

Prevalence of hematuria and proteinuria in asymptomatic pediatric age group in suburban Chennai



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ABSTRACT

Background: Hematuria is rare in normal physiology. Proteinuria is almost always abnormal. It has been reported that hematuria and proteinuria are present even in apparently healthy children. **Aims and Objectives:** This study was carried out to find the prevalence of proteinuria and hematuria in asymptomatic pediatric age group in suburban Chennai. **Materials and Methods:** This cross-sectional study was carried out among 200 apparently healthy children of a suburban community in Chennai. Urine samples were collected from all children who satisfied the study criteria. The study period was from June 2020 to December 2021. The collected urine samples were analyzed in the laboratory for hematuria and proteinuria. The data were entered into Microsoft Excel and analyzed using SPSS version 23. **Results:** Of the 200 children, 105 (52.5%) were males and 95 (47.5%) were females. The mean \pm standard deviation of the age of the study participants was 6.275 ± 4.0362 . Twenty-nine (14.5%) had hematuria, 45 (22.5%) had proteinuria, and 10 (5%) children had both. **Conclusion:** Hematuria and proteinuria are present in asymptomatic children. Urinalysis is an effective, easy, and non-invasive screening method for early detection of an underlying renal disease.

Key words: Hematuria; Proteinuria; Children; Urinalysis

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INTRODUCTION

Hematuria is defined as “the presence of more than 5 red blood cells (RBCs) per high power field collected in an uncentrifuged mid-stream urine collection.”^{1,2} It is classified into two: Macroscopic and microscopic, based on gross identification and detectable only following centrifugation, on direct testing through urine dipstick, or following direct visualization through urine microscopy, respectively.^{3,4} Hematuria is rare in normal physiology, as the tightly knit structure of the glomerular basement membrane prevents blood from entering the urinary collecting system. When this barrier is disrupted, the

RBCs enter into the urinary collection system. Some of the factors that lead to hematuria are exercise, inflammation, structural disruption, malignancy, and trauma. In children especially, the presence of blood in the urine is alarming to the child and the caretaker, calling for an immediate response. Furthermore, asymptomatic microscopic hematuria is tenfold more prevalent than gross hematuria.⁵

The presence of protein in urine, proteinuria, is abnormal. It may be an indication of an underlying glomerular disease or chronic kidney disease. Proteinuria may be the cause and effect of glomerular injury and many of the systemic complications of glomerular injury. It can be

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present in apparently healthy children. Detection of urinary abnormalities helps to prevent and diagnose renal problems early and thus reduce the progression of disease by early intervention.⁶ Coexistence of hematuria and proteinuria warns the presence of a significant renal disease. The simplest and cheapest way to screen an apparently healthy subject is by urinalysis.⁷

In one study, the prevalence of proteinuria and hematuria was found to be 4.3% and 2.5%, respectively.⁸ In a study, the prevalence of hematuria and proteinuria in 4–6 years old children was 0.85% and 1.57%, respectively, whereas 0.06% had mixed proteinuria and hematuria.⁹ A study from Korea showed that early detection using urinalysis screening and confirmatory diagnosis by renal biopsy seems to be helpful for the assessment of prognosis and intervention of chronic renal disease progression.¹⁰

Hence, this study aims at studying the prevalence of proteinuria and hematuria in asymptomatic pediatric age group in suburban Chennai, as there are only limited studies available in this aspect.

Aims and objectives

This study was carried out to find the prevalence of proteinuria and hematuria in asymptomatic pediatric age group in suburban Chennai.

MATERIALS AND METHODS

Study design

This was a prospective and cross-sectional study.

Study population, area, and duration

There were 200 children in the age group of 1–14 years in a suburban community near Kandigai. Their urine samples were collected during June 2020–December 2021.

Ethical clearance

Clearance was obtained from Institutional Ethical Committee (IEC No. June 04, 2017).

Inclusion criteria

All children of age 1–14 were included in the study.

Exclusion criteria

Children with history of any renal or medical illness, acute febrile illness, vomiting, diarrhea, abdominal pain (symptoms of urinary tract infections), and children with congenital malformations were excluded from the study.

