

## Causes of Gross Hematuria in Patient at a Tertiary Care Hospital

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### ABSTRACT

**Objective:** To determine the causes of hematuria in patients coming to a tertiary care hospital.

**Patients and Methods:** This cross-sectional study was carried out at Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan. Data was collected over a period of six months (June 2016 to December 2016). Data of all the adult male and female patients presenting with complaint of gross hematuria during the period were gathered and analyzed for etiological profile.

**Results:** In the study the most common cause was urological malignancy, which was present in 29 (58%) of patients. This includes all the urological cancers. Among other causes, 11 (22%) patients had urolithiasis while 5 (10%) patients had gross hematuria due to trauma to renal tract. 3 (6%) males had hematuria due to enlarged vascular prostate and only 2 (4%) females had gross hematuria due to urinary tract infection.

**Conclusion:** Urological malignancy was the most common cause of gross hematuria, which is associated with male gender, older age and history of smoking. Other causes were urolithiasis, trauma, BPH and UTI. We recommend screening for malignant disease of all the patients presenting to the departments of urology with the complaint of gross hematuria.

**Key words:** Hematuria, Urolithiasis, Urological Malignancy

#### Author's Contribution

<sup>1-2</sup> Conception, synthesis, planning of research and manuscript writing

Interpretation and discussion

<sup>3-6</sup> Data analysis, interpretation and manuscript writing, Active participation in data collection.

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### Introduction

Hematuria is defined as the presence of more than five red blood cells/HPF in three consecutive urine samples, taken at least one-week apart.<sup>1</sup> Hematuria that is not explained by an obvious underlying condition is commonly seen in urological practice. In many such patients, particularly young adult patients, the hematuria is transient and with no consequence. On the other hand, there is an appreciable risk of malignancy particularly in

older patients (eg, over age 35 years) with hematuria, even if transient.<sup>2</sup> Presentation of gross hematuria can be overtly bloody, tea colored, smoky or microscopic.<sup>3</sup> Urinary tract malignancies (bladder, ureter and kidney) are distinct clinical entities. Hematuria is a common presentation in all these diseases.<sup>2</sup> Condition can be asymptomatic or symptomatic, transient or persistent; it may or may not be associated with proteinuria or other

**Table 1: Baseline characteristics of study population**

Baseline Characteristics	Number (n)	Percentage (%)	
Age (mean 44.8 ±17.2 years; range:17-78 years)	Upto 30 years	15	30
	31-50 years	14	28
	> 50 years	21	42
	Total	50	100
Gender	Males	40	80
	Females	10	20
	Total	50	100
	M:F	4:1	
H/o smoking	Smokers	24	48
	Non-smokers	26	52
	Total	50	100
Co-morbids	No comorbid	31	62
	Hypertension	7	14
	Diabetes	5	10
	Hypertension+ diabetes	4	8
	Cva	2	4
	Asthma	1	2
	Total	50	100
Duration of hematuria (mean 33.1 ±35.3 days; range:3-120 days)	Upto 2weeks	19	38
	2-4 weeks	13	26
	> 4 weeks	18	36
	Total	50	100

abnormalities.<sup>2-5</sup> Evaluation of the hematuria involves a detailed history, physical evaluation and imaging studies.<sup>6</sup> Presence of the clots in the urine is suggestive of extraglomerular cause.<sup>5</sup> Fever, abdominal pain and dysuria is associated with UTI. Recent abdominal injury may point towards hydronephrosis.<sup>3</sup> Glomerular disease presentation is early morning periorbital puffiness, weight gain, dark colored urine, edema and hypertension. Hematuria with glomerular causes is painless.<sup>7</sup> A recent history of skin or throat infection may suggest post infection glomerulonephritis.<sup>8</sup> Among adult's, joint pains, skin rash and prolonged fever are suggestive of collagen vascular diseases. In case of anemia, hematuria cannot be the sole cause, in such cases other factors must be counted on. In Henoch-Schonlein purpura and systemic lupus erythematosus, arthritis and rashes are a common

presentation. Information regarding exercises, menstruation, and bladder catheterization, recent intake of drugs or toxins or passage of a calculus may be helpful in differential diagnosis. Further family history of the Alports syndrome, CVD, polycystic disease and urolithiasis is critical for differential diagnosis.<sup>9</sup> Other denominators in the diagnosis of hematuria are age, sex and race. Hematuria is a sign and not a disease, though it may be an early presentation of urinary tract cancers, so clinicians should focus on the root cause identification and eradication.<sup>10</sup>

