

Occupational Exposure as it Relate to Pathogenic contamination in some Individuals in some parts of Plateau State, North Central Nigeria

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Abstract: - This study investigated *Cryptosporidium* species in Apparently Healthy Individuals (AHI) of different occupation the study was carried out in Jos metropolis of Plateau State, Nigeria. Three hundred (300) samples were collected from Apparently Healthy Individuals (AHI). Samples were analyzed for *Cryptosporidium* infectious. *Cryptosporidium* species and other intestinal parasites were determined by parasitological techniques (Formol-ether and floatation concentration techniques Staining was done using Zielh Neelsen technique). *Cryptosporidiosis* in AHI was 37(12.3%). Younger individuals between the ages of 0-10 and 11-20, had 11(55.0%), 12 (60.0%) and 15 (57.7%), 14 (58.33%) in the male and female group. These were statistically ($p < 0.05$) significant. *Entamoeba histolytica*, *Giardia intestinalis*, *Taenia saginata*, *Ancyclostoma duodenale*, (Hookworm sp) *Ascaris lumbricoides*, and *Hymenolepis nana* were also identified. Of these, two major parasites implicated in gastroenteritis and diarrhea (*Entamoeba histolytic* and *Giardia intestinalis*) had prevalence of 40(13.33%) and 11(3.67%) respectively. The occurrence of this parasite in relation to the occupational group sampled showed that the prevalence was higher with the herdsmen, butchers and the farmers having 17.11%, 16.96% and 15.84% in that order with the least occurring in the businessmen with 8.33%. These results are discussed in relation to the distribution and significance of *Cryptosporidium* species and other enteric parasites in the environment.

Keywords: - *Cryptosporidium* species, Individuals, Nigeria, Occupational, Plateau State

I. INTRODUCTION

The genus *Cryptosporidium* is composed of protozoan parasites that infect epithelial cells in the microvillus border of the gastrointestinal tract of all classes of vertebrates. They are found worldwide. Effects of infection vary with the species of *Cryptosporidium species*. Some species of *Cryptosporidium species* infect many host species whereas others appear restricted to groups such as rodents or ruminants and still others are known to infect only one host species. Some species primarily infect the stomach whereas others primarily infect the intestine. Some species are pathogenic, whereas the presence of others has not been shown to be related to any disease manifestations. Some infections are acute and self-limiting whereas others are chronic [1],[2]. The severity and duration of infection with pathogenic species are also affected by the immune status of the infected person or animal. Immune competent individuals might suffer mild, moderate, or severe acute illness whereas immunocompromised individuals can suffer severe chronic illness and even death [3]. The ability of *Cryptosporidium* species to infect humans and a wide variety of animals and because of the ubiquitous presence of *Cryptosporidium* oocysts in the environment, humans can acquire *Cryptosporidium species* infections through several transmission routes[4]. These include direct person-to-person or animal-to-person transmission and indirect waterborne and food borne transmission, and the parasites can be of anthroponotic or zoonotic origin. The role of each transmission route in endemic areas, however, is frequently unclear because of the expensive nature of epidemiologic investigations and the inability to differentiate *Cryptosporidium* species by conventional microscopy.

There are now sixteen recognized species and nearly triple this number of unnamed cryptosporidians that have been identified only as genotypes. However, most studies on the biology, morphology, biochemistry, host preferences, immunology, pathogenicity, physiology, and prevalence have been conducted on one species, *Cryptosporidium parvum*. The reason: this species is of medical and veterinary importance, it is geographically widespread, and it infects many host species producing prodigious numbers of oocysts making it more easily obtainable for study than other species of *Cryptosporidium* species and it can be grown and tested in vitro and in animal models. Consequently data derived from *Cryptosporidium parvum*, in some cases, have become generalized

and extended to other members the genus. Obviously each species and genotype has individual characteristics that make it different from the others.

