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Prevalence of Asymptomatic Proteinuria among a Rural and Healthy Childhood Population

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Summary

Onifade EU, Grange AO. Prevalence of Asymptomatic Proteinuria among a Rural and Healthy Childhood Population. *Nigerian Journal of Paediatrics 1997; 24 : 14.* Apparently healthy rural primary school children, aged between five and fifteen years, numbering 859, were screened for proteinuria on three occasions. Urine microscopy and culture was carried out on clean urine samples and blood pressure measurement was undertaken on those children with proteinuria. The study revealed a 7.5 percent prevalence of proteinuria that persisted for up to six months in 1.5 percent of the cases. Proteinuria tended to increase with age in both sexes and of all the cases, 4.5 percent were males and 2.9 percent females ($P > 0.05$). Of the cases, 5.1 percent had mild proteinuria (1+) while proteinuria of 3+ that is usually found in nephrotic syndrome was present in only 0.5 percent. Urine microscopy and culture revealed *Schistosoma haematobium* infestation in 0.9 percent and significant bacteriuria in 1.1 percent. All the proteinuric children had normal blood pressure (mean 104/68mmHg ±12/10) and the values of plasma urea, serum protein, albumin and creatinine concentrations performed on the 31 subjects with proteinuria were normal.

Introduction

RENAL diseases, particularly the acquired disorders, constitute major causes of morbidity and mortality in children,[1] adolescents[2] and adults.[3] Thus, early detection and institution of appropriate management of these disorders, using simple and inexpensive screening test methods among different childhood populations, are essential in any programme that aims at reducing morbidity and mortality from these disorders. It has been shown that symptomatic or asymptomatic proteinuria which is associated, especially with haema-

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turia, pyuria and casturia, invariably signifies some underlying renal disease.[4,5] There is also evidence that persistent asymptomatic proteinuria is often associated with serious renal disease.[6-9] The prevalence of asymptomatic proteinuria among pre and school aged children varies widely, ranging between three and 26 percent.[10-16] Studies of prevalence of asymptomatic proteinuria in Nigeria, including those from Kaduna,[13] Lagos[14,16] and Ibadan[15] have confirmed similar wide variations. By contrast, there have been no such wide variations in the prevalence among American children.[10,11] This is probably because American workers studied large numbers of subjects, eliminated cases of orthostatic proteinuria and employed the same criteria in their definition of significant proteinuria.

The present prospective study, undertaken in order to screen apparently healthy rural children in the Ifo/Ota Local Government Area(1/OLGA), Ogun State, for asymptomatic proteinuria (defined as 30gm/litre of protein or more, in a single urine sample) and any associated renal or urinary tract disease, aimed at the determination of the prevalence of this condition among the subjects.

Subjects and Methods

The study was carried out at the primary heathcare practice area (PHCPA), Lagos University Teaching Hospital (LUTH) as well as at the College of Medicine, University Of Lagos (CMUL). The area, occupying a wet lowland forest region of the country, is situated in 1/OLGA in Ogun State. The 1985 estimated population of this PHCPA was given as 76,394 in 66 villages and Ifo town. The area is divided into eight zones, of which six occupy the PHCPA. The population of the area is homogenous, with the indigenes being predominantly of the Yoruba ethnic group; it is a rural area with no pipe-borne water, electricity or tarred roads. The primary occupation of the inhabitants is farming subsistence crops.

For the present study, five of the 20 primary schools in the area described above, were selected by random sampling method. Screening for proteinuria was carried out on all healthy subjects in classes one to five who had no history of fever and were found to be fit on physical examination. Each subject was instructed to void the first morning urine sample into a clean container and bring this to the school for initial screening test, using *Albustix* (Ames). Clean-voided urine samples were later obtained into sterile containers from subjects with proteinuria for microscopic examination, culture and where indicated, sensitivity tests. All the cultures were performed within 45 minutes of urine collection.

