ejpmr, 2024, 11(4), 01-05

SJIF Impact Factor 7.065

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

PREVALENCE OF AMOEBIASIS IN ZONE-A AGRICULTURAL DISTRICT OF BENUE STATE NIGERIA

Ali C. O.*, Amuta E. U., Onekutu A., Ikpa T. F. and Iboyi M. O.

Department of Zoology, Joseph Sarwuan Tarka University Makurdi, Nigeria.

***Corresponding Author: Ali C. O.**

Department of Zoology, Joseph Sarwuan Tarka University Makurdi, Nigeria.

Article Received on 11/02/2024 **Article Revised on 01/03/2024** **Article Accepted on 22/03/2024**

ABSTRACT

Amoebiasis is a life-threatening and high prevalent infection in developing countries. A prevalence study was undertaken in the Zone A Agricultural District of Benue State. A total of 290 stool samples were collected and screened among consented persons using standard microscopic techniques. Demographic data collected include locations, gender and age. Data analysis was done using descriptive and inferential statistics. The Zone recorded 82 infected cases out of a total of 290 subjects screened, resulting in total prevalence of 28.3%. As a result, the area could be described as an endemic region of amoebiasis. There was no significant association between infection and the locations in Zone A (χ^2 =2.29, P>0.05). The study recorded high number of infected males 24 (20.3%) and females 58 (33.7%) but the difference was not significant (P>0.05). Age group 11-20 years and 21-30 years recorded the higher prevalence of 38.2% and 35.7% respectively than other groups. Amoebiasis was not significantly associated with gender and age group (P>0.050) in study area. Therefore, both male and females as well as all age groups are equally vulnerable to amoebiasis thus suggesting the possibilities of other predisposing factors in the Zone. The data presented in this report is important in the control of amoebiasis in the communities under the Zone A Agricultural District of Benue State, Nigeria.

KEYWORDS: Zone A, Amoebiasis, Prevalence, Demographic data, Control.

INTRODUCTION

Amoebiasis caused by *Entamoeba histolytica* is the third leading parasitic disease causing morbidity and mortality in humans.[1] *Entamoeba histolytica* is well recognized as a pathogenic amoeba, associated with intestinal and extraintestinal infections.[2] *Entamoeba histolytica* is distributed worldwide and it has been estimated that up to 50 million people are infected by *E. histolytica*, primarily in developing countries, and it is responsible for over 100,000 deaths a year just behind malaria and schistosomiasis.[3,4,5,6,7]

The prevalence of amoebiasis varies with the population of persons affected, varying among nations and between zones with various financial conditions. Infection occurs worldwide, with a higher prevalence in countries of low socioeconomic status and poor public health. Countries with a high rate of infections include Africa, India, Mexico, and Central and South America.[7,8] Amoebic colitis is manifested in gastrointestinal disorders including as dysentery and diarrhoea.[2,7,10,11] Amoebic liver abscess is the most common form of extraintestinal amoebiasis.[7] Other clinical manifestations are: amoeboma, pleuropulmonary amoebiasis, cardiac infection, cerebral amoebiasis, amoebic peritonitis, amoebic pericarditis, genitourinary involvement and amoebic appendicitis. WHO and CDC guidelines on control of amoebiasis provides the need to for prevalence studies in different parts of the world. Some authors reported high prevalence of amoebiasis in many parts of Nigeria[12,13,20] There are sketchy pieces of information on intestinal parasitic infection in Benue State, the prevalence of amoebiasis in the different Agricultural zones of Benue State is non-existent. Such studies are necessary for disease control. The present investigation therefore determined the prevalence of amoebiasis in the Zone A Agricultural District of Benue State, Nigeria.

MATERIALS AND METHODS

Study area

The research was conducted in the Zone Agricultural District of Benue State Nigeria. The State lies within the lower river Benue trough in the middle belt region of Nigeria. Its geographic coordinates are longitude 7° 47' and 10° 0' East; latitude 6° 25' and 8° 8' North. River Benue is the dominant geographical feature and it is the second largest river in Nigeria. Agriculture forms the backbone of the Benue State economy, engaging more than 70 per cent of the working population. This has made Benue a major food producer in the nation. Kwande and Kastina LGAs are among the prominent LGAs in the Zone A.

