

RESEARCH

Open Access



Prevalence of prostate cancer and its grade group stage at diagnosis in patients treated with prostatectomy in rural south western Uganda

Robert Mugarura^{1*}, John Lule¹, Jacqueline Akello¹, Mary Katushabe², Joram Mugisha³ and Everd Bikaitwoha Maniple¹

Abstract

Background Prostate cancer is the most frequently diagnosed cancer among men in the world. Uganda and Zimbabwe have been reported to have highest incidence rates of prostate cancer in sub-Saharan Africa. There are no urologists and no prostate cancer diagnostic facilities in rural communities in south western Uganda. Men with lower urinary tract symptoms are treated with prostatectomy by midlevel healthcare workers and general surgeons without prior prostate cancer screening. Histological diagnosis relies on the prostate tissue retrieved during surgery and the results may take several months. Prostate cancer care in southwestern Uganda remains uncoordinated and has not been documented before. This study aimed to establish and document the burden of prostate cancer in rural southwestern Uganda as a basis for further research.

Methods This was a retrospective study conducted in hospitals in rural southwestern Uganda. We used hospital records as primary source of data. Histology results of patients treated with prostatectomy during the five-year period (2019–2023) were retrieved and data extracted for analysis. 1013 patients were included in the study. Univariate data analysis was done with STATA version 17.0. The study received ethics clearance for Kabale university REC and Uganda National council of Science and Technology.

Results The average age of patients in this study was 70.6 year (range 54–102 years). Prostate cancer was present in 232 (22.9%) patients. Seventeen (7.3%) patients with prostate cancer were below sixty years. Most (75.4%) of the patients with prostate cancer in this study had low to intermediate risk disease. Perineural tumor infiltration was present in 28.9% of prostate cancer patients.

Conclusion More than 1 in 5 men (22.9%) with lower urinary tract symptoms treated with prostatectomy in the study period in southwestern Uganda had prostate cancer. Majority of patients (75.4%) had low to intermediate risk disease. These findings highlight the urgent need for systematic improvements in prostate cancer care, including

*Correspondence:
Robert Mugarura
rmugarura@kab.ac.ug

Full list of author information is available at the end of the article



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

sensitization of both health workers and the general population, establishment of early screening and regional diagnostic and treatment facilities to enhance patient outcomes in resource -limited rural communities in Uganda.

Clinical trial number Not applicable.

Keywords Prostate cancer, Urology, Rural community, Diagnostic challenges, Uganda

Background

Prostate cancer (Pca) is the most frequently diagnosed cancer among men in the world [1] and the leading cause of cancer related death among men in Sub-Saharan Africa and the Caribbean [2]. The relative burden of prostate cancer among males in sub-Saharan Africa is particularly high and accounts for 20.3% of all cases of cancer in men [3] with Uganda and Zimbabwe having the highest Prostate cancer incidence rates in Africa [4].

Though the current incidence of prostate cancer in Uganda is unknown, the Age Standardized Incident Rate of prostate cancer in Uganda is expected to increase from 41.6 per 100,000 in 2001–2015 period to 60.5 per 100 000 men by 2030 [5].

Available prostate cancer statistics in Uganda are mainly from the Cancer Institute and the Kampala Cancer Registry in central Uganda. There are hardly any reports from rural communities in Uganda.

Uganda has less than 20 registered urologists for a population of 45.9 million. Majority of the urologist reside in urban centers which deprives the rural communities of the much-needed urological care. As a result, there is a persistent lack timely access to appropriate surgical diagnosis and care in rural communities in southwestern Uganda [6].

Patients with lower urinary tract symptoms in rural communities are often treated with prostatectomy performed by general doctors and other midlevel medical practitioners. Histological diagnosis is obtained post operatively and may take up to six months to obtain the results. As a result, Prostate cancer care in rural southwestern Uganda is not streamlined and remains largely uncoordinated.

There is also limited knowledge regarding prostate cancer disease; its occurrence, symptoms and treatment in Ugandan population [7]. The limited knowledge of prostate cancer and the severe shortage of healthcare resources including scarcity of urologists and diagnostic tools in rural southwestern Uganda, contribute to significant delays in prostate cancer detection, often resulting in advanced disease at presentation.

This study aimed at determining the occurrence of prostate cancer among patients undergoing prostatectomy in rural communities in rural Southwestern Uganda. Results from this study provide an insight into the burden of prostate cancer in rural southwestern Uganda. The results also highlight the urgent need for

prostate cancer assessment and treatment in rural communities in Uganda.

