International Journal of Science and Healthcare Research
Vol. 9; Issue: 1; January-March 2024
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Prevalence and Intensity of Urinary Schistosoma Haematobium Eggs Among the School Aged Children in Kona Ward, Ardo Kola Lga, Taraba State, Nigeria

Elkana D.S.[1], Elkana O.S[2], Adle A.A[3], Obadiah S.Y[2,] Babylon P[4], Usman D.D[2], Azuchukwuene G.C.[2]

[1]Department of Nursing Science, Taraba State University, Jalingo, Taraba State, Nigeria.
[2]Department of Biological Sciences, Taraba State University, Jalingo/ Taraba State, Nigeria.
[3]Department of Biological Sciences, University of mkar, benue State, Nigeria.
[4]Department of Public Health, Taraba State University, Jalingo, Taraba State, Nigeria.
[5]Department of Environmental Health Science, Taraba State University, Jalingo/ Taraba State, Nigeria.

Corresponding Author: Elkana D.S. Email: debbyelkana@gmail.com

DOI: https://doi.org/10.52403/ijshr.20240127

ABSTRACT

The study was conducted to examine the prevalence and intensity of urinary Schistosomiasis haematobium in two Kona ward settlement of Ardo kola local government, area of Taraba State, Nigeria. The study employed urine filtration technique using polycarbonate membrane filters to detect *Schistosoma haematobium* eggs in urine. Standard culture techniques to isolate urinary tract pathogens with their susceptibility patterns were carried out. Questionnaires were administered to collect information on socio-demographic data on the children. A total of 1153 urine samples were collected and analysed for the eggs of Schistosoma haematobium, out of 675 children infected with urinary schistosomiasis, the highest occurrence of bacteriuria (61.3%) was recorded in the heavy intensity (>50 eggs/10ml urine) while low intensity (1 – 50 eggs/10ml urine) recorded the lowest occurrence of bacteriuria (59.2%). Chi square analysis showed significant association between intensity and bacteriuria (χ^2 = 309.5, p = 0.000). Spearman's correlation coefficient for bacteriuria also showed significant relationship between urinary schistosomiasis and bacteriuria (r = 0.518, p<0.001). The percentage occurrence of *E. coli* in heavy ova intensity (>50 eggs/10ml urine) is slightly higher (56.9%) than in light intensity (55.0%). Occurrence of *Klebsiella spp* in heavy intensity is slightly above (24.9%) that of light intensity (24.4%). *P aeroginosa* and *Proteus spp* occur more in light intensity (24.9%) and (28.9%) respectively than in heavy intensity (14.2%) and (14.6%) respectively. Occurrence of *S. aureus* is significantly higher in heavy intensity (4.2%) than in light intensity (1.7%). In subjects negative for urinary schistosomiasis, occurrence of bacteria isolates follows similar pattern with *Klebsiella spp* occurring more (3.3%) than the other isolates. These findings indicate that the areas are endemic to urinary schistosomiasis and therefore prompt intervention in the study areas is needed.

Keywords: prevalence, intensity, Schistosoma haematobium, school aged children, kona ward, Ardo kola, Taraba State, Nigeria

INTRODUCTION

Background to the Study

Schistosomiasis is a chronic and debilitating disease caused by digenetic Trematode flatworms (flukes) of the genus Schistosoma (Noble & Glem, 1982). It is one of the most common parasitic infections in the world (Gracio et al., 1992), ranking second to only malaria in terms of its socio-economic and public health importance in tropical and

subtropical areas (Ogbe, 2002). It is also the most prevalent of the waterborne diseases and one of the greatest risks to health in rural areas of developing countries (Ogbe, 2002). Infection occurs through contact with water infested with the free swimming larval stages of parasitic worms (cercariae) that penetrate the skin and develop in the human body to maturity. Parasite eggs leave the human body with urine or excreta. They hatch in freshwater and infect the appropriate aquatic snail intermediate hosts. Bulinus snails are intermediate host for S. haematobium (Ukoli, 1984). Within the snails they develop into cercariae, which are, in turn, released into the water to infect new human hosts. Transmission can take place in almost any type of habitat from large lakes or rivers to small seasonal ponds or streams (WHO, 2002).

In urinary Schistosomiasis, the worms live in the blood vessels of the bladder. Only about a half of the eggs are excreted in the urine. The rest stay in the body, damaging other vital organs. It is the eggs and not the worm itself which cause damage to the intestines, the bladder and other organs (Banerjee & Agrawal, 1992).

The disease occurs in 74 countries in Africa, South America and Asia, with an estimated 200 million people infected, 85 percent live in sub-Saharan Africa, and at least 600 million are at risk of infection (WHO, 1993). Recent estimates from sub-Saharan Africa indicate that 280,000 deaths per year can be attributed to Schistosomiasis (van der Werf et al., 2003).

In Nigeria, Schistosomiasis due to S. haematobium is widespread, constituting a public health problem particularly in children (Sulyman et al., 2009 Fana et al., 2009 & Akinboye et al., 2011). The distribution of the disease is focal, aggregated and usually related to water resources and development schemes such as irrigation projects, rice/fish farming and dams. It occurs in all the states of the federation, with a high infection rate among school children (Mafe et al., 2000; Okpala et al., 2004).

