Original Article,

An Analysis of Prostate Biopsy Results at the Cape Coast Teaching Hospital, Ghana

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Abstract:
Introduction: Prostate cancer is the commonly diagnosed male cancer worldwide. The best technique for the diagnosis of prostate cancer is prostate biopsy. Transrectal ultrasound (TRUS)-guided biopsy of the prostate enhances early diagnosis of prostate cancers.
Objective: The aim of the study is to describe the clinical and pathological characteristics of Prostate cancers as seen at the Cape Coast Teaching Hospital
Materials and Methods: A total of 62 patients who underwent TRUS-guided prostatic biopsy over a period of 3 years (January 2019- December 2021) participated in the study. Their data were analyzed retrospectively using the archives of the pathology department of the Cape Coast Teaching Hospital.
Results: Of the 62 patients who underwent TRUS-guided prostrate biopsy from January 2019 to December 2021, their mean age was 68.3 with an age range of 34-89 years. 67.7% had adenocarcinoma of the prostate, 1.6% had spindle cell cancer, 24.2% had benign prostate hyperplasia and 6.5% had chronic prostatitis.
Conclusion: The indications for prostate biopsy in our center detect more patients with prostate cancer than other prostate pathologies. The serum PSA significantly correlated with the Gleason grade.

Keywords: PSA density, Prostate Specific Antigen (PSA), Digital Rectal Examination (DRE), Radical Prostatectomy, Adenocarcinoma of the Prostate

Introduction:

Prostate cancer is the leading diagnosed cancer among males worldwide and the third among all cancer cases in the world, after breast and cervix uteri cancer(1,2).

The best way to diagnose prostate cancer is the histopathological examination of a radical prostatectomy specimen. It ensures that focal cancers are not missed, and grading is representative of the tumor present in the prostate. However, this is not feasible in each patient suspected to have prostate cancer hence, prostate biopsy is accepted as the best technique for diagnosing prostate cancer. To improve accuracy, this is done under image guidance and multiple sites are also sampled. Indeed, the introduction of transrectal ultrasound (TRUS)-guided biopsy of the prostate has significantly enhanced the early diagnosis of prostate cancer (3-6).

Although no level of PSA can be considered normal, prostatic biopsy is generally recommended for men with a prostate-specific antigen (PSA) level above 4 ng/ml(3). The prostate cancer prevention trial data showed that there is a continuum of risk for prostate cancer based on the level of PSA (7). The trial data suggested a downward review of the threshold for prostate biopsy after it found that a significant number of men with PSA of less than 4ng/ml had clinically significant malignancy (7). In fact, there is still debate on whether risk rises with PSA and whether a low PSA level can rule out prostate cancer (8,9).

Prostate cancer is the most diagnosed cancer among adult males in Ghana but literature on prostate cancer in Ghana is scanty (10).

This paper analyses the findings on prostatic biopsy in Ghanaian men with elevated (> 4ng/ml) PSA.

Data on prostate cancer from the central region of Ghana is nonexistent. Our objective is to describe the clinical and pathological characteristics of prostate cancer patients seen at the only tertiary referral facility in the Central and Western regions and make recommendations for the improvement of care.

Methods:

A total of 62 patients who underwent TRUS-guided prostatic biopsy over a period of 3 years (January 2019- December 2021) participated in the study. Their data were analyzed retrospectively using the archives of the pathology department of the Cape Coast Teaching Hospital. Data regarding age, PSA, number of cores, and final histology were retrieved from the archived requisition and histopathology report forms. The indication for PSA included men presenting for routine prostate cancer screening, men with lower urinary tract symptoms and men with clinical suspicion of malignancy. Prostate biopsy was indicated for men with elevated PSA, abnormal prostate on digital rectal examination (DRE) or both. No biopsies were taken in patients with PSA less than 4 ng/ml and for patients with PSA: 4-10ng/ml with normal prostate on DRE, decision for biopsy was also based on the PSA density or the PSA velocity. Biopsies were done by a urologist under transrectal ultrasound guidance. The 12-core biopsy was the target for each patient but some patients had extended core biopsies if suspicious areas were seen on ultrasound. Specimen was sent for histopathology in separate containers for left and right lateral lobes. Reporting was done according to the College of American Pathologists cancer guidelines template. Inflammation was considered as the main histological diagnosis only when there was no coexisting cancer or precursor lesions in any of the cores. Patients were stratified into three groups based on their PSA: 4–10.0 ng/ml, >10.0 – 20ng/ml, and >20 ng/ml.

