

Cyclosporiasis of Human at Wasit Province

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Abstract: The present study aimed to investigate the *Cyclospora cayetanensis* infection among patients in Wasit Province. The study started from October to December 2017. One hundred stool samples were collected from patients who were suffering from diarrhea of both genders who attended to Al-karamah Teaching Hospital at Wasit province and General Hospital of Martyr Fairuz at Hay district. Data was collected using a questionnaire form including information about gender, age, location. Stool samples were examined by direct modified acid-fast stain as a standard method. The results of our study revealed that 33% (33%) was positive for *C. cayetanensis*. The infection rate in males was 16 (48%) while in females was 17 (52%). The age group patients (1-20 years) showed the highest 17 (52%) prevalence rate while the lowest prevalence was in patient with age group (40-80 years). Modified acid-fast stain method appeared to be a useful alternative method to detect *C. cayetanensis* in stool specimens.

Keyword: Modified acid-fast stain, *C. cayetanensis*, human, stool.

INTRODUCTION

Cyclospora cayetanensis is a protozoan parasite which belongs to the phylum Apicomplexa, subclass Coccidialina, family Eimeriidae. The life cycle of *C. cayetanensis* is typical of monoxenous coccidia, which complete asexual and sexual development within a single host, many species of *C. cayetanensis* have been identified in animals. However, *C. cayetanensis* is the only species identified in humans, and appears to be restricted to the human host [1, 2]. Once sporulated, organisms of the genus *Cyclospora* have an oocyst that contains two sporocysts, and each sporocyst contains two sporozoites.

C. cayetanensis oocysts are spherical, measuring 8–10 µm in diameter, and as such are smaller than many other species of *Cyclospora* [3-5]. The oocysts of *C. cayetanensis* are spherical, measure about 8-10 µm in diameter, and have a bilayered wall, which consists of a 50 nm cell wall and a 63 nm outer fibrillar coat. A study by Eberhard et al. suggested that this parasite only infects humans [6]. The oocysts that are excreted in the feces by an infected host are not infectious until they sporulate, which takes about 7 to 15 days under favorable environment (23 to 27°C) [7]. The sporulated oocyst has two sporocysts (resistant wall), with each containing two infectious sporozoites. The life cycle of this coccidian parasite begins when food or water contaminated with sporulated oocysts is ingested by a susceptible host. Upon ingestion, the oocysts excyst and release sporozoites, which infect the epithelial cells of the small intestine. Except for sporulation, *Cyclospora* undergoes its life cycle, asexual and sexual stages, in the human host. *C. cayetanensis* can cause illness that its severity and duration depend on the immune system of the host. Cyclosporiasis is usually self-limited in immunocompetent hosts; however, much more severe symptoms have been observed in the

immunocompromised, as well as in HIV-infected individuals. Following *Cyclospora* infection, acalculous cholecystitis, biliary disease, Guillain-Barré syndrome and Reiter syndrome have all been reported in HIV patients [8]. The diagnosis of cyclosporiasis can be based on identifying the oocysts in the fecal samples by microscopy techniques. Detection of *Cyclospora* oocysts can be done using modified acid-fast staining [9]. Cyclosporiasis is widely distributed throughout the world, commonly in tropical and subtropical regions [10]. The aims of present study to investigate the *Cyclospora cayetanensis* infection among patients in Wasit Province

MATERIALS AND METHODS

A total of 100 stool samples collected from suspected patients with cyclosporiasis suffering from diarrhea who attended to Al-karamah Teaching Hospital at Wasit province and General Hospital of Martyr Fairuz at Hay district. This study was conducted during the period from November 2017 to March 2018. The diagnosis of *Cyclospora cayetanensis* infections directly through smearing with the modified Ziehl-Neelsen stain for fecal smears [9].

Statistical analysis

Statistical analysis: The statistical analysis was performed using SAS (Statistical Analysis System - version 9.1) [11].