There are reports of Bilharziasis in Zamfara State (Adamu et al., 2001; Ladan et al., 2011), but none in Abarma village in Gusau Local Government Area of Zamfara State, Nigeria, where the inhabitants that predominantly farmers, traders and civil servants rely on one river for their daily water needs. This study is design to investigate the prevalence and intensity of urinary Schistosomiasis among the inhabitants of Abarma village. It is our hope that findings from this study will inform control managers on the status of the infection in the study area

The children at great risk of kidney damage are infants and young children with febrile urinary tract infection in whom the infection is effective (Kunin 1972, 1979). The incident of primary infection is greatly influenced by age and sex and by predisposing factors that impair the defence mechanism that maintains the sterility of the normal urinary tract. Infection in children is often hard to recognize because of the variable symptomology and the difficulty of obtaining suitable specimens of urine in the very young, but they are of particular importance as causes of permanent damage to the developing kidney (Obi *et al*, 1996). Pyuria is evidenced by the inflammation of the genitourinary tract; it is a common problem with asymptomatic bacteria (Linshaw *et al*, 1996). Urinary Tract Infection of both bacteria and parasitic origins has been associated with high incidence of squamous cell of bladder and cervix carcinoma (Shortliffe, 1995).

Statement of the Problem

Urinary schistosomiasis is a neglected common parasitic disease of children and no attempt has been made in recent past to report the secondary urinary pathogen that could be associated with the disease among school-aged children in rural Nigeria.

The disease occurs in 74 countries in Africa, South America and Asia, with an estimated 200 million people infected, 85 percent live in sub-Saharan Africa, and at least 600 million are at risk of infection (WHO,

1993). Recent estimates from sub-Saharan Africa indicate that 280,000 deaths per year can be attributed to Schistosomiasis (van der Werf et al., 2003).

In Nigeria, Schistosomiasis due to S. haematobium is widespread, constituting a public health problem particularly in children (Sulyman et al., 2009 Fana et al., 2009 & Akinboye et al., 2011). The distribution of the disease is focal, aggregated and usually related to water resources and development schemes such as irrigation projects, rice/fish farming and dams. It occurs in all the states of the federation, with a high infection rate among school children (Mafe et al., 2000; Okpala et al., 2004).

MATERIALS AND METHODS

The study area

The study was carried out in Murbai and Sobai settlements of Kona ward in Ardo-kola LGA which is located in the central part of Taraba State. Ardo-kola LGA is bounded by Jalingo LGA to the North and Gassol LGA to the south and Yorro LGA to the East. Some areas in the local government depend on slow running water, streams and ponds for drinking and daily chores. The main tribes in the Local Government Area are Kona, Mumuye, Fulani and Jukun. The main occupation of the people in the area is farming while very few are involved in trading and civil service.

