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Original Research Article

Prevalence and predictors of survival among patients with prostate cancer attending Nyeri County and referral hospital, Kenya: a review of records 2017-2022

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ABSTRACT

Background: Prostate cancer is a significant health concern globally. The incidence rate of prostate cancer (PCa) has continued to rise in Kenya. This study aimed to investigate the prevalence of prostate cancer in patients attending Nyeri County and referral hospital in Kenya, identify predictors of survival, and assess the impact of treatment modalities on survival outcomes.
Methods: A retrospective observational design was employed, analyzing data from 252 patient records documented between 2017 and 2022. Demographic characteristics, clinical features, treatment modalities, and survival outcomes were extracted and analyzed.
Results: The prevalence of prostate cancer among the study population was found to be 10.84%. The majority of patients diagnosed with prostate cancer were aged 70 years or older, with none below 40 years. Most patients were residents of Nyeri County, and some came from neighboring counties in central Kenya. The overall survival rate for prostate cancer patients was 64.29%, indicating that 35.71% of patients died during the study period. Advanced age, comorbidities, and late-stage diagnosis were associated with lower survival rates. Multivariate analysis revealed that prostate cancer cases with hypertension were 2.91 times more likely to die compared to those without comorbidities (p=0.01, CI: 1.285051-6.597691).
Conclusions: The study highlights a significant prevalence of prostate cancer in the region and emphasizes the need for enhanced management strategies. Early detection programs, tailored treatment approaches considering comorbidities, and improved access to healthcare services are recommended to enhance survival rates and overall management of prostate cancer in this population.

Keywords: Comorbidities, Predictors, Prevalence, Prostate cancer, Survival outcomes, Treatment modalities

INTRODUCTION

Prostate cancer is a significant health burden globally, impacting millions of men each year. It is the second most common cancer and the fifth leading cause of cancer-related deaths among men worldwide.[1] The burden of prostate cancer varies across different regions, with higher incidence rates observed in developed countries compared to developing nations.[2] Factors contributing to the global burden include aging populations, changes in lifestyle and dietary patterns, and variations in access to healthcare and screening programs.[3] Regionally, prostate cancer burden shows substantial disparities. North America, Europe, and Australia have some of the highest incidence rates globally, while regions such as Africa and Asia generally report lower rates.[4,5] These differences can be attributed to variations in risk factors, genetic predisposition,

healthcare infrastructure, and awareness levels. Limited resources and inadequate screening programs in some regions contribute to late-stage diagnoses, leading to higher mortality rates.[6-8]

In Kenya, prostate cancer is a significant health concern among men. It ranks as the third most common cancer in the country, following lung and liver cancer.[9] Incidence rates have been increasing over the years, and the disease predominantly affects men over the age of 50.[10,11] Several factors contribute to the prostate cancer burden in Kenya, including limited access to healthcare services, lack of awareness and education about the disease, cultural beliefs and stigma surrounding male health issues, and inadequate screening programs.[12,13] Efforts are being made to improve cancer care and raise awareness through initiatives such as education campaigns, screening programs, and the establishment of cancer treatment centers in major cities.

Prostate cancer is a significant health concern among men globally, and its burden in Kenya is also substantial. However, there is a lack of comprehensive data on the prevalence and predictors of survival specific to the Nyeri County region. This knowledge gap hinders the development of targeted interventions, personalized treatment plans, and effective healthcare policies for prostate cancer patients in the area. Understanding the prevalence of prostate cancer in Nyeri County is essential to assess the magnitude of the problem and identify potential areas for intervention. The lack of accurate prevalence data specific to the region hampers healthcare planning, resource allocation, and the implementation of targeted prevention and early detection strategies. Additionally, the absence of updated information may lead to underestimation or inadequate recognition of the disease burden, compromising the provision of appropriate healthcare services and support for affected individuals. Predictors of survival among prostate cancer patients in Nyeri County are crucial for optimizing treatment outcomes and improving patient care. Identifying factors such as stage at diagnosis, treatment modalities, access to healthcare, socioeconomic status, and comorbidities can help healthcare providers and policymakers make informed decisions regarding patient management. Without this knowledge, healthcare professionals may not have the necessary guidance to develop personalized treatment plans or interventions that consider the unique challenges and needs of prostate cancer patients in Nyeri County, potentially impacting their survival rates and quality of life.

Therefore, conducting a study on the prevalence and predictors of survival among prostate cancer patients attending Nyeri County and referral hospital was essential to address the gaps in knowledge, inform targeted interventions, improve healthcare planning, and ultimately enhance the outcomes for prostate cancer patients in the region.

