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Clinicopathologic Characteristics of Prostate Cancer in a Nigerian Tertiary Health Facility

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Abstract

Background: Cancer of prostate (CAP) is a public health problem. Its prognosis depends on various clinical and histopathological parameters.
Objective: The study aimed to analyze the clinical and histopathological characteristics of CAP diagnosed in our facility.
Methods: This was a retrospective, descriptive cross-sectional study of histopathologically confirmed cases of CAP seen in our facility over a 3year period.
Results: Out of the 550 cases reviewed during the study period, CAP was histopathologically diagnosed in 201 patients, giving an incidence of 36.5% for CAP in this study.
The mean age of the patients was 69.4+10.0 years (ranges:45.0 to 95.0 years). Twenty-two patients (10.9%) had a positive family history of CAP. The commonest symptom at presentation was lower urinary tract symptoms (LUTS) (63.7%) followed by urinary retention (8.0%). The median PSA was 35.8 ng/ml (Ranges: 7.9 to 200.0 ng/ml) while 116 (57.7%) had abnormal digital rectal examination (DRE) findings. The predominant source of tissue for histopathology was prostate biopsy (85.1%). All were adenocarcinomas histopathologically, with majority of patients, 92.0 (45.8%), having moderately differentiated tumors. Gleason grade 3, being the predominant grade, was seen in 109 (54.2%) patients while the Gleason score 7 was the commonest observed in 92 (45.8%) patients.
The commonest ISUP grade seen in 55 (27.4%) patients was grade 1 with the least (12.4%) being ISUP grade IV.
There was no correlation between the age and the Gleason grade, Gleason score, ISUP grade and serum PSA (p-value >0.05) but there was a statistically significant difference in the mean age at diagnosis with those having a positive family history of CAP presenting at earlier age compared to those without positive family history (P<0.001)
Conclusion: Adenocarcinomas were the only histopathology variant seen in this study with majority of tumors being moderately differentiated. Gleason grade 3 was the predominant pattern seen with ISUP grade 1 tumors being commonest. A positive family of CAP is an important determinant of age of onset of CAP.

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Introduction

Cancer of prostate (CAP) is a public health problem[1]. Its prognosis depends on various clinical and

histopathological parameters[2].

CAP is a disease of the elderly with 80% of men diagnosed at the age ≥65[3]. In the United States of America, prostate cancer is the most common cancer of males and is second only to lung cancer as a cause of cancer-related deaths[4].

Prostate cancer, just like most cancers in other parts of the body, is often asymptomatic at early stages in the evolution of the disease process and is often detected by various screening methods. Advanced disease presentation is rarein western countries but can be common in low middle income countries (LMIC) like ours where population-based screening strategies are not commonly practiced[2,3]. Hence, the need for routine screening in our environment for early detection and treatment of prostate cancer cannot be overemphasized.

The integration of digital rectal examination (DRE), serum prostate specific antigen (PSA) testing, multiparametric MRI prostate scan and prostate biopsy procedures (when indicated) forms a comprehensive diagnostic approach for suspected cases of CAP.

Hence, histopathological examination of prostatic specimens serves as the gold standard diagnostic approach for differentiating malignant from benign prostatic diseases.

The Gleason grading system forms the cornerstone for histopathological assessment of tissue samples from suspected cases of CAP[5]. Gleason score is one of the most powerful predictors of prostate cancer progression and survival[6]. Urologists often use it along with other clinical parameters to risk-stratify patients with CAP. The most commonly used risk stratification method for CAP patients is the National Comprehensive Cancer Network (NCCN) and D'Amico classification systems[7]. This stratifies CAP patients based on serum PSA, clinical stage and biopsy core histology into low risk (Gleason score 2-6), intermediate risk (Gleason score 7) and high risk (Gleason score 8-10)7. Gleason grading system is not without its limitations. One of such limitations is the lumping of Gleason score 7 into one group as intermediate risk group as depicted by NCCN classification system. Whereas many clinicians consider finding of Gleason score 7 on biopsy samples to be of intermediate risk, several studies have shown that patients with Gleason score 4+3 tumors demonstrate worse pathological stage and biochemical recurrence rates than ones with Gleason score 3+4 tumors[8,9].

