Original Article

The Role of Specific Diet on the Treatment of Pediatric Asymptomatic Microscopic Hematuria; a Before and After Study

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*Corresponding Author Reyhaneh Koochaki, MD. Email: drreyhanehkoochaki@yahoo. com Abstract

Background and Aim: Asymptomatic microscopic hematuria (AMH) in children has been known as a troublesome clinical condition which demands a patient to visit a physician. This study aimed to investigate the role of a specific diet on the amelioration of AMH in children.

Methods: The current analysis was carried out in children ranging from 6 months to 14 years. This before and after research study was performed to evaluate the effects of certain diet on the treatment of pediatric AMH. Renal function tests, kidney ultrasonography and urinary assessments were performed and patients with AMH were enrolled in this query. Study group was ordered to consume a specific hypoallergenic diet. The number of urinary red blood cells was compared before and after diet. Data were analyzed using SPSS. A value of P < 0.05 was considered significant.

Results: Our special diet was effective in the treatment of stable microscopic hematuria in 72% of study group. Statistically, after a special diet, there was a significant decrease in the number of red blood cells in urine test (P <0.001).

Conclusion: Specific hypoallergenic diet was effective in treatment of AMH in children. Reducing urinary red blood cell counts has been linked to the effectiveness of diet in the management of stable microscopic hematuria.

Keywords: Asymptomatic Microscopic Hematuria; Child; Diet; Hypoallergenic.

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Introduction

Hematuria is one of the most momentous clinical manifestations, dating back in antiquity to more than a thousand years ago in Persian medicine (1,2). The presence of red blood cells (RBCs) in the urine which is categorized as a visible or microscopic hematuria is presumably associated with the kidney or urogenital tract disorders. The estimated prevalence of microhematuria, depending on different factors such as age, sex, type of test and genetic-based diseases, ranges from approximately 0.5% - 1% in children (3, 4). Korean report revealed a prevalence of 0.8% in school children for isolated

microscopic hematuria and Japanese query showed a prevalence of 0.15% in high school children (5,6). Therefore, Asymptomatic microscopic hematuria (AMH) is common in children, with a prevalence that ranges from 0.4% to 4.1% depending on the definition criteria.

AMH is considered as the presence of three or more red blood cells per high powered field (HPF) on urinalysis in the absence of an obvious pathologic cause (7, 8). Experts recommend that at least two of three urine tests indicate microscopic hematuria over a period of 2–3 weeks before performing further evaluations (8). Hematuria is believed to result from the glomeruli, renal tubules, interstitium, or the urinary tract which includes the collecting system, ureter, bladder, or urethra.

Hematuria is divided to glomerular and nonglomerular forms (9). It is supposed to be difficult to diagnose the duration and onset time of disease, since microscopic hematuria is accidentally noticed in routine checkups. Approximately 80% of patients with persistent, isolated microscopic hematuria have no identifiable symptom. In addition, important systemic disorders like systemic lupus erythematosus or Henoch-Schönlien Purpura nephritis which are considered as the symptoms of vasculitis contribute to the microscopic hematuria. Urolithiasis and crystalluria are other clinical etiologic factors for microscopic hematuria. It is also believed that inflammation. structural disruption, malignancy, and trauma lead to hematuria (10).

Moreover, it has been revealed that specific foods such as beets, blackberries and different vegetables or specific medications play key roles in differential diagnosis of microscopic hematuria.

As a whole, a good history and physical examination and initial assessment of urine for infection, proteinuria and RBC cast could be helpful in first step of management. Physicians should ensure that serious disorders are not overlooked, however, unnecessary tests are not performed (9,11).

Since the stable AMH is one of the major issues for patients referring to pediatric and pediatric nephrology clinics, no specific cause is found yet and most of the time, there is no specific therapeutic strategy for resolution of isolated microhematuria. AMH in the otherwise healthy child is a minimal health threat, rarely indicative of serious illness.

Moreover, it causes many concerns for families and increases the economic burden for both families and society. Responding to a diet can reduce the need for more evaluation, unnecessary therapies, and reduce the costs by families. In this regard, we aimed to investigate the efficacy of a specific diet with decrease some allergenic and gunk food on the treatment of pediatric microhematuria (12).

