

A Case Report of Multiple Parasitic Infestations with Shigellosis

Ostwal K, Pathak S and Shaikh N

Department of Microbiology, Dr. Vaishampayan memorial Government Medical College Solapur-413003 Maharashtra, India

*Corresponding author: Karan Ostwal, Assistant professor, Department of Microbiology, Dr. Vaishampayan Memorial Government Medical College, Solapur - 413003, Maharashtra, India, Tel: +91 8862079170; E-mail: karanost55@gmail.com

Received date: June 03, 2015; Accepted date: August 11 2015; Published date: August 14, 2015

Copyright: © 2015 Ostwal et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Enteroparasites are worldwide in distribution and enteroparasitic infections are usually seen in conditions with lowered immune response like malignancy, malnutrition, HIV infection, pregnancy, etc. In this report, we are discussing a case of a seven year old boy, having quadriplegic spastic cerebral palsy with mental retardation who was admitted in Paediatric inpatient department of our hospital, with chief complaints of acute abdomen, loose stools and not accepting feeds. Routine stool examination showed rhabditiform larvae of *Strongyloides stercoralis* along with trophozoites of *Giardia lamblia*, cysts of *Entamoeba histolytica* and eggs of *Trichuris trichiura*. The soil transmitted threadworm, *Strongyloides stercoralis* is one of the most neglected among the so-called neglected tropical diseases. *Giardia lamblia* is considered to be the most common human protozoan enteropathogen worldwide. *E. histolytica* is a leading cause of mortality and morbidity in developing countries. While *Trichuris trichiura* is a common intestinal parasite of humans, primarily affecting caecum and appendix. On aerobic culture, non-lactose fermenting colonies of *Shigella dysenteriae* type1 were isolated. Patient was started on Albendazole therapy, to which he responded well. This study reflects the importance of taking into consideration the possibility of such neglected parasitic infections, in order that their underreporting can be brought into check.

Keywords: *Strongyloides stercoralis*; *Giardia lamblia*; *Entamoeba histolytica*; *Trichuris trichiura*; *Shigella dysenteriae*

Introduction

Enteroparasites are widely distributed around the world, and infection usually varies according to region and age [1,2]. Conditions resulting into lowering of immune response like immunosuppressive therapy, HIV infection, malnutrition, pregnancy, etc., act as predisposing factors [3,4].

Strongyloides stercoralis, is a nematode endemic in tropics and subtropics, mainly in hot and humid climates [2,3]. It is more frequently seen in closed, low socio-economic communities with poor sanitation [2,3].

S. stercoralis is unique in its ability to replicate in the human host permitting ongoing cycles of autoinfection. *Strongyloidiasis* can consequently persist for decades without further exposure to exogenous infection. Chronic *S. stercoralis* infections can be asymptomatic or cause cutaneous, gastrointestinal and/or pulmonary symptoms [3]. Autoinfection can go unchecked and large numbers of invasive larvae may disseminate widely and cause hyperinfection, which can be fatal [3].

Giardia lamblia is the only intestinal flagellate which causes endemic and epidemic diarrhoea in humans [5]. It is well documented that in developing countries, infections are associated with poor sanitary conditions, poor water quality and overcrowding [6].

In developing countries, there is a very high prevalence and incidence of infection and data suggest that long-term growth retardation can result from chronic giardiasis [7].

Entamoeba histolytica is the third leading parasitic cause of death in the developing countries, infecting more than 10% of world's

population [5]. It is endemic in India and affects all age groups. Humans are affected through food and water contaminated with the cysts of *E. histolytica* due to feces, flies or unwashed hands of food handlers [3].

T. trichiura causes worldwide parasitic infection most prevalent in tropical and subtropical areas. It is the third most common roundworm parasite in humans [8]. It is an infection of the large intestine and is called as whipworm [9].

Shigellosis is an important cause of bloody diarrhea in all age groups, especially in children [10]. Poverty, poor sanitation, lack of personal hygiene and poor water supply are considered to be the major predisposing factors for *Shigella* infection [11]. Amongst all the *Shigella* spp., *S. dysenteriae* and *S. flexneri* are most frequently isolated in developing countries [12].

