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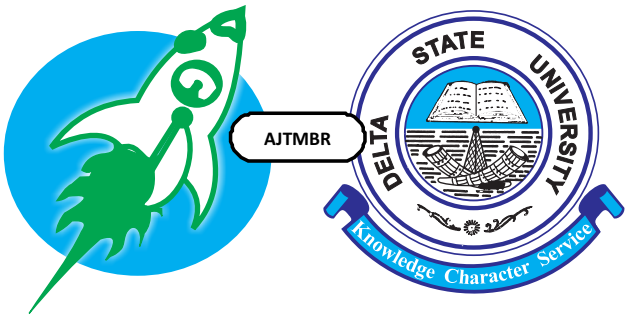

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Focus and Scope

The African Journal of Tropical Medicine and Biomedical Research is a multidisciplinary and international journal published by the College of Health Sciences, Delta State University of Abraka, Nigeria. It provides a forum for Authors working in Africa to share their research findings on all aspects of Tropical Medicine and Biomedical Sciences and to disseminate innovative, relevant and useful information on tropical medicine and biomedical sciences throughout the continent. The journal will publish original research articles, reviews, editorials, commentaries, short reports, case reports and letters to the editor. Articles are welcome in all branches of medicine and dentistry including basic sciences (Anatomy, Biochemistry, Physiology, Pharmacology, Psychology, Nursing etc) and clinical sciences (Internal Medicine, Surgery, Obstetrics and Gynaecology, Dental surgery, Child Health, Laboratory Sciences, Radiology, Community Medicine, etc). Articles are also welcome from social science researchers that document the intermediating and background social factors influencing health in countries of Africa. Priority will be given to publication of articles that describe the application of the principles of primary health care in the prevention and treatment of diseases.

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Table of Contents

Intensity of Urinary Schistosomiasis and Prevalence of Urinary Tract Pathology Among Primary School Pupils in Delta State, South-south, Nigeria

Mbagwu Nkemjika E[1], Ezeonwu BU[1], Agabi JO[1], Okolo Selina N[2]

Abstract

Background: The urinary tract pathology (UTP) of urinary schistosomiasis is a common complication of the infection caused by inflammatory reactions mainly against the deposited egg antigens around the urinary tract and it is a disease of major public health importance.

Objective: The aim of this study was to determine the correlation between the intensity of urinary schistosomiasis and the prevalence of its UTP among primary school pupils in Ndokwa-East Local Government Area (NELGA) of Delta State, South-south Nigeria.

Method: This study was a cross sectional descriptive study of primary school children aged 5-15 years in Ndokwa-East Local Government Area (NELGA) of Delta State. Urine microscopy was used to identify infected primary school pupils. The intensity of infection was classified using egg count according to World Health Organization (WHO) standard, after which they participated in an ultrasound examination, using WHO guideline for schistosomiasis morbidity.

Result: Among the infected subjects, 87.5% of those with severe infection had bladder wall pathology, while 71.4% of those with mild infection had bladder wall pathology (FET, p-value = 0.613). Additionally, 12.5% of those with severe infection as against 7.1% of those with mild infection had hydroureter (FET, p-value = 1.000), while 37.5% of those with severe infection as against 42.9% of those with mild infection had hydronephrosis (FET, p-value = 1.000).

Conclusion: The prevalence and severity of UTP in this study had no significant relationship with the intensity of infection.

Key Words: Urinary schistosomiasis, Urinary tract pathology, Intensity of infection, NELGA

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INTRODUCTION

Schistosomiasis is an immunologic disease,[1,2,3] and the pathogenesis of acute, sub-acute, and chronic schistosomiasis involve immunologic mechanisms.1 The acute phase coincides with the invasion and migratory stages of the parasite life cycle.1 The sub-acute phase coincides mainly with granuloma formations in the bladder, lower ureters, seminal vesicles, prostate, female genital tracts, etcetera, depending on the quantity of schistosoma eggs and where they are deposited.1 The granuloma coalesce to form tubercles, nodules and masses that often ulcerate, giving rise to dysuria, hematuria, and proteinuria. 1 The masses can also obstruct urinary outflow, depending on their location, leading to hydronephrosis and hydroureter.1 Building up of

back pressure from the obstruction can lead to renal damage, depending on the severity.1 The chronic phase coincides with the period where antigen-antibody immune complexes are formed and deposited in the kidney, leading to proliferative glomerulonephritis. Oncogenic alterations resulting from error-prone repair of modified DNA (from schistosome egg-derived estrogen-like molecules and their metabolites reacting covalently with DNA bases), leading to urogenital carcinomas occur in the chronic phase too. 4 The prevalence of urinary schistosomiasis has remained relatively high in Ndokwa-East Local Government Area (NELGA) of Delta State and its Urinary Tract Pathology (UTP) is a disease of public health importance.5 However, there is paucity of data on the influence of the intensity of infection on the UTP of urinary schistosomiasis in NELGA of Delta State. This study therefore helped in addressing the above knowledge gap.