Methods

This was a retrospective study conducted in hospitals in southwestern Uganda. Histology results of all patients who underwent prostatectomy over a period of five years (2019–2023) were retrieved from Hospital archives and data extracted for analysis. A total of 1096 medical records were retrieved. 83 records had missing data and were excluded. 1013 record with complete data of patients with lower urinary tract symptoms treated with prostatectomy were enrolled for this study. All the records were obtained from Private not for profit health facilities in southwestern Uganda. No records were available in public hospitals.

This study received ethics approval from Kabale University research and ethics committee. Administrative clearance to access hospital records was obtained from hospital administration. Simple descriptive analysis to establish the demographic characteristics of patients, prevalence of prostate cancer and the Gleason score group grade using STATA version 17.

Results

The average age of patients in this study was 70.6 year (range 54–102 years). The patients' age was further subdivided into age groups as shown in Table 1.

Prevalence of prostate cancer

The prevalence of prostate cancer in this study was 22.9% as shown in Table 2. Seventeen (7.3%) patients with prostate cancer were below sixty years. Other prostate pathologies found were benign prostate hyperplasia (BPH), prostatitis and prostate intraepithelial neoplasia (PIN). Most (75.4%) of the patients with prostate cancer had low to intermediate risk disease at diagnosis. Perineural prostate cancer infiltration was present in 28.9% patients at diagnosis.

Discussion

In this study, more than 1 in five patients (22.9%) treated with prostatectomy for lower urinary tract symptoms (LUTS) were found to have prostate cancer. This is higher than the lifetime rate of 1 in 6 men in the United States [8]. In the neighboring Ankole region, a higher prevalence of prostate cancer of 52.2% was found among men

Table 1 Demographic and age distribution of patients

Age group	Frequency	Percent	Cumulative percentage
below 60 years	153	15.03	15.03
61–70 years	379	37.49	52.52
71–80 years	332	32.74	85.26
over 80 years	149	14.74	100.00
	1,013	100.00	

Key- BPH Benign prostate Hyperplasia, PIN; prostate intraepithelial neoplasia, GS; Gleason Score

Table 2 Prevalence of prostate cancer and its stage at diagnosis

Histology findings	Freq. (n = 1013)	%	Cumulative percentage (%)
BPH	746	73.6	73.6
BPH, Prostatitis	26	2.6	76.2
BPH, low grade PIN	7	0.7	76.9
BPH, High grade PIN	2	0.2	77.1
Prostate Cancer	232	22.9	100
Age distribution of Prostate cancer	Freq. (n = 232)	%	Cum. %
Below 60 years	17	7.3	7.3
60–70 years	90	38.8	46.1
71–80 years	86	37.1	83.2
> 80 years	39	16.8	100
Prostate Cancer Stage at Diagnosis	Freq. (n = 232)		
Low risk (GS ≤ 6)	44	19	19
Intermediate risk (GS = 7)	133	57.3	76.3
High risk (GS = 8)	51	22	98.3
Very high risk (GS = 9–10)	4	1.7	100
Perineural involvement (N = 232)			
NO	165	71.1	71.1
YES	67	28.9	100

attending the urology clinic of Mbarara Regional Referral Hospital with LUTS [9]. Though these hospital-based studies may be affected by adverse selection bias, they indicate a high prevalence of prostate cancer among men seeking care for LUTS in western and southwestern Uganda communities.

In this study prostate cancer affected more men in the 60–80 years age group. Prostate cancer was also found in 17 patients (7.3%) below 60 years. As noted by Pernar, 2018, patients of black race are likely to develop a more aggressive form of prostate cancer and present with metastatic disease as early as 45 years of age compared to their white race counterparts [1]. This underscores the need for prostate cancer early screening among high-risk males in southwestern Uganda.

With an improvement in life expectancy among the Ugandan male population from 48.8 years in 2000 to 66.7 years in 2021, more men will be seeking treatment for

various prostate gland related diseases including prostate cancer [10].

Majority (76.3%) of the patients with prostate cancer in this study had low to intermediate risk disease at diagnosis (GS less than 8) and only 28.9.7% of patients had perineural involvement at diagnosis. This is lower than a Gleason score of 8 reported in a study in Mbarara [8] and a GS > 8 reported from Kampala Cancer Registry, Central Uganda [11]. In another study conducted from Uganda cancer institute (UCI), 90% of prostate cancer patients had advanced disease with a Gleason score of 9 and a high median PSA of 91.3ng/ml indicating metastatic disease [12]. This may be because more than 75% of patients who are received at UCI are referrals from regional referral hospitals in Uganda and other neighboring countries [12]. Patients are often referred to UCI with advanced diseases after failing to respond to available treatments in the lower health facilities.

