Rivers-Water Contamination by Nematode Larvae and Ova in SixLocal Government Areas of Kogi Nigeria.

Omowaye,. O.S ,Audu P.A and Iyaji F. O
Department of Biological Science, Kogi State UniversityAnyigba, P.m.b 1008,.Anyigba, Nigeria.
Corresponding author. E-mail:omowayestephen@gmail.com, Jesuniyiprevail@gmail.comTel: +2348037696091.

ABSTRACT: River-Water Contamination by Nematode Larve and Ova in Eastern Zone of Kogi ,Nigeria.was conducted between July 2013 and May 2015 and eleven rivers in six LGAs were examine for parasites isolation using concentrated techniques. Among others contaminant, four species of nematodes were found such as larve of *Strongiloides stercoralis (27.85%), Ascaris lumbricoides, ova,Enterobium vermicularis ova, Dictophyma renale larve,and Hookworm species egg .Out of* a total of73945, *larvae of Dictophyma renale had the highest of 22455* followed by*Strongiloides stercoralis* with 20590 while Hookworm had the least with 3000, Maboro River had the highest sample for positive 73.0% (437). It was followed by Emoha river in Bassa LGA with70.8% (454) River Niger in Idah LGA had the least with 49.8% (309) followed by Omala river in Omala LGA 62.1% (389). Among the Rivers there is no significant different statistically X^2=118.13.. Physiochemical Parameter , such as temperature ,Dissolve oxygen ,Electrical conductivity, turbidity, and depth were measured during the study and the result observed were below the WHO standard for portable water. Overall result show that ,all the river-water examined were contaminated with parasitic nematodes. Hence, there is need for water treatment before use.

Key words: Nematode, Contamination, Rivers, Kogi, Nigeria

1 INTRODUCTION

Contamination of drinking water by parasites can lead into major waterborne outbreaks of infection [P. Karanis *et.,al*,2007]; in additionto this Cryptosporidium is now increasingly considered an important foodborne pathogen [H. V. Smith *et.,al* 2007,, S. M. Cacciò *et .,al* 2007] causing a disease of socioeconomic significance worldwide.Potable water or drinking water is water that is free from disease producing microorganisms and chemical substances deleterious to health Waterborne outbreaks of helmithic disease have been attributed to contaminateddrinking-water, from both surface-water and groundwater sources (Craun,1990), and to recreationalwater, including swimming poolsOutbreaks caused by drinking-water have been attributed to contamination
of the source water by heavy rainfall or snow-melt to sewage contamination
of wells (d'Antonio *et al.,* 1985; Kramer et al., 1996), to inadequate treatment or treatment deficiencies (Badenoch 1990; Craun et al., 1998), and to combinations of these factors Leakages and cross-connections in water-distributionsystems have also caused outbreaks of helmithic diseas (Craun, 1990; de Jong &Andersson, 1997; Craun *et al*., 1998)..

2 MATERIALS AND METHODS

2.0 Study Area:

The study was carried out in Eastern part of Kogi State. The State has its coordinates as 7^0 0''N and 6^0 45'0''E in DMS (Degrees Minutes Seconds) or 7.75 and 6.75 (in decimal l degrees). Its UTM position is KP55 and it joint

operation Graphics reference is NV32-01.and it is located in north central Nigeria. Kogi State is the most centrally located of all the states of the federation occupies 29, 833 square kilometres.

Dekina is located in the north-eastern part of Odu-Iyale township. It lies approximately between longitude 6^{0} $^{36'E}$ and latitude 7^{0} 30'E and is bordered to the west by Ofu township, to the north by Bassa L.G.A. and to the south-east by Ankpa township. It is the headquarter home-town of Dekina L.G.A,. the largest L.G.A. in Nigeria in terms of land mass. The northeasterly line of equal latitude and longitude passes through the southeast of the LGA. It has an area of 2.461km (950sqmi) and population of 260, 312 at the 2006 census.

