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Trend in incidence and clinicopathological characteristics of prostate cancer in Northern Tanzania: analysis from a population based cancer registry data 2015–2021

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Abstract

Background Globally, prostate cancer is a common disease among men. However, limited epidemiological data exists regarding prostate cancer in Tanzania. Consequently, there is insufficient evidence to convince policymakers of the need to combat this health issue. The study aimed to assess the prevalence, trends and clinicopathological characteristics of prostate cancer in northern Tanzania.

Methods This cross-sectional study with chart review utilised data from the Kilimanjaro cancer registry, identifying all adult men diagnosed with cancer from January 2015- December 2021. The study recorded variables such as subject age, symptoms, Gleason score, prostate specific antigen (PSA) and metastatic statuses at presentation. Risk stratification followed American Society of Medical Oncology criteria, including low, intermediate and high-risk categories. The analysis was conducted using STATA version 17.

Results Over the study period, 5164 adult men were registered, with prostate cancer accounting for 1619(31.4%) and showing an increase trend in incidence. The mean age at presentation was 73.9(± 10.1) years, and the majority of study subjects were from Kilimanjaro region 1200(74.1%). After applying exclusion criteria, 714 subjects with histologically confirmed diagnoses of prostate cancer remained. Of these, 710(99.4%) were symptomatic at presentation, with lower urinary tract symptoms being the most common symptoms in 548(76.8%). The median PSA at presentation was 109(36.2–263) ng/mL with 349(51.1%) having a PSA of > 100ng/mL. Gleason group grades 4 and 5 accounted for 207(29.5%) and 219(31.2%), respectively. A total of 178(43.6%) subjects had metastatic disease at presentation. The treatment of choice for a large proportion of subject 440(94.6%) was androgen deprivation therapy.

Conclusions The burden of prostate cancer in northern Tanzania is high and the majority of subjects present with symptoms. A large proportion of subjects have metastatic disease at initial presentation, emphasizing the need for prostate cancer screening.

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Keywords Prostate cancer, Clinicopathological characteristics, Northern Tanzania

Background

Globally, prostate cancer (Pca) is a common disease and is among the most common causes of death in men [1–3]. The epidemiology of Pca varies broadly across the globe [4–6]. The incidence rate is highest in developed countries compared to developing ones, ranging from 6.3 to 83.4 per 100,000 men across regions, with parts of Europe, the Caribbean, Australia, New Zealand and America having the highest incidence [1, 7]. Although Africa has a low incidence rate of 26.6 per 100,000 men, linked to poor screening and lack of cancer registries [4–6, 8], this continent is expected to have the highest rate in the near future [6]. This has been proved by a report from Ghana that has shown an increased number of Pca cases each year [9].

Only < 40% of Pca in Sub-Saharan Africa (SSA) presents with localized disease, while in Europe > 80% are diagnosed at an early curable stage [5]. Many other studies have also found that in Africa as well as Asia, the majority of patients have an advanced disease or metastatic disease at presentation [8, 10–13]. In Sudan, 85.4% of patient presents with stage 3 and 4 disease [11]. In Tanzania, up to 57.7% of Pca cases have bone metastasis at presentation [14]. The average age at presentation of Pca is 66 years with black men having a younger age at presentation compared to whites [7, 8].

While mortality is decreasing in the developed world, it is increasing in most developing countries including African nations [1, 7]. The Pca related low mortality rate in the developed world is contributed by the utilisation of screening for early detection [1]. In SSA, Pca is the leading cause of cancer death among men [1], with mortality rate that is expected to double by the year 2030 [15]. In Kenya, Pca accounted for 9.4% of all cancer and is the leading cause of cancer death among Kenyan men [15]. Similarly, in Rwanda, Pca accounted for 16.3% of cancer deaths, making it among the most common causes of morbidity and mortality in men [16]. Pca is among the common causes of death among Tanzanian men [1]. At Kilimanjaro Christian Medical Centre (KCMC), a tertiary and zonal referral hospital in Tanzania, an average of 100 Pca cases are seen annually [14], making it the most common urological cancer in our centre (KCMC hospital data).

