

Epidemiology And Pathological Features of Patients with Urological Cancers: A 17-Year Retrospective Study from The Yaounde Cancer Registry, Cameroon

ND Martin Mokake^{1,2}, Kingsley Njeck², Ekani Boukar Mahamat^{1,2}, Divine Enoru Eyongeta^{1,2}, Ntunwetape Ngwane^{1,2}, Andang Paul Mayah², Mwambo Nalova^{1,2}, Fongang Fonchou Hermann², Michel Lontsi Demano³ and George Enow-Orock^{1,2}

¹Department of Surgery, Faculty of Health Sciences, University of Buea, P.O. Box 63, Buea, South West Region, Cameroon

²Buea Regional Hospital, Buea, Southwest Region, Cameroon.

³Department of Animal Biology, Faculty of Science, University of Dschang

*Corresponding author:

Ngomba Divine Martin Mokake,
Department of Surgery, Faculty of Health
Sciences, University of Buea, P.O. Box 63,
Buea Cameroon

Received: 23 Oct 2025

Accepted: 15 Nov 2025

Published: 22 Nov 2025

J Short Name: COS

Copyright:

©2025 Ngomba Divine Martin Mokake. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially

Keywords:

Urological Cancers; Prostate Cancer; Kidney Cancer; Bladder Cancer; Epidemiology; Pathology; Yaoundé Cancer Registry; Cameroon

Citation:

Ngomba Divine Martin Mokake, Epidemiology And Pathological Features of Patients with Urological Cancers: A 17-Year Retrospective Study from The Yaounde Cancer Registry, Cameroon. Clinics of Surgery® 2025; V11(1): 1-8

1. Abstract

1.1. Background

Urological cancers (UCs) occupy an important place in urological pathologies and despite an increasing cancer burden, epidemiological data remain scarce due to limited registry coverage. This study aimed to determine the epidemiology and pathological characteristics of UCs in the Yaoundé population over a 17-year period using the Yaoundé Cancer Registry.

2.1. Methods

A retrospective descriptive study was conducted using data from the Yaoundé Cancer Registry from June 2004 to April 2021. All histologically or clinically confirmed UC cases were included. Data were extracted using a structured extraction form from February 2nd to April 5th 2022, transferred into Microsoft Excel, and analysed with SPSS version 26.

3.1. Results

Of 12,899 cancer cases, 646 were UCs (prevalence 5.0%). Males accounted for 91.2% and females 8.8%, with a mean age of 60.4 years. Prostate cancer was the most common (77.2%), followed by kidney (11.3%), bladder (7.6%), and testicular cancers (3.9%). No penile cancer was recorded. Adenocarcinoma dominated prostate histology, nephroblastoma accounted for nearly half of kidney cancers in children <10 years, transitional cell carcinoma was most frequent among bladder cancers (79.6%), and Burkitt lymphoma led testicular cancers. Most diagnoses were histological (73.8%). At diagnosis, 42.9% tumours were localized, and 2% were metastatic. Surgery was the primary treatment (64.9%).

3.2. Conclusion

UCs represent an important cancer burden in Yaoundé, dominated by prostate cancer in older men and nephroblastoma in children. Late presentation remains a challenge, with surgery as the main treatment due to limited oncology infrastructure. Strengthened awareness, early detection, and improved cancer care resources are critical to improve outcomes in Cameroon.

4. Resume

4.1. Introduction

Urological cancers (UCs) represent a significant portion of urological pathologies, and despite an increasing morbidity burden, epidemiological data remain scarce due to limited registry coverage. This study aimed to determine the epidemiology and pathological characteristics of UCs in the population of Yaoundé over a 17-year period, using the Yaoundé Cancer Registry.

2.2. Methodes

A 5-year retrospective cross-sectional study was conducted from January 1, 2020, to December 31, 2024, at the Buea Regional Hospital and the Douala Gynecology, Obstetrics, and Pediatrics Hospital. It included all pregnant women admitted for a non-obstetric surgical emergency during their pregnancy. Data were extracted using a validated form and analyzed using the Statistical Package for Social Sciences, version 25.0.

2.3. Results

The proportion of non-obstetric surgical emergencies was 1.7%. The mean age of the women who underwent these procedures was 30.15 ± 5.43 years (95% confidence interval: 22–41 years). Most cases occurred in the second trimester (58.7%, or 27/46).

Acute appendicitis was the most frequent surgical indication across all trimesters.

2.4. Conclusion

The proportion of non-obstetric surgical emergencies was consistent with global estimates, particularly in the second trimester, with appendicitis being the most frequent indication. Collaboration between surgical, obstetric, and emergency care teams should be strengthened to ensure rapid and coordinated patient management.

