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Original Article

Screening of Kidney Diseases among Asymptomatic School Children in Downtown of Dhaka, Bangladesh

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Abstract:

Renal diseases are increasingly common causes of childhood morbidity and mortality. To find the prevalence of kidney diseases among school children in rural area of Bangladesh, this cross-sectional study was conducted in National Institute of Kidney Diseases and Urology, Dhaka from January 2018 to December 2018. Total 2401 school children of downtown of Dhaka were included in this study. Urine from all children were collected and examined by dipstick and light microscopy. In this study, 2401 children were screened, of them 1123 (46.8%) were boys and 1278 (53.2%) were girls. Prevalence of urinary abnormalities detected by first dipstick test was (2.83%) and second test was (2.21%). Urinary tract infection was the most common abnormality (1.33%) and Proteinurea was the second most common abnormality found in this study (0.58%) (Isolated proteinurea was 0.33%). In this study, hematuria was detected in 0.54% children (isolated hematuria is 0.29%). Prevalence of combined hematuria and proteinuria was 0.25%. When it comes to identifying hidden kidney disorders in children who are asymptomatic, urine screening is essential. Thus, urinary screening aids in the early detection of renal disorders and offers a structural work-up for a subsequent strategy that could result in their prevention, diagnosis, and treatment.

Keywords: Kidney disease, Hematuria, Proteinuria.

Introduction:

Renal disease in children varies in presentation, just like other childhood illnesses. The pattern of childhood renal disorders is similar in most parts of the world, although the frequency of occurrence of the various types appears to be different[1]. Childhood renal disorders may be symptomatic or asymptomatic in presentation. Both forms of presentation could result in significant morbidity and mortality; hence, the necessity for adequate and equal attention in their management[2].

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Proteinuria and/or hematuria, with or without hypertension, are frequent but not specific signs of renal disorders. However, they neither prove the presence of nor exclude the possibility of renal disorders. For this reason, the discovery of proteinuria and/or hematuria, with or without hypertension, should always be followed up by proper evaluation. Studies have shown that childhood renal disorders detected by urine screening have a better prognosis when compared with those presenting with massive proteinuria and/or gross hematuria[3,4].

Dipstick urinalysis (DUA) remains a cornerstone to evaluate the kidney function at relatively low cost[5,6]. Asymptomatic hematuria or proteinuria is commonly detected by a routine dipstick with a reported prevalence between 1%-10% for proteinuria, and 0.5%-2% for hematuria6. Isolated hematuria, as well as proteinuria is usually benign, however persistent hematuria and/or proteinuria may be associated with serious underlying renal diseases or systemic disorders that require workup and referral to the nephrologists[7].

Materials and Methods:

This cross sectional study was done among children between the age 6 to 16 years attending schools in Downtown of Dhaka during the period January 2018 to December 2018. Children with past history of any renal or medical illness, acute febrile illness and children with congenital malformations were excluded from the study. Ten schools were selected for conducting the study. A school health program was organized in each of these schools for 2-3 days, respectively. After obtaining informed consent from parents and teachers, students, who met inclusion and exclusion criteria, were selected for the study. A thorough physical examination was done including recording of weight and height. Aseptic precaution was explained to the participants for collection of urine sample, then midstream urine was collected in a clean plastic container. Urine was examined by dipstick for color, turbidity, pH, specific gravity, albumin, and glucose. After centrifugation 3000 rpm/ min for 5 min sample was examined microscopically for red blood cell (RBC), white blood cell, casts, and bacteria. Students and school authorities were informed about abnormal urinary findings and were advised follow-up in the hospital for further evaluation. Children whose urine examination showed any one of the following were considered to have urinary abnormality suggestive of a renal disease. Albumin ≥2+, pus cells ≥5 cells/hpf, and RBC ≥5 cells/hpf. Data were taken and calculated by using SPSS version 24 and presented accordingly.

Results:

A total of 2401 students, who fulfilled the inclusion and exclusion criteria between the ages 6 and 16 years were enrolled in the study. Among them 46.8% were males, and 53.2% were females. 0.33% of children showed proteinuria (urine albumin ≥2+), which is seen more in males compared to females. Table I shows urinary abnormalities among the children. According to dipstick method, isolated hematuria was 13 (0.54%), isolated proteinuria was 10 (0.42%), combined proteinuria & hematuria was 7 (0.29%) and urinary tract infection was 38 (1.58%). According to complete urine analysis, isolated hematuria was 7 (0.29%), isolated proteinuria was 8 (0.33%), combined proteinuria & hematuria was 6 (0.25%), and urinary tract infection was 32 (1.33%). Urinary abnormalities were found among 2.83% children and 2.21% children according to dipstick urine analysis and complete urine analysis respectively.

