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TRANSMISSION OF AMOEBIASIS AT SOME SELECTED AREAS OF KANO METROPOLIS, KANO STATE, NIGERIA: THE ROLE OF HUMAN FAECES USED AS MANURE

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ABSTRACT
A study to determine the role of human faeces used as manure in the transmission of amoebiasis was undertaken at four selected areas in Kano metropolis. A total of one hundred faecal samples, twenty five per site were screened using microscopy method. Out of this; forty five were positive for cysts of Entamoeba histolytica from which a total of 300 cysts were identified. Site A (Ranji) had to total of 59 (19.67%) cysts, site B (Kofar Dawanau) had a total of 60 (20.0%), site C (Kofar Famfo), had a total of 76 (25.33%) and site D (Gyadi-gyadi) had a total of 105 (35.0%). The result showed that sites C and D (Gyadi-gyadi and Kofar Famfo) had the highest number of E. histolytica cysts (25.33% and 35.0% respectively) while sites A and B (Ranji and Kofar Dawanau) had the lowest values of E. histolytica cysts recovered from the four sites (i.e. 19.67% and 20.0% respectively). No significant difference between the sites as per the distribution of the cysts was found using ANOVA at p = 0.05. Based on the result obtained in this study it was concluded that the disease can be transmitted through the use of human faeces as manure. Good sanitary practices amongst others are suggested for control of amoebiasis.

Key words: Human faeces, manure, amoebiasis, transmission, Kano metropolis

INTRODUCTION

Amoebiasis is a protozoan infection caused by *Entamoeba histolytica* and causes amoebic colitus and liver abscess. In developing countries, the infection occurs primarily among travelers to endemic regions, recent immigrants from endemic regions, homosexual males, immuno-compromised persons and institutionalized individuals (Swords and Canytey, 2002). Amoebiasis is the third common parasitic infection in about 10% of the world's total population causing death after *Schistosomiasis* and malaria (Ramasubrahamanian, 2006). A very high prevalence of the disease has been reported in tropical countries like India, Mexico, Central and South America (Kingsbury *et al*., 1985). In the developing world, *E. histolytica* causes over 450 million infections per annum and about 100,000 deaths (Ravdin, 1988). In addition, the distribution of *E. histolytica* has been found to be more related to inadequate sanitation and poor personal hygiene than to climatic factors (Cheesbrough, 1998).

Furthermore, Ramasubrahamanian (2006) reported that in tropical areas with poor sanitation, infection rates are estimated to reach 50% of the total population. Yet, about 90% of the infections are found to be asymptomatic, while the remaining 10% produce a spectrum of symptoms varying from dysentery to amoebic liver abscess.

Although amoebiasis is transmitted by direct contact with dirty hands or objects or through sexual contacts, the primary mode of transmission is through faecal contamination of drinking water and foods (Ravdin, 1988; Wikepedia, 2006).

E. histolytica is transmitted as a result of the ingestion of infected cysts in food or water contaminated with sewage or from hands of persons contaminated with faeces. Lack of personal hygiene among cyst carriers contributes to the spread of the infection, enhanced by feeding on faeces containing the cysts and subsequently contaminated food (Cheesbrough, 1998). This study was carried out on faecal samples collected from the sites primarily because local vegetable and wet season farmers were found to be collecting the dried faeces from the sampling sites for use as manure in their farms with out knowing the possible health implication of that practice.

The aims and objectives of this research were therefore to carry out microscopic analysis of human faeces used as manure, collected from Ranji, Kofar Dawanau, Kofar Famfo and Gyadi-gyadi Court Road, with the view to finding out whether such areas possibly contribute to the incidence of the disease in the area or otherwise as information on this appeared to be scanty in the area with the view to enlighten the public and health authorities concerned for appropriate measures to be taken.

