DOI: https://doi.org/10.54393/pjhs.v6i5.2847

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 05 (May 2025)

Original Article

OPEN ACCESS

Urological Carcinomas in Patients Presented with Gross Hematuria

Muhammad Asif[1], Mumtaz Ali Chandio[2], Obaid Ur Rehman[3], Safiullah[4], Fazli Akbar[5], R.A Mughal[6] and Rafiullah[7*]

[1]Department of Urology, District Headquarter Teaching Hospital, Mardan, Pakistan
[2]Department of Urology, Peoples University of Medical and Health Sciences for Women, Shaheed Benazirabad, Pakistan
[3]Department of Urology, Ali Fatima Hospital, Lahore, Pakistan
[4]Department of Urology, Chandka Medical College, Larkana, Pakistan
[5]Surgical A Ward Saidu Group of Teaching Hospital, Swat, Pakistan
[6]Department of Urology, Benazir Bhutto Hospital, Rawalpindi, Pakistan
[7]Department of Urology, Rizwan Medical Center, Peshawar, Pakistan

ARTICLE INFO

Keywords:
Gross Hematuria, Urological Carcinoma, Urinary Tract Infection, Cystoscopy

How to Cite:
Asif, M., Chandio, M. A., Rehman, O. U., Safiullah, ., Akbar, F., Mughal, R., & Rafiullah, . (2025). Urological Carcinomas in Patients Presented with Gross Hematuria: Urological Carcinomas with Gross Hematuria.Pakistan Journal of Health Sciences, 6(5), 231-235. https://doi.org/10.54393/pjhs.v6i5.2847

Corresponding Author:
Rafiullah
Department of Urology, Rizwan Medical Center, Peshawar, Pakistan
rafiullah.afridi@gmail.com

Received Date: 7th February, 2025
Revised Date: 28th April, 2025
Acceptance Date: 25th May, 2025
Published Date: 31st May, 2025

ABSTRACT

Gross hematuria is a common urological symptom associated with both benign and malignant conditions. It is often a presenting feature of urological carcinomas, necessitating timely evaluation and diagnosis to improve outcomes. **Objectives:** To determine the prevalence of urological carcinomas and assess their association with demographic and clinical variables among patients presenting with gross hematuria. **Methods:** This descriptive cross-sectional study was conducted at the DHQ Teaching Hospital Mardan (KP) from July 2024 to January 2025. A total of 209 patients presenting with gross hematuria were included. Detailed demographic and clinical data, including age, gender, family history of cancer, anticoagulant use, urinary tract infections, history of stones, and prior urological surgeries, were recorded. All patients underwent urine cytology, ultrasound, X-ray KUB, computed tomography (CT) scan, and cystoscopy when required. Data analysis was performed using SPSS-25, and the Chi-square test was applied to determine associations. **Results:** Urological carcinoma was diagnosed in 41 (19.6%) patients. Higher prevalence was observed in older age groups (24.6% in 60–80 years) but showed no significant association with gender (p=0.333) or other clinical variables such as urinary tract infections (p=0.527) and anticoagulant use (p=0.997). Benign causes, including urinary tract infections (17.8%) and trauma, were common. **Conclusions:** It was concluded that urological carcinomas were prevalent in patients with gross hematuria, particularly in older age groups, highlighting the need for structured diagnostic evaluations. Early imaging, cytology, and cystoscopy are recommended to differentiate malignant from benign causes and improve outcomes.

