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Evaluation of Entamoeba Histolytica Transmission Rates amongst Primary School Children in Five Selected Communities in Gwagwalada Area Council, Fct, Abuja, Nigeria

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ABSTRACT
Amoebic dysentery is a cosmopolitan infection caused by Entamoeba histolytica and ranks third among parasitic infections that lead to death especially in children. Epidemiological data in most rural communities about this infection is scanty. Three hundred and fifty (350) children aged 0- 14 years were sampled for E. histolytica infection in five communities in Gwagwalada Area Council, FCT-Abuja. The stool samples were examined for cysts of E. histolytica using saline and iodine preparations. The prevalence rate of 18.6 % was recorded. The prevalence by sex showed a higher infection rate in males (20.0 %) than females (17.1%) which was significantly different (x^2, $p<0.05$). This showed an association between sex and the prevalence of E. histolytica. There was also a slight association observed among the different age groups. The highest prevalence of 28.6 % was recorded in children from Passo community, although there was no significant difference among the communities (x^2, $p>0.05$). There is therefore an urgent need for improved sanitation, personal hygiene and a proper deworming scheme amongst school children in the study areas to alleviate the scourge.
Keywords: Evaluation, *Entamoeba histolytica*, Transmission, Children, Communities, Abuja.

INTRODUCTION

Amoebic dysentery is an infection caused by protozoan parasite *Entamoeba histolytica* of the class Sarcodina with or without the presence of clinical symptoms. It ranks third among parasitic diseases that results to death worldwide; being second to malaria as a protozoan cause of death (Schmidt and Roberts, 2009). About 500 million people are believed to be infected at any one time, and up to 100,000 deaths occur per year (Haque and Petri, 2006). Although cosmopolitan in distribution, it mainly occurs in the tropics and sub tropics and other places especially in areas where there is low level of sanitation and very poor personal hygiene practices (Ibrahim, 2008). It parasitizes man causing amoebic dysentery, amoebic hepatitis, and pulmonary amoebiasis . *E. histolytica* inhabits the large intestine of man, but can also establish itself in the liver, lungs, brain and other organs where secondary lesions are produced. Amoebic dysentery remains an important health problem in Nigeria due to inadequacies in sanitation infrastructure and health care facilities (Haque and Petri, 2006). Clinical features of amoebiasis range from asymptomatic colonization of amoebic colitis (dysentery or diarrhea) and invasive extraintestinal amoebiasis, which is manifested most commonly in the form of liver abscesses (Fotedar *et al*.,2007).Global statistics on the prevalence of *E.histolytica* infection indicate that 90 % of individuals remain asymptomatic while the other 10 % develop clinically overt disease (Haque *et al*., 2006). Once the parasites invade the intestinal wall, they reach the submucosa and the underlying blood vessels. From there, trophozoites travel in the blood to sites such as the liver, lungs or skin. Encystation occurs in the intestinal lumen, and cyst formation is complete when four nuclei are present. These infective cysts are passed into the environment in human faeces and are resistant to a variety of physical conditions (Nematian, *et al.,* 2012). On some occasions, trophozoites may exist in the stool, but cannot survive outside the human host (Inabo, *et al.,* 2014). *E. histolytica* is basically transmitted through the ingestion of food and water that are faecally contaminated with the cysts of the parasite (Ibrahim, 2008). In Nigeria, amoebiasis is prevalent and widespread which has been attributed to quite a number of multiple environmental sources of transmission (Inabo, *et al,* 2014; Ajero *et al.,* 2008). Several reports have recognized amoebiasis as an important health problem especially among young growing children of school age. The several surveys have indicated a high prevalence of intestinal parasitic infections among Nigerian children in different localities (Aribodor, *et al.*, 2012).Surprisingly, there is paucity on the epidemiology of amoebic dysentery in Gwagwalada Area Council, FCT-Abuja especially rural communities in the area. This study therefore aims at filling the information gap on the prevalence of amoebic dysentery in some rural communities using primary school children in the area.

