

FACTORS ASSOCIATED WITH HAEMATURIA IN CHILDREN IN AGE GROUP OF 1 TO 14 YEARS

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ABSTRACT

Background: Haematuria is the most common urinary finding that bring children to the attention of the pediatric nephrologists. It can be caused by glomerular & non-glomerular diseases. The main causes of Haematuria are urinary tract infections, trauma to abdomen, acute post streptococcal glomerulonephritis and congenital hydronephrosis.

Objective: The objective of this study was to identify the distribution of factors in children with haematuria in age group of 1 to 14 years.

Methods: A total of 84 admitted patients of haematuria, who fulfill the inclusive criteria were enrolled in this study after consent from their parents. Each patient was evaluated through history, examination and investigated. Urine sample of each patient was analyzed for a microscopic examination. Investigations / imaging were performed in clinical laboratory of LGH / PGMI, Lahore. The collected information was entered into SPSS version 20, and analyzed.

Results: There were 47(44.05%) male and 37(55.95%) female patients in this study. The mean age of patients was 8.69 ± 3.63 years. We found 14 patients (16.66%) has urological anomalies, 6 boys have posterior urethral valves. 2 girls and one boy have vesicoureteral reflux. One boy and one girl have ureterovesical junction obstruction, one boy has hypospadias and 2 girls, ureteropelvic junction obstruction. History of recent bladder catheterization was seen in 5(5.59%), urinary tract infection 17(20.23%) and 14 patients has urological anomalies (16.66%).

Conclusion: According to this study, most common factors causing haematuria was urinary tract infection 17(20.23%) acute poststreptococcal glomerulonephritis 16(19.04%) and congenital urological anomalies 14(16.66%). Renal stones were found in 10(11.90%).

Keywords: Haematuria, infection, dysuria, Oliguria.

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INTRODUCTION

Haematuria is defined as more than 5 RBC per high power field in the sediment from 10 ml of centrifuged freshly voided urine. (Davis and Anver, 2004). It may be symptomatic or asymptomatic, and may be associated

with or without proteinuria and other urinary abnormalities. Haematuria is categorized, as either microscopic (detected only by dipstick and confirmed by microscopic examination), or macroscopic (visible to the naked eye). Urine could be tea-colored, pink or even red. More than 50% of children presenting with gross haematuria have a readily apparent cause. The main differential diagnosis is IgA glomerulonephritis, which is characterized by episodic macroscopic haematuria, proteinuria, hypertension, and progressive renal impairment in one third of individuals of Haematuria. (Savigne et al., 2001) Haematuria is a common presentation in children with vesicoureteric reflux in UTI. (Craig et al., 2000)¹.

Family history of diabetes is not a risk factor for Haematuria in children, as diabetes is not usually associated with renal anomalies. Haematuria can be caused by glomerular or non-glomerular diseases. The main causes of haematuria are, urinary tract infections. (Asharam et al., 2013, Craig and Hodson, 2014)¹⁻², trauma to abdomen, acute post streptococcal glomerulonephritis (White et al., 2001), and congenital abnormalities, e.g. hydronephrosis. Congenital posterior urethral polyp may cause haematuria and variety of nonspecific micturition abnormalities Jane et al(2013)³, IgA nephropathy(2014)⁴, hemolytic uremic syndrome and bleeding disorders may cause gross haematuria. Asymptomatic microscopic haematuria resulting from strenuous exercise has been well documented in association with a variety of contact and non-contact sports activities (Abarbanel et al., 1990). The disease in children younger than 5 year is most commonly due to congenital abnormalities, like obstructive uropathy and renal dysplasia. Most of the patients with congenital diseases usually present after one year of age or still patients are not investigated to find out cause of Haematuria. After 5 years of age, acquired diseases (different types of glomerulonephritis), hyperuricosuria, idiopathic hypercalciuria and familial disorders (juvenile nephro-nopothiasis, Alport syndrome) are main causes. (Nogt and Avner, 2004) Urinary calculi are uncommon in children but they may present with haematuria alone, i.e. no Colic.(Ali and Rifat, 2005)⁵ Pakistan in one such country that falls in the geographic zone of a stone belt nation and a high incidence of urinary stones has been reported throughout the country. (Abbasi, 1994) Factors associated with progressive renal disease with continuous structural, metabolic, genetic disorders, are hyper filtration injury, persistent proteinuria, systemic & intra renal hypertension, renal calcium phosphorus deposition, and hyperlipidemia. Jane et al(2013)³. The prevalence of macroscopic haematuria is about 1% and of microscopic haematuria is about 5%. Half of the patients will have underlying abnormality. About 10% children with microscopic haematuria have a urological malignancy. 35% will have an underlying tumour.(Ritchie et al., 1986). In clinical practice; dipstick urinalysis is most commonly used to detect haematuria in asymptomatic patient. Dipstick testing has 91 to 100% sensitivity and 65 to 99% specificity for haemoglobin detection. Renal biopsy is mandatory in unexplained haematuria (Ahmad and Tejani, 2010)⁶, if it lasts for about one year or if prognosis is unfavourable due to appearance of hypertension, significant proteinuria or persistent low level of serum complement (C3). If IgA nephropathy is suspected, immunofluorescence microscopy of renal biopsy specimen was performed. Haematuria is the end result of various disease processes; morbidity and mortality rates

