Introduction

Strongyloides stercoralis, a soil transmitted helminth, occurs worldwide. Clinical manifestations range from asymptomatic eosinophilia in the immunocompetent host to disseminated disease and septic shock in immunocompromised host. It is endemic in rural areas of tropical and subtropical regions. It also occurs sporadically in temperate areas (Appalachia and southern Europe). In developed nations such as United States, the highest rates of infection are among residents of the southeastern states. While from India, there are few scattered case studies, which have reported localized involvement to disseminated strongyloidiasis. Most of these patients undergo many radiological investigations before a diagnosis of strongyloidiasis is made. A very few case series describing the clinical manifestations, therapy, and outcome are available from India. We herein report two cases from our institute and review those reported in the Indian literature to provide the descriptive data on the epidemiology, clinical features, therapeutic regimen practiced, and outcome of the disease.

Case 1

A 62-years-old Indian woman hailing from Rishikesh housewife by occupation living in crowded settings, presented to emergency with complaints of recurrent vomiting for last 7 months. Frequency of vomiting increased gradually from 2–3 episodes per day to 10–12 episodes during the course of illness hampering her daily life. Her general hygiene was very poor. On blood investigations, her counts were within normal limits, but there was marked eosinophilia. Ultrasound abdomen was normal. Contrast enhanced computed tomography (CECT) of abdomen showed jejunal wall thickening, intramural gas, and multiple hypodense lesions in mesenteric fat suggestive of bowel perforation. Peritoneal washings, jejunal aspirate, and duodenal aspirate were sent for stool examination. S. stercoralis eggs were reported in the stool examination. She was started on albendazole 400 mg bi-daily for 6 days, and then dose was increased to 400 mg daily for next 12 days. The patient was discharged after 21 days. She did not have any gastrointestinal symptoms while on follow-up visits at 1-month intervals for 2 years. She was also prescribed probiotics to improve her gastrointestinal motility.

Conflict of interest

None.

References

1. Paul M, Meena S, Gupta P, Jha S, Rekha US, Kumar VP. Clinico-epidemiological spectrum of strongyloidiasis in India: Review of 166 cases. J Family Med Prim Care 2020;9:485-91.

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was no eosinophilia. Ultrasonography (USG) abdomen revealed ill-defined circumferential hypo-echoic wall thickening of pylorus causing luminal narrowing with dilated proximal stomach. No improvement in patient’s condition was observed after initial conservative management. Upper gastrointestinal endoscopy was done which showed antrum mucosal atrophy with edematous mucosa in pylorus and duodenum. Biopsy revealed normal histology. Contrast enhanced computed tomography (CECT) abdomen showed diffused symmetric circumferential wall thickening involving antrum of the stomach and duodenum with no proximal dilatation [Figure 1]. CECT thorax revealed calcified fibrothorax likely due to chronic right sided empyema. After all these investigations, stool and sputum microscopy were done. Rhabditiform larvae and adult worm of *Strongyloides stercoralis* were seen in stool wet mount [Video 1]. Rhabditiform larvae were seen in sputum wet mount [Figure 2]. After this, the patient was given one dose of ivermectin 10 mg and albendazole 400 mg. After 3 days of therapy, patient improved clinically and was discharged.

**Case 2**

A 35-year-old psoriatic female from Haridwar, on steroids admitted with complaint of abdominal pain, diarrhea, vomiting for 5 days associated with fever. Patient gave history of one episode of melena. She also had right sided pleural effusion and maculopapular rashes over abdomen. There was hepatomegaly on ultrasound abdomen. The patient condition did not improve after initial conservative management. Other routine investigations were normal. Investigations such as CECT and endoscopy were planned but could not be performed as patient could not afford them. Later, microscopy was done for the stool sample which revealed rhabditiform larvae of *Strongyloides stercoralis* [Figure 3]. Patient improved on ivermectin and albendazole treatment and was discharged after 3 days of therapy. Patient was lost to follow up.

**Methods**

**Literature search**

Literature search was done in Medline (National Library of Medicine, Bethesda, MD) and Google for the period of 2001 to December 2018 using the following terms: ‘Strongyloides India’, “Strongyloidiasis India,” “Hyperinfection syndrome India,”...
“Stercoralis India,” “Rhabditiform larvae India,” “Disseminated Strongyloidiasis India.” Only cases from English literature were reviewed. Reference lists of retrieved articles were checked to detect additional articles missed by this search strategy.

