

Full Length Research Paper

## First case of confirmed isosporiasis in an immunocompetent child at a private clinic of Abidjan, Ivory Coast: Case Report

N'da Angbeletchi David AKA<sup>1</sup>, Kalou Dibert ZIKA<sup>2</sup>, Gonat Serge Pacôme DOU<sup>1</sup>, Fatoumata COULIBALY<sup>3</sup>, Mocket Adolphe EHOUMAN<sup>4</sup>, Ibrahima KONE<sup>5</sup> and Koffi Daho ADOUBRYN<sup>6</sup>

<sup>1</sup>University Félix Houphouët-Boigny of Abidjan, 01 BP V34 Abidjan, Cocody. <sup>2</sup>Université Alassane Ouattara, BP V18 Bouaké. <sup>3</sup>Université Pelero Gon Coulibaly, BP 1328, Korhogo. <sup>4</sup>Olopam Pharma and Research & Development, 10 B.P 1274 Abidjan. <sup>5</sup>Groupe Médical et de Consulting BOZOUMA, 01 BP 6648 Abidjan. <sup>6</sup>Université Alassane Ouattara, BP V18 Bouaké.

### Abstract

Accepted 11 January, 2021

Isosporiasis is a parasitic disease caused by *Isospora belli*. Human infection occurs by the ingestion of sporulated oocysts found either in contaminated water, food, or on the hands. We reported here a case of isosporiasis accidentally discovered in a 2-years-old child a day before leaving the hospital for pneumonia. The child had a diarrhoeal episode. *Isospora belli* oocysts were discovered in his stool samples after microscopic examination. The antibiotic restored the clinical condition of the child after 10 days. The diagnosis of Isosporiasis should be considered in children with digestive disorders in a context of malnutrition or immunocompromised in our settings.

**Keywords:** Isosporiasis, Cystoisosporiasis, *Isospora belli*, Immuno-competent Child, Malnutrition, Ivory Coast, Côte d'Ivoire, Africa.

### INTRODUCTION

Isosporiasis is a coccidiosis that is widely spread across the world and most predominantly in the tropical areas. In humans, the species *Isospora belli* and *Isospora natalensis* have been reported to be responsible for the observed clinical morbidity (Curry and Smith, 1998). Unfortunately, estimated number of people at risk

or infected are unclear.

*Isospora belli* was first discovered by Virchow in 1860 (Eberhard and Arrowood, 2003). Its measures are about 22-33x12-15 µm in size, with round granular centres. The most common transmission route of the infectious agent is by the ingestion of contaminated food, drinking water or by hands. Indeed, in Africa, studies have made it possible to incriminate salads and fruits as vectors (Oluwasola et al., 2020; Getaneh et al., 2019; Getaneh et al., 2020). Humans are infested by ingesting the sporulated

Corresponding Author. Email: [akadavid2000@yahoo.fr](mailto:akadavid2000@yahoo.fr)  
Tel.00225 21 30 51 18, Fax: 00225 21 30 51 17

oocysts when consuming contaminated foods, water or on their hands. After ingestion of the parasites, symptoms can occur about a week in the form of a gastrointestinal disorder such as diarrhea which can be severe, even dysenteric, nausea and anorexia (Mills and Goldsmid, 1995; Brandborg et al., 1970; Alagappan, 2018). In addition, a meteorism as well as an emission of fatty stools can be seen. The frequency of stool varies between 6 to 10 daily stools, watery, foamy and smelly (Garcia et al., 1988). Isosporiasis is a parasitic disease known to be responsible for chronic diarrhea, especially in patients with compromised immunity (Myint and Can, 1993). Sexual transmission through oral contact has already been reported (Yezid, 2000).

In people affected by HIV or people with an immune deficiency especially AIDS patients or people on immunosuppressant drugs for transplantation, isosporiasis is one of the opportunistic infections that should not be overlooked, particularly in the case of the diarrheal syndrome. The clinical picture is often silent. However, it can start with a profuse diarrhea in the case of an immunosuppressed person.

We reported here a case of Isosporiasis discovered accidentally in a malnourished child.

## MATERIAL ET METHODS

A 30-months old male child originated from the village of Blapleu (7°37'60"N, 7°43'60"W) was referred by the Regional Hospital Center of Man (CHR of Man, 7°24'N, 7°33'W), West of Ivory Coast for severe anemia associated with a chronic cough evolving since two weeks ago. In his medical backgrounds, there are several episodes of diarrhea, anorexia, cough and rhinorrhea. The pregnancy was poorly monitored with only 2 antenatal consultations performed. The child's immunization is not up to date. The child was exclusively breastfed for up to 6 months and weaned at 12 months from its HIV negative mother.

