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Haematuria in the Rural Primary School Children in South Western Nigeria-Using Combi Test Strips

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Abstract: An epidemiological survey of the prevalence of haematuria using Combi test strips was undertaken among 894 primary school children aged 6-14 years in Imesi-Ile rural community in Osun State of Nigeria, in order to identify those with such renal disorder. Haematuria was present in 48 (5.37%) out of the entire pupils' population. Causes identified for haematuria were schitosomiasis in 46, acute glomerulonephritis in 1 and sickle cell anaemia in another one. The serum proteins, electrolytes and creatinine levels were within normal limits in all these pupils with haematuria except in 2 with hypoalbuminaemia and another 5 with elevated gammaglobulin levels. Causes of haematuira in this study were largely due to infestation with schistosoma haematobium. Control measures against schistosomiasis are advocated.

Key words: Haematuria, schitosomiasis, glomerulonephritis, combi test strips, Nigeria

INTRODUCTION

Haematuria is the passage of blood in urine (Bergstein, 1992). It is difficult to quantify the number of red blood cells that are present in the normal urine, though there are fewer than 5 per high power field in the sediment of a 10 mL centrifuged fresh urine specime (James, 1976; Meadow, 1986) the normal red cell excretion rate increases with age and this is greater after exercise (Meadow, 1986). They are believed to pass into the urine via the glomerulus, while their pliable form allows them to be squeezed through the capillary basement membranes (Meadow, 1986).

Glomerular injury as in acute post streptococcal glomerulonephritis may result in the escape of red blood cells, which appear in the urine in sufficient quantities to discolour it (Meadow, 1986). Cytotoxic drugs like cyclophosphamide may cause haemorrhagic cystitis, especially when the child is not passing enough urine from low fluid intake (Meadow, 1986). Micro-infarction of the renal pyramids by intravascular sickling may be responsible for haematuria among patients with sickle cell disease (Sergeant, 1988). It may originate from the ureters when renal stones or clots of blood pass through it (Meadow, 1986). Painless terminal haematuria is the cardinal symptom of urinary schistosomiasis (Doehring, 1988). Other causes of haematuria include, trauma, pyelonephritis, haemorrhagic disorders, such as Haemophilia A , B and thrombocytopaenia.

MATERIALS AND METHODS

The subjects of the study were the 894 Primary school pupils aged between 6 and 14 years old, in Imesi-Ile. Already excluded from the study were the 7 pupils whose parents refused to give consent, the 3 pupils withdrawn from the school during the course of study and the only child on anti tuberculous medications (specifically rifampicin) which can alter the results for haematuria.

A questionnaire containing questions on such details as age, class, sex, address, symptoms and signs of renal diseases was administered on each of the 894 pupils in all the 7 primary schools in Imesi-Ile. A detailed physical examination was conducted on each pupil noting the general health, height, weight, pallor, jaundice, dehydration and the temperature. Physical stigmata of sickle cell anaemia, such as bossing, prognathism and long, thin extremities were checked for. Features of chronic renal disease like growth retardation, anaemia, oedema and wasting were also searched for.

Method of testing with combi test strips and other investigations: Urine samples were collected into 2 sterile bottles from every pupil. The test strip was dipped into one of the fresh urine samples for approximately 1 sec then drawn across the edge of the container to remove the excess urine. After 30 sec the test strip was compared with the colour scale and the results were recorded

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immediately. Colour changes that took place after 2 min were regarded as of no significance. The other urine sample was examined for red blood cells, puscells, casts, crystals and ova of *Schistosoma haematobium*. Blood chemistry was also done in pupils with positive results.

RESULTS

The age and sex distribution of the population under study is shown in Table 1. There were 503 boys and 391 girls. Male : Female ratio was 1.2 : 1. The m ean age for the entire population was 9.32 years, median age was 10 years.

