



A SURVEY OF PARASITE CYSTS AND EGGS (OVA) ON NIGERIAN CURRENCY NOTES IN KEFFI, NASARAWA STATE, NIGERIA



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Abstract: Contaminated naira note associated with parasitic pathogen have become of health concern in Nigeria, causing different diseases. Naira notes in circulation in Keffi Local Government Area of Nasarawa State were studied for a period of four months (March-June, 2015) in Zoology Laboratory of Nasarawa State University to ascertain the prevalence of parasites cysts and eggs on Nigerian currency. A total of two hundred (200) samples of Nigeria naira notes consisting of fifty (50) pieces of each naira denomination (5, 10, 20 and 50) only were randomly collected. The notes were collected with hands covered with hand gloves into sterile polythene bags labeled according to their denominations and were conveyed to Zoology Laboratory Nasarawa State University for analysis. The samples were collected from traders, transporters, food vendors, students and some commercial banks in Keffi. Each currency note was swabbed using swab stick and thereafter folded and inserted into a sterile bottle, 10ml of sterile normal saline was poured on each of the sampled notes. The resultant sediment was examined microscopically to discover parasite cysts and eggs (ova), out of the two hundred naira notes examined 40 (20%) were contaminated by cysts and eggs of parasites. The parasites encountered included *E. histolytica* accounted for 04(02%), *G. lamblia* 04(02%), *A lumbricoides* 12(06%) and Hook Worm (Ova) 20(10%). Statistically, using Chi-Square test, there was significant difference between prevalence of the parasites and the naira denominations ($p < 0.05$). Also, there was significant difference between prevalence of the parasites and the collection areas ($P < 0.05$). No contamination was found on the mint naira notes obtained from some of the commercial banks. Hence, it was concluded that the likelihood of contacting infections from cysts and eggs due to contaminated naira notes in transaction is high. There is need for improvement of hygiene amongst the populace to avoid transmission of these parasitic organisms in humans also the cashless system should be highly encouraged and promoted in the country.

Keywords: Parasite cysts & eggs, Nigerian currency notes, Keffi

Introduction

Money is used as a medium of 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, trampling, stapling, torn, cello-taped, ripped, faded and writing on them. The eggs and cysts on the naira notes could also be from several sources, it could be from the atmosphere during usage, handling or production (Awodi *et al.*, 2000). Daily transactions have made the naira to pass through many hands and pathogens 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 it fall on the ground.

In financial institutions, casinos, supermarkets and retail businesses, workers who handle money are exposed to numerous disease causing germs just by performing (Barolia *et al.*, 2011) their duties. Other attitudes such as the wetting of hands or fingers with saliva or contaminated water to lubricate the fingers in counting money could lead to a possible transfer of parasite and bacteria from such medium to the notes (Amech and Balogun, 1997).

This study is aimed at identifying and determining contamination of the naira note with parasite cysts and eggs in the study area.

Materials and Methods

Study area

Study was conducted in Keffi Nasarawa State Nigeria. Keffi is geographically situated at longitude $7^{\circ}52'E$. Keffi town is about 850 m above sea level and it is located on the north-west of the state capital, Lafia. It has an area of 138 km² and a population of 92,664 at the census of 2006. The mean annual rainfall range from; 14.2 to 229.4 mm with the highest in August and lowest in April, the mean annual temperature of

the area in a year range from 19.3 to 23.8°C. The annual mean humidity varies from 32 to 86%. The occupation of the people is mainly farming combined with petty trading. There are many secondary schools and a University (Nasarawa State University, Keffi) in the area.

Sample collection

A total of two hundred (200) samples of Nigeria note consisting of fifty (50) pieces of each naira denomination (5, 10, 20 and 50) only were randomly collected. The notes were collected with hands covered with hand gloves into sterile polythene bags labeled according to their denomination and were conveyed to Zoology Laboratory, Nasarawa state University for analysis.