After treatment with antibiotics (Amoxicillin + Clavulanic acid) for broncho-pneumopathy the child was referred to Abidjan. His parents, both villagers live in the village and are cultivators. On admission, the child was whining, refusing any food or drink. He weighed 9.4 kg (Z-score-3 SD) for 79 cm (Z-score<-1 SD). MUAC was 120 mm. The temperature was 98.9 °F. The conjunctivae and mucous membranes were very pale.

The examination showed a predominant edema in the face, the trunk and the lower limbs. The abdomen was bloated and soft. There was a slight hepatomegaly and a

grade 2 of Hackett's grading system for palpable splenomegaly. The pleuro-pulmonary system examination revealed numerous crackling rales in the 2 lungs. No other abnormalities were noticed elsewhere.

Haematological and radiological explorations were carried out. Also, a parasitological exploration based on direct examination as well as Ritchie's technic to the stools collected one day before his discharge was performed. Finally, the rapid HIV diagnostic tests called: Test Determine® by ALERE were carried out on the child, then on the father.

## RESULTS

The child blood's shown a bi-cytopenia lesion associated to a radiological appearance in favor of bilateral broncho-pneumopathy as described in table 1. HIV tests were negative. Otherwise, five oocysts of *Isospora belli* were isolated on the smear as shown in figure 1.

## TREATMENT

With regard to the treatments, the patient was transfused with a pellet of platelets cells in 30 minutes followed by an isogroup-isoRhesus AB Positive blood (80 ml for 1 hour). In addition, an antibiotic was prescribed (Ceftriaxone 700 mg/d for 10 days) associate with an imidazole drug (Metronidazole 360 mg/d for 7 days). To complete the therapeutic measures, the child received oral anti-anemic drugs (VITAFER: 1 teaspoon x2/day) and a vitamin supplement (Uvesterol 1000 UI/d for 3 months). A nutrition rehabilitation program was also added to its treatment.

## EVOLUTION

The course of the disease was marked by a reduction in the cough and the diarrhea frequencies and the clearance of the symptoms two weeks later. The patient was definitively cured from isosporiasis after a negative control of the stools one month later.

## DISCUSSION

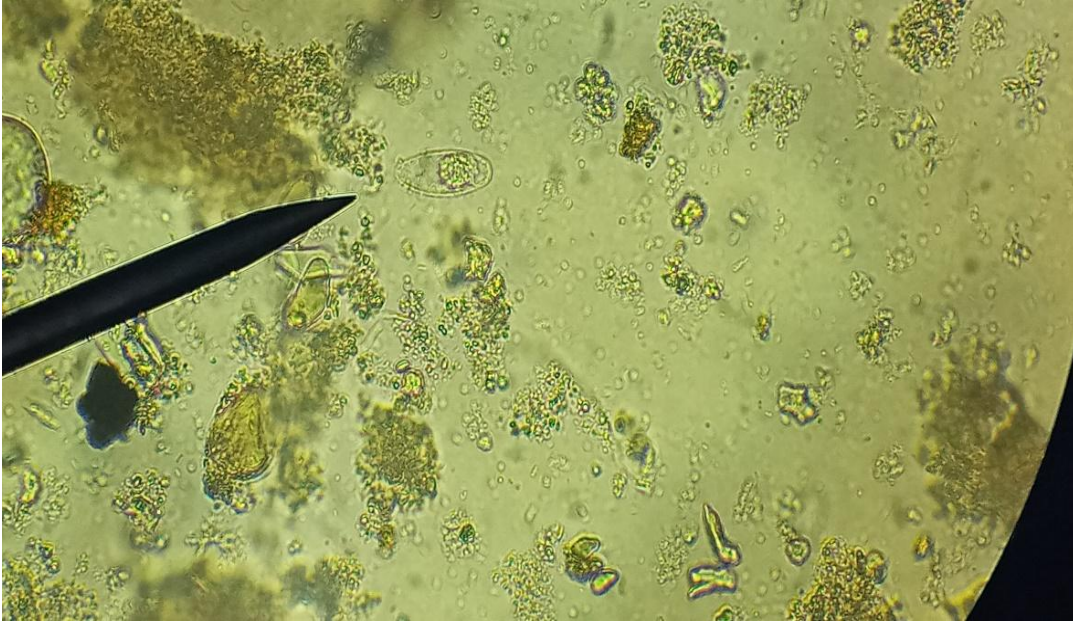
In Africa, no case of Isosporiasis in an immunocompetent malnourished child has been reported to our knowledge. Isolated cases reported are usually linked to an immunocompromised person due to AIDS (Ka et al., 2011;