2.3 Sample Collection

In each water sample, protozoa were collected from the nitrocellulose membrane according to the method of Payment *et al.*(1989) and Kfir *et. al. (1995*), the pH of each sample was adjusted to 3.5. Every sample was filtered separately through a nitrocellulose membrane (0.45μm pore size, 142 mm diameter, Millipore).
The protozoan parasites, *Giardia* and *Cryptosporidium,* present on the surface of the membrane filter after sample filtration, were collected by soaking and thorough washing of the membrane in 20 mL of 5% formal saline [5% formaldehyde (Merck–Schuchardt) in 0.85% NaCl (Sisco Res. lab. India)]. This washing solution was centrifuged [Hermel Z 323 K, Germany] at 4000 rmp for 6 minutes at room temperature and the pellet was re-suspended in 1mL of distilled water. A volume of 500 μl was used for microscopic examination.

2.4 Microscopic Examination

Stained smears from formalin-fixed pellets of concentrated water samples was prepared and examined microscopically. Chlorazol black E (Sigma) or iron haematoxylin was used for detection of *Giardia* cysts. For *Cryptosporidium* oocysts the modified Kinyoun acid-fast method was used, as described by Alles and Coworkers (1995).

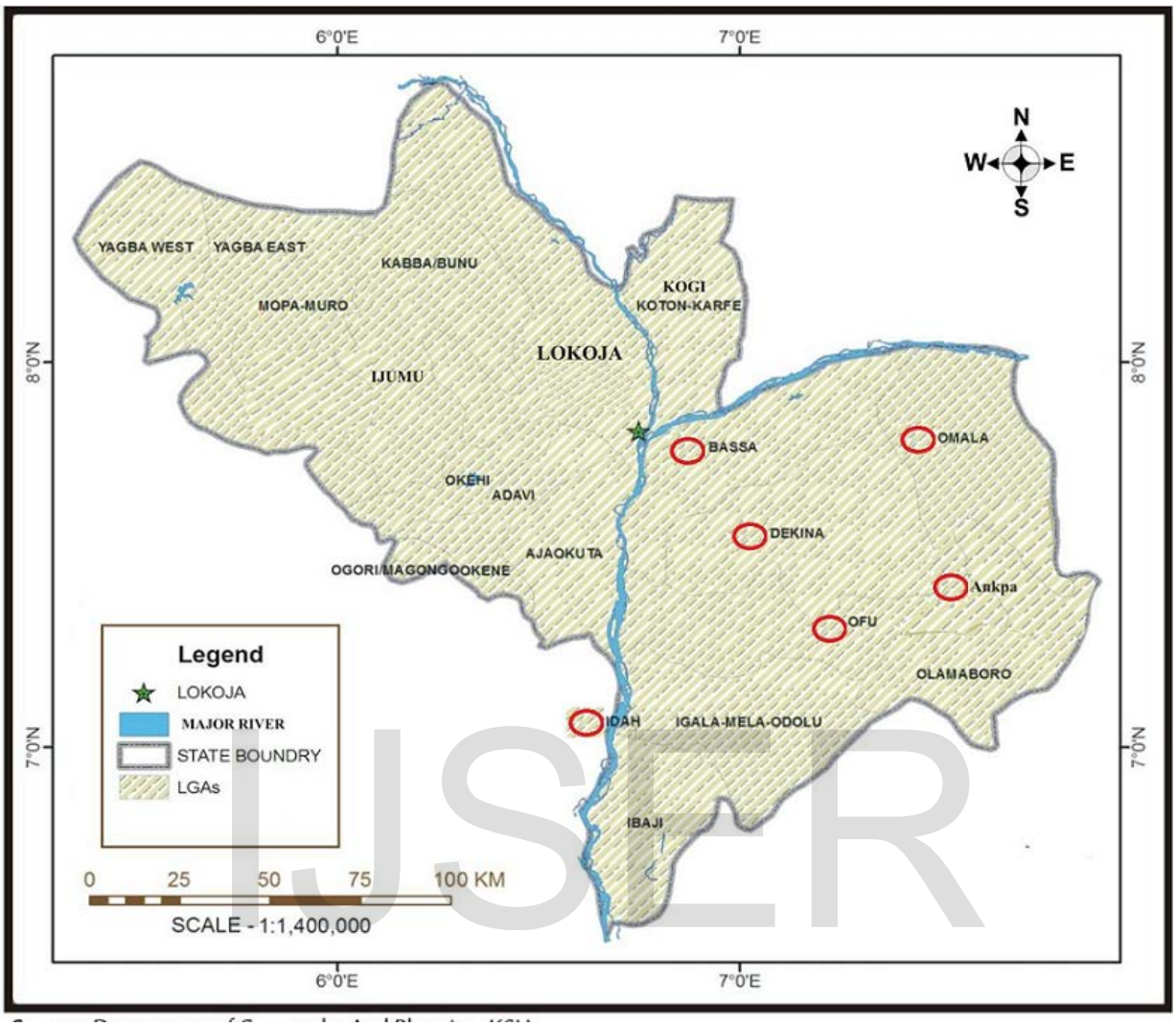

Figure 3.2: Map of Kogi State Showing the Sampling Site
Source: Department of Geography and Planning, KSU (2012).