METHODS

Study design

This study utilized a retrospective cohort study design. The medical records of prostate cancer patients who attended Nyeri County and referral hospital during 2017 to 2022 period were reviewed to collect the necessary data.

Sample selection

The sample included all prostate cancer patients attending Nyeri County and referral hospital from 2017-2022 totaling 252. Inclusion criteria included confirmed prostate cancer diagnosis and availability of complete medical records.

Data collection

Data was collected from electronic medical records and paper-based files. Variables of interest included demographic information, clinical characteristics, treatment modalities, comorbidities and survival outcomes. Data collectors were trained to ensure consistency and accuracy in data abstraction.

Data analysis

Descriptive statistics were used to calculate the prevalence of prostate cancer among the patient population attending Nyeri County and referral hospital. Chi-square test was performed to assess the association between various factors and survival outcomes. Factors such as age, stage at diagnosis, treatment modalities and comorbidities were assessed for their association to survival outcomes. Multivariate analysis was conducted to control for confounding variables and determine the independent effects of predictors. Further, multivariate analysis was conducted to explore the association between comorbidities and survival outcomes.

Ethical considerations

The study adhered to ethical guidelines, ensuring patient confidentiality and privacy. Data was anonymized and stored securely. The study was conducted in accordance with the Declaration of Helsinki and obtained appropriate approvals from Nyeri County and referral hospital and relevant ethical review boards; Dedan Kimathi University of Technology, institutional scientific ethics review committee (DeKUT ISERC), National Commission for Science, Technology, and Innovation (NACOSTI) and Nyeri County health department.

RESULTS

A total of 2328 cancer patients' records were reviewed. Of these, 252 were of patients diagnosed with prostate cancer. None of the patients diagnosed with prostate

cancer were below 40 years. Majority, 77.38% (195) were aged 70 + years. Nearly all, 99.6% (251) were at least 50 years old. Majority were residents of Nyeri County 82.54% (208), while the rest were from neighboring Counties of Kirinyaga (5.16%, 13), Laikipia (3.97%, 10), Embu (1.59%, 4), Muranga (4.76%, 12) and Meru (1.59%, 4) in central Kenya. One case was from Machakos County (0.04%, 1).

Prevalence of prostate cancer cases

During the study period from 2017 to 2022, 2328 cancer cases were recorded, a total of 252 prostate cancer cases were identified among these patients attending Nyeri County and referral hospital in Kenya. The prevalence of prostate cancer among the study population was found to be 10.84%.

Survival rates

Among the 252 prostate cancer patients, all of them were followed up until the end of the study period. The overall survival rate at the end of the study was found to be 64.29% (162). This indicates that 64.29% of the patients who were diagnosed with prostate cancer survived until the end of the study, while the remaining 35.71% (90) experienced mortality during the study period. This represents a case fatality rate of 35.71%.

Predictors of survival

Proportionately, of the 252 cases diagnosed with prostate cancer; majority of the deaths, 81.11% (73) were among those aged at least 70 years. In terms of marital status, the married ones 94.44% (85) accounted for majority of deaths. In terms of treatment modalities, of the 72 who had received chemotherapy, no fatality was experienced for those who had at least 10 cycles of chemotherapy, as was the case for those who had received at least 20 cycles of radiotherapy (total who received radiotherapy- 12). However, the availability and utilization of specific treatment options varied among patients, and further investigation is required to explore the reasons behind these variations.

Those cases with renal disease (n=2) and HIV (n=2) reported 100% mortality while those labelled as having co-morbidity hypertension, diabetes mellitus and cardiovascular disease (CVD) had 22.03% (n=59), 25% (n=12), 57.14% (n=7), mortality respectively. Several factors were analyzed to determine their association with survival rates among prostate cancer patients. The demographic characteristics of the patients, including age (p=0.368), marital status (p=0.538), County of usual residence (p=0.640- Fisher's exact) were found not to have a significant impact on survival outcomes. Equally, the staging-alternative staging (p=0.635), surgery (p=0.393), number of cycles for chemotherapy (p=0.693) and radiotherapy (p=0.136) were not significant. Additionally, patients with combined comorbidities, such as hypertension, CVD and diabetes and HIV, hypertension and renal disease, were found to have a zero-survival rate (n=3, 100%, mortality) compared to those without comorbidities or with single comorbidity. Having comorbidities was significantly associated with survival (p=0.016). Table 1 shows the characteristics of patients in detail.

Table 1: Descriptive characteristics of 252 prostate cancer patients registered between 2017 and 2022 at Nyeri County referral hospital.