**Table 1.** Results of para-clinic exploration.

Type of Analysis	Date	Results
Hematology	24/10/2018	<ul style="list-style-type: none"> <li>• Hemogram :</li> <li>- Hb : 5,9 g/dl ;</li> <li>- WC : <math>6.4 \times 10^3 / \text{mm}^3</math></li> <li>- RC : <math>2.23 \times 10^6 / \text{mm}^3</math></li> <li>- PNN : 43%, PNB : 0%, PNE: 02%, Monocytes:10%</li> <li>Lymphocytes: 45%</li> <li>- Platelets : <math>77 \times 10^3 / \text{mm}^3</math></li> <li>• Blood Group and Rhesus status : AB Positive</li> </ul>
	25/10/2018	<ul style="list-style-type: none"> <li>• Hemogram :</li> <li>- Hb : 7,5 g/dl ;</li> <li>- WC : <math>5.3 \times 10^3 / \text{mm}^3</math></li> <li>- RC : <math>2.78 \times 10^6 / \text{mm}^3</math></li> <li>- PNN : 37%, PNB : 0.1%, PNE: 00%, Monocytes:10%</li> <li>Lymphocytes: 52%</li> <li>Platelets : <math>82 \times 10^3 / \text{mm}^3</math></li> </ul>
Parasitology	24/10/2018	<ul style="list-style-type: none"> <li>• Direct examination of blood</li> <li>- Absence of trophozoite of <i>Plasmodium falciparum</i></li> <li>• Direct examination of stools</li> <li>- Présence of Oocystes of <i>Isospora belli</i></li> </ul>
Biochemistry	24/10/2018	CRP :48 (vr :<6 mg/l)
Medical imaging exploration	25/10/2018	<ul style="list-style-type: none"> <li>• Abdominal echography</li> <li>- Homogeneous splenomegaly</li> <li>- diffuse aerostercoralstasis</li> <li>- absence of intraperitoneal fluid effusion</li> <li>- free pleural sacs</li> <li>• Chest X-Ray</li> <li>- Bilateralparietal bronchial thickening</li> <li>Bilateral basal para-cardiac alveolar opacity</li> <li>- Normal cardiomediastinal shadow</li> <li>- Normal chest wall</li> </ul>

Sangaré et al., 2015; Gassama et al., 2001). In Ivory Coast, a study showed a prevalence of 3.9% among children under 5 years old. However, their nutritional as well as HIV status are not mentioned (Kassi et al., 2004). In USA a few isolated cases have been reported, particularly in the context of a liver donation without any symptoms from the donor (Akateh et al., 2018). In South America, a case of isosporiasis was discovered after intestinal transplantation in a patient who developed gastrointestinal disturbances 3 months later (Gruz et al.,

2010). In Europe, isolated cases have been reported in Turkey. Indeed, a case of isosporiasis was diagnosed in western Turkey, about thirteen years ago in a slightly older boy (12 years old), during an epidemiological investigation, carried out in a village in the province of Manisa. The child was immunocompetent (Ibrahim et al., 2007). In the same year, KORU *et al.* reported a case of isosporiasis diagnosed to a 32-year-old kidney transplanted recipient, who presented fever associated with digestive symptoms (Koru et al., 2007). In the same



**Figure 1.** Oocyst of *Isospora belli* in the stool specimen of patient (27/15  $\mu\text{m}$ ; x400 magnification).

country, Usluca *et al.* reported in 2012 an isolated case of a 35-year-old patient who suffered from isoporiasis after liver transplantation. A sulfonyleurea-based treatment made it possible to overcome the disease (Usluca *et al.*, 2012).

The same situation occurred in the south-eastern part of Europe, where a case was reported in Spain in a 2-year-old eutrophic child who presented a narrowing of the esophagus following ingestion of caustic fluid. The diagnosis was made simultaneously both after biopsy of the intestinal mucosa and parasitological examination of the stool (Durango *et al.*, 2011).

