Original Research Article

What is the carcinoma detection rate in patients from southern Nigeria with indications who had digitally guided transrectal biopsy?

ABSTRACT

Background: Most prostate cancer diagnosis comes from the histopathological evaluation of specimens obtained from prostate biopsies. It is the standard investigative modality for the diagnosis of prostate cancer. There are clinical, laboratory and imaging indications for prostate biopsy. Digital rectal examination (DRE), elevated prostate-specific antigen (PSA) levels and imaging abnormality observed during evaluation could be falsely positive or negative, and none has 100% sensitivity and specificity.

Aim: To determine the carcinoma detection rate in patients who had digitally guided transrectal prostate biopsy following indications from abnormal DRE and or elevated PSA with or without imaging findings suggestive of prostate cancer.

Materials and Methods: The study was a 6year retrospective study on patients who had prostate biopsy following abnormal DRE and or laboratory with or without imaging evaluation suspicious of PCa. They either had DRE features such as indurations and elevated PSA>10ng/ml and imaging findings suspicious of malignancy and were found to have indications for prostate biopsy. The data was coded into Excel and analyzed with SPSS version 20.

Results: 194 patients had a prostate biopsy for abnormal DRE findings, elevated PSA and or imaging indications with a mean age of 66.48yrs and age range from 29-107years. The modal range was the 60-69years age group. The histology of the biopsy in all was adenocarcinomas. The carcinoma detection rate was 34% (66) of the patients. 21.1% (41) of

patients had benign prostatic hyperplasia (BPH) with prostatitis, while 44.8% (87) had only BPH. The prevalence of adenocarcinoma increases with and for aged <50years, 60-69years, 70-79years, and >80years were 0%, 17.8%, 35.5%, 48.1%, and 45.5%, respectively.

Conclusion: We found a cancer detection rate from digitally guided transrectal biopsy in patients with indications for biopsy to be 34.0%. The prevalence of high-grade PCa in the various age groups increases with age. Improving the quality of pre-biopsy evaluation capacity will enhance the validity of prostate biopsy.

Keywords: BPH, detection rates, Gleason score, ISUP, prostate cancer

INTRODUCTION

Prostate cancer is the second most frequent cancer and the fifth leading cause of mortality worldwide. Mortality rates do not follow incidence, with the highest mortality rates in the Caribbean, sub-Saharan Africa, and Micronesia/Polynesia[1]. It is more prevalent in Blacks and Caribbean men of African descent[2]. Adeloye et al. reported an incidence of 22.0/100,000 population in Africans. Ikuerowo et al.[4] found a prevalence rate of 1046/100,000 men of age ≥40 in the Lagos community study, while Obiora and Nwosu,[5] in Port Harcourt, Nigeria, reported a hospital incidence of 37.4%. The diagnosis is made from history, examination, prostate-specific antigen testing, and prostate biopsy targeted at the peripheral zone. Most prostate cancer arises from histopathological evaluation of biopsy specimens, the standard investigative modality for diagnosing prostate cancer. [6]

There are clinical, laboratory and imaging indications for prostate biopsy. Clinically, abnormal digital rectal examination (DRE) findings that warrant biopsy include the presence of indurations, obliteration of the median sulcus and asymmetry of the prostate. Prostate-

specific antigen (PSA) is a tumour marker for prostate cancer and is used for screening, diagnosis and prognostication in the management of prostate cancer. The normal range is 0-4ng/ml. The risk of developing prostate cancer (PCa) increases significantly at PSA levels greater than 10ng/ml, and biopsy may be indicated. A transrectal ultrasound scan using a high-frequency probe with findings of the hypoechoic lesion is another indication. There are different routes for prostate biopsy. Transrectal ultrasound-guided biopsy is most recommended, but digital guided biopsy is the procedure most commonly performed at most centres in Nigeria at present.[7,8]

Histologically, adenocarcinoma is the predominant type with few variants. Since 2014, the International Society of Urological Pathologists (ISUP) Grade Group system has now been adopted by the WHO as the accepted grading system.[9] Benign Prostatic Enlargement (BPE) and Prostate cancer account for a massive workload in Urology out-patient clinics in West Africa.[10,11] While PCa is more prevalent in the peripheral lobe of the prostate, BPE traditionally affects the transitional zone where 20-25% of prostate cancer occurs.[11,12] DRE, elevated PSA and imaging investigation could be falsely positive or negative, and none has 100% sensitivity and specificity in detecting prostate cancer. We aim to determine the carcinoma detection rate in patients who had digital transrectal prostate biopsy following indications from abnormal DRE and or elevated PSA with or without imaging findings suggestive of prostate cancer.