3. Background of The Study

Cancer is a major global health concern, with more than 19 million new cases and nearly 10 million deaths reported in 2020[1,2]. The burden continues to grow, particularly in low- and middle-income countries (LMICs), where health systems often lack resources for prevention, diagnosis, and treatment [3]. Among the many cancer groups, urological cancers (UCs) including prostate, bladder, kidney, testicular, and penile cancers occupy a prominent place due to their frequency, clinical impact, and socioeconomic implications [4].

Prostate cancer (PCa) is the second most commonly diagnosed malignancy in men globally, accounting for 1.4 million new cases and 375,000 deaths still in 2020 [1,2,5]. Bladder cancer (BCa) is the 10th most common cancer worldwide, with 573,000 new cases and 213,000 deaths annually [1]. Also, kidney cancers (KCa) account for 2–3% of all cancers, with increasing incidence in developed countries [6,7]. Furthermore, testicular cancer (TCa), although relatively rare, is the most common malignancy in men aged 20–34 years in Europe and North America. Penile cancer, though rare globally, remains more frequent in parts of Africa, Asia, and Latin America [6].

In Africa, UCs contribute significantly to the cancer burden. Darre et al. in Togo reported that UCs represented 14.7% of cancers diagnosed over two decades [8]. Prostate cancer dominates the UC spectrum across Africa, with incidence rates among the highest globally [9]. Several studies attribute this to genetic susceptibility, lifestyle changes, and lack of screening [10,11]. Bladder cancer, historically associated with schistosomiasis, remains prevalent in North and sub-Saharan Africa [12]. Kidney cancers, especially nephroblastoma, account for a large proportion of pediatric cancers. Testicular cancers are uncommon but still reported, often with late-stage presentation [13].

In Cameroon, cancer incidence is rising. The World Health Organization (WHO) estimates that more than 15,000 new cancer cases occur annually, with prostate cancer ranking as the leading malignancy in men [14]. UCs accounted for 6.5% of malignancies in Cameroon [15]. More recent reports indicate a shift toward prostate cancer dominance, with bladder and kidney cancers contributing smaller proportions. Despite the growing burden, limited data exist on the epidemiology and pathology of UCs in Cameroon. The comprehensive Yaounde Cancer Registry (YCR) provides an opportunity to fill this gap. Understanding UC prevalence, histological subtypes, and treatment trends

is critical for planning effective cancer control strategies. Thus, the current study aimed to determine epidemiology and pathological features of patients with urological Cancers of patients with UCs in Yaoundé and the treatment modalities used for the UC management.

4. Methods

4.1. Study Design and Setting

A retrospective descriptive study was conducted using data from the YCR, covering June 2004 to April 2021. The Yaoundé population-based cancer registry is a cancer recording soft copy system where all cancers related data in Cameroon are registered. It is a registry located in the General Hospital Yaoundé. It has been operating since 2004. It collects data from about 20 sources in Yaounde. The percentage of cases registered for which histological confirmation available was 90.32% for males and 83.87% for females. The Yaoundé council areas contain reference health facilities and health research facilities such as GHY, Centre Pasteur, CHU, HGOPY and many others. These cancer care facilities are specialized Hospitals for cancer diagnosis and treatment. They provide histological, fine needle aspiration cytology (FNAC), radiation therapy, haematological, surgical and chemotherapeutic services. These facilities help provide statistical information on cancers. The registry started with a staff comprising of two supervisors and two trained registrars whose primary duty is to extract cases from various cancer sources and submit them to the registry office in GHY. These data were later submitted to the director for verification and subsequent entry into a computer. A special software, Cancer Registration Version 5 (CANREG5) was used to check on accuracy, duplication and data control. A computer analyst assists in data analysis, employing other software like SPSS, Excel and Epi Info.

4.2. Population and Inclusion Criteria

The study population included all cancer patients in the Yaoundé population registered in the YCR with UCs diagnosed during the study period. UCs were defined as cancers of the prostate, bladder, kidney, testis, or penis. Cases with incomplete demographic or diagnostic information were excluded.

4.3. Sample Size and Justification

We conveniently sampled all UCs cases registered in the registry from June 2004 to April 2021.

5. Materials

A good computer set up with soft wares entering form, cancer registry, pens, pencils and phone were used for proper execution of this project. An internet modem was also used for internet access.

5.1. Data Collection Procedure

Data were extracted from February to April 2022 using a specially designed digital entry form. The software form contained patient's sociodemographic characteristics, cancer site, histological subtype, diagnostic method, stage at diagnosis, and treatment modality. Cancers were coded according to the Inter-

national Classification of Diseases for Oncology, third edition (ICD-O-3). Histological subtypes were categorized based on WHO pathology classification.