Here, we present a case report of a 7 year old boy who was admitted in our hospital with complaints suggesting gastrointestinal infection. On investigation, it revealed a rare combination of infection with multiple parasites which included *S. stercoralis*, *E. histolytica*, *G. lamblia* and *T. trichiura* along with *Shigella dysenteriae*.

Case Report

A 7 year old boy, having quadriplegic spastic cerebral palsy with mental retardation, was brought to pediatric OPD with complaints of fever, abdominal pain, loose stools and not accepting feeds since 2-3 days. There was no history of vomiting.

Patient also had similar episodes of recurrent loose stools since 2 years, for which he was admitted in private hospital.

He was admitted to paediatric inpatient department.

Grossly the stools were yellowish green, semisolid, foul smelling and with a frequency of 10-12 per day.

On examination, he was irritable, pale, lethargic and cachexic with low grade fever not associated with chills or rigor. General condition was poor. His eyes were dry and platynychia was noted. Skin pinch retracted slowly which was suggestive of severe dehydration. Pulse was 126 beats/min, respiratory rate 20/min, blood pressure 90/70 mmHg.

Anthropometrically, height was 16 cm, weight 13 kg, head circumference 45 cm, chest circumference 49 cm, mid-arm circumference 11 cm, upper segment: lower segment 54:62; all this also suggested developmental delay.

Patient was a known case of cerebral palsy with history of convulsion episodes in the past, for which patient was on anti-convulsant therapy.

On cutaneous examination, there was marked urticaria along with pruritic, raised, erythematous lesions showing a typical course of larval migration as in Figure 1.



Figure 1: Urticarial rash and erythematous lesions along a typical course of larval migration.

The stool sample of the patient was sent to microbiology department for further examination.

Microbiological workup

Grossly the stool was yellowish, semisolid and foul smelling.

On wet mount examination of stool, the following findings were noted:

Rhabditiform larvae of *S. stercoralis* (Figure 2):

- Size 200 μm \times 15 μm
- Short buccal cavity
- Double bulbed oesophagus
- A prominent genital primordium
- Anal pore from posterior end

Motile trophozoites of *Giardia intestinalis*:

- About 12 μm \times 8 μm size
- Pear shaped and bilaterally symmetrical
- Ventral disc, flagella, axostyles
- Motile with a falling leaf appearance.
- Abundant in number

Cysts of *Entamoeba histolytica*:

- Size 12 μm \times 20 μm
- Uninucleate to quadrinucleate



Figure 2: Rhabditiform larvae of *S. stercoralis* on wet mount of stool sample.

Eggs of *Trichuris trichiura*:

- Bile stained barrel-shaped eggs
- Protruding polar mucus plugs
- 50 μm \times 25 μm in size
- Unsegmented ovum

On Gram stain of the stool sample, the larvae were stained Gram negative (Figure 3).

Stool sample was further subjected to plate culture on blood agar. After incubation for 2 days, visible trails of the larvae carrying the bacteria alongwith it, were seen (Figure 4).

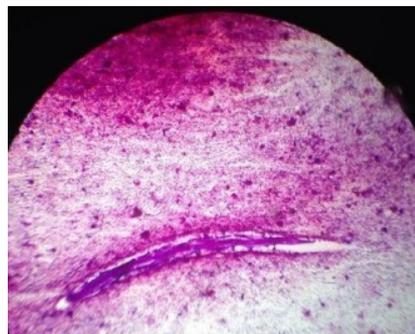


Figure 3: Gram negatively stained larva of *S. stercoralis*.

On aerobic culture, non-lactose fermenting colonies grew on MacConkey agar, which on further biochemical and motility testing gave following results:

- Non motile
- Indole not produced
- Methyl red positive
- Voges Proskauer reaction was negative
- Citrate not utilized
- Urea not hydrolysed
- On Triple sugar iron test, Alkali/Acid reaction
- Catalase negative
- Nitrate was reduced
- Mannitol not fermented
- Oxidase not produced
- Glucose fermented with no gas production
- Sucrose not fermented

- Ornithine not decarboxylated

On testing with antisera for serotyping, it was identified as *Shigella dysenteriae*. The strain was inferred to be *S. dysenteriae* type 1 based on biochemical reactions and serotyping.