To address some of these limitations, Epstein et al during a 2014 consensus meeting of the International Society of Urological Pathologist (ISUP) proposed a grading system that was subsequently endorsed and adopted by the World Health Organization (WHO)[10]. This new grading system is termed ISUP Grade Groups. Basically, ISUP Grade Group 1 = Gleason score ≤ 6, Grade Group 2 = Gleason score 3+4, Grade Group 3 = Gleason score 4+3, Grade Group 4 = Gleason score 8, and Grade Group 5 = Gleason score 9 & 10[11].

Despite the fact that both Gleason score 3+4 tumors and Gleason score 4+3 tumors belong to Gleason grade 7, they are separately recognized and depicted as ISUP Grade Groups 2 and 3 respectively.

Considering the fact that CAP patients often present late in our environment with poor prognosis, there is need to study the peculiarities of CAP patients seen in our environment. Hence, the aim of the study is to analyze the clinical and histopathological characteristics of CAP amongst men diagnosed with the CAP in our locality. An insight into the clinico-pathologic characteristics of CAP will help in better understanding of the various prognostic factors as well as aid in improving treatment strategies in order to ensure better outcome.

Materials and method

This was a retrospective cross-sectional study in a Nigerian tertiary health facility. The study population included all male patients aged ≥40 years with complete records who were histopathologically confirmed to have CAP in our facility.

The study was carried out over a 3-year period from January 2021 to December 2023.

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Ethical approval was also obtained from the University Research Ethics Committee of Ebonyi State University, Abakaliki, Nigeria (Approval No: EBSU/DRIC/UREC/Vol.02/001), 30/04/2025.

The research was carried out the Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AEFUTHA), Ebonyi state, Nigeria.

All participants were provided with detailed information about the procedures, their rights, including right to withdraw at any time without any penalty. Written informed consents were obtained from all the participants after being fully informed of

the procedure's potential benefits and risks.

The study center is a major multi-specialty tertiary health facility located in Ebonyi State, Southeast Nigeria with a 720-bed capacity. It also serves as a major referral center for the neighboring states of Enugu, Abia, Imo, Benue and Cross River.

The study involved retrieval and retrospective review of case files of patients who were histopathologically diagnosed of CAP in our facility during the study period.

Extracted clinical data for analysis included: the patients' socio-demographic characteristics, symptoms at presentation, digital rectal examination (DRE) findings, serum PSA, source tissues for histopathology, Gleason's Grade, Gleason's Score, & ISUP grade.

Data analysis was done using IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, NY, USA). The relationship between the age and the Gleason grade, Gleason score, ISUP grade and serum PSA were assessed using Chi-square test. The relationship between the presence of a positive family history of prostate cancer and the age of onset of the cancer was also determined using Student t-test.

Where appropriate, figures and tables were used to represent some of the data. P-value < 0.05 was considered to be statistically significant.

Result

Out of the 550 cases reviewed during the study period, CAP was histopathologically diagnosed in 201(36.5%) patients. The mean age of the CAP patients was 69.40+10.0 years (range 45.0 to 95.0 years). The peak incidence was at 70-79 years, closely followed by 60-69 years accounting for 36.8% and 31.8%, respectively. Only 6 cases of prostate cancer (3.0%), were seen in patients aged < 50 years as shown in (Figure 1).

The commonest symptom at presentation was lower urinary tract symptoms (LUTS) (63.7%) followed by urinary retention (8.0%) (Fig.2)

