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Prevalence of *Cryptosporidium spp.* among Diarrhea Patients attending Hospital and Community based in Cachar District of Assam, India

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A B S T R A C T

Diagnosis of Cryptosporidiosis and associated diarrhea is a big challenge for health care in this region. To determine the prevalence of cryptosporidiosis among the hospital in the Cachar district of Assam, India. A standard conventional technique was used in the identification of parasites, including cryptosporidiosis from among the 220 diarrheal patients whose samples were analyzed. We report a 65.9 % (145 out of 220) overall parasite, prevalence and 16.3% (36 out of 220) prevalence of *Cryptosporidium* oocysts was found in the patients studied. High percentages of *Cryptosporidium* positive cases were observed in the <1 years (31.3%) and the 1-14 years 49 (22.2%) age groups. Other intestinal parasites found in the stool samples of the studied diarrhea patients were: hookworm which was observed in 25(11.3%) patients, *Ascaris lumbricoides* also in 25(11.3%) patients, *Entamoeba histolytica* was found in 19(8.6%) patients, *Giardia lamblia* in 11(5.0%) patients, *Cyclospora cayetanensis* in 07 (3.1%) patients, *Strongyloides stercolaris* in 5 (2.2%), and *Trichuris trichiura* was found in 09(4.09%) patients. Poor hygiene both personal and environmental, poor diagnostic, clinical, prevention and control skills facilities may have impacted on Cryptosporidiosis has been reported in this study.

Introduction

Cryptosporidium spp, an apicomplexan protozoon, parasites causes acute and persistent diarrhoea in the young of several animal species (Angus *et al.*, 1983) and life-threatening chronic diarrhoea in immunocompromised individuals (Goodgame *et al.*, 1995). The global prevalence of this parasite can be ascertained by the reports from all continents (Current *et al.*, 1991). Intestinal parasitic infections are among the most common infections in the worldwide. It is estimated that 3.5 million peoples in the world are affected as a result of these infections, the majority being children (WHO, 1998). The main clinical sign of these disease caused by the parasites is diarrhea (Al-Shammari *et al.*, 2001). It has effect particularly on infants, and elder people and annually killing at least 4-5 million of those aged less than 5 years in Asia, Africa, and Latin America (Bern *et al.*,

1992).The main problems in developing countries such as India, particularly in this region where humid condition, the unhygienic condition, and the poor socioeconomic conditions are prone to this parasite. Intestinal parasitic infections cause severe diarrhea, especially in infants, and can be fatal in acute diseases (Adamu *et al*., 2005).

In this study, we investigate the prevalence of *Cryptosporidium* spp. with special importance to intestinal parasites in all age group.

Materials and Methods

A cross-sectional study was conducted from January 2012 to January 2013. A total number of 220 patients visiting pediatric OPD or admitted at pediatric ward, diarrhea ward at Silchar Medical College and Hospital, SMD Civil Hospital, Silchar, Narisikha and various communities in this region of Cachar district Assam, India, having complaints of diarrhea, weight loss, anorexia, and other conditions, which may raise thought of intestinal parasitic infection, were included in this study. The clinical history along with a questionnaire form containing various details of socio-demographic factors were obtained. Stool samples were examined for the presence of *Cryptosporidium* oocysts and other parasites. Saline and iodine mount preparations were examined microscopically under a 100x magnification with oil immersion to detect oocysts and/or parasites before and after concentration of the sample of the formal ether technique. The modified Ziehl-Neelsen staining was used for detecting coccidian parasites.

Results and Discussion

The study was conducted a total number of 220 patients enrolled in the various Hospital and community level of the Cachar districts, Assam, India, 116 (52.72%) were males and 104 (47.27%) were females (Table 1).

As shown in Table 2, highest number of parasitic infections was seen in age group of, <1 years and 1-14 years. This can be characterized to attribute that the school going age and higher outdoor activities the children are more prone to these diseases. In addition, parasitic infections were found to be more in males.