5.2. Data Management and Data Analysis

Following data collection, the supervisor in charge of the registry did monitoring to ensure quality of data and extraction. Validity checks and duplication was monitored using CAN-REG5 software. Data from the entering form was transferred to Microsoft Excel and analyzed using Special Package for Social Sciences (SPSS) version 26. Descriptive statistics (frequencies, percentages, means) were generated. Associations between UC type and demographic variables were tested using chi-square. A p-value <0.05 was considered significant.

5.3. Ethical Considerations

Ethical approval was obtained from the Faculty of Health Sciences Institutional Review Board, University of Buea. An authorization to carry out this study was granted by director of the

YCR. Patient identifiers were anonymized to ensure confidentiality.

6. Results

6.1. Overall Prevalence of Urological Cancers

A total of 12,899 cancer cases were recorded in YCR during the study period. Of these, 646 were UCs, yielding a prevalence of 5.0%. Out of this, PCa was the first prevailing UCs cases with more than three quarter (77.2%) cases and a minority (3.86%) of all malignant cases in the registry. This was followed by KCa with less than one sixth (11.3%) and a very small fraction (0.58%) of all cancer cases. Similarly, BCa made up less than one sixth (7.6%) of UCs and a very small fraction (0.38%) of all cancer cases. TCa was the fourth UCs with a minority (3.9%) of cases. It is among the rear malignant tumours (0.20%) of all cancer cases. No case of penile cancer was identified in this study (Figure 1).

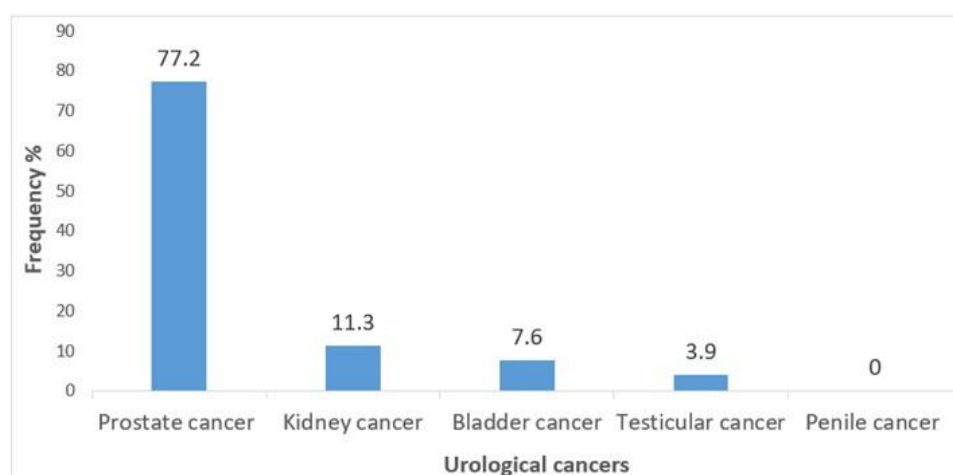


Figure 1: Distribution of UCs.

6.2. Socio-Demographic Characteristics of Patients with Urological Cancers

Out of the 646 urological cancer cases, most (91.2%) were male, and a minority (8.8%) were female. The mean age was 60.4 years, with the age group 65-74 years being the most frequent (31.4%). Prostate cancers peaked in men >60 years, while nephroblastoma was concentrated among children <10 years.

Nearly one third (32.4%) of the patients attended the primary level of education, majority (98.6%) were natives, and less than one fourth (22.3%) had unknown occupations (Table 1).

6.3. Patients' Background

In this study, a minority (6.97%) of all UCs cases were HIV positive and more than one quarter (28.31%) were negative. More than half (64.72%) of the cases had an unknown status (Figure 2).

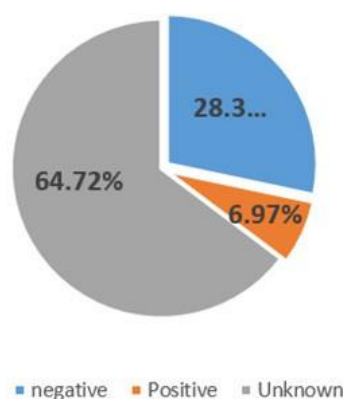


Figure 2: HIV status of patients with UCs.