Subjects who had significant bacteriuria were treated, using antibiotics to which isolated organisms were sensitive. One week later, a repeat of the *Albustix* test was performed on early morning urine specimens of all the subjects with proteinuria; after six months, the test was repeated in order to ensure absence of protein from the urine. Similarly, a repeat microscopy of urine specimens, culture and sensitivity tests were carried out at the end of the week on each subject who had significant bacteriuria and received antibiotic treatment. Estimation of serum urea, creatinine, total protein and albumin concentration was performed on those subjects with significant proteinuria. Four millilitres of whole blood collected into lithium heparin containing bottles, were obtained from

the subjects for these estimations. Blood pressure was measured on all the subjects with significant proteinuria, using a mercury sphygmomanometer with appropriate cuffs.

Informed consent was obtained from the parents and the study was approved by the Ethical Committee, Lagos University Teaching Hospital, Idi-Araba, Lagos. The results of the study were computer-analysed, using the SPSS statistical analysis package; significance of differences between groups was determined by the chi-square test.

Results

There were 968 healthy children in primaries one to five from the five selected rural schools. Of these 968 subjects with a mean age of nine years (range five to 15 years), 859(88.7 percent) participated in the screening test for proteinuria. The initial screening test for the prevalence of asymptomatic proteinuria revealed one of 7.5 percent (4.5 percent in males and 2.9 percent in females). Table I shows that the sex difference (445 males and 414 females) was not significant ($X^2 = 7.29$, $P > 0.05$). Prevalence tended to increase with age in both sexes, but there was however, no correlation between proteinuria and age in either sex ($X^2 = 13.58$ in females $X^2 = 5.98$ in males; $P > 0.05$). Up till the age of 11 years, more males had proteinuria, whereas beyond 13 years, there was a preponderance of females.

The prevalence of proteinuria showed two peaks among the males (at six years and 11 years, respectively). Among the females, the prevalence of proteinuria continued to rise with age, reaching a peak of 33.3 percent at 15 years. The degree of proteinuria was commonly mild with 1+, moderate with 2+, and marked with 3+ in 44(5.1 percent), 16(1.9 percent) and four (0.5 percent) of the subjects, respectively. Similarly, fewer numbers of children showed marked proteinuria when the tests were repeated. Four (11.1 percent) of the subjects had 2+ proteinuria at six months as compared with eight (16.7 percent) at one week. No subject had 3+ proteinuria at six months compared with two (4.2 percent) at one week.

Table 1

Prevalence of Proteinuria and Sex Distribution among 859 Subjects on First Screening Test.

Test	Sex		Total
	M	F	
Negative	320(37.3)	338(39.3)	658(76.6)
Trace	86(10.0)	51(5.9)	137(15.9)
1+	26(3.0)	18(2.1)	44(5.1)
2+	11(1.3)	5(0.6)	16(1.9)
3+	2(0.2)	2(0.2)	4(0.5)
Total	445(51.8)	414(48.2)	859(100)

Figures in parenthesis represent percent of total.

For the repeat urine testing, 48(75 percent) of the 64 children who had significant proteinuria at first testing, returned after one week, while 36(56.3 percent) of the 64 subjects returned for the third test (Table II). It is evident that the prevalence of proteinuria dropped with re-

peated testing. Proteinuria persisted in 26(54.3 percent) of 48 subjects who were retested after one week. On the third testing, six months later, 13(36.1 percent) of the 36 subjects had proteinuria. The overall prevalence of persistent asymptomatic proteinuria was 1.5 percent.

Of the 58 specimens of urine on which microscopy and culture were carried out, nine (15.5 percent) yielded significant bacterial growth (colony count > 10^5 orgs/ml of urine) while eight (13.8 percent) had viable ova of *Schistosoma haematobium*. Blood pressure measurement in all the 64 subjects with proteinuria was normal; the range of systolic blood pressure was 80-120mmHg and that of the diastolic 50-80mmHg. The mean systolic blood pressure was 104mmHg, while the mean diastolic pressure was 68mmHg. Serum urea, total protein, albumin and creatinine were determined in 31(48.4 percent) of the 64 subjects. All the values obtained were within normal limits, with the mean value for urea being 2.77mmol/litre, for protein 57g/litre, for albumin 30g/litre and for creatinine 5.7mmol/litre.