Despite the common occurrence of Pca in Africa, there is still limited information pertaining to Pca on this continent, partly due to the presence of few functional cancer registry [17]. In particular, studies that have examined the epidemiology and characteristic of the disease in Tanzania are very scarce, compounded by the limited sample size [14] and therefore, there isn't enough evidence to devise measures to combat the disease. In the northern zone of Tanzania, there is a well-established cancer registry with data that covers the entire zone. Therefore, the objective of this study was to determine the trend in incidence and characteristic of Pca in northern Tanzania by utilising data from the cancer registry. This study will help in illuminating the Pca trajectory, which will serve as a foundation for persuading interested parties that action must be taken to avert the disease.

Methodology

Study design and setting

This cross-sectional study with chart review was conducted at KCMC Hospital, one of the four zonal referral hospitals in Tanzania. The catchment area of the hospital is 15milion people who reside in four administrative regions namely, Kilimanjaro, Tanga, Arusha and Manyara. [18]. The hospital has a bed capacity of over 640 with well-established departments including urology and medical records (www.kcmc.ac.tz).

The urology department of KCMC has six specialists and a capacity of 42 beds. It offers both inpatient and outpatient services throughout the week except weekends. Prostate procedures done in the department include transrectal ultrasounds and tru-cut biopsies (TCB). The indication for the TCB is elevated serum prostate specific antigen (PSA) and/or abnormal digital rectal examination (DRE). Transurethral resection of the prostate (TURP), open prostatectomies and radical prostatectomies are among the prostate surgeries performed in the department. Apart from the urologist, the three oncologists who work with the hospital are among the team involved in the multidisciplinary management of Pca.

The Kilimanjaro population-based cancer registry is located at KCMC Hospital. The registry was established since 2000 and extended to capture cancer diagnosed in the entire northern zone in 2015. This extension was an important step for the registry to be recognised by African Cancer Registry Network (AFCRN) in which it was successfully registered as an AFRCRN member in 2017. The registry contains social demographic information including age, sex, residence, diagnosis and time when the diagnosis was made and all the information is captured using the CanReg5 data collection form. It also contains the name of the health facility that diagnosed the patient and whether the diagnosis was clinical based on physical examination, radiological and/or tumour marker finding or histological/pathological.

The medical record of KCMC is among the well-established departments that keep all records of patients including Pca cases. In year 2018, the department started

to shift gradually from physical files to electronic medical record system (EHMS) that was popularised in all departments and by the year 2020, the physical files stopped to be used. As a result of this shift, some of the information is missing in the electronic files for patients who were attended/admitted before the shift and therefore, if they are needed the physical files can be traced from the archive located in the medical record department.

Sample size calculation and sampling technique

This study involved all Pca cases diagnosed during the study period. The power of the study was determined by using two-proportion power analysis, whereby the z score was 1.95 for a 95% confidence interval. By considering the Pca prevalence of 39.8% in the previous study, the effect size (0.313–0.398) was found to be 0.085, resulting in a power of >99.9% [19].

Study population and data collection technique

The Kilimanjaro population-based cancer registry team was requested to provide a list of all adult (aged>18 years) male cancer cases recorded from January 2015 to December 2021. Then all subjects who were diagnosed with Pca were listed out. The list contained area of residence, age at diagnosis, as well as whether diagnosis of Pca was made at KCMC or elsewhere. All subjects who were diagnosed at KCMC were provided with their respective medical record number. The medical record numbers were used to extract clinical presentation, history of co-morbid conditions (hypertension, diabetic mellitus), stage at presentation, histological results, initial PSA at diagnosis, as well as initial treatment offered from the electronic medical record system (EHMS). If any useful data was missing from the EHMS, the same file number was used to track down the physical file from the medical record department. All the data were extracted using a structured questionnaire (supplementary file) recorded in the REDCap software.

Data analysis

Data was cleaned, coded and analysed using STATA software version 17 and presented in tables and figures. Continuous variables were summarised using mean or median with their respective measure of central tendency while frequency was used for categorical variables. The prevalence of Pca was determined from the total number of adult male cancer, then trend analysed using all Pca cancer cases diagnosed during the study period. The age of the cancer subjects was categorised as 39–50, 51–60, 61–70, 71–80, and 81–90 and above 91.

The Gleason score of histologically confirmed Pca was group graded as grade 1 (Gleason score≤6), grade 2 (Gleason score 3+4=7) grade 3 (Gleason score 4+3=7), grade 4 (Gleason score 8) and grade 5 (Gleason score 9–10) [20] and further sub-classified into low grade (Gleason score≤6), intermediate grade (Gleason score 7) and high grade (Gleason score 8–10) [12, 21] The PSA was categorised as ≤4, 4.01-10, >10.01-20, 20.01-50, 50.01–100 and 100.01+ng/mL [12, 22].