Antibiotic susceptibility testing, using Kirby Bauer Disk diffusion method, was done against three drugs, i.e., Ciprofloxacin, Cotrimoxazole and Ampicillin, as mentioned in CLSI guidelines [13]. The isolate was found to be sensitive to Ciprofloxacin, while it was resistant to Ampicillin and Cotrimoxazole.

Repeat samples were collected on day 2 and day 3, after starting treatment, which showed marked decrease in larvae as well as other parasites. Also the health of the child improved after 3 days Albendazole therapy. He was further started on Metronidazole therapy for 14 days.

Other Laboratory investigations were as in Table 1.

Lab parameters	Results	Normal range
Hemoglobin	6.9 g/dL	12-16 g/dl
WBC	29120/mm ³	4000-11000
MCV	69.40 fL	80-100 fL
Platelet count	285,000/mm ³	1.5-4 lac/mm ³
HCT	22.90%	35-50%
Sr. Bilirubin	0.7 mg%	0.1
Indirect	0.2 mg%	
Direct	0.5 mg%	
Neutrophils	65%	40-70%
lymphocytes	8%	20-40%
Monocytes	3%	2-10%
Eosinophils	24%	2-6%
Basophils	0%	≤ 1%
Total proteins	6.2 g/dL	6.3-7.9%
Albumin	3.2 g/dL	3.7-5.3%
Globulin	3.0 g/dL	1.8-3.6%
Sr. Creatinine	1.4 mg/dl	0.8-1.2 mg/dl
BUN	58 mg/dl	20-40 mg/dl
Sr. Sodium	130 mEq/L	133-155 mEq/L
Sr. Potassium	3.3 mEq/L	3.5-5 mEq/L
BSL	70 mg/dl	70-110 mg/dl
SGOT	27 IU/L	5-45 IU/L
SGPT	30 IU/L	5-40 IU/L

Table 1: Laboratory parameters with normal ranges.

On complete blood count there was eosinophilic leucocytosis, hypochromia, microcytosis and anisocytosis. Ultrasonography of abdomen and pelvic scan had no significant finding.



Figure 4: Trails of larvae carrying bacterial colonies along with them, on blood agar plate culture.

Outcome

Initially when the patient was admitted he was administered inj. amikacin following microscopy report the patient was immediately shifted on albendazole 400 mg QID for 3 days and ciprofloxacin 500 mg BD for 5 days. The patient responded well to the treatment and a repeat stool sample was taken on 5th day in which there was no evidence of active parasitic infection. The general condition of the patient improved and he was finally discharged after 5 days of hospitalization.

Discussion

Strongyloidiasis is caused by 2 species of the intestinal nematode Strongyloides. The most common and globally distributed human pathogen of clinical importance is *Strongyloides stercoralis*. The other species, *Strongyloides fuelleborni*, is found sporadically in Africa and Papua New Guinea [4].

S. stercoralis was first reported in 1876 in the stools of French soldiers on duty in Vietnam who had severe diarrhea, and the disease the organism produces was known for many years as Cochin-China diarrhea [4].

Strongyloidiasis can occur in immunocompromised states such as hematologic malignancies, usage of corticosteroids or other immunosuppressive therapies, HIV infection and malnutrition [1-3]. Risk factors for *Strongyloides stercoralis* infection also include travelling to an endemic region and low socio-economic status with poor hygiene conditions [1].

In our case, patient was grossly malnourished with very poor hygiene status. This can be attributed to the mentally retarded state of the patient.

Chronic infections with *S. stercoralis* can be clinically inapparent or can lead to cutaneous, gastrointestinal, or pulmonary symptoms. Skin involvement is characterized by a migratory, serpiginous, urticarial rash, termed as larva currens [4].

The buttocks, groin, and trunk are more commonly affected by larva currens than the extremities and the head. Gastrointestinal symptoms of strongyloidiasis include diarrhoea, abdominal discomfort, nausea, and anorexia. Abdominal bloating is the most common complaint [4].

However, in a majority of uncomplicated cases of strongyloidiasis, the intestinal worm load is often very low and the output of larvae is minimal. Eosinophilia is usually the only indication to the presence of *S. stercoralis* infection [4].