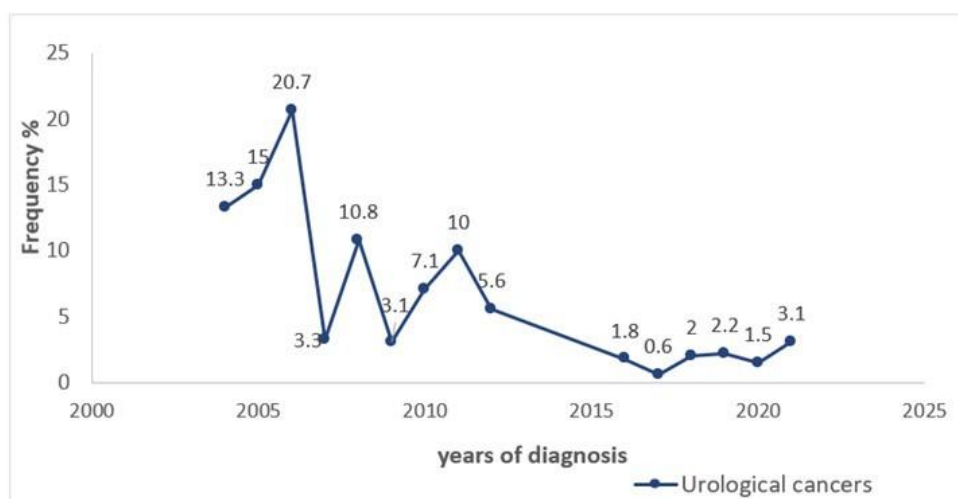
Table 1: Socio-demographic characteristics urological cancer patient (n=646).

Variable	Category	Frequency	Percentage
Age group (years)	0-14	44	6.8
	15-24	9	1.4
	25-34	7	1.1
	35-44	23	3.7
	45-54	71	11.0
	55-64	159	24.6
	65-74	203	31.4
	75-84	107	16.6
	>84	23	3.4
	Total	646	100.0
Sex	Female	57	8.8
	Male	589	91.2
	Total	646	100.0
Level of education	Primary	209	32.3
	Secondary	211	32.7
	University	66	10.2
	None	160	24.8
	Total	646	100.0
Ethnicity	Natives	637	98.6
	Foreign	9	1.4
	Total	646	100.0
Occupation	Employed	455	70.4
	Unemployed	19	2.9
	Pupil	16	2.5
	Student	12	1.9
	Unknown	144	22.3
	Total	646	100.0

6.4. Annual Epidemiological Distribution of Urological Cancers in The Yaounde Population

The annual distribution of UCs was from 2004 to 2021. This result shows that the highest annual UCs cases was in 2006 with

an annual frequency of 134 (20.7%). This was after a gradual increased from 2004 to 2006. The latter then drastically fall to 2007 with frequency of 20 (3.3%). The lowest cases registered was in 2017 with a frequency of 4(0.6%) (Figure 3).

**Figure 3:** Annual distribution of UCs.

6.5. Diagnosis Urological Cancers

Eight methods of diagnosis were identified in the cancer registry. More than three quarter (73.8%) of all diagnosed cases were diagnosed pathologically by histology of the primary tumours. Equal small percentages of cases were diagnosed using Cytolo-

gy of the metastatic tumour (5.41%) and laboratory investigation (5.41%). Clinical diagnosis was performed in those with PCa (1.8%). Only (2.7%) cases of an autopsy were done and all in those with KCa. Imaging investigation was basically by ultra-sound couple with clinical findings amongst a small percentage (4.76%) (Figure 4).

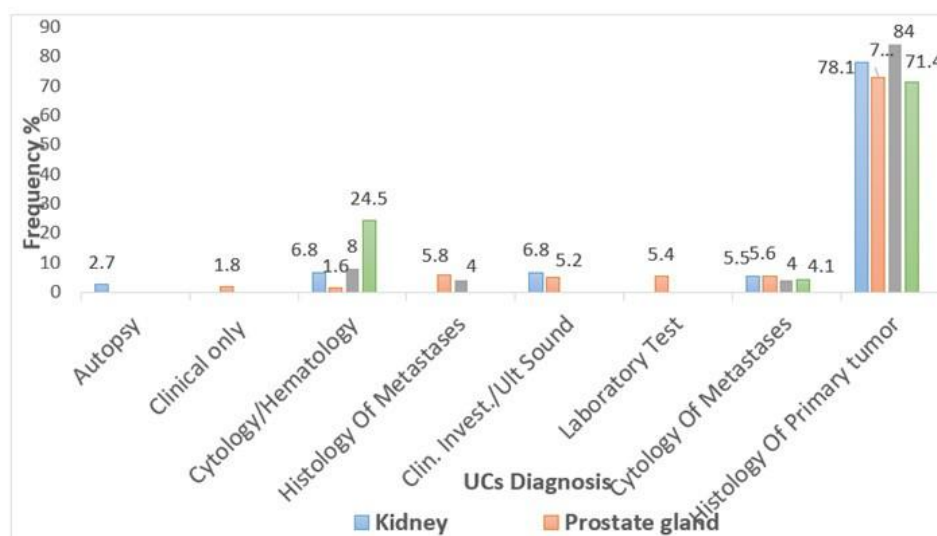


Figure 4: Diagnostic distribution of urological cancers.