Table II

Prevalence of Proteinuria among 859 Subjects on Three different Screening Tests

Proteinuria level	*Number Tested*		
	First Time	*Second Time*	*Third Time*
Nil/ Trace	795(92.5)	22(45.8)	23(63.9)
1+	44(5.1)	16(33.3)	9(25.0)
2+	16(1.9)	8(16.7)	4(11.1)
3+	4(0.5)	2(4.2)	0(0)
Total	859	48	36

Figures in parenthesis represent percent of total.

Discussion

The rate of participation by the subjects in the present study was 89 percent, this being higher than that reported by Wagner *et al*[11] in a similar study on children in the United States of America. Our high participation rate was most probably due to the function of using a "captive" population of the PHCPA which is a target group that is frequently used for several medical surveys. The participation rate however, fell with repeated testing as well as with the introduction of venipuncture. The falling rate could also be attributed to relocation of families, absence from school by some of the subjects and the venipuncture. Furthermore, lack of any personal benefits of either the subjects or the parents might have contributed to the falling participation rate.

The prevalence of asymptomatic proteinuria of 7.5 percent in the present series was between the range of 3.6 and 26.1 percent reported by several other workers in Nigeria and elsewhere.[10-16] Our prevalence was lower than those reported by Abdurrhaman, Chakrabarty and Ochaga,[13] Ajasin,[14] and Ekunwe and Odujinrin[16] who tested urine samples that were collected from the subjects soon after arrival at school, thereby including possible cases of orthostatic proteinuria. Furthermore, in the study undertaken by Ekunwe and Odujinrin,[16] trace proteinuria was considered as being sig-

nificant. The prevalence rate of 7.5 percent in our series would seem to be a true representative of asymptomatic proteinuria as care was taken to eliminate orthostatic proteinuria by screening the first morning urine samples of the subjects. As had been noted earlier, prevalence of asymptomatic proteinuria in our study fell with repeated testing such that by the end of the six months, proteinuria persisted only in 1.5 percent of the subjects. This observation may have been due to the elimination of some of the causes of the proteinuria as for example, the treatment of those subjects with schistosomiasis and urinary tract infection.

In contrast to previous studies, more males than females (M:F ratio of 1.6:1) in our study had proteinuria. This finding may be related to the prevalence of schistosomiasis which is well known to be commoner among males than females.[17] Akinkugbe, Akinwolere and Oyewole [18] have proffered a similar explanation for the higher prevalence of proteinuria in males than in females among one of the two groups of their subjects. The two abnormalities in our subjects with asymptomatic proteinuria were schistosomaisis in 0.9 percent and urinary tract infection in 1.1 percent of the cases. No apparent cause for the proteinuria was found in the other subjects. Perhaps such investigative procedures as intravenous urography and renal biopsy might have revealed latent abnormalities but the costs of these procedures are prohibitive. Besides, previous studies have suggested that such procedures are unnecessary in subjects with persistent asymptomatic proteinuria.[8 9 12] This may well be correct as a majority of our subjects had mild proteinuria and the blood levels of the indices of renal function, were normal in all 31 subjects who underwent these blood tests. Most importantly, the fundamental ethical issue of using blood tests in the investigation of subjects with asymptomatic proteinuria must always be considered in such studies.

Based on the present findings, it is recommended that while assessing a child with asymptomatic proteinuria, urine microscopy and culture is all that is required in order to eliminate such treatable causes as schistosomiasis and urinary tract infection. In rural communities with limited medical facilities, it seems that male children would benefit from urinary screening at primary and secondary school entry, while screening in the females may be delayed to just before secondary school entry.

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