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Outcome of children with isolated microscopic hematuria without renal biopsy

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ABSTRACT

Introduction: Hematuria (presence of >5 RBCs/HPF) may be a transient outcome or indicator of significant renal disorder in children. Children with neither symptoms of a disease nor a physical abnormality who have microscopic hematuria should be placed in the category of isolated microscopic hematuria (IMH).
Objectives: The aim of this study was to evaluate the course of IMH.
Patients and Methods: This investigation is an observational study of 124 patients referred to pediatric nephrology clinic from 2002-2012 with IMH.
Results: In this study, 124 patients, 40 (32.3%) female and 84 (67.8%) male were evaluated. The mean age was 5.6±2.4 years. The mean follow-up time was 14.3 ± 14.4 months. This mean for 45.2% of the patients, was less than 6 months and for 4% of the patients, it was more than 4 years. The reasons for discovering hematuria were; 66.1% after routine evaluation, 21.8% due to positive family history and 12.1% after urinary tract infection (UTI). In this study, all the laboratory tests and kidney function were normal, except for the presence of microscopic hematuria.
Conclusion: It was concluded that IMH without renal failure, hypertension (HTN) and proteinuria is a benign condition with no need for kidney biopsy.

Original

Implication for health policy/practice/research/medical education:
We concluded that microscopic isolated hematuria without symptoms of renal failure, HTN and proteinuria is a benign condition with no need for kidney biopsy. However, the follow-up of these patients for signs and symptoms of renal impairment is strongly recommended.
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Introduction

In children, the presence of blood or protein in urine may be a transient finding that usually accompanies a nonspecific viral infection. However, it can sometimes be an indicator of glomerular or urinary tract disorder (1,2). Hematuria is a common presenting feature of diseases that cause damage to the glomerulus and it was estimated that its frequency varies from 0.18% to 16.1%, depending on the screening strategy used in the population studies (3-5).

RBC in urine can originate from any site along the urinary tract and may be gross or microscopic. It may originate from the renal tissue (glomeruli, renal tubules or interstitial area) or urinary tract (collecting system, ureters, bladder and urethra) (4,5).

Microscopic hematuria is commonly screened using the urinary dipstick test. A positive result usually prompts further examination (6).

Asymptomatic microscopic hematuria has many etiologies ranging from minor incidental findings to highly significant lesions that are immediately life–threatening (4,7,8).

The finding of the study in which children and young adults with persistent asymptomatic isolated microscopic hematuria (IMH) were evaluated is unclear (6), while only a few population based studies have addressed the long-term outcomes of this condition among children. Hence, this problem prompted the evaluation of children referred

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to the pediatric nephrology clinic due to IMH.

Objectives

Regarding the significant role of IMH in the early detection of kidney disease, this study was conducted to evaluate the clinical course of the disease in children.

Patients and Methods

This study is an observational study of 124 patients who were referred to the pediatric nephrology clinic from 2002-2012 with IMH.

IMH was defined as five or more RBC/HPF in three consecutive fresh urine specimens collected over a few weeks. When this condition is accompanied by normal renal function and without hypertension (HTN), proteinuria or family history of renal failure, IMH was applied for patients. Sonography was also done for patients. The data of patients such as laboratory tests (CBC, BUN, creatinine, Na, K, C3, C4, urine Ca/Cr, serum IgA, HBSAg and HCVAb), necessity for biopsy and mean time of follow-up were obtained from patient's chart. These tests were conducted every 6-12 months on the patients. The candidates for renal biopsy were patients who had persistent proteinuria, HTN, renal impairment and persistent complement decrease.

Ethical issues

1) The research followed the tenets of the Declaration of Helsinki, and was approved by the ethical committee of Kermanshah University of Medical Sciences.

Data analysis

The proportion of observations, mean, standard deviation (SD), minimum and maximum continuous variable, age, proportion and percentage of categorical data (reasons for discovering hematuria) and sex variable were calculated with descriptive statistics methods. These analyses were performed using SPSS software (version 18 for windows).

Results

This study evaluated 124 patients, 40 (32.3%) female and 84 (67.8%) male from 2002 to 2012 (Table 1). The age range was between 1 to 15 years (mean 5.6 ± 2.4 years). The mean follow-up time was 14.3 ±14.4 months. This mean for 45.2% of the patients, was less than six months and for 4% of the patients, it was more than 4 years.