Data was captured using the Epi-data software and analyzed with PASW Statistics for Windows, Version 28.0. Chicago: SPSS Inc. The x2 test was used to evaluate differences in proportions and any significant results are reported at $P < 0.05$.

Ethical clearance for this study was obtained from the Ethics Review Committee of the Cape Coast Teaching Hospital. Ethics number: CCTHERC/EC/2022/030

Results:

A total of 62 men had prostate biopsies over the study period. The mean age was 68.3 years with an age range of 34-89 years. There were 9(14.5%) patients with PSA 4-10ng/ml, 13(21.0%) with PSA 11-20ng/ml and 40 (64.5%) patients with PSA >20ng/ml as shown in Table 1.

Table 1: Age distribution and PSA range

Age (Years)	Frequency (%)	PSA Group			Total (%)
		4-10 ng/ml	11-20 ng/ml	>20 ng/ml	
<50	3(4.8)	1	1	0	2(3.2)
51-60	7(11.3)	2	0	6	7(11.3)
61-70	26(42.0)	5	4	16	25(40.3)
71-80	23(37.1)	2	3	17	22(35.5)
>80	3(4.8)	2	1	3	6(9.7)
Total	62(100.0)	11	9	42	62(100.0)

Twelve cores were obtained from 48(77.4%) men and extended cores taken from 14 (22.6%) men. There were 42(67.7%) men with prostate adenocarcinoma, one (1.6%) with spindle cell sarcoma, 15(24.2%) men with benign prostate tissue suggesting nodular hyperplasia and 4(6.5%) men with active chronic prostatitis. Four of the patients with prostate adenocarcinoma had repeated biopsies as initial biopsies suggested benign prostate tissue with Atypical Small Acinar Proliferation (ASAP) suspicious for malignancy. Prostate cancer was detected in 4(44.4%), 6(46.2%) and 32(80%) of men with PSA 4-10ng/ml, 11-20ng/ml and >20ng/ml respectively. Table 2 shows the distribution of serum PSA levels among the various pathologies and Table 3, the age distribution and total Gleason score for Prostate cancer patients. Patients with PSA > 20ng/ml were more likely to have cancer (χ2 = 18.6047, P< 0) as compared to the other two groups.

Table 2: Histopathology findings and PSA range

PSA(ng/ml)	4-10	11-20	>20	Total
BPH	3	5	7	15
Prostatitis	1	2	1	4
Adenocarcinoma	4	6	32	42
Spindle cell sarcoma	1	0	0	1

Table 3: Age distribution and total Gleason score for Prostate cancer patients

Age (Years)	Total Gleason Score					Total
	6	7	8	9	10	
<50	0	1	0	0	0	1
51-60	0	3	1	1	0	5
61-70	4	8	2	2	1	17
71-80	5	7	2	2	0	16
>80	0	2	1	0	0	3
Total	9	21	6	5	1	42

The distribution of high grade disease (Gleason 8-10) was 2/4, 2/6 and 8/32 respectively for PSA 4-10ng/ml, 11-20ng/ml and >20ng/ml as shown in Table 4. There is no statistical difference. ($\chi2$ = 0.212, P= 0.65). Almost half (47.6%) of the patients with prostate adenocarcinoma had intermediate risk disease with Gleason 7.

Table 4: PSA range and total Gleason's Score for cancer patients

PSA group(ng/ml)	Total Gleason Score					Total
	6	7	8	9	10	
4-10ng/ml	1	1	0	1	1	4
11-20ng/ml	0	4	1	1	0	6
>20ng/ml	8	16	5	3	0	32
Total	9	21	6	5	1	42

Among the patients with adenocarcinoma of prostate, there was no correlation between patient age and serum PSA (P= 0.53), Gleason score (P=0.34) or percentage of positive cores (P=0.23). Similarly, there was no significant relation between the Gleason score and the percentage of positive cores (P= 0.25) and the percent of positive cores and the serum PSA (P= 0.96). However, there was a significant correlation between the Gleason score and serum PSA (P= 0.035)

Discussion:

In the prostate cancer prevention trial, 15 percent of men in the control group who had a PSA < 4.0ng/ml had prostate cancer on the end- of –study biopsy. In fact, 15 percent of these cancers were moderate to high grade (a Gleason score of 7 to 9).(11) However, most clinicians use a PSA threshold of 4.0 ng/ml for men over the age of 50 years with normal prostate findings on rectal exam to make decisions for prostate biopsy. This is the practice in our center and hence almost all men who undergo prostate biopsy in our center and were included in this study had PSA > 4.0ng/ml. The acceptance of 4ng/ml threshold for biopsy is a reasonable balance in the controversy on use of PSA for prostate screening.

