East African Medical Journal Vol. 97 No. 9 September 2020
URINARY ABNORMALITIES, HYPERTENSION, AND BODY MASS INDEX IN PRIMARY SCHOOL CHILDREN IN ABUJA, NIGERIA
Adeline Okechukwu Adaora, (FMCPaed) Department of Paediatrics, University of Abuja Teaching Hospital, Gwagwalada, Abuja. P.M.B 228, Gwagwalada, Federal Capital Territory, Abuja, Nigeria,
Agnes-Jane Ifeanyichukwu Dike, (FWACP): Department of Paediatrics, Federal Medical Center, Makurdi, Benue State. P.M.B 102004. Makurdi, Benue State.

Corresponding author: Okechukwu Adaora Adeline, Department of Paediatrics, University of Abuja Teaching Hospital, Gwagwalada, Abuja. Email: nebokest@yahoo.com

URINARY ABNORMALITIES, HYPERTENSION, AND BODY MASS INDEX IN PRIMARY SCHOOL CHILDREN IN ABUJA, NIGERIA

A. A. Okechukwu, and A. I. Dike

ABSTRACT

***Objective*: To determine the prevalence of urinary abnormalities, and its associations with hypertension, and body mass index among primary school children in our environment.**

***Design*: A cross sectional school-based study.**

***Setting*: Was among apparently healthy, school children from 24 public primary schools in, Abuja, Nigeria.**

***Subjects*: Eight hundred and sixty-one urine samples from these children were analyzed for the presence of urinary abnormalities, blood pressure was measured, and body mass index calculated, and categorized.**

***Results*: Of the urine sample analysed, 215(25.0%) was from urban, and 646(75.0%) from rural schools. There were 46.1% males, their mean age was 9.5±2.1years, mean systolic, and diastolic blood pressure were 102.2±11.9mmHg, and 60.3±7.9mmHg, and body mass index was 15.3±2.4kgm^2. The prevalence of urinary abnormality was 145(16.8%), underweight was 297(34.4%), while overweight, and obesity were 5(0.6%), and 12(1.4%) respectively. Pre-systolic 37(4.3%), pre-diastolic 10(1.2%), systolic 109 (12.7%), and diastolic 12(1.4%) hypertension prevalence was also documented. Statistical significant association was seen between proteinuria and diastolic blood pressure, OR=4.7, CI 0.9-25.0; p=0.02; and between nitrituria with body mass index, OR=1.5, CI 0.6-4.0, p=.008. Significant association was also documented between nitrituria and location of school, OR = 2.1, CI 0.1-4.4, p=0.001; and between haematuria, and nitrituria with socio-economic status, OR=1.6, CI 0.84-3.03, p=0.001 and OR=9.1, CI 2.9-28.7, p=0.001 respectively.**

***Conclusion*: High prevalence of urinary abnormalities, systolic hypertension, and underweight was documented among the study population. There is need to establish school-based screening programs for blood pressure measurements,**

body mass index assessment, and urinalysis for early detection and lifestyle modifications.

INTRODUCTION

Abnormalities detected on routine urinalysis in patients without symptoms could be indicators of underlying renal or cardiovascular diseases. Many childhood nephropathies present with proteinuria or haematuria, which may indicate kidney damage, and early detection is important to halt progression to chronic kidney disease (CKD).[1] Urinary nitrite, and leucocyturia are indicative of urinary tract infection (UTI), and when left untreated, could lead to renal scaring, hypertension, and CKD from ascending infection.[2] CKD is now a public health problem in both children and adults. Early detection of urinary abnormalities using dipstick urinalysis is a simple, inexpensive, non-invasive, quick test that can be used for early detection of silent renal /cardiovascular diseases. This singular measure has gained wide acceptance in many Asian paediatric population,[,1,3] in contrast to what is obtained in United States of America, and Europe where such measures has proven not to be effective in the reduction of CKD.[4] Routine urinary screening is not a common practice in many developing countries of the world, Nigeria inclusive despite reports of rising prevalence of CKD in our paediatric population.[5] Most studies on urinary abnormalities in the country are focused on adolescent age group, or preschool children or on proteinuria and or haematuria, with few studies on school age children.[6,7] More of such studies using dipstick urinalysis is necessary to establish its usefulness and increase its acceptability as a screening tool in children in our environment.[7]