Variables	N	%	Cumulative %	P value
Age (years)				
40-49	1	0.4	0.4	
50-59	13	5.16	5.56	
6069	43	17.06	22.62	0.368
70 +	195	77.38	100	
Total	252	100		
Marital status				
Single	1	0.4	0.4	
Married	242	96.03	96.43	0.538
Divorced	2	0.79	97.22	
Widowed	7	2.78	100	
Total	252	100		
Comorbidities				
None	186	73.81	73.81	
Hypertension (HTN)	46	18.25	92.06	
Renal disease	1	0.4	92.46	
CVD	1	0.4	92.86	
HIV	3	1.19	94.05	0.016
Diabetes mellitus	2	0.79	94.84	
DM +HTN	8	3.17	98.02	
HTN + CVD	2	0.79	98.81	
DM+CVD+HTN	2	0.79	99.6	
HIV+HTN+ renal disease	1	0.4	100	
Total	252	100		
County of residence				
Nyeri County	208	82.54	82.54	
Kirinyaga County	13	5.16	87.7	0.64
Laikipia County	10	3.97	91.67	
Embu County	4	1.59	93.25	
Murang'a County	12	4.76	98.02	
Meru County	4	1.59	99.6	
Machakos County	1	0.4	100	
Total	252	100		
Patient status				
Dead	90	35.71	35.71	
Alive	162	64.29	100	
Total	252	100		

Furthermore, out of the 252 cases evaluated, only 2.78% (2) were diagnosed at an early stage, while 90.08% (227) were diagnosed at an advanced stage (locally advanced

and metastatic). This indicates a high proportion of late-stage diagnoses, suggesting potential delays in detection and access to healthcare services.

Table 2 shows the prostate cancer staging for the patients in detail.

Table 2: Prostate cancer staging for patients registered between 2017 and 2022 at Nyeri County referral hospital.

Variables		N	%	Cumulative %
Alternative staging	Early	7	2.78	2.78
	Locally advanced	41	16.27	19.05
	Metastatic	186	73.81	92.86
	Uncertain	18	7.14	100
	Total	252	100	

Survival rates were higher for those diagnosed early, majority of those in early stage were still alive at the end of the reporting period. Of these 90 deaths reported, 87.78% (79) were diagnosed at an advanced stage (locally advanced and metastatic). This highlights the importance of early detection and timely interventions in improving survival outcomes for prostate cancer patients.

Table 3 shows the prostate cancer staging vis a vis patient status for the patients in detail.

Table 3: Prostate cancer staging vis a vis patient status for patients registered between 2017 and 2022 at Nyeri County referral hospital.

Staging	Patient status		
	Dead	Alive	Total
Early	1	6	7
Locally advanced	6	35	41
Metastatic	79	107	186
Uncertain	4	14	18
Total	90	162	252

At multivariate analysis, prostate cancer cases with hypertension were 2.91 times more likely to die compared to those without comorbidities (2.91, p=0.01, CI: 1.285051-6.597691).

The prevalence of prostate cancer among patients attending Nyeri County and referral hospital in Kenya was found to be 10.84%. The overall survival rate for prostate cancer patients was 64.29%

DISCUSSION

The study's findings reveal important insights into the prevalence, survival rates, and predictors of survival among prostate cancer patients in the studied population. The prevalence rate of 10.84% indicates a significant burden of prostate cancer in patients attending Nyeri County and referral hospital in Kenya, globally, the burden is substantive.[14] This highlights the need for increased efforts in terms of awareness, screening, and early detection strategies to address the high prevalence of prostate cancer.

The overall survival rate of 64.29% indicates that there is room for improvement in the management and outcomes of prostate cancer in this setting. Recent research has highlighted the need for enhanced management strategies and improved outcomes for prostate cancer patients. For instance, a study by Zhang et al conducted a retrospective analysis of prostate cancer patients and reported a similar finding of a 5-year survival rate of 66.5%. This suggests that efforts should be directed towards optimizing treatment approaches and developing innovative therapies to increase the survival rates of patients.[15] The high mortality rate among patients aged 70 years and above suggests that advanced age is a significant predictor of poor survival outcomes. Several recent studies have supported the observation that advanced age is associated with poorer survival outcomes in prostate cancer patients. For instance, a population-based study by Hamada et al analyzed a large cohort of elderly prostate cancer patients and found that older age was independently associated with higher mortality rates.[16] These findings emphasize the need for age-specific interventions and tailored treatment strategies for elderly patients. Additionally, being married was associated with a higher mortality rate, which may be influenced by various factors such as social support, access to healthcare, and overall health status. The influence of marital status on prostate cancer outcomes has been investigated in recent studies. Contrary to our findings, a study by Zhang et al examined the impact of marital status on survival outcomes and reported that unmarried patients had worse overall survival rates compared to married patients. The authors suggested that social support, including emotional and instrumental support from a spouse, might play a role in the observed difference in mortality rates.[17]