INTRODUCTION

Gross hematuria, defined as visible blood in the urine, is a clinically significant symptom that warrants urgent urological evaluation. While it may result from benign conditions such as urinary tract infections (UTIs), nephrolithiasis, or trauma, it is also a cardinal sign of urological malignancies, including bladder cancer, renal cell carcinoma (RCC), and upper tract urothelial carcinoma (UTUC) [1, 2]. Distinguishing between benign and malignant causes is essential, as a substantial proportion of patients presenting with gross hematuria are ultimately diagnosed with cancer. Epidemiological studies have consistently demonstrated a strong association between gross hematuria and urological malignancies. In a Spanish cohort attending a dedicated hematuria clinic, bladder tumors were identified in 31.5% of patients [1]. Similarly, a South African study found malignancy in 20% of patients evaluated for visible hematuria, with bladder cancer being the most prevalent diagnosis [2]. These findings highlight

DOI: https://doi.org/10.54393/pjhs.v6i5.2847

the necessity of a thorough and timely investigation in all patients presenting with this symptom, regardless of apparent risk factors. Current diagnostic guidelines recommend a multimodal approach combining urine cytology, cystoscopy, and imaging studies. Among imaging modalities, computed tomography urography (CTU) is widely considered the gold standard for upper urinary tract evaluation due to its superior sensitivity and specificity compared to ultrasound [3]. A 2023 study comparing CTU with ultrasonography confirmed CTU's superior diagnostic accuracy in identifying both benign and malignant causes of hematuria [4]. Despite these advancements, the clinical presentation of urological malignancies can be deceptive. Upper tract urothelial carcinoma may mimic inflammatory or infectious conditions, leading to diagnostic delays [5]. Additionally, rare benign conditions such as bladder amyloidosis can radiographically resemble cancer, reinforcing the need for histological confirmation before treatment decisions are made [6]. Risk stratification remains a cornerstone of hematuria assessment. Well-established predictors such as advanced age, male gender, and smoking history have been repeatedly linked to increased cancer risk [7]. However, recent studies also emphasize that malignancies may occur in patients without traditional risk factors, suggesting that reliance on demographic risk profiles alone is insufficient [8]. Moreover, rare but clinically important scenarios, such as synchronous malignancies involving both RCC and UTUC, have been documented, supporting the use of a comprehensive diagnostic approach [9]. Although uncommon, urothelial carcinoma can even present in pediatric patients, and cases of painless gross hematuria in children have been reported as initial indicators of malignancy [10]. Furthermore, gross hematuria related to anticoagulant use may obscure serious pathology, requiring careful clinical judgment to distinguish medication effects from underlying malignancy [11]. Other rare causes, such as uretero-iliac artery fistulas, particularly in patients with prior pelvic surgery or radiotherapy, also exemplify the broad differential diagnoses in gross hematuria [12]. These diverse clinical scenarios underscore the importance of a standardized, multidisciplinary approach. The establishment of specialized hematuria clinics and adherence to structured diagnostic pathways have been shown to improve early cancer detection, reduce delays in management, and ultimately enhance patient outcomes [13]. Given the substantial proportion of urological carcinomas diagnosed in patients presenting with gross hematuria, early detection and timely intervention remain critical for improving prognosis and survival outcomes. Despite advancements in diagnostic technologies, delays in identifying malignancies, particularly in high-risk groups, continue to pose challenges.

This study aims to evaluate the prevalence of urological carcinomas and assess their association with demographic and clinical variables. The findings are expected to provide evidence for refining diagnostic pathways, enhancing risk stratification, and improving early detection strategies in patients presenting with gross hematuria.