Pca was classified into potentially curable disease (T1-T4, N0/Nx, M0) and metastatic disease (Any T, Nx, M1). The former was further subdivided into; clinically localized: T1, T2, T3 N0/Nx, M0, locally advanced disease: T4 N0/Nx, M0 and Unknown T -stage with N0/Nx, M0. At KCMC, Pca subjects are grouped into three risk categories: low, intermediate and high-risk based on PSA, Gleason score and tumour stage as per the European Society of Medical Oncology (ESMO) [23]. This study used the same criteria to group study subjects. All analyses were done at a 95% confidence interval and 5% error.

Results

A total of 5164 adult male cancer subjects were entered in the Kilimanjaro cancer registry from 2015 to 2021. Of these, Pca was diagnosed in 1619 subjects. A total of 364 Pca subjects were diagnosed outside KCMC and hence histology results could not be traced. Of the 1255 Pca subjects who were diagnosed at KCMC, 271 subjects were diagnosed based on clinical findings (without tissue diagnosis) and 270 had missing case notes, hence excluded from clinicopathological characteristics and treatment analysis. Thus, 714 Pca subjects were included in the clinicopathological characteristics and treatment analysis (Fig. 1).

Prevalence of Pca

Pca accounted for 1619 (31.4%) of the total adult male cancer cases entered in the Kilimanjaro population-based cancer registry, followed by oesophageal cancer 837(16.2%) (Fig. 2).

Age and regional distribution of Pca subjects

Of the 1619 subjects with Pca, their age spanned from ≤39 to 91+years with a mean age of 73.9(±9.9) years. The majority 632(39.1%) were in the age group of 71–80 years, with 3(0.2%) subjects aged≤39 years.

Most 1200(74.1%) of the study subjects were from Kilimanjaro, followed by Arusha and Tanga regions with 174(10.8%) and 80(4.9%) cases, respectively, (Fig. 3).

Trend in incidence of Pca

The incidence of Pca increased steadily throughout the duration of the study, with the highest incidence of 405(25%) recorded in 2021. However, in year 2020, there was a slight decrease in incidence, 272(16.8%) compared to year 2019, 300(18.5%). On average, the incidence of Pca is estimated to increase by 48 cases annually (Fig. 4).