Methods and Methodology: The study was a six-year retrospective study on patients who had prostate biopsy following clinical and or laboratory with or without imaging evaluation suspicious of PCa. They either had DRE features such as induration and or elevated PSA>10ng/ml with or without transrectal ultrasound scan showing features of carcinoma, such as hypoechoic lesions, nodulations, capsular discontinuity and involvement of the seminal vesicles. Prostatectomy specimens from open surgery and transurethral resection of

the prostate were excluded. Their case notes were retrieved, and their age, pathology diagnosis, Gleason score and other relevant information were obtained, coded into Excel and analyzed using SPSS version 20.

Results: 194 patients had a prostate biopsy for clinical, laboratory or imaging indications with a mean age of 66.48yrs and age range from 29-107yrs as shown in Table 1. Most patients were in their sixth and seventh decades. Adenocarcinoma was the histological diagnosis in 34% (66) of the patients; 21.1% (41) of patients had benign prostatic hyperplasia with prostatitis, while 44.8% (87) had benign prostatic hyperplasia.

The carcinoma detection rate in the participants aged <50years, 60-69years, 70-79years, and >80years were 0%, 17.8%, 35.5%, 48.1%, and 45.5%, respectively. All were adenocarcinoma. There was a statistically significant relationship between age and BPH, prostatitis and prostate cancer, as shown in Table 3, with a weak positive correlation.(p=0.047; r=0.125) this suggests age may be linearly related to the development of BPH, prostatitis and PCa.

Table 1. Age characteristics of patients with prostate biopsy following clinical indication from DRE raised PSA or imaging findings.

Age	
Mean	66.48
Median	66.50
Std. Deviation	9.40
Range	78.00
Minimum	29.00
Maximum	107.00

Table 2. Age group distribution of patients who had prostate biopsy following DRE elevated PSA or imaging indications.

	Frequency	Per cent
<50	8	4.1
50-59	45	23.2
60-69	76	39.2
70-79	54	27.8
>80	11	5.7
Total	**194**	**100.0**

Table 3. Association between age and histopathological findings of prostate biopsy patients.

Age	BPH + Prostatitis.		BPH		Adenocarcinoma	
	N	(%)	N	(%)	N	(%)
<50	2	(25.0)	6	(75.0)	0	(.0)
50-59	13	(28.9)	24	(53.3)	8	(17.8)
60-69	17	(22.4)	32	(42.1)	27	(35.5)
70-79	7	(13.0)	21	(38.9)	26	(48.1)
>80	2	(18.2)	4	(36.4)	5	(45.5)
Total	41	(21.1)	87	(44.8)	66	(34.0)

Chi square =16.07, p-value = 0.041*; r = 0.125

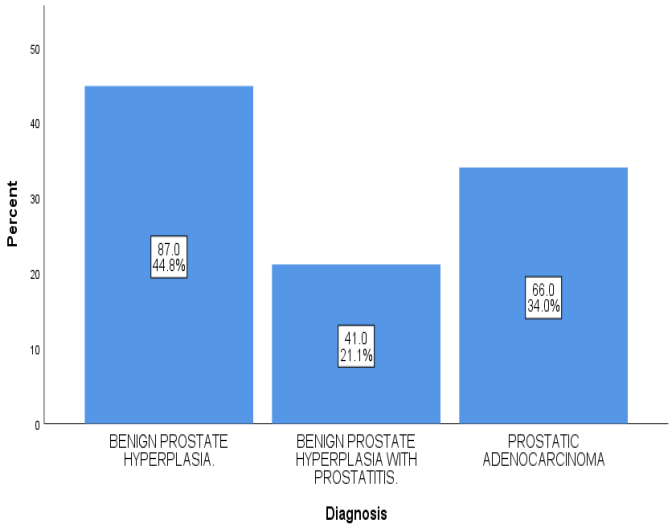

Figure 1. Histological findings of prostate cancer patients with clinical, biochemical and imaging indications for prostate biopsy.