METHODS

This descriptive cross-sectional study was conducted to determine the prevalence of urological carcinomas and assess their association with demographic and clinical variables among patients presenting with gross hematuria. The study took place at the Department of Urology, District Headquarters (DHQ) Teaching Hospital, Mardan (Khyber Pakhtunkhwa), over seven months from July 2024 to January 2025. Before initiation, ethical approval was obtained from the hospital's institutional review board (Approval No. 1309). All participants were informed about the nature and purpose of the study, and written consent was obtained. Participant confidentiality and data privacy were strictly maintained. The sample size was calculated using a previously reported prevalence rate of 16.17% for urological carcinomas among patients with gross hematuria, as documented by Soomro et al., [14]. Using Open Epi (Version 3.01), with a 95% confidence level, 5% margin of error, and an assumed power of 80%, the required sample size was calculated to be 209 patients. A non-probability consecutive sampling technique was employed to enroll patients who fulfilled the inclusion criteria and presented during the study period. Inclusion criteria consisted of patients of either gender, aged 18 years and above, who presented with visible (gross) hematuria and consented to participate. Patients with microscopic hematuria were excluded from the study to maintain a clinically homogenous population. Gross hematuria is more strongly associated with underlying malignancies and is more likely to prompt immediate urological evaluation, whereas microscopic hematuria often results from benign causes and follows a different diagnostic protocol. Additionally, patients with bleeding disorders unrelated to urological conditions and those who declined to participate were excluded from the study. Demographic and clinical data were collected using a structured questionnaire. Variables recorded included age, gender, duration of hematuria, family history of urological carcinoma, history of urinary tract infections, previous urological surgeries, use of anticoagulant medication, and history of urinary stones. All patients underwent a standardized diagnostic evaluation, including urine cytology for detection of malignant cells, ultrasound or CT scan for identification of structural abnormalities, and cystoscopy when indicated for direct visualization of the bladder. Biopsy and histopathological confirmation were obtained in suspected cases of malignancy. The primary

DOI: https://doi.org/10.54393/pjhs.v6i5.2847

outcome of the study was the presence or absence of urological carcinoma, while secondary outcomes included the distribution of carcinoma types (e.g., bladder, renal, ureteral, or urethral cancer) and their relationship with clinical variables. Data were entered and analyzed using SPSS version 25. The normality of continuous variables such as age was assessed using the Shapiro-Wilk test. Since age was found to be normally distributed, it was expressed as mean ± standard deviation. Categorical variables were summarized as frequencies and percentages. Associations between clinical variables and carcinoma presence were evaluated using the Chi-square test. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 209 patients presenting with gross hematuria were included in the study. The mean age of the participants was 50.70 ± 17.95 years, and the mean duration of gross hematuria was 30.21 ± 18.04 days. Urological Carcinomas were found in 41 (20%) patients. (Figure 1).

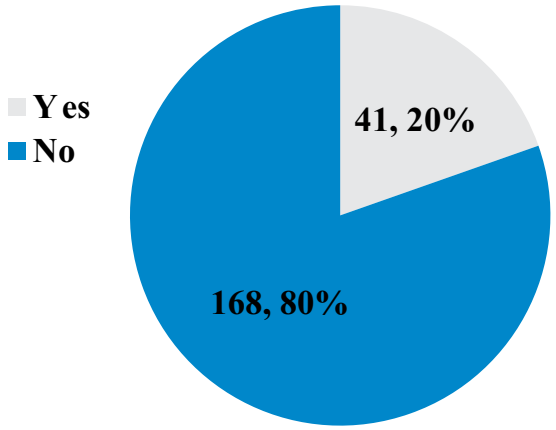

Figure 1: Frequency of Urological Carcinomas

In this study, the presence of urological carcinoma was analyzed about various demographic and clinical variables among 209 patients. Carcinoma was more frequently observed in older age groups, with 17 (24.6%) cases occurring in patients aged 60–80 years, compared to 16 (20.5%) in the 40–59 years' group and 8 (12.9%) in the 20–39 years' group. However, this difference was not statistically significant (p=0.233). Gender distribution showed that 22 (22.4%) female and 19 (17.1%) male had carcinoma, but this difference also lacked statistical significance (p=0.333). Similarly, no significant association was found between a family history of cancer and carcinoma, as 20 (17.7%) patients with a family history and 21 (21.9%) without it had carcinoma (p=0.449). The use of anticoagulants did not influence carcinoma rates, with 20 (19.6%) of patients using anticoagulants and 21 (19.6%) not using anticoagulants being affected (p=0.997). Urinary tract infection history was also unrelated to carcinoma, with 18 (17.8%) of patients with a history of UTI and 23 (21.3%) of those without it having carcinoma (p=0.527). Similarly, a history of urinary stones showed no significant impact, with carcinoma present in 20 (19.0%) patients with stones and 21 (20.2%) without stones (p=0.835). Previous urological surgeries were also not associated with carcinoma, as 20 (18.5%) of patients with surgery and 21 (20.8%) without surgery had carcinoma (p=0.679). Overall, none of the analyzed variables demonstrated a statistically significant association with the presence of carcinoma, suggesting that other unmeasured factors or larger sample sizes may be required to identify meaningful trends (Table 1).