Hypertension and prehypertension are important signs, and major causes of progressive kidney damage. Is widely defined in children as average systolic and/or diastolic blood pressure (BP) of ≥95th per centile, and between ≥90th and <95th per centile for age, gender, and height. Although the incidence of hypertension is low in children compared to adults, the prevalence is on the increase across Africa, between 0.2% to 24.8%.[8] Kidney damage in hypertension occurs as a result of glomerular hypo-perfusion, and ischaemia from increase in intra-glomerular capillary pressure resulting in glomerulosclerosis, a known risk factors for cardiovascular diseases and renal impairment. Ikimalo *et al*[7] however reported that all children with urinary abnormalities in their study in Nigeria had normal blood pressure and attributed such finding to probably an uncommon early event. Hothan *et al*[9] and Odetunde *et al*[10] equally observed proteinuria and haematuria not to be significant risk factor(s) for hypertension. Chaudhury *et al*[11] on the other hand had a contrary view and observed a significantly higher incidence of pre-hypertension, and stage 1 hypertension to be associated with asymptomatic urinary abnormalities. Raham *et al*[12] also documented hypertension to be strongly correlated with obesity, asymptomatic proteinuria, and haematuria.

The body mass index (BMI) derived from the weight in kilogram, and height in centimeter is a measure of body fat in kg/m^2. Abnormal BMI (high or low) has been found to be associated with kidney damage. High BMI (over-weight, obesity) is on increase among children all over the world, with prevalence rates of 2-18% in Nigerian.[13] Obesity is a known risk factor for CKD because of its associated with high leptin that stimulates release of epinephrine, nor-epinephrine from sympathetic nervous system, and renin from the kidney. These hormonal release causes sodium and water retention, hypertension, and glomerular injury.[14] In addition, compression of the kidneys by visceral fat in obesity results in release of norepinephrine, epinephrine, renin-angiotensin-aldosterone, combination that results in hypertension, with risk of glomerular damage.[14] Some studies have found a significant association between proteinuria and obesity.[15] Chandury *et al*[11] also documented a significant association between low BMI (underweight) with proteinuria and attributed such to low birth weight which has been documented as a risk factor for albuminuria and progressive kidney disease.

Patients with hypertension, urinary abnormalities could be asymptomatic, and may remain so despite on-going kidney damage. When left un-attended has the potential to progress; therefore, identifying these children at the early stages becomes necessary in order to institute any available measures which can slow down progression to CKD and ESRD. We therefore conducted this study not only to determine the prevalence of urinary abnormalities, hypertension, and abnormal BMI among primary school children in Abuja, but also document any association of hypertension and BMI with urinary abnormalities. Such information is necessary for formulation of preventive strategies for CKD in the study area, and the country.

SUBJECTS AND METHODS

A cross sectional school-based study was conducted in Gwagwalada Area Council (GAC), with 10 wards, in the Federal Capital Territory (FCT), Abuja, among apparently healthy, school children, aged 6-12 years from 24 urban and rural pubic primary schools from September 2017 to March 2018. Inclusion criteria were healthy primary school children whose parent/ caregiver and themselves agreed to be part of the study. Excluded were those whose parents/caregiver and they themselves refused to be participate in the study, and those with evidence of kidney disease such as nephrotic syndrome, history of passage of bloody urine, and girls who were menstruating. Sampling technique for recruitment of subjects was a five staged multi-random sampling method.

Eligible subjects were given sample bottle for urine collection, and questionnaires to be filled by the parents/caregivers. Early morning urine was collected using appropriate technique. The girls were told to part their labia and clean the introits with water before collection of mid-stream urine. The boys were also told to retract their prepuce while urinating for the uncircumcised subjects to prevent contamination. The sample bottle was to be filled up to the 20ml and analysed using the Combo strips 10 (DFI co. Ltd.). The strip was completely immersed in the urine for approximately 1 second and held horizontally close to the colour codes on the reagent bottles for comparism. The biodata was collected, and included: the level of education of both parents/ caregiver, their type of occupation, history of hypertension in the family. Social class was assigned based on the occupation and educational attainment of the parents or primary care giver.

BP was measured by the auscultation method using a mercury sphygmomanometer

(AC Cusson & Sons LTD; Model No. CM195QP) and a stethoscope (Littmann, 3M healthcare). Subjects were seated quietly for 15minutes in the room with his/her back supported, feet on the floor and right arm fully exposed and supported on a table, with the ante-cubital fossa approximately at level of the heart. The right arm was used to measure the BP using appropriate cuff size, and ensuring the length of the cuff completely encircles the upper arm, while the bladder size was about 2/3rd of the upper arm length and 3/4th of its circumference. A stethoscope was placed on the ante-cubital fossa afterwards to listen for the Korotkoff sound after the inflation of the bladder. Phases I and V were taken as systolic and diastolic BP respectively and were recorded to the nearest 2 mm Hg. BP was taken thrice; the first was discarded, while the second and the third were averaged. A subject's BP was interpreted as normal BP, pre-hypertension, or hypertension using appropriate age and sex-based blood pressure charts as follows: Normal BP: SBP and/or DBP <90th centile for age and sex. Pre-hypertension: SBP and/or DBP ≥ 90th centile but < 95th for age and sex. Hypertension: SBP and/or DBP ≥ 95th centile for age and sex. Subjects who were found to have elevated BP were referred to University of Abuja Teaching Hospital (UATH) for further evaluation and management

