INCIDENCE OF *CRYPTOSPORIDIUM* INFECTION IN PORT-HARCOURT RIVERS STATE NIGERIA BASED ON REGULAR CONTACT WITH DOMESTIC ANIMALS

TARIUWA[1*], H. O., AJOGI[1], I., EJEMBI[2], C. L., AWAH[3], I. J., GREEN[4], P. A., FADIPE[5], E. O. and ODOBA[1], M. B.

[1]Department of Public Health and Preventive Medicine, Faculty of Veterinary Medicine, [2]Department of Community Medicine, Faculty of Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria. [3]Department of Clinical Microbiology and Parasitology, [4]Department of Community Medicine, University of Port-Harcourt Teaching Hospital, Port-Harcourt, River State, Nigeria. [5]Department of Surgery and Medicine, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

[*]Correspondence: E-mail:mailhenry10@yahoo.com,**Tel**:+2348033850536or+2348050741976. **Current Address:** c/o The Dean, Faculty of Veterinary Medicine, University of Abuja, Gwagwalada, Federal Capital Territory, Nigeria.

SUMMARY

The study was undertaken to determine the prevalence and significance of *Cryptosporidium* infection in humans based on their regular contact with domestic animals. A total of six hundred fecal samples from respondents were examined for *Cryptosporidium* oocyst using the cold Ziehl-Neelson staining method. Questionnaires were also administered to the respondents to derive desired information. Of the 600 fecal samples examined, there was 13.5% incidence of *Cryptosporidium* infection. More children (25.5%) were infected than adults (3.04%). Diarrhoeic samples accounted for 74% of positive cases, while non-diarrhoeic samples accounted for 26%. It was concluded that there is an association between *Cryptosporidium* infection incidence and regular contact with domestic animals in children as opposed to adults. The dynamics of the disease will help evolve sustainable control and preventive strategies that are cost effective and affordable.

KEY WORDS: *Cryptosporidium*, Domestic animals, Diarrhoea

INTRODUCTION

Cryptosporidium, a protozoan enteropathogen is one of the common causes of gastroenteritis and diarrhoea in several animal species especially calves, lambs, birds, reptiles, fish and man (Tsipori *et al.*, 1983; Current, 1985 and Mata, 1986). Most recently, zoonotic infection has been reported with *Cryptosporidium parvum* causing infections in man and livestock (William *et al.*, 1985 and Gatei *et al.*, 2002). It is an important cause of diarhoeal illness world wide especially in children (William *et al.*, 1985 and Gatei *et al.*, 2002).

It was first discovered in mice in 1907 by Tyzer, but its importance as an agent of diarrhoea was not recognized until 1970 (Norman, 1991; Tyzzer, 1990 and Tyzzer, 1912).Over the last decade *Cryptosporidium* has emerged as a common cause of acute self-limiting gastroenteritis in immunocompetent people and is commonly associated with traveler's diarrhoea syndrome (Casemore, 1994). The incubation period is usually about one week, with clinical signs of profuse, offensive, watery diarrhoea, which may be accompanied by abdominal pain, vomiting and fever (William *et al.*, 1985 and Mata, 1986). In the immunocompromised, such as those with Acquired Immune Deficiency Syndrome (AIDS), cryptosporidiosis is a common and life threatening condition causing profuse and intractable diarrhoea leading to severe dehydration, malabsorption and wasting (William *et al.,* 1985; Mata, 1986 and Flanigan, 1993).

In Nigeria, *Cryptosporidium* was shown to be a significant agent of diarrhoea among immunocompetent patients in our hospitals (Kwaga *et al.,* 1987 and Nwabuisi, 1998). The disease initially thought to be self-limiting in immunocompetent patients now assumes a chronic course in malnourished and immunocompromised patients. Several authors have established the prevalence of *Cryptosporidium* infection in different animals' species in Nigeria. (Ayeni *et al.,* 1985 and Kwaga, 1988; Christopher, 2002 and Bamaiyi, 2004)

Oocysts are discharged into water bodies from various animals' hosts. In situations of poor public water treatment facilities, transmission of *Cryptosporidium* among the human population is likely to be increased. The need to establish incidence of the disease in our various hospitals, because of its zoonotic implication and the association of the infection with regular contact with animals is of public health importance. It is in the light of the preceding that the study aimed to determine the prevalence of *Cryptosporidium* infection amongst respondents in University of Port-Harcourt Teaching Hospital (UPTH), Braithwaite Memorial Hospital Port-Harcourt and other healthy volunteers within the township and to assess the significance of regular contact with animals in *Cryptosporidium* infection. It is believed that data from this study may provide adequate basis for evolving sustainable cost-effective control measures in our environment.

MATERIALS AND METHODS

Sample source/size

A total of 600 faecal samples were collected in equal proportion from respondents categorized into two age groups i.e. adults (=15years old) and children (<15years old) and were examined microscopically for oocyst of *Cryptosporidium* after staining with cold Zcihl-Neelson stain.

Faecal samples were collected in wide mouth plastic container with lid. Age, consistency of stool samples and information on whether respondents had regular contact with domestic animals were recorded in interviewer-administered questionnaires. Samples were examined as they were collected or preserved using 10% formol saline.

Formol ether concentration

About 1g of faecal sample was emulsified in 10mls of 10% formol saline in a universal bottle using an applicator stick. The faecal suspension was then sieved, and 1ml of diethyl ether was added to the filtrate to extract fat and minimize debris. The mixture was then centrifuged at 5,000 revolutions/minute for 10 minutes. The supernatant was decanted and a thin smear was made from thoroughly mixed sediment on a clean microslide and air dried (Chesbrough, 1987).