MATERIALS AND METHODS

Study Sites

Four sites were selected for the purpose of this research within Kano metropolis. Site A is Ranji, located at Nassarawa Local Government Area of Kano state. This site is bounded to the south by Tudun Murtala Quarters, to the east by Dakata Quarters and to the north by Bompai Industrial Estate. Site B is located at Kofar Dawanau, Dala Local Government Area, along Kano city wall. It is bounded to the north by the famous Dala hill and Dandinshe Quarters, and to the south by Kofar Dawanau Quarters. Site C is located at Kofar Famfo, Gwale Local Government Area, along Bayero University, Kano Road. The site is bounded to the north by Dukawuya quarters and to the south by Central Administration Kano State Polytechnic. Site D is located along Gyadi-gyadi Court Road, opposite Post Office, it is bounded to the east by Gyadi-gyadi quarters and to the west by Hausawa quarters. The site has a lot of decaying organic matter and water in the area. This site belongs to Ministry of Environment Kano State, under the Refuse Management and Sanitation Board (REMASAB). All the four sites above are largely being used as inappropriate dumping sites of the faeces from domestic and other sources by the locals. Similarly, the sites are being utilized by local people particularly rural-urban migrators that come to the city and do not use public convenience and also those that do not have proper places to live in the metropolis and therefore respect proper sanitary practices in the metropolis.

Sample Collections

Prior to collection of samples and subsequent analysis, a pilot survey was conducted on the sites with the view to ensuring that the dumped faeces at the sites were being collected and used as manure by local farmers.

One hundred (100) samples of stool, 25 from each site, were collected with the aid of applicator stick. Each sample was then placed in a clean screw cap bottle. Accordingly, the sample bottles were labeled based on the site of collection, 1 to 25 as follows: - A1, A2,….A24 and A25; B1, B2,….B24 and B25; C1, C2,….C24 and C25; D1, D2,....D24 and D25). The samples were always taken to the laboratory and immediately analyzed microscopically in accordance with Cheesbrough (1998).

Preparation of Reagents

Physiological Saline and Dobell's Iodine reagents (Table 2) used in this research were prepared in accordance with Cheesbrough (1998) procedure. Physiological Saline reagent was prepared by dissolving 8.5g of sodium chloride in a small quantity of water and then made to a liter, then transferred in to a clean leak proof bottle. The bottle was then labeled and stored at room temperature. To make 200ml of the Dobell's iodine reagent, 8g of potassium iodide was also weighed and transferred in to a clean leak – proof brown bottle of 250ml capacity. Small quantity of water was added and shaken well to dissolve the reagent and then made up to 200ml. Four grams (4g) of iodine was then added to the potassium iodide solution prepared above and then mixed up well to dissolve the iodine (Cheesbrough, 1998).

Analysis of Samples

A drop of physiological saline was placed on one end of a clean slide and another drop of Dobell's iodine on the other end. A wire loop or piece of stick was used to mix a small amount of the stool sample (about 2mg) and matched with the Dobell's iodine until a smooth thin preparation was obtained. Each preparation was covered with a cover slip. The entire saline preparation was examined systematically for cysts of *E. histolytica* under light microscope. The amoebae (trophozoites) were usually examined on fresh dysenteric samples to avoid their encysting. Several microscopic fields were always examined with x40 objective before reporting "no cyst found". The iodine preparation was used to assist in the identification of the cysts. The grading of cysts found per preparation was based on the chart reported by Cheesbrough (1998) as follows: Scanty (1–3), few (4–10), moderate (11-20), many (21–40) and very many (>40). The above method of grading the cysts on the basis of the fact that it is only the cysts that survive in that environment.

Statistical Analysis

Statistical analysis was carried out using ANOVA operated on a Microsoft Excel software at 5% probability level.