Weight in kilogram (kg) was measured using Seca 755 mechanical weighing scale, and read to the nearest 0.5kg. Height was measured with Seca stadiometer,755 model to the nearest 0.1 centimetre. BMI was calculated using weight (kg)/height $(m)^2$. Results were then plotted on the appropriate W.H.O approved BMI charts and interpreted as follows: normal BMI between 5th and 85th centile, underweight is < 5th centile, over weight is between 85th to < 95th centile, while obese is ≥ 95th centile.

Sample size was calculated using Leslie Kish [16] cross sectional surveys: Z^2pq/d^2 with prevalence for urinary abnormalities of 9.6% by Akor *et a*l [6] from Nigeria, and 10% non-responders,

Ethics clearance was from the UATH Ethics Committee, from FCT Research Committee, FCT Department of Policy and Implementation Education Secretariat, FCT Universal Basic Education Board, and Heads of the selected schools.

Data analysis was done using the statistical package for social sciences (SPSS) version 22 for frequency tables, mean, standard deviation and ranges. Student t test was used to compare group means; chi-square was used to analyse categorical data. Logistic regression analysis was used in testing the covariates that were significant in the previous bivariate analysis. P value of <0.05 was considered statistically significant

RESULTS

Table1 depicts the socio-demographic characteristics of the study population. There were more females (53.9%), more between the ages of 9-10years (36.4%), and majority from rural schools 646 (75.0%). Their means age was 9.5±2.1years, so also was their mean SBP (102.2±11.9mmHg), mean DBP (60.3±7.9mmHg), and mean BMI (15.3±2.4kgm^2). While 4.3% had pre-systolic hypertension, 1.2% have pre-diastolic hypertension, and while 12.7% had systolic hypertension, 1.4% had diastolic hypertension. Pre-hypertension 47 (5.5%) and hypertension 121(14.1%) was seen in this study. Two hundred and ninety-seven (34.5%) of the subjects were underweight, 547(63.5%) had normal BMI, 5(0.6%) were over-weight, and 12(1.4%) were obese. There was no statistically significant difference between the study variables of subjects with positive and negative urinalysis (there p values were <0.05) except for religion (x^2=19.23, p=0.001), and SES (x^2= 21.97, p=0.001).

Table 1

Socio-demographic Characteristics of the Study Population

Variables	Total Population N (%) N=861	Positive Urinalysis N (%) N = 145	Negative Urinalysis N (%) N=716	Chi-square statistic	P Value
Mean Age(years)	*9.5±2.11	*9.96±1.9	*9.45±2.15	T=0.956	0.34
Sex					
Male	397(46.1)	58 (40.0)	339(47.3)	2.62	0.106
Female	464(53.9)	87 (60.0)	377(52.6)		
Age range(years)					
6 – 8	277 (32.2)	44 (30.3)	233(32.5)	4.37	0.113
9 – 10	313 (36.4)	45 (31.0)	268(37.4)		
11 – 12	271 (31.5)	56 (38.6)	215(30.0)		
Location of school					
Urban	215 (25.0)	28 (19.3)	187(26.1)	2.98	0.084
Rural	646 (75.0)	117(80.7)	529(73.9)		
Religion					
Christian	339 (39.4)	29(20.0)	310(43.3)	27.51	0.001
Moslem	497 (57.7)	111(76.6)	386(53.9)		
ATR	25 (2.9)	5(3.4)	20(2.8)		
Systolic BP (mmHg)					
Normal	715(83.0)	122(84.2)	593(82.8)	0.503	0.778
Pre-hypertensive	37(4.3)	7(4.8)	30(4.2)		
Hypertensive	109(12.7)	16(11.0)	93(13.0)		
Mean Systolic BP	*102.2± 11.9	*101.9±12.48	*102.22±11.79	T=0.268	0.788
Diastolic BP (mmHg)					
Normal	839(97.4)	138(95.1)	701(97.9)	4.55	0.103
Pre-hypertensive	10(1.2)	4(2.8)	6(0.8)		
Hypertensive	12(1.4)	3(2.1)	9(1.3)		
Mean Diastolic BP	*60.3 ± 7.9	*60.7±7.9	*60.2±8.0	T=0.679	0.5
BMI (kg/m^2)					
Underweight	297(34.5)	55(37.9)	242(33.8)	1.66	0.645
Normal	547(63.5)	86(59.3)	461(64.3)		
Overweight	5(0.6)	1(0.7)	4(0.6)		
Obese	12(1.4)	3(2.1)	9(1.3)		
Mean BMI	*15.3±3.4	*15.27±2.6	*15.35±2.35	T=0.4	0.688
Social Class					
Upper	218 (25.3)	21 (14.5)	197(27.5)	24.48	0.001
Middle	245(28.5)	55(38.0)	190(26.5)		
Lower	398 (46.2)	69 (47.5)	329(46.0)		

