DOI: https://doi.org/10.53350/pjmhs02024181396

ORIGINAL ARTICLE

Urological Carcinomas in Patients Presenting with Gross Haematuria: A Retrospective Study of 155 Cases

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ABSTRACT

Background: Gross haematuria is a significant clinical symptom that often indicates urological malignancy, including bladder cancer, renal cell carcinoma (RCC), and urothelial carcinoma of the renal pelvis and ureter. Early identification and diagnosis are crucial for optimal treatment outcomes. This study aims to investigate the types of urological malignancies in patients presenting with gross haematuria.

Methods: A retrospective analysis of 155 patients who presented with gross haematuria between January 2017 and October 2023 was conducted. Clinical, imaging, and histopathological data were reviewed for the diagnosis of urological malignancies.

Results: Bladder cancer was the most common malignancy (49%), followed by RCC (30%) and urothelial carcinoma of the renal pelvis (14%). Cystoscopy and CT urography were the primary diagnostic modalities. Smoking and occupational exposure were significant risk factors. Logistic regression identified smoking as the strongest predictor of bladder cancer.

Conclusion: Gross haematuria is a key symptom that should lead to early and thorough evaluation for urological cancers, particularly bladder cancer. Timely use of imaging and cystoscopy improves diagnostic accuracy.

Keywords: gross haematuria, urological carcinoma, bladder cancer, renal cell carcinoma, urothelial carcinoma, diagnostic modalities

INTRODUCTION

Gross haematuria (visible blood in the urine) is a major clinical symptom in urological practice and often signals a potential malignancy, particularly in the bladder, kidneys, or ureters. Bladder cancer is the most common cancer associated with haematuria, followed by renal cell carcinoma (RCC) and urothelial carcinoma of the renal pelvis and ureter[1]. The presence of visible haematuria in patients warrants a thorough investigation, including imaging studies and cystoscopy, to identify the underlying cause, as it could be an early indicator of malignancy[2].

The association of haematuria with urological malignancies is well documented. In a large cohort study, bladder cancer was found to account for approximately 70% of all malignancies in patients presenting with gross haematuria[3]. Other cancers, such as RCC and urothelial carcinoma, although less common, can also present with this symptom, often in more advanced stages[4]. A number of risk factors, such as smoking, occupational exposure, and family history, have been implicated in the development of these cancers[5,6].

Bladder cancer, in particular, is often associated with a high recurrence rate and poor prognosis in advanced stages, making early detection through routine screening and diagnostic investigations essential[7]. RCC, although less frequently associated with haematuria, is another common malignancy, with a significant portion of patients presenting with gross haematuria in the later stages of the disease[8]. Urothelial carcinoma of the renal pelvis and ureter, though rare, requires careful consideration when evaluating patients with gross haematuria, especially in those with known risk factors[9].

Given the importance of early detection for improved outcomes, this study aims to explore the prevalence and risk factors of urological carcinomas in patients presenting with gross haematuria and to assess the effectiveness of current diagnostic methods in detecting these malignancies.

METHODOLOG

This retrospective cohort study reviewed clinical data from 155 patients who presented with gross haematuria between January 2017 and October 2023 at a Shahida Islam Teaching Hospital Lodhran and Renal Transplant Unit, Dow University Hospital, Karachi. All patients underwent a standard diagnostic evaluation, including clinical history, urinalysis, imaging studies, cystoscopy, and biopsy where appropriate.

Inclusion Criteria:

- Patients aged 18 years and older
- Presentation with gross haematuria
- Complete medical records available for review

Exclusion Criteria:

- Known benign causes of haematuria such as urinary tract infections or renal stones
- Incomplete medical records or lack of a final diagnosis

Diagnostic Approach:

Each patient underwent:

- Urinalysis to evaluate for infection, haematuria, or other abnormalities.
- CT Urogram and/or Ultrasound to assess renal masses, stones, and abnormalities in the upper urinary tract.
- Cystoscopy for suspected bladder cancer or other lower urinary tract abnormalities.
- Biopsy for histopathological confirmation when required.

Statistical Analysis: Descriptive statistics were used to summarize patient characteristics, malignancy distribution, and diagnostic findings. Logistic regression analysis was performed to identify the risk factors most strongly associated with urological malignancies.

RESULTS

A total of 155 patients presented with gross haematuria. The mean age of the cohort was 63 years (range 42-82 years). Of these, 108 patients (70%) were male and 47 (30%) were female. The gender distribution reflected a higher incidence of gross haematuria in men, which aligns with established trends, especially in bladder cancer and RCC.

In the results of this study, bladder cancer emerged as the most prevalent urological malignancy, accounting for 49% of the cases, with patients primarily presenting with painless gross haematuria, often linked to a history of smoking. Renal cell

Received on 06-11-2023
Accepted on 25-12-2023

carcinoma (RCC) was diagnosed in 30% of patients, presenting with intermittent haematuria, flank pain, and a palpable mass, most commonly in males with risk factors such as smoking and obesity. Urothelial carcinoma of the renal pelvis and ureter was found in 14% of patients, typically diagnosed in individuals with a history of smoking or occupational chemical exposure, presenting with haematuria and occasional flank pain**.** Prostate cancer, though less common, was identified in 8% of patients, often in advanced stages, causing haematuria due to tumor invasion into the bladder or urethra. These findings underscore the importance of thorough diagnostic evaluation for urological malignancies in patients with gross haematuria, with bladder cancer remaining the most common cause.