Ethical Consideration and Study design

Ethical clearance was sought and granted by the Department of Zoology, Joseph Sarwuan Tarka University Makurdi and the Benue State Hospital Management Board, in Nigeria. This study was undertaken between January 2018 and April 2022. Inclusion criteria for enrolment of participants were those living around tributaries, rivers, ponds, dams and lakes and those willing to participate in the study by signing or thumb-printing the Informed Consent Form (ICF). People who did not consent or assent to be part of the study were simply excluded. Kwande and Katsina-Ala LGAs were specifically chosen for the study within the Zone A Agricultural District.

Sample Collection and Preservation

A total of 290 stool samples were collected from people in the Zone A consisting of 182 samples in Kwande LGA (182) and 108 samples in Katsina-Ala LGA. Fresh stool specimens were collected from each person into a clean labeled sterilized bottle. Positive samples were preserved without fixative and stored at -20º C.[15]

Direct wet film examination of stool for Eggs and Larvae of parasites.

The procedure for the formol ether concentration technique adopted for this research was as presented by.[15] Using an applicator stick, 1g (Pear size) of faeces was emulsified in about 4mls of 10% formol water contained in a tube. Three milligrams (3mls) of 10% v/v formol water (10% of concentrated formalin and 90mls of water) was added and the bottle caped and mixed well by shaking. Then the emulsified faeces was sieved and the sieved suspension collected in a beaker. The suspension was transfered to a conical (Centrifuge) tube made of strong glass and 3-4mls of diethyl ether was added. Then, the tube was stopped and mixed for a minute. With a tissue wrapped around the top of the tube, the stopper was loosen (Considerable pressure will have built up inside the tube). The tube was centrifuged immediately at 750-1,000g (Approximately 3000rpm) for 1 minute. The preparation was examined microscopically using the X10 objective with the condenser iris close sufficiently to give good contrast. X40 objective was used to examine cyst.[15]

Data analysis

Descriptive statistics was used to summarize the data collected. Prevalence was estimated as percentages. Non parametric inferential statistics applied to test for significance in variation and associations include the Friedman statistics, Kruskal- Wallace test and Chi-square tests at appropriate degree of freedom. Level of significance was $P \leq 0.05$ (95% confidence limit).

RESULTS AND DISCUSSION

Table 1 gives the prevalence of amoebiasis in Zone A Agricultural District of Benue State, Nigeria. The Zone recorded 82 infected cases out of a total of 290 subjects screened, resulting in total prevalence of 28.3%. There were 59 infected cases in Kwande LGA out of 182 stool samples with prevalence of 32.4% while Katsina-Ala LGA recorded 23 cases out of 108 stool samples with prevalence of 21.3%. Amoebiasis infection was not significantly associated with the two LGAs in Zone A (χ^2 =2.29, P>0.05).

The existing prevalence is higher than the 3.5% reported for many developed countries where the standard of living is high and risk factors are low.[7] This study aligns with other reports published by the World Health Organisation[17] that described developing and underdeveloped countries as being endemic in terms of amoebiasis. Results were consistent with the estimated average prevalence of *Entamoeba* infection ranging from 1-40% in Africa.[7] WHO[17] gave a global classification system for prevalence of amoebiasis as low (< 10%), moderate (11-25%) and high or endemic (>25%). Using this information, the reported prevalence of 28.3% in Zone A Agricultural District of Benue State falls within the WHO standard classification for high or endemic infection rate. Kwande LGA with 32.4% prevalence also falls within the endemic class while Katsina-Ala LGA with 21.3% falls within the moderate class of infection. Generally, the prevalence recorded in Zone A was higher than the average prevalence of 10 % reported by WHO[17] for developing countries. Result was also consistent with the estimated average prevalence of *Entamoeba* infection ranging from 1-40% in Africa.[7] From the result, the Zone A axis could be described as hot spots of the infection that require iimediate intervention programme for amoebiasis while Kwande LGA demands more crucial attention than the other area studied.