Fig 1 shows the pie chart of urinary abnormalities seen among the study population. While 716(83.2%) of the subjects had no urinary abnormalities, 145(16.8%) had varying degrees of urinary abnormalities, ranging from 60(7.0%) of proteinuria, 91(10.6%) of haematuria, 23(2.7%) of nitrituria, to 29(3.4%) of leucocyturia.

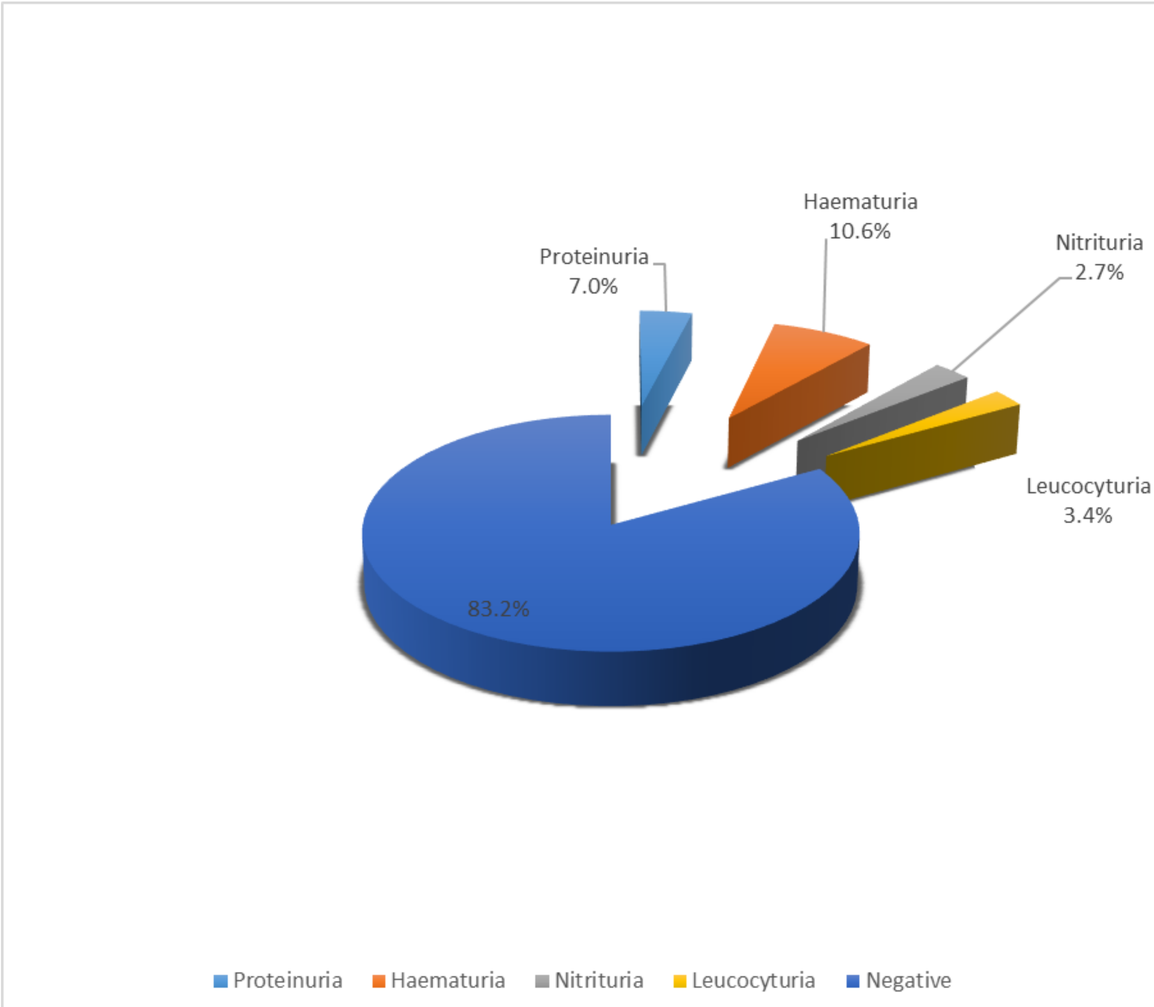

Fig. 1: Distribution of urinary abnormalities among the study population

Table 2 showed the relationship between urinary abnormalities with SBP, DBP. Using bivariate and multivariate logistic regression, no statistically significant association was seen between SBP with all the urinary variables (proteinuria, haematuria, leucocyturia, and nitrituria), their p values were <0.05. There was however statistically significant association between subjects with proteinuria and DBP using the same model. With bivariate analysis, OR= 3.5, CI 0.7-17.1, for positive proteinuria, and OR of 4.7, CI 1.2-18.0, for negative proteinuria, p=0.01. Using multivariate analysis, OR of 4.7, CI 0.9-25.0 was documented for positive proteinuria, and OR of 5.1, CI 3.1-20.3, for negative proteinuria, p=0.02.

Table 2

Relationship between urinary abnormalities with Systolic and Diastolic Blood Pressure

Urinary abnormality	**Systolic BP (%)**				**P value**	**Multivariate analysis OR (95% CI)**	**P value**
	Normal	**Pre-Hypertension**	**Hypertension**				
	n = 715	**n = 37**	**n = 109**	**Bivariate Analysis OR (95% CI)**			
Proteinuria							
Positive	52(7.3)	3(8.1)	5(4.6)	0.74(0.2-3.1)	0.76	-	-
Negative	663(92.7)	34(91.9)	104(95.4)	0.75(0.3-1.8)			