Table 1: Demographic Characteristics

Characteristic	Number (N=155)	Percentage (%)
Age (mean ± SD)	63 ± 12 years	-
Male	108	70%
Female	47	30%
Smoking History	80	52%
Occupational Exposure	53	34%
Family History of Urological Cancer	23	15%

Table 2: Distribution of Urological Malignancies

Cancer Type	Number of Cases (N=155)	Percentage (%)	Gender Distribution	Mean Age
Bladder Cancer	76	49%	Male: 70%, Female: 30%	63 years
Renal Cell Carcinoma (RCC)	46	30%	Male: 75%, Female: 25%	65 years
Urothelial Carcinoma (Renal Pelvis/Ureter)	21	14%	Male: 60%, Female: 40%	60 years
Prostate Cancer	12	8%	Male: 100%	70 years

Among the 155 patients, smoking was the most prevalent risk factor, affecting 52% of patients (n=80), consistent with previous studies linking smoking to bladder cancer and RCC (11). Occupational exposure to carcinogenic chemicals was noted in 34% of patients (n=53), including those working in industries such as textiles, rubber, and dyes. A family history of urological cancer was reported in 15% of the patients (n=23), highlighting the genetic predisposition to these malignancies (12).

Table 3: Risk Factors for Urological Carcinomas

Risk Factor	Number (N=155)	Percentage (%)
Smoking	80	52%
Occupational Exposure	53	34%
Family History of Urological Cancer	23	15%

Logistic Regression Analysis: A logistic regression model was applied to identify the factors most strongly associated with bladder cancer. Smoking was found to be the most significant predictor, with an odds ratio (OR) of 3.5 (95% CI: 2.1-5.7). Occupational exposure was also a significant predictor of urothelial carcinoma, with an OR of 2.3 (95% CI: 1.5-3.8).

Table 4: Logistic Regression Analysis of Risk Factors for Bladder Cancer

Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)
Smoking	3.5	2.1-5.7
Occupational Exposure	2.3	1.5-3.8
Family History of Urological Cancer	1.2	0.6-2.3

DISCUSSION

This study examined the incidence and characteristics of urological carcinomas in patients presenting with gross haematuria. The findings indicate that bladder cancer is the most common malignancy in this cohort, accounting for nearly half of the cases. Renal cell carcinoma (RCC) and urothelial carcinoma of the renal pelvis were also significant causes of gross haematuria. These results are consistent with prior studies, which report bladder cancer as the leading cause of haematuria[13], while RCC and urothelial carcinoma remain less frequent but still relevant diagnoses[14].

Bladder cancer remains the most common cause of gross haematuria in this cohort, reflecting the well-established association between haematuria and bladder malignancy. Risk factors such as smoking and occupational exposure to carcinogenic substances are strongly linked to an increased risk of bladder cancer[15]. The logistic regression analysis showed that smoking was the most significant predictor of bladder cancer, with an odds ratio of 3.5. This aligns with findings from large-scale epidemiological studies that emphasize smoking as a major risk factor for bladder malignancy[16,17].

Although less common than bladder cancer, RCC was diagnosed in 30% of patients in our cohort. Gross haematuria in RCC is often intermittent, and patients may not seek medical attention until the disease has advanced[18]. Our study emphasizes the importance of imaging, particularly CT, in detecting RCC early, especially when patients present with haematuria. The role of smoking and obesity in increasing RCC risk has been well-documented[19]. Early nephrectomy is recommended for localized RCC, while systemic therapies are available for advanced stages[20].

Urothelial carcinoma of the upper urinary tract, although rare, accounted for 14% of cases in our study. This highlights the importance of considering this diagnosis in patients with risk factors for urological malignancy, particularly those with exposure to carcinogenic chemicals[21]. Urothelial carcinoma in the renal pelvis can be difficult to diagnose without advanced imaging techniques such as CT urography or MRI[22].

This study underscores the importance of a thorough diagnostic workup for patients presenting with gross haematuria. Cystoscopy and CT urography are invaluable tools in diagnosing bladder cancer and RCC, respectively[23,24]. Additionally, early intervention and appropriate staging are critical for improving patient outcomes, especially in bladder cancer and RCC, where survival rates decrease with advanced disease[25,26].

CONCLUSION

This study highlights the critical role of gross haematuria as a clinical presentation in patients with urological malignancies. Bladder cancer was found to be the most common cause of haematuria, followed by renal cell carcinoma (RCC) and urothelial carcinoma of the renal pelvis and ureter. Smoking was identified as the most significant risk factor for bladder cancer, with occupational exposure also playing a key role in the development of urological cancers.

Our findings emphasize the importance of early detection through comprehensive diagnostic workup, including cystoscopy, CT urography, and biopsy, to confirm the diagnosis. The use of logistic regression analysis identified smoking as a key predictor for bladder cancer, further reinforcing the need for targeted prevention strategies in high-risk populations.

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This article may be cited as: Pansota MS, Hamid RB, Khan A, Junaid M, Bazai AK, Khan J: Urological Carcinomas in Patients Presenting with Gross Haematuria: A Retrospective Study of 155 Cases. Pak J Med Health Sci, 2023; 18(1): 396-398.