The mode prostate cancer Gleason score at diagnosis in this study of 7 is higher than the mode Gleason score of < 6 reported in high income countries with a 5-year survival rate of nearly 100% [13]. Increase in Gleason score and tumour Grade Group has been found to be directly related to tumour size, disease progression and prognosis [14].

PSA was not routinely done for patients undergoing prostatectomy in southwestern Uganda. Only 237 (23.4%) of the patients had PSA result. This is due to non-availability of the test and the cost of the test. The average cost of PSA test in southwestern Uganda is 10 USD. It was also noted that the machines used to quantify PSA levels used a scale of up to 100ng/ml. As a result, it was not possible to accurately determine the average PSA levels in this study. Limited PSA data (23.4% availability) in this study reduced the ability to evaluate prostate cancer biochemical profile comprehensively.

All patients were treated from private facilities in southwestern Uganda. These are mainly faith-based health facilities that charge patient fees to offer care. No routine free prostate cancer care service was available in public health facilities in southwestern Uganda. Families in southwestern Uganda whose main economic activity is subsistent farming often experience catastrophic expenditure on health care resulting into impoverishment [15]. Its estimated that 33.8% of the rural population in Uganda live below the poverty line of USD 1.77 per person per day [16].

The high poverty levels, need for out-of-pocket patient fees, reduced national healthcare funding and non-availability of health insurance further complicates early diagnosis of prostate cancer. There is a urgent need for government of Uganda to prioritize and streamline prostate cancer diagnosis and care in the public health facilities. This will help to eliminate the socioeconomic

barriers in prostate cancer care in rural communities in Uganda.

The lancet commission on prostate cancer, 2024, noted that late diagnosis of prostate cancer is now widespread worldwide but especially in Low Middle-Income Countries (LMICs), where late diagnosis is the norm [17]. To combat the problem of late prostate cancer diagnosis, the commission recommended; an emphasis on education for both health workers and the general population that is linked to outreach screening programmes to increase Pca awareness, and a shift from palliative to curative therapies based around surgery and radiotherapy [17].

Investment in both diagnostic and therapeutic equipment and training of health workers by the Uganda government and its development partners is key in improving prostate cancer care through early diagnosis and initiation of appropriate curative treatment to improve favourable patient survival and good quality of life.

Conclusion

More than 1 in 5 men (22.9%) with lower urinary tract symptoms treated with prostatectomy in southwestern Uganda had prostate cancer. Majority of patients (75.4%) had low to intermediate risk disease. There is a urgent need for the government of Uganda to prioritize and streamline prostate cancer diagnosis and treatment in rural communities in Uganda. Investing in diagnostic and therapeutic equipment, decentralization of diagnostic facilities, training of health care workers and sensitization of the general population can improve prostate cancer diagnosis and care in rural communities in Uganda.

Study limitations

This was a retrospective hospital-based study limited to only patients treated for prostatectomy. As a result, it was not possible to evaluate the treatment outcomes of patients with prostate cancer in terms of survival and quality of life. It was also not possible to establish the socioeconomic and other factors associated with prostate cancer in southwestern Uganda. We recommend a prospective population-based study to further appreciate the burden of prostate cancer in southwestern and to document the available treatment options and treatment outcomes.

Abbreviations

BPH	Benign prostate hyperplasia
GS	Gleason score
LUTS	Lower urinary tract symptoms
Pca	Prostate cancer
PSA	Prostate specific antigen
UCI	Uganda cancer institute
WHO	World health organisation

Acknowledgements

We acknowledge Mr Ninsiima Herbert for assisting in data analysis and hospital staff of Bwindi hospital, Kisiizi hospital, Kabale Regional Referral Hospital and St Francis Mutorele hospital who assisted in availing the patient records required for this study.

Author contributions

Conceptualization: R.M, E.M, J.L. Methodology: R.M, E.M, J.L., Data Curation: K.M, J.M, R.M, Writing – Original Draft Preparation: R.M, E.M, A.J, Writing – Review & Editing: R.M, E.M, J.L, A.J, Supervision, E.M, J.L. All authors have read and approved the Manuscript for submission.

Funding

This study was funded by Kabale University through the Kabale University Directorate of Research and Publications.

Data availability

The raw data set from this study has patient information and is therefore not available for the general public. It can only be availed by the corresponding author on special and genuine request.