SUBJECTS AND METHODS

The study was conducted in the selected primary schools in Ndokwa East LGA of Delta State. It was a cross sectional descriptive study of primary school children aged 5-15 years in Ndokwa-East Local Government Area (NELGA) of Delta State, to determine the relationship between the severity of urinary tract ultrasonographic abnormalities among primary school children with urinary schistosomiasis and intensity of infection. Subjects' recruitment was by multistage, stratified sampling method. The wards and the primary schools were selected by simple random sampling method. Urine microscopy (urine centrifugation-sedimentation method of diagnosis) was used to separate infected and uninfected primary school pupils. The schistosoma eggs identified during the urine microscopy were counted twice (to minimize errors) and recorded as number of eggs per 10millilitres of urine (EP10ml) and graded according to World Health Organization (WHO) standard; <50 eggs/10 ml urine considered as mild infection, and ≥50 eggs/10 ml of urine as severe infection. 3 6 This was carried by a laboratory scientist who had undergone further training on parasitology, to ensure accuracy. All the infected subjects proceeded to the next stage of the study.

The infected pupils were scanned in the morning. The kidneys, the ureters, and the bladder of all the subjects were scanned using a 3.5Mhz curvilinear array transducer of a logic V5 ultrasound machine (GE Medical systems[CHINA] CO LTD, 2016), by a Consultant Radiologist, to minimize error. The radiologist had no knowledge of the intensity of infection of the subjects to minimize bias as well.

The kidneys were assessed in the longitudinal and transverse axis for pathologies of the renal parenchymal and pelvi-calyceal collecting systems. The abnormalities were classified and scored according to World Health Organization (WHO) guideline for schistosomiasis morbidity. The pathological lesions were classified into those affecting the bladder and those affecting the upper urinary tract (ureter and kidneys). For the bladder pathologies, the scores were given as follows; a wall irregularity with thickening up to 5mm is scored 1, and 2 if multifocal. A focal bladder wall thickening greater than 5mm was given a score of 1, and a score of 2 if multifocal. A mass considered as a localized thickening of the bladder wall, protruding into the lumen (> 10mm), was given a score of 2 when single and a score of n+2 for multiple masses (n = number of masses). Pseudo polyps, defined as outgrowths of the wall, attached by slender bases (narrower than the mass), were scored like the masses. Each lesion in the wall was scored only once, in one category

only. 7 Hydroureter was given a score of 3 when moderately dilated (the ureter being visualized at the proximal and/or distal third), and 4 when grossly dilated (the ureter being dilated more than is required for mere visualization). Hydronephrosis was given a score of 6 if dilated with conserved parenchyma (distance between renal pelvis and capsule being > 1cm), and a score of 8 if severely dilated with compression/absence of parenchyma (distance between renal pelvis and capsule being < 1cm). Urinary tract lesions not meeting the above criteria were given scores of 0. 7 Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. Intensity of infection and prevalence/severity of urinary tract abnormality were treated as categorical variables and expressed using frequency tables and charts. The significance of association between the prevalence of UTP and intensity of infection were tested using chi-square test and Fisher's exact test when indicated. The level of significance was set at a p-value of less than 0.05.

Ethical Consideration

Ethical clearance was obtained from the Ethics Committee, FMC Asaba. Written permissions were obtained from the State Ministry of Basic and Secondary Education, and the Local Government Chairman. Verbal permission was obtained from the community leaders. Written informed consent were obtained from the parents/caregivers of the study participants and written assent were obtained from the participants aged ≥ 7years

RESULTS

General characteristics of the study population

There were 22 infected study participants who completed the study. There were 13 males (59.1%) and 9 females (40.9%), giving a ratio of 1.4:1. They all belonged to the lower socio-economic status. The mean (SD) of weight, height, and body mass index (BMI) of the subjects were 26.3kg (11.1), 123.4cm (16.3), and 16.6kg/m^2 (3.4) respectively.