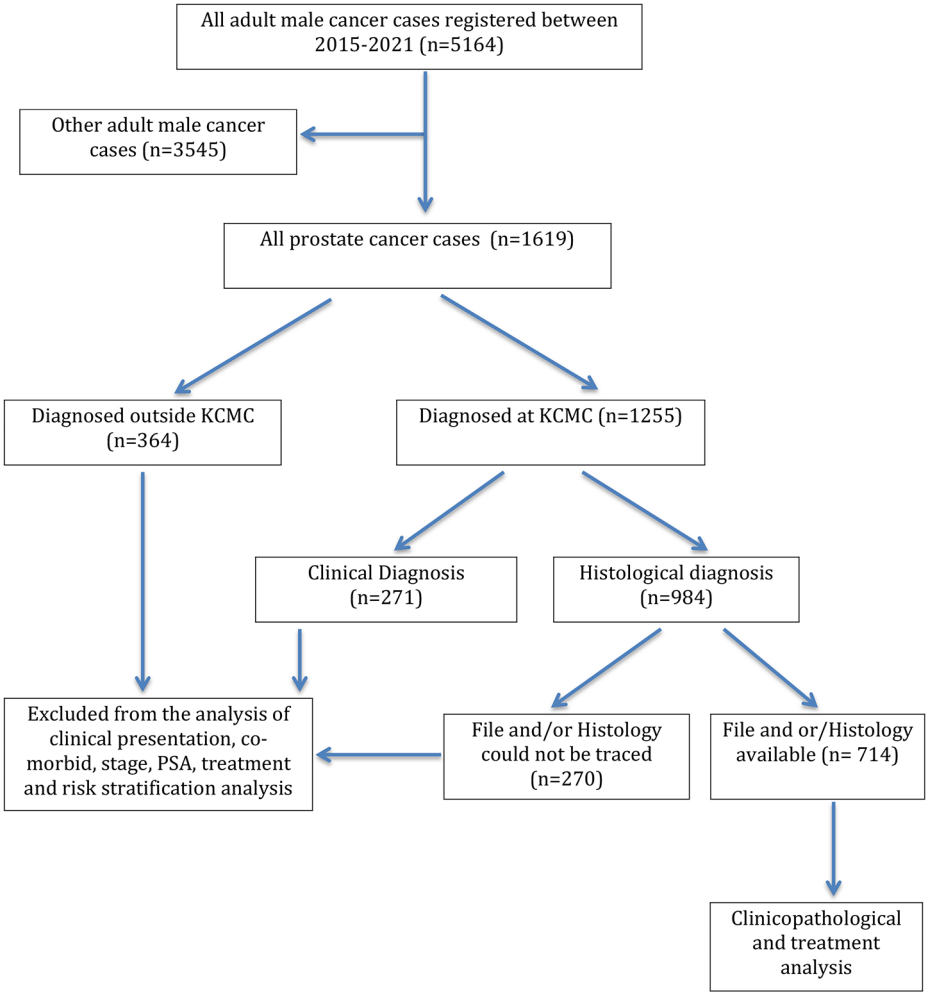

Fig. 1 Flow chart of subjects enrolment (*n* = 5164)

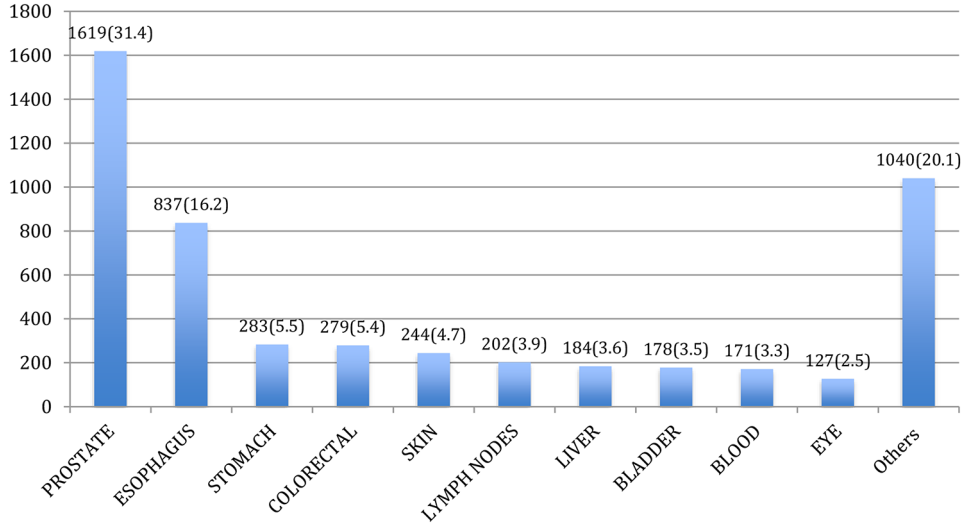

Fig. 2 Types of adult male cancer recorded at Kilimanjaro population-based cancer registry from the year 2015–2021 (*N* = 5164). Others = oral, lung, naso-pharynx, unknown, breast, pancreas, bone, thyroid, kidney, small intestine, penis, gall bladder, Ear/nose, Testis, bile duct, nervous system/nerves, urethra