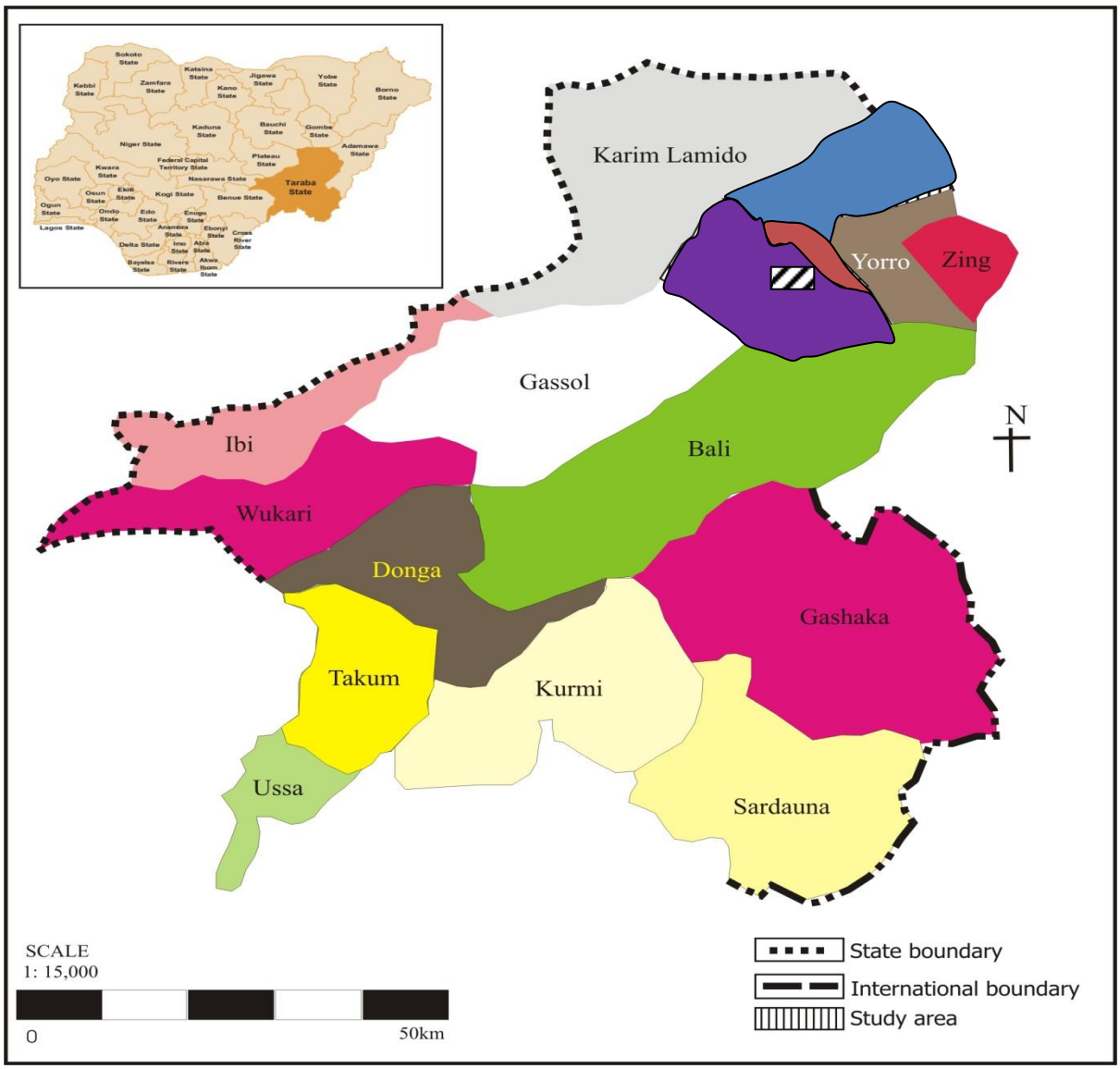

Fig 1: Map of Taraba State showing the study area
Source: Taraba State Ministry of Land and Survey, 2023.

Study Design

This is a cross sectional study carried out among school aged children at Sorbai and Murbai in Kana ward of Ardo kola local government, Taraba State, North-East, Nigeria. All school aged children who consented were screened for the study.

Sample collection

Consent for this study was obtained from the village head, healthcare center, and also willing participants.

Sterile universal plastic containers with screw caps that bore identification numbers were given to the children. The children between the ages of 2-16 years were informed on urine sample collection instruction that is, the mid-stream urine. The samples were collected between 10.00am and 2:00pm, because timing for urine collection was critical especially for the detection of *Schistosomiasis haematobium* (WHO, 1980; Cheesbrough, 2005).

A total of 1153 urine sample were collected, 675 positive samples with urinary schistosomiasis were examined for bacteriuria using standard culture method described by Cheesbrough (2005).

Urine Filtration Technique

Polycarbonate membrane filter of 13mm diameter and 12 - 14µm pore size was used according to the method described by Cheesbrough (2005). The polycarbonate membrane filter stained with lugols iodine was placed on a microscope slide and examined under the 10x and 40x objective lens. The number of eggs of S. haematobium were counted and expressed as eggs/10ml of urine. Intensity was reported as the number of ova per 10mls of urine and categorized as light intensity of infection (1-50 ova/mls) and heavy (>50 ova/10mls) of urine were found. The presence of pyuria (white blood cells) and red blood cells were also noted.

Data Analysis

Data obtained was entered in Microsoft excel and exported to the Statistical Package for Social Sciences (SPSS) version 23.0 for data analysis. The relationship between the prevalence and intensity of the disease and various parameters obtained from this study was analysed. Chi- square test was used to compare bacteriuria occurrence between the settlements, age and sexes, of the *Schistosoma haematobium* infected school aged children. Spearman rho's correlation analysis was also used to determine relationship between the intensity of the disease and the prevalence of bacteria.

RESULTS

Occurrence of bacteriuria in relation to intensity of urinary schistosomiasis infected school-aged children in two Kona settlements, Ardo-kola LGA, Taraba State, Nigeria.

This describes the occurrence of bacteriuria in relation to intensity of urinary schistosomiasis infected school-aged.

Out of 675 children infected with urinary schistosomiasis, the highest occurrence of bacteriuria (61.3%) was recorded in the heavy intensity (>50 eggs/10ml urine) while low intensity (1-50 eggs/10ml urine) recorded the lowest occurrence of bacteriuria (59.2%). Chi square analysis showed significant association between intensity and bacteriuria (χ^2 = 309.5, p = 0.000). Spearman's correlation coefficient for bacteriuria also showed significant relationship between urinary schistosomiasis and bacteriuria (r = 0.518, p<0.001)

Table 1: Occurrence of bacteriuria in relation to intensity of urinary schistosomiasis infected school-aged children in two Kona settlements, Ardo-kola LGA, Taraba State, Nigeria.