RESULTS

During the study period, stool samples were collected from 100 patients whose suffering from diarrhea during period between November 2017 to March 2018 from Al-Zahraa and Al-Karama hospitals,

Wasit, Iraq. The *C. cayetanensis* were detected in 33% (33/100) of stool samples which considered as a positive result, while 67% (67/100) were negative for *C. cayetanensis*. Characteristics of the *C. cayetanensis* detection are shown in (Table-1) (fig-1). Most of the participants 52% (17/ 33) samples were children less than 20 years of age. The proportion of male was 48% (16/ 100) while the female was 52% (17/ 100) (Table-2).

Table-1: The result of modified Ziehl–Neelsen staining test

Result	Samples	Percentage
Positive	33	33%
Negative	67	67%

Table-2: The positive cases in relationship to the age and the gender

Age/Year	+ Ve Case	Male	Female
> 1-20	17 (52 %)	9 (56.25 %)	8 (47%)
20-40	9 (27 %)	5 (31.25 %)	4 (23%)
40-60	3 (9 %)	1 (6.25 %)	2 (12%)
60-80	4 (12 %)	1 (6.25 %)	3 (18%)
Percentage of (+ Ve Case)	33 (33%)	16 (48%)	17 (52%)

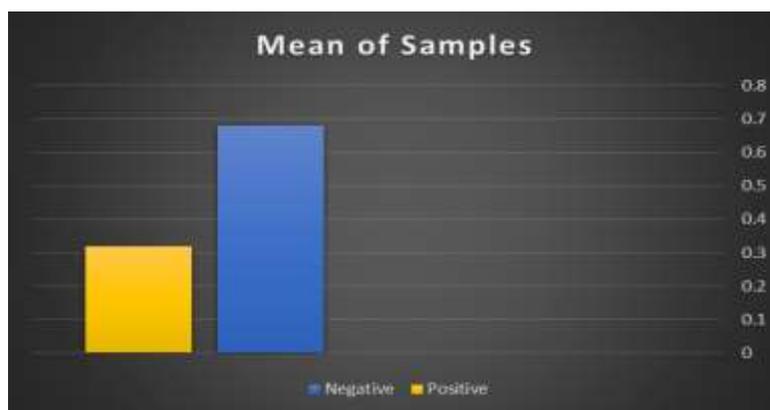


Fig-1: The mean for modified Ziehl–Neelsen staining results

DISSCUSSION

The coccidian parasites are important pathogens. Many physicians remain unaware of their clinical importance [12]. *Cyclospora* has now been identified worldwide in the feces of both immunocompetent and immunocompromised patients with diarrhoea [13-15]. Several studies have documented the fact that *C. cayetanensis* is a diarrhoea causing agent [16-18].

A variety of methods have been developed for the detection of *Cryptosporidium* spp., *Cystoisospora*, and *Cyclospora* which include microscopic, immunological, and molecular techniques. Immunological and molecular techniques are more time-consuming, complex, and expensive, making them less beneficial methods for screening, especially in resource-poor settings [19]. However, they have usually better sensitivities and specificities. Effective diagnosis of infections caused by these coccidian

parasites requires diagnostic tools to be timesaving, cost-effective, accurate, and sensitive. As microscopy is a speedy, economical, and reliable diagnostic tool, it can be used for screening in primary health care settings as well. Microscopic detection is based on finding the environmentally and chemically resistant oocysts in the stool samples. It provides the advantage of direct visual confirmation of the presence of *Cryptosporidium*, *Cystoisospora*, and *Cyclospora* oocysts [20].

This study has documented prevalence of *C. cayetanensis* infections among people living in Wasit, Iraq. The prevalence of *C. cayetanensis* was higher among patients age less than 20 years. A previous study in similar set up showed higher prevalence (8.3%) of *C. cayetanensis* among children [21]. In Peru, in an endemic community, *C. Cyclospora* was present among children [22], that is in agreement with our study which noted that the most patients whose

infected with *C. cayetanensis* were under 20 years. And also, our studies with agreement with [23-26] which described that all age groups can infect this disease, the most vulnerable age group seems to be less than 1 year to 15 years of children.

It might be due to the fact that the coccidian parasites are opportunistic and infect both immunocompetent and immunocompromised patients. However, it may not occur after infection. Some amount of immunity may be present in adults who are exposed to the infection, as the infection is less prevalent in adults living in endemic areas.

