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Full Length Research Paper

Screening for asymptomatic proteinuria and haematuria in children in El-ferdous Village / White Nile State/ Sudan

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Abstract

Mass screening for proteinuria and haematuria enhances the awareness of renal diseases and improves the chances for an early diagnosis and therapy. Early diagnosis is the cornerstone for prevention of kidney failure. Even if progression cannot be slowed, patients who have been diagnosed early have better survival when commencing renal replacement therapy. Objectives: The objective of this study is to determine asymptomatic renal disease in children in particular proteinuria and haematuria in asymptomatic children. Subjects and methods: It is a community based study of prevalence of asymptomatic proteinuria and haematuria in children at Elferdous village-White Nile State where 213 children aged 2-18 years were included. A detailed history, a thorough clinical examination, a questionnaire and a full renal profile was done for each child with proteinuria, haematuria or both. The data was collected and analyzed using SPSS version 18. Results: The data was collected from 213 children. Male to female ratio was 1.31:1. Their age ranged from 2-18 years. 25 children (11.7%) were found to have proteinuria. Those with haematuria were also found to be 25 children (11.7%). 7 children (3.3%) of those with haematuria had schistosomiasis and 14 children (6.5%) had both proteinuria and haematuria. All of them had normal renal profile and normal GFR. Conclusion and recommendation: The prevalence of proteinuria and haematuria was significant. Urinary screening programmes in children must be a routine especially in school age children. Those with proteinuria need more renal investigations while those with haematuria we need to look for other causes for haematuria e.g. bilharsiasis.

Keywords: asymptomatic proteinuria, haemtaturia, children Sudan.

INTRODUCTION

The profile of renal diseases prevalent in Africa is unique with respect to etiology and clinical presentation. Endemic infections are a major cause of many renal diseases (Bahia et al., 2004). However, comprehensive information about the etiology of chronic kidney disease CKD from developing countries is lacking due to the absence of renal registries (Mohamed et al., 2010), and data on the epidemiology of CKD in children are limited, especially information on children in the earlier CKD stages who are generally asymptomatic (Ardissino et al., 2003).

So an early diagnosis is the cornerstone for prevention

of kidney failure. Even if progression cannot be slowed, patients who have been diagnosed early have better survival when commencing renal replacement therapy (Satoshi and Kohji, 2007). Mass screening for proteinuria enhances the awareness of renal diseases and improves the chances for an early diagnosis and therapy. (Heidland, 2009).

Almost all of the filtered proteins are reabsorbed in the proximal tubule by endocytosis at the luminal membrane. Significant proteinuria occurs when this energy-requiring mechanism is saturated. Significant proteinuria can be classified into glomerular proteinuria, tubular proteinuria and overflow proteinuria (Patric, 2009) Orthostatic proteinuria is only present when the patient is upright. The proteinuria is usually mild and not selective. No treatment is needed (Brandt, 2010). Transient proteinuria is usually associated with exercise, stress, fever, and dehydration. It does not reflect renal disease. Persistent proteinuria indicates renal disease. Proteinuria may lead to renal injury and should be thoroughly investigated (Rytand et al., 1981).

Children with persistent dipstick-positive proteinuria must undergo a quantitative measurement of protein excretion, most commonly on a timed 24-hour urine collection. In children levels of urinary protein excretion higher than 100 mg/m2 per day (or 4 mg/m2 per hour) are abnormal. Proteinuria of greater than 40 mg/m2 per hour is considered heavy or in the nephrotic range (Houser et al., 1984). An alternative method of quantitative assessment is measurement of the total protein/creatinine ratio on a spot urine sample, preferably the first morning specimen. The normal value for this ratio is <0.2 protein/creatinine in children greater than two years of age and <0.5 protein/creatinine in infants and toddlers from 6 to 24 months (Houser et al., 1984).

Haematuria is defined by the presence of an increased number of red blood cells in the urine. Haematuria can either be gross or microscopic. Microscopic haematuria may be discovered incidentally (Marie and Patric, 2011). The most common screening test for haematuria is the urinary dipstick test for blood (Feld et al., 1997). Urinalysis including microscopic examination may identify a potential site of bleeding (glomerular versus non-glomerular) and aid in determining the underlying cause. The identification of the glomeruli as the source of blood is important both prognostically and to optimize the subsequent diagnostic evaluation (Fagozzi et al., 2008).