Different infection rates have been reported in many parts of Nigeria. The 28.3 % prevalence of amoebiasis found in the Zone A Agricultural District of Benue State was higher than the 8.1% in Bwari Abuja,[18] 17.0% from Niger State,[14] 5.1% from Kwara State,[18] 6.5 % in Nassarawa State[19] and 26.7 % among school children in Lafia, Nasarrawa State.[19] Reports given by some authors on amoebiasis in some States within Nigeria gave higher prevalence than the present outcome. These include 75.1% in Pategi town, Kwara State,[12] 46.6 % in Zaria, Kaduna State,[13] 56.39% in Wamakko LGA Sokoto,[14] 72% among food vendors in Abeokuta 67.6% among primary school children in Anambra State.[21] Although, Benue State has benefited from mass drug administration of the preventive chemotherapy using Abendazole to deworm children of various schools, the present result has undermined such laborious intervention. This could be due to many reasons. It is possible that the inhabitants of this Zone have not had enough awareness and orientation on the need to receive the drug or it could be due to inadequate supply of the drug making it impossible to cover the entire Zone or due to the fact that only children of a particular age were treated.

Table 2 gives the prevalence of amoebiasis in relation to the gender of infected subjects in the two LGAs representing the Zone A axis of Benue State. Zone A recorded the high number of infected males 24 (20.3%) and females 58 (33.7%) but the difference was not significant (P>0.05). There were more females than males among the infected subjects in the two LGAs although infection was not significantly associated with gender in the two LGAs (P>0.05). Kwande LGA had higher number of infected males 17 (23.3%) and females 42 (38.5%) than Katsina-Ala. In the latter, there were 07 (15.6%) infected males and 16 (25.4%) infected females. Table 3 gives the prevalence of amoebiasis in relation to the age group of infected subjects in the two LGAs representing the Zone A axis of Benue State. Age group 11-20 years and 21-30 years recorded the higher prevalence of 38.2% and 35.7% respectively. Amoebiasis was not significantly associated with age group (P>0.050) in Zone A. In Kwande LGA, age groups 11-20 years and 21-30 years had the highest prevalence of amoebiasis (42.9% and 41.0% respectively). Katsina-Ala had similar but lower pattern of infection where the aforementioned age brackets had prevalence of 30.8% and 29.0% respectively while those above 41 years had no any infection case. Divergent reports exist on the relationships between amoebiasis and demographic parameters of the infected patients including gender and age.[12,14,23] The present study found equal vulnerability of male and female to amoebiasis infection though females had higher but insignificant rate than females. This agrees with some reports where both sexes are equally susceptible to amoebiasis.[12,23]

In studies carried out by some workers[24] females were more infected than males. Also, Mohammed *et al*.[14] in their report, attributed the higher prevalence of amoebiasis in males to their adventurous nature which affords them a greater exposure due to tendency of indulging in outdoor activities. Inabo *et al*.[25] and Reuben *et al*.[22] independently reported that males were more exposed to this infection than females who might be more preoccupied with domestic activities and this tends to limits their level of exposure to the possible sources of infection. In the present study, the higher number of infected female than male is insignificant and therefore could not be accounted for. Both male and female equally engage in agricultural activities, sales and marketing of agricultural products. Both genders interact with large water bodies and also dwell in non-hygienic environment where the cysts of *Entamoeba* might be ingested.

Table 1: Prevalence of Amoebiasis in Kwande and Katsina-Ala Local Government Area (Zone A) of Benue State.

Local government area	No. examined	No. of Infected (%)
Kwande	182	59 (32.4)
Katsina-Ala	108	23 (21.3)
Total	290	82 (28.3)

$\chi^2_{(1df)}$ (% Infection and LGAs) =2.29, P= 0.130 (P>0.05)

Table 2: Prevalence of Amoebiasis in Relation to Gender in Kwande and Katsina-Ala (Zone A) LGAs.

Local government area	Males		Females	
	No. examined	No.(%) infected	No. examined	No.(%) infected
Kwande	73	17 (23.3)	109	42 (38.5)
Katsina-Ala	45	07 (15.6)	63	16 (25.4)
Total	118	24.0 (20.3)	172	58 (33.7)

Friedman $S_{(1df)}$ (Infection and Gender blocked by Location) =2.00, P= 0.157 (P>0.05)

Table 3: Age Related Prevalence of Amoebiasis Kwande and Katsina-Ala Local Government Areas.

