

Original Research Article

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Urinary screening for detection of renal abnormalities in asymptomatic pre-school children referred to Ardabil city health centers from 2016 to 2017

Susan Mohammadi-Kebar^{1,3}, Javed Zarea-noghabi^{2,3}, Saeid Hoseininia^{1,3*}, Davoud Mahmoudi³

¹Department of Internal Medicine, ²Department of Pediatrics, ³Faculty of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

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***Correspondence:**

Dr. Saeid Hoseininia,

E-mail: s.hoseininia@arums.ac.ir

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ABSTRACT

Background: Urinary screening for detection of proteinuria, hematuria, and pyuria for early diagnosis curable or preventable renal disease in three decade has been considered. The aim of this study was urinary screening for Detection of renal abnormalities in asymptomatic pre-school children referred to health center in Ardabil city from 2016 to 2017.

Methods: This was a cross-sectional descriptive study that has been done on urine specimens of 350 children who referred to Ardabil city health center to injection DTP vaccine from April 2016 to Sep 2017. In these infants, proteinuria, hematuria, pyuria and urinary casts were examined and abnormal finding were referred to future investigation to nephrologist. Information was collected and analyzed by statistical methods in SPSS version 21.

Results: A total of 350 children were enrolled in the study. There were 196 (56%) boys and 154 (44%) girls. The prevalence of urinary abnormalities in all children was 8.3%. Of all urinary abnormalities, proteinuria and hematuria were detected in 12 children (3.44 %). Of all infants, 9 children (2.57%) had pyuria. Also, 6 children (1.8%) had urinary casts that of them two cases had acid ureic cast and four cases had calcium oxalate cast.

Conclusions: This study showed that the prevalence of urinary abnormalities in Ardabil city children was similar to other studies in other country or cities. The reasons of this may be different in race and ethnic. We suggest that routine urinalysis should be part of screening of children at the school entry in Ardabil.

Keywords: Asymptomatic children, Hematuria, Proteinuria, Pyuria, Screening, Urinalysis

INTRODUCTION

Glomerulonefritis is one of the leading causes of end-stage renal disease (ESRD) worldwide, especially in Asian countries, including China, which can develop at a young age without any obvious clinical signs but it can only be accompanied by abnormal urinalysis such as microscopically isolated hematuria or proteinuria. Therefore population-based urine screening has been performed for the pediatric population in different countries.¹⁻³

By urine analysis, asymptomatic children with chronic glomerulonefritis and progressive, including IGA nephropathy and proliferative membrane glomerulonefritis (MPGN), have a chance to be diagnosed and treated promptly that for these children have been showed a good prognosis.^{4,5} The simplest and cheapest method of screening in healthy people is a urinalysis test which can detect hematuria and proteinuria.⁶ In Iran, different results have been recorded in different studies which conducted in different cities on the prevalence of urinary disorders in preschool children. Studies have also been

conducted in Korea, Japan, Taiwan, Pakistan, Sudan, and Malaysia shown that hematuria and proteinuria being reported as the most common disorder in some studies. The aim of this study was urinary screening for detection of renal abnormalities in asymptomatic pre-school children referred to Ardabil city health centers from 2016 to 2017.

METHODS

Study design and participants

This cross-sectional descriptive study was performed on 350 children (196 boys and 154 girls) who referred to Ardabil city Health Center for injection of triple vaccine (diphtheria, tetanus, and pertussis) at ages 5 to 6 years from April 2016 to September 2017. We estimated the sample size based on 95% significant level, study power of 80% and prevalence of renal abnormalities in similar studies about 350 children and these samples were selected by random cluster sampling technique. There were 14 health centers in Ardabil, each of which was considered as a cluster. Two clusters were randomly selected from the clusters and samples were collected from those two health centers. Urine samples were taken from all children and urine analysis was performed on all samples. Urine analysis was performed microscopically to examine hematuria, pyuria (presence of white blood cells in the urine) and cast observation and also with the help of dipstick to test for proteinuria. Among the cases that were abnormal in the first test, the second urine test was performed to prove urinary incontinence and to rule out transient cases.

