DIPSTICK URINE ANALYSIS SCREENING AMONG ASYMPTOMATIC SCHOOL CHILDREN: A CROSS SECTIONAL STUDY FROM NORTH KERALA

GANESH MOHAN.M.
Assistant Professor, Department of Pediatrics,Govt. Medical College
Ernakulam, Kochi, Kerala 683503, INDIA

ABSTRACT

Background: Early identification of kidney diseases in children and adolescents is an important initial step in prevention of chronic kidney diseases (CKD).Mass urinary screening is a useful tool to identify children with asymptomatic progressive renal disease. The current study was undertaken to screen asymptomatic children between the ages of 5 and 10 years for detecting urinary abnormalities.

Method: The present study was conducted among 1000 school going children from 3schools of Payyanur district of North Kerala. Urine was examined by dipstick for color, turbidity, P.H, specific gravity, albumin and glucose. Samples were also examined microscopically for R.B.C, W.B.C, casts and bacteria. Culture was done for samples found to be abnormal.

Results:1) 95.8% of children had normal appearing urine, 2.9% had turbid urine and 1.3 % had cloudy urine. 2.4 % had tested positive for urinary sugar. 1.3 % of students had trace albuminuria and 2.9 % students had albuminuria of 1+. 11.2 % of children had pus cells in urine out of which 1.2 % students had pus cells >= 5. 0.5% students have epithelial cells more than >=5/ hpf. 1.9 % students had RBC in urine. 0.3 % had crystals in their urine 0.4 % students had bacteria present in urine. A total of 0.6% of children had positive urine cultures with count >100000 cfu/ ml

Conclusion: In conclusion, asymptomatic urinary abnormalities might be detected by urine screening program at school age. Further work-up should be offered to define the exact etiology of any abnormal finding and to determine whether early detection of renal disorders in childhood will lead to effective interventions and reduction in the number of individuals who develop end-stage renal disease.

Key words: Urinary screening, Renal disease, Urinary tract infection, Dipstick, Urinary abnormality, Micturition, Proteinuria

INTRODUCTION

Routine urinary screening program is a proven strategy for diagnosing and initiation of treatment for renal diseases in children.(1)The simplest and least expensive method of screening apparently healthy individuals is dipstick urine analysis.(2,3)

Several studies have used reagent strips and have documented their effectiveness in detectingurinary abnormalities.(4,5) Proteinuria and hematuria detected by urine analysis may be considered as earliest markers of renal disease.Studies have shown that positive urine tests for haematuria and/or proteinuria in mass screening settings were significant predictors of end stage renal disease.Urinarytract infections are common in childhood, and may be subclinicalor present with nonspecific symptoms and signs, and have the potential for long-term complications.(6)Relatively few studies have addressed urinary findings in

healthy children at schools in South India. This study was therefore carried out to assess urine findings in apparently healthy primary school children. The results of the study would add further evidence for routine screening of urine in school children especially in a low resource setting. Such evidences would help in designing population based preventive measures that would curb the need for expensive and more resource needed procedures like dialysis and transplantation.

AIM OF THE STUDY

The study aims to find the proportion of urinary abnormalities in asymptomatic school children using dipstick.

MATERIALS AND METHODS

The present study was conducted during the period from (June 2011 to December 2011) in three schools namely KendriyaVidyalaya,Subramanya Shenoymemorial Government LP school and B.E.M LPschool of Payyannur situated in Kannur district in North Kerala. Ethical clearance for the study was obtained from the institute ethics committee of Pariyaram Medical College. The students studying in class 1 to V were selected for the study. A total of 500 students were enrolled in the study from Kendriya vidhyalaya and 500 from govt schools.

Students in good health were included for the study. Children with previous history of renal or medical diseases, acute febrile illness, and children with congenital malformations were excluded. Instructions written in the local language about proper methods of collection of urine samples were sent home to parents in advance. The first morning urine sample was obtained from each child in a clean 50mL vessel. A thorough physical examination was done including recording of weight, height and blood pressure.Urine was examined by dipstic for colour, turbidity, P.H, specific gravity, albumin and glucose. After centrifugation 3000 rpm/min for 5 minutes sample was examined microscopically for R.B.C., W.B.C, 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, RBC > 5 cells/hpf.Urine sample of students with abnormal findings were sent for urine culture.

STATISTICAL ANALYSIS

Statistical analysis was done by using statistical package of social science SPSS version 16. Qualitative data were expressed in the form of numbers and percentages. Differences between groups were evaluated by chi-square.

RESULTS

Of the 1000 school children screened, 562(56.2%) were males and 438(43.8%) were females. The maximum number of students were of the 10 years of age(27.2%) and minimum number in the 7 year age(15.3%). (Table 1)

Table 1 : Distribution of students based on age and gender

Age in years	Males	Females	Percentage
6	112	97	20.9
7	86	67	15.3
8	95	60	15.5
9	128	83	21.1
10	141	131	27.2
Total	562	438	100

The following parameters were noted from the urine samples collected.
1. Physical appearance
2. Urine sugar and protein
3. Microscopy for RBC, crystals, pus cells and bacteria
4. Urine culture for confirmation of infection.