We report a 65.90% (145 out of 220) overall parasite prevalence and 16.3% (36 out of 220) prevalence of *Cryptosporidium* oocysts was found in the patients studied. No parasite was detected in 44 (20%) patients investigated. The age range was between <1 years to 84 years. The majority 81(36.8%) and 72(32.7%) of the patients were between <1 and 25-34 years respectively. The majority of the study population presented with persistent diarrhea, 132 (61.36%). Other intestinal parasites found to be causing diarrhea alongside *Cryptosporidium* are *hookworm and Ascaris lumbricoides* with 25 (11.3%) prevalence each. *Entamoeba histolytica* was found in 19 (8.6%) patients, *Giardia lamblia* in 14(6.3%) patients, *Isospora belli* in 11(5.0%), *Cyclospora cayetanensis* in 8(3.6%) patients, *Strongyloides stercolaris* in 3 (1.3%), and *Trichuris trichiura* was found in 6 (2.7%) patients. (Figure 2 and table 2).

The study also reveals that cryptosporidiosis is higher people of poor socioeconomic status, out of 36 cases of Cryptosporidiosis from the study, 24 (66.6%) was found to be associated with poor living conditions, they use contaminated drinking water some time direct from the pond, river and marsh which may be contaminated with parasites and these increase the risk of infection. In this study the people of lower educational levels were found to be associated with

Cryptosporidiosis, out of 36 cases, 27 patients (75.0%) was found to be having lower educational background as compared to only 6 patients (16.6%).

Cryptosporidium was the most commonly detected diarrhoeagen amongst the various intestinal parasites which were for in the present study. Its role as a diarrhoeagen at high frequency has also been reported from hospitals in northern (Uppal *et al*., 1991), southern (Mathan *et al*., 1985), eastern (Das *et al*., 1993) and western (Sarawathi, 1988) India (range of detection 4.3-13.0%).

Intestinal protozoan parasites are widespread in the worldwide and remain key role in human health concern in many tropical and subtropical countries. The prevalence rates of intestinal parasitic infections and type of parasite exhibit wide variation from different countries, between geographical areas, communities, and even seasons (Tappe *et al*., 2011).

In this study, prevalence of intestinal parasites is 65.9%; among these, 8.6% are *Entamoeba histolytica*, 5% are *Giardia lamblia*, 16.3% *Cryptosporidium* spp., 11.3% *Hookworm* 4.09% *Trichuris trichiura* 0.36% *Ascaris lumbricoides*. 3.1% *Cyclospora cayetanensis*, and 2.2% *Strongyloides starcorales*.

Table.1 Age and sex distribution in the study population

Age groups	Percentage (%) N = 65.9%	Male n = 116	Female n = 104
<1	69 (31.3%)	31(14.09%)	38(17.2%)
1-14	49 (22.2%)	25(11.36%)	24(10.9%)
15-24	34 (14.5%)	22(10.0%)	12(5.4%)
24-34	23(10.45%)	11(5.0%)	12(5.4%)
35-44	19(8.6%)	09(4.09%)	10(4.54)
45-54	13(5.9%)	07(3.18%)	06(2.7%)
55-64	08(3.6%)	06(2.7%)	02(0.90%)
65-74	04(1.8)	04(1.8%)	0(0.0%)
75-84	01(0.45)	01(0.45)	0(0.0%)

Key; %=percentage, n=number

Table.2 Distribution of *Cryptosporidium* with other intestinal parasites according to sex

Parasites	Patients		Total (n=145)
	Male (n=78)	Female(n=67)	
Cryptosporidium spp.	31(14.09%)	05(2.27%)	36(16.3%)
Hookworm	04(1.8%)	21(9.5%)	25(11.3%)
Ascaris lumbricoides	15(6.8%)	10(4.5%)	25(11.3%)
Cyclospora cayetanensis	01(0.45%)	06(2.7%)	07(3.1%)
Giardia lamblia	09(4.09%)	02(0.09%)	11(5.0%)
Strongyloides stercorales	0(0.0)	05(2.27%)	05(2.2%)
Entamoeba histolytica	17(7.7%)	02(0.90%)	19(8.6%)
Trichuris trichiura	0(0.0)	09(4.09%)	09(4.09%)
Ascaris lumbricoides	01(0.45%)	07(3.1%)	08(0.36%)

Key; %=percentage, n=number

Fig.1 Microscopy (10*100X magnification) using M-zn staining technique. A-B: Cysts of *Cryptosporidium* spp.