3.0 RESULTS

Table 1:Distribution of parasite by River in the Study Areas

LGA	River	Number Examined	Number Positive (%)	Number Negative (%)	Chisquare	df	P value
Ankpa	Maboro	599	437 (73.0)	162 (27.0)	118.129	10	0.000**
Bassa	Ehoma	641	454 (70.8)	187 (29.2)			
Dekina	Itemehe	700	441 (63.0)	259 (37.0)			
	Oganaji	670	422 (63.0)	248 (37.0)			
	Ojoufu	753	446 (59.2)	307 (40.8)			
Idah	Inachalo	596	355 (59.6)	241 (40.4)			
	Ega	621	309 (49.8)	312 (50.2)			

2861(62.47) 1719(37.53)

4580

Total

Table 2:Distribution of parasite by Month during the study

Months	Number Examined	Number Positive (%)	Number Negative (%)	Chisquare	df	P value
June	292	237 (81.2)	55 (18.8)	374.955	11	0.000**
July	609	431 (70.8)	178 (29.2)			
August	458	412 (90.0)	46 (10.0)			
September	570	438 (76.8)	132 (23.2)			
October	496	313 (63.1)	183 (36.9)			
November	505	361 (71.5)	144 (28.5)			
December	643	345 (53.7)	298 (46.3)			
January	652	374 (57.4)	278 (42.6)			
February	699	388 (55.5)	311 (44.5)			
March	745	424 (56.9)	321 (43.1)			
April	830	438 (52.8)	392 (47.2)			
May	805	458 (56.9)	347 (43.1)			
Total	**7304**	**4619 (63.2)**	**2685 (36.8)**			

Table 3: Distribution of Nematodes Species during the study

Nematode species found	Number of parasites isolated	Percentage (%)of parasites isolated
Strongiloides stercoralis (Ss)	20590	27.85
Ascari lumbricoides (Al)	11520	15.58
Dictophyma renale (Dl)	22455	30.37
Enterobium vermicularis (Ev)	16380	22.15
Hookworm sp	3000	4.06
TOTAL	73945	100

Table 4: Seasonal Distribution of Physiochemical Parameter during the study

L G A	Study Area	Season	Dissolve oxygen (Do_2)	P H	Turbidity (m)	Temperature (T^oc)	Electrical conductivity (mVe)	Depth (m
OMALA	AJOKPA		0. 6	11. 64	0. 00	23. 5	200	. 0
ANKPA	ANKPA OR MABOLO		0. 6	11. 64	0. 00	23. 5	200	. 0
IDAH	EGA		0. 6	11. 64	0. 00	23. 5	200	. 0
BASSA	EMOHA OR BASSA		0. 6	11. 64	0. 00	23. 5	200	. 0
OFU	GOFANTE	DS	0. 6	11. 64	0. 00	23. 5	200	3. 0
IDA	INACHALO	DS	0. 1	6. 33	0. 00	29. 3	074	4. 5
DEKINA	ITEMEHE	DS	0. 1	11. 13	3. 0	25. 7	164	7. 0
OFU	OFU	DS	0. 1	6. 22	0. 00	28. 7	225	5. 0
DEKINA	OGANE-AJI	DS	0. 1	6. 22	0. 00	28. 7	225	5. 0
DEKINA	OJOFU	DS	0. 1	6. 22	0. 00	28. 7	225	5. 0
OMALA	OMALA	DS	0. 1	6. 22	0. 00	28. 7	225	5. 0

4.0 DISSCUSION

For River parasite isolation out of 4580 samples examined,2861 were positive with 62.47%. Maboro River had the highest sample for positive 73.0% (437). It was followed by Emoha river in Bassa LGA with70.8% (454). River Niger in Idah LGA had the least with 49.8% (309) followed by Omala river in Omala LGA 62.1% (389). Among the River there is no significant different statistically X^2=118.13 (Table 1)