Collection area

Samples were collected from, traders, transporters, food vendors, students of Nasarawa State University and some commercial Banks in Keffi. Consent of the subjects was considered before collection of the currency notes.

Sample analysis

Each currency note was swabbed using swab stick and thereafter folded and inserted into a sterile bottle and 10 ml of sterile normal saline was poured on each of the naira notes using a 10 ml syringe (Willey *et al.*, 2008). Each bottle was covered and shaken vigorously and left standing for 30 min then shaken for the last time, the notes were removed using a forceps and transferred to a sterile polythene bag (Cheesbrough, 2006). The content of each bottle was poured into a test tube and centrifuged for 2 min at specific gravity of 1.20. 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 cyst and eggs (Cheesbrough, 2006).

Statistical analysis

Data collected were analyzed statistically using descriptive statistics and chi test at a 95% confidence interval.

Results and Discussion

Out of the two hundred (200) naira notes sampled comprising 50 pieces each of ₦5, ₦10, ₦20, ₦50, 40(20%) samples were contaminated with parasites. The result indicated that the five (5) naira notes had the highest parasite count of 19 (38%); followed by ten (10) naira notes with a parasite count of 04(08%) while fifty (50) notes have 05(10%) parasites count. Statistical analysis showed the level of parasite contamination to be significantly different ($\chi^2_{calc} = 19.25$; $\chi^2_{tab} = 9.49$; $df = 4$; $p < 0.05$). Cyst and ova of four (4) parasites were discovered; *E. histolytica* account for 04(02%), *G. lamblia* 04(02%), *A. lumbricoides* 12(06%) and Hook Worm (Ova) 20(10%)

Table 1 show the parasites count on 50 samples each of the naira denominations 19 parasites were observed on the ₦5 notes which gives 38% prevalence. ₦10 notes show a parasite count of 12(24%). On ₦20 notes, 04(8%) parasites were discovered and ₦50 parasites counts 05(10%). Therefore, the total parasites count on the 200 samples of the naira denominations sampled is 40 which give a 20% prevalence.

Table 1: Prevalence of parasites in relation to different denominations

Denominations (Naira ₦)	No. of samples	No. of contamination (%)
₦5	50	19(38)
₦10	50	12(24)
₦20	50	04(08)
₦50	50	05(10)
Total	200	40(20)

$\chi^2_{calc} = 14.60$; $\chi^2_{tab} = 7.82$; $df = 3$; $p > 0.05$

Parasites cyst and eggs (ova) and prevalence on the Naira notes

The various parasites cyst and egg (ova) discovered on 50 samples each of the naira denomination studied. *E. histolytica* accounted for 2% (4), *G. lamblia* 2% (4), *A. lumbricoides* 6% (12) and Hook worm (ova) 10% (20). It was observed that Hook Worm (ova) has the highest prevalence of 10% (20) followed by *A. lumbricoides* with a prevalence of 6% (12), while *G. lamblia* and *E. histolytica* both recorded prevalence of 2%(4) (Table 2).

(Table 2): Prevalence cyst and egg (ova) based on naira notes denomination collection in Keffi

Naira Denomination	No. of samples	Species of parasites			
		<i>E. histolytica</i>	<i>G. lamblia</i>	<i>A. lumbricoides</i>	Hook Worm (ova)
₦5	50	0(0)	0(0)	8(16)	11(22)
₦10	50	4(8)	0(0)	3(6)	5(10)
₦20	50	0(0)	3(6)	1(2)	0(0)
₦50	50	0(0)	1(2)	0(0)	4(8)
Total	200	4(2)	4(2)	12(6)	20(10)

Table 3: Prevalence of parasites based on collection sources

Collection Sources	No. of samples	Prevalence of parasites				Total (%) Contaminated
		₦5	₦10	₦20	₦50	
Traders	40	3	3	1	2	9(22.5)
Students	40	2	1	1	0	4(10)
Food Vendors	40	4	4	1	2	11(27.5)
Transporters	40	10	4	1	1	16(40)
Banks	40	0	0	0	0	0
Total	200	19	12	4	5	40(20)