In Asia, case reports have also been recorded in recent decades. Indeed, our clinical case is similar to the case documented in India from a 9-year-old girl (Abhilasha *et al.*, 2007). The malnourished patient was treated favourably with TMP-SMX. In the same country, an isolated case has been reported in an immunocompetent 5-year-old boy with chronic fever and gastrointestinal syndrome. Several coprologies have made it possible to identify the disease (Bijay *et al.*, 1993).

Additional cases have been revealed in South Korea in an adult who underwent a jejunal biopsy following chronic diarrhea that has progressed for more than 2 years in a context of significant weight loss (Min *et al.*, 2013). A little Diagnosis can also be made by analyzing the duodenal aspiration fluid, or then any other samples. In some cases, histopathology expertise may be requested for biopsies taken during this examination. Once stained, the reading of the slides may show the villous atrophy or the parasites trapped in the cells of the epithelium. (Doerr and Seifert, 2012).

further south, in Burma, a female case was diagnosed by PCR after 4 years of follow-up in a 28-year-old immunocompetent refugee. The patient recovered after one month of treatment with Trimethoprim-sulfamethoxazole (TMP-SMX) (Woon *et al.*, 2016).

In China, a case of isoporiasis having invaded the gallbladder is described for the first time in this country in a Vietnamese man who has presented digestive disorders for 15 years. Unfortunately, its immune status has not been indicated (Chiu *et al.*, 2016). Otherwise, in immunocompromised patients, especially patients with AIDS, CD4 cells appear to be a determining factor of *Isospora belli* infection (Indrani *et al.*, 2013).

Indeed, death can occur when CD4 cells are very low, although treatment has been instituted (Mudholkar and Namey, 2010).

Furthermore, eosinophilia has been strongly associated with isoporiasis, particularly in patients without weight loss, but with low CD4 + cell counts (<100-200 cells /  $\text{mm}^3$ ).

With regards to the biological diagnosis, Oocysts can be seen in direct wet fecal microscopic preparation in a drop of saline by the biologist. He can also carefully concentrate the stools by centrifugation and then examined under the biological microscope (Doerr *et al.*, 1995).

However, the possibility of making a diagnosis by PCR on various samples exists but it is reserved for the reference laboratory centers due to the relatively expensive nature of the investments in our settings. In this context, very little progress has been made in the biomolecular detection of *Isospora belli* (Dongyou, 2012).

Regarding the intermediates or paratenic hosts, the question is still relevant, after the discovery of 3 gibbons harboring the parasite (Zaman, 1968; Kirkpatrick, 1988).

In fact, hypotheses have been put forward to explain the contrast between the presence of the parasite in countries with a good health system and a relatively small number of notified cases (Lindsay et al., 1997).

From a therapeutic standpoint, the drug recommended as the first line for the treatment of Isosporiasis belongs to the sulfonamides family. Trimethoprim-sulfamethoxazole (TMP-SMX) is preferably used. (Weiss et al., 1988; Westerman et al., 1979).

However, in case of allergy, the option of pyrimethamine may be considered (Georgiev, 2003).

In addition, metronidazole-based treatments have also proven their effectiveness (Forthal and Guest, 1984; Hallak et al., 1982).

Furthermore, isosporiasis, like other coccidiosis, is likely to cause absorption disturbances in the intestinal wall (Brandborg et al., 1970). The abundance of fluid loss can lead to severe asthenia and significant weight loss (Kobayashi et al., 1985), as described to our patient.

The fact that her parents are farmers could be a risk factor. Indeed, the legumes and salads harvested in their fields and brought home are consumed by the family. Given the difficulties of access to drinking water in this region of the country, and due to the low level of

education of parents, those are less informed about infections linked to unsanitary food. In our case, given that the diagnosis was made practically when the child was discharged, the patient continued his treatment with Ceftriaxone 50 mg / kg / day for 10 days associated to the metronidazole treatment. A minor side effect was recorded (itching). Our patient did not present any problem with tolerance or compliance.

## CONCLUSION

Isosporiasis is a coccidiosis that affects children as well as adults. Under the tropics, etiological research for diarrhea is not common, even in non-immunocompetent people. Identification of *Isospora belli* which does not require a great expertise will allow appropriate treatment to achieve a cure. The search for this parasite should be systematic for children with nutritional disorders which are weakening factors. The strengthening of human resources as well as the improvement of the technical platform of reference laboratories in regions in order to identify *Oocysts of Isospora belli* are urgently needed.

Acknowledgments: We would like to thank very much the staff of CHR of Man for their dedication.

