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PATHOGENIC INTESTINAL PARASITES AND BACTERIAL AGENTS IN SOLID WASTES
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PATHOGENIC INTESTINAL PARASITES AND BACTERIAL AGENTS IN SOLID WASTES

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ABSTRACT

Objective: **To determine the profile of potentially pathogenic enteric parasites and bacterial agents in municipal refuse dumps in Ibadan, Nigeria.**
Design: **A cross-sectional survey.**
Setting: **Five major market places refuse dumps in Ibadan municipality, Nigeria.**
Methods: **The major market places in Ibadan city were randomly selected by lottery method. The refuse sludge were sampled and examined parasitologically and bacteriologically using the methods as described. Data analysis was done by using chi-square test where applicable.**
Results: **Cases of multiple intestinal parasites and bacterial agents were commonly encountered in the sludge refuse samples. The commonly found parasitic agents were of both human and veterinary importance. These include *Ascaris Lumbricoides* (9.3 egp), *Entamoeba histolytica* (8.07 cyst per gram), Hookworm/strongyle (6.27 egp) and *Ascaris suum* (1.07 egp). Others were *Ascaris vitolorum* (1.09epg), *Strongyloides papillosu* (0.52 larvae per gram.), *Schistosoma suis* (0.31 epg) *Dicrocoelium dendriticum*(0.9egp). The most commonly found bacterial agents were *Klebsiella species, Escherichia Coli, Proteus species, streptococci*, and other gram-positive organisms. Climatic conditions affected the distribution of both parasites and bacterial agents in the sludge ($P<0.001$). More intestinal parasites 2423 (53.4%) and bacterial agents 2150 (27.2%) were encountered at mean air temperature 26.1±0.6, mean relative humidity of 72±3.5%. The degree of contamination by market locations varies significantly ($P<0.001$).**
Conclusion: **A high degree of contamination of solid waste dumpsites with bacterial and parasitic agents was observed in the present study. As a result of the public health importance of the organisms isolated it is opined that well planned waste management and health education programs will go a long way to reduce the potential epidemic risks posed by such sites in Ibadan, Nigeria.**

INTRODUCTION

Refuse, soil, animal waste and sewage sludge are common sources of manure, used to fertilize agriculture fields(1-3). Studies have revealed the incidence and distribution of many pathogenic intestinal parasites and bacterial agents from refuse which infect both man and animals(4-6). The most commonly found bacterial agents include gram negative enteric bacteria like *Pseudomonas species, Salmonella species, Klebsiella species, Escherichia coli, Aeromonas* species and some gram-positive organisms(4-8).

Similarly intestinal parasites are life threatening in many communities and are of a major international health concern(9). It has been shown that refuse dumps are significant source of transmission for intestinal parasitic infection in Kampala, Uganda and Jos, Nigeria(10,11). Whereas many workers have isolated veterinary and medically important parasitic agents from refuse dumps and abattoir in some parts of the world(11-13), there is dearth of information on the status of refuse dumps in Southwestern Nigeria, especially Ibadan, where refuse dumps are found everywhere. Hence this study is designed to determine the profile of potentially pathogenic enteric bacterial and parasitic agents in refuse dumps in major markets in Ibadan metropolis.

MATERIALS AND METHODS

Study Area: This study was carried out between July 1999 and January 2000 in Ibadan, capital of Oyo State, Nigeria, the most populous black city south of Sahara with about 3.5 million (1991 national census). Being a metropolitan city, there is influx of people of other nationalities beside the local indigenous for many reasons socioeconomic and political. This deluge of people into the city has given rise to many market places in the city to the extent that many mountainous refuse dumps are common features in the market

Table 7

Prevalance of potentially pathogenic bacteria in refuse dumps in Ibadan at mean air Tempereatures of 28.4 ±0.5°C Mean Relative Humidity of 72±3.5%

		Percent Positivity											
Refuse Location	No.of sample examined	*Staphylo-coccus aureus (%)*	*Staphylo coccus albas (%)*	*Staphylo coccus specie (%)*	*Yeast cells (%)*	*Gram positive bacilli (%)*	*Esche richia coli (%)*	*Klebsiella specie (%)*	*Proteus specie (%)*	*Pseudo monas specie (%)*	*Salmo nella specie (%)*	Total *	Degree of conta mination(%) #
Bodija	161	7.7	17.1	3.1	3.4	12.3	10	10.6	10.9	20.6	4.3	350	21.7
Sango	161	0.8	4.8	1.6	0	13.7	16.5	17.7	12.1	26.6	6.0	248	15.4
Oritamerin	161	11.2	11.5	0	5.5	11.2	16.2	16.4	10.5	21.4	1.2	401	24.8
Dugbe	161	11.2	11.5	0	1.4	12.7	16.2	7.9	4.7	16.4	17.8	365	22.6
Oje	161	7.3	6.5	0	3.6	16.5	15.3	16.9	6.9	17.8	0	365	22.6

* Total depict polyparasitism in refuse sample
\# Percentage contamination per refuse dump.

The results on the prevalence of potentially pathogenic bacterial agents isolated at mean air temperature of 28.4 ± 0.5°C and mean humidity of 72 ± 3.5% shows that of the 7612 cases of multiple bacterial contamination at this climatic condition, *E. coli* 238 (14.8%) was the highest prevalent followed by *Klebsiella specie* 218 (13.8%) and *Streptococcus* specie 15(0.9%). The variations in the contamination rate by refuse dump were also significant ($X^2 = 834.23$ df = 4, $P<0.001$).