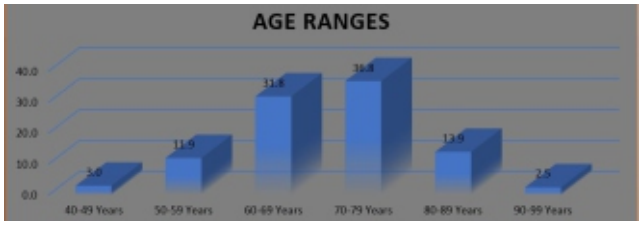

Figure 1: Age Distribution of Patients in years

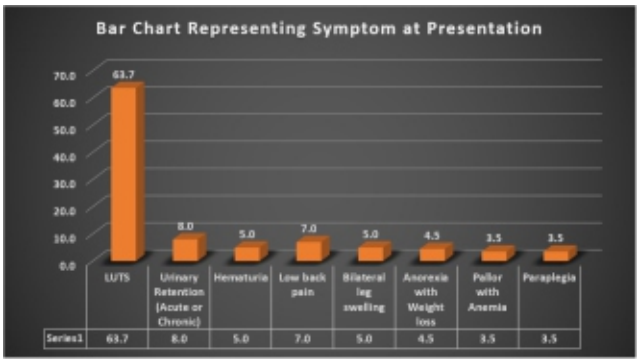

Figure 2: Symptoms at Presentation

Twenty-two (10.9%) patients had a positive family history of CAP with abnormal DRE findings seen in 116 patients (57.7%).

There was a statistically significant difference in the mean age at diagnosis with those having a positive family history of CAP presenting earlier compared to those without positive family history (P<0.001) (Table 1)

Table 1: Comparison of Mean Age at Diagnosis (Patients with a Positive family history vs. without a Positive family history of CAP)

Family History of CAP	N (%)	Age (Years) Mean ± SD(Min-Max)	95% C.I For Mean	T	P. value
Yes	*22.0 (10.9%)*	57.8±8.2 (45.0 – 78.0)	54.2 – 61.5	-6.059	<0.001
No	179.0(89.1%)	70.7±9.5 (44 - 95)	69.3 -72.1		
Total	**201**				

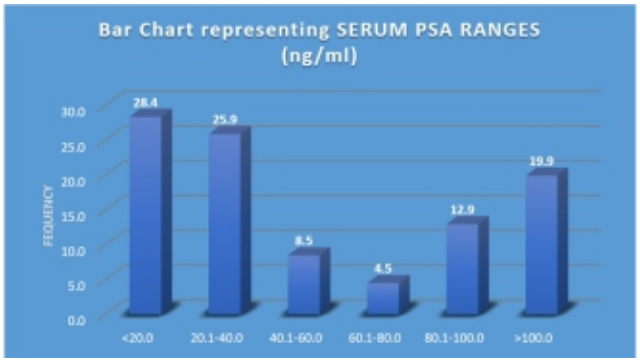

Figure 3: Distribution of Pre-biopsy Serum PSA

The median pre-biopsy serum PSA was 35.8ng/ml (Ranges: 7.9 to 200.0ng/ml) (Fig 3)

The predominant source of tissue for histopathology was prostate biopsy (85.1%) followed by open prostatectomy samples in 11.9% of cases (Fig 4)

Out of these 201 cases, 171.0 (85.1%) were clinical carcinoma (with diagnosis made from

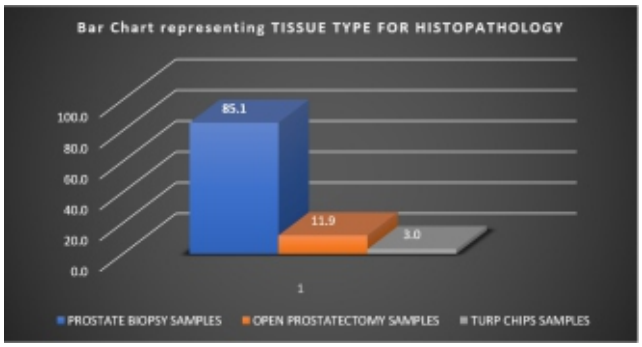

Figure 4: Source of tissue for histopathology

histopathology of trucut biopsies in clinically suspected carcinoma cases), while 30 (14.9%) were incidental carcinoma cases (being diagnosed in open prostatectomy and TURP specimens amongst patients that were clinically diagnosed with nodular benign prostatic hyperplasia pre-operatively).
Histopathological examination of the tissue samples showed that all were adenocarcinomas with 92.0 patients (45.8%) having moderately differentiated tumors (Figure 5).