Hematuria was found in 66.1% of the subjects after routine evaluation; in 21.8%, it was due to positive family history, and in 12.1%, it was after urinary tract infection (UTI) follow-up (Table 1).

None of the patients had abnormal laboratory test results, significant renal involvement or HTN at presentation and during follow-up. None of them also underwent renal biopsy.

Table 1. Data of patients

Factor		No.	%
Gender	Male	84	67.7
	Female	40	32.3
Reasons of discovering hematuria	After routine evaluation	82	66.1
	Positive family history	27	21.8
	Following urinary tract infection	15	12.1
Total		124	100

Discussion

IMH is a common clinical presentation and can indicate the presence of underlying genetic or serious kidney disease (3). However, the literature has not provided clear and sufficient guidelines on how to approach and counsel a child with asymptomatic IMH (2). Thus, a clinician should ensure that serious conditions are not missed while avoiding the unnecessary and expensive laboratory test, and necessary advise should be given for further evaluation wherever indicated (4).

In short-term, prognosis in the absence of proteinuria, high blood pressure or renal impairment is almost always excellent. However, long-term follow-up of such large proportion of patients indicates a significant increase in the lifetime risk of end-stage renal failure (3).

The most common indicator of abnormality of the urine is a positive or abnormal urine strip test for blood (9). This test is very sensitive and when used correctly, urine dipsticks have a sensitivity of 100% and specificity of 99% to detect 1-5 RBC/HPF (4). Then, confirmation of the presence of hematuria with microscopic examination is the most important step (9). The criteria of five or more RBC/HPF was generally used in three consecutive fresh un-centrifuged urine specimens collected over a few weeks to define microscopic hematuria (5,8,9). Microscopic hematuria can be accompanied by fever, malaise, non-urinary tract diseases (such as rash or arthritis) or urinary tract diseases (such as dysuria, frequency in urination and edema) clinical manifestations (6). The disorders responsible for such an association are infections, rheumatologic or immunological diseases, glomerular and interstitial diseases, lower urinary tract abnormalities, stones, tumors, vascular diseases, hematological disorders and medications (2,9). In some of these conditions, hematuria is directly related to a primary disorder and will disappear once the primary disease is cured (8,9).

A child who presents neither the symptoms of an illness nor a physical abnormality, who has a microscopic hematuria should be placed in the category of asymptomatic IMH (2,6,9).

In the current study, the cause of 12.1% microscopic hematuria was discovered after UTI evaluation, 21.8% were due to family history and 66.1% after routine evaluation.

Asymptomatic microscopic hematuria is common in the unselected population of children with a prevalence that ranges from 0.4% to 4.1%, depending on the criteria applied to define hematuria (9).

The present study, like some other investigations, revealed the benign course of IMH. For example, Emad Momtaz and Rahimi, in a study on 200 patients, evaluated the causes of hematuria. They concluded that

renal stone, UTI, hypocalcemia, urinary tract anomaly and glomerulonephritis were the most common cause of hematuria in these patients (13). Miller studied 342 children with asymptomatic hematuria. He concluded that in 274 (80%) of the patients, microscopic hematuria was not accompanied by a significant disease, whereas only two patients required renal biopsy (11). In another study, Park et al evaluated 1044 patients with proteinuria and hematuria. In this study, asymptomatic microscopic hematuria was detected in 60% of the patients. They conducted kidney biopsy only for patients who additionally had HTN, severe proteinuria or renal impairment (12). There are only a few population studies that provide important information regarding the presence of IMH. Therefore, the current study was conducted to evaluate the course of patients with IMH. In fact, the finding of microscopic hematuria alone in an asymptomatic child is merely an indication of repeat testing for one or more times. Additionally, further investigations should be carried out only after persistent hematuria is established over a period of 2-3 weeks (9,10).

Conclusion

The authors concluded that microscopic isolated hematuria without symptoms of renal failure, HTN and proteinuria is a benign condition with no need for kidney biopsy. However, the follow-up of these patients for signs and symptoms of renal impairment is strongly recommended.

Limitations of the study

Short term follow-up (less than 6 months) in 45% of the patients, is a considerable limitation of the study.

Authors' contribution

AS; study design, research proposal initiation and approval, and manuscript preparation, review of scientific content. MRT; manuscript preparation, review of scientific content. RMA; Data collection and writing of manuscript. MSS; Data collection and writing of manuscript. SK; statistical analysis.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

Conflicts of interest

The authors declared no competing interests.

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