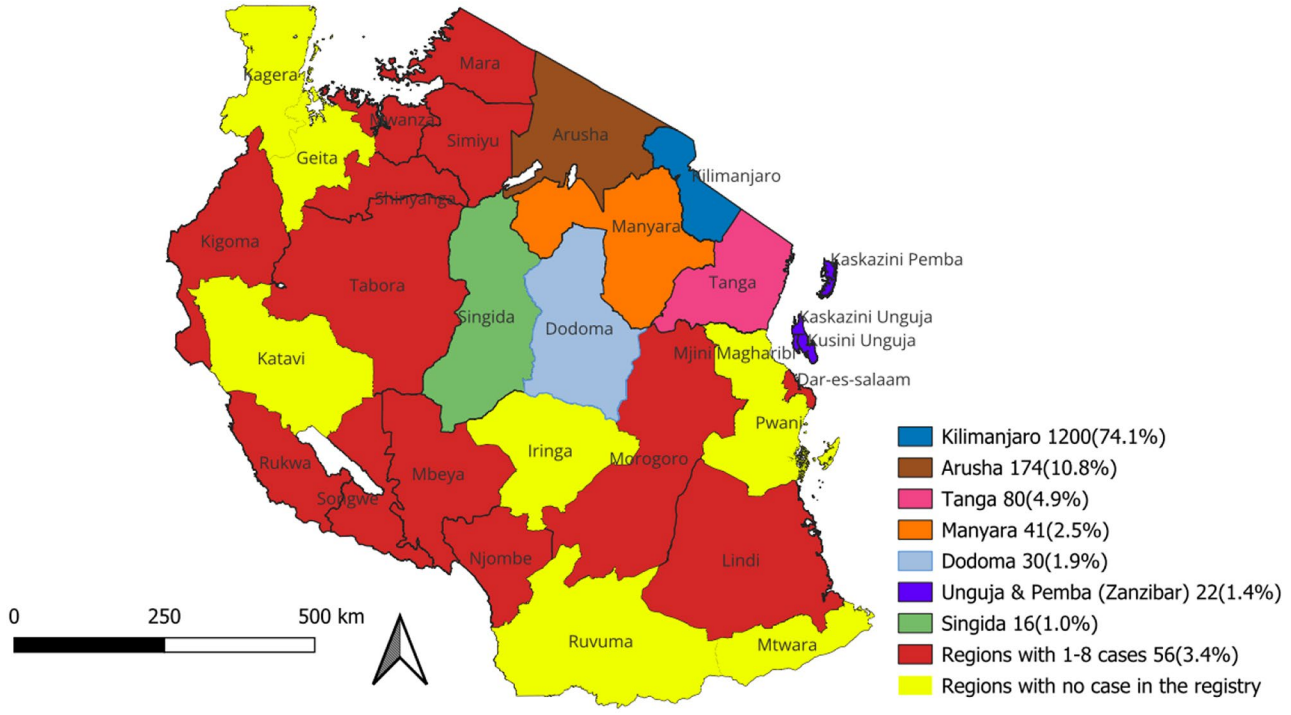

Fig. 3 Map of Tanzania showing regional distribution of subjects diagnosed with Pca from the years 2015–2021

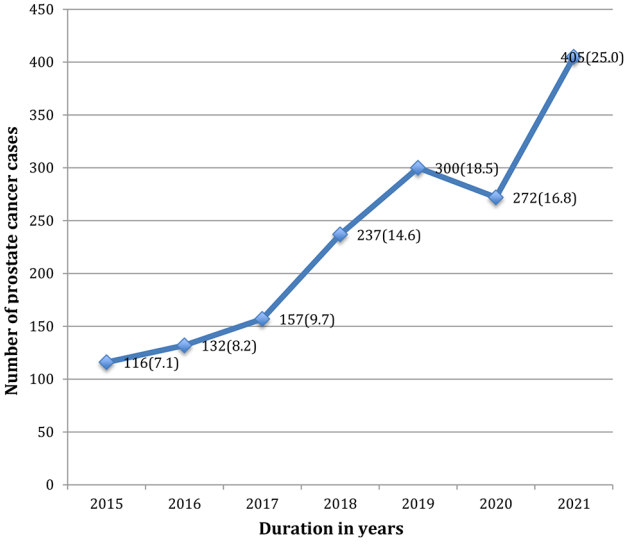

Fig. 4 Trend in incidence of Pca in northern Tanzania from the year 2015–2021 ($n=1619$)

Clinicopathological characteristics of Pca subjects

The majority of Pca subjects presented with signs and symptoms 710(99.4%), with irritative and obstructive lower urinary tract symptoms (LUTS)) accounting for the majority 548(72.7%), followed by lower back pain, 245(34.3%) and urine retention in 173(24.2%). Diabetes mellitus and hypertension were present in 77(11.3%) and 190(27.9%), respectively. A total of 349(51.1%) subjects had PSA>100ng/mL, with Gleason group grades 4 and 5 (Gleason score≥8) accounting for 207(29.5%) and 219(31.2%), respectively. Metastatic disease at initial presentation accounted for 178(43.6%) (Table 1).

Of the 714 Pca subjects, 465(65.1%) had their treatment record available, whereby 237(51%) had an unknown T stage with N0/Nx M0. A total of 440(94.6%) subjects were kept on ADT alone. The main form of ADT was surgical ADT (bilateral total orchiectomy) (BTO), which was provided to 111(37.9%) and 153(52.2%) subjects with metastatic disease and unknown T stage but with Nx/N0M0, respectively. Radical prostatectomy was offered in 4(0.8) subjects (Table 2), whereby the pathological stages were pT3bN0, pT3bN, pT3bNx and pT3aNx. One of the four subjects who underwent radical prostatectomy experienced postoperative urine incontinence and another one developed a surgical site infection.