## REFERENCE

- Abhilasha K, Saxena S, Malhotra VL, Deb M (2007). Infection à *Isospora belli* infection in a malnourished child. J Commun Dis. 39 (2): 141-3.
- Akateh C, Arnold CA, Benissan-Messan D, Michaels A, Black SM (2018). *Cystoisospora belli* Gallbladder Infection in a Liver Transplant Donor. Case Reports in Infect. Dis. 3170238. DOI: 10.1155/2018/3170238.
- Alagappan R (2018). Manual of Practical Medicine. Jaypee Brothers Medical Publishers. pp. 1100
- Bijay RM, Sarman S, Anand B (1993). Transient *Isospora belli* infection in a normal child. Indian J. Pediatr. 60(2):299-301.
- Brandborg LL, Goldberg SB, Breidenbach WC (1970). Human coccidiosis — a possible cause of malabsorption. N Engl J Med 283:1306–1313.
- Chiu KW, Chiou SS, Lu LS, Wu CK, Eng HL (2016). Molecular Identification of biliary *Isospora belli*: A case report. Medicine (Baltimore). 95 (10): e3071.
- Curry A, Smith HV (1998). Emerging pathogens: *Isospora*, *Cyclospora* and microsporidia. Parasitology 117: S143-S159.
- Doerr W, Seifert G (2012). Tropical Pathology. Springer Science & Business Media, pp. 2083
- Doerr W, Ashwort TG, Seifert G (1995). Tropical pathology. Springer Science & Business Media. pp. 2083.
- Dongyou L (2012). Molecular Detection of Human Parasitic Pathogens. CRC Press. Pp. 895.
- Durango R, Belandria K, Quintero M, García G, López K (2011). Infestación por *Cryptosporidium Spp* e *Isospora Belli* en preescolar inmunocompetente: A propósito de un caso. Gen vol.65 (3): 230-233.
- Eberhard M L, Arrowood MJ (2003). *Isospora belli* and *Cyclospora cayatanensis*. In: Dionisio D. (eds) Textbook-Atlas of Intestinal Infections in AIDS. Springer, Milano: 347-358.
- Forthal D, Guest SS (1984). *Isospora belli* enteritis in three homosexual men. Am J Trop Med Hyg. 33:1060–1064.
- Garcia LS, Owen RL, Current WL (1988). Isosporiasis. In: Balows A., Hausler W. J., Ohashi M., Turano A., Lennete E. H. (eds) Laboratory Diagnosis of Infectious Diseases. Springer, New York, NY. [https://doi.org/10.1007/978-1-4612-3898-0\\_95](https://doi.org/10.1007/978-1-4612-3898-0_95).
- Gassama A, Thiaw B, Dia NM, Fall F, Camara P, Hovette P, Perret JL, Gueye-Ndiaye A, Mboup S, Sow PS, Aidara-Kane A (2001). Etiologies infectieuses des diarrhées de l'adulte au cours de l'infection à VIH à Dakar: étude de cas/témoins sur 594 malades. Dakar Med. 46(1):46-50.
- Georgiev VS (2003). Opportunistic Infections: Treatment and Prophylaxis. Springer Science & Business Media. pp. 545.