Among the 1% of children with two or more positive urines for haematuria, only one-third have persistent haematuria, defined as a positive repeat test after six months (Litaka et al., 1994). The most common causes of persistent microscopic haematuria include glomerulopathies, hypercalciuria, IgA nephropathy, Alport syndrome, thin basement membrane disease, post-infectious glomerulo-nephritis and nutcracker syndrome (Feld et al., 1997). The combination of haematuria and proteinuria is significantly less common than either isolated proteinuria or haematuria. Although asymptomatic haematuria with proteinuria has a prevalence rate of less than 0.7 percent in unselected school-age children, it is associated with a higher risk for significant renal disease (Diven et al., 2000)

Subjects and methods

The study was conducted at Elferdous village 32 kilometer to the south from Elduiam Town in White Nile State in December 2010. The study population included children between 2 and 18 years old of both sex. Children less than 2 years and above 18 years, with known renal disease, hypertension and diabetes mellitus or with fever were all excluded from the study.

The study included 213 children. The data collected by systematic randomized method. A complete and detailed history was taken from every child and a careful clinical examination was performed. A questionnaire sheet in which information obtained from each child was recorded. A full renal profile and GFR were done for each child with haematuria, proteinuria or both. Urine test for bilharsiasis was done for children with haematuria.

A urine dipstick for proteinuria and haematuria was done using Multistix 10 SG, Bayer Reagent Strips; Bayer Diagnostics, Tarrytown, NY. Urine screening test for haematuria is the urinary dipstick test for blood. Blood urea, serum creatinine, serum potassium, serum sodium, serum calcium, serum phosphate and random blood sugar were all done for all children with proteinuria and/or haematuria. The data was collected, double entered and analyzed using SPSS version 18.

RESULTS

Data was collected from 213 children (n=213). The age group between 2-18 years divided into three groups: fifty four children (25.4%) were between 2-5 years, eighty five (39.9%) between 5 – <10 yrs and seventy four (34.7%) between 10-18 years old (table 1). The majority of children (121) were males constitute (56.8%) whereas females were 92 (43.2%) (figure 1).

Proteinuria defined as (+) or more of protein and this was found in 25 children (11.7%). 18 children (8.5%) of them were 10 years old or more (P=0.001) (table 2). 25 children had haematuria (11.7%). most of them were more than 10 years old (16 children 7.5%) and the least account were those less than 5 years old 2 children (0.9%) (p =0.035). The majority of children with haematuria were males (p=0.766) (Figure 2).

Children with both proteinuria and haematuria were 14 children (6.5%) (p=0.000) (Table 3). Urine for schistosomiasis was done for those who showed positive urine dipstick for haematuria. From 213 children 7 children were positive for urine schistosomiasis (3.3%),

Table 1. shows the distribution of sample according to age.

Age	Frequency	Percent
less than 5	54	25.4
5 and less than 10 years	85	39.9
more than 10 years	74	34.7
Total	213	100.0

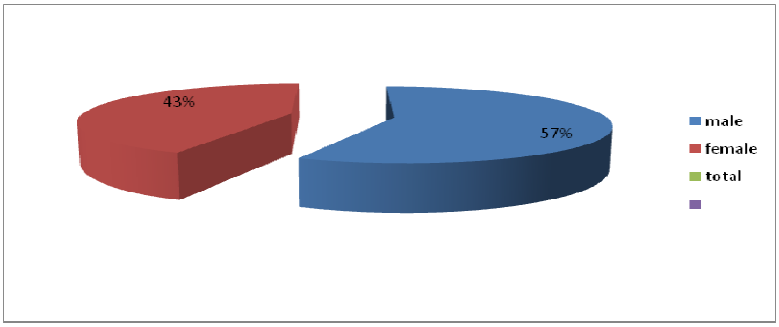

Figure 1. Show the distribution of children according to gender: (n=213)