Data collection tool and procedure

After getting assent and informed consent from the children and their parents, the children who met with the inclusion and exclusion criteria were selected for the study. A midstream urine was collected in a clean sterile container that was provided by the researchers. Urine was examined by dipstick for pH, specific gravity, albumin, RBCs, and glucose within half an hour of collecting the sample. Those samples found positive for RBCs were examined under the microscope after centrifugation of 3000 rpm/min for 5 min, as dipstick cannot differentiate between RBCs, hemoglobin, and myoglobin. The centrifuged urine sample was observed at high power for three or more fields. Positive samples were reconfirmed with another sample after 15 days. Those found positive for proteinuria and hematuria were informed and advised to follow-up in the hospital for further evaluation.

Data analysis

Collected data were entered into Microsoft Excel and analyzed using SPSS version 23.

RESULTS

Of the 200 children, 105 (52.5%) were males and 95 (47.5%) were females. The mean \pm standard deviation of the age of the study participants was 6.275 ± 4.0362 (Table 1).

Of the 200 urine samples collected, 171 (85.5%) showed nil RBCs in the urine. Twenty-nine (14.5%) had hematuria. Twenty-eight (14%) were (+), 1 (0.5%) was (++) (Table 2).

Of the 200 urine samples collected, 155 (77.5%) had no proteins. Forty-five (22.5%) had proteinuria. Thirty-two (16%) showed (+), 13 (6.5%) showed (++) (Table 3).

Ten (5%) children had both hematuria and proteinuria. Fifteen (7.5%) male children and 14 (7%) female children had hematuria (Figure 1). Twenty-five (12.5%) male children and 20 (10%) female children had proteinuria (Figure 2). The prevalence of coexistence of hematuria and proteinuria among male children was 6 (3%), and among female children was 4 (2%) (Figures 3 and 4).

DISCUSSION

Hematuria and proteinuria are indicators of glomerular injury or chronic kidney disease. Urinalysis is the most common test used for detecting urinary abnormalities

in children. In Asia, Japan was the first country to start a national urinary screening program in 1973 for school children aged 6–14 years on an annual basis.¹¹ Following which, Taiwan started a national program in 1990.¹² Korea's

program began in 1998 for children from 6 to 18 years.¹³ There is no such urinary screening program available in India.

In these programs, the 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 the present study, we have used the same methodology.

The prevalence of hematuria in our study was found to be 14.5%, and it was found to be almost equal among the genders, with a slight preponderance to males. Hanif et al.,¹⁴ found that there is no significant difference between two genders in the prevalence of hematuria. A male preponderance was reported in study done by Kalyesubula et al.,¹⁵ These findings are in line with the present study. The prevalence of proteinuria in our study was found to be 22.5%, with a male preponderance. This is in line with other studies.^{8,16}

The prevalence of coexistence of hematuria and proteinuria was found to be 5%. This is similar to the findings in studies carried out in different countries. A lower prevalence rate