Cryptosporidiosis in humans is predominantly a diarrheal disease with the organisms growing in an intracellular but extra-cytoplasmic location in the enterocytes of the gastrointestinal tract. Infection affects all age groups and can occasionally affect other organs. The disease is more protracted, severe and affects extra-intestinal sites in people with innate or acquired deficiencies in immunity[5], [6].

Cryptosporidium species causing symptomatic disease was first noted in turkeys in 1955. During the 1970s *Cryptosporidium species* infections were reported to cause neonatal diarrhea in calves [7], [8]. The first human cases of cryptosporidiosis in humans were recorded in the 1970s: one in a young girl with enterocolitis [8]. With the developing AIDS pandemic in the 1980s more cases of cryptosporidiosis in AIDS were identified [9] and *Cryptosporidium* was found to be a cause of diarrhea in immunocompetent people [6], [5]. Cryptosporidiosis occurs worldwide, Sero-epidemiological studies of particular areas have indicated that the percentage of the population affected at some time in life can vary from under 20% to over 90% [10].

II. MATERIALS AND METHODS

1.1. Study Area

The study was carried out in one Local Government Area of Plateau State, namely the Jos North Local Government Areas (JNLGA). Ethical clearance was process from the management of Faith Alive Foundation before the commencement of this research. Three hundred (300) stool samples were collected from the apparently healthy. Samples were collected based on the different age categories of the subjects sampled. Questionnaires, verbal communication were used to get other information from the subject.

1.2. Collection of Samples

Human stool samples were collected in properly labeled sterile wide-mouthed plastic bottles, most of which were collected the next day but few were collected on the same day. Demographic information, (occupation) history and observable clinical conditions of each individual were recorded along with description of stool (watery, loose, or well formed, mucoid, bloody and coloured). The samples were then transported in Coleman icebox to the Parasitology and Diagnostic Laboratory of the National Veterinary Research Institute, Vom, Nigeria for further analysis. Processing of samples commenced immediately but all unprocessed samples were preserved in 10% formalin solution and refrigerated all analysis was done within a week.

1.3. Processing of Faecal Samples

Faecal samples were screened using two methods. The formal ether concentration and the saturated sodium chloride floatation techniques. The McMaster counting technique was used for counting the frequency of occurrence of the oocysts following the manufacturer's instructions. Oocysts of *Cryptosporidium species* can be detected in wet preparations but they are more easily identified in smear, stained by the modified Ziehl-Neelsen (Zn) method following concentration by the formol ether oocysts concentration technique as described by the manufacturer.

III. RESULTS AND DISCUSSION

The study population was 300 individuals, who were apparently healthy (AH) 37 (12.33%). Other enteric parasites encountered in the healthy group were *Entamoeba histolytica* 40(13.33%), *Ancylostoma duodenale* 23(7.67%), *Giardia intestinalis* and *Hymenolepis nana* each with 11(3.67%). the subjects had low prevalence of the infection 12.33% of *Cryptosporidium sp.* and 3.67% of *Giardia intestinalis* (Table 1).

Table 1: Prevalence of *Cryptosporidium species* and other Parasites in Human

Parasites	No. +ev	Percentage
<i>Cryptosporidium sp.</i>	37	12.33
<i>Giardia intestinalis</i>	11	3.67
<i>Entamoeba histolytica</i>	40	13.33
<i>Hymenolepis nana</i>	11	3.67
<i>Taenia saginata</i>	16	5.33
<i>Ascaris lumbricoides</i>	16	5.33
<i>Ancylostoma duodenale</i>	23	7.67
TOTAL	154.00	51.33
MEAN	22.00	
SD	12.00	

1.4. Distribution of *Cryptosporidium* species according to Occupational groups.

From Figure 1, there exist differences in the distribution of this parasite in the different occupational groups sampled. High prevalences were observed with the classes of occupation that have direct contact with the animals and their faecal matter: Butchers 19(16.96%), Famers 16 (15.84%), Herdsmen 13(17.11%) when compared to the groups of occupation that just occasionally visit the animal market or the abattoir: civil servants 6(7.06%), businessmen 8(8.33%) and veterinary workers, 4(8.70%).