RESULTS

The results from this study are presented in Table 1 and 2. Table 1 showed that out of the total of 100 faecal samples analyzed 45 (45%) were found to be positive and 55 (55%) negative for the cysts of the *E. histolytica* recovered from the sampling sites. The highest recovery of 13 (13%) was made from Kofar Famfo (site C) followed by 12 (12%) from Ranji (site A) while Kofar Dawanau (site B) and Gyadi-gyadi Court Road (site D) both had a recovery of 10 (10%) each. On the other hand, the total negative samples for the cysts of this protozoan parasite at sites A, B, C and D were 13 (13%), 15 (15%), 12 (12%) and 15 (15%) respectively. Thus, the highest number negative of 15 (15%) were recorded from site B and D while the least negative was from site C (12 (12.0%)). Table 2 showed that out of the 100 samples screened, 300 cysts of *E. histolytica* were recovered from the saline and iodine preparations of the stool samples collected from the study sites. Out of this, 154 (51.33%) were recovered from saline preparation, while 146 (48.67%) were from iodine preparation. Ranji (site A) appeared to have the list frequency of occurrence of the cysts, having recovered 59 (19.67%) from both preparations, 29 (9.67%) and 30 (10.00%) were recovered from saline and iodine preparations respectively.

Kofar Dawanau (Site B) was the second least after Ranji with 60 (20.00%) as the total number of the cysts recovered from the site; 28 (9.33%) from saline and 32 (10.67%) from iodine preparation. The results of this screening (Table 2) revealed that Kofar Famfo (Site C) was second to the highest in terms of the frequency of occurrence of the cysts during the period of study with a total of 76 (25.33%) cysts; 41 (13.67%) from saline and 35 (11.66%) from iodine preparation. On the other hand, the highest number of cysts recovered during the period of this research were from Gyadi-gyadi Court Road (Site D) with a total of 105 (35.00%). Out of the above, 56 (18.67%) and 49 (16.33%) were respectively recovered from saline and iodine preparations as shown in Table 2. No significant difference between the sites as per the distribution of the cysts was found using ANOVA at $p = 0.05$.

Table 1: Distribution of Positive and Negative Faecal Samples for the Presence of *E. histolytica* from the sampling Sites

Sites	Number of Samples Identified in Physiological Saline and Dobell's Iodine preparations (%)		Total (%)
	Positive	Negative	
Ranji (A)	12 (12.0)	13 (13.0)	25 (25.0)
Kofar Dawanau (B)	10 (10.0)	15 (15.0)	25 (25.0)
Kofar Famfo (C)	13 (13.0)	12 (12.0)	25 (25.0)
G/gyadi C. Rd. (D)	10 (10.0)	15 (15.0)	25 (25.0)
Total (%)	**45 (45.0)**	**55 (55.0)**	**100 (100.0)**

Numbers in parenthesis are percentages

Table 2: Cysts of *E. histolytica* Found in Samples of Faeces from the Sampling Sites

Sites	Number of Cysts Recovered (%)		Total (%)
	Saline	Iodine	
Ranji (A)	29(09.67)	30(10.00)	59 (19.67)
Kofar Dawanau (B)	28(09.33)	32(10.67)	60 (20.00)
Kofar Famfo (C)	41(13.67)	35(11.66)	76 (25.33)
G/gyadi C. Rd. (D)	56(18.67)	49(16.33)	105 (35.00)
Total (%)	**154(51.33)**	**146(48.67)**	**300 (100.00)**

N.B.: Numbers in parenthesis are percentages

DISCUSSION

The results of this study showed that there was an incidence of *E. histolytica* cysts at all the sites (Table 1 an 2) and therefore, they can all serve as potential sources of the infection. However, all the incidences appeared to be lower than the high rate of 50% reported by WHO (1997) in the developing areas worldwide since even the highest incidence of 35% in this study at Gyadi-gyadi Court Road (site D) was lower than the above. Nonetheless, incidence of the cysts recorded at Kofar Famfo (site C) of 25.33% corroborate well with the one reported by Gatti *et al.* (2000) of 26.97% in a remote area of Ecuador.