Table 1: Age and sex distribution of 894 imesi-ile primary school children screened for haematuria

Age last birthday	No. of males	No. of females	Total	(%)
6	49	42	91	10.18
7	54	36	90	10.07
8	66	54	120	13.42
9	62	35	97	10.85
10	103	63	166	18.57
11	36	41	77	8.62
12	73	69	142	15.88
13	37	34	71	7.94
14	23	17	40	4.47
Total	503	391	894	100.00

Data from pupils questionnaires indicated that 192(21.48%) waded through streams routinely but only 61(6.82%) admitted to having bloody urine

Table 2: Combi dipstick screening results of the 894 pupils

Haematuria	Male	Female
Positive	28	20
Negative	475	371
Total	503	391

Table 3: Age and sex distribution of 48 pupils with haematuria

Age	No.of males (% of 48)	No. of females (% of 48)	Total (% of 48)
6	5(10.42)	2(4.17)	7(14.58)
7	4(8.33)	3(6.25)	7(14.58)
8	6(12.50)	4(8.33)	10(20.83)
9	2(4.17)	1(2.08)	3(6.25)
10	1(2.08)	2(4.17)	3(6.25)
11	2(4.17)	3(6.25)	5(10.42)
12	5(10.42)	2(4.17)	7(14.59)
13	2(4.17)	1(2.08)	3(6.25)
14	1(2.08)	2(4.17)	3(6.25)
Total	28(58.34)	20(41.66)	48(100.00)

Table 4: Biochemical results of the pupils with schistosomiasis.

Parameter*	Range	Mean
Cholesterol (2.5-6.5 mmol L^{-1})	2.1-3.7 mmol L^{-1}	2.52 mmol L^{-1}
Urea (2.5-5.8 mmol L^{-1})	3.2-4.6 mmol L^{-1}	3.98 mmol L^{-1}
Creatinine (50-110 µmol L^{-1})	71-108 µmol L^{-1}	83.3 µmol L^{-1}
Total protein (58-80 g L^{-1})	77-103g lL^{-1}	85.6 g L^{-1}
Albumin (35-50 g L^{-1})	31-43 g dL^{-1}	35.78 g L^{-1}
Globulin (9.2-45 g L^{-1})	42-64 g dL^{-1}	50.9 g L^{-1}
Sodium (120-140 mmol L^{-1})	121-132 mmol L^{-1}	128 mmol L^{-1}
Potassium (3-5 mmmol L^{-1})	3.1-4 mmol L^{-1}	3.5 mmol L^{-1}
Bicarbonate (20 B 30 mmol L^{-1})	20-29 mmol L^{-1}	26 mmol L^{-1}

* Hospital reference values are indicated in parenthesis.

Sixty one pupils had complaints of bloody urine from the questionnaire, but haematuria was demonstrated by dipstick in only 48(5.36%) of the total population (Table 2). These comprised 28 boys and 20 girls (Table 3). The Table 3 also shows that this abnormal finding occurred in all ages under study. Forty six of the 48 pupils with haematuria were found to have schistosomiasis. The other 2 pupils had sickle cell anaemia and acute glomerulonephritis, respectively. No *Schistosoma haematobium* ovum or red blood cell was detected in the urine samples of the remaining 15 pupils with complaints of bloody urine, even following examination of the samples again after exercises at about midday. The pupils with schistosomiasis were treated with praziquantel (Biltricide) 40 mg/kg/day with reversal of proteinuria within a month but microscopic haematuria persisted in 5 of them when they were re-assessed 2 months after treatment. However, there was no more microscopic haematuria in these 5 pupils, 3 months after treatment.

Out of 48 children with haematuria, 9(18.75%) had 5-10 red blood cells per microlitre; 28(58.33%) had up to 50 red blood cells per microlitre and 11(22.92%) up to 250 red blood cells per microlitre of urine.

The results of serum biochemistry with respect to protein (albumin and globulin), cholesterol, urea etc. are shown in Table 4. Serum levels of the parameters were within normal limits except in a few cases. Five children with schistosomiasis had very elevated globulin levels, while 2 had hypoalbuminaemia.

