SCREENING OF RENAL DISEASES IN THE FIRST PRIMARY SCHOOL CHILDREN IN SHIRAZ

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Abstract- Screening interval urinalysis has long been considered essential to pediatric health care. A urinalysis is recommended at four times: in infancy, early childhood, late childhood, and in adolescence. Several chemical parameters can be measured as commercially available in dipstick test. This test is relatively inexpensive and it takes less than 5 minutes to be completed. In a 3 month follow up program, mass urine screening tests was conducted in four educational areas of Shiraz, Iran, randomly in 1601 students. The questionnaire was filled by their parents and general physical exam was done by general physicians. Fresh urine specimens were screened using a dipstick for chemical analysis including: protein, glucose, blood, urobilinogen, leukocyte-esterase, bilirubin and nitrite. In those who had urinary abnormalities by dipstick or who were symptomatic or had physical abnormalities further investigations were carried out. In 1601 apparently healthy children (809 boys, 799 girls) urinary abnormalities were detected in 76 (4.7%) subjects at first screening. There were urinary symptoms in 63 patients. The most common form of urinary abnormalities was proteinuria (56 subjects, 3.6%). Followed by hematuria (1%), nitrite (0.6%), leukocyte estrase (0.4%) and glucosuria (0.2%). Abnormality in sonography of kidneys were found in 22 cases. Positive dipstick findings had significant correlation with abnormal ultrasound findings. This study shows that it is possible to screen a large population of patients at relatively low cost, providing the framework for further action that may help in the prevention and timely diagnosis of renal diseases.
Acta Medica Iranica 2007; 45(3): 215-218.

INTRODUCTION

A major question for renal medicine in developing countries is how to define strategies that can identify early enough those subjects who are at risk of developing a renal disease later in life.

This will make it possible to design population–oriented preventive measures that will limit the need for dialysis and transplantation. Prevention is more and more important in this setting given the shortage of financial resources and the fact that dialysis centers, equipment and trained personnel are simply not available to the general population. The simplest and least expensive way of screening apparently healthy subjects is urinalysis (1-2) and several studies have been made using reagents strips, documenting their reagents strips, documenting their

effectiveness in detecting urinary abnormalities at relatively low cost (3-5). Mandatory annual urine screening in Tokyo schools throughout a 13- year period detected renal disease in only 0.017 of elementary students and 0.015% in junior high school students (6).

It parents are properly informed that most urinary abnormalities, are transient, that the likelihood of significant renal disease is low, and that simple tests are adequate to resolve most questions, then the potential benefit of screening urinalysis in accord with the guideline of the American academy of pediatrics for outweigh the risks (7).

We used dipstick methods to screen apparently healthy children; further studies were then performed in patients found to have urinary abnormalities on dipstick analysis.

Patients and methods

In a 3 month follow up conducted in four educational areas of Shiraz, Iran, randomly in 1601 school children (809 boys, 792 girls) public elementary school children (6-7 years of age) urine samples were collected at home with participants being instructed to empty their bladder on the preceding night and collect a mid- stream sample on first urination the following morning. In addition, letters were sent to each household with explicit instruction to: (1) urinate completely at bed time on the previous night; (2) refrain from consuming vitamin C or food with a high vitamin C content collect a mid- stream specimen immediately upon rising. Urine samples were then transported in refrigerated containers to the test center for analysis. The mean period between urine collection and analysis was 4- 6h. Urinalysis was performed using the dip and –read reagent strips. All asymptomatic children were assumed to have a screening dipstick urinalysis was performed by the pediatrician on a second sample brought in by a parent.

The questionnaires were filled by their parents (urinary symptoms). General physical examination (weight, height, blood pressure, edema, paleness) was done by general physicians.

Two sequential abnormal urinalysis for proteinuria, hematuria, glucosuria, bacteriuric or who were symptomatic a or had physical abnormalities, further investigations (microscopic urinalysis, urine culture, sonography, VCUG, isotope scan) were carried out.

Urinalysis were considered abnormal as follows: 1) 1+ or greater proteinuria; 2) 1+ or greater hematuria; 3) positive leukocyte esterase; 4) 1+ or greater glucosuria using an Uri LAB reagent strips (DFICO., Ltd, Republic of Korea).

Statistical analysis

The data were analyzed using the SPSS 10 software. Differences between the groups were evaluated by the chi-square and student t test. Pearson correlation coefficient and Fisher's exact test were used to determine the correlation between quantitative data. P value < 0.05 was considered significant.

RESULTS

The study was conducted in four areas of the city (Shiraz) which represent four different geographical and socio- economic environments.

Apparently healthy children (1601) were enrolled over a period of 3 months. There were 809 (50.5%) boys and 792 (49.5%) girls. Urinary abnormalities were detected in 76 children at first screening. The most common form of urinary abnormality was proteinuria, which was found in 56(3.6% of positively screened subjects, other renal abnormalities were hematuria (1%), nitrite (0.6%), leukocyturia (0.4%) and glucosuria (0.2%) (Table 1). There were urinary symptoms in 63 questionnaires. The most common symptoms was Anorexia 320 (20%) (Table 2).

Confirmatory tests and further clinical studies were then carried out in 139 children (76 with positive dipstick and 63 with positive questionnaires).