Definition of urine analysis parameters

Hematuria defined as the number of RBCs more than or equal to 5 in each large microscopic field, proteinuria greater than or equal to +1 and pyuria defined as the number of WBCs more than 10-12 and casts including uric acid casts, oxalate or other casts were checked.

Data collection and statistical analysis

Data from urine analysis of samples were collected and then analyzed using descriptive statistics in SPSS 21.

Inclusion criteria

In this study, healthy children (with a history and physical examination and normal blood pressure) referred to health centers for vaccination of triple vaccine (diphtheria, tetanus, pertussis) were entered the study.

Exclusion criteria

Children with a recent cold or fever, any strenuous exercise during the last few days, any recent trauma and urinary symptoms such as dysuria and flank pain were excluded from the study.

Ethical approval

This study was approved by ethic committee of Ardabil University of Medical Science and registered by code IR.ARUMS.REC.1397.101.

RESULTS

Of the total studied children, 196 were boys (56%) and 154 were girls (44%). The overall prevalence of urinary disorders in total children was 8.3%. Also, the prevalence of urinary disorders was 11.7% in girls and 5.6% in boys. Out of all children, 11 (3.14%) had hematuria of which five (45.5%) children were boys and six (54.5%) children were girls. Also, nine children (2.57%) had pyuria of which seven (77.8%) were girls and two (22.2%) were boys (Table 1).

Table 1: Frequency of urine analysis indices in studied samples by gender of children.

Variables	Girls (n=154)		Boys (n=196)		Total (n=350)	
	n	%	n	%	n	%
Hematuria	6	54.5	5	45.5	11	3.14
Proteinuria	0	0	1	100	1	0.3
Pyuria	7	77.8	2	22.2	9	2.57
Acid uric cast	1	50	1	50	2	0.6
Oxalate calcium cast	2	50	2	50	4	1.2
Hematuria and urine infection	2	100	0	0	2	0.6

Also, the prevalence of hematuria in the studied girls was 3.9% and in boys was 2.6% and the prevalence of pyuria in girls was 4.5% and in boys was 1% and the difference was significant (Figure 1).

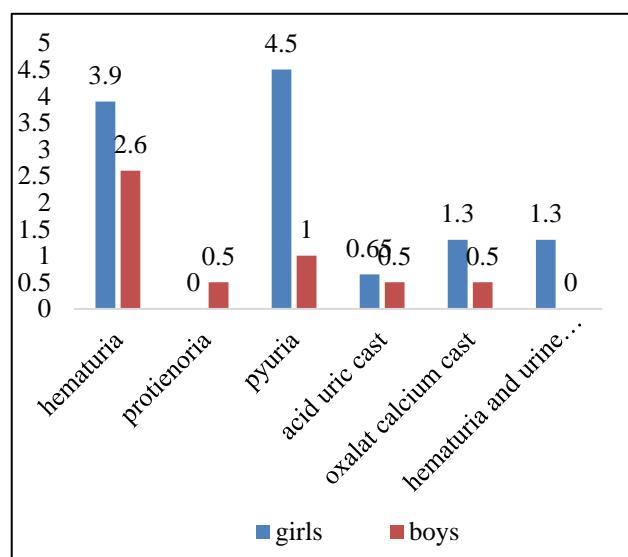


Figure 1: Prevalence of urine disorders in studied children by gender.

DISCUSSION

In the present study, screening was performed among 350 patients, in the urine analysis of the samples, 12 children (3.44%) had abnormal urine in terms of proteinuria and hematuria. In Jafari et al study in Yazd city this rate was 3.1%, in Sadeghi et al study in Zahedan city was 2.2% and in Shajari et al study in Shiraz was 4.7%.⁷⁻⁹ Also, in the study of Hajar et al in Beirut, Lebanon, the prevalence of urinary disorders was 2.9%.¹⁰ In the study of Malaysia was 2.3%, in Tokyo was 0.6 %, in Egypt was 0.72%, in Bolivia was 7.2% and in Nigeria was 9.6%.¹¹⁻¹⁵