6.6. Pathological Stages of Urological Cancers at Diagnosis

Pathologically, UCs were classified according to stages from the initial, localized, primary to metastatic tumours. Less than half (42.9%) of the UCs cases were localized tumour. A minority (6.3%), (7.0%) had direct extension and lymph nodes involvement respectively. Metastatic tumour identified made up 23.2% of UCs (Figure 5).

6.7. Treatment Modalities

Chemotherapy, radiotherapy and surgery were the three identifiable treatments modalities. Patients are distributed in Figure 6 depending on whether they benefited from any of these treatments. More than half (64.9%) of these patients benefited from surgery. Among these, most (80.0%) of the patients were those with PCa. 36.5% benefited from chemotherapy and 12.2% from radiotherapy (Figure 6).

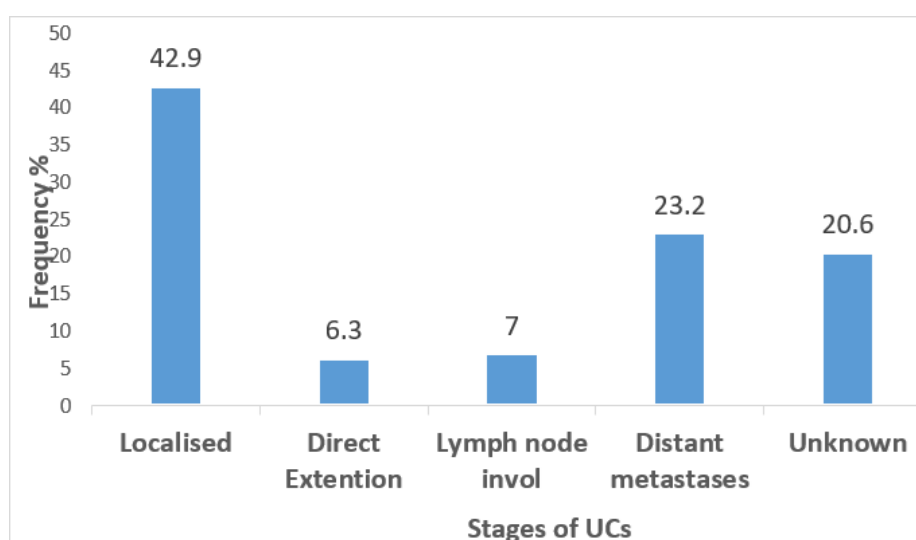


Figure 5: Staging of urological cancers.

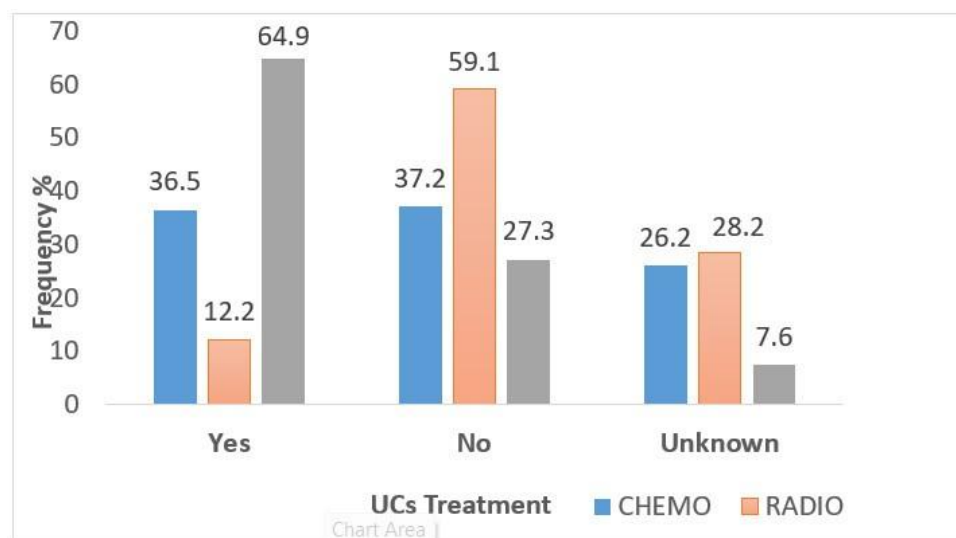


Figure 6: Treatment of Urological cancers.