**Table 1.** Urinary finding at first screening

Urinary finding	No	Boys	Girls
Proteinuria	56	22	34
Hematuria	16	6	10
Nitrite +	9	2	7
Leukocyte esterase	6	2	4
Glucosuria	3	2	1

Table 2. Prevalence of symptoms in study group (general and urinary)

Symptom	No	Boys	Girls
Anorexia	320	143(17.7%)	177(22.3%)
Enuresis	193	113(14%)	80(10.1%)
Poor weight gain	170	63(7.8%)	107(13.5%)
Nocturia	162	92(11.4%)	70(8.8%)
Malodor urine	66	40(4.9%)	26(3.2%)
Lower abdominal pain	55	33(4.1%)	22 (2.7%)
Loin pain	44	22(2.7%)	22(2.7%)
Dysuria	37	11(1.4%)	26(3.3%)
Incontinency	32	13(1.6%)	19(2.4%)
Drippling	27	14(1.7%)	13(1.6%)

On the second urinalysis 22 of subjects had urinary abnormalities. The final diagnosis, was abnormal ultrasonographic findings (uroepithelium thickening of bladder wall, stone and a double collecting system (22 subjects).

Hematuria, nitrite + and leukocyturia (1), hematuria and proteinuria (4) isolated proteinuria (1), nitrite (2) leukocyturia (1) urinary tract infection 3(0.2%).
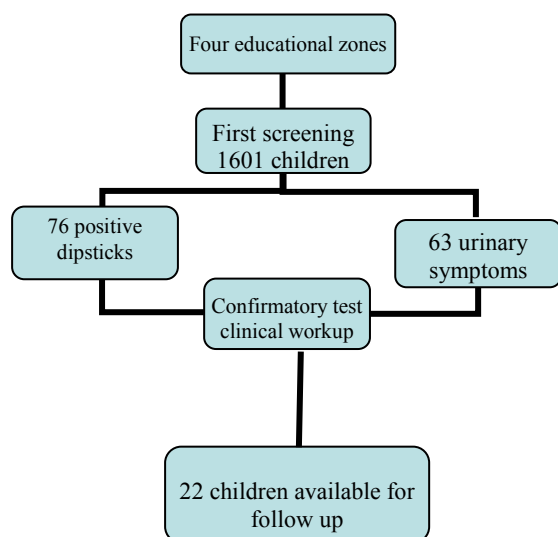
Fig .1. Illustration of the subsequent phases of the study.

DISCUSSION

Our method of urine screening involved a two stage process including: (1) urinalysis on the first morning urine sample, with repeat urinalysis when the first revealed abnormal findings.

(2) a detailed history and physical examination with additional laboratory studies to search for evidence of renal disease. Dipstick urinalysis is the most common test for detecting urinary tract disorders in asymptomatic persons. Multi- pad dipstick reagent strips can detect a variety of disorders, including bacteriuria (nitrite test), pyuria (leukocyte esterase test), hematuria (heme test) and proteinuria (tetrabrom phenol test) (8).

A single screening dipstick urinalysis be obtained at school entry age, between 5 and 6 years old, in all asymptomatic children. False-positive and false-negative urinalysis results are due to a variety of factors, including specimen contamination, the presence of the certain organisms, the timing of interfering substances (urobilinogen, glucose, ascorbic acid, drugs, urine cells and bacteria), other urine properties (specific gravity, pH, concentration) and biologic factors (exercise, cold exposure, prolonged recumbency, medical illness). A False positive/transient abnormality is defined as an individual with an abnormal initial urinalysis with a normal repeat urinalysis. 7.3% (139/1901) of the children were calculated to have an initial abnormal urinalysis. Upon retesting, only 1.4% (22/1601) of children were calculated to have a persistent abnormality (Fig. 1).

The prevalence of initial asymptomatic proteinuria, hematuria, nitrite, leukocyte esterase and glucosuria were 3.6%, 1%, 0.6%, 0.4%, 0.2% respectively. In Tokyo the prevalence of proteinuria, and hematuria among elementary school children was 0.08% and 0.54% (6). In Niigata prefecture, Japan, first urine samples from elementary school children were examined on several occasions over a 1 – year period with an incidence of proteinuria of 0.1% and hematuria of 0.3% (9).

There have been other reports from different countries on the prevalence of hematuria, proteinuria in childhood (10-13).

Dodge *et al.* conducted three consecutive urinalysis on 6 to 12 year old children at intervals of 3-6 weeks and found proteinuria in all three tests in 0.942% of the females and 0.33% of males, and hematuria in 0.34% and 0.12%, respectively (14).

In Bolivia, urinary abnormalities were detected in 4261 subjects at first screening. The most common form of urinary abnormality was hematuria (4% of positively screened subjects). Other renal abnormalities were leukocyturia (41%) and proteinuria (11%) on a second screening 35% of the subjects had no urinary abnormalities (15).

This study showed that through an extended information campaign, mass screening of the population for renal ailments is feasible in a developing country, and can provide useful information on the frequency of renal diseases. However, the difficulties of such a large- scale study emerged when we tried to test for a second time those patients who had a positive dipstick at the first check.

This study helped define for the first time the frequency of asymptomatic renal diseases in Shiraz (Iran). It shows that it is possible to screen a large population of patients at relatively low cost, providing the frame work for further action that may help in the prevention and timely diagnosis of renal diseases.

Conflict of interests

The authors declare that they have no competing interests.

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