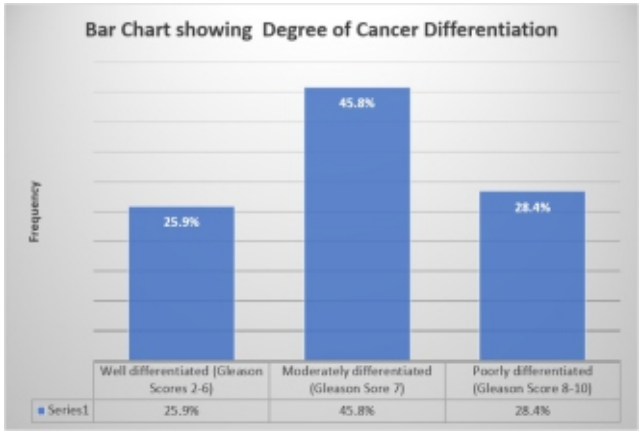

Figure 5: Degree of cancer differentiation

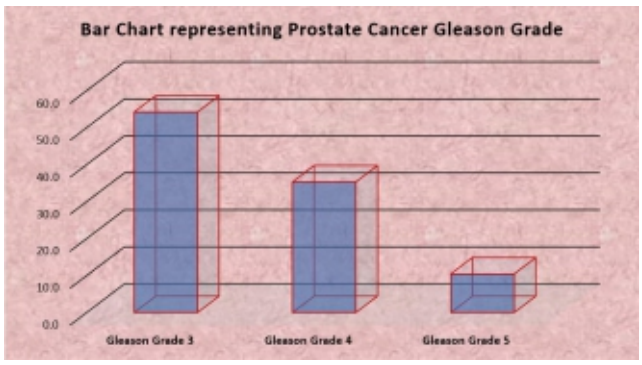

Figure 6: Gleason grades of the patients

The Gleason grade 3 was predominantly seen in 109.0 (54.2%) patients with the least being grade 5 seen in 21.0 (10.4%) patients as shown in (Figure 6).
The Gleason score 7 was predominantly seen in 92.0 patients (45.8%), followed by Gleason score 6 seen in 53.0 patients (26.4%) and the least being Gleason score 10 in 5.0 patients (2.5%) (Fig 7)

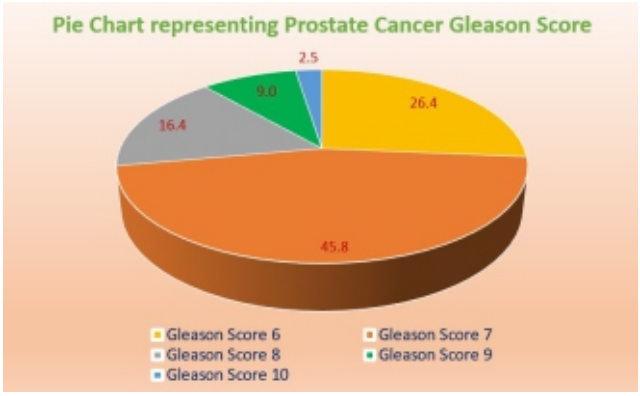

Fig 7: Gleason scores of the patients

Fifty-three (26.4%) patients had Gleason score 6 while 148.0 (73.6%) patients had Gleason score 7-10.
The ISUP grade group I was the commonest grade seen in 55 patients (27.4%), followed by ISUP grade group II in 51 patients (25.4%) with least being ISUP grade group IV seen in 25 patients (12.4%) (Figure 8)

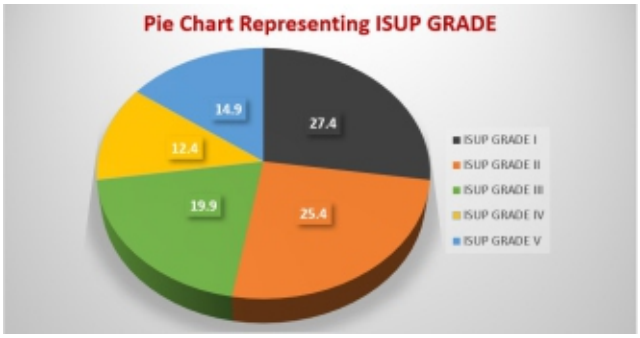

Figure 8: Distribution of the ISUP grade

There was no relation between the age and the Gleason grade, Gleason score, ISUP grade and serum PSA (p-value > 0.05)
However, a statistically significant positive correlation was noted between the existence of a family history of prostate cancer and the age of onset of the cancer (p-value <0.005).