	Age(Years)									
	≤10		11-20		21-30		31-40		≥41	
	No. examined	No. infected (%)	No. examined	No. infected (%)	No. examined	No. infected (%)	No. examined	No. infected (%)	No. examined	No. infected (%)
Kwande	21	07 (33.3)	42	18 (42.9)	39	16 (41.0)	43	13 (30.2)	37	05 (13.5)
Katsina-Ala	18	03 (16.7)	26	08 (30.8)	31	09 (29.0)	21	03 (14.3)	12	0 (0.0)
Total	39	10 (25.6)	68	26 (38.2)	70	25 (35.7)	64	16 (25.0)	49	5 (10.2)

Friedman $S_{(4df)}$ (% Infection and Age blocked by LGA) = 8.00, P= 0.092 (P>0.05)

From statistical inferences, all age groups are equally vulnerable to amoebiasis in this study. However, infection occurred more in young adults of between 21 to 30 years and less in older group (≥41 years). It shows that all age groups are equally exposed to predisposing risk factors in the State. In other reports, infection and age groups are significantly associated.[26,27] The observed infection rate in these regions could be as a result of high level of predisposing factors in communities around within the Zone A axis. Factors such as ignorance, unhealthy sociocultural 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 had been reported to predispose people to amoebiasis infection.[15,14] It is worrisome to note that some of the infected persons are at risk of complications arising from the *E. hystolica* infections. This has been reported to degenerate into severe life-threatening cases if not diagnosed and treated and it might account for high cases of amoebic dysentery or amoebic colitis when infective cysts of *E. hystolitica* are ingested through faeca-oral routes and contamination of food and water.[7]

CONCLUSION

The prevalence of amoebiasis in the Zone A Agricultural District of Benue State was found to be 28.3%. Hence this region could be described as high and endemic according to WHO classification. It this requires urgent intervention programme. The study found no significant association between infection and demographic parameters such as location, gender and age group. Here, male and females as well as all age groups are equally vulnerable to amoebiasis thus suggesting the possibilities of other predisposing factors in the Zone.

REFERENCES

1. Saidin, S., Othman, N., Noordin, R. Update on laboratory diagnosis of amoebiasis. *European Journal of Clinical Microbiology and Infectious Disease*, 2019; 38(1): 15-38.
2. Marie, C. Amebiasis, PhD seminar presentation at University of Virginia School of Medicine, 2022.
3. Ximénez, C., Cerritos, R., Rojas, L., Dolabella, S., Moran, P., Shibayama, M., Gonzalez, E., Valadez, A., Hernandez, E., Valenzuela, O., Limon, A., Partida, O. and Silva, E.F."Human amoebiasis: breaking the paradigm?" *International Journal of Environmental*, 2010.
4. Nath, J., Ghosh, S.K., Singha, B. and Paul, J. "Molecular epidemiology of amoebiasis: a cross-sectional study among north east Indian population," *PLOS Neglected Tropical Diseases*, 2015; 9(12): e000422
5. Dong, H., Li, J., Qi, M., Wang, R., Yu, F., Jian, F., Ning, C. and Zhang, L. Prevalence, molecular epidemiology, and zoonotic potential of *Entamoeba* spp. In nonhuman primates in China," *Infection, Genetics and Evolution*, 2017; 54: 216–220.
6. Elsheikha, H.M., Regan, C.S. and Clark, C.G. "Novel Entamoeba findings in nonhuman primates," *Trends in Parasitology*, 2018; 34(4): 283–294.
7. Center for Disease Control and Prevention CDC, 2023. Parasites Available from:https://www.cdc.gov/parasites/about.html
8. Haque, R. and Petri Jr, W.A. Diagnosis of amoebiasis in Bangladesh. *Archives of Medical Research*, 2010; 37: 273-276.
9. CDC, Global Health, Division of Parasitic Diseases and Malaria, 2019.
10. Escobedo, A.A., Almirall, P. and Alfonso, M. Treatment of intestinal protozoan infections in children. *Archive of Diseases in Children*, 2009; 94(6): 478-82.
11. Arthur, C. and Richard, L. A. Entamoeba histolytica Infection. A publication of the US government-NIH NLM. Accessed at NCBI homepage, 2023. (https://www.ncbi.nlm.nih.gov)
12. Adedoja, A., Akanbi, A.A. and Babatunde, S. Asymptomatic intestinal protozoa in school age children in Pategi, Pategi LGA f Kwara State, Nigeria. *African Journal of Infectious Diseases*, 2015; 9(2): 39 – 42.
13. Ngobeni, R., Abhyankar, M. M., and Jiang, N. M. *Entamoeba histolytica*-encoded homolog of macrophage migration inhibitory factor contributes to mucosal inflammation during amoebic colitis. *Journal of Infectious Diseases*, 2017; 215: 1294 – 302.
14. Mohammed A. S, Muhammad A., Baba J., Mustapha A., and Hussaini H. B. Prevalence of *Entamoeba histolytica* infection among primary school children in five selected communities of Wushishi Local Government Area, Niger State, Nigeria. *Federal University Dutsin-Ma Journal of Sciences, 2020; 4(3): 663 – 66.*
15. Silva, E.E.F. and Gomes, M.A. "*Entamoeba histolytica/ Entamoeba dispar*," in Parasitologia Humana, D. P. Neves, A. L. de Melo, M Linardi, and A Vitor, Eds., Atheneu Press, Sao Paulo, Brazil, 2016; 264.
16. WHO Parasitic infection. Available from https://pubmed.ncbi.nlm.nih.gov/26633 *Research and Public Health*, 2023; 7(3): 1105– 1120.
17. World Health Organization An information bulletin for WCO Kenya. Kenya hosts 1st African regional workshop on coordinated approaches to pneumonia and diarrhoea prevention and control, 2011; 1: 1-4.
18. Okusaga, F. R., Ombugadu, R. J., Yako, A. B. and Amuga, G. A Microscopic and Molecular Detection of *Entamoeba histolytica* in Selected Public Primary School Pupils of Bwari Area Council, F.C.T Abuja, Nigeria. *European Journal of Biology and Biotechnology, 2021;* 2(3): 57-61.
19. Abubakar, U. Point-prevalence survey of hospital acquired infections in three acute care hospitals in Northern Nigeria. *Antimicrobial Resistance and Infection Control*, 2020; 9(63): 1-7.