These results indicate that different cities differ in the percentage of urinary disorders that the existence of different statistics can be due to racial differences and different prevalence of kidney problems in different cities. In the present study, 11 patients (3.14%) had hematuria of which 6 (54.5%) were girls and 5 (45.5%) boys and one case (0.28%) had proteinuria, that was a boy. Also, the prevalence of hematuria was 3.9% in girls and 2.6% in boys. In Sadeghi et al study in Zahedan, the prevalence of hematuria was 2.1% in girls and 1% in boys, and the prevalence of proteinuria was 1.05% in girls and 0.33% in boys.⁸ In Jafari et al study in Yazd, proteinuria was 1.79% and hematuria was 0.5% and isolated proteinuria was the most common urinary disorder in the first screening.⁷ In Shajari et al study in Shiraz, the rate of proteinuria was 3.6% and hematuria was 1%.⁹

In the study by Hajar et al in Beirut, Lebanon, hematuria was the most common disorder with a prevalence of 2% (of which 1% was microscopic isolated hematuria) and proteinuria with a prevalence of 0.2%.¹⁰

In a study conducted by Baziec et al in Sudan, among 486 children, the rate of hematuria in girls was 6.3% in boys was 3% and proteinuria in girls 3.3% and in boys 3% which hematuria was the most common disorder.¹⁶ However in some countries including Malaysia, Egypt and Shanghai, the prevalence of hematuria were 0.21%, 0.36% and 0.46%, respectively.^{11,13,17} In the present study the rate of urinary disorders was higher in girls, which was consistent with the study of Hajar in Lebanon and also in Nigeria but in the study of Hanif et al in Pakistan, there was no significant relationship between gender and prevalence of urine disorders.^{10,15,18}

Thus, it was observed that the most common urinary disorder has been reported in different studies, but it should be noted that both hematuria and proteinuria are important urinary findings that may be a precursor to kidney disease that should be considered. In the second screening study, two patients (0.57%) were positive for hematuria in one case a history of kidney stones in the second degree family was mentioned. Accurate history and blood pressure were measured in these patients and they were normal and additional tests were requested for

these individuals, including urinalysis, urine culture, calcium to creatinine ratio, C3 and ultrasound of the kidneys and urinary tract all of which were normal. Thus, transient hematuria was observed for seven patients and continuous isolated microscopic hematuria was observed for two cases.

Children with isolated asymptomatic microscopic hematuria lasting more than two weeks require further diagnostic tests and examinations, according to recent recommendations, a child with isolated microscopic hematuria should be followed up every three months for a year.¹⁹

In a study by Vehaskari et al, 22 children with isolated microscopic hematuria with no specific family history underwent biopsy, two of whom had IgA nephropathy and one had Allport syndrome and the rest of cases were normal.²⁰ In Japan, out of 220 children studied with microscopic hematuria who underwent biopsy, 6 had IgA nephropathy and 7 children had mild tubular disorders.²¹ This study showed that although microscopic isolated hematuria may be a benign finding, it can be an important symptom of the underlying disease. In the present study, a case of proteinuria was observed, which in latter studies in the second screening was reported to be normal, which could be possibly a transient proteinuria. In the present study, 9 patients (2.57%) had pyuria of which 7 were girls and 2 were boys. Other studies have shown that the causes of increased urinary tract infections in girls are shortness of the urethra and proximity of the urethra to the anus.²² In the first screening study, 5 patients excreted uric acid and calcium oxalate casts, which are often nonspecific and non-pathological and in review it was repeated in only one case that the person had a large excretion of calcium oxalate crystals and in quantitative examination, urinary calcium and creatinine levels were Hypercalciuria.

Of limitation of this study we could refer to lack of financially resources and non-long follow-up of patients for detection the main cause of disease or observation of disease contaminations such as hypertension or gross hematuria.

CONCLUSION

The results of this study showed that hematuria and pyuria were the most common findings of urinary disorders in studied children in Ardabil pre-school children. The presence of hematuria alone or in combination with proteinuria requires further investigation for renal disease because these findings can be a precursor to renal disease and ultimately to renal failure. It is recommended that routine urine analysis be conducted in pre-school children because this test is inexpensive and its findings can be very valuable.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Ardabil University of Medical Science and registered by code IR.ARUMS.REC.1397.101

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