7. Discussion

This study presents one of the most comprehensive registry-based analyses of UCs in Cameroon. Urological cancers (UCs) occupy an important place in urological pathologies. A total of 12899 cancers cases were identified in the Yaounde population. Among these, 646 cases were those with UCs. 91.81% were male, 8.82% were female with 5.26% those with KCa and 3.56% cases with BCa. The sex ratio was 10.33. The age range 65-74 years was the most frequent with 31.4% and an average age was 60.4years. Similarly [15], reported an average age of 64.77 years in both sexes with UCs in Cameroon. However, Enow et al in 2012 reported an average age of cancer patients in Cameroon was about 44.8 years [16]. This average age is lower than that reported in our study and that of [12]. This is probably because Enow et al reported an average age of all cancer cases in Cameroon. Like in our results, Bray et al reported in 2018 that PCa risk increases strongly with age and >85% of newly diagnosed individuals are >60 years of age. Furthermore, they reported 90% of BCa diagnoses were in those with 55 years and above [6]. This is similar to our results with 31.4% cases in patients > 65years. This is because aging is a principal risk factor for many cancers like PCa, BCa and some KCa. Contrary, some KCa like nephroblastoma were diagnosed mostly in childhood patients as attest by many studies [8] and also, as it is the case in our study.

In our study, the prevalence of UCs was 5.0% in all malignant cases in the Yaounde population. This finding was similar to 6.5% UCs cases in all malignant tumors reported by Sow et Nkegoum in 2006 in Cameroon [9]. The latter recruited inpatients in the urological department of the Yaounde Central Hospital. Contrary, our result was far lower than 14.7% UCs in all cancer cases reported in Togo by [7].

Epidemiologically, PCa was the prevailing UCs with a dominant frequency of 77.2% and 3.86% of all cancer cases in our study. Similarly, reported PCa as first UCs in men with a frequency of 86% in Cameroon [12]. However, in Benin and Togo, Tengue et

al reported PCa as the first UCs with a high hospital prevalence of about 12% in 2016 [17]. This was far lower than 72.2% cases in our results. This could be because they carried out a hospital base study. In 2018 reported the prevalence of 1.38% PCa of all malignant cases in a Cameroon Hospital base study. This result is less than 3.86% reported in our study. This may be because they carried out a hospital base data collection [18].

Most of UCs cases with a frequency of 73.8% were confirmed pathologically by histology of the primary tumours. 1.36% were diagnosed clinically. These findings are alike to that reported by Enow et al in Cameroon, where only 4% of cancer cases are diagnosed clinically and 89% were confirmed pathologically [3].

Morphologically, adenocarcinoma of the prostate was the commonly identified histological subtype of PCa with 86 % frequency. Malignant neoplasia were 11.2% and 2.8% cases were prostate carcinoma. Study reported that the peripheral zone of the prostate is made up to >70% of the prostate glandular tissue and almost 80% of prostate tumors arise in this area [19].

Several histological subtypes of KCa were identified. Nephroblastoma with a frequency 47.9% was the leading pathological subtype. These all occurred in patients less than 15 years. 31.5% were male and 16.4 % female in all KCa cases. Clear cell adenocarcinoma was the next common histological subtype 26.1% frequency. Similarly, nephroblastoma was the predominantly histological subtype of KCa in children according to in Togo and Engbang et al in Cameroon in their studies in 2014 [8,20]. They are also the second cancer of the Togolese childhood cancers from 0 to 15 years. It is much more frequent than in adult [21].

Bladder cell carcinoma was the common histological subtype of BCa. 79.6% were transitional cells carcinoma and 12.2% were squamous cells carcinoma for both sexes. Adenocarcinoma of the bladder had the lower frequency of 8.2 %. Just like in our results, urothelial carcinoma represents about 90% of BCa cases according Abdelmoteleb in 2016 [22]. On the other hand, reported that squamous cell carcinoma was most frequent malignant tumour with 42.4% and 15.2% in those with transitional

cells carcinoma in Cameroon [9]. Also, a multicentre study conducted in the Littoral region of Cameroon by reported 40.6% of bladder tumours being squamous cell carcinoma [20].

Burkitt lymphoma was the most common pathological subtype of TCa with a frequency of 20%. Embryonal carcinoma was the second most common with a frequency of 16%. The mean age with TCa was 42.12 years. Similar to our findings reported that the main types of TCa were lymphomas and spermatocytic seminomas [23].