In addition, the prevalent among female was more than male, which agree with previous studies in Nepal, which observed *C. cayentanensis* tends to be more prevalent among female [27]. The results also showed no significant difference between males (48%) and females (52%) infection with *Cyclospora*, although the rate of infection in females was relatively higher than the rate of males, this may be due to that both genders can be exposed to *Cyclospora* oocysts equally and both male and female have the same sensitivity to infection especially at the early stages of their lives. This result agrees with the results of [27] in Nepal [28] in Anhui, China and [29] in Egypt, but the result disagree with results of [30] in Alexandria, Egypt.

CONCLUSION

Coccidian parasites infections are common among people in Wasit, Iraq. As *C. cayetanensis* is known to be associated with fecal-oral route of transmission, it is directly or indirectly due to consumption of the contaminated water. As chlorination is not enough to get rid of these parasites, we suggest boiling drinking water coming from the high-risk sources.

REFERENCES

1. Miliotis MD, Bier JW, editors. International handbook of foodborne pathogens. CRC Press; 2003 Mar 18.
2. Ortega YR, Sanchez R. Update on *Cyclospora cayetanensis*, a food-borne and waterborne parasite. *Clinical Microbiology Reviews*. 2010 Jan 1;23(1):218-34.
3. Ortega YR, Gilman RH, Sterling CR. A new coccidian parasite (Apicomplexa: Eimeriidae) from humans. *The Journal of parasitology*. 1994 Aug 1;625-9.
4. Lainson R. The genus *Cyclospora* (Apicomplexa: Eimeriidae), with a description of *Cyclospora schneideri* n. sp. in the snake *Anilius scytale* (Aniliidae) from Amazonian Brazil: a review. *Memórias do Instituto Oswaldo Cruz*. 2005 Apr;100(2):103-10.
5. Simjee S. *Foodborne diseases*. Humana Press; 2007.
6. Eberhard ML, Ortega YR, Hanes DE, Nace EK, Quy Do R, Robl MG, Won KY, Gavidia C, Sass NL, Mansfield K, Gozalo A. Attempts to establish experimental *Cyclospora cayetanensis* infection in laboratory animals. *Journal of Parasitology*. 2000 Jun;86(3):577-82.
7. Mansfield LS, Gajadhar AA. *Cyclospora cayetanensis*, a food-and waterborne coccidian parasite. *Veterinary parasitology*. 2004 Dec 9;126(1-2):73-90.
8. Ortega YR, Sterling CR, Gilman RH, Cama VA, Diaz F. *Cyclospora* species--a new protozoan pathogen of humans. *New England Journal of Medicine*. 1993 May 6;328(18):1308-12.
9. Visvesvara GS, Moura H, Kovacs-Nace E, Wallace S, Eberhard ML. Uniform staining of *Cyclospora* oocysts in fecal smears by a modified safranin technique with microwave heating. *Journal of Clinical Microbiology*. 1997 Mar 1;35(3):730-3.
10. Soave R. *Cyclospora*: an overview. *Clinical Infectious Diseases*. 1996 Sep 1;23(3):429-35.
11. SAS. *SAS/STAT Users Guide for Personal Computer*. Release 9.13. SAS Institute, Inc. Cary, NC, USA. 2010
12. Current WL, Garcia LS. Cryptosporidiosis. *Clinical microbiology reviews*. 1991 Jul 1;4(3):325-58.
13. Ribes JA, Seabolt JP, Overman SB. Point prevalence of *Cryptosporidium*, *Cyclospora*, and *Isospora* infections in patients being evaluated for diarrhea. *American journal of clinical pathology*. 2004 Jul 1;122(1):28-32.
14. Kansouzidou A, Charitidou C, Varnis T, Vavatsi N, Kamaria F. *Cyclospora cayetanensis* in a patient with travelers' diarrhea: case report and review. *Journal of travel medicine*. 2004 Jan 1;11(1):61-3.
15. Ghimire TR. *Cyclosporiasis in HIV and Non-HIV patients: A study in Kanti Children's Hospital, Maharajgunj and Sukra Raj Tropical and Infectious Disease Hospital, Teku, Kathmandu, Nepal* (Doctoral dissertation, Dissertation submitted in partial fulfillment of Master's Degree in Zoology (Parasitology), Central Department of Zoology, Tribhuvan University, Kirtipur, Kathmandu, Nepal).
16. Ortega YR, Gilman RH, Sterling CR. A new coccidian parasite (Apicomplexa: Eimeriidae) from humans. *The Journal of parasitology*. 1994 Aug 1;625-9.
17. Magar DT, Rai SK, Lekhak B, Rai KR. Study of parasitic infection among children of Sukumbasi Basti in Kathmandu valley. *Nepal Med Coll J*. 2011;13(1):7-10.
18. Nassef NE, El-Ahl SA, El-Shafee OK, Nawar M. *Cyclospora*: a newly identified protozoan pathogen of man. *Journal of the Egyptian Society of parasitology*. 1998 Apr;28(1):213-9.