Declarations

Ethical approval and consent to participate

This study involved human participants and was conducted in accordance with the Declaration of Helsinki. This study was reviewed and approved by Kabale University research and ethics committee (KABREC-2023-11) and Uganda National council of science and technology (HS3101ES). Waiver of participant written informed consent was granted by the Kabale University research and ethics committee. Administrative clearance to access patient information was obtained from hospital administration.

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Kabale University School of Medicine, Kabale, Uganda

²Muhumure Health foundation, Kabale, Uganda

³Kisiizi Hospital, Rukungiri, Uganda

Received: 29 August 2024 / Accepted: 19 December 2024

Published online: 27 December 2024

References

1. Perner CH, Ebot EM, Wilson KM, Mucci LA. The epidemiology of prostate cancer. *Cold Spring Harbor Perspect Med*. 2018;8(12):a030361.
2. World Health Organization. Global Health Observatory. Geneva: World Health Organization. 2018. [who.int/gho/database/en/](https://www.who.int/gho/database/en/). Accessed 24th May 2020.
3. Parkin DM, Bray F, Ferlay J, et al. Cancer in Africa 2012. *Cancer Epidemiol Biomarkers Prev*. 2014;23:953–66.
4. Chu LW, Ritchey J, Devesa SS, et al. Prostate cancer incidence rates in Africa. *Prostate Cancer*. 2011;2011:947870.
5. Asasira J, Lee S, Tran TXM, et al. Infection-related and lifestyle-related cancer burden in Kampala, Uganda: projection of the future cancer incidence up to 2030. *BMJ Open*. 2022;12:e056722. <https://doi.org/10.1136/bmjopen-2021-056722>.
6. Robert M, Jonathan NA, Kisakye NI, Mary K, Mutakoha E. Persistent unmet need for surgical care in Western Uganda. *Trop Doct*. 2024;18:00494755241261734.
7. Nakandi H, Kirabo M, Semugabo C, Kittengo A, Kitayimbwa P, Kalun S, Maena J. Knowledge, attitudes and practices of Ugandan men regarding prostate cancer. *Afr J Urol*. 2013;19:165–70.
8. Pollock PA, Ludgate A, Wassersug RJ. Prostate cancer. *Curr Oncol*. 2014;22:10.
9. Kyegombe W, Joseph E, Ronald O, Lagoro K, Eddymond E, Aniitah N, Mwesiigwa MM. Prevalence and histological patterns of prostate cancer

- among patients presenting with obstructive lower urinary tract symptoms at mbarara regional referral hospital. medRxiv 2023;27:2023–07. <https://data.who.int/countries/800>, Accessed 28th /8/2024.
10. Yahaya JJ, Okecha T, Odida M, Wabinga H. Prognostic factors for overall survival of patients with prostate Cancer in Kyadondo County, Uganda. *Prostate cancer*. 2020;2020:8517130. <https://doi.org/10.1155/2020/8517130>.
 11. Yahaya JJ, Okecha T, Odida M, Wabinga H. Prognostic factors for overall survival of patients with prostate cancer in Kyadondo County, Uganda. *Prostate Cancer*. 2020;2020(1):8517130.
 12. Mazariello CG, Egger S, King MT, Juraskova I, Woo H, Berry M et al. Fifteen-year quality of life outcomes in men with localised prostate cancer: population based Australian prospective study *BMJ* 2020;371:m3503 <https://doi.org/10.1136/bmj.m3503>
 13. Zelic R, Giunchi F, Fridfeldt J, Carlsson J, Davidsson S, Lianas L, Mascia C, Zugna D, Molinaro L, Vincent PH, Zanetti G. Prognostic utility of the gleason grading system revisions and histopathological factors beyond gleason grade. *Clin Epidemiol* 2022;18:59–70.
 14. Anderson GA, Ilcisin L, Kayima P, Abesiga L, Portal Benitez N, Ngonzi J, Ronald M, Shime MG. Out-of-pocket payment for surgery in Uganda: the rate of impoverishing and catastrophic expenditure at a government hospital. *PLoS ONE*. 2017;12(10):e0187293.
 15. Uganda Bureau of Statistics (UBOS). Uganda National Household Survey, 2019/2020. Uganda; UBOS: Kampala; 2021.
 16. James ND, Tannock I, N'Dow J, Feng F, Gillissen S, Ali SA, Trujillo B, Al-Lazikani B, Attard G, Bray F, Comp  rat E. The Lancet Commission on prostate cancer: planning for the surge in cases. *Lancet*. 2024;403(10437):1683–722.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.