- Getaneh A, Mezgebu N, Megbaru A (2020). Parasitic Contamination of Fruits and Vegetables Collected from Local Markets of Bahir Dar City, Northwest Ethiopia. *Res Rep Trop Med* 11: 17–25.
- Getaneh A, Mohammedaman M, Direslgne M, Desta H (2019). Parasitic contamination of vegetables marketed in Arba Minch town, southern Ethiopia. *BMC Infect Dis.* 19: 410
- Gruz F, Fuxman C, Errea A, Tokumoto M, Fernandez A, Velasquez J, Nagel C, Ruf A, Mauriño E, Nachman F, Rumbo M, Gondolesi G (2010). *Isospora belli* infection after isolated intestinal transplant. *Transpl. Infect. Dis.* 12: 69–72.
- Hallak A, Yust I, Ratan Y, Adar U (1982). Malabsorption syndrome, coccidiosis, combined immune deficiency, and fulminant lymphoproliferative disease. *Arch. Intern. Med.* 142:196–197.
- Ibrahim CB, Şükran K, Enis K, Mehmet EL, Özgür K, Ahmet Ö (2007). Isosporiasis in an immunocompetent child: case report. *TurkiyeParazitol. Derg.* 31(1):25-7
- Indrani M, Pritilata P, Susmita S, Mutikesh D, Moningi VN, Sanghamitra P, Banojini P (2013). Prevalence of sis in relation to CD4 cell counts among HIV-infected patients with diarrhea in Odisha, India. *Adv. Biomed. Res.* 3; 2: 61.
- Ka R, Dia NM, DiaML, Tine D, Diagne RD, DiopSA, Dieng Y, SowAI (2011). Étiologiesparasitairesetbactériennes de la diarrhée chez les personnes vivant avec le VIH hospitalisées à l'hôpital de Fann (Sénégal). *Mali Med.* 26 (1): 7-11.
- Kassi RR, Kouassi RA, Yavo W, Barro-Kiki CP, Bamba A, Menan HI, Kone M (2004). Cryptosporidioseetisospore chez les enfantssouffrant de diarrhée à Abidjan. *Bull. Soc. Pathol. Exot.* 97 (4): 280-2.
- Kirkpatrick CE (1988). Animal reservoirs of *Cryptosporidium parvum* and *Isospora belli*. *J. Infect. Dis.* 158:909.
- Kobayashi LM, Kort MP, Berlin OG, Bruckner DA (1985). *Isospora* infection in a homosexual. *Diagn. Microbiol. Infect. Dis.* 3: 363–366.
- Koru Ö, Araz RE, Akyön YY, Ergüven S, Yenicesu M, Pektaş B, Tanyüksel M (2007). Case Report: *Isospora belli* Infection in A Renal Transplant Recipient. *TurkiyeParazitol. Derg.* 31 (2): 98-100.
- Lindsay DS, Dubey JP, Blagburn BL (1997). Biology of *Isospora spp.* from humans, nonhuman primates, and domestic animals. *Clin. Microbiol. Rev.* 10 (1): 19–34.
- Mills AE, Goldsmid JM (1995). Intestinal Protozoa. In: *Tropical Pathology. SpeziellepathologischeAnatomie (Ein Lehr- und Nachschlagewerk)*, vol 8. Springer, Berlin, Heidelberg. [https://doi.org/10.1007/978-3-642-57863-2\\_12](https://doi.org/10.1007/978-3-642-57863-2_12).
- Min JK, Woo HK, Hyun-Chae J, Jee-Won C, Jong-Yil C (2013). *Isospora belli* Infection with Chronic Diarrhea in an Alcoholic Patient. *Korean J. Parasitol.* 51(2):207-212.
- Mudholkar VG, Namey RD (2010). Heavy infestation of *Isospora belli* causing severe watery diarrhea. *Indian J. Pathol. Microbiol.* 53: 824-5.
- Myint, S, Can AJ (1993). *Molecular and Cell Biology of Opportunistic Infections in AIDS.* Springer Science & Business Media Dordrecht, pp. 283.
- Oluwasola OO, Olufemi OA, Olufarati OF, Kayode BA, ThankGod EO (2020). Parasitic contamination and public health risk of commonly consumed vegetables in Ibadan-Nigeria. *Pan Afr. Med. J.* 36: 126.
- Sangaré I, Bamba S, Cissé M, Zida A, Bamogo R, Sirima C, Yaméogo BK, Sanou R, Drabo F, Dabiré RK, Guiguemdé RT (2015). Prevalence of intestinal opportunistic parasites infections in the University hospital of Bobo-Dioulasso, Burkina Faso. *Infect. Dis. Poverty.* 27; 4:32.
- Usluca S, Inceboz T, Unek T, Aksoy U (2012). *Isospora belli* in a patient with liver transplantation. *Turkiye ParazitolDerg.* 36(4):247-250.
- Weiss LM, Perlman DC, Sherman J, Tanowitz H, Wittner M (1988). *Isospora belli* infection: treatment with pyrimethamine. *Ann. Intern. Med.* 109(6):474-5. doi: 10.7326/0003-4819-109-6-474. PMID: 3261956.
- Westerman EL, Christensen RP (1979). Chronic *Isospora belli* infection treated with co-trimoxazole. *Ann. Intern. Med.* 91(3):413-4. doi: 10.7326/0003-4819-91-3-413.
- Woon SA, Yang R, Ryan U, Peter B, David P (2016). Chronic *Cystoisospora belli* infection in an immunocompetent Myanmar refugee – microscopy is not sensitive enough. *BMC Infect. Dis.* 16: 221.
- Yezid G (2000). *Diagnostic Pathology of Parasitic Infections with Clinical Correlations.* Oxford University Press pp. 769.
- Zaman V (1968). Observations on human *Isospora*. *Trans. R. Soc. Trop. Med. Hyg.* 62:556–557.