Bacteriuria (%)			
Intensity eggs/10mls	**Negative**	**Positive**	**total**
1-50	172 (40.8)	250 (59.2)	422
>50	98 (38.7)	155 (61.3)	253
Total	270 (40.0)	405 (60.0)	675

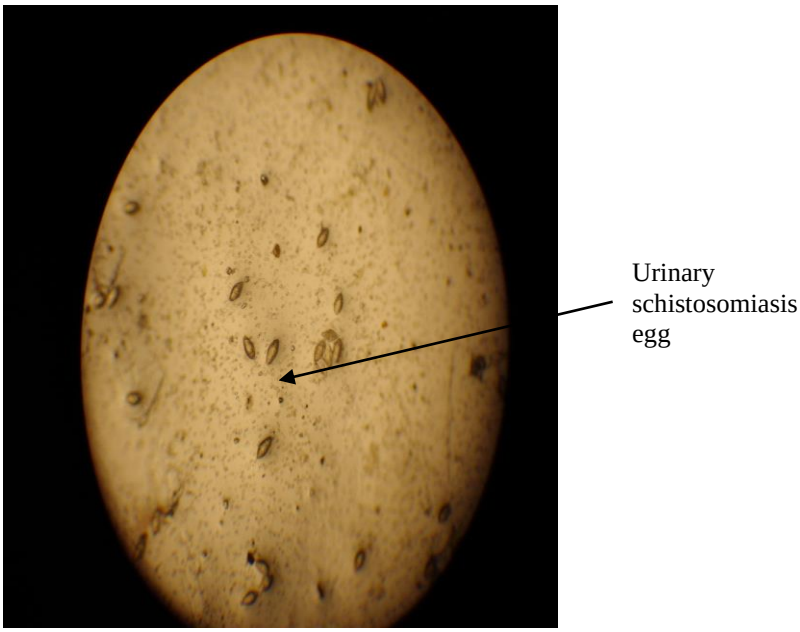

Plate 7: Light intensity of *Schistosoma haematobium* (1 – 50 eggs/10ml urine)

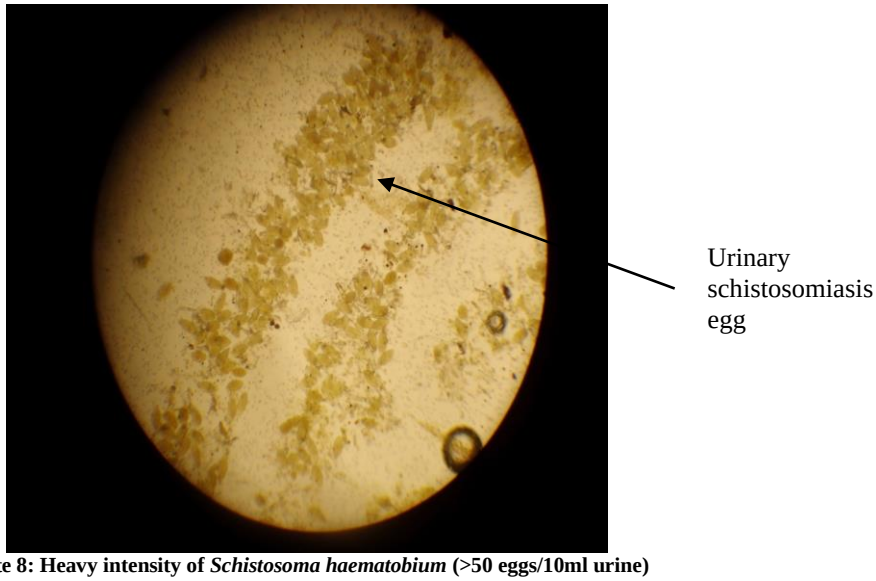

Plate 8: Heavy intensity of *Schistosoma haematobium* (>50 eggs/10ml urine)

Occurrence of different bacteria isolates in relation to intensity of urinary schistosomiasis infected school-aged children in two Kona settlements.

This summarizes the occurrence of each of the bacteria isolates in relation to ova intensity.

The percentage occurrence of *E. coli* in heavy ova intensity (>50 eggs/10ml urine) is slightly higher (56.9%) than in light intensity (55.0%). Occurrence of *Klebsiella spp* in heavy intensity is slightly above (24.9%) that of light intensity (24.4%). *P aeroginosa* and *Proteus spp* occur more in light intensity (24.9%) and (28.9%) respectively than in heavy intensity (14.2%) and (14.6%) respectively. Occurrence of *S. aureus* is significantly higher in heavy intensity (4.2%) than in light intensity (1.7%). In subjects negative for urinary schistosomiasis, occurrence of bacteria isolates follows similar pattern with *Klebsiella spp* occurring more (3.3%) than the other isolates.

Table 2: Percentage occurrence of different bacteria isolates in relation to intensity of urinary schistosomiasis infected school-aged children in two Kona settlements, Ardo-kola LGA, Taraba state, Nigeria

Bacteriuria (%)					
Intensity of *S. haematobium* eggs/10ml urine	***E. coli***	***S. aureus***	***P. aeroginosa***	***Klebsiella spp***	***Proteus spp***
Negative	15 (3.1)	4 (0.8)	7 (1.5)	16 (3.3)	8 (1.7)
1 – 50	232 (55.0)	17 (1.7)	105 (24.9)	103 (24.2)	122 (28.9)
> 50	144 (56.9)	12 (4.2)	36 (14.2)	63 (24.9)	37 (14.6)
Total	391 (33.9)	23 (2.0)	148 (12.8)	182 (15.8)	167 (14.5)

Occurrence of bacteria in *Schistosoma haematobium* infected school-aged children according to age in two Kona settlements, Ardo-kola LGA, Taraba state, Nigeria.