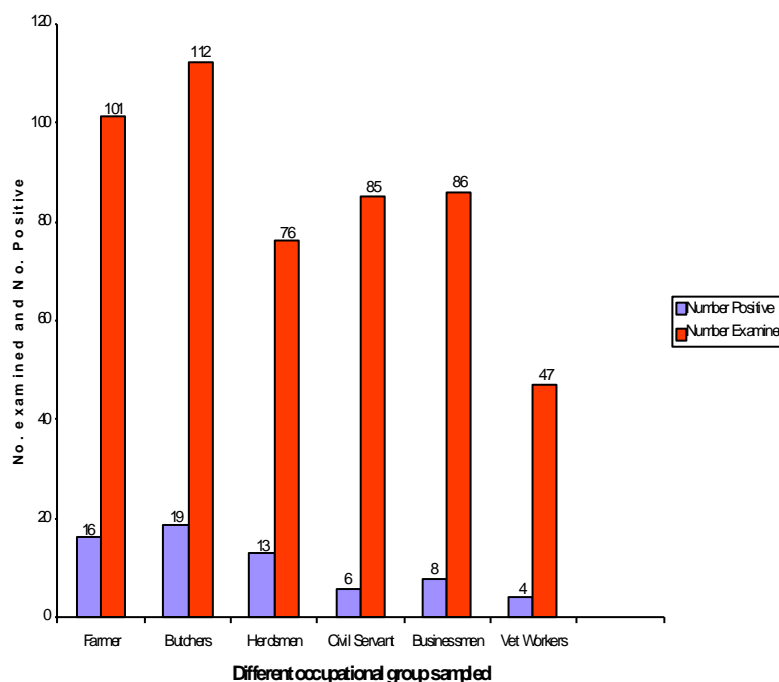


Figure 10 Distribution of *Cryptosporidium* species among subjects according to occupation in the study area

IV. DISCUSSION

1.5. Occupational Distribution of *Cryptosporidium* species in the Study Area.

Our finding shows a positive correlation ($p < 0.05$) between *Cryptosporidium* species prevalence and peoples occupations. Prevalence of *Cryptosporidium* sp was high in butchers (30.64%), followed by the farmers (25.80%) and herdsman (20.90%) the least prevalence was with the veterinary workers (4.17%).(3) in a study to assess the occupational risk of *Cryptosporidium* species infection in Tiledo reported fourteen out of the 16 sites positive for *Cryptosporidium* species (77.8%), occupational exposure to *Cryptosporidium* species is very plausible. On a similar note, [11] and [3] also reported prevalence of 18.2-25.6% with the farmers and the herdsman. The relatively high prevalence among farmers and the herdsman could be attributed to frequency of exposure to cryptosporidiosis, faecal contamination through water, manure. Our results in this study support the fact that economic condition of individuals is a risk factor in *Cryptosporidium* infection [12].

On the contrary [1] reported low prevalence (1.1%) of *Cryptosporidium* in butchers. However, [12] and [9],[1] and [11] reported lower prevalence of (1.1 to 2.0%) in the butchers' and farmers from developed countries(USA, and the UK). Water treatment does not prevent faecal oral contact, an event that is likely responsible for the majority of the transmission of these parasites among herd members. Consumption of water from field ponds during spring runoff could also negate any benefits that water treatment has on reducing water-borne transmission of these parasites other sources of transmission can be exposure to infected animals and humans [12], [5].

The lowest prevalence was with the Vet workers (4.17%), this can be as a result of their level of enlightenment which makes them cautious [10], [12]. Educational visit to working farms during the lambing season can also be a source of contamination [13].

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