Discussion

To the best of our knowledge, this is the first study to report on the burden and characteristics of Pca using relatively large population-based Kilimanjaro cancer registry data for the years 2015–2021. The results highlighted that Pca is the most common cancer in men, with an increased trend over the past seven years. The majority of subjects had high PSA, Gleason score and advanced stage at presentation, with ADT being the most common form of treatment offered.

The Pca prevalence of 31.4% in the current study is much higher than the global prevalence of 12% where it

Table 1 Clinicopathological characteristics of Pca cases diagnosed in northern Tanzania from the year 2015–2021

Variable	*n*(%)
Presenting symptoms (*n* = 714)	
Asymptomatic	4(0.6)
Irritative and obstructive symptoms	519(72.7)
Haematuria	29(4.1)
Urine retention	173(24.2)
Paraplegia/Para paresis	30(4.2)
Lower back pain	245(34.3)
History of Diabetes Mellitus (*n* = 680)	
Yes	77(11.3)
No	603(88.7)
History of Hypertension (*n* = 682)	
Yes	190(27.9)
No	492(72.1)
Gleason Group Grade (Gleason score) (*n* = 702)	
Grade 1 (Gleason score ≤ 3 + 3 = ≤ 6)	71(10.1)
Grade 2 (Gleason score 3 + 4 = 7)	117(16.7)
Grade 3 (Gleason score 4 + 3 = 7)	88(12.5)
Grade 4 (Gleason score 4 + 4, 3 + 5,5 + 3 = 8)	207(29.5)
Grade 5 (Gleason score 4 + 5, 5 + 4, 5 + 5 = 9–10)	219(31.2)
Prostate-specific antigen (ng/mL) (*n* = 683)	
≤ 4	9(1.3)
4.01-10	39(5.7)
10.01-20	52(7.6)
20.01-50	114(16.0)
50.01–100	120(16.7)
100.01+	349(51.1)
Median (IQR)	109(36.2,263)
Radiological test (*n* = 408)	
Plain Abdominal and/or lumber sacral x-ray	301(73.7)
Abdominal pelvic CT scan	35(8.6)
CT skeletal survey	67(16.4)
Others*	5(1.2)
T stage (158)	
T1	1(0.7)
T2	12(7.6)
T3	36(22.8)
T4	109(68.9)
Distant Metastasis (*n* = 408)	
Yes	178(43.6)
No	230(56.4)
Risk stratification (152)	
Low risk	2(1.3)
Intermediate	3(2.0)
High risk	147(96.7)

* MRI abdomen and pelvis (4), radioisotope bone scan (1)

is reported to be the second most common cancer after lung cancer [1, 11]. This prevalence is also higher than the prevalence of 24% and 20.3% in Europe and SSA, respectively [7, 8]. The index study corroborates with the finding from a similar study conducted in another zonal referral hospital in Tanzania that had a prevalence of 39.84% [19]. It is well known that the prevalence of Pca varies as a result of variation in utilisation of PSA as a screening tool. However, the role of genetics, environmental and personal lifestyle as risk factors for Pca development cannot be underestimated [2, 24]. The Tanzanian male population is a relatively unscreened group and therefore other factors other than screening might have contributed to the observed high prevalence.

Globally, it has been predicted that the burden of Pca will increase in the near future. Africa countries are expected to record the highest incidence rate [7] with an annual increase rate of 2–10% [25]. The trend of Pca has been reported to be on increase in South Africa from 1998 to 2017 by 7.4% in 2010 and 12.6% in 2017 [26]. Ghana has also proved the increase in Pca cases over the period of five years, with the highest rate registered in the last year of the study (2014) [9]. As results, we were not surprised to find a rapid increase in the incidence of Pca throughout the study period, with the highest incidence being registered in 2021. However, in 2020, there was a slight decrease in the incidence of Pca, which could be due to the effect of COVID-19, where many people preferred not to go to the hospital. The rapid increase in incidence of Pca in Africa may be contributed by increased life expectancy, improved cancer record and health care system and utilisation of PSA in some countries [7, 25].