**Data analysis**

Data on demographic characteristics, geographical location, clinical presentation, and clinical manifestations along with the duration, diagnostic modality, treatment given, and outcome were noted for each case. If the information on the resident state of the patient was unavailable, the institute from where the study had been reported was considered. Cases were considered as “immunocompromised” in which an underlying disease or predisposing factor was mentioned and as “immunocompetent” in which no such predisposing condition and negative Human immunodeficiency virus (HIV) serology was mentioned. Cases were identified as having hyperinfection syndrome or disseminated strongyloidiasis as reported in studies. The data are presented as frequencies and percentages or mean and standard deviation (SD).

**Results**

**Studies and cases**

Our literature search for the period of 2001 to 2018 yielded 61 studies with 164 cases. In addition to these, two recent cases from our institute were also included. Hence, a total of 166 cases were evaluated. The maximum number of cases was reported from Delhi in 2017 and contained data collected over a period of one and half decade. Another retrospective study from Vellore spanning over 7 years reported *Strongyloides stercoralis* larvae detection in 2,309 stool samples.

**Age and gender**

The mean age at presentation was 36.37 years ± 19.50 (range 2- to 90-year old, data available for 95/166 cases). The information regarding the gender was available for 95 patients, out of whom, 70 (73.6%) were males and 25 (26.4%) were females. The male to female ratio was 2.8:1. Most of the patients infected with Strongyloidiasis were from age group of 21–40 years of age [Figure 4].

**Geographical location**

The highest number of cases was reported from Delhi (36). Out of these 36 cases, 30 cases have been reported from a tertiary level referral hospital.[14] Next in order are Assam (17), Maharashtra (17), Karnataka (16), Tamil Nadu (12), Uttar Pradesh (9), Odisha (5), Andhra Pradesh (4), Kerala (3), Jammu and Kashmir (3), Uttarakhhand (3), Rajasthan (3), Manipur (2), West Bengal, Punjab, Chandigarh, and Gujarat (1 case each) [Figure 5].

**Risk factors and underlying diseases**

Of 166 cases, 43 (data available for 78/116 cases) had a history of underlying immunosuppression in the form of HIV, steroid therapy, human Tcell-lymphotropic virus (HTLV), and malignancy. Several other underlying conditions have also been reported as shown [Figure 6]. Interestingly, few studies from different parts of India, such as Udaipur, Assam, Manipur, and Chennai, have also showed presence of *S. Stercoralis* larvae in stool samples of asymptomatic school going children of rural and tribal population. The prevalence ranged from 0.09% to 6%.[31,38,59,63]

**Duration of disease**

Duration of the symptoms ranged from as 15 days to 10 years (mean 9.5 months, data available for 64/166 cases).

**Clinical presentation**

Most common clinical presentation was acute diarrhea in 47 cases (61%, data available for 77 cases) followed by cough
and respiratory symptoms in 20 (25.9%). Other 10 cases had vague symptomatology ranging from abdominal pain, bloating, generalized weakness, and purpuric rashes.

**Diagnostic modality**

The most common diagnostic modality used was stool microscopy (115/160; 69.3%) followed by duodenal biopsy (22/98; 22.4%), sputum microscopy (12/98; 12%), and cytology (5/98; 5%) of body fluids. Other samples from which parasite was detected were cervicovaginal biopsy and gastric aspirate in occasional cases.

All the samples which detected Strongyloidiasis mostly found the larva (rhabditiform/filariform); however, eggs were also detected along with larva in stool (3), duodenal biopsy (5), and sputum (1). Adult worm was found in two cases of duodenal biopsy.

Before stool microscopy was done, 56 (33.7%) out of 166 cases had undergone investigations, such as Chest X-ray (9.6%), plain X-ray (1.8%), CECT (5.4%), endoscopy (7.2%), USG abdomen (6.6%), ECHO (0.6%), and ECG (2.4%).