DISCUSSION

Identified causes of haematuria in this study were *Schistosoma haematobium* infestation in 46(5.15%) pupils, acute glomerulonephritis in 1(0.11%) pupil and sickle-cell anaemia in another 1(0.11%) pupil. The aetiology of haematuria in most of the previous Nigerian studies has been ascribed to schistosomiasis (Abayomi *et al*., 1971). Most studies have revealed that schistosomiasis is most prevalent between the ages of 6 and 20 years (Doehring, 1988) which is the age group that indulge in swimming in flowing rivers. Kings *et al*. (1988) were of the opinion that the declining level of *Schistosoma haematobium* infection with increasing age was explained by acquired resistance. This self limiting nature of infestation with schistosomiasis in chronic cases could explain why there was discrepancy between the number of pupils with bloody urine 61 and those from whom *Schistosoma haematobium* ova 46 were isolated in this study. The elevated globulin levels in 5 pupils with schistosomiasis could be explained on the basis of

immunological response that is found in chronic infections (Chen and Mott, 1989). Chen and Mott (1989) have described a circadian rhythm of *Schistosoma haematobium* egg excretion with a peak in the late morning and early afternoon. Physical exercise and fluid intake before micturition could significantly increase the egg output. The isolation of *Schistosoma haematobium* ova could thus be enhanced in those patients who have haematuria but who do not at first examination have *Schistosoma haematobium* ova in the urine by re-examining mid-day urine sample collected after the patient has taken a vigorous exercise (Doehring, 1988; Gryseels, 1989). All the affected pupils with schistosomiasis, treated with praziquantel (Biltricide) 40 mg/kg/single dose had persistence of microscopic haematuria in about 10% of them, when they were re-assessed 2 months after treatment. This is in agreement with the previous findings by Chen and Mott (1989). It has been discovered, however, that the control of the snail host of *Schistosoma haematobium* using *Bulinus globosus* could limit the infection in a particular population as practiced in the highveld region of Zimbabwe (Watts, 1991).

The 6 year old-pupil with genotype SS consistently had dipstick and microscopic haematuria. No history of contact with flowing stream was elicited and no *Schistosoma haematobium* ova were demonstrated in the urine on microscopy. It has been well established that haematuria, in the absence of any organic disease, may occur in sickle cell trait and in sickle cell anaemia (Sergeant, 1988). Haematuria in sickle cell anaemia has been ascribed to micro-infarction of the renal pyramids with intravascular sickling (Sergeant, 1988). It might be expected to occur more commonly in sickle cell disease than in the sickle cell trait. The haematuria is typically painless though, when heavy, a dull back pain may be experienced.

While, nephrectomy had been performed in the past for torrential hematuria, it was revealed that there could be recurrence of haematuria in the remaining kidney in nearly half of the cases (Sergeant, 1988). Epsilon-Amino Caproic Acid (EACA) which inhibits urokinase promotes clotting of blood in the renal pelvis and has been successful in the treatment of some patients but not in others (Sergeant, 1988). It carries the hazard of clot and ureteric obstruction. Controlled trials are needed on the efficiency of EACA. Until other therapies are found, we will still rely on the basic principles of hydration, alkalisation and blood transfusion where found expedient (Sergeant, 1988) James (Meadow, 1986) is of the opinion that EACA should not be recommended because of its potential danger of clot and ureteric obstruction. The mother of this particular child under reference was, obviously, frustrated by the child's episodes of recurrent sicknesses. In spite of counselling, she decided not to bring him anymore for hospital admission. The child died before the investigators' last visit to Imesi-Ile.

Haematuria was also found in the 6-year-old pupil with acute glomerulonephritis who also had skin lesions from scabies for about 4 weeks. Acute post-streptococcal glomerulonephritis is known to follow infection of the throat or skin with certain `nephritogenic' strains of group A beta-haemolytic streptococci M-types 49, 55 and 57 being commonly associated with skin infection (Meadow, 1986). Scabies is extremely common in the tropical countries and it is due to an infestation of the mite *Sarcoptes scabiei.* Absence of microscopic haematuria by 6 weeks after discharge indicates that the pupil is unlikely to fall into the category that will have progression of the renal disease.

Causes of haematuria in this study were largely due to infestation by *Schistosoma haematobium.* Control measures like keeping the streams free of vegetation on, which the snails can breed, use of molluscicides to kill the snails, introducing fish and other predators, which can feed on the snails, chlorination and treatment of identified cases will go a long way in reducing the prevalence of haematuria in the general population.

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