In the current study, the average age at diagnosis of Pca was around the seventh decade of life, which is in concordance with a similar study done in SSA with an average age at diagnosis of 70(64–77) years [27]. Although it is known that black men present at younger age as compared to Whites, the age at diagnosis of 74 (±9.6) years was slightly higher than 65(8.7) years among Whites [28]. Only 3(0.2%) of our subjects presented at the age ≤ 39 years. We believe the majority of the cases had a sporadic type of Pca that usually takes a long time to develop and is mostly diagnosed after the fifth decade of life, especially in the absence of screening.

Co-morbid conditions like diabetes mellitus (DM) and hypertensions (HTN) are age related conditions. Further, both HTN and cancer have been linked with inflammation, with a high mortality rate being observed among Pca patients with HTN [29]. So we were not surprised to find HTN accounting for 27.9%. However, the prevalence of HTN in this study was lower than the prevalence of 54.6% observed among Caucasians but similar to the prevalence of 28.6% among African Americans [30]. This difference in prevalence might be contributed by the differences in genetics and environmental factors (life style).

A computer tomography (CT) of the pelvis +- abdomen was the primary imaging modality for evaluating the prostate in the majority of cases in this study, with magnetic resonance imaging (MRI) being done in only four cases. A CT scan is not considered suitable for evaluating

Table 2 Treatments offered among subjects diagnosed with Pca in northern Tanzania from the year 2015–2021 (*N* = 465)

	***n* (%)**	**Stages**			
		1 *n*(%)	**2 *n*(%)**	**3 *n*(%)**	**4 *n*(%)**
No. Patients (%)	465(100)	27(5.8)	33(7.1)	237(51.0)	168(36.1)
Variable					
Type ofTreatment offered (*n* = 465)					
Surveillance*	17(3.7)	5(29.4)	4(23.5)	8(47.1)	
Watchful waiting	2(0.4)	2(100)			
Radical prostatectomy alone	3(0.7)	3(100)			
Radical Prostatectomy and ADT	1(0.2)	1(100)			
Radical radiotherapy and ADT	2(0.4)	1(50.0)	1(50.0)		
Androgen deprivation therapy (ADT) only	440(94.6)	15(3.4)	28(6.4)	229(52.0)	168(38.2)
Type of ADT offered (*n* = 440)					
Surgical ADT (BTO)	293(66.6)	10(3.4)	19(6.5)	153(52.2)	111(37.9)
Medical ADT**	97(22.0)	3(3.1)	8(8.2)	47(48.5)	39(40.2)
Combined surgical and medical ADT	50(11.4)	2(4.0)	1(2.0)	29(58.0)	18(36.0)

*The subjects who were not kept on any form of treatment but were instead being followed up were referred to as being under surveillance

** Medical ADT included casodex alone, combined casodex and zoladex and zoladex alone

Stages: 1 = Clinically Localized: T1, T2, T3, N0/Nx, M0. 2 = Locally advanced disease: T4, N0/Nx, M0. 3 = Unknown T -stage: N0/Nx, M0. 4 = Metastatic disease (Any T, Nx, M1)

Pca because of its poor soft tissue contrast and lack of molecular information [31]. A CT scan is mainly used for evaluating the status of lymph nodes and distant metastases. However, CT has low diagnostic accuracy compared with more advanced imaging like positron emission tomography (PET)/CT. MRI of the pelvis allows for more detailed assessment of the pelvis, including the prostate, due to its superior soft tissue resolution as compared to any other imaging modality [31]. In this study, CT was the preferred imaging of choice, most likely because during the study period MRI was not available in the whole of the northern zone. The lack of appropriate imaging modality in resource-limited settings might lead to undertreatment and ultimately high mortality.

Plain X-ray is less sensitive in detecting bone metastasis compared to radioisotope bone scans [32]. However, radioisotope bone scan is not available in our centre, that's why the majority of subjects had plain X-rays as their investigation of choice to rule out bone metastasis. Similarly, at Tanzania National Hospital, Muhimbili, plain X-ray was the second most common investigation for metastatic workup after ultrasound, accounting for 51% [33]. The metastatic prevalence of 42.68% [17], and 46% [11], reported among Ugandans and Sudanese, respectively, is almost similar to what was found in the current study. We would expect the prevalence of bone metastasis to have been higher if more sensitive studies like radioisotope bone scans had been used to evaluate study subjects.