Methods

A before and after research study was performed to evaluate the effects of certain diet on the treatment of pediatric microhematuria. All patients (aging from 6 months to 14 years), referred to the nephrology clinic who were diagnosed with isolated microscopic hematuria without a specific stable cause in their laboratory and imaging tests, were involved in this survey. In order to have no particular problems, patients were evaluated for urinary tract infection and other kidney and urinary disorders. Urinalysis and urine culture, urine random for assessment of calcium to creatinine ratio, protein, uric acid and oxalate to creatinine ratio were done. Renal and urinary tract ultrasound. serum electrolytes, kidney function tests and estimation of glomerular filtration rate, serum complements levels (C3, C4 and CH50) and antinuclear antibody (ANA test) were performed to ruled out other underlying diseases.

Demographic characteristics of patients with initial laboratory findings were included in the information forms. We started a specific diet on all patients and restricted usual allergenic snacks in their regular food program. These patients had been monitored by a dietary restriction of junk snacks, salty food, chocolates, carbonated beverages and fast foods for at least 4 weeks. They then were asked to refer to clinic after first month. After this period, the effect of above-mentioned diet on their urinary red blood cell count was assessed and findings were recorded in the relevant patient information forms.

Data were analyzed using SPSS version 25. Quantitative variables were expressed as standard deviations. In order to assess the distribution of qualitative variables, One-Sample Kolmogorov-Smirnov Test was utilized. To analytical analysis, statistical test χ^2 , Fisher's test, t-test and were used. A value of P <0.05 was considered statistically significant.

Results

We evaluated a total of 122 pediatric patients with AMH. 66% of our study group were female. The mean age of children with stable microscopic hematuria was 2.5 ± 9.5 years with a range of 1- 14 years. Mean of their weight was 10.7 -22.6 kg with a range of 9-57.8 kg. The mean number of red blood cells in the first urinalysis was 7.4 - 12.6 per high power field (HPF) with a range of 6-45 per HPF. After a special diet, the mean number of red blood cells in the urine test was 4.2 ± 4 per HPF with a range of 0-20 per HPF. After initiation of specific diet microscopic

hematuria improved in 88 patients (72.13%). Statistically, after a special diet, there was a significant decrease in the number of red blood cells in urine test (P < 0.001) (Figure 1).



Figure 1. Comparison of the number of urine red blood cells in children with stable microscopic hematuria before and after a particular diet

Beneficial effects of a particular diet on the treatment of persistent microscopic hematuria in different genders were shown in figure 2. Statistically, the effectiveness of taking a particular diet was higher in boys with hematuria (P = 0.031).



Figure 2. Effectiveness of a specific diet in the treatment of stable microscopic hematuria in different genders

Discussion

Our results illustrated that, the prevalence of microhematuria was higher in female than male which is consistent with a study by Bignall et al (13).

After taking the specific diet, patients showed a significant reduction of RBC in their urine tests (P<0.001).

Many experts suggested closed follow-up for patients with AMH based on practical algorithms. In the final step it is recommended that the pediatric nephrologist participate in directing the further evaluation of the children with AMH persisting for more than 12 months (8).

In our study we revealed that many of patients with AMH had normal urinalysis test after a specific diet. It shows that asymptomatic microscopic hematuria could be a reaction of bladder and urinary tract mucosa to some kind of foods. A relationship between allergy especially food allergy and the development of proteinuria, hematuria and other kidney problems has been postulated, but never proven (14,15).

In this regarding Mansouri in her review article revealed relationship between eosinophilic cystitis and allergic disorders (16).

Graham et al reported a case with hematuria and allergy and suggested that allergy should be considered as a possible diagnosis in a child with unexplained hematuria (17).

On the other hands, Lelong et al reported 2 cases of children presenting with episodes of hematuria, frequently following attacks of asthma or allergic rhinitis. The authors recommended the need to carry out a search for AMH in patients with hyper reactive airway diseases (18). It shows a strong relationship between allergic events and hematuria which was noteworthy from researchers' point of view. In this regard Rivera et al showed a kind of sauce-induced hematuria in their report (19). The results of these studies show that pediatric AMH may be a reactive phenomenon due to some dietary or environmental allergenic or irritating factors. Further studies are need to prove these kind of theories.

Conclusion

In summary, we concluded that specific hypoallergenic diet may have an effective role in resolution of microhematuria in children and decrease the need for further evaluation and treatment in these stable asymptomatic patients.

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Conflict of Interest

The author declares no conflicts of interest.

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