Similar to our approach, recent research has emphasized the importance of demographic factors as possible predictors of survival in prostate cancer patients. A study by Wu et al explored the impact of demographic factors, including age, marital status, and socioeconomic status, on the survival outcomes of prostate cancer patients. The findings highlighted the significance of these factors in influencing treatment decisions and developed personalized support strategies for patients.[18] This underscores the importance of a holistic approach in prostate cancer management.

The study also highlights the impact of comorbidities on survival outcomes. Patients with renal disease, HIV, or combined comorbidities of hypertension, cardiovascular disease, and diabetes had significantly higher mortality rates. This accentuates the importance of comprehensive management strategies that address both prostate cancer and coexisting health conditions. Close monitoring, appropriate treatment selection, and coordinated care for

patients with comorbidities can potentially improve survival rates in this population.

The high proportion of late-stage diagnoses, with the majority of cases diagnosed at advanced stages, suggests potential delays in detection and access to healthcare services as was similarly reported in a review of the literature on racial disparities in the diagnosis of prostate cancer, treatment, survival, and genetic susceptibility.[19] This finding underscores the need for enhanced efforts in promoting early detection and timely interventions for prostate cancer. It is crucial to raise awareness about the importance of regular screenings, especially among high-risk individuals like those advanced in age, and ensure that healthcare services are accessible and available for early diagnosis and treatment. Timely interventions can significantly improve survival outcomes for prostate cancer patients, as demonstrated by the higher mortality rate among patients diagnosed at advanced stages.

The finding that prostate cancer cases with hypertension are 2.91 times more likely to die compared to those without comorbidities highlights the potential impact of hypertension on the survival outcomes of prostate cancer patients.[20] This association between hypertension and increased mortality is consistent with several recent studies in the field. A study by Wallis et al conducted a retrospective analysis of over 20,000 prostate cancer patients and found that hypertension was significantly associated with worse overall survival. The study reported a hazard ratio of 1.29 (95% CI: 1.22-1.37), indicating a 29% increased risk of death among patients with hypertension.[21] These findings support the notion that hypertension is an important comorbidity that can negatively influence the prognosis of prostate cancer patients. Similarly, a systematic review and meta-analysis by Zhang et al explored the impact of comorbidities on survival outcomes in prostate cancer. The analysis revealed that hypertension was associated with a higher risk of all-cause mortality in prostate cancer patients, with a pooled hazard ratio of 1.19 (95% CI: 1.08-1.31).[22] This suggests that hypertension can be considered a significant predictor of poor survival in prostate cancer. Furthermore, the relationship between hypertension and mortality in prostate cancer patients may be influenced by the interplay of various biological mechanisms. Hypertension can contribute to chronic inflammation, oxidative stress, and vascular dysfunction, which may promote tumor progression, metastasis, and resistance to treatment.[23] These factors can potentially impact the overall survival of prostate cancer patients with hypertension.

In conclusion, this study's findings highlight the prevalence, survival rates, and predictors of survival among prostate cancer patients in this population. The results emphasize the need for targeted interventions focusing on early detection, appropriate treatment selection, and comprehensive management strategies that address comorbidities. Further research and interventions are necessary to enhance early detection efforts, and reduce the burden of late-stage diagnoses in this population. Efforts should also be made to address the specific challenges faced by older patients and those with comorbidities to improve their overall survival outcomes.

The retrospective nature of this study, reliance on medical records for data collection, missing or incomplete information, and the possibility of selection bias were some limitations. Efforts was made to mitigate these limitations through rigorous data collection, validation, and appropriate statistical analysis

CONCLUSION

This study examined the records of 2328 cancer patients, 252 of whom had prostate cancer. The prevalence of prostate cancer among the study population was 10.84%. The overall survival rate for prostate cancer patients was 64.29%, indicating that there is room for improvement in the management and outcomes of prostate cancer in this setting. Factors such as advanced age, comorbidities, and late-stage diagnosis were notable possible risk factors to survival of prostate cancer patients. Early detection, appropriate treatment selection, and the management of comorbidities were identified as crucial factors that may improve survival outcomes. The high proportion of late-stage diagnoses suggests potential delays in detection and access to healthcare services, highlighting the importance of early detection and timely interventions. The study emphasizes the need for further research and interventions to address the identified gaps and enhance prostate cancer care in this population.

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