Bhakkan et al. [12] in Guadeloupe noted that PSA of >100ng/mL was prevalent in 5% and Gleason score≥8 accounted for 13.6% [21]. In Nigeria, PSA>20ng/mL was prevalent in only 56%% of cases and a Gleason score>8 in 27.9%. These proportions are much lower than what is found in the present study. However, our findings are in line with a Ugandan study that had PSA>10ng/mL accounting for 81% and a high grade Gleason score at 47.3% [17]. In our previous work at the same centre, KCMC, Tanzania, we found Gleason score>8 and PSA>20ng/mL to account for 57.8% and 86.7%, respectively [14]. The observed differences could be due to differences in Pca screening practices, with poor screening leading to delay in diagnosis and hence late presentation with advanced stage of the disease. By the time we were conducting this study, the Tanzanian male population was relatively unscreened, as evidenced by the 4(0.6%) subjects who were asymptomatic. Some of the barriers to Pca screening include poor knowledge of Pca and its screening. In Dar es Salaam, Tanzania>50% of men have poor knowledge of Pca and its screening, with only 7.7% ever being screened [34].

Small proportional of study subjects had available T stage, PSA and Gleason score for risk stratification, which might have caused overestimation of the prevalence of high-risk disease (97%). However, since the majority (85.4%) of study subjects had PSA>20ng/mL, we expected such a high prevalence of high-risk disease as there is a correlation between PSA and Gleason score as well as advanced Pca [35, 36]. In Oman and Uganda, the prevalence of high-risk disease was 68.1% and 56.5%, respectively [10, 17]. Pca is asymptomatic in its early stages and once it becomes symptomatic, like in our case, it is already an advanced/high risk disease. Although patients with Pca usually die from causes other than the cancer itself [37], advanced disease/high-risk disease is associated with mortality [38]. The high-risk/stage disease might be the reason for mortality observed among Tanzanian men [1]. Pca education and screening are

indicated in order to diagnose the disease at an early curable stage and hence reduce mortality [39].

The majority of subjects were kept on ADT with BTO being the main type of ADT. This is in agreement with other studies in Africa where the disease presents late but also with limited options of treatment [11, 33]. However, Katongole et al. reported 38.4% of subjects were on ADT, a proportional that is much lower than the current study [17]. The backbone for treatment of high-risk non-metastatic Pca is long-term ADT combined with either concurrent radical prostatectomy or radiotherapy [5]. Although we have capacity to do radical prostatectomy in our centre, we had only four subjects who had undergone radical prostatectomy among other treatment options. Further, radiotherapy is not available at the centre, this could explain the low number 2(0.3%) of subjects who benefited from this option. The majority of subjects received surgical ADT probably because of its affordability compared to medical ADT [40].

Limitation and strength of the study

The results of this study should be discussed in light of the following limitations: First, the retrospective design contributed to the missing of necessary information, including patient's files, cancer stage, PSA level and histology report in some cases. This might have caused overestimation of proportions, including proportion of metastatic disease as well as high risk disease. This highlights the need to improve the patient record system for both future studies and patient benefits. Second, this study utilised data from one-zonal population-based cancer registry in Tanzania; therefore, the result may not be generalised to all cancer registries but rather to a registry with a similar context.

Despite these limitations, the study findings were comparable to many other studies and provided a baseline for understanding the trend and characteristics of Pca in a resource-limited setting.

Conclusions

The burden of Pca in northern Tanzania is high and increasing, with a high proportion of metastatic disease at presentation. Therefore, there is a need to educate and encourage the community on the need for Pca screening for early diagnosis. A future large prospective cohort study is recommended to further gain insights on clinicopathological characteristics of prostate cancer patients to mitigate for the limitation of missing data.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12885-024-13194-6.

Supplementary Material 1

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Author contributions
BNN, FS, KAM and BTM participated in the study conception. FS facilitated data acquisition. BNN, SHK, CN, TJM and IJK performed data extraction. BNN and MPM performed data analysis and interpretation of results. BNN, AM and OJM wrote the initial draft of the manuscript. BTM, KAM and MN revised the manuscript critically. All authors read and approved the final manuscript.

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Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval
Ethical approval was obtained from College Research Ethics Review Committee (CRERC) of Kilimanjaro Christian Medical University College (KCMUCo. The director of KCMC Hospital granted the data access permission. Since this study was retrospective with no direct contact with the patient/participants during data collection/extraction, CRERC waived us from obtaining consent from individual participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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