Table 1: Association of Demographic and Clinical Variables with Presence of Urological Carcinoma (n=209)

Variables	Presence of Carcinoma (Yes)	Presence of Carcinoma (No)	Total	p-value
Age Group				
20–39 Years	8 (12.9%)	54 (87.1%)	62	0.233
40–59 Years	16 (20.5%)	62 (79.5%)	78	
60–80 Years	17 (24.6%)	52 (75.4%)	69	
Gender				
Female	19 (17.1%)	92 (82.9%)	111	0.333
Male	22 (22.4%)	76 (77.6%)	98	
Family History of Cancer				
Yes	20 (17.7%)	93 (82.3%)	113	0.449
No	21 (21.9%)	75 (78.1%)	96	
Use of Anticoagulants				
Yes	20 (19.6%)	82 (80.4%)	102	0.997
No	21 (19.6%)	86 (80.4%)	107	
Urinary Tract Infection				
Yes	18 (17.8%)	83 (82.2%)	101	0.527
No	23 (21.3%)	85 (78.7%)	108	

DOI: https://doi.org/10.54393/pjhs.v6i5.2847

History of Stones				
Yes	20 (19.0%)	85 (81.0%)	105	0.835
No	21 (20.2%)	83 (79.8%)	104	
Previous Urological Surgery				
Yes	20 (18.5%)	88 (81.5%)	108	0.679
No	21 (20.8%)	80 (79.2%)	101	

Note: p-values were calculated using the Chi-square test to assess associations between clinical variables and the presence of urological carcinoma.

DISCUSSION

This study observed a 20% prevalence of urological carcinomas among 209 patients with gross hematuria, without statistically significant associations with age, gender, family history, anticoagulant use, urinary tract infections, urinary stones, or prior urological surgeries. These findings are consistent with, and in some cases diverge from, recent literature on this topic. Our carcinoma prevalence aligns with findings from Hamid *et al.*, who reported a 17.06% prevalence in 170 patients presenting with gross hematuria [15]. Similarly, Rashidullah *et al.*, found an 18.6% prevalence, also emphasizing that UTIs and trauma were the most common non-malignant causes of hematuria [16]. These results support the notion that gross hematuria is a key clinical indicator for further investigation of potential malignancy. Although carcinoma was more frequent in older age groups in our study, this trend was not statistically significant. In contrast, Rai *et al.*, conducted a systematic review and found age to be a consistent risk factor for urothelial malignancies, particularly bladder cancer [17]. Likewise, Takeuchi *et al.*, reported that age strongly correlates with risk, highlighting the need for risk stratification models that incorporate age more effectively in clinical pathways [18]. Gender was not a significant factor in our study, but other recent research suggests otherwise. Khadhouri *et al.*, in the large multicenter IDENTIFY study, demonstrated male sex as a significant predictor for bladder cancer [19]. Rai *et al.*, also identified higher risks among males, attributing it partly to increased smoking rates and occupational exposures [17]. We found no significant association between family history and cancer, a finding that contrasts with recent findings. The Mayo Clinic cohort study by Takeuchi *et al.*, emphasized family history as an important predictive variable, especially for renal and urothelial cancers [18]. Similarly, our data did not show a difference in carcinoma rates based on anticoagulant use. This is consistent with Ryšánková *et al.*, who found that neither anticoagulants nor antiplatelet therapies significantly increased the risk of urological cancers in hematuria patients [20]. Their study of 562 patients revealed that malignancy risks were consistent across medicated and non-medicated groups. The lack of association between UTI history and carcinoma in our cohort supports the observations by Rai *et al.*, who found that UTI history was more prevalent in benign cases [17]. Khadhouri *et al.*, also noted that previous UTI history was associated with a lower likelihood of malignancy in their predictive model [19]. Our study found no link between urinary stones or prior surgeries and cancer risk. This agrees with findings from Rashidullah *et al.*, who observed that although urinary calculi were common in their cohort, they did not significantly correlate with malignancy presence [16]. More broadly, our results reinforce recent calls for multifactorial diagnostic tools. The IDENTIFY study [19] and newer algorithms like the Hematuria Cancer Risk Score (HCRS) [21] suggest that single variables such as age or UTI history may be insufficient alone, and composite models significantly outperform traditional guidelines in identifying high-risk patients.