Table-I: Distribution of children according to urinary abnormalities (N=2401)

Urinary abnormalities	First screening (By dipstick method) n (%)	Confirmatory screening (By complete urine analysis) n (%)
Isolated hematuria	13 (0.54)	7 (0.29)
Isolated proteinuria	10 (0.42)	8 (0.33)
Combined proteinuria and hematuria	7 (0.29)	6 (0.25)
Urinary tract infection	38 (1.58)	32 (1.33)
Total	**68 (2.83)**	**53 (2.21)**

Table II shows prevalence of isolated hematuria according to demographic variables. Two (0.08%) isolated hematuria cases were male and 5 (0.21%) were female. Two (0.08%) of them were in age group 8-9 years, 3 (0.12%) in 10–11 years age group and 2 (0.08%) in age group 12-13 years.

Table-II: Prevalence of isolated hematuria according to demographic variables (N=1528)

Demographic variables	Hematuria cases (%)
Sex:	
Male	2 (0.08)
Female	5 (0.21)
Age (in years)	
6-7	0 (0)
8-9	2 (0.08)
10-11	3 (0.12)
12-13	2 (0.08)
14-16	0 (0)

Here isolated proteinuria according to demographic variables shows Five (0.21%) of them were male and 3 (0.12) were female. Two (0.08%) of them were in age group 8-9 years, 4 (0.17%) were in age group 10 – 11 years and 2 (0.08%) of them were in age group 12-13 years (Table III).

Table-III: Prevalence of isolated proteinuria according to demographic variables (N=2401)

Demographic variables	Proteinuria cases (%)
Sex:	
Male	5 (0.21)
Female	3 (0.12)
Age (in years)	
6-7	0 (0)
8-9	2 (0.08)
10-11	4 (0.17)
12-13	2 (0.08)
14-16	0 (0)

Table IV shows prevalence of urinary tract infection according to demographic variables. UTI was present in 4 (0.33%) males and 24 (1.00%) females. Maximum 14 (0.58%) children with UTI were in age group 10-11 years followed by 7 (0.29%) in age group 8-9 years, 5 (0.21%) in age group 12 – 13 years, 3 (0.12%) in both 14-16 years and 14 – 16 years age group.

Table-IV: Prevalence of urinary tract infection according to demographic variables (n=32)

Urinary tract infection	Number of children (%)
Sex	
Male	8 (0.33)
Female	24 (1)
Age (in years)	
6-7	3 (0.12)
8-9	7 (0.29)
10-11	14 (0.58)
12-13	5 (0.21)
14-16	3 (0.12)

Discussion:

Urinary screening test has been used to identify asymptomatic renal disease in children progressing to chronic kidney disease. Dipstick urinalysis is the most common test used for detecting urinary abnormalities in these children. In Asia, Japan was the first country to start a national urinary screening program for school children aged 6-14 years on an annual basis in 1973.[8]

Taiwan initiated a national program in 1990, covering children from 6 to 15 years old.[9] While Korea's program began in 1998 for children from 6 to 18 years.[10] The process of screening was similar in all the studies. Urine collected from the children was tested using urine dipstick. Those children with proteinuria and/or hematuria underwent a second urinary screen. Those with persistent abnormalities were then referred to a pediatrician or nephrologist for further investigations. In our study, we did not do the second screening for children being tested positive in the initial screening.

In our study, the prevalence of urinary tract infections and proteinuria was higher in the 10 to 11 year age group. This high prevalence may be explained by the fact that only a single urine sample was screened. This prevalence may be considerably lesser if repeat screening was undertaken. A lower prevalence rate of 0.12%- 3.56% was reported and all these studies initially had little higher prevalence and dropped to these range on further evaluation.[11-13] Variation in the detection rate of urinary abnormalities on screening in these studies may be due to varying ethnic backgrounds and the prevalence of renal diseases in these population.[14]

Mass urinary screening programs are well recognized in some Asian countries (Japan, Korea, and Taiwan), but this is not the case for North America and Europe because of concern about cost-effectiveness. The cost-effectiveness of urinary screening programs, found them to be an ineffective procedure for primary care providers, and supported the recommendations of the American Academy of Pediatrics guidelines.[15]

A major question for pediatric nephrologists in developing countries is what strategy should be adopted that can detect silent renal diseases that may manifest later in life.

Conclusion:

We concluded that urine screening is the simple and feasible method for diagnosis of urinary abnormalities in asymptomatic children which requires periodic reevaluation to minimize the progression to renal diseases. The limitations of our study were that an early morning urine sample was not collected. Repeat evaluation was not done. Further evaluation for the etiology of urinary abnormalities could add significance to the screening of urinary abnormalities in these children.

Conflict of interest:

There is no conflict of interest.

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