**Therapeutic regimen**

Therapeutic regimen followed was available for 98 cases. Forty-two cases (42/98; 42.8%) were treated with ivermectin alone with a cure rate of 97.6% (41/42). Nine cases (9.1%) treated with combination of ivermectin and albendazole giving cure rate of 88.8% (8/9). Five cases (5.1%) treated with combination of ivermectin and thiabendazole with cure rate of 100% (5/5). Thirty-six cases (36.7%) were treated with Albendazole alone with cure rate of 100% (36/36). Combination of albendazole plus thiabendazole and thiabendazole plus mebendazole was used in one patient each, both of whom expired due to comorbid conditions.

**Outcome**

The documentation of outcome of infection was available for 102 cases. The outcome was described as cure in 90 cases. Mortality was seen in 12 cases. Mortality in disseminated strongyloidiasis was 44.4% (4/9), whereas it was 8.3% (1/12) in hyperinfection syndrome.

**Discussion**

This study gives gestalt on epidemiology, clinical manifestations, diagnostic modalities, treatment regimen, and outcome of strongyloidiasis in India.\(^{[1,3,6,15,52,66-71]}\) Following the first report in 1876 in stool sample of French soldiers with diarrhea returning home from expeditions in Indo-China region, the disease has been infrequently reported.\(^{[69]}\) This is a review on Indian studies from 2001 onward, which includes mostly case reports and retrospective studies. Few prospective studies have reported Strongyloides infection from Manipur, Assam, Udaipur, and Chennai.

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. Next highest cases were from Assam (10.2%). To the best of our knowledge this is first comprehensive review on strongyloidiasis in India [Figure 5].

Our study highlights that this disease is prevalent in close to 10 states with different weather conditions. Internationally, the existing information suggests that *S. stercoralis* infections affect between 10% and 40% of the population in many tropical and subtropical countries. Brazil and Thailand are *S. stercoralis* endemic countries where reliable and consistent data on infection is available and the infection rate is estimated to be 10.8%. European studies principally focused on refugees, immigrants and travelers to endemic countries where the adjusted prevalence is close 12.7%, whereas in the United States, it ranges from 6% to 45% depending on the population screened. In neighboring country, Nepal, it is estimated to be 5.8%. Little information is available from countries with the largest populations, namely, China and India.\(^{[72]}\) Our study tries to address that concern, but further prospective community-based cross-sectional studies with participation of family physicians are needed to quantify infection rates.

The review found the disease to be more prevalent in males 21–40 years, with an overall male to female ratio of 3:1. This is in concordance with a study from Thailand.\(^{[68]}\) Infections in children and adolescents have also been reported. The most common manifestations are waxing and waning gastrointestinal, cutaneous, or pulmonary symptoms that persist for years; others may have eosinophilia without any symptoms. Most Strongyloides infections manifest as asymptomatic peripheral blood eosinophilia that varies from 350 to 450/µL.\(^{[70]}\) In this study, most common clinical presentation was acute diarrhea. The predisposing factors are an important indication for suspecting infection with Strongyloides. The most common being HIV infection and steroid therapy followed by HTLV infection, chronic alcoholism, malignancy, immunosuppressive therapy, and chronic diarrhea, which is in concordance with data elsewhere.\(^{[73]}\)

In its typical life cycle, *Strongyloides* travels from the skin to the lungs and then to the gastrointestinal (GI) tract of its host. In hyperinfection, there is increase in number of worms migrating through different stages of standard lifecycle. While in disseminated disease there is presence of parasites out-side of the traditional life cycle (i.e. in organs other than the skin, GI tract, or lungs). Filariform larvae may enter arterial circulation and lodge in various organs such as lymph node, pericardium, pancreas, liver, kidneys, and brain.\(^{[73,74]}\) The vague clinical presentation of Strongyloidiasis delays clinical suspicion leading to hyperinfection and disseminated Strongyloidiasis. Therefore, persistent and vague gastrointestinal, cutaneous or pulmonary symptoms along with underlying predisposing conditions and prolonged duration of illness should arouse suspicion for this parasitic infection.\(^{[75]}\) In our review, mortality due to disseminated strongyloidiasis (44%) was higher as compared with hyperinfection syndrome (8.3%), which is in contrast with studies elsewhere.\(^{[76]}\) However, accurate and timely diagnosis of strongyloidiasis is essential, to prevent...
hyperinfection and disseminated Strongyloidiasis both of which have poor outcome.[77-79]