DISCUSSION

This study has shown that there are high degrees of refuse contamination with pathogenic human and animal intestinal parasites and bacterial agents in Ibadan municipality. The commonly found intestinal parasites include *A. lumbricoides, E. histolytica*, hookworm (strongyle), while the least encountered was *Schistosoma suis*. The cysts, oocyst and helminthes eggs recovered from the refuse dump sample were essentially those that were shed in the faeces of human and animals which became dispersed indiscriminately to refuse dumps. Other potential sources include litters from poultry farms, piggeries, sheep, goat from market in the study area and waste from abattoir houses. These sources of cysts and eggs in refuse dumps are similar to those previously reported elsewhere in Nigeria(1,17), and in other parts of the world(18,19). The report of isolation of intestinal parasites of veterinary importance such as *A suum, A.vitulorum Strongyloides papillosu* in Ibadan refuse dumps accords well with the report of Burger(12) that intestinal parasites of veterinary importance are capable of been transmitted to the public through abattoir wastes which were indiscriminately deposited in the refuse dump.

The isolated parasitic agents from municipal refuse are capable of causing outbreak of water or food borne amoebiasis, giardiasis or balantidiasis through the contaminative route(11). This is in consonance with reports of outbreak of giardiasis from cyst and oocyst in municipal sludge(18,19). These reports corroborate the fact that other agents isolated in this study are potential sources of infection to the population in Ibadan.

This study has shown that there were cases of multiple parasitic contaminations in each refuse dump sample. The incidence of the parasites by market locations has shown a statistically significant difference ($X^2 = 1391.52$, df = 4, $P<0.001$). Though Sango refuse dump appeared the most contaminated, the degree of contaminations compared to Oritamerin and Bodija refuse locations is not significant ($P>0.001$). This meant that risk of contracting disease in these areas is relatively the same. The level of pollution in these market places is bound to be higher than the rest as residential buildings in the area have no toilet nor waste disposal facilities hence the residents often make use of the market as dumping ground for their excrement and other wastes.

It has been shown in this study that climatic condition has significant impact on the occurrence rate of parasitic agents in refuse dump in Ibadan. More intestinal parasites (53.4%) were isolated at mean air temperature of 26.1 ± 0.6°C mean relative humidity of 8.2 ± 3.0% than 46.6% isolated at mean air temperature 28.4 ± 0.5°C and mean relative humidity 72 ± 3.5%. This report accords well with other reports(20-22) that the survival of intestinal parasites is dependent on favourable degree of temperature, moisture, humidity, desiccation, and biological activities.

The potentially pathogenic bacterial agents recorded in this study are essentially gram negative enteric bacteria and few other gram positive. These organisms which were also reported earlier(5-7) include *Klebsiella species, Escherichia coli, Proteus species, Pseudomonas*

species, Salmonella species, Staphylococcus aureus and *Staphyloccocus albus* and yeast cells. According to Ashiru and Osoba(23), a number of human diseases have been attributed to have originated from community acquired bacterial agents, especially where environmental conditions such as poor sanitation, heavy flies density and indiscriminate disposal of human and animal waste is prevalent. It is important to note that the heap of refuse dumps in the study area is located near the market center where arrays of exposed food items are displayed. Earlier on, Adeyeba and Okpala(24) have reported that common filth houseflies are active mechanical transmitters of potentially pathogenic parasites and bacterial agents in Ibadan markets. The incidence of the potentially pathogenic bacterial agents in refuse dumps in Ibadan market further confirms the report of Adeyeba and Okpala(24) as enunciated. The results shows a varying degree of multiple bacterial contaminations. Though the variation was generally statistically significant (X^2= 251-50, df = 4, P<0.001) in the study area, the degree of bacterial contamination in Sango market (15.4%) and Oje market (15.9%) was not significantly different.

Prevalence of these multiple bacterial agents varies with change in climatic condition. It has been shown that at mean air temperature of 26.1±0.5°C and mean relative humidity of 82±30%, more bacterial agents were isolated in the refuse than at mean air temperature of 28.4 ± 0.5°C, mean relative humidity of 72 ± 3.5%. The difference in the prevalence by climatic condition was statistically significant (X^2= 834.23) df = 4, P<0.00.1). This reinforces the fact that the survival of bacterial agents depends on conducive atmospheric conditions among other factors as opined by Adeyeba and Okpala(24).

This study has shown that there are high degrees of refuse contamination with pathogenic intestinal parasites and bacterial agents in Ibadan market places. These reservoirs of potential infections agents portends a great danger to public health as most food stuff, sold in the markets are often left exposed to house flies which are mechanical carriers of pathogens in the area(24). It is our considered opinion that the waste dumps in Ibadan could be turned to useful economic resources as against the present status of "nursery of pathogens". Therefore the mountainous refuse dump could be processed into organic fertilizer for use by the farming community of the state and boost the economy of the area. The fertilizer plant would also provide job opportunity for the youth as part of the poverty alleviation programme of government. Besides, the roads would be cleared of the menacing and eye sore blockage by this mountainous rubbish for free vehicular and pedestrian movement. It is also recommended that the Health Education unit of the local authority should be adequately strengthened and funded in order to perform its traditional role/duty of informing, educating and communicating. The information, education and communication components of health educational programme should be strengthened in order to address knowledge, attitude and belief of the selling and buying population.

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