In this case, patient had predominantly gastrointestinal and cutaneous symptoms. He had abdominal pain, diarrhoea, anorexia along with migratory urticarial rash over the trunk, buttocks and thighs, suggestive of larva currens. Also there was eosinophilia with anaemia.

Skin lesions, pulmonary and gastro-intestinal symptoms, and blood eosinophilia are reported as unspecific disease markers [14].

The most commonly used conventional parasitological methods for detection of *S. stercoralis* include: Lugol iodine stain, Baermann concentration, formalin-ethyl acetate concentration, Harada-Mori filter paper culture, and agar plate cultures [3,4]. However, agar plate culture and Baermann method are best suited [15].

Other than larvae of *S. stercoralis*, there were also cysts of *Entamoeba histolytica*, trophozoites of *Giardia lamblia* and eggs of *Trichuris trichura*; all of which suggests high grade parasitic infection. Similar kind of finding was obtained in one more study by Dinleyici et al. [1].

Giardia lamblia infection is often acquired by drinking contaminated water or by person-to-person transmission among preschool children [16]. It is the only parasitic infection implicated in influencing the nutritive condition of the child with higher *G. lamblia* infection rates in undernourished children [17,18]. In humans, *Giardia lamblia* infections have a wide clinical spectrum ranging from asymptomatic carriage to long-lasting diarrhoea with malabsorption [6].

The child here, was not only undernourished but also had a very poor sanitary living.

Trichuriasis is mostly observed in the age group of 2-7 years, where incidence of pica is highest [9]. People living under poor hygienic conditions are at greater risk of developing trichuriasis-including institutionalized or mentally retarded persons and children of the primary school age. In more than half the cases of severe trichuriasis, there is a history of ingestion of non-food substances such as soil and wood [8]. Also hot and moist climate favor the worms survival [9].

It is usually clinically asymptomatic. However, heavy infection, especially in small children, can cause gastrointestinal symptoms, such as abdominal pain, diarrhoea, nausea, vomiting, anorexia, constipation and chronic appendiceal syndrome [8].

In this case, the child was noted to have the habit of eating soil, as indicated by attendant. This can be correlated to his age as well as the mentally retarded condition.

Of all serotypes of Shigellae, *Shigella dysenteriae* type 1 attracts special attention for its epidemic-causing potential and also for its association with most serious dysentery cases, with a high attack rate, high case-fatality rate, and various complications [10].

Though bloody diarrhea is a common presentation in *Shigella* infection, it was not present in our case. Such a finding was also noted in another study, where watery diarrhea has been noted as a more common presentation than bloody diarrhea in cases of *Shigella* infection [12].

Oral rehydration is the principal means of management, because of the enteroinvasiveness antibacterial treatment may be necessary. While most of recent studies have reported multiple drug resistance in *Shigella* spp., it was not so in our case. One of the studies has noted highest resistance to Cotrimoxazole followed by Ampicillin [12]. Another study by Datta S et al. shows multidrug resistance in *S. dysenteriae* type 1 isolates to at least 7 drugs, which included Ampicillin, Fluoroquinolones and Cotrimoxazole with hundred percent resistance.

According to Huang et al., *S. dysenteriae* is most frequently resistant to Ampicillin [12]. This was also noted in our case; the isolate was resistant to Ampicillin and Cotrimoxazole while it was sensitive to Ciprofloxacin.

Because it is imperative to examine multiple stool samples to make a correct diagnosis according to Siddiqui and Berk, stool sample was collected for 3 consecutive days and diagnosis was confirmed [4]. But the parasitic load was reduced on each day since patient was started on therapy.

Many immunodiagnostic assays are available for detection of *S. stercoralis* infection. But they are not routinely used because of limited success. These include skin testing with larval extracts, indirect immunofluorescence analysis of fixed larvae, radio allegro sorbent testing for specific IgE, and gelatin particle agglutination. An ELISA test (Strongyloides antibody) for detecting the serum IgG against a crude extract of the filariform larvae of *S. stercoralis* is available only at specialized centers [4]. Also serological tests are available for diagnosis of Giardia like ELISA, indirect immunofluorescence and for *Entamoeba histolytica* such as PCR, indirect hemagglutination and counter immuno electrophoresis. These were not done because of their non-availability.