Laboratory diagnosis of strongyloidiasis involves demonstration of larvae in stool using the wet mount method. “Figures 2 and 3” Sensitivity of a single direct fecal microscopic examination is said to be less than 30% and it increases to 70% if three fecal specimens are screened.[74] The chances of finding larvae increases only after collecting and observing more than seven samples from each suspected patient; applying stool concentration techniques together with other advanced laboratory techniques. Ironically, most of these patients underwent many expensive investigations before a diagnosis of strongyloidiasis could be made mainly using stool microscopy. In our review also, 56 patients (33.7%) had undergone investigations such as chest X-ray (9.6%), plain X-ray (1.8%), CECT (5.4%), endoscopy (7.2%), USG abdomen (6.6%), ECHO (0.6%), and ECG (2.4%), although role of these investigations in determining the extent of disease cannot be undermined. Stool microscopy is a simple, rapid, and inexpensive investigation ironically done quite late in the course of disease. Larva is most detected morphological form but rarely eggs may be found in sputum sample obtained from patients with hyperinfection syndrome.[71]

Ivermectin is the treatment of choice for the condition, its efficacy is more than other drugs used to treat this condition.[8,9,79] In our study also, ivermectin was the most common treatment regimen with cure rate of 97%. Moreover, ivermectin is well tolerated and has less adverse effects than benzimidazole group of drugs.[78] However, other anthelmintic drugs like albendazole, mebendazole, and thiabendazole have also been prescribed in combination for disseminated and hyperinfection with successful cure.[74]

Prevalence in asymptomatic school going children and tribal population ranging from 0.09% to 6% highlights the importance of national deworming day conducted on February 10, initiated by Ministry of health and family welfare, Government of India, in 2015 which has covered 26.68 crore children by February 2018.[80] Moreover several villages in India are open defecation free as a result of toilet being constructed under “Swachh Bharta Abhiyan” which will further contribute to the cause.[81] In conclusion, strongyloidiasis is widely prevalent in India. Patients presenting with vague gastrointestinal symptoms, on steroid therapy, HIV infection should have their multiple stool examined for parasites. Strongyloidiasis is a highly underreported infection requiring further research with close coordination between microbiologists and family physicians.[82]

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published, and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

References
1. Schär F, Trostdorf U, Giardina F, Khieu V, Muth S, Martí H, et al. Strongyloides stercoralis: Global distribution and risk factors. PLoS Negl Trop Dis 2013;7:e2288.
2. Jourdan PM, Lamberton PHL, Fenwick A, Addiss DG. Soil-transmitted helminth infections. Lancet 2013;391:252-65.
3. Centers for Disease Control and Prevention. Notes from the field: Strongyloidiasis in a rural setting–Southeastern Kentucky, 2013. MMWR Morb Mortal Wkly Rep 2013;62:843.
4. Centers for Disease Control and Prevention. Notes from the field: Strongyloides infection among patients at a long-term care facility–Florida, 2010-2012. MMWR Morb Mortal Wkly Rep 2013;62:844.
5. Reddy PR, Thomas SM, Rajalakshmi A, Vijayan D, Raman M. A rare case of Strongyloides hyperinfection from hypogammaglobulinemia. Indian J Crit Care Med 2017;21:466-8.
6. Pradhan G, Behera P, Panigrahi MK, Bhuniya S, Mohapatra PR, Turuk J, et al. Pulmonary strongyloidiasis masquerading as exacerbation of chronic obstructive pulmonary disease. Tuberc Respir Dis (Seoul) 2016;79:307-11.
7. Gupta P, Dua R, Bhatia M, Gupta PK, Kaistha N. Eosinophilia in advanced HIV infection with hyperinfection syndrome: A case report. J Pharm Bioallied Sci 2018;10:102-5.
8. Saurabh K, Tak V, Nag VL, Bohra GK. Cardiac arrest in a case of systemic lupus erythematosus and hepatitis-B coinfection: Can Strongyloides stercoralis be the culprit? Trop Parasitol 2018;8:106-9.
9. Natrajan K, Medisetty M, Gawali R, Tambolkar A, Patel D, Thorat V, et al. Strongyloidiasis hyperinfection syndrome in an HIV-infected patient: A rare manifestation of immune reconstitution inflammatory syndrome. Case Rep Infect Dis 2018;2018:6870768.
10. Gupta V, Bhatia S, Mridha AR, Das P, Khanna N. Strongyloides stercoralis hyperinfection: An often missed but potentially fatal cause of anemia and hypoalbuminemia in leprosy patients on long-term steroid therapy. Indian J Dermatol Venereol Leprol 2017;83:381-3.
11. Gupta N, Choudhary A, Mridha BR, Kale P, Ghosh A, Verma N. Strongyloides stercoralis infection: A case series from a tertiary care centre in India. J Glob Infect Dis 2017;9:86-7.
12. Mohanty S, Samprathi M, Parija S. Reactive arthritis associated with Strongyloides stercoralis: Report of an uncommon relation. Trop Parasitol 2017;7:117-9.
13. Sukhwani KS, Bansal N, Soni M, Ramamurthy A, Gopalakrishnan R. Enterococcal meningitis in association with Strongyloides hyperinfection syndrome. Germs 2017;7:28-31.
14. Kumar SP, Mallya V. Incidental detection of Strongyloides
stercoralis in a routine cervicovaginal smear. J Cytol 2017;34:69-70.