$\chi^2_{calc} = 19.25$; $\chi^2_{tab} = 9.49$; $df = 4$; $p < 0.05$

Parasites based on collection areas

The parasites count based on collection area. Out of the 40 samples from traders, 9 parasites were found with 22.5% prevalence. 4(10%) parasites were found from the samples obtained from students. 11(27.5%) parasites were found from

the samples from Food Vendors and samples from transporters accounted for 16(40%) parasite count. However, no parasites were found on notes from the Banks (Table 3). There is significant difference between the contamination rates of the different collection areas.

The result obtained from this study showed that Nigerian currencies in circulation within Keffi and elsewhere are likely to be contaminated with different parasites; this is in agreement with the studies of Ogo *et al.* (2004). A prevalence of 20% (40) was recorded for cysts and ova of parasites on dirty naira notes. This is in agreement with the findings of Amehe and Balogun (1997); Matur *et al.* (2009) as well as Yakubu *et al.* (2014) that dirty naira notes are potential sources of contracting disease agents.

Studies have revealed that parasite cysts and eggs are most prevalent on very dirty objects and mutilated materials and the naira currency (Okwa and Bello, 2016), while the mint (fresh notes) had no parasites which in agreement with the report of Uneke and Ogbu (2007). The reports of Ogo *et al.* (2004) and Matur *et al.* (2009) in a survey conducted in FCT which was also revealed by this study. Adelowo (1990) recorded intestinal parasites in post secondary school students complements this finding.

Among the restaurants visited/surveyed, 60% do not have standard cashier that handle money solely, even waiter/waitress collect money during transaction with customers. By handling money and food simultaneously, the possibility of contamination and cross contamination is most likely. Many food outlets heavily rely on the exchange of cash for their goods. In some instances, the handling of food and money has been physically separated by employing separate individuals to carry out one task each. In other instances, there has been a move to handle food only with gloved hand as stated in Vriesekoop *et al.* (2010).

There is a significant difference between contamination rates of different naira denominations as five (5) naira notes show the highest parasite count followed by (10) naira notes, then fifty (50) naira and twenty (20) naira has the least contamination rate. This is in agreement with Matur *et al.* (2009) whose survey of parasite cysts, Eggs and bacteria on Nigeria Currency in FCT indicates that five (5) naira notes had the highest parasite and bacterial load 64% (16) and 100% (25) respectively. Also, Okwa and Bello (2016) reported higher level of contamination on lower denomination.

The study also shows that there is a significant difference between contamination rates of different sources of currency (Traders, Transporters, Food Vendors, Students of Nasarawa State University, Keffi and commercial Banks).

The persistence of damaged or terribly mutilated notes in active circulation could elevate their contributory role in transmission of some pathogens, thereby constituting potential public health hazard. This is also in agreement with Awodi *et al.* (2000) study in Wukari, Taraba State on prevalence and public health significant of parasite cysts and eggs on the Nigerian currency.

Conclusion

In Nigeria, poor currency-handling culture is widespread, and there indiscriminate abuse of currency notes. A great majority of populace does not carry money in wallets, and squeezing of currency notes is a common occurrence. The health danger of contaminated naira notes is obvious and the chances of contacting infection are enhanced by the non-withdrawal of the mutilated notes from circulation. From this study, twenty (20) naira polymer notes indicated low parasite retention capacity than those naira denominations in paper form. Therefore, the need for other naira denominations in paper forms, to be made in polymer form is imperative.

Recommendations

- i) There should be public awareness on the fact that currency notes could be a source of infection and can be dangerous to health.
- ii) Money handling machines like ATM should be made more available and they should be able to sanitize money by destroying the microbes by heat or short exposure to antimicrobials.
- iii) Cashless system of banking should be more encouraged especially with the emergence of infectious disease agents.

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