Discussion

The incidence of CAP in our study was 36.5%. This is in tandem with the incidence of 37.4% noted by Obiora et al[11]. A closely related but lower incidence rates were observed by Mohammed A Z et al from Jos, Nigeria, Cavit et al. from Turkey and Nwafor C C et al from Lagos, Nigeria which showed an incidence of 24.6%, 29.0% and 29.3% respectively[12,13,14].

However, the incidence rates noted in our study and other previous studies[11,12,13,14] were higher compared with the incidence of 20.5% from Asian Japanese population[15].

Thus, there is significant variations in the reported incidence of CAP worldwide. These observed differences in the incidence of CAP in our study compared to that of Caucasians and Asians might be explained by geographical variations in genetic, environmental, lifestyle and dietary factors[15].

Since most of the studies including ours are hospital-based and not population-based studies, the observed incidences in these studies may not be a true representation of the incidence in general population. Hence, a larger population-based study is necessary to validate the findings of these studies and determine the true incidence of CAP.

The mean age of the patients in this study was 69.40+10.0 years. This is similar to the findings by Sabalpara M A et al[16] and Okeke U.V et al[17] in their studies but at variance with Gaikwad S.L et al[18] and Shah R et al[19] that noted a lower mean age of 63.7+ 5.9 years and a higher mean age of 74.9+ 8.1 years respectively.

There was bimodal peak in the incidence of prostate cancer in our study with highest incidence (36.8%) seen in age group70-79 years followed closely by age group 60-69 years (31.8%). This finding of bimodal peak in the incidence of CAP is similar with the observation by Nwafor C C et al in their study[14]. Our study also found that prostate cancer is predominantly seen in 8th decade (70-79year) of life which is similar to findings of previous studies[14,16,17,19,20,21,22]. However, some other studies[18,23] noted that the peak incidence of prostate cancer occurs at 7th decade (60-69 years) of life. Prostate cancer is predominantly a disease of ageing men and it is commonly seen in seventh and eighth decades of life as has been demonstrated by our study and previous ones[14,16,17,18,19,20,21,22,23]. Prostate cancer is rare before age of 50.0years. In our study, only 6.0 of cases of CAP (3.0%) occurred in patients aged <50.0 years. This is in keeping with the findings of previous studies[11,14,16,22,23] with the incidence of CAP in patients aged <50.0 years ranging from 1.0 to 4.5%. However, other studies[17,18,19,21] noted that none of their patients presented before age of 50.0 years.

The role of the age of the patient as a significant prognostic factor in prostate cancer is controversial[24,25,26,27].

While some studies[24,25] have shown that younger men are likely to have a more aggressive disease and carry a worse prognosis, other studies[26,27] on the contrary have demonstrated that CAP in young men has a better prognosis with more favorable outcomes compared with CAP in older men.

Generally speaking, CAP presenting at younger age group tends to be more aggressive with poorer prognosis and often seen in patients with positive family CAP[28]. This study demonstrated a statistically significant positive correlation between the existence of a family history of prostate cancer and the age of onset of the cancer. This means that those with positive family history of CAP are more likely to present at younger age than those without positive family history. Consequently, it is recommended that men with positive family history should start early screening with Prostate Specific Antigen (PSA) testing29.

As expected, only 5 of patients aged ≥ 90.0 years had CAP (2.5%). This is similar to findings of previous studies[14,16,17,18,19,20,21,22,23]. This study showed a steep increase in the frequency of CAP with the peak incidence noted at 7th and 8th decades of life and then declining precipitously thereafter. Prostate cancers amongst elderly men, especially those with well differentiated tumors, often run a slow indolent course[30]. Such patients are often likely to die with, instead of dying from the CAP. Masterly inactivity with watchful waiting or active surveillance may be a viable option of managing this category of patients[30].

DRE is an important bedside screening procedure in clinical evaluation of patients to allow for early detection of CAP[31]. Abnormal DRE findings were seen in 116 (57.7%) of patients.