19. Fryauff DJ, Krippner R, Prodjodipuro P, Ewald C, Kawengian S, Pegelow K, Yun T, von Heydwohlf-Wehnert C, Oyoyo B, Gross R. Cyclospora cayetanensis among expatriate and indigenous populations of West Java, Indonesia. *Emerging infectious diseases*. 1999 Jul;5(4):585.
20. Sherchand JB, Cross JH. Cyclospora cayetanensis in Nepal: A study of microbiological and epidemiological aspects. *NHRC*. 2004;3:1-8.
21. Khanna V, Tilak K, Ghosh A, Mukhopadhyay C. Modified Negative Staining of Heine for Fast and Inexpensive Screening of Cryptosporidium, Cyclospora, and Cystoisospora spp. *International scholarly research notices*. 2014;2014.
22. Bern C, Ortega Y, Checkley W, Roberts JM, Lescano AG, Cabrera L, Verastegui M, Black RE, Sterling C, Gilman RH. Epidemiologic differences between cyclosporiasis and cryptosporidiosis in Peruvian children. *Emerging infectious diseases*. 2002 Jun;8(6):581.
23. Ghimire TR, Mishra PN. Intestinal parasites and haemoglobin concentration in the people of two different areas of Nepal. *J. Nepal Health Research Council*. 2005; 3(2): 1-7.
24. Ghimire TR, Mishra PN, Sherchand JB. The seasonal outbreaks of Cyclospora and Cryptosporidium in Kathmandu, Nepal. *J. Nep. Health Res. Council*. 2005;3(1).
25. Sherchand JB, Sherchand JB, Cross JH. An epidemiological study of Cyclospora cayetanensis in Nepalese people. *Journal of Institute of Medicine*. 2007 Jun 23;29(1).
26. Hoge CW, Echeverria P, Rajah R, Jacobs J, Malthouse S, Chapman E, Jimenez LM, Shlim DR. Prevalence of Cyclospora species and other enteric pathogens among children less than 5 years of age in Nepal. *Journal of Clinical Microbiology*. 1995 Nov 1;33(11):3058-60.
27. Ghimire TR, Sherchan JB. Human Infection of Cyclospora cayetanensis: Review on its Medico-biological and Epidemiological Pattern in Global Scenario. *J. Nepal Health Research Council*. 2008(4)2.
28. Wang KX, Li CP, Wang J, Tian Y. Cyclospore cayetanensis in Anhui, China. *World journal of gastroenterology*. 2002 Dec 15;8(6):1144.
29. Abdel-Wahab AM, El-Sharkawy SG, Rayan H, Hussein EM. Detection of Cyclospora cayetanensis infections among diarrheal children attending Suez Canal University Hospital. *PUJ*. 2008;1(1):37-46.
30. Massoud NM, Said DE, El-Salamouny AR. Prevalence of Cyclospora cayetanensis among symptomatic and asymptomatic immune-competent children less than five years of age in Alexandria, Egypt. *Alexandria Journal of Medicine*. 2012 Sep 1;48(3):251-9.