Table 2. Shows the association of Proteinuria with age

			Age			
			less than 5	5 and less than 10 years	10 or more years	Total
proteinuria	nil	Count	53	79	56	188
		% of Total	24.9%	37.1%	26.3%	88.3%
	+	Count	1	0	10	11
		% of Total	.5%	.0%	4.7%	5.2%
	++	Count	0	5	7	12
		% of Total	.0%	2.3%	3.3%	5.6%
	+++	Count	0	1	1	2
		% of Total	.0%	.5%	.5%	.9%
Total		Count	54	85	74	213
		% of Total	25.4%	39.9%	34.7%	100.0%

P=0.001

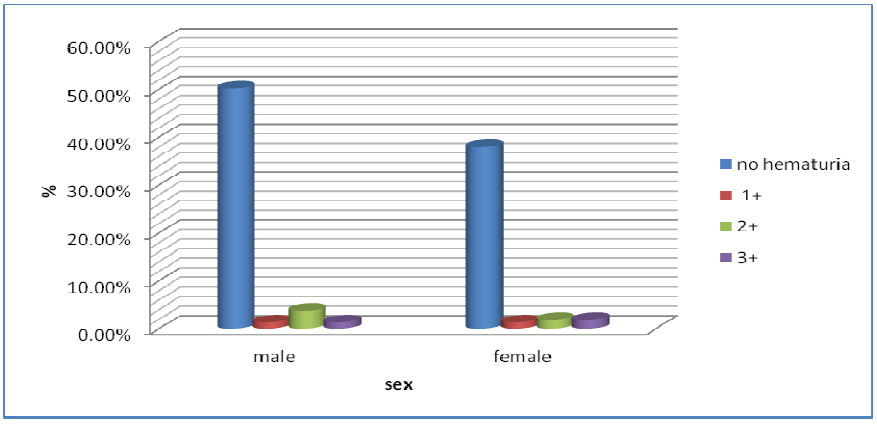

Figure 2. Shows the correlation between haematuria and sex.

Table 3. Shows the association between proteinuria and haematuria

			Haematuria				
			no	**+**	**++**	**+++**	**Total**
proteinuria	Nil	Count	177	4	6	1	188
		% of Total	83.1%	1.9%	2.8%	.5%	88.3%
	+	Count	8	0	1	2	11
		% of Total	3.8%	.0%	.5%	.9%	5.2%
	++	Count	2	2	5	3	12
		% of Total	.9%	.9%	2.3%	1.4%	5.6%
	+++	Count	1	0	0	1	2
		% of Total	.5%	.0%	.0%	.5%	.9%
Total		Count	188	6	12	7	213
		% of Total	88.3%	2.8%	5.6%	3.3%	100.0%

P=0.000

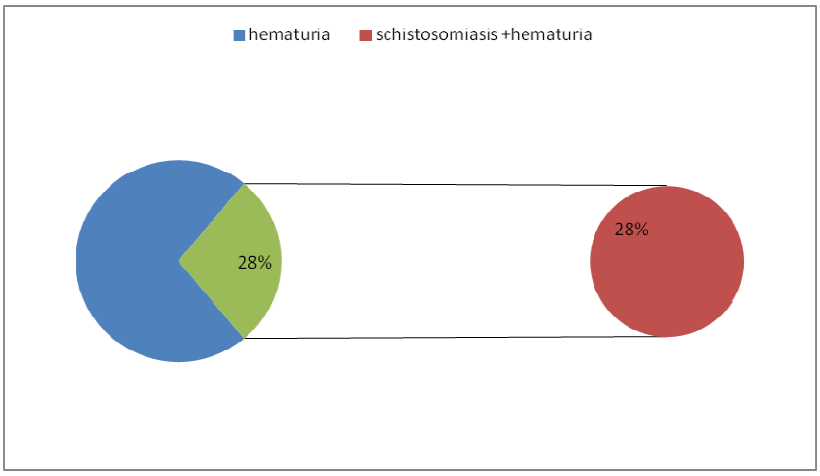

Figure 3. Shows the correlations between haematuria and schistosomiasis

which represented 28% from those with haematuria (Figure 3). All children with proteinuria and/or haematuria had normal renal profile and normal GFR.