are dependent on primary process that caused it. So, aim of this study was to evaluate the different factors, associated with haematuria, and if possible, any of these factors could be eliminated by treatment.

METHODS

This study was conducted from 1-01-2015 to 30-6-2015 in the paediatric department, Lahore General Hospital, Lahore. Eighty-four patients of haematuria admitted in the ward who fulfill the inclusion and exclusion criteria was included in the study. Patients of both sexes between 1-14 years of age having positive dipstick haematuria covering macroscopic as well as microscopic haematuria were included in study. Patients on dialysis and currently on any drug therapy (Anticoagulants) were excluded from study. It was convenient non-probability sampling. This was a descriptive study.

All the patient of haematuria admitted in the ward, which fulfill the inclusive criteria, was enrolled in this study after consent from their parents. Each patient after consent was clinically evaluated through history and examination and was investigated. Certain points were specifically noted like, fever, pain abdomen, pain during micturition, frequency and recent enuresis in older children. History of abdominal trauma and recent throat or skin infection was noted. Information regarding bladder catheterization recently and use of specific drugs e.g. cyclophosphamide or calculus in passed urine and family history of renal diseases was sought. Then detailed physical examination was performed. Urine sample of each patient was analyzed for a microscopic examination, following a positive dipstick test, as these are most conventional investigations available. More than 5 red blood cells per high power field in centrifuged urine were regarded as an indicator for further assessment. In addition to these, other investigation like complete blood count, urine culture, BUN, serum creatinine, coagulation studies, ASO titre, ANA titre, complement levels, different imaging studies, and renal biopsy was carried out as and when indicated. Investigations were performed in clinical laboratory of Lahore General Hospital / PGMI, Lahore and different imaging studies was carried out in radiology department of Lahore General Hospital / PGMI, Lahore. Renal biopsy was done in urology department of Lahore General Hospital / PGMI, Lahore, under ultrasound guidance under anesthesia. Specimen of renal biopsy was sent to pathology department of post graduate medical institute, Lahore. If IgA nephropathy is suspected, immunofluorescence of renal biopsy specimen was performed.

Further investigation was performed where appropriate. All this information was collected through a specific Performa.

The collected information was entered into spss statistical version 10.0, and analyzed. Qualitative data like gender and related factors was presented in form of f(%). Mean +S.D was used for quantitative data such as age of children. Chi-square / Fisher's exact test was applied to compare different factors of gender and various age groups (<4years, 4-8 and 8.1-14 years). P-value ≤ 0.05 was considered as significance.

After this study we was able to identify the most common and least factors associated with haematuria. After identification the preventive and curative measures can be adopted for prevention and management of haematuria.

Table-1: Descriptive statistics of patient's age (years), duration of heamaturia (days), height (cm), weight (kg.) And head circumference (cm)

| | Mean | Std. Deviation | Range | Minimum | Maximum |
|-------------------------------|--------|----------------|-------|---------|---------|
| Age (years) | 8.69 | 3.63 | 13 | 1 | 14 |
| Duration of heamaturia (days) | 11.51 | 9.94 | 38 | 2 | 40 |
| Height (cm) | 117.36 | 18.69 | 70 | 75 | 145 |
| Weight (kg.) | 23.78 | 8.27 | 24 | 14 | 38 |
| Head circumference(cm) | 47.8 | 4.85 | 17 | 35 | 52 |

A total of 69 (82.14%) patients presented with red color urine, Dysuria was seen in 60(71.43%) patents, abdominal pain was complained by 49(58.33%) and history of abdominal trauma was reported by 3(3.57%) patients only. In 61(72.62%) patients fever was observed, H/O of recent skin infection was seen in 13(15.48%), history of recent throat infection was seen in 65(77.38%) and recent bladder catheterization was seen in 5(5.95%) patients only. In 2(2.38%) patients, there was family history of renal disease. Systemic illness was also present in 14(16.67%) patients.