MATERIALS AND METHODS

Study Area

The study was undertaken in five selected sites in some parts of Gwagwalada Area Council in Abuja, Nigeria. These sites are:- Passo, Angwan-Dodo, Giri, New Kutunku and Dukpa. Gwagwalada Area Council is located about 55km away from Federal Capital City. It lies on latitude 8° 55', North and 9° 00' North and longitude east

and 7°.05' east (Ishaya, 2013). The area covers a total of 65sq kilometer located at center of very fertile area with abundance of grasses (Ishaya, 2013).

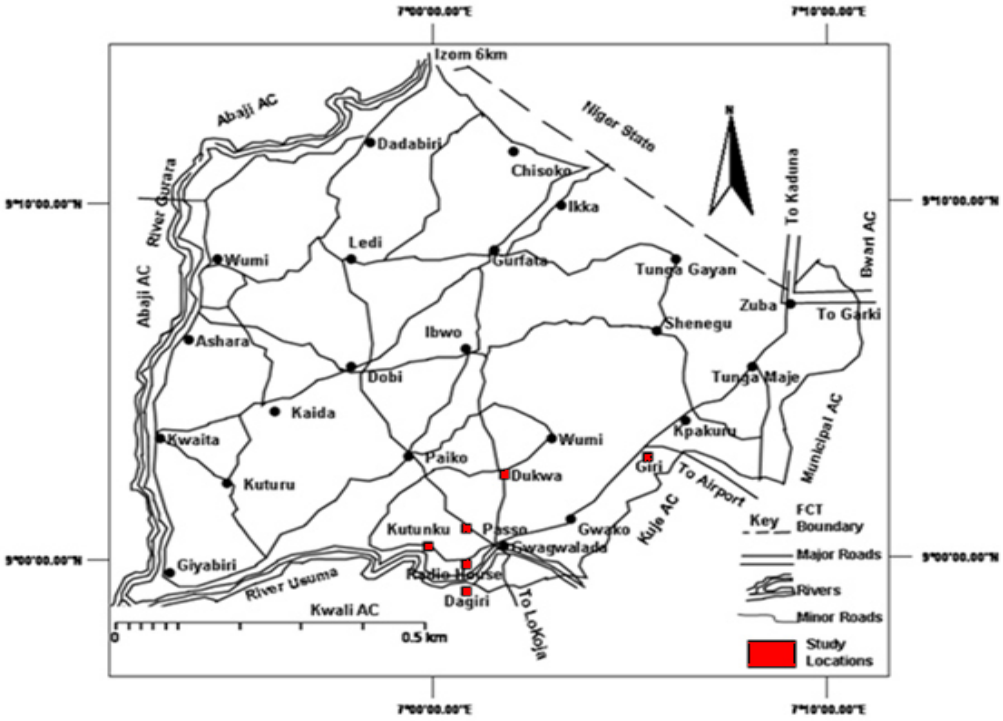

Figure 1: Map of Gwagwalada Area Council F.C.T. Abuja Showing the Study Sites.
Source: Abuja Geographical Information System

This study area falls in to the guinea savanna vegetation zone of the country which is the broadest of all the vegetation types, constituting about 50% of the land area of Nigeria. There are two seasons within this vegetational zone, dry season that lasts between four to seven months and a rainy season that lasts between four to five months. The rainfall ranges between 1016mm and 1524mm with relative humidity of between 60% and 80%. The guinea savanna is divided into two vegetation zones: - the northern and the southern guinea savanna (Ishaya, 2013).

The northern guinea savanna is characterized by mainly grasses like *Hyperrhenia Andropogon, Schizachyrium* species with interspersing trees *of lsobelina doka, Albizia Zygai, Anthoesta virgelli, Annona senegalensis (*Ishaya*, 2013).* High fall grasses of about 5 -10m eg. *Andropogon gayanus, Tectorum* species and more densely trees characterize the southern guinea Savanna, hence the name transition woodland. The trees are thick - barked of up to 40-50feet.

