A Survey of Parasite Cysts, Eggs and Bacteria on Nigerian Currency in FCT, Abuja

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ABSTRACT: A survey of parasites cysts and eggs and bacteria as contaminants of the Nigerian naira notes in circulation in the Federal capital territory (FCT) Abuja was carried out between April and May 2008. A Total of Two hundred (200) naira notes of N5, N10, N20, N50, N100, N200, N500 and N1000 denominations, were collected in separate polythene bags from traders, beggars, motor-parks, students of University of Abuja, food vendors, individuals and banks. Collection was based on their denomination (with 25 samples per denomination) and physical appearances (clean, dirty, very dirty and mutilated). Each naira note was rinsed in sterile normal saline and the solution was concentrated using the centrifuge machine and examine microscopically to recover parasite eggs and cysts and part of the solution cultured in Medias of MacConkey agar, CLED agar and Chocolate agar to recover the presence of bacteria. Of the two hundred naira notes examined 32% (64) were contaminated with various species of parasites and 58% (116) with bacteria species while the mints harbour no contamination. The parasites encountered include Ascaris lumbricoides eggs (4.5%), Hookworm ova (8.5%), Lice of the genus Pediculus humanus corporis (5.0%), Enterobius vermicularis eggs (0.5%), flagellates cysts (1.5%) and Entamoeba histolytica cysts (12.5%). Bacteria isolated after culture were Staphylococcus spp (30.5%), Escherichia coli (9.0%), Klebsiella spp (6.5%), Pseudomonas spp (6.5%) and Proteus spp (5.5%). The study reveals that dirty naira notes are potential vehicles for pathogens and parasitic infections to man during handling ($x^2 = 36.02; df=7; p<0.05$ and ($x^2 = 60.75; df=7; p<0.05$ for bacteria and parasites respectively). [New York Science Journal. 2010;3(1):10-13]. (ISSN: 1554-0200).

KEYWORDS: Naira notes, Parasites, Bacteria, Contamination, FCT, Abuja.

INTRODUCTION

Money is used as a medium for exchange for goods and services, settlement of debts and for deferred payments in economic activities (Beg and Fisher, 1997). In Nigeria, the naira notes presently in circulation are abused by squeezing, stapling, torn, cello taped, ripped faded and writings on them.

The contamination of the naira notes could also be from several sources, it could be from the atmosphere, during storage, usage, handling or production (Awodi et al., 2000). Daily transactions have made the naira to pass through many hands and pathogens become imposed on them. Ogo et al. (2004), reported that the source of contamination could be as a result of poor or negative money handling practices like spraying during ceremonies where such notes may be trampled upon when they fall on the ground.

Parasites are organisms that live in a close relationship with other organisms (hosts) and are capable of causing harm to their host. Parasites that have been observed to be contaminants of the naira notes are mainly of faecal origin (Awodi, et al., 2000). When hands used in cleaning up the anus after passing out faeces are not properly washed and are used to touching the naira note in any way, the tendency is contamination with the trophozoite of the developed parasite, eggs, cysts or even the oocyst. Other attitudes such as the wetting of hands or fingers with saliva or use of contaminated water to lubricate the hand in counting money could lead to possible transfer of parasite and bacteria from such medium to the notes (Ameh and Balogun, 1997).

Bacteria are particularly very ubiquitous their ability to contaminate objects such as the naira notes is very prevalent when compared to parasite. Ordinarily, the exposure of naira notes to the atmosphere could even bring about contamination depending on the environment in question (Ameh and Balogun, 1997). Since the isolation of bacterial
and fungal organisms from naira notes in Zaria (Ameh and Balogun, 1997) and the effect of parasitic and bacterial organisms on man it has become necessary for thorough investigations to be carried out to determine safety of the naira note.

This study was aimed at isolating, identifying and determining the level of contamination of the naira notes with bacterial and parasitic pathogens in the Federal Capital Territory (FCT) of Nigeria, Abuja.