The overall monthly parasite isolation were found to be 4619 in number with 63.2%. The month of August regardless the year indicated the highest result with 90%. It was followed by month of June. While the least value is in April 52.8% (438) followed by month of December. Generally, among the month there is no significant different statistically X^2=374.955 The result revealed that wet season had the high parasites isolation and abundances compare to dry season.(Table 2)

Result of parasites isolation show that , *Dictophyma renale* had highest number of parasite isolation 30.37%.It was followed by larve of *Strongiloides stercoralis* (27.85%) while the Hookworm species had the least(4.06%)followed by Ascaris ova (15.58%) .(Table 3)

The Physiochemical Parameter during the study show stability nearly in all the study areas.However, turbidity in River Itemehe in Dekina was higher compare to others. .Electrical conductivity had stability in all the Rivers except in Inachalo and Itemehe River that had lower measurement of 074 and 164 respectively as against 200 or 2259(mVe) in other river.For temperature, stability of 23.5^{o}c and 28.7^{o}c was maintained in all the areas study except in Inacnalo River that had 29.3^{o}c as the highest temperature during the study. The dissolve oxygen was constant with 0.1 and 0.6 throughout the study .pH parameter show variability among the study areas ranged between 6.2 to 11.6. (Table 4) .Depth also show variation of 3m to 7m in the study areas.

The highest prevalence observed in Maboro River may be as a result of inflow of debris into the water bodies compare to others. The position of Maboro River has a linking directly to the market with gutter. It was also noticed, that the highest prevalence observed in Maboro took placed during the wet season. The least prevalence observed in Ega river may likely not unconnected with her nature. Ega has a fast moving kind of flow. The speed of flow do not encourage the accumulation of rubbish which can in turn increase the reproduction of parasites cyst and ova.

CONLUSION

The results of the present study support the water- borne parasites
reported by(Panagiotis *et al.,* 2007) which transmits a number of parasitic infections of humans. The public and recreation water users should therefore be caution on water –borne infection of nematodes .There should be thorough treatment of water before used.

REFERENCES

Alles, A.J., Waldron, L.S., Sierra, A.R., Mattia, A.R., (1995). Prospective comparison direct immunofluorescence and conventional staining methods for detection of Giardia and Cryptosporidium spp. in human fecal specimens. *J. Clin. Microbiol*. 33, 1632–1634.

Badenoch J, ed. (1990). *Cryptosporidium in water supplies.* London, Her Majesty's
Stationery Office.

Craun GF (1990). Waterborne giardiasis. In: Meyer EA, ed. *Human parasitic diseases.Vol. 3, Giardiasis*. Amsterdam, Elsevier: 267–293.

Craun GF et al. (1998). Waterborne outbreaks of cryptosporidiosis. *Journal of the American Water Works Association*, 90:81–91.

de Jong B, Andersson Y (1997). Waterborne cryptosporidiosis—a single outbreak in Sweden. In: Fricker CR, Clancy JL, Rochelle PA, eds. *Proceedings the International Symposium on Waterborne Cryptosporidium, March 1997, Newport Beach, CA, USA*. Denver, CO, American Water Works Association: 367–368.

d'Antonio RG (1985). A waterborne outbreak of cryptosporidiosis in normal hosts. *Annals of Internal Medicine*, 103:886–888.

Karanis P, Seitz HM (1996). Vorkommen und Verbreitung von *Giardia* im Rohund Trinkwasser von Oberflachewasserwerken. [Occurrence and distribution of *Giardia* in raw and treated water from surface water treatments. *GWF-Wasser/Abwasser*, 137:94–100

Karanis P., Kourenti C., and Smith H., "Waterborne transmission of protozoan parasites: a worldwide review of outbreaks and lessons learnt," Journal of Water and Health, vol. 5, no. 1, pp. 1–38, 2007..

Panagiotis Karanis, Christina Kourenti and Huw Smith 2007. Waterborne transmission of protozoan parasites: A worldwide review of outbreaks and lessons learnt. Journal of Water and Health, 05.1, 2007.

Smith H. V., Cacciò S. M., Cook N., Nichols R. A. B., and Tait A., "Cryptosporidium and Giardia as foodborne zoonoses," Veterinary Parasitology, vol. 149, no. 1-2, pp. 29–40