The occurrence of bacteriuria in *Schistosoma haematobium* infected school-aged children in relation to age is described in table 8. Bacteriuria is shown to occur more in 1 – 5 years age group, percentage occurrence follows this pattern: *E. coli (*84.1%), *P. aeroginosa* (60.3%), *Proteus spp* (52.4%), *Klebsiella spp* (30.2%), while S. *aureus* occurs less in 1 – 5 years (i.e. 1.6%) but high in 6 – 10 years age group (3.0%). The 11 – 15 years age group recorded the lowest percentage occurrence of all the bacteria isolates: *E. coli* (49.4%), *Klebsiella spp* (22.7%), *Proteus spp* (14.8%), and *P. aeroginosa (*14.2%). In children negative for urinary schistosomiasis, the occurrence of bacteriuria was also recorded with *Klebsiella spp* having the highest occurrence of (3.3%) followed by *E.coli* (3.1%), *Proteus spp* (1.7%), *P.aeroginosa* (1.5%) and *S.aureus* (0.8%).

Table 3: Occurrence of bacteria in *Schistosoma haematobium* infected school-aged children according to age in two Kona settlements, Ardo-kola LGA, Taraba state, Nigeria.

Bacteriuria (%)					
	E. coli	***S. aureus***	***P. aeroginosa***	***Klebsiella spp***	***Proteus spp***
By Age					
Negative	15 (3.1)	4 (0.8)	7 (1.5)	16 (3.3)	8 (1.7)
1 – 5	53 (84.1)	1 (1.6)	38 (60.0)	19 (30.2)	33 (52.4)
6 – 10	236 (54.1)	13 (3.0)	78 (17.9)	107 (24.5)	100 (22.9)
11 – 15	87 (49.4)	5 (2.0)	25 (14.2)	40 (22.7)	26 (14.8)
By Sex:					
Negative	15 (3.1)	4 (0.8)	7 (1.5)	16 (3.3)	8 (1.7)
Male	151 (34.0)	19 (4.3)	56 (12.6)	49 (11.0)	65 (15.1)
Female	225 (97.4)	0 (0.0)	85 (36.8)	117 (50.6)	92 (39.8)

DISCUSSION

According to the findings of this study, 675 children out of 1153 were infected with urinary schistosomiasis, the highest occurrence of bacteriuria (61.3%) was recorded in the heavy intensity (>50 eggs/10ml urine) while low intensity (1 – 50 eggs/10ml urine) recorded the lowest occurrence of bacteriuria (59.2%). Chi square analysis showed significant association between intensity and bacteriuria (χ^2 = 309.5, p = 0.000). Spearman's correlation coefficient for bacteriuria also showed significant relationship between urinary schistosomiasis and bacteriuria (r = 0.518, p<0.001). The occurrence of bacteriuria in this study (60.0%) is higher than 48.3% reported among school children infected with urinary schistosomiasis in a rural settlement of Ngbo-West in Eastern Nigeria (Uneke *et al*, 2009) but lower than (80.3%) reported among children infected with urinary schistosomiasis in the Federal Capital Territory, Abuja , Nigeria (Ifeanyi *et al*, 2009) The bacteriuria occurrence levels among schistosomiasis infected children is also similar to findings reported in Egypt among school children where bacteriuria was 10 times higher in areas endemic for urinary schistosomiasis (Laughlin *et al*, 1979). This high rate of concomitant bacteriuria among school-aged children could be attributed to urinary schistosomiasis.

The study also revealed that the percentage occurrence of *E. coli* in heavy ova intensity (>50 eggs/10ml urine) is slightly higher (56.9%) than in light intensity (55.0%). Occurrence of *Klebsiella spp* in heavy intensity is slightly above (24.9%) that of light intensity (24.4%). *P aeroginosa* and *Proteus spp* occur more in light intensity (24.9%) and (28.9%) respectively than in heavy intensity (14.2%) and (14.6%) respectively. Occurrence of *S. aureus* is significantly higher in heavy intensity (4.2%) than in light intensity (1.7%). In subjects negative for urinary schistosomiasis, occurrence of bacteria isolates follows similar pattern with *Klebsiella spp* occurring more (3.3%) than the other isolates. This study showed that all 675 subjects positive for urinary schistosomiasis, had pyuria (pus cells). This finding is suggestive of inflammatory lesions of the bladder caused by *Schistosoma haematobium*, the eggs deposition in the tissue could give rise to inflammation and granules formation leading to subsequent urinary tract infections. Earlier on, some researchers had implicated pyuria with bacterial infection (Bhatt *et al*, 1984, Adeyeba and Ojeaga, 2002 and Ifeanyi *et al*, 2009).