MATERIALS AND METHODS

A total of two hundred (200) samples of the Nigerian naira notes consisting of twenty-five (25) pieces of each naira denominations (N5 to N1,000 notes) were collected. Collection was made from traders, beggars, motor conductors in parks in Abuja metropolis, students of University of Abuja, food vendors and individuals all over FCT Abuja between April and May, 2008. the nature of the notes collected were categorized as follows; clean notes, dirty notes, very dirty notes, very dirty and mutilated notes and mints (fresh notes).

The notes were collected with hands covered with hand gloves into sterile polythene bags according to their denominations and conveyed to the University of Abuja Biology laboratory for analysis. Each currency note was swabbed using swab stick and thereafter folded and inserted into a sterile bottle and 10ml of sterile normal saline was poured on each of the naira note using a 10ml syringe.

Each bottle was covered and shaken vigorously and left standing for 30 minutes, then shaken for the last time. The note was removed using a pair of forceps and transferred to a sterile polythene bag. The contents of each bottle was poured into a centrifuge tube and centrifuged at 1,500rpm for 2minutes. The supernatant decanted while the resultant sediment was stirred and a drop placed on a clean grease free slide and examined microscopically (X10 and X40) for parasite cysts and eggs (Jeffrey and Leach, 1975; Cheesbrough, 1992).

The swab was inoculated into different media (MacConkey agar, CLED agar and Chocolate agar) and streaked. Each media was incubated for 24 hours at 37°C and the plates read the following day while observing mixed growth of distinct colonies of individual micro-organisms. Each colony was isolated and further identification carried out using gram staining and bio-chemical test (Willey et al., 2008).

The result was analyzed statistically using the chi-square test.

RESULTS

Of the two hundred (200) samples examined for both parasite and bacteria 32 (64%) were contaminated with parasites while 116 (58%) had bacterial contamination. The result indicated that the five (5) naira notes had the highest parasite and bacterial load 64% (16) and 100% (25) respectively. Statistical analysis showed the level of parasite and bacteria contamination between the naira denomination to be significantly different \( \chi^2 = 36.02; df=7; p<0.05 \) and \( \chi^2 = 60.75; df=7; p<0.05 \) respectively.

Cyst and ova of six parasites were recovered; 
Ascaris lumbricoides accounted for 4% (8), Hook worm (ova) 8.5% (17), lice 5% (10), Enterobius vermicularis 0.5% (1), Flagellates 1.5% (3) and Entamoeba histolytica 2.5% (25).

Table 1 showed five bacteria species identified Staphylococcus spp 30.5% (61), Escherichia coli 9% (18), Klebsiella spp 6.5% (13), Pseudomonas spp 6.5% (13) and Proteus spp 5.5% (11).

<table>
<thead>
<tr>
<th>Naira Denomination</th>
<th>NO</th>
<th>A. lumbricoides %</th>
<th>Hook Worm (ova)</th>
<th>Lice</th>
<th>E. vermicularis</th>
<th>Flagellates</th>
<th>E. histolytica</th>
</tr>
</thead>
<tbody>
<tr>
<td>N5</td>
<td>25</td>
<td>16(4)</td>
<td>36(9)</td>
<td>12(3)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N10</td>
<td>25</td>
<td>4(1)</td>
<td>12(3)</td>
<td>20(5)</td>
<td>4(1)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N20</td>
<td>25</td>
<td>0(0)</td>
<td>0(0)</td>
<td>4(1)</td>
<td>0(0)</td>
<td>8(2)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N50</td>
<td>25</td>
<td>0(0)</td>
<td>12(3)</td>
<td>4(1)</td>
<td>0(0)</td>
<td>4(1)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N100</td>
<td>25</td>
<td>8(2)</td>
<td>4(1)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N200</td>
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<td>0(0)</td>
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<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>4(1)</td>
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<tr>
<td>N500</td>
<td>25</td>
<td>4(1)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>48(12)</td>
<td>52(13)</td>
</tr>
<tr>
<td>N1000</td>
<td>25</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>48(12)</td>
<td>48(12)</td>
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<tr>
<td>%Total</td>
<td>200</td>
<td>45(8)</td>
<td>8.5(17)</td>
<td>5(10)</td>
<td>0.5(1)</td>
<td>1.5(3)</td>
<td>12.5(25)</td>
</tr>
</tbody>
</table>
Table 2. Bacteria Isolated from Naira notes using the Swap Method.