Table 1: Gender distribution of the study participants

S. No.	Gender	Frequency	Percentage
1	Male	105	52.5
2	Female	95	47.5

Table 2: Red blood cells in the urine samples

S. No.	RBCs	Frequency	Percentage
1	(+)	28	14
2	(++)	1	0.5
3	Nil	171	85.5
	Total	200	100.0

Table 3: Proteins in the urine samples

S. No.	Protein	Frequency	Percentage
1	(+)	32	16.0
2	(++)	13	6.5
3	Nil	155	77.5
	Total	200	100.0

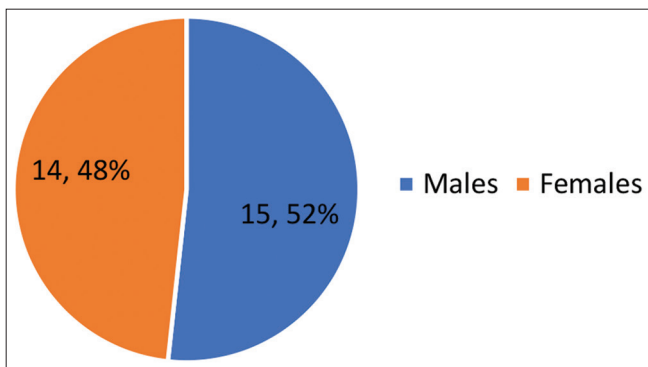


Figure 1: Hematuria and gender distribution

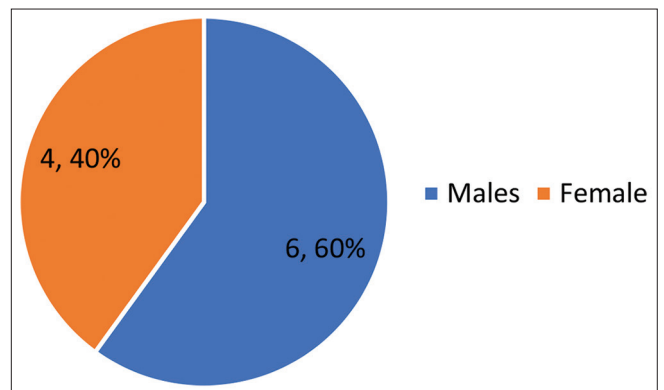


Figure 3: Urinary abnormality and gender distribution

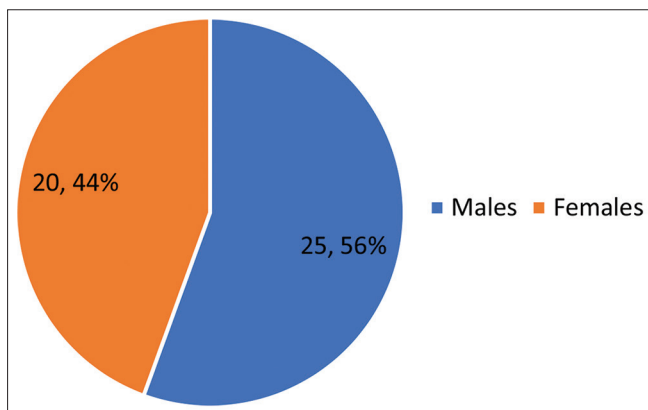


Figure 2: Proteinuria and gender distribution

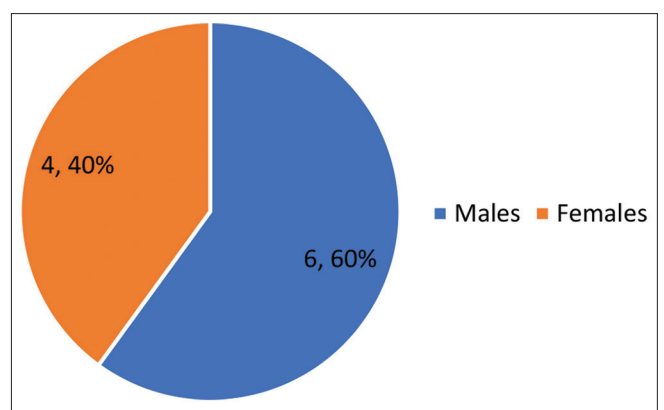


Figure 4: Coexistence of hematuria and proteinuria

of 0.12–3.56% was reported by studies from Egypt,¹⁷ Iran,¹⁸ Malaysia,¹⁹ and Japan.¹¹

Urinalysis in children is a non-invasive and viable test for early detection of asymptomatic renal diseases. However, Sekhar et al.,²⁰ studied the cost-effectiveness of such urinary screening programs and reported them to be an ineffective procedure for primary care providers. Further, they supported the current recommendations of the American Academy of pediatrics guidelines, which does not recommend such routine screening programs. The policy makers and stakeholders have to find out newer ways of screening and implementation for early identification of renal diseases in children.

The strength of the present study is that urine samples that came as positive were reconfirmed with another sample after 15 days. Those found positive for proteinuria and hematuria were informed and advised to follow-up in the hospital for further evaluation.

Limitations of the study

The cross sectional nature of study poses limitation. There was no possibility of follow-ups in this design.

CONCLUSION

Hematuria and proteinuria are present in asymptomatic children. Urinalysis is an effective, easy, and non-invasive screening method for early detection of an underlying renal disease. The policy makers have to find newer ways of screening implementation for early identification of renal diseases in children, which will have a great impact in reducing the disease burden at individual, family, and society levels.

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BSS- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of the study protocol, data collection, data analysis, manuscript preparation, and submission of article; **RH**- Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; **JS**- Design of study, statistical analysis, and interpretation; **CPL**- Review manuscript; **SR**- Review manuscript; **BSS**- Literature survey and preparation of figures; and **BSS**- Coordination and manuscript revision..

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