Currently, there is very limited data on etiological profile of hematuria in Pakistani Population. Present study was designed to gather data from urology department of tertiary care hospital. As there is an appreciable risk of malignancy particularly in older patients, the study will

help in devising departmental guidelines in order to identify those high risk patients at an earlier stage. Our main objective was to determine the causes of hematuria in adult Pakistani population.

### Patients and Methods

This cross-sectional study was carried out at Pakistan Institute of Medical Sciences (PIMS), Islamabad. Data was collected over a period of six months (June 2016 to December 2016). Study design was approved by the hospital ethical committee and informed consent was obtained from all study participants. Data of all the adult male and female patients coming to urology outpatient and emergency department of PIMS with the complaint of gross hematuria was gathered and analyzed for etiological profile. The patients underwent a comprehensive protocol of investigations. These include complete blood count, ESR, complete urine examination. Renal function was assessed with serum creatinine, blood urea, and serum electrolytes including potassium, sodium, calcium and phosphate. Results of urine cytology, urine culture, imaging studies and cystoscopy was also evaluated. Statistical software SPSS 22 was used for data analysis.

### Results

In this study we included 50 patients with gross hematuria, 40 (80%) patients were male and 10 (20%) were female, with a male to female ratio of 4:1. Age ranged from 17 years to 78 years with median 41.5 years. In the total sample size of 50, fifteen (30%) patients were less than 30 years while twenty-one (42%) were more than 50 years of age (Table 1). In the study most common cause was urological malignancy which was present in 29 (58%) of patients. This includes all the urological cancers.

Causes	n(%)
Urological malignancy	29(58%)
Urolithiasis	11(22%)
Uro-trauma	5(10%)
BPH	3(6%)
Urinary tract infection	2(4%)

Table 3: Gender based stratification

Causes	Male (n=40) n (%)	Female (n=10) n (%)
Urological malignancy	26 (89.7)	3 (10.34)
Urolithiasis	4 (80)	1 (20)
Uro-trauma	7 (63.6)	4 (36.4)
Urinary tract infection	0 (0)	2 (100)
BPH	3	-

In total, 11 (22%) patients had urolithiasis while 5 (10%) patients had gross hematuria due to trauma to renal tract, 3 (6%) males had hematuria due to enlarged vascular prostate and only 2 (4%) females had gross hematuria due to urinary tract infection (table 2). Urological malignancy was significantly associated with history of smoking; it was observed that 62.1% of the participants with urological malignancy were smoker while 37.9% were nonsmoker. Gender based stratification showed patients with urological malignancy were mostly males (n=26/29, 89.7%). Patients with uro-trauma and urolithiasis were also mostly males and patients with UTI were all females (Table 3). Age based stratification showed that most patients with urological malignancy were >50 years of age (n=17/29, 58.6%) and all patients with BPH (Benign prostatic hyperplasia) were also >50 years of age, most of the patients with uro-trauma were < 30 years of age (n=4/5, 80%) and all patients with UTI were < 30 years of age (Table 4).

### Discussion

In our study the most common cause was urological malignancy which was present in 29 (58%) of patients. This included all urological cancers. The urological malignancy remains the most common cause of gross hematuria in adults. Patel JV in a similar study reported that the most common differential diagnosis for both microscopic and gross hematuria in adults includes infection, malignancy, and urolithiasis.<sup>11</sup> Our study results reveal similar information. In another study on patients with asymptomatic microscopic hematuria, Yamamoto M, et al reported that of 236 patients over the age of 40,

**Table 4: Age based stratification**

Causes	Up to 30 years (%)	31-50 years (%)	>50 years (%)	Total (n)
Urological malignancy	1 (3.4)	11 (37.9)	17 (58.6)	29
Urolithiasis	8 (72.2)	3 (27.3)	0	11
Uro-trauma	4 (80)	0	1 (20)	5
BPH	0	0	3 (100)	3
Urinary tract infection	2 (100)	0	0	2