Common trees, such as *Daniella Oliveri, Afzelia africanus* among other species, are common. The temperature of this area is highly influenced by the Niger-Benue trough where heat is trapped. The highest diurnal temperature ranges between 27^0C and 37^oC in the months of November-April (dry season). The rainy season comes between the months of April to October with temperature range of 23^oC and 36^oC. It is pertinent to observe that, this area has a higher temperature than any other Area Council in the Federal Capital Territory throughout the year (Ishaya, 2013).

Study Population

Children aged 0-14 years constituted the study population. Five primary schools in the study areas were used for the study. The total population in the five primary school was 1,550 pupils. A total of 350 pupils comprising of (175 males and 175 females) were randomly selected for the study where 70 pupils were selected from each school based on the willingness of the pupil to participate in the study.

Study Design

A cross sectional survey was conducted to ascertain the prevalence of *E. histolytica* in the children sampled. For school age children, the class lists of the different classes in the different schools were used to determine age

and sex which the pupils later reconfirmed. For younger children who were not yet in school, demographic information were gotten from parents and guardian. A sample size of 350 was worked on based on Rufai, *et al.,* (2006) guidelines of 200-250 individuals to adequately evaluate the prevalence of amoebiasis (NPC 2006). The communities sampled in the study were based on the fact that they all had similar prevailing ecological factors.

Data Analysis

Chi-square test was used to evaluate the level of association between the different parameters studied. The analysis was done using Statistical Package for Social Sciences (SPSS) version 17.

Laboratory Preparation of faecal smears and identification of parasite

Well labeled specimen bottles that had names, age and sex of the pupils were given out for the collection of their stool samples. The stool samples were collected and preserved in 10% formol ether and immediately taken to the laboratory for microscopy. For the microscopic examination, both saline and iodine preparations of the stool were examined. The former was used for the identification of the trophozoites while the later was used for the identification of cysts.

Wet preparation using 3% iodine was the method used. This is because iodine stains the nucleus of *E.histolytica* properly, thus allowing for easy identification of the cyst. A little portion of the formed stool specimen was collected and mixed with the 3% iodine solution to form a smear. This was covered with a cover slip and viewed under the microscope using x10 objective for examination and x40 for identification of the parasite (Aribodor *et al*., 2012).

Another stool specimen was also prepared using a drop of physiological saline. A cover slip is applied before examining the preparation microscopically. The presence of ingested red blood cells and the characteristic directional movement are diagnostic of *E.histolytica*. The cyst of *E. histolytica* was identified with the diagnostic features as described by (Cheesbrough, 2009).

RESULTS

Of the 350 school pupils sampled, 65 (18.6%) were found to be positive for *Entamoeba histolytica* infection (Table 1). The prevalence recorded by individual communities were as follows; Passo 28.6%, Angwan-Dodo 20.0%, Giri 14.3%, New Kutunku 18.6% and Dukpa 11.4% (Table 1) There was no association between the communities sampled and the prevalence of *E.histolytica* infection (P>0.05). The result also revealed a prevalence rate of 20.0% for males and 17.1% for females (Table 2). There was an association between sex and prevalence of *E. histolytica* (P<0.05).

The age group 11-14years showed the least prevalence of 16.7%. This was followed by the age group 0-5 years which showed 19.1%. The highest prevalence of 19.8% was observed in the age group 6-10 years (Table 3).There was however no association among the different age groups(P>0.05).

Table1. Prevalence of *E. histolytica* infection in children 0-14 years in Gwagwalada Area Council, Abuja.

Community	No Sampled	No Positive	Percentage Prevalence
Passo	70	20	28.6
Angwan-Dodo	70	14	20.0
Giri	70	10	14.3
New Kutunku	70	13	18.6
Dukpa	70	08	11.4
Total	**350**	**65**	**18.6**

Table 2: Prevalence of *E.histolytica* infection by sex in Gwagwalada Area Council, Abuja

Sex	No Sampled	No Positive	Percentage Prevalence
Male	175	35	20.0
Female	175	30	17.1
Total	**350**	**65**	**18.6**

Table 3: Prevalence of *Entamoeba histolytica* infection by age in Gwagwalada Area Council, Abuja.