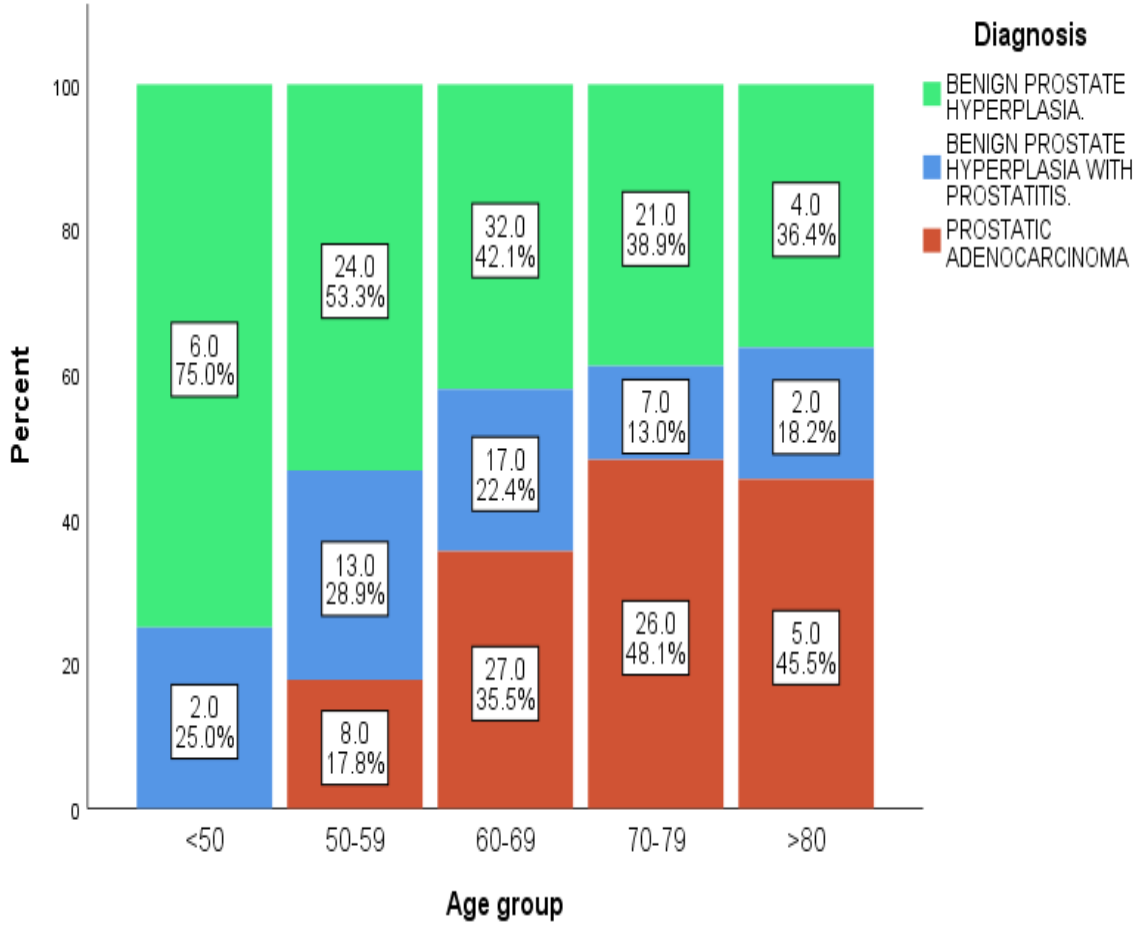

Figure 2. Group distribution of histopathology report on prostate biopsy. *(Well differentiated=Grade Group 1; Moderate differentiation =Grade Group 2 or Gleason 3+4=7/ Grade Group 3 or Gleason 4+3=7; Poor differentiation=Grade Group 4 or Gleason 8; and Grade Group 5 or Gleason 9/10)*