Cold Ziehl-Neelson stain

A drop of fecal suspension was placed on a glass slide and spread to form a thin smear. Slides were fixed in absolute alcohol for 10minutes and then flooded with Carbol Fuchsin for 1hour. Following washing, the slides were decolorized in 3% acid-alcohol for between 15seconds and 1minute, depending on the film thickness. Slides were then washed, counterstained with 1% Methylene Blue for 4 minutes, washed, air dried, and examined under X 40 and oil immersion objectives. The cryptosporidial oocysts appeared as small spherical to oval, bright pinkish red structures within a halo (Morgan, 1998).

Statistical analysis

Associations between various risk factors and occurrence of *Cryptosporidium* infection were assessed using Chi square test for association and odds ratio analysis. Data generated were analyzed on the computer statistical package for social sciences (SPSS). Differences were expressed as significant at 95% confidence level (Steel and Torrie, 1980 and Hennekens and Buring, 1987). Odds ratio value greater than unity denotes associations. The association is significant if the levels in 95% C.I do not span 1. Values of $P < 0.05$ were considered significant.

RESULTS

The incidence of *Cryptosporidium* infection among respondents who had regular contact with domestic animals was 7.7% (Table I). The prevalence rate was higher in children 25.5% (Table II) than in adults 3.04% (Table III). Samples collected had diarrhoeic or non-diarrhoeic consistencies in equal proportion. More *Cryptosporidium* oocysts was demonstrated in diarrhoeic samples (20%) compared to non-diarrhoeic forms (Table IV).

Among adult respondents that were positive for the infection (Casemore *et al.*, 1994) had regular contact with dogs, of this number 2 and 3 respondents respectively had regular contact with cattle and poultry. Of the 13 positive results that were recorded among children, 10 had regular contact with dogs only while others

TABLE I: Prevalence of human *Cryptosporidium* infection in Port-Harcourt according to regular contact with animals:

Regular contact with animals	*Cryptosporidium* infection status		Total	%Positive
	Positive	Negative		
Positive	19	229	248	7.7
Negative	62	290	352	17.6
Total	**81**	**519**	**600**	**13.5**
P < 0.005		**X^2=12.34**		**O.R=0.39**

TABLE II: Prevalence of human *Cryptosporidium* infection among children in Port-Harcourt according to regular contact with animals

Regular contact with animals	*Cryptosporidium* infection status		Total	%Positive
	Positive	Negative		
Positive	13	38	51	25.5
Negative	30	219	249	12
Total	**43**	**257**	**300**	**14.3**
P <0.05		**X^2=6.23**		**O.R=2.5**

TABLE III: Prevalence of human *Cryptosporidium* infection among adults in Port Harcourt according to regular contact with animals

Regular contact with animals	*CRYPTOSPORIDIUM* infection status		Total	%Positive
	Positive	Negative		
Positive	6	191	197	3.04
Negative	32	71	103	31.07
Total	**38**	**262**	**300**	**12.7**
P <0.05		**X^2=48.01**		**O.R=0.07**

TABLE IV: Prevalence of human *Cryptosporidium* infection in Port-Harcourt according to diarrhoeal status

Diarrhoeal Status	*CRYPTOSPORIDIUM* infection status		Total	%Positive
	Positive	Negative		
Positive	60	240	300	20
Negative	21	279	300	7
Total	**81**	**519**	**600**	**13.5**
P < 0.05		**X^2=21.71**		**O.R=3.32**

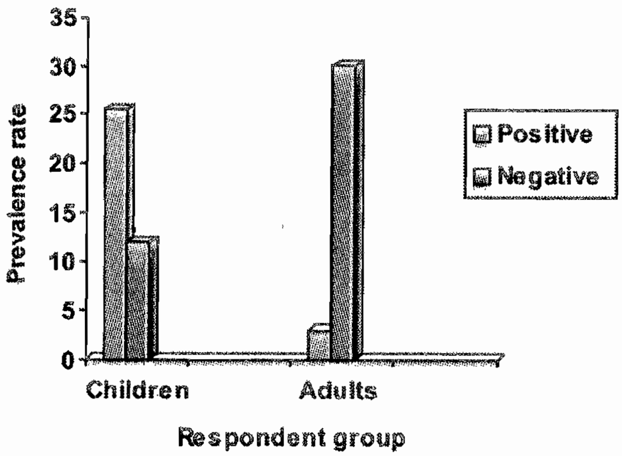

Fig 1: Bar chart showing the comparative prevalence rates among respondent groups according to regular contact with animals

DISCUSSION

The significant association between the prevalence of the infection and regular contact with domestic animals in children as opposed to adults can be explained by the difference in behavioural pattern between both age groups. Children are more likely to make unhygienic contact with animals or their faecal droppings in the environment, which they inadvertently transfer feco-orally thus establishing transmission of the infective oocyst and initiating infection. This may be one the factors making children a higher risk group than adults in most populations worldwide.

CONCLUSION

Cryptosporidium oocysts have been demonstrated in the faeces of respondents who had regular contact with domestic animals in this study. It accounts for 7.7% of cases among this group. Children emerged as a high risk group with significant association with this risk factor ($\div^2$ = 6.23, P<0.05) with an odds ratio of 2.5 (Table II). This study serves to provide baseline data on the prevalence of *Cryptosporidium* infection among humans having regular contact with animals. We suggest that this should be considered in planning intervention aimed at preventing the zoonotic transmission of the infection by exacting strict hygienic practices when human contact with animals is made especially for children whose interaction with animals and environments which animals frequent should be strictly monitored and control measures imposed with emphasis on premises contaminated with faecal droppings.

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