6.8% were found to have a genitourinary cancer, while 27.5% had other significant urologic disease. However, 52.1% of the patients had unknown etiology of microscopic hematuria and 13.6% had insignificant urologic lesions. Of the 72 patients under the age of 40 a positive diagnosis was made in 16 patients (22.2%).<sup>12</sup> The apparent differences in the rates of urological malignancy in their study (6.8%) and present study (58%) may be attributed to different patient inclusion criteria. They analyzed patients with asymptomatic microscopic hematuria while we analyzed patients with gross hematuria. Considering high level of malignancy rate in our study, we can safely assume, it may be the result of late presentation of the patients at our facility, where most of the time, the cases are referred from remote areas, when symptoms are aggressive and failure of standard symptomatic treatments at GP clinics. There can be a role of socio-economic situations in the country and current practicing trends can be a major factor, thus we recommend that in future these factors should be considered along with standard parameters so that a clearer and multidimensional picture can be assessed. In another local study conducted in department of urology, Mayo Hospital, Lahore it was concluded that 54% patients with gross hematuria had malignancy.<sup>13</sup> A study conducted in Srilanka by Goonewardena SA *et al* showed that bladder cancer (Urological malignancy) remains the commonest cause of gross hematuria in patients above 40 years of age.<sup>14</sup> Our results are quite comparable with these national and international studies as we have also concluded that the urological malignancy remains the common cause of the gross hematuria in our setup (58%).

In the study of society statistics of hematuria done in 2002-2003, in hospital episode statistic department of health, England 2002-2003, 65% men and 35% women consulted for management of gross hematuria. In hospital episode statistic, department of health England 2002-2003, hematuria occurred in 15-59 years old group in about 44% of the patients and in the same study 24% of the people were above 75 years of age.<sup>15</sup>

Among total 29 (58%) patients having urological malignancy, 26 (89.7%) were males and only 3 (10.3%) were females. In a study conducted in wine wells hospitals and Medical School and University of Dundee, Scotland, UK it was concluded that 25% of patients presenting with frank hematuria had malignancy and in the same study, it was also concluded that males were more likely than females to have malignancy.<sup>16</sup> Studies conducted at Mc Gill University, Canada and in USA, showed that primary health care providers are over using routine urine analysis in the absence of clear indications. While at the same time referral ratio for specialist investigation is lower. These studies concluded that cases of hematuria shall be looked carefully and possibility of the serious conditions like urological malignancy should not be ignored.<sup>17,18</sup>

Contrary to above mentioned studies, a large scale study showed that microscopic hematuria among patients of age < 40 can be first assessed by nephrologist due to low risk of malignancy.<sup>19</sup> A retrospective study concluded that patient above age 40 and >25 RBC's/HPF are at greater risk of urological malignancy.<sup>19</sup> The cigarette smoking has got a definite relationship with urinary tract malignancies. In our studies, 29 (58%) of the patients and urological malignancy among them 18 (62.1%) patients were smokers. Smoking is the most common and important cause of urological malignancy. The study conducted by Amlung CL.<sup>20</sup> It was proven that cigarette smoking remains the most important cause of bladder cancer. In another study, the cigarette smoking was found as single most important cause of urinary bladder.

Our study results showed that the second common cause was urolithiasis, which was found in eleven (22%) patients. Similar findings were reported by Irfan *et al*<sup>13</sup> and Goonewardena *et al*<sup>14</sup>. Our study results show that the third common cause was urological trauma found in 4/5 (80%) of males and 1/5 (20%) of females. The trauma

was common in younger age group. Similar findings were reported by Tarik K <sup>21</sup> that gross hematuria is present in all patients having renal trauma. Shabir M <sup>22</sup> reported that renal trauma was more common in 21-40 years of age and among males (78%) which is similar to our study results.

## Conclusion

Urological malignancy is the most common cause of gross hematuria, which is associated with male gender, older age and history of smoking. Other causes include urolithiasis, trauma, BPH and UTI.

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