Conclusion

Strongyloidiasis is becoming a major global health challenge that is underreported in many countries since it is not readily visible on routine procedures. It is also essential to implement prevention efforts in endemic countries such as health education campaigns on the disease, proper sanitation through appropriate disposal of faecal material, regular de-worming and the use of protective footwear. Also habits like eating soil or pica should be discouraged. Periodic deworming of mentally retarded patients should be done so as to avoid further complications.

References

1. Dinleyici EC, Dogan N, Ucar B, Ilhan H (2003) Strongyloidiasis associated with amoebiasis and giardiasis in an immunocompetant boy presented with acute abdomen. Korean J Parasitol 41: 239-242.
2. Karyakarte R, Damle A (2012) Medical Parasitology (3rdedn.) Books and Allied (p) Ltd, Kolkata.
3. Montes M, Sawhey C, Barros N (2010) Strongyloides stercoralis: there but not seen. Curr Opin Infect Dis 23: 500-504.
4. Siddiqui AA, Berk SL (2001) Diagnosis of Strongyloides stercoralis infection. Clin Infect Dis 33: 1040-1047.
5. Parija SC (2013) Textbook of Medical Parasitology: Protozoology and Helminthology (4thedn.) All India Publishers and Distributors, New Delhi.
6. Espelage W, Heiden M, Stark K, Alpers K (2010) Characteristics and risk factors for symptomatic Giardia infection in Germany. BMC public health 10: 41.

7. Adam RD (2001) Biology of *Giardia lamblia*. *Clin Microbiol Rev* 14: 447-475.
8. Huang N, Fang H, Chou K, Chung H (2003) *Trichuris trichiura*: an unusual cause of chronic diarrhoea in a renal transplant patient. *Nephrol Dial Transplant* 18: 2434-2435.
9. Nimir AR, Aziz MS, Tan GC, Shaker AR (2009) Massive lower gastrointestinal bleeding attributable to heavy whipworm infection and *Salmonella typhi* coinfection: a case report. *Cases Journal* 2: 82-85.
10. Dutta S, Dutta D, Dutta P, Matsushita S, Bhattacharya SK, et al. (2003) *Shigella dysenteriae* serotype 1, Kolkata, India. *Emerging Infectious Diseases* 9: 1471-1474.
11. Srinivasa H, Baijayanti M, Raksha Y (2009) Magnitude of drug resistant shigellosis: A report from Bangalore. *Ind J Med Microbiol* 27: 358-360.
12. Wu CH, Huang LT, Huang IF, Liu JW, Chen JB, et al. (2009) Acute non-outbreak Shigellosis: Ten years experience in Southern Taiwan. *Chang Gang Med Journal* 32: 59-64.
13. Clinical and Laboratory Standards Institute (2012) Performance Standards for Anti-microbial Susceptibility testing; Twenty third informational supplement, M100-S23.
14. Salim N, Schindler T, Abdul U, Rothen J, Genton B, et al. (2014) Enterobiasis and Strongyloidiasis and associated coinfections and morbidity markers in infants, preschool- and school aged children from rural coastal Tanzania: a cross sectional study. *BMC Infect Dis* 14: 644.
15. Campo PL, Gutiérrez LA, Cardona AJ (2014) Diagnosis of *Strongyloides stercoralis* infection. Meta-analysis on evaluation of conventional methods Parasitological (1980-2013). *Rev Esp Salud Publica* 88: 581-600.
16. Porter J, Gaffney C, Heymann D, Parkin W (1990) Food borne outbreak of *Giardia lamblia*. *Am J Public Health* 80: 1259-1260.
17. Duran C, Hidalgo G, Aguilera W, Rodriguez-Morales AJ, Albano C, et al. (2010) *Giardia lamblia* infection is associated with lower body mass index values. *J Infect Dev Ctries* 4: 417-418.
18. Sharifdini M, Kia E, Ashrafi K, Hosseini M, Mirhendi H, et al. (2014) An analysis of clinical characteristics of *Strongyloides stercoralis* in 70 indigenous patients in Iran. *Iran J Parasitol* 9: 155-162.