Haematuria							
Positive	71(9.9)	6(16.2)	14(12.8)	0.75(0.2-2.5)	0.88	-	-
Negative	644 (90.1)	31 (83.8)	95(87.2)	1.05(0.6-2.0)			
Nitrituria							
Positive	18(2.5)	2(5.4)	3(2.8)	0.97(0.1-7.4)	0.85	-	-
Negative	697 (97.5)	35 (94.6)	106(97.2)	0.65(0.2-2.8)			
Leucocyturia							
Positive	23(3.2)	2(5.4)	4(3.7)	1.65(0.4-7.3)	0.29	-	-
Negative	692 (96.8)	35 (94.6)	105(96.3)	0.3(0.04-2.0)			
Urinary abnormality	Diastolic BP (%)				p-value	Multivariate analysis OR (95% CI)	P value
	Normal	Pre-Hypertension	Hypertension				
	n = 839	n = 10	n = 12	Bivariate Analysis OR (95% CI)			
Proteinuria							
Positive	59(7.0)	1(10.0)	0(0)	3.5(0.7-17.1)	0.01	4.7(0.9-25.0)	0.02
Negative	780(93.0)	9(90.0)	12(100)	4.7(1.2-18.0)		5.1(3.1-20.3)	
Haematuria							
Positive	88(10.5)	1(10.0)	2(16.7)	2.2(0.5-10.3)	0.17	-	-
Negative	751(89.5)	9(90.0)	10(83.3)	2.9(0.8-10.8)			
Nitrituria							
Positive	22(2.6)	1(10.0)	0(0)	4.1(0.5-34.0)	0.3	-	-
Negative	817(97.4)	9(90.0)	12(100)				
Leucocyturia							
Positive	28(3.3)	0(0)	1(8.3)	3.4(0.4-27.7)	0.39	-	-
Negative	811(96.7)	10(100)	11(91.7)				

Table 3 depicts the relationship between urinary abnormalities with BMI. No significant relationship was seen between urinary variables and BMI, except for BMI and nitrituria, OR of 1.7, CI 0.7-4.03, for positive nitrituria, and OR of 9.7, CI 2.0-49.7 for negative nitrituria, p=0.01 using bivariate analysis. Using multivariate logistic regression, significant association shows OR of 1.5, CI 0.6-4.0, for positive nitrituria, and OR of 14.6, CI 2-105 for negative nitrituria, p=0.008.