The pre-biopsy serum PSA ranged from 7.9 to 200.0ng/ml with median value of 35.8ng/ml. None of the patients had serum PSA < 4.0 ng/ml. This high PSA is in keeping with late presentations that bedevils our subregion as has been reported by earlier authors[32].

Prostate biopsy is the cornerstone of prostate cancer diagnosis. The indications for prostate biopsy commonly include abnormal DRE findings, serum PSA > 4.0ng/ml or both. All our patients had serum PSA > 4.0ng/ml. This means that the indications for prostate biopsy in our patients were either a combination of both abnormal DRE findings and elevated serum PSA (as seen in 57.7% of the patients), or elevated serum PSA only (seen in 42.3% of the patients). None of our patients had prostate biopsy based solely on abnormal DRE findings alone.

In our study, all the patients had symptoms with the commonest presenting symptoms being obstructive LUTS (63.7%) followed by urinary retention (8.0%). This is similar to findings by Sabalpara M A et al[16] that noted that 82.0% of their patients presented with obstructive LUTS. This clinical presentation is in keeping with advanced disease.

In our study, the predominant source of tissue for histopathology was prostate biopsy (85.1%) followed by open prostatectomy samples and the least being TURP samples. This is similar to previous studies[11,16,23,33] where the major source of their tissue samples was prostate biopsy. This is in contrast with the study by Gaikwad S.L et al[18] and Rajan S et al[19] where the samples were predominantly TURP specimens. Nasiru R et al[22] also noted that the predominant source of tissue for their histopathology was open prostatectomy specimens. Previous studies have shown that the source of tissues for histopathology is of prognostic significance as prostate cancer detected incidentally from TURP chips have been shown to be of a better prognosis than ones detected through core prostate biopsies[34,35].

The zonal anatomy of the prostate as popularized by McNeal[36] allows for localization of the zone of origin of CAP foci. McNeal identified that 68.0% of prostate cancers originate from the peripheral zone (PZ), 24.0% from the transitional zone (TZ), and 8.0% from the central zone (CZ)36.

Cancer foci detected incidentally in tissue removed by TURP (clinical stage T1a or T1b) are predominantly of transitional zone (TZ) origin, while clinically palpable cancers on DRE (clinical stage T2a, 2b or 2c) detected by core prostate biopsies are predominantly of peripheral zone (PZ) origin 37. Generally, CAP arising from the TZ is associated with more favorable pathological features and may have less malignant potential with better prognosis than tumors that arise in the PZ[34,35].

Incidental CAP (iCAP) is defined as symptom-free cancer that is unexpectedly detected following histopathologic examination of prostate specimens from prostatic pathology that was previously presumed to be benign[38]. It is often diagnosed after tissue samples were subjected to histology following TURP or open prostatectomy procedures for clinically suspected cases of BPH. In our study, 30 (14.9%) cases of iCAP were recorded. This is similar to the finding of CC Obiorah et al[11] that found 17.2% cases of iCAP in their study but is in contrast with the study by Nwafor CC et al[14] that noted 2.2% of iCAP cases. These category of patients with the diagnosis of iCAP should be adequately counselled about this, treatment options discussed and appropriate treatment measures instituted as soon as possible in order to ensure good outcomes.

Several histopathological variants of CAP exist in accordance with WHO classification[34]. Majority (95%) of CAP are adenocarcinomas with other less common histological subtypes which include transitional cell carcinoma, neuroendocrine tumor, small cell carcinomas, signet ring carcinoma, basal cell carcinoma accounting for about 5%[39]. In our study, the histologic subtype of CAP were all adenocarcinomas (100%). This is similar to the findings of previous studies[11,16,18,19,20,21,22,33] that also noted adenocarcinoma as their only histologic subtype. However, Okeke U.V et al[17] observed in their study that 1.6% of their patients had transitional cell carcinoma while Buanza R L et al[23] found that 7.6% of their patients had squamous cell carcinoma, with the rest being adenocarcinoma in both studies. Kusuma Puttaswamy et al[21] also noted a single case of neuroendocrine tumor in their study with the rest being adenocarcinomas.

The Gleason grade 3 was predominantly seen in 109 (54.2%) patients with the least being grade 5 seen in 21 (10.4%) patients. This is in keeping with the findings by Rajan S et al[19].