Joint pain, joint swelling, Oliguria, skin rashes and H/O of bleeding disorder was seen in 22(26.19%), 5(5.95%), 50(59.52%), 28(33.33%) and 6 (7.14%) patients only.

According to patients examination we found Jaundice in 39(46.43%), Petechiae in 12(14.29%), and Pigmentation in 21(25%).

Edema of periorbital was seen in 57(67.86%), Edema of Ankle in 12(14.29%) and Edema of generalized body was seen in 4(4.76%) of the patients.

Lymph nodes of cervical was present in 2(2.38%) and renal enlargement was seen in 4(4.67%) of the patients According to clinical investigations we found that Retic was present in 3(3.57%), Cellular cast was seen in 30(35.71%), RBC casts were seen in 64(76.19%) and WBC casts were seen in 23(27.38%) patients.

RESULTS

There were 47(44.05%) male and 37(55.95%) female patients. The mean age was 8.69 ± 3.63 years. All patients were taken with heamaturia having mean duration of disease as 11.51 ± 9.91 with minimum duration of 2 days and maximum duration of 40 days.

Their average weight and height was 23.78 ± 8.27 kg and 117.36 ± 18.69 cm. Mean head circumference of all patients was 47.8 ± 4.85 cm.

Table-2: Descriptive statistics of patient's presentation

| | No. of patients | Percentage |
|--------------------------------|-----------------|------------|
| Red Color urine | 69 | 82.14 |
| Dysuria | 60 | 71.43 |
| Abdominal Pain | 49 | 58.33 |
| History of abdominal Trauma | 3 | 3.57 |
| Fever | 61 | 72.62 |
| H/O. Recent skin infection | 13 | 15.48 |
| H/O Recent throat infection | 65 | 77.38 |
| Recent bladder catheterization | 5 | 5.95 |
| Family H/O renal disease | 2 | 2.38 |
| Systemic illness | 14 | 16.67 |
| Joint Pain | 22 | 26.19 |
| Joint Swelling | 5 | 5.95 |
| Oliguria | 50 | 59.52 |
| Skin rashes | 28 | 33.33 |
| H/O bleeding disorders | 6 | 7.14 |

Table-3: descriptive statistics of patient's examinations

| | N | Percent |
|-------------------------|----|---------|
| Jaundice | 39 | 46.43 |
| Petechiae | 12 | 14.29 |
| Pigmentation | 21 | 25.00 |
| Edema of Periorbital | 57 | 67.86 |
| Edema of Ankle | 12 | 14.29 |
| Edema of Generalized | 4 | 4.76 |
| Lymph nodes of Cervical | 2 | 2.38 |

DISCUSSION

Haematuria is a common problem in children and adolescents, and a significant disease burden and require prompt evaluation. Haematuria may be the first manifestation of a genitourinary disease, it may be difficult to establish a diagnosis even after evaluation by specialist. (Hanevold and Stapleton, 2012)⁷.

A study reported the mean age of patients was 10.7 years, and the male: female ratio, 1.14:1.0. (Spivacow et al., 2008)⁸ In current study, we found almost similar age and gender distribution i.e. there were 47(44.05%) male and 37(55.95%) female patients. The mean age was 8.69 ± 3.63 years.

Child evaluation with haematuria begins with a detailed history, physical examination, and urine analysis. This determine the level of haematuria (i.e., upper vs. lower urinary tract) and the urgency of the evaluation. In addition, special consideration should be given to family history, identify anatomic abnormalities and malformation syndromes, and gross haematuria. (Cohen and Brown, 2003)⁹.

According to a study, 48 patients(14%) had trauma; and 48 had UTI (14%), and 10 patient out of these also had urologic abnormalities. (Ahmad and Tejani, 2000)⁶. We found that H/O of recent bladder catheterization was seen in 5(5.59%), urinary tract infection 17 (20.23%) and 14 patients has urological anomalies (16.66%) patients only.