Pathologically, less than half (42.9%) of the UCs cases were localized tumour, followed by metastatic tumor with 23.2%. Direct extension and lymph nodes involvement were the least pathological stages of this tumor. According to Geolani et al in their 2017 report, revealed that clinical diagnosis at early stages is challenging, due to absence of specific symptoms and the location of the primary tumors. Thus, at diagnosis, patients may already present with metastases, resulting in poor prognosis [24,25]. This was unlike our study were most of the cases were localized tumours. This could be explained by awareness, probably increase in early screening which favour diagnosis of these cancers at a localized stage. Eventually, this could better the prognosis.

Chemotherapy, radiotherapy and surgery were the most identifiable treatments modalities of UCs in our study. More than half (64.9%) of our patients with a frequency of undergo surgical treatment and most (80%) were those with PCa. This is because majority of the pathological subtypes were diagnosed at the localized stage which may had favoured initial surgical treatment like prostatectomy. More than one third (36.5%) of these patients benefited chemotherapy and only about 12.2% did Radiotherapy. The primary treatment of KCa cases were surgical resection, done probably by open radical nephrectomy. Currently chemotherapy treatments are becoming a standard especially in metastatic tumours [26,27].

The study findings are limited by the potential underreporting due to incomplete registry coverage, missing staging data, and absence of survival outcomes. Desirable information on number of deaths cases could not be gotten [28]. This limited us in bringing out the modality rate of UCs in our study which compromised the epidemiological characteristics of UCs in our study. Additionally, other pathological characteristics like grading or degree of differentiation of the tumours limited our study in better characterizing UCs. As strengths, the CANREG5 software was adapted to check for duplication of entries. This minimized statistical error.

8. Conclusion

UCs represent an important cancer burden in Yaoundé with prostate cancer dominating, followed by kidney cancer, cancers of bladder and lastly cancer of the testicles. No case of penile cancer was identified in our study. Most of UCs cases were confirmed by pathology of primary tumour. Adenocarcinoma of the prostate was the most common histological. Nephroblastoma

was the leading morphological subtype of KCa and it was most common in children less than 10years. Bladder carcinomas were the most common with TCC and leading in males. Adenosarcoma of the bladder was the least frequent. Burkitt lymphoma and embryonal carcinoma of the testicles were the most frequent subtypes of TCa. At diagnosis, less than half were localized tumours and less than one quarter were metastatic. The most common treatment modality of these cancers was surgery. Policy makers could consider putting in place multicentre software's institutions for confirmed malignant registration, and also expand diagnostic and treatment infrastructure (pathology, radiotherapy, chemotherapy).

References

1. Abdelmoteleb H, Jefferies ER, Drake MJ. Assessment and management of male lower urinary tract symptoms (LUTS). *International Journal of Surgery*. 2016; 25: 164-171.
2. Bray F, Ferlay J, Soerjomataram I, Siegel RL. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *Wiley Online Library* Bray, J Ferlay, I Soerjomataram, RL Siegel, LA Torre, A JemalCA: A Cancer Journal for Clinicians, 2018•Wiley Online Library. 2018; 68(6): 394-424.
3. Cedric TF, Blaise NYH, Etienne A, Paul N. Epidemiological Aspects of Prostate Cancer at the Medical Oncology Service of the Yaounde General Hospital -Cameroon. *International Journal of Healthcare and Medical Sciences*. 2018; 4(5): 66-72.
4. ChiHang YY, ChiFai NN. Urological malignancy in Hong Kong: the trend and the practice. 2015.
5. Dahm S, Barnes B, Kraywinkel K. Detection of missed deaths in cancer registry data to reduce bias in long-term survival estimation. *Frontiers in Oncology*. 2023; 13: 1088657.
6. Darré T, Amégbor K, Kpatcha M, Tengue K. Cancers urologiques au Togo: profil histopathologique à propos de 678 cas. SpringerT Darré, K Amégbor, M Kpatcha, K Tengue, L Sonhayé, K Doh, M Tchaou, S AnoukouJournal Africain Du Cancer/African Journal of Cancer. 2014; 6(1): 27-31.
7. Djeumi T, Guifo M, Mbassi A. Operations for Urologic Malignant Tumors or Suspected Neoplasms in a Resource-Limited Setting: Last Decade Experience in Cameroon. *Cancer Sci*. 2019; 2(2): 1-3.
8. Engbang N, Sala B, Moby H. undefined. (n.d.). Cancers urogénitaux dans la région du littoral-Cameroun: épidémiologie et histopathologie. *Ajol. Info NJP Engbang, B Sala, H Moby, C Fonkwa, B Essomba, JDE Sime, G Ateba, A FewouRevue de Médecine et de Pharmacie*. 2014.
9. Hsieh JJ, Purdue MP, Signoretti S, Swanton C. Renal cell carcinoma. *Nature Reviews. Disease Primers*. 2017; 3: 17009.
10. Huang Q, Yang J, Liu GX, Zi H. Changes in disease burden and global inequalities in bladder, kidney and prostate cancers from 1990 to 2019: a comparative analysis based on the global burden of disease study 2019. *BMC Public Health*. 2024; 24(1): 1-10.
11. Kiemeny LA, Rothman N, Koutros S. Genetic Predisposition to Bladder Cancer. *Biology of Bladder Cancer: From Molecular Insights to Clinical Strategies*. 2024; 23-55.