The finding of Gleason score 7 as the most predominant Gleason score in our study was similar to the observation from previous studies[14,16,18,20,21]. However, this is at variance with the studies by Obiorah CC et al[12] & Shah Ret al[19] that noted the predominance of Gleason score of 8 and 9 respectively.

Since Gleason Score is an important prognostic indicator, one can appreciate the possible reason why

CAP has a high mortality in Nigeria. This may be because our patients typically present late mainly with high GS 7 and above tumors. Some authors have attributed lack of awareness of the disease as the plausible cause of late presentation with the high Gleason scores[32].

The ISUP grade 1 was the commonest grade seen in 55 (27.4%) patients. This is in consonance with the findings by Pushpaet al[20] but at variance with Shah R et al[19] and Rive Lukuaku Buanza et al[23], both studies noting the ISUP grade 5 to be commonest. Other studies[11,16,18,20,21,22], however, were silent on the ISUP grades of their patients.

Majority of our patients, 92.0(45.8%) had moderately differentiated adenocarcinomas. This finding is similar with the previous studies[11,20,33] that observed that the majority of the cases of adenocarcinoma in their patients were moderately differentiated. In this study, 148.0 (73.6%) patients had Gleason score of 7-10. This is similar with the study by Obiorah C C et al[11] that noted that 60.6% of their patients had scores[7-10].

Studies have also shown that patients with a pathological GS of ≤6 have an excellent progression-free survival, which can be up to 90.0%. However, men with a GS ≥7 adenocarcinoma have a 29.0 to 43.0% risk of death from prostate cancer[40]. GS ≥7 was seen in 73.6% of our patients and as such, are presumed to have a poor prognosis.

This is in keeping with other Nigerian studies that have found that majority of their prostate cancer patients present late with high Gleason cores and thus have poor prognosis[11,14,17,22].

The degree of differentiation is an important prognostic factor[2]. The less differentiated a tumor is, the more aggressive it is with poorer prognosis. By implication, majority of patients in our environment have poor prognosis.

Hence, the need for a comprehensive prostate cancer screening protocol for early detection and treatment of patients in order to ensure good outcome.

Conclusion:

Histopathologically, CAP consist of a diverse spectrum of disease with clinical behavior ranging from well-differentiated noninvasive tumor to high-grade metastatic cancer with profound morbidity and mortality.

Adenocarcinomas were the only histopathology variant seen in this study with majority of patients having poorly differentiated tumors. A positive family of CAP is an important determinant of age of onset of CAP. The Gleason score 7 and ISUP grade 1 tumors were predominantly seen with majority of our patients presenting late with high grade (Gleason scores 7-10) disease.

Recommendation: Increased public awareness campaign with routine comprehensive population-based CAP screening strategy will allow for early detection and treatment of cases to improve outcome.

Abbreviations

AE-FUTHA: Alex Ekwueme Federal University Teaching Hospital Abakaliki

CAP: Cancer of Prostate
DRE: Digital Rectal Examination
ISUP: International Society of Urological Pathologists
LMIC: Low Middle-Income Countries
LUTS: Lower Urinary Tract Symptoms
MRI: Magnetic Resonance Imaging.
NCCN: National Comprehensive Cancer Network
PSA: Prostate Specific Antigen
Author Contributions

AOU, JU, OFE, CO: Designed the study, performed the study, analyzed the data, and drafted the initial manuscript.
AOU, AOO, SO, UUO: Contributed to the study design, collected data, and review manuscript
EA, CJO, EA: Performed the statistical analysis, and help revise the manuscript
All authors reviewed and approved the final version of the manuscript

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Availability of data and materials

Research datasets are intact and can be readily made available on demand for it.

Declarations

Ethics approval and consent to participate

Ethical approval for the study was obtained from the University Research Ethics Committee of Ebonyi

State University, Abakaliki, Nigeria (Approval No: EBSU/DRIC/UREC/Vol.02/001, Date: 30/04/2025).

Consent for publication

This is a retrospective study that does not require the consent of all patients for publication. Our manuscript does not contain any individual person's data in any form (including individual details, images or videos) which require consent for publication.

Competing interests

The authors declare no competing interest.

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