Table 3
Relationship between Urinary Abnormalities with BMI

Urinary abnormality	**BMI (%)**							
	Underweight	**Normal**	**Over-weight**	**Obese**			**Multivariate analysis OR (95% CI)**	**P value**
	n = 297	**n = 547**	**n = 5**	**n = 12**	**Bivariate Analysis OR (95% CI)**	**P value**		
Proteinuria								
Positive	19 (6.4)	40 (7.3)	0 (0)	1(8.3)	1.4(0.8-2.4)	0.21	-	-
Negative	278 (93.6)	507 (92.7)	(100)	11 (91.7)	3.8(0.4-35.0)			
					3.4(0.7-16.3)			
Haematuria								
Positive	25 (8.4)	64 (11.7)	0 (0)	2 (16.7)	1.2(0.8-2.0)	0.59	-	-
Negative	272 (91.6)	483 (88.3)	5 (100)	10 (83.3)	2.0(0.4-9.4)			
					0.1(0.1-0.2)			
Nitrituria								
Positive	8 (2.7)	15 (2.7)	0 (0)	0 (0)	1.7(0.7-4.03)	0.014	1.5(0.6-4.0)	0.008
Negative	289 (97.3)	532 (97.3)	5 (100)	12 (100)	9.7(2.0-49.7)		14.6(2-105)	
Leucocyturia								
Positive	4 (1.3)	25 (4.6)	0 (0)	0 (0)	1.1(0.5-2.4)	0.9	-	-
Negative	293 (98.7)	522 (95.4)	5 (100)	12 (100)				

Table 4 is the table showing urinary abnormalities with location of school, gender, and SES. Statistically significant association was seen between nitrituria and location of schools, OR of 2.1, CI 0.1-4.40.1, p=0.001. There was also a strong association between haematuria, and nitrituria with SES: OR=1.6, CI 0.84-3.03, p=0.001 for haematuria, and OR=9.1, CI 2.9-28.7, p=0.001 for nitrituria. No association was seen between any of the urinary variables with gender, values <0.05.

Table 4

Urinary abnormalities with Location of School, Gender, and SES

	Location of School							
Urinary Variables	Urban n=215 (%)	Rural n=646(%)		Uni/Bivariate Analysis OR (95% CI	P value	Multivariate analysis OR (95% CI	P value
Proteinuria	6	54		0.31(0.138-0.7)	0.005	1.16(1.1-2.4)	0.33
Haematuria	12	79		0.42(0.23-0.77)	0.005	1.27(0.62-2.6)	0.51
Nitrituria	11	12		2.9(1.3-6.45)	0.009	2.14(0.1-4.4)	0.001
Leucocyturia	10	17		1.79(0.81-3.92)	0.149	-	-
	Sex						
Urinary Variables	Male n=397(%)	Female n=464(%)		Uni/Bivariate Analysis OR (95% CI	P value	Multivariate analysis OR (95% CI	P value
Proteinuria	30	30		1.14(0.67-1.92)	0.633	-	-
Haematuria	40	51		0.87(0.56-1.35)	0.533	-	-
Nitrituria	11	12		1.07(0.47-2.46)	0.867	-	-
Leucocyturia	11	16		0.77(0.35-1.67)	0.501	-	-
	SEC						
Urinary Variables	Upper n=218 (%)	Middle n=245 (%)	Low n=398 (%)	Uni/Bivariate Analysis OR (95% CI	P value	Multivariate analysis OR (95% CI	P value
Proteinuria	18	19	23	1.23(0.63-2.4) 2.9(1.55-5.6)	0.006	0.62(0.6-1.9) 2.0(0.9-4.04)	0.044
Haematuria	20	29	42	1.74(0.96-3.1) 5.5(3.1-9.8)	0.02	1.6(0.84-3.03) 4.9(2.6-9.4)	0.001
Nitrituria	5	15	3	3.68(1.3-10.2) 1.3(0.3-5.5)	0.001	9.1(2.9-28.7) 3.1(0.56-16.7)	0.001
Leucocyturia	12	11	4	1.06(0.5-2.4) 0.7(0.2-2.2	0.09	-	-

DISCUSSION

The prevalence of urinary abnormality in this study was 16.8%. While this was higher than reported studies within the country,[15,17] others recorded similar finding (16.4%),[19] while some documented higher prevalence 44.0%,[2] and 25.1%.[20] The high prevalence of urinary abnormalities in the present study may be attributed to the endemicity of schistosomiasis, the endemicity of malaria/ quartan malaria resulting in immune complex nephritis, HIV associated nephropathy, urinary tract infections (UTI), post streptococcal glomerulonephritis, among others. El-Abden *et al*[20] from Egypt equally attributed the high prevalence of urinary abnormalities in their study to the contiguous nature of their study area.