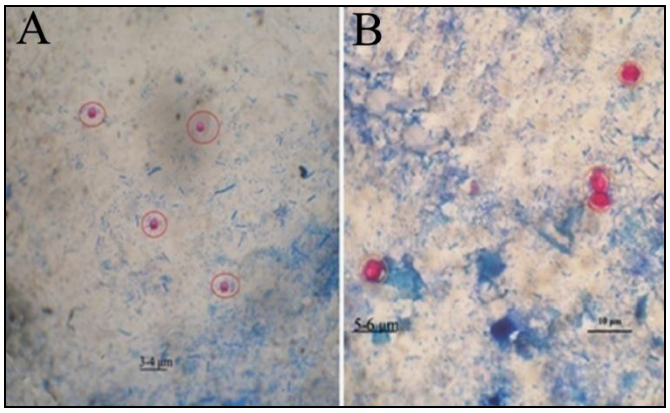
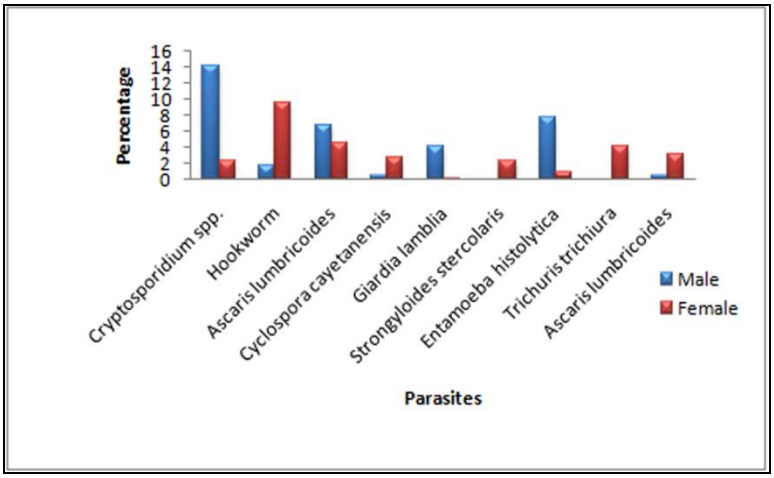


Fig.2 Prevalence of *Cryptosporidium* spp. and other parasites



In 40% of the cases, the nuclear family was found to be uneducated, which leads to poor living conditions and poor sanitary habits, ultimately increasing the risk of parasitic infections. About 54% cases were living in hurt; such type of hurt tends to be in surrounding area without proper sanitation and drainage system, which contribute to higher prevalence of parasitic infection (Champa *et al*., 2012 and Kiran *et al*., 2014). It was also noted that 46.6% cases where having drinking water from open pond, river and marshes and 20% were using water from borewell. Because these wells are constructed at a shallow level, they can come in contact with condition for survival and development of eggs like *Ascariasis lumbricoides* (Awasthi *et al*., 2008).

In this study, 16.3% of cryptosporidiosis was reported among the population of mostly affected aged <1 years and 1-14 years. This is higher than the report of 1% from England and 10% from Peru (Kortbeek *et al*., 2000 and Moseier *et al*., 2000). Factors which help in parasite transmission include transmission in day care centers, swimming pools, public water supplies, and other water sources. *Cryptosporidium* was detected by modified acid fast staining of

fecal smears in only 2% of samples analyzed in Accra, Ghana (Binka *et al*., 2011) compared to 16.3% obtained in our study with the same detection protocol of modified acid fast staining of fecal smears. This high prevalence may be due to under reporting, poor diagnostic skills caused indirectly by poor resources regarding proper management to control of the disease in developing countries. If use of improved better diagnostic methods such as having high sensitivity must be used to diagnose parasitic infections in patients with diarrhea.

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