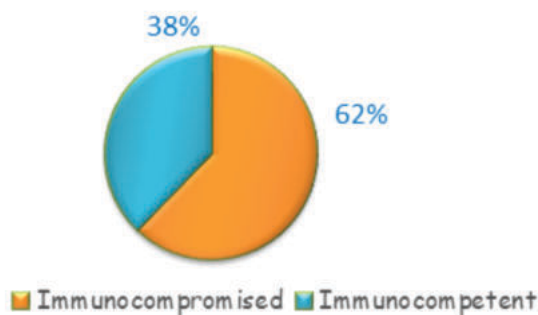
free, dry, wide mouth, screw cap and flat bottom were received at Helminthology Unit. The samples were processed by saline and iodine wet mount examination followed by examination by formol-ether concentration technique. Observations were noted.

For our study, cases presenting with diarrhea and diagnosed in the laboratory with larvae of *Strongyloides* spp. in stool samples within the above-mentioned study time frame were included in the study. This was followed data analysis.

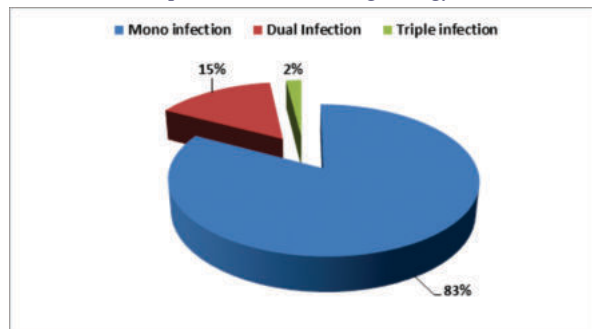
## RESULTS

Out of 5678 samples received, 151 (2.66%) were found to be positive for larvae of *Strongyloides*. 94 (62.2%) and 57 (37.7%) cases belonged to immunocompetent and immunocompromised category respectively (Figure :-1). Males (77%) were affected more than females (23%) and the maximum number of cases were seen in age group of 31 to 40 years (37%) followed by 41 to 50 years (23.8%).

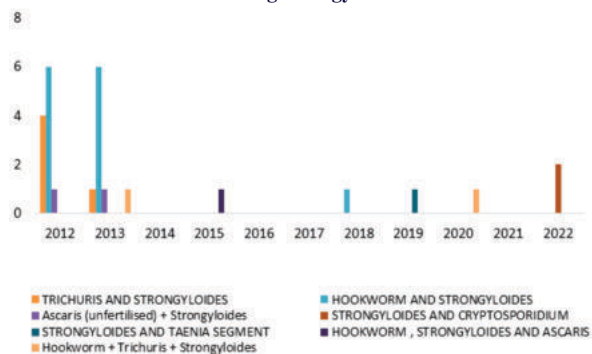
The number of patients having mono-infection, dual-infection and triple-infection were 125 (83%), 23 (15%) and 3 (2%) respectively. (Figure :-2 ) Dual infections of *Strongyloides* were seen with Hookworm (13/151 ), *Trichuris trichiura* (5/151), *Ascaris lumbricoides* (2/151), *Cryptosporidium* spp. (2/151) and *Taenia* (1/151) while triple infections were seen with *Trichuris trichiura* + Hookworm (2/151) and *Ascaris lumbricoides* + Hookworm (1/151). (Figure :-3 ). Trend analysis shows that there has been a decline in the number of *Strongyloides* cases over the last 10 years (Figure :-4).



**Figure 1: - Pie Chart Showing Distribution Of Immunocompetent And Immunocompromised Cases Among Strongyloides Infection**



**Figure 2: - Pie Chart Showing Distribution Of Mono-infection And Concurrent Infections Among Strongyloides Cases**



**Figure 3: - Bar Diagram Showing Distribution Of Concurrent Infections**



**Figure 4: - Trend Analysis Of Year Wise Distribution Among Strongyloides Cases From 2012 - 2022**

## DISCUSSION

*Strongyloidiasis* is a major global health challenge that is underestimated in many countries. It remains an important helminthic disease due to increase in travel, migration from non-endemic to endemic countries, autoinfection and risk of hyperinfection syndrome in immunocompromised patients. Novel diagnostic methods are expected to improve epidemiological studies and control efforts for prevention and treatment of *strongyloidiasis*.

Meanwhile, clinicians need to recognize the risk factors associated with *Strongyloides* infection and screen patients from endemic areas prior to receiving corticosteroid therapy or organ transplantation. It is also essential to note that prevention efforts in endemic countries such as health education campaigns on the disease, proper sanitation through appropriate disposal of fecal material, regular de-worming and the use of protective footwear are achievable goals for reducing the prevalence of *strongyloidiasis*.

On a promising note, we have observed in our study a declining trend of *Strongyloides* infection especially thereby stressing on an increased awareness among clinicians, prompt laboratory diagnosis from the laboratories and successful practice of lifestyle modification by the susceptible population.

## CONCLUSION

Diagnosis of *Strongyloides stercoralis* is often delayed owing to patients presenting with nonspecific gastrointestinal complaints, a low parasite load and irregular larval output. The difficulty in diagnosis and irregular excretion of larvae leads to underreporting of cases. Hence an enhanced and integrated approach is required for prompt diagnosis and treatment of such life-threatening cases.

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