12. Lopez-Beltran A, Scarpelli M, Montironi R. 2004 WHO Classification of the Renal Tumors of the Adults. *European Urology*. 2006; 49(5): 798-805.
13. Moore LE, Wilson RT. Lifestyle Factors, Exposures, Genetic Susceptibility, and Renal Cell Cancer Risk: A Review. *Cancer Investigation*. 2005; 23(3): 240-255.
14. Orock GE, EP N, AS D. Current cancer incidence and trends in Yaounde, Cameroon. *Oncology, Gastroenterology and Hepatology Reports*. 2012; 1(1): 58-63.
15. Orock GE E, P N, AS D. Current cancer incidence and trends in Yaounde, Cameroon. *Oncology, Gastroenterology and Hepatology Reports*. 2012; 1(1): 58-63.
16. Parkin D, Bray F, Ferlay J, Epidemiology AJ. Biomarkers, undefined, & 2014, undefined. (2014). *Cancer in africa 2012*. Aacrjournals.OrgDM Parkin, F Bray, J Ferlay, A Jemal *Cancer Epidemiology, Biomarkers & Prevention*. 2014.
17. Prostate JMT. The zonal anatomy of the prostate. Wiley Online Library JE Mc Neal The Prostate, 1981 Wiley Online Library. 1981; 2(1): 35-49.
18. Raman JD, Nobert CF, Goldstein M. Increased incidence of testicular cancer in men presenting with infertility and abnormal semen analysis. *Aua journals. Org* JD Raman, CF Nobert, M Goldstein *The Journal of Urology*. 2005.
19. Rawla P. Epidemiology of Prostate Cancer. *World Journal of Oncology*. 2019; 10(2): 63.
20. Rigaud J, Avancès C, Camparo PT. Recommandations en onco-urologie 2013 du CCAFU: Tumeurs malignes du pénis. *Progres En Urologie*. 2013; 23(S2).
21. Secondino S, Viglio A, Neri G, Galli G, Faverio C, Mascaro F. Spermatocytic Tumor: A Review. *International Journal of Molecular Sciences*. 2023; 24(11): 9529.
22. Song, W., urology, H. J.-K. journal of, & 2015, undefined. (2015). Incidence of kidney, bladder, and prostate cancers in Korea: an update. *Synapse.Koreamed.OrgW Song, HG JeonKorean Journal of Urology*, 2015. synapse. Koreamed.Org. 2015; 56(6): 422-428.
23. Sow M, Nkégoum B, Oyono J. Epidemiological and histological features of urogenital tumours in Cameroon. *Europe Pmc*. 2006; 36-39(16(1)).
24. Tengue K, Kpatcha TM, Botcho G, Leloua E. Profil épidémiologique, diagnostique, thérapeutique et évolutif du cancer de la prostate au Togo. *Ajol. InfoK Tengue, TM Kpatcha, G Botcho, E Leloua, AK Amavi, K Sikpa, E Sewa, T Anoukoum* *African Journal of Urology*. 2016; 22(2): 76-82.
25. WHO. World cancer report: cancer research for cancer prevention. *Cancer Control*. 2020; 613.
26. Wild, C P, Weiderpass E, Stewart BW. *World Cancer Report*. 2020.
27. Zi H, Liu MY, Luo LS. Global burden of benign prostatic hyperplasia, urinary tract infections, urolithiasis, bladder cancer, kidney cancer, and prostate cancer from 1990 to 2021. *Military Medical Research*. 2024; 11(1): 1-18.
28. Zulfikar Y, Umbas R, Mochtar CA. Karsinoma Pelvis Renis dan Ureter di Jakarta: Karakteristik dan Faktor Risiko. *Indonesian Journal of Cancer*. 2010; 4(2).