CONCLUSIONS

It was concluded that this study identified a 19.6% prevalence of urological carcinomas among patients presenting with gross hematuria. No statistically significant associations were found between carcinoma and variables such as age, gender, family history, UTI, or anticoagulant use. However, a higher carcinoma rate was observed in the 60–80 years' age group. We recommend that all cases of gross hematuria undergo comprehensive evaluation using urine cytology, imaging, and cystoscopy. Future multicenter studies with broader variable inclusion are needed to refine risk stratification models and guide diagnostic protocols more effectively.

Authors Contribution

Conceptualization: R
Methodology: MAC, OUR
Formal analysis: MA
Writing review and editing: MA, S, FA, RAM

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

DOI: https://doi.org/10.54393/pjhs.v6i5.2847

REFERENCES

[1] Fernández-Pello S, Rodríguez G, JJ SP, PJ SS. Gross Hematuria and Usefulness of Urinary Cytology: Experience at Hematuria One Stop Clinic. Archivos Espanoles de Urologia. 2021 Jun; 74(5): 470-6.

[2] Jaumdally J, Sinha S, Lazarus J, Jaumdally SZ, Sinha S, Pinto G. One-stop hematuria clinic: First experience in South Africa. South African Medical Journal. 2019 Nov;109(11): 850-3.doi:10.7196/SAMJ.2019.v109i11 .13827.

[3] Turner R, Powari M, Stevenson T. From Hematuria to Nephroureterectomy via Urine Cytology—A Case Study.Cytopathology.2023 Sep; 34(5): 494-6. doi: 10. 1111/cyt.13271.

[4] Pandey S, Gupta V, Salu FF, Prateek B, Kumar S, Kalra P. Comparative Study of Ultrasound Abdomen and Pelvis with CT Urography in Diagnosis of Benign Causes of Hematuria. International Journal of Frontiers in Medicine and Surgery Research.2023; 3(2). doi: 10.53 29 4/ijfmsr.2023.3.2.0067.

[5] Sengupta S, Basu S, Ghosh K. Transitional Cell Carcinoma of the Upper Urinary Tract: A Puzzle. International Journal of Advances in Medicine. 2020 Oct;7(10):1585.doi:10.18203/2349-3933.ijam2 0204 07 8.

[6] Pal M, Chaudhary A, Srinivas V. Amyloidosis-A Rare but Mystifying Differential of Urothelial Cell Carcinoma of Urinary Bladder: A Case Report. Urology and Nephrology Open Access Journal.2019; 07(2): 34-36. doi: 10.15406/unoaj.2019.07.00239.

[7] Brooks ER, Siriruchatanon M, Prabhu V, Charytan DM, Huang WC, Chen Y et al. Chronic Kidney Disease and Risk of Kidney or Urothelial Malignancy: Systematic Review and Meta-Analysis. Nephrology Dialysis Transplantation.2024 Jun; 39(6): 1023-33. doi: 10.10 93 /ndt/gfad249.

[8] Nielsen TK and Røder MA. Case of the Month from Rigs Hospitalet, Copenhagen, Denmark: Unexplained Gross Hematuria. British Journal of Urology International.2022Nov;130(6):744. doi: 10.1111/ bju. 158 43.