20. Mohammed, T., Tijjani, I., T. H. I. Spencer, T. H. I., Mohammed A.B. Garba1, M. K., Nataala, S. U. Imam, A. U. and Aschroft O.F. Prevalence and Predictors of *Entamoeba histolytica* Infection among School-age Children in Wamakko Local Government Area, Sokoto State Nigeria. *South Asian Journal of Parasitology*, SAJP, 2018; 42363.
21. Aribodor, D. N., Anidebe, A. O., Eneanya, O. A. and Emelummadu, O. F., *Entamoeba histolytic*a Infection in children aged 0-12 years in rural communities in Anambra State, Nigeria. *Nigerian Journal of Parasitology, 2012;* 33(2): 129-132.
22. Reuben, C.R., Katsa, M. and Hassan, S.C. Prevalence of Intestinal Amoebasis in School Age Children in Lafia, Nasarawa State, Nigeria. *International Research Journal of Biological Science*, 2013; 2(7): 42-45.
23. Amuga, A.G. and Onyeka, J.O.A. Prevalence of Entamoeba histolytica among rural community in Bassa Local Government Area of Plateau State, Ngeria. *Journal of Pest and Disease and Vector Management*, 1995; 2: 89-92
24. Shler, A. M. and Hawri, M. B. Molecular Identification and Prevalence of *Entamoeba histolytica*, *Entamoeba dispar* and *Entamoeba moshkovskii* in Erbil City, Northern Iraq. *Polish Journal of Microbiology, 2020;* 69(3): 263–272.
25. Inabo, H.G., Galadima, M., Ogbodu, L.J. and Okuofu, C.A., Prevalence of *E. histolytica* and *G. lamblia* primary school pupil in five rural villages around Kaduna and Zaria. *Nigerian Journal of Parasitology*, 21:61-68.
26. Mbagwu, T.T., Abioye J.K. and Seye B. Prevalence of *Entamoeba histolytica* in Bingham University and Environ. *EC Microbiology*, 2019; 15(4): 242-250.
27. Jade, N.S., Mohammad, A., Djamel, H., Anthony, M. and Stéphane, M. Updates on the worldwide burden of amoebiasis: A case series and literature review. *Journal of Infection and Public Health*, 2022; 15(10).: 1134-1141.