<table>
<thead>
<tr>
<th>Naira Denomination</th>
<th>NO</th>
<th>% prevalence / no of contaminants</th>
<th>% / total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Staphylococcus spp</td>
<td>E. coli</td>
</tr>
<tr>
<td>N5</td>
<td>25</td>
<td>52(13)</td>
<td>28(7)</td>
</tr>
<tr>
<td>N10</td>
<td>25</td>
<td>32(8)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N20</td>
<td>25</td>
<td>16(4)</td>
<td>0(0)</td>
</tr>
<tr>
<td>N50</td>
<td>25</td>
<td>44(11)</td>
<td>16(4)</td>
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<tr>
<td>N100</td>
<td>25</td>
<td>48(12)</td>
<td>4(1)</td>
</tr>
<tr>
<td>N200</td>
<td>25</td>
<td>36(9)</td>
<td>20(5)</td>
</tr>
<tr>
<td>N500</td>
<td>25</td>
<td>16(4)</td>
<td>4(1)</td>
</tr>
<tr>
<td>N1000</td>
<td>25</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>%/Total</td>
<td>200</td>
<td>30.5(61)</td>
<td>9(18)</td>
</tr>
</tbody>
</table>

DISCUSSION

The result obtained from this study showed that Nigerian currencies in circulation within the Federal Capital Territory (FCT) Abuja and elsewhere are likely to be contaminated with different parasites and bacteria organism as was discovered elsewhere in Nigeria (Ogo et al., 2004; Ameh and Balogun, 1997). A prevalence rate of 32% was recorded for cysts and ova of parasites on dirty naira notes. This is in agreement with the findings of Jolaoso (1991) and Ameh and Balogun (1997) that dirty naira notes are a potential source of contracting disease agents. It was observed that the presence of dirt on the notes was related with the presence of cysts and or eggs of parasites. Once a note had dirt on it, there was a high chance that it could harbour cysts and or eggs of parasites on it.

Studies have revealed that parasite cysts and eggs are most prevalent on very dirty objects and mutilated materials and the naira and other currency, while the mint (fresh notes) had no parasite. The report of (Ogo, et al., 2004) is in consonance with this fact.

The result showed that the denominations of notes did not influence the level of contamination. Although, the five naira note was mostly contaminated this is not unconnected to the methods of handling the naira notes it is also a reflection of the present poor economic situation in Nigeria where the naira is highly devalued to the extent that higher denominations have suddenly become readily available at all levels of daily transactions.

Parasite cysts and eggs isolated from the notes are those of high socio-economic importance that pose danger and great health consequence to man. For instance, Entamoeba histolytica and Ascaris lumbricoides are easily transmitted orally therefore, it has becomes very worrisome when in Nigeria were many people tongue-wet their finger when counting money thereby, contaminating their fingers used to handle or eat food without washing of hands. The source of contaminating the naira note has long been discovered to be through poor handling practices including spraying during ceremonies and dirty hands contaminated with human and animal faecal maters (Dada, et al, 1979; Fashuyi, 1983; Adelowo, 1990) and much recent observations incriminating soles of foot-wears carrying cysts and eggs from contaminated soils (Nock et al., 2000).

The contamination of the naira with bacterial organisms showed that these organisms are widely distributed in the environment and so much associated with humans and their metabolic waste, which bores down to the level of personal hygiene. This could be transferred from parts of the body such as the nose and mouth to the note as in the case of Staphylococcus spp (Jolaoso, 1991).

In conclusion, the potential health danger of spraying naira notes is obvious and the chances of contracting infection are enhanced by the non-withdrawal of the dirty and mutilated notes from circulation. To help control the spread of these pathogens, it is recommended that the central Bank of Nigeria should enforce laws on unethical handling of the naira and ensure periodic withdrawal of dirty notes from circulation.

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