15. Shah S, Kongre V, Kumar V, Bharadwaj R. A study of parasitic and bacterial pathogens associated with diarrhea in HIV-positive patients. Cureus 2016;8:e807.

16. Rathor N, Khillan V, Sarin SK. Strongyloides stercoralis hyperinfection in patient with autoimmune hepatitis and purpura fulminans. Indian J Crit Care Med 2016;20:52-4.

17. Mutreja D, Sivasami K, Tewari V, Nandi B, Nair GL, Patil SD. A 36-year-old man with vomiting, pain abdomen, significant weight loss, hyponatremia, and hypoglycemia. Indian J Pathol Microbiol 2015;58:500-5.

18. Panda S, Kar A, Das U, Rout N. Cervical strongyloidiasis in an immunocompetent patient: A clinical surprise. Indian J Pathol Microbiol 2015;58:389-91.

19. Ahmed NH, Chowdhary A. Pattern of co-infection by enteric pathogenic parasites among HIV sero-positive individuals in a Tertiary Care Hospital, Mumbai, India. Indian J Sex Transm Dis 2015;36:40-7.

20. Khanna V, Tilak K, Mukhopadhyay C, Khanna R. Significance of diagnosing parasitic infestation in evaluation of unexplained eosinophilia. J Clin Diagn Res 2015;9:DC22-4.

21. Shukla S, Chauhan R, Wadhwa S, Sehal S, Singh S. Strongyloides stercoralis hyperinfection causing eosinophilic ascites. Diagn Cytopathol 2015;43:731-3.

22. Nasimuddin S, Malayan J, Gnanadesikan K, Kandaswamy M. A case report of strongyloidiasis associated with giardiasis in a patient with renal calculi from a tertiary care center in South India. J Glob Infect Dis 2014;6:137.

23. Khuroo MS. Hyperinfection strongyloidiasis in renal transplant recipients. BMJ Case Rep 2014 pii:bcr2014205068. doi: 10.1136/bcr-2014-205068.

24. Praharaj I, Sujatha S, Ashwini MA, Parija SC. Co-infection with Nocardia asteroides complex and Strongyloides stercoralis in a patient with autoimmune hemolytic anemia. Infection 2014;42:211-4.

25. Janagond AB, Sasikala G, Agatha D, Ravinder T, Themozhivalli PR. Enteric parasitic infections in relation to diarrhea in HIV infected individuals with CD4 T cell counts <1000 cells/µl in Chennai, India. J Clin Diagn Res 2013;7:2160-2.

26. Shah K, Prabhakar K, Noronha V, Patur P, Desai S, Joshi A. A diagnostic dilemma in a patient with lymphoma. Indian J Med Paediatr Oncol 2013;34:114-6.

27. Khanna V, Anusha G, Hande HM, Shashidhar V, Mukhopadhyay C. Strongyloides stercoralis hyperinfection presenting as subacute intestinal obstruction. Int J Recent Sci Res 2013;2:352-3.

28. Mayekar V, Ruben I, Rekhi B. Serendipitously identified Strongyloides stercoralis in a cervicovaginal smear. J Cytol 2013;30:270-1.

29. Murthy VS, Geethamala K, Kumar BD, Rao MS. Strongyloides of duodenum clinically masquerading as gastric malignancy. Ann Trop Med Public Health 2013;6:248-50.