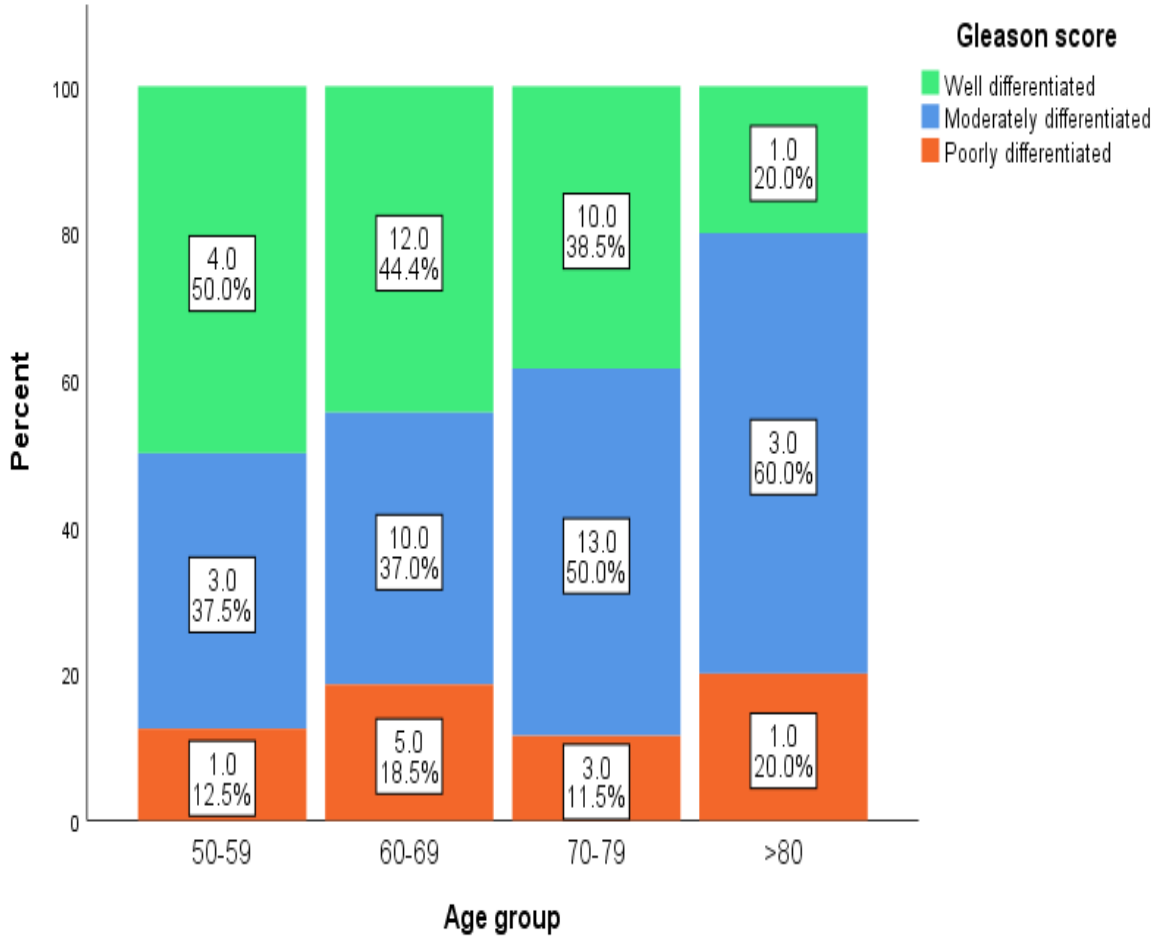

Figure 3. Gleason score distribution of adenocarcinoma detected at biopsy**.** *(Well differentiated=Grade Group 1; Moderate differentiation =Grade Group 2 or Gleason 3+4=7/ Grade Group 3 or Gleason 4+3=7; Poor differentiation=Grade Group 4 or Gleason 8; and Grade Group 5 or Gleason 9/10)*

DISCUSSION

In evaluating men with BPE, a prostate biopsy is essential where there are clinical, biochemical or imaging indications suspicious for PCa. PCa detection rate varies between geographical location and races. Godtman *et al.*[13,] in reporting the Göteborg-1 Prostate

Cancer Screening Trial in Sweden, showed a detection rate of 13.4% in the screening arm, where 70% of the population was screened. The median age at diagnosis was 65yrs. In 2020, Patasius et al.,[14,] in a ten-year population-based study in Lithuania, demonstrated a PCa rate of 35.3%-42%. Pepe et al.,[15,] in their evaluation of 1,028 Caucasian males, reported a detection rate of 42.2%. The detection rate is generally noticed to increase with age at diagnosis progressively. In a hospital-based study of Chinese men, Na et al.[16] had a carcinoma positive prostate biopsy rate of 47%. They similarly observe an increasing diagnosis of PCa with age.

The PCa detection rate in our study was 34%. The detection rate is lower than a similar study by Ogbetere *et al*.[17] in Nigeria which reported PCa in 63.3% of patients that had prostate biopsies. This wide disparity will merit further investigation. There was a statistically significant relationship between age and BPH, prostatitis and prostate cancer, as shown in Table 3, with a weak positive correlation. ($p=0.047$; $r=0.125$) This is not surprising since BPH, prostatitis, and PCa are more frequent with age.