The report that *E.coli* is the most frequently encountered urinary tract pathogen is a confirmation of this study where it has 33.9% occurrence followed by *Klebsiella sp* (15.8%), *Proteus sp* (14.5%), *Pseudomanas aeroginosa* (12.8%) and *S.aureus* (2.0%). All children with the primary infection of urinary schistosomiasis had more than one bacterium. When the mucosa is broken, which happens with urinary schistosomiasis, the urinary tract becomes an easy target for invading bacteria. The outcome is manifested in later years since most of the subjects examined had asymptomatic bacteriuria and did not present symptom such as painful micturition. This development poses great danger to the health of the school children (Fincharm *et al*, 2003). In the two settlements studied, the people depend more on traditional medicine which is more or less ineffective in the treatment of urinary schistosomiasis and its associated bacteriuria co-infection because there is virtually no existing health centres and trained community health care personnel in these settlements, thus systemic knowledge about bacteria co-infection and schistosomiasis in the 2-15years age group is scanty which is understandable since methods for schistosomiasis surveys are not optimal for detecting bacteriuria (Fincharm *et al*, 2003)

All the organisms encountered during the course of this study were resistant to Amoxycillin, Augumentin, Cotrimoxazole and Tetracycline. *E. coli* in particular showed a high level of resistance to Amoxycillin and Gentamycin. Similar results were reported by Galia *et al* (2003), Mordy and Erah (2006), Frank-Peterside and Wokoma (2009) and Ayoade, (2013). Gentamycin, Ofloxacin and Nitrofurantoin were found to be the most effective for all the bacteria isolates except *S.aureus* that recorded 40% susceptibility. Chloramphenicol was found to be the most effective for *S. aureus* (100% susceptibility).

CONCLUSION

The findings of this study shows that 675 children out of 1153 were infected with urinary schistosomiasis, the highest occurrence of bacteriuria (61.3%) was recorded in the heavy intensity (>50 eggs/10ml urine) while low intensity (1 – 50 eggs/10ml urine) recorded the lowest occurrence of bacteriuria (59.2%).

This study revealed that there is high occurrence of bacteriuria among school-aged children with urinary schistosomiasis in Sorbai and Murbai settlements of Ardo-kola LGA, Taraba State, Nigeria. Infection rate was highest in the 1-5years old than other age groups, and more in males than females, intensity of *Schistosoma haematobium* greatly influences the occurrence of bacteriuria in school-aged children. Urinary tract pathogen implicated is *E. coli, Klebsiella sp, Pseudomonas*

aeroginosa, Proteus sp and S. aureus which is due to unhygienic practices engaged in by the children. Therefore, there is need for Ardo kola local government Chairman and Taraba State Government to educate the inhabitants of the study area on urinary schistosomiasis and other related diseases and to mount successful control interventions in the areas affected.

Recommendations

The present study recommends that:

- There should be improvement in basic infrastructures such as potable water in rural communities, building of suitable health centres and adequate toilet facilities.
- Periodic epidemiological studies will help in identifying the important UTI pathogen associated with urinary schistosomiasis with a view to developing an effective and proper treatment model.
- All children infected with urinary schistosomiasis should be screened for bacteriuria and appropriate antibiotics concurrently administered along with Praziquantel.
- Intensive and sustained public health awareness and education programmes be carried out to sensitize the people on the risk of urinary schistosomiasis and its co-infection with bacteriuria.

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCE

1. Adeyeba, O.A. and Ojeaga S.G.T., (2002). Urinary schistosomiasis and concomitant urinary tract pathogens among school children in metropolitan Ibadan, Nigeria. *African Journal of Biomedical Research*, 5:103-107.
2. Andrich, M.P and Majd, M., (1992). Diagnostic imaging in the evaluation of the first urinary tract infections in children and young children. *Paediatric Journal*, 90:436-41.
3. Anigilaj,e E.A. and Bitto, T.T.,(2011) Prevalence and predictors of urinary tract infections among school children infected with cerebral palsy in Markurdi. *Nigeria International Journal of Nephrology*, 13:37-48.
4. Ayoade, F, Moro, D.D. and Ebene, O.L., (2013). Prevalence and antimicrobial susceptibility pattern of asymptomatic urinary tract infections of bacterial and parasitic origins among university students in Redemption Camp, Ogun State, Nigeria. *Open Journal of Medical Microbiology*, 3:8-16.
5. Badawi, A.F, Mostafa, M.H and O'Connor, P., (1992). Involvement of alkylating agents in schistosome associated bladder cancer: the possible basic mechanisms of induction cancer. *Open Journal of Medical Microbiology*, 63(3): 171-88.
6. Baker, P.C. Nelson, D.S and Shunk, M., (2001). The addition of Ceftriaxone to oral therapy does not improve outcome of febrile children with urinary tract infection. *America Pediatric Journal*, 153:135-139.
7. Batisky, D., (1996). Pediatric urinary tract infection. America Pediatric Journal 22:69-76.
8. Bedwani, R, Renganathan, E, and El-Kwhsky, E., (1998). Schistosomiasis and the risk of bladder cancer in Alexandra, Egypt. *British Journal Cancer*, 77 (7): 1186-1189.
9. Bhatt, K.M, Bhatt, S.N, Kanja, C and Ryobe J., (1984). Urinary leucocytes in bladder schistosomiasis. *East Africa Medical Journal*, 61(6): 442-452.
10. Bigwan, E.I and Elijah, D., (2013), Prevalence of Escherichia coli among uropathogens in asymptomatic bacteriuria in a tertiary institute in Jos. *International Journal of Biomedical and Advance Research*,13(4): 1-15.
11. Bjorgrinsson, E, Majd, M. and Eggli, K.D.,(1991). Diagnosis of acute pyelonephritis in children: comparison of sonography and 99M TC-DMSA scintigraphy. *America Journal of Radiology.Roentgenol*, 157:539-543.
12. Chan, S.L. and Shortliffe, L.M., (2006). Paediatric urinary tract infections. Paediatrics Clinic of North America, 53(3):379-400.
13. Cheesbrough, M. (2005). District laboratory practice in tropical countries. Part 2. Cambridge University Press, 34-50.
14. Chukwu B.F, Okafor, H.U and Ikemefuna, A.N., (2010), Socio-demorgraphic factors associated with asymptomatic bacteriuria in children with sickle cell anaemia in tertiary