Out of the total samples examined2.9% had turbid urine and 1.3 % had cloudy urine. 2.4% of children in the study population had tested positive for urinary sugar and 1.3 % of students had trace albuminuria and 2.9 % students had

albuminuria of 1+.Microscopic examination of the samples revealed that 11.2 % of children had pus cells in urine out of which 1.2 % had pus cells ≥ 5 / hpf. A total of 1.9 % students had RBC in urine but none had significant hematuria ie; ≥ 5 rbc/hpf. Prevalence of crystals in the urine of study sample was found to be 0.3%. Bacteria in microscopy were found in 0.4%. (Fig 1).
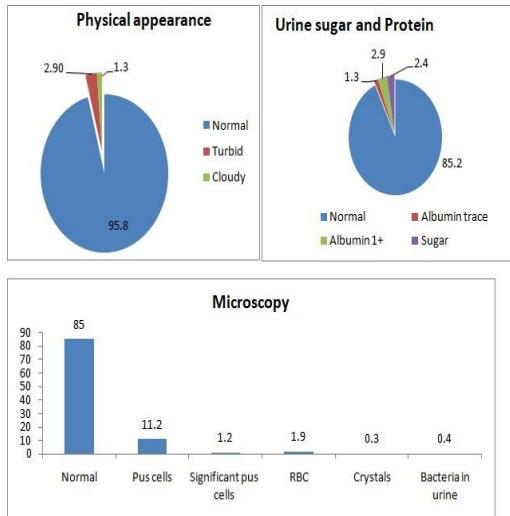

Fig:1 Percentage of urine samples with abnormalities in dipstick test and microscopy

All samples were subjected to urine culture examination and positive culture was observed in 0.6% of samples.

Association between positive bacterial culture and variables such as age, gender, type of school-govt/private, average water intake per day and frequency of micturition was done using chi-square test. Age, gender and type of school were not significantly associated with the bacterial culture positivity whereas average water intake and frequency of micturition showed significant association with culture positivity. It was found that children who consumed more water per day had less chances of getting urinary infections. Similarly those children with increased frequency of micturition had less urinary infections. (Table 2)

Table 2: Bivariate analysis of selected variables with urine culture status

Variable		Positive urine culture	negative urine culture	P value
Age	< 8	2	342	
	≥ 8	4	652	
Gender	Males	0	562	<0.001
	Females	6	432	
Type of school	Govt	4	496	
	Private	2	498	
Micurition frequency during school hours	Nil	1	137	< 0.0001
	1 to 3	1	789	
	≥ 4	4	69	
Water intake during school hours	Nil	4	104	<0.00001
	1 to 3	1	642	
	≥ 4	1	248	

DISCUSSION

Renal diseases which remain silent in paediatric population is best detected by a urinary screening, which helps to reduce the burden of chronic kidney disease. Urinary screening by dipstick is regarded as one of the best and effective method for such early detection of renal disease in asymptomatic children.(7)
In the present study prevalence of urinary abnormalities in asymptomatic children was found to be 14.8% .Many studies have been done to find out the prevalence of urinary abnormalities in asymptomatic school children. Some of them showed higher prevalence of asymptomatic urinary abnormalities, while some had very low prevalence.(8-13)
Among the samples screened 2.9% were turbid in appearance. Khallid.N.S. et alfound turbid appearance in 1.2% of the samples.(14)

In this study, all 6 children who had urine infection were females.

Similar observation was made by Park et al in their study where urinary abnormalities were more common in girls than in boys.(15) Contrarily Lin et al, found more males to have

urinary abnormality compared to female.(16) There was no difference in urinary abnormality with age or gender in study done by Vehaskari et al.(17)

In our study dipstick-detected glycosuria was encountered in 2.4% of children. Abd El-Naser M and Alharthi AA in their studies in screening preschool children reported glucosuria of 0.3% and 0.6% respectively whereas Hajar F et al reported no cases of glucosuria.(18-20)

Proteinuria was detected in 2.9% of children. This was in agreement with a study done in Iran by Abd Al-Hamid et al,who reported proteinuria in 1.7 % of his cases.(21) A study conducted in Chennai by Vinod et al observed a higher percentage of proteinuria (4.3%) among school children.(22) Much lower prevalence of proteinuria was observed in studies done among school children in Lebanon and Saudi Arabia.(19,20) Proteinuria as well as hematuria may be the only early signs of renal disease (membranous nephropathy (MN), membranoproliferative glomerulonephritis (MPGN), post-infectious glomerulonephritis (PIGN), IgA nephropathy (IgAN) and others).(23) Renal diseases such as nephritis are common in developing countries, where survey screening has shown a high prevalence for proteinuria with or without hematuria.(24)

Children establish drinking patterns early in child hood. Water intake by children during school hours was assessed in this study. It was found that 10.80% of children did not drink water during school hours. Rugget et al found that some children drink significantly less water during the school day than during the week ends.(25)The reason for this is to be looked in to. It has been proven that drinking enough water can help protect body against certain diseases like urinary tract cancer, kidney and bladder stones.(26,27)

Frequency of micturition assessed in this study showed that 10.5% of the students abstain from micturition during school hours. Infrequent bladder emptying can have a negative impact on the child's self-esteem and can even predispose for urinary tract infection. The school teachers must instruct the students to use toilet at least twice during the school hours and never to cultivate the habit of holding urine for longer periods.

A major challenge for developing countries is to halt the progress of renal disease in children to chronic renal disease which is difficult to manage due to lack of financial resources and inadequate infrastructure. Urinary screening in school children is a non-invasive and viable test for early detection of silent renal diseases. Because of its simplicity, routine urine analysis is the best way in early detection of most frequent conditions like proteinuria, hematuria or glycosuria at a very low cost. This is useful in selecting asymptomatic patients with renal diseases who may benefit from early treatment, counseling or who require long term follow-up.(28)

The limitations of our study were that an early morning urine sample was not collected for younger children. 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.

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