[9] Uscanga-Yépez J, Segovia-Sandoval K, Wilbert SS, Barrera-Juárez E. Synchronous Multilocular Renal Carcinoma with Ipsilateral Papillary Urothelial Carcinoma. Journal of Clinical Urology.2019Sep; 12(5): 401-3. doi: 10.1177/2051415818773677.

[10] Arshad Z and Zaidi SZ. Urothelial Carcinoma in Children, Case Report with Review of Literature. The Journal of the Pakistan Medical Association.2019 May; 69(5): 720-1.

[11] Rai SK and Moudgil K. Heparin-Induced Gross Hematuria: A Case Study. International Journal of Research in Pharmaceutical Sciences.2019;10(3).doi: 10.26452/ijrps.v10i3.1440.

[12] Hernandez N, Desroches B, Peden E, Satkunasivam R. Uretero-Iliac Artery Fistula: A Rare Cause of Haematuria. British Medical Journal Case Reports CP. 2020Sep;13(9):e232189.doi: 10.1136/bcr-2019-232 18 9.

[13] Rao K and Sengupta S. Haematuria. In the Book: Textbook of Surgery.2019 Nov. doi: 10.1002 /978 1119 468189.ch74.

[14] Soomro AS, Mustafa G, Mahar NA, Mahmood A. Examine the Frequency of Urological Carcinomas in Patients Presented with Gross Hematuria. Age (Years). 2021; 30(20): 8-51.

[15] Hamid H, Ghani A, Farooq K, Ullah R, Begum F, Khan I. Frequency of Urological Carcinoma in Patients Presenting with Gross Hematuria. Biological and Clinical Sciences Research Journal.2023; 4(1): 471. doi: 10.54112/bcsrj.v2023i1.471.

[16] Malik MR, Saleem A, Patujo YH, Khan SA. Frequency of Urological Carcinomas in Patients with Gross Hematuria. Pakistan Journal of Medical and Health Sciences. 2022 Oct; 16(08): 872-. doi: 10.53350/ pjmhs 22168872.

[17] Rai BP, Escrig JL, Vale L, Kuusk T, Capoun O, Soukup V *et al*. Systematic Review of the Incidence of and Risk Factors for Urothelial Cancers and Renal Cell Carcinoma Among Patients with Hematuria. European Urology.2022 Aug; 82(2): 182-92. doi: 10.1016/j.eururo. 2022.03.027.

[18] Takeuchi M, McDonald JS, Takahashi N, Frank I, Thompson RH, King BF et al. Cancer Prevalence and Risk Stratification in Adults Presenting with Hematuria: A Population-Based Cohort Study. Mayo Clinic Proceedings: Innovations, Quality and Outcomes.2021 Apr; 5(2): 308-19. doi: 10.1016/j. mayocpiqo.2020.12.001.

[19] Khadhouri S, Gallagher KM, MacKenzie KR, Shah TT, Gao C, Moore S *et al*. Developing A Diagnostic Multivariable Prediction Model for Urinary Tract Cancer in Patients Referred with Hematuria: Results from the IDENTIFY Collaborative Study. European Urology Focus.2022 Nov; 8(6): 1673-82. doi: 10.1016/j. euf.2022.06.001

[20]20. Rysankova K, Vrtkova A, Grepl M, Filipkova V, Vesela A, Krhut J. Risk of Genitourinary Malignancy in Patients That Receive Anticoagulant or Antiplatelet Therapy. Bratislava Medical Journal/Bratislavské Lekárske Listy.2023 Oct1; 24(10). doi: 10.4149/ BLL _2023_112.

[21] Tan WS, Ahmad A, Feber A, Mostafid H, Cresswell J, Fankhauser CD *et al*. Development and Validation of a Hematuria Cancer Risk Score to Identify Patients at Risk of Harboring Cancer. Journal of Internal Medicine. 2019 Apr; 285(4): 436-45. doi: 10.1111/joim.12868.