health care facility in South eastern Nigeria. *Nigerian Medical Journal*, 51(4):137-140.
15. Colgan, R,Nicolle, L.E, McGlone, A. and Hooton, T.M., (2006). Asymptomatic bacteriuria in adults. American Family Phycisian 74(6): 985-990. PMID 17002033.
16. Cowan, S.T and Steel, J.L., (1975). Manual for the Identification of Medical Bacteria. 3rd Ed. Cambridge University Press, 45-117.
17. El-Mawla, N.G, El-Bolkainy, M.N and Khaled, H.M., (2001). Bladder cancer in. Africa. *International Journal of Microbiology*, 28(2):174-8.
18. Feld, L., (1991). Urinary Tract infection in childhood: pathogenesis, diagnosis and management pharmacology. America Journal of Paediatric Medicine, 11: 326-35.
19. Fincharm, J.E, Markus, M.B. and Adams, V.J., (2003). Could soil transmitted helminth infection influence the HIV/AIDS Pandemic? Acta. Tropical 86(2-3):315-333
20. Frank-Peterside, N. and Wokoma, E.C (2009). Prevalence of asymptomatic bacteriuria in students of university of Port- Harcourt Demonstration Secondary School. *Journal of Applied Sciences and Environmental Management*, 3 (2): 55-58.
21. Galia, P, Erica, R, Gilad, B. and Herve, B., (2003). Molecular epidemiology of asymptomatic bacteriuria in the elderly. *Journal of Age an Ageing*, 32(6): 670-673.
22. Garcia, F.J. and Nager, L., (2002). Jaundice as an early diagnostic sign of urinary tract infection in infancy. *Pediatrics journal of America*, 109(5): 846-851.
23. Gordon, R.L. and Stuart, L., (1989). Diagnosis and treatment of urinary tract infection. *America Journal of Medicine*,100 (64):7182
24. Gorelick, M.H. and Shaw, K.N., (1999). Screening tests for urinary tract infection in children: A meta- analysis.*Australia Journal of paeaditric*. 3(3):104- e54.
25. Graham, J.C. and Galloway, A., (2001). The Laboratory Diagnosis of Urinary Tract Infections. A.C.P Best Practice. No 167, *Journal of Clinical Pathololog*y 54:911-919.
26. Hellerstern, S., (1998). Urinary Tract Infection In Children: why they occur and how to prevent them. America Family Phycisian, 57(10): 2240-6.
27. Hicks, R.M., (1982).Nitrosamines as possible etiology agents in Bilharzial bladder cancer. Banburry Report. 1992: 12: 455-471.
28. Hoberman, A. Wald, E.R. Hickey, R.W. and Baskin, M., (2009). Oral versus initial intravenous therapy for urinary tract infection in young febrile children. *America Journal of pediatrics.*104:79-86.
29. Hotez, P.J. and Kamath, A., (2009). Neglected tropical diseases in Sub-Saharan Africa: Review of their prevalence, distribution and disease burden. Plos Neglect. Trop. Dis 3:e412.
30. Ifeanyi, C.I. Matur, B. M and Ikeneche, F. N., (2009). Urinary schistosomiasis and concomitant bacteriuria in the Federal Capital Territory Abuja, Nigeria. *New York Science Journal*, 2009, 2(2):1-8, ISSN 1554-200.
31. Johnson, J.R. Mobley, L.T and Warren, J.W., (1996). Treatment and prevention of urinary tract infection. Washington DC. ASM Press 1996:95-118.
32. Kaye, D., (1972).Urinary Tract infection. *Journal of infectious Disease*. (PT.11) 582-583.
33. Keren, R. and Chan, E., (2002). A meta-analysis of recommended, randomized and controlled trials: controlling short and long course antibiotic therapy for urinary tract infection in Children. *Pediatric America Journal*. E70-80. Cross Ref Medline.
34. Kolawole, A.S. Kolawole, O.M, Kandaki-Olukemi, Y.T and Babatunde, S.K., (2009). Prevalence of urinary tract infections (UTIs) among patients attending Dalhatu Araf Specialist Hospital Lafia, Nassarawa State. Nigeria. *International Journal of Medicine and Medical Sciences*. 1(5):163- 167.
35. Koyle, M. A, Barqawi,A, Wild, J, Passamaneck, M. and Furness, P. D., (2003). Paediatric urinary tract infection: the role of Fluoroquinolone. *Pediatric Infectious Disease Journal* 22: 1133-1137.
36. Kunin, C. M., (1972). Epidemiology and natural history of urinary tract infection in school-aged children. Pediatric Clinic North America, 18: 509-528.
37. Kunin, C.M., (1979). In detection, prevention and management of urinary tract infection in school children. An epidemiologic, clinical andlLaboratory study. *Medical Journal of Pediatric Medicine*. 43: 91-100.
38. Kunin, C.M., (1994). Urinary tract infections in female. *Clinical Infectious Disease Journal*.18(1):1-10.
39. Latif, A.S., (2004). Urogenital infections in the tropic. The Australasian College of Tropical Medicine. 04:8-16.
40. Laughlin, L.W, Farid, Z, Mansour, N, and Edman, D. C., (1979). Bacteriuria in urinary schistosomiasis in Egypt: A prevalence survey. *Aerica Journal of Tropical Meicine and Hygiene*, 27 (5): 916-918.