The use of higher PSA thresholds risks missing a cancer until it is too late for a cure, whereas the use of lower PSA thresholds increases not only unnecessary biopsies but also the proportion of biopsies that identify clinically insignificant disease. (9,12-14)

In this study, prostate cancer was detected in 4(44.4%), 6(46.2%) and 32(80%) of men with PSA 4-10ng/ml, 11-20ng/ml and >20ng/ml respectively, confirming that increasing PSA levels increased the risk of prostate cancer. Our data also suggests that in our patients with indication for biopsy, cancer is more common than BPH or prostatitis. This is in contrast with the findings in Indian men where prostatitis was commonest at all levels of PSA. (15)

Prostate cancers detected at lower PSA levels are more likely to have a small volume (less than 0.5 ml) and to be low-grade. (16,17)

However, it is interesting to observe that 50% of the 4 cancer patients with PSA 4-10ng/ml in this study had high grade (Gleason 9 and 10) disease. In fact, the only cancer patient with Gleason score 10 in this study had PSA of 7.4ng/ml and prostate biopsy was done mainly because of abnormal rectal examination findings.

In this study, 24.2% and 6.5% of patients with PSA > 4.0ng/ml had benign prostatic tissue with features suggestive of nodular hyperplasia (BPH) and prostatitis respectively. It should be noted that several conditions other than prostatic adenocarcinoma may account for an elevation of serum PSA. These include BPH, clinical prostatitis, urinary tract infection, urethral instrumentation, transurethral resection of the prostate etc. None of the patients in this study had undergone any procedures and none had symptomatic prostatitis or urinary tract infection prior to the PSA test. A missed prostate cancer at

biopsy remains a possibility in some of these patients, especially if a representative (adequate) number of cores is not obtained.

It is believed that the use of PSA derivatives such as PSA density and PSA velocity in patients who have PSA< 10ng/ml and normal prostate findings on rectal examination helps to avoid unnecessary biopsies. This is the practice in our center and this subset of patients (3/65) who were offered prostate biopsy had the decision influenced by the PSA density >0.15ng/ml or velocity >0.75ng/ml/year.

Prostate cancer is histologically heterogeneous as seen in the 5 patterns of the Gleason grading system. (18) Gleason grade correlates with volume, extent and prognosis. Serum prostate specific antigen (PSA) levels also correlate with tumor volume. Helpap et al found that in Germany, both conventional and modified Gleason grading correlated with age, serum PSA, percent positive biopsies and percent cancer length in 828 consecutive needle biopsy specimens of prostate carcinoma.(19) Similarly, Okolo et al found positive correlation between serum PSA and Gleason grade, as well as between serum PSA and Gleason score in a cohort of Nigerian men with prostate cancer. (20) In this study, there was no correlation between patient age and; serum PSA (P= 0.53), Gleason score (P=0.34) or percentage of positive cores (P=0.23). However, there was a significant correlation between the Gleason score and serum PSA (P= 0.035), similar to the findings in Nigeria and in Germany. High-grade cancers are known to produce less PSA than low-grade cancers, after correction for cancer volume. (12,21)

The prevalence of high-grade cancer with increasing PSA levels in this study is likely because higher-grade cancers are more often larger in volume than low-grade cancers, and the PSA level is directly related to the volume of the cancer.

The study population of 62 men who had prostate biopsies during the study period may not be representative of the burden of people with prostate pathologies in the study area. However, these were the data available during the study period.

Conclusion:

The indications for prostate biopsy in our center detect more patients with prostate cancer than other prostate pathologies. The findings of this study also highlight the continued importance of DRE in our practice.

The serum PSA significantly correlated with the Gleason grade, but there is no correlation between patient age and serum PSA, Gleason score, or percentage of positive cores.

The authors recommend for similar multi-center studies among Ghanaian populations to improve our ability to use our limited resources efficiently in our setting and also increase the understanding of prostate diseases in our environment. There is the need for further studies to determine other tumour markers and tools that can aid the diagnosis and prognosis of prostate diseases in Ghanaian men

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