The prevalence of pre-hypertension and hypertension in this study was 5.5%, and 14.1%. This compared to 4.2% and 17.2%,[9] and 5.4% and 17.3%.[8] On the contrary, Chaudhury and co-workers[11] on the other hand recorded a much higher prevalence of pre-hypertension of 13.4%, and a lower prevalence of hypertension of 4.1%. Rahman *et al* [12] on the contrary observed a higher prevalence of both pre-hypertension (13.4%), and hypertension (15.0%). Other studies from the country recorded a lower prevalence of both pre-hypertension and hypertension.[7,8] The very high prevalence of hypertension and pre-hypertension in this study in comparism with others may be due to varying methods of BP measurement, different criteria for diagnosis of hypertension, as well as regional variations. A repeat BP reading after 2 weeks may have given a true prevalence of hypertension in this study considering that the point prevalence used may be affected by others factors such as anxiety, apprehension, exercise etc. Individuals with high BP may be an early pointer to some chronic diseases that requires further evaluation, hence such children were referred to paediatric cardiology unit for further evaluation. Hypertension was found to be commoner in female than male in this study, a finding in support with other studies,[2,19] and was attributed to hormones differences and higher BMI in females.[9,17]

This study showed statistically significant association between DBP and proteinuria (OR of 4.7, CI 0.9-25.0, p=0.02), a finding that was contrary to previously works,[7,17] but similar to Rahman *et al*[12] who found a significant association between hypertension with proteinuria, and haematuria, and suggested lifestyle modifications with increased physical activity, restricted caloric and sodium intake to help reduce cardiovascular morbidity in adulthood as proteinuria due to obesity was documented to improve after normalization of BMI in adolescents.

Most subjects (63.5%) in this study had normal BMI, 34.5% were underweight, 1.4% obese, and 0.6% overweight. Similar BMI was also documented by Ezendu *et al* [17] from Nigeria, 87.1%, 5.7%, and 2.4% for normal weight, overweight and obesity. However, Rahman *et al* [12] from Pakistan, and Yusuf *et al* [13] from Nigeria reported lower prevalence. The low prevalence of obesity in this study may be due to the middle and low social class of the study population (74.7%). Children of the non-elite are more likely to be under-fed, to be indulged in many manual jobs/ hawking for family upkeep and trekking to schools. These practices are associated weight loss or poor weight gain. They are equally not in the habit of watching movies/indoor games for a long time, a habit that is also associated with prolong inactivity and obesity. There was statistically significant association between nitrituria and BMI (OR of 1.5, CI 0.6-4.0) in the present study, a finding that was similar to study by Chaudhury et al.[11] Nitrituria, an indication that nitrite producing bacteria is present in the urine, and signifies UTI. The association between BMI (obesity) and infections however remain obscure as most researchers have recommended further studies in this field.

Nitrituria and haematuria was also significantly associated with location of school, and SES. This was equally documented in other studies.[5,14] Possible explanations could be due to location of schools, SES of the study population, and endemicity of Schistosoma haematobium (SH) infection in the study area. The study area is largely populated by middle and low-income people, and most public primary schools (75.0%) are located in the rural communities where lack of water, overcrowding, poor environmental sanitation are common findings. Poor anal/vaginal hygiene from the female folks, non-circumcision of the male which encourages retrograde ascending/colonization of enteric bacteria from the gut, and recreational activities of children in cercariae-polluted water could possible explain the positive association of nitrituria and haematuria with place of residence, and SES.

CONCLUSION

The prevalence of urinary abnormalities, hypertension and underweight was high in this study, while obesity was low. There is need to establish routine school-based screening programs for BP measurement, BMI assessment, and dipsticks analysis for early detection and lifestyle modifications.

REFERENCES

1). Yap HK, Quek CM, Shen Q, Joshi V, Chia KS. (2005). Role of urinary screening programme in children in the prevention of chronic kidney disease. Annals Academy of Medicine Singapore, 34, 3-7.

2). Muoneke VU, Eke CB, Ibekwe RC, Uwakwe RA, Daniyan OW. (2016). Clinical and urinary findings in children presenting at the children out-patient clinic (CHOP) in a tertiary hospital in Abakiliki, South East Nigeria. African Journal of Paediatric Nephrology,13, 30-7.

3). Mariana AJ, Luangphinith S, Loo S, Scottolini A, Hodges CV. Dipstick chemical urinalysis: an accurate cost – effective screening test. Available in Journal of Urology. Aug.1987; vol.132 (1) pg. 64-7

4). Committee on Practice and Ambulatory Medicine, Bright Futures Periodicity Schedule Workgroup. Bright Futures/American Academy of Pediatrics. Recommendations for Preventive Pediatric Health Care. PEDIATRICS, 2017: 139(4); DOI: 10.1542/peds.2017-0254 www.aap.org/periodicityschedule

5). Odutola IO, Oluwatoyin AO, Emeka EN, Henrietta UO, Ngozi RN, Johnathan CA. (2015). Urinary screening for asymptomatic renal disorders in pre-school children in Enugu metropolis, South- east Nigeria: Useful or useless. Saudi journal of Kidney diseases and transplantation, 26(6), 1241-5.