DISCUSSION

This is the first report on the prevalence of asymptomatic proteinuria and haematuria among children in Sudan. We studied 213 children from Elferdous village / White Nile State/ Sudan aged 2-18 years. Fifty four (25.3%) were 2 - 5 years, eighty five of children (39.9%) were between 5 - 10 years and seventy four (34.7%) were between 10-18 years. Male to female ratio was 1.3:1.

Sixty two children (29.1%) of the studied group had urinary abnormalities. In Bolivia 14082 subjects were screened (80% of them under the age of 15 years) and reported that urine abnormalities were detected in 4261 (30.3%) at the first screening which is similar to our study. Only 1019 (7.2%) subjects had urinary abnormalities at the second screening (Plata et al., 1998). In a Malaysian study, screening of 45149 primary school children for proteinuria and haematuria showed that 1.9% of those screened had positive results but only 0.12% was found to be positive on further evaluation (Zainal et al., 1995). Mass urine screening showed urinary abnormalities in 0.3% in Taiwan (Lin et al., 2001), 0.62% of elementary school children in Japan (Murakami M et al 1991) and in 5.25% in Nigeria (Oviasu and Oviasu, 1994).

We found that 25 children (11.7%) had proteinuria (p = 0.001), and this is very significant result and higher than the reports in Jos state, Nigeria where it was found to be (3.5%) (Francis et al., 2009). In the study by Shajari et al in Iran1601 Iranian students 6 - 7 yr of age were included. Midstream first morning urine specimens were analyzed. Proteinuria was detected in 56 (3.6%) of the subjects (Shajari et al., 2007). In our study those with proteinuria and were 10 years or more were 17 children (8.4%). Jafar et al. (2005) reported that (3.3%) of 4977 children aged 5–15 years in Pakistan had proteinuria. The mean prevalence was higher in children 10–15 years of age (3.7%) than in younger children (2.8%) (Jafar et al., 2005).

In our study males with proteinuria were 56.8% which is slightly more than female but the relation is not statistically significant (P = 0.883). This is similar to the study done by Orifade EU and Grange Ao in Nigeria (Onifade and Grange, 1997). The higher prevalence in our study could partially be due to the contribution of orthostatic proteinuria from the use of random midstream urine sample.

In our study those with haematuria were 25 children (11.7%) (p =0.035). Unlike the study done by Hamidreza et al. (2009) in north Iran this show haematuria in (17.8%) (Hamidreza et al., 2009). Whereas Francis et al. (2009) in Jos state, Nigeria found that the prevalence of haematuria was 1.5% (Francis et al., 2009). The increasing prevalence in their study is due to schistosomiasis which is similar to prevalence of haematuria in our study that could be due to schistosomiasis which represented 68% in those with haematuria and this is significant (p=0.000). Schistosomiasis is a known local environmental problem in the population of White Nile State where this work was carried out with 41% among school student as reported by Abozer et al in (2008.

All children in our study with proteinuria, haematuria or both had normal renal profile and normal GFR. This is similar to study done by Ernet K Sumaili and Eric P Cohen in screening for chronic kidney disease in sub-Saharan Africa in The Democratic Republic of Congo (Ernet and Eric, 2010). Similarly, the study done by Mamoun Elsheikh and Christoph Kaisy et al where renal function was investigated in 218 school children with schistosoma mansoni infection in the Province of Gezira in central Sudan and in 65 Sudanese and 65 German age-matched controls. Serum creatinine was normal in all children. A pathological urinary protein-creatinine ratio was found in 3% of *S.* mansoni-infected children and in 5% of Sudanese controls but in none of the European children (Mamoun et al., 1989).

CONCLUSION AND RECOMMENDATIONS

There was significant prevalence of proteinuria and haematuria in the group studied. In those with haematuria 68% had positive urinary schistosomiasis. All children with proteinuria and/or haematuria had normal renal profile and normal GFR. Urinary screening programmes in children must be a routine especially in school age children. Those with proteinuria need more renal investigation while those with haematuria in spite of more renal investigations, we needs to look for other causes for haematuria e.g. bilharsiasis. A repeated urinalysis and hospital referral for those with persistent urinary abnormalities is advocated to afford affected children further investigations and appropriate management.

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