According Ahmed et al, from 342 patients, 45 (13%) had congenital urologic anomalies. Of these 45, 20 male and 2 female patients had vesicoureteral reflux, 10 boys was with posterior urethral valves, 7 boys and 1 girl had obstruction of ureteropelvic junction, 7 boys with proximal hypospadias, 2 boys and 1 girl with obstruction of ureterovesical junction, 2 boys and 1 girl with ureterocele, and 1 boy with caliceal diverticulum. Also, 18 patients (5%) had renal stones; 3 diagnosed with low-grade transitional cell carcinoma of bladder; and 1 with Wilms tumor. In 118 patients (34%; 95 boys and 23 girls), no etiological factor was present. (Ahmad and Tejani, 2000) ⁶. In our study, we found 14 patients (16.66%) has urological anomalies. All patients were in age group between 1 to 3 years. 6 boys have posterior urethral valves. 2 girls and one boy has vesicoureteral reflux. One boy and one girl has ureterovesical junction obstruction, one boy has hypospadias and 2 girls has ureteropelvic junction obstruction.

Another study reported that 1,044 school children were identified with haematuria with or without proteinuria during a mass school urine screening test and they were referred to pediatric nephrologists at 13 hospitals of Korea. These children had isolated haematuria (60.1%), isolated proteinuria (26.4%: transient, 19.6%; orthostatic, and 4.9%; persistent, 1.9%) or haematuria

and proteinuria combined (13.5%). The patient's history, examination, laboratory investigations, renal ultrasound and Doppler ultrasonography were performed. Renal biopsies were done in 113 children with severe proteinuria, hypertension, derranged renal function, chronic renal disease in family, different systemic diseases or with persistent haematuria with or without proteinuria for 12 months.(Park et al., 2005). According to our series 69(82.14%) patients presented with red color urine, Dysuria was seen in 60(71.43%) patents, abdominal pain was complained by 49(58.33%) and history of abdominal trauma was reported by 3(3.57%) patients only. In 61(72.62%) patients fever was observed, 2(2.38%) had family history. Systemic illness was also present in 14(16.67%) patients. Joint pain, joint swelling, Oliguria, skin rashes and H/O of bleeding disorder was seen in 22(26.19%), 5(5.95%), 50(59.52%), 28(33.33%) and 6 (7.14%) patients only. Patient's presentation in this study was comparable as reported by Park et al.

Musa K, et al reported that in a 7-year period between 1996 and 2003, eight patients (14.8%) had pancytopenia. Six patients with pancytopenia had *Brucella melitensis* isolated from blood cultures, and all of them had *Brucella* agglutination titers of at least 1:320. Fever was the most common manifestation and it was followed by malaise, anorexia, sweating, weight loss, and gastrointestinal symptoms. (Karakukcu et al., 2004)¹⁰ Our investigation included that mean Hb of patients was 9.97 ± 1.44 . Mean TLC, Neutrophils, Monocytes was 5908.33 ± 2807.70 , 114.30 ± 184.29 and 3.57 ± 2.84 respectively. Mean Lymphocytes and Eosinophil was 35.71 ± 11.63 and 2.556 ± 1.95 respectively. Mean Platelet count was 472750 ± 64.55 with minimum and maximum platelet counts 20000 and 2500000. Mean serum creatinine, Na, K, Ca was 1.70 ± 1.94 , 134.15 ± 5.15 , 4.54 ± 0.78 and 4.79 ± 2.83 respectively. According to patients examination we found Jaundice in 39(46.43%), Petechiae in 12(14.29%), and Pigmentation in 21(25%). Edema of periorbital was seen in 57(67.86%), Edema of Ankle in 12(14.29%) and Edema of generalized body was seen in 4(4.76%) of the patients. In our study pancytopenia was found in 4 children (4.47%). Results are not comparable with Musa K, et al study.

CONCLUSION

According to our study, the most common presentation and factors of heamaturia in our local paediatric population are, dysuria was seen in 60(71.43%) patients, abdominal pain was complained by 49(58.33%), fever 61(72.62%) and recent throat infection 65(77.38%). Oliguria was seen in 50(59.52%). According to patients examination we found Jaundice in 39(46.43%),

Petechiae in 12(14.29%), and Pigmentation in 21(25%). Edema of periorbital was seen in 57(67.86%), Edema of Ankle in 12(14.29%) and Edema of generalized body was seen in 4(4.76%) of the patients. In our study, most common factors causing haematuria was urinary tract infection 17(20.23%), acute poststreptococcal glomerulonephritis 16(19.04%) and congenital urological anomalies 14(16.66%). Renal stones were found in 10(11.90%).

ETHICAL APPROVAL

The study was approved by the Institutional Review Board of Postgraduate Medical Institute / Ameer-ud-Din Medical College/Lahore General hospital, Lahore. Dated: January 01, 2017.

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AUTHOR'S CONTRIBUTIONS

RHA: Manuscript writing, Data collection and Analysis

FL: Interpretation of data

AZ: Discussion, Reference writing

ASA: Literature Review, Critical review