Among the infected subjects that completed the study, 77.3% (17/22) had UTP using ultrasonography.

Intensity of the US infection in the subjects

Fourteen out of the 22 infected subjects (63.6%) that completed the study had mild infection, while the rest had severe infection

Prevalence of UTP among the study participants

Seventeen (77.3%) out of the 22 infected pupils studied, had at least one abnormality of the bladder wall such as bladder mass, increased bladder wall thickness, abnormal bladder wall shape, and bladder wall irregularity. Two (9.1%) out of the 22 infected pupils had hydroureter, and 9 (40.9%) out of the 22 infected pupils had hydronephrosis of at least one kidney.

Relationship/correlation between the intensity of infection and prevalence of urinary tract pathologies.

The intensity of infection had no significant relationship with the prevalence of the urinary tract pathologies as shown in table I.

TABLE I: Relationship between intensity of infection and prevalence of UTP

Parameter		Intensity of infection		p-value
		Mild infection (N=14)	Severe infection(N=8)	
		n (%)	n (%)	
Abnormality of the bladder	Yes	10 (71.4)	7 (87.5)	0.613
	No	4 (28.6)	1 (12.5)	
Hydroureter	Yes	1 (7.1)	1 (12.5)	1.000
	No	13 (92.9)	7 (87.5)	
Hydronephrosis	Yes	6 (42.9)	3 (37.5)	1.000
	No	8 (57.1)	5 (62.5)	

FET = Fisher's Exact Test

Relationship between the Intensity of infection and severity of Urinary Tract Pathology of Urinary Schistosomiasis.

There was no significant relationship between the intensity of infection and severity of UTP as shown in Table II.

TABLE II: Relationship between intensity of infection and severity of UTP

Parameter		Intensity of infection		FET	p-value
		Mild infection (N= 10) n (%)	Severe infection (N= 7) n (%)		
Irregularity of the bladder wall	Normal	7 (70.0)	5 (71.4)	-	1.000
	Focal irregularity	1 (10.0)	1 (14.3)		
	Multifocal irregularity	2 (20.0)	1 (14.3)		
Thickening of the Bladder wall	No thickening	4 (40.0)	4 (57.1)	-	0.647
	Focal thickening	2 (20.0)	0 (0.0)		
	Multifocal thickening	4 (40.0)	3 (42.9)		
Bladder wall mass	No mass	9 (90.0)	5 (71.4)	-	0.537
	Multiple masses	1 (10.0)	2 (28.6)		
Bladder wall shape	Normal shape	5 (50.0)	2 (28.6)	-	0.354
	Abnormal shape	5 (50.0)	5 (71.4)		
Severity of the hydronephrosis	Unilateral mod hydroneph	2 (33.3)	2 (66.7)	-	1.000
	Bilateral mod hydroneph	3 (50.0)	1 (33.3)		
	Severe hydronephrosis	1 (16.7)	0 (0.0)		

mod = *moderate,* hydroneph = *hydronephrosis,* FET = *Fisher's Exact Test*

DISCUSSION

The prevalence and severity of UTP in this study had no significant relationship with the intensity of infection. Similar to this finding, King et al8 and Onile et al; 9 reported that subjects with bladder pathologies, could have mild or severe schistosomiasis infection. The finding is however at variance with those of Vester et al, 10 Ekwunife et al,11 Nmorsi et al,12 and Sacko et al; 13 who all reported that UTP of urinary schistosomiasis were associated with increasing egg output.10[11,12,13] A number of factors may play a role in the differences. Genetic factors for instance, as suggested by Kouriba et al14 in Mali, may play a role in the similarity between this index study and the studies by King et al8 and Onile et al. 9 It may be that majority of the subjects with UTP were immunologically naïve, and so, mounted a vigorous inflammatory response to any infection, be it mild or heavy infection;[14] resulting in UTP. It may also be that acquired immunity developed earlier in areas of high exposures, and this acquired immunity modulated the host immune response to the antigen of schistosoma eggs, to the development of UTP, especially in heavily infected subjects. This is as reported by Joseph et al15 in 2004, and Woolhouse et al16 in 1999.

CONCLUSION

The prevalence and severity of UTP in this study had no significant relationship with the intensity of infection. Therefore, the final thought on the influence of severity of infection on the development of UTP from this study is that intensity of schistosomiasis infection alone may not affect the development of UTP of schistosomiasis. This influence may be altered probably by genetic make-up of the parasite, and the hosts' immune response.

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