6). Akor F, Okolo SN, Agaba EL, Okolo AA. (2009). Urine Examination Findings in Apparently Healthy New School Entrants in Jos, Nigeria.SAJCH3(2):60-63.

7). Ikimalo FE, Eke FU, Nkanginieme KE, Ikimalo J. (2003). Urinary screening for detection of asymptomatic haematuria and proteinuria in children in urban and per-iurban schools in Port Harcourt. Nigerian Journal of Paediatrics, 30(1),1-6.

8). Ujunwa FA, Ikefuna AN, Nwokocha ARC, Chinawa JM. (2013). Hypertension and prehypertension among adolescents in secondary schools in Enugu, South East Nigeria. Italian Journal of Pediatrics, 39,70-76..

9). Hothan KA, Alasmari BA, Alkhelaiwi OK, Althagafi KM, Alkhaldi AA, Alfityani AK, et al. (2016). Prevalence of hypertension, obesity, hematuria and proteinuria amongst healthy adolescents living in Western Saudi Arabia. Saudi Medical Journal, 37(10), 1120-6. doi: 10.15537/smj.2016.10.14784.

10). Odetunde OI, Okafor HU, Uwaezuoke SN, Ezeonwu BU, Adiele KD, Ukoha OM. Chronic kidney disease in children as seen in a tertiary hospital in Enugu, South-East, Nigeria. Niger J Clin Pract. 2014; vol.17 pg.196-200

11). Chaudhury AR, Reddy TV, Divyaveer SS, Patil K, Bennikal M, Karmakar K, Dasgupta SCS, Sircar D, Pandey R. (2017). A Cross-sectional Prospective Study of Asymptomatic Urinary Abnormalities, Blood Pressure, and Body Mass Index in Healthy School Children. Kidney Int Rep 2, 1169–1175; http://dx.doi.org/10.1016/j.ekir.2017.07.018,

12). Rahman AJ, Qamar FN, Ashraf S, Khowaja ZA, Tariq SB, Naeem H. (2013). Prevalence of hypertension in healthy school children in Pakistan and its relationship with body mass index, proteinuria and hematuria. Saudi J Kidney Disease Transplant, 24(2), 408-12.

13). Yusuf SM, Muhammad SM, Baba MM, Ibrahim DG, Andrew EU. (2013). Overweight and Obesity among Adolescents in Kano, Nigeria. Journal of Metabolic Syndrome, 2, 126.

14). Alaje AK. Runsewe-Abiodun T, Olawale OO. Prevalence, Pattern and Determinants of Urine Abnormalities among School Pupils in a Semi-Urban Community. Annals of Hlth Res, 2019: 5(1); 114-125. DOI: https://doi.org/10.30442/ahr.0501-12-42.

15). Shen W, Chen H, Chen H, Xu F, Li L, Liu Zhi-hong. (2010). Obesity related Glomerulopathy: Body Mass Index and Proteinuria. Clinical Journal of American Society of Nephrol, 5;1401-9.

16). Araoye MO. Subject selection, in Araoye MO. Research Methodology with statistics for health and social sciences 2nd edition. Ilorin, Nigeria. Nathadex; 2004; 115-29.

17). Ezendu C, Chukwuka OJ, Ebenebe JC, Nwazu A. (2017). Asymptomatic proteinuria and elevated blood pressure among adolescents in urban secondary schools in south-eastern Nigeria. Oriental Journal of Medicine, 29,3- 4.

18). El-Abden M, Abo-ElKheir O, El-Sadek S, El Said A, Awaad M. (2013). Screening of renal diseases by urine analysis in primary school aged children at El-Gharbiya Governorate-Egypt. Egyptian Journal of Hospital Medicine, 2013:50;24–33

19). Adebukole BA, Theophilus AA, Temilade A, Wasiu AO. (2016). Burden of hypertension and abnormal glomerular permeability in Hypertensive school children. Nephro Urol Mon; 8(4),1-7

20). Alharthi AA, Taha AA, Edrees AE, Elnawawy AN, Abdelrahman AH. (2014). Screening for urine abnormalities among preschool children in western Saudi Arabia Medical Journal,35 (12),1477-1481.