41. Linshaw, M., (1996). Asymptomatic bacteriuria and vesicurotheral reflux in children. Kidney International. 50(1):312-329.
42. Linshaw, M., (1996). Controversies in childhood urinary tract infection. *World Journal Uroologyl*.17(6): 383-392.
43. Majd, M, Rushton, H. G and Jantausch, B., (1991). Relationships among vesicurotheral reflux, P-fimbriated *Escherichia coli* and acute pyelonephritis in children with febrile urinary tract infection. *Africa Journal of Pediatric Medicine*. 91(2): 578-85.
44. Mbata,T.I., (2007). Prevalence of antibiogram Of UTIs among prison inmate in Nigeria, *International Journal of Microbiology*, 3, (2):11-15.
45. Mobley, L.T. and Warren, J.W., (1996). Urinary tract infections: molecular pathogens and clinical management. Washington D.C ASM Press. 1996, 3-28.
46. Mordy, R.M and Erah, P.O., (2006). Susceptibility of common urinary isolates to the commonly used antibiotics in a tertiary hospital in southern Nigeria. *African Journal of Biotechnology*, 5:1067-1071.
47. Nmorsi,O.P, Kwandu, U.N. and Ebianguanye, L.M., (2007). Schistosoma haematobium and urinary tract pathogens co-infection in a rural community of Edo state, Nigeria. *Nigerian Journal of community Diseases*, 39(2):35-90.
48. Obi, C.L, Tarupiwa, A and Simango, L., (1996). Scope of urinary pathogen isolated in public health laboratory: antibiotic susceptibility atterrns and incidence of haemolysis. Harare Zimbabwe. Central *Africa Journal of Medicine*.43: 26-27.
49. Poggensee, G, Krant, I, Nordin, P. and Mtwere, S., (2005). A six year follow-up of children with urinary schistosomiasis and soil transmitted helminths in Northern Tanzania. *Acta Tropical Journal*,93(2): 131-140.
50. Roohalla, S.R.G. and Stacy, C., (1995). Treatment of urinary tract infection. *American Journal of Medicine*,100 (6A): 171.
51. Sam, A.H. and James, T.H., (2010). Rapid Medicine. Willey-Blackwell ISBN-1-4051-8323-3.
52. Shaikh, N, Morone, N.E, Bost, J.E and Farrels, M.H (2008), Prevalence of urinary tract infection in childhood: a meta-analysis. *Pediatric Infectious Disease Journal*, 27(4): 302-308.
53. Shortliffe, L.M., (1995). The management of urinary tract infection in children without urinary abnormalities. University Clinic of North America 22: 67-73.
54. Stokes, E. J., (1968). In Clinical Bacteriology. 3rd Ed. London Edward Arnold 1968
55. Stull, T.L and Lipuma M., (1991). Epidemiology and natural history of urinary tract infection in children. University Clinic of North America.72 (2):287-98.
56. Uneke, C.J, Ugwuoke-Adibuah, S, Nwakpu, R. O, and Ngwu, B.A., (2009). An assessment of *Schistosoma haematobium* infection and urinary tract bacterial infection amongst school children in rural Eastern Nigeria. *The Internet Journal of Laboratory Medicine*. 2009; 4 (1):35-48
57. Warren, J.W., (1996).Clinical presentation of urinary tract infection. Washington DC. ASM Press, 1996; 3-28.
58. World Health Organization. Report of World Health Organization Informal Consultation on Schistosomiasis Control. World Health Organization, Geneva 1980, Google Scholar.
59. Zelikovic, I, Adelman, R.D. and Nancarrow, P.A., (1992). Urinary tract infection in children. An update. *Western Journal of Medicine*.157: 554-561.

How to cite this article: Elkana D.S., Elkana O.S, Adle A.A, Obadiah S.Y, Babylon P, Usman D.D et.al. Prevalence and intensity of urinary schistosoma haematobium eggs among the school aged children in Kona ward, Ardo Kola Lga, Taraba State, Nigeria. *International Journal of Science & Healthcare Research.* 2024; 9(1): 211-220.
DOI: *https://doi.org/10.52403/ijshr.20240127*

******