Ages	No Sampled	No Positive	Percentage Prevalence
0-5	126	24	19.1
6-10	116	23	19.8
11-14	108	18	16.7
Total	**350**	**65**	**18.6**

DISCUSSION

Generally, amoebic dysentery is a common disease in developing countries, with school age children carrying the heaviest burden of the associated morbidity (Nematian *et al*., 2012; Oninla *et al*., 2007). A total prevalence rate of 18.6% was recorded for all the communities surveyed in this study which is consistent with the report of Ibrahim, 2008 in Kano Northern Nigeria and Aribodor *et al*., 2012 in Anambra, South east Nigeria respectively.

The comparative high prevalence of *E. histolytica* infection observed in this study could be attributed to such predisposing factors which are prevailing in the study communities such as ignorance, unhealthy socio-cultural practices, poor drainage system, unhygienic methods of disposing human faeces and refuse, poverty, inadequate health care facilities as well as low standard of personal hygiene and general cleanliness in the communities studied from where the subjects were drawn. A closer and more practical look at the rural environments studied lends credence to this observation (Nyenke, *et al.,* 2008). The difference observed among the five communities was not statistically significant. This is attributable to the fact that the populace of the different communities studied shared common boundaries and had the same way of life which influenced that practices significantly. Habits such as defecating in nearby bushes that were close to the streams and rivers which were sources of water to the inhabitants was a common phenomenon among the people of the different communities studied. Passo community had the highest prevalence rate which may associated with the very high level of poverty noticed in that community. This led to overcrowding and poor housing in the community which are predisposing factors to the spread of the infection (Rufai and Awi, 2006). The comparatively low prevalence recorded in Dukpa may be associated with the high rate of development in the community.

This has resulted in many homes owning a water closet in their individual homes thereby reducing the spread of the infection. Also, most of the populace in this community patronizes the public borehole as their source of water.

The significantly high prevalence of infection observed among male children may be attributed to the fact that they are more adventurous than their female counterparts and have a greater tendency of indulging in outdoor activities (Inabo *et al.,* 2014; Reuben, *et al., 2013*). It could also be maintained that males engage more in activities that predisposes them to the infections such as farming, fishing, and hunting. These activities necessitated more contact and exposure to the infections. On the other hand, female children are more pre occupied with domestic activities which limits their level of exposure to the possible sources of infection (Aribodor *et al.,* 2012).This is however contrary to the report of Nyenke *et al*. 2008 in Degema and environs where they reported that females were more infected than males.

The result reveals a high prevalence of 19.8% among children between age group 6-10. This could be attributed to the fact that children within this age group are found to be playing on the sand with little or no care. They tend to be ignorant of the gains associated with general cleanliness and high level of personal hygiene. The age group 11-14 recorded the least level of infection. This could be attested to the fact that they are quite matured and are so conscious of the need to take personal hygiene more seriously as compared to the other age group. This agrees with the findings of Schmidt, *et al.,* 2009 and Reuben *et al*., 2013.

Similarities in the findings of this study with that reported by other researchers lay claims to the fact that those rural communities often lack basic social amenities, which have negatively impacted on the young ones. These communities lack basic health care services, limited access to good and healthy toilet facilities, lack of pipe borne water and a host of limited access. The prevailing deplorable state of infrastructure in the communities surveyed has supported the transmission of *E. histolytica* and affecting mostly the growing children.

CONCLUSION

Amoebic dysentery a neglected tropical disease that affects most rural communities in developing countries like Nigeria has posed great challenges on human development. This has an adverse effect on school age children who are the hardest hit. Government at all levels must intensify efforts at reaching the grassroots through the integration of regular mass enlightment on programs. Efforts should also be geared at creating awareness through health education especially in schools to reduce the scourge.

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