30. Girj A, Kannan S, Jeyakumari D, Gopal R. Hyperinfection with Strongyloides in a HIV-negative elderly male. Trop Parasitol 2012;2:64-6.

31. Choubisa SL, Jaroli VJ, Choubisa P, Mogra N. Intestinal parasitic infection in Bhil tribe of Rajasthan, India. J Parasit Dis 2012;36:143-8.

32. Dash K, Chauhan S, Tripathy R, Chakravorty S. Strongyloides stercoralis hyperinfection with features of acute intestinal obstruction in a patient operated for prolapse disc. J Cytol 2012;29:278-9.

33. Tiwari S, Rautaraya B, Tripathy KP. Hyperinfection of Strongyloides stercoralis in an immunocompetent patient. Trop Parasitol 2012;2:135-7.

34. Kalita J, Bhoi SK, Misra UK. Fatal Strongyloides stercoralis infection in a patient with chronic inflammatory demyelinating polyneuropathy. Pathog Glob Health 2012;106:249-51.

35. Parashari UC, Khanduri S, Kumar D. Radiological appearance of small bowel in severe strongyloidiasis. Rev Soc Bras Med Trop 2012;45:141.

36. Prakash G, Gupta RK, Prakhya S, Balakrishnan R. Concurrent infection of candidiasis and strongyloidiasis in an endoscopic biopsy in an immunocompetent host. Indian J Pathol Microbiol 2011;54:644-5.

37. Mundkur SC, Aroor S, Jayashree K. Disseminated strongyloidiasis in a immunocompromised host. Indian Pediatr 2011;48:974-6.

38. Devi U, Borkakoty B, Mahanta J. Strongyloidiasis in Assam, India: A community-based study. Trop Parasitol 2011;1:30-2.

39. Pukhrambam PD, Rebachandra H, Singh NB, Singh TN. Strongyloides stercoralis infection in an HIV positive patient--A case report from RMS, Imphal, Manipur. J Commun Dis 2010;42:231-4.

40. Murali A, Rajendiran G, Ranganathan K, Shanthakumari S. Disseminated infection with Strongyloides stercoralis in a diabetic patient. Indian J Med Microbiol 2010;28:407-8.

41. Choksi M, Joseph AJ, Simon E, Shah A, Ramachandran J, Ramakrishna BS. The association of HTLV-I infection, persistent intestinal infection with Strongyloides stercoralis and gastrointestinal lymphoma. BMJ Case Rep 2009;2009:bcr0720080373. doi: 10.1136/bcr.07.2008.0373.

42. Banerjee D, Deb R, Dar L, Mirdha BR, Pati SK, Thareja S, et al. High frequency of parasitic and viral stool pathogens in patients with active ulcerative colitis: Report from a tropical country. Scand J Gastroenterol 2009;44:325-31.

43. Jayaprakash B, Sandhya S, Anithakumari K. Pulmonary Strongyloidiasis. J Assoc Physicians India 2009;57:535-6.

44. Somani SK, Goyal R, Awasthi G. Duodenal mucosal nodularity in Strongyloides stercoralis infection. Trop Gastroenterol 2009;30:47-8.

45. Agarwal V, Agrawal T, Ghoshal UC. Intestinal strongyloidiasis: A diagnosis frequently missed in the tropics. Trans R Soc Trop Med Hyg 2009;103:242-6.

46. Mukhopadhyay C, Wilson G, Chawla K, Vss B, Shivananda PG. A 6 year Geohelminth infection profile of children at high altitude in Western Nepal. BMC Public Health 2008;8:98.

47. Marathe A, Date V. Strongyloides stercoralis hyperinfection in an immunocompetent patient with extreme eosinophilia. J Parasitol 2008;94:759-60.

48. Rai S, Wadhwa V, Kharbanda P, Uppal B. A case of poly-parasitism involving a trematode and four different nematodes in a migrant from Bihar. Indian J Med Microbiol 2007;25:62-3.

49. Ghosh K, Ghosh K. Strongyloides stercoralis septicemia following steroid therapy for eosinophilia: Report of three cases. Trans R Soc Trop Med Hyg 2007;101:1163-5.

50. Jeyamani R, Joseph AJ, Chacko A. Severe and treatment resistantstrongyloidiasis--indicator of HTLV-I infection. Trop Gastroenterol 2007;28:176-7.