The clinical indications for biopsy of the prostate include abnormal DRE findings and elevated PSA levels. Prostatitis can lead to some change in the consistency of the prostate. Chronic prostatitis may be associated with fibrosis which could present as induration of the prostate leading to a biopsy. Acute and chronic bacterial prostatitis could cause a marked elevation in serum PSA level that can confuse with adenocarcinoma. In one study, prostatitis was found to cause a sustained rise in the PSA level during the acute inflammatory phase.[18] The PSA progressively fell with antibiotic treatment and down to the average level after about two weeks of biopsy. In chronic prostatitis, it could remain persistently elevated for much longer, warranting a biopsy.[18]

The PSA should be repeated after the treatment of prostatitis.[18] The authors repeat the PSA after six weeks of antibiotic therapy in patients with elevated PSA and associated chronic

prostatitis, especially if the DRE and ultrasound findings suggest benign diseases. A fall in the level the PSA level to normal level indicates prostatitis.[18] If it remained elevated, we performed a biopsy after a 1.5Tesler MRI. This reduces the morbidity and potential mortality [20] from complicating urosepsis that could be associated with prostate biopsy.[20]

In our study, 21% of patients had prostatitis with background BPH. Lower urinary obstruction causes urine stasis and could lead to urinary tract infection and prostatitis. It is wise to repeat PSA if elevated when a patient presents with retention as it often falls after relief of retention and treatment for any associated secondary UTI. Other factors that increase false-negative results include a large gland, number of cores and tumour volume.

The invention of the transrectal ultrasound (TRUS)-guided systematic sextant biopsy method by Hodge and colleagues in 1989 was an important watershed in the diagnosis of PCa.[21] Detection rates of TRUS guided biopsies up to 67% have been reported in a 12-core extended biopsy.[17,18] The use of transrectal ultrasound (TRUS) guidance for biopsy improves the detection rate of PCa. Abnormal findings on transrectal ultrasound scans in PCa include the presence of multiple nodular hypoechoic lesions in the peripheral zones and capsule discontinuity. Ultrasound-guided saturation biopsy doubles the detection rates, especially in patients with low PSA and previous negative biopsies. It, however, does not increase the PCa detection rate more than the 12-18 core biopsy when used for routine primary biopsy. Saturation biopsy doubles the PCa detection rate compared to the 12-18 protocol.[22]

Several studies have observed an increased prevalence of poorly differentiated adenocarcinoma of the prostate with age.[23,24,25] we also notice an increase frequency of high Gleason's score adenocarcinoma of the prostate in the older age group. This has clinical

relevance since patients with high Gleason scores frequently require treatment, and age is an essential consideration in treatment selection for PCa.

BPH was the primary diagnosis in 44.8% (78) of the patients in our study. This is similar to other the finding of other researchers who also had a predominance of BPH over PCa in their studies.[10,16,17] The PSA can be elevated when it is complicated with urinary tract infection, retention, pyocystitis, and bladder stones. Under these conditions, infections can cause a rise in the PSA, leading to potentially a negative biopsy for cancer.[26,27] Additionally, procedures such as digital rectal examination, transrectal ultrasound scan, prostatic calculi could cause a rise in the PSA and a potential negative biopsy for carcinoma.[28]

In our study, 66% (128) of the patients who had clinical and or laboratory with or without imaging indication(s) for biopsy had BPH with or with prostatitis. It emphasizes the importance of improving pre-biopsy evaluations to avoid unnecessary biopsies. It impacts both the patient and the urologist: the financial and psychological cost to the patient; the person-hour demand on the urologists; and the morbidity and occasional mortality[20] from the potential risk of urosepsis to the patient. In our study, all our patients had digital guided biopsies. TRUS guided biopsy was not used on all the patients. Government funding and institutional support and effort to provide capacity for routine TRUS guided biopsy, which is recommended [29,30,31] for routine biopsy, will improve the sensitivity and specificity of prostate biopsy in Nigeria. In equivocal cases, TRUS-MRI fusion techniques, multiparametric MRI, and PSMA-PET CT scan, if available and when appropriately utilized, can improve the validity of prostate biopsy.[32]

CONCLUSION

We found a cancer detection rate from digitally guided transrectal biopsy in patients with indications for biopsy to be 34.0%. The prevalence of high-grade PCa in the various age

groups increases with age. Improving the quality of pre-biopsy evaluation capacity will enhance the validity of prostate biopsy.

DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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