The lowest incidence of the disease recorded from Ranji (site A) and Kofar Dawanau (site B) of 19.67% and 20.00% respectively, were much lower than the estimated prevalence of disease in the United States of 4% (Communicable Disease Service Manual, 2003), where personal hygiene and methods of sewage disposal are said to be better than what is obtainable here but closer to the incidence reported by Sabharwal *et al.* (1991) of 23% in Medical Students of Dayanand Medical College and Hospital. Ludhiana. The higher incidence of *E. histolytica* cysts at sites C and D observed in this study might be as a result of higher quantity of faeces being deposited at these sites which were much higher than those of sites A and B and also the environmental conditions that favour the survival of the cysts like water, soil, decaying plant materials, improper sanitation and management of sewage at sites C and D which were in line with the literature on the occurrence of *E. histolyica* reported by Smyth (1994) that the parasites occur in every natural environment capable of supporting life (e.g. water, soil, decaying plant material and sewage).

CONCLUSION

Based on the results of this study it can be concluded that all the four sampling sites can serve as possible sources of amoebiasis in the metropolis through the use of human faeces from the sites as manure in our agricultural farms. However, there appears to be higher risk of the infection by using faeces collected from Kofar Famfo (site C) and Gyadi-gyadi (site D) than from Ranji (site A) and Kofar Dawanau (site B) as the former have higher percentages of cysts of the parasite probably due to better survival conditions and faecal load in the former than in the latter sites although there is possibility of transmission in all the sites as one viable cyst can cause the infection. Therefore, amoebiasis being the third common parasitic infection causing death and a worldwide infection whose distribution is more associated with poor sanitary and personal hygiene, the disease needs attention by individuals, community, states, national and international organizations so that effective preventive and control measures of this modes of transmission can be achieved.

Thus, it was recommended that Government should enact a law that will stop people from using human faeces as manure which can be achieved by subsidizing the price of fertilizers to farmers.

REFERENCES

Blessmann, J. Linh, P.V, Buss, H. and Tannich, E. (1998). Epidemiology of Amoebiasis in Region of High Incidence of Amoebic Liver Abscess in Central Vietnam. http://www/ajtmh.org/egi/content/abstract/66/5/578.

Cheesbrough, M. (1998). *District Laboratory Practice for Tropical Countries* (ed.). 1:3. Cambridge University Press, U.S.A. Pp. 190-203.

Communicable Disease Service Manual (2003). Amoebiasis (*Entamoeba histolytica*). The New Jersey Department of Health and Senior Services. P. 1-6. http://www.state.nj.us/health/cd/manual/amoebiasis.pdf

Gatti, S. Robinson, F., Anselmi, J. Bruna, A. and Scaylia, M. (2000). A Study on the Incidence of *E. histolytica* in a Remote Rural Area of Ecuador. http://www.ajtmh.or/cgi/content/abstract/67/1/123.

Kingsbury, D. T., Wagner, G. E. and Sagal, G. P. (1985). *Microbiology, then National Medical Series for Independent Study*, Harwal Publishing Company, Pp. 241-243.

Ramasubrahamania, V. (2006). Amoebiasis, Mark F. Wiser, Tunale universitywebhealthcentre.com.

Ravdin, J. (1988). *Amoebiasis, Human Infection by Entamoeba histolytica*. John Wiley and Sons, New York, USA. Pp. 21-27.

Sabharwal, B. D., Aggarwal, S. P., Duggal, A. and Kalsi, G. (1991). The Prevalence of Intestinal Amoebiasis and Giardiasis Among Medical Students and Hospital Employees of Dayanand Medical College and Hospital, Ludhiana. *Indian Journal of Maternal and Child Health.* April – June: 2 (2): 58-59.

Smyth, J. D. (1994). *Introduction to Animal Parasitology*, (ed.). Cambridge University Press, Cambridge, USA. Pp. 22-29.

Swords, J. R. and Canytey, R. J. (2002). Amoebiasis. Infectious Diseases Society of America, USA. *Journal of Medicine*. 3:1-11.

WHO, (1997) www.who.int/ctd/html/amoedia html.

Wikepedia, (2006). A Free Encyclopaedia (ed.). 18 V.14.