

RESEARCH COMMUNICATION

Prostate Specific Antigen and Gleason Score in Men with Prostate Cancer at a Private Diagnostic Radiology Centre in Western Jamaica

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Abstract

Background: Prostate cancer is the most common malignant tumour in men and the second most common cause of male cancer death. The study examines the clinicopathological features of patients with prostate cancer consecutively diagnosed at a private Diagnostic Radiology Centre in Western Jamaica over a 6-year period. **Method:** The medical records, including the pathology reports of 423 consecutive patients who had transrectal ultrasonography (TRUS) - guided prostate biopsy between January 2006 and December 2011 were reviewed. **Results:** The mean age at diagnosis of the 191 men with prostate adenocarcinoma was 68.5 ± 0.59 years with the majority in the 70 - 79 year age group (43.5%). Moderately differentiated carcinomas (Gleason score of 6) comprised the largest group with 72 cases (37.9%); poorly differentiated cancers with Gleason scores of 8 - 10 comprised 49 cases (25.8%). The PSA levels increased with Gleason score. The mean PSA levels for men with Gleason score of 6 was 50.1 ± 30.0 ng/mL compared with 136.5 ± 59.9 ng/mL in patients with Gleason score of 8 and 140.5 ± 31.8 ng/mL in patients with Gleason score of 9. Perineural invasion was present in 7.85% of the cases overall; high-grade prostatic intraepithelial neoplasia (HGPIN) was present in 4.71% of the biopsies. **Conclusion:** Although the majority of patients had moderate, and moderate to poor differentiated carcinomas, the number with poorly differentiated carcinoma was high. This is a reflection of the patients' late clinical presentation at the time of diagnosis.

Keywords: Prostate specific antigen - Gleason score - prostate cancer - differentiation - Jamaica

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Introduction

Prostate cancer is the second most common cancer among men, surpassed only by non-melanoma (Gugliotta et al., 2008; Reis et al., 2009). It is the most common non-cutaneous cancer and the second leading cause of cancer death among men in the United States of America (American Cancer Society, 1996). An estimated 186,320 American men received a new diagnosis of prostate cancer in 2008 and the incidence of this disease is estimated to exceed 192,000 cases in 2009 (Jemal et al., 2008).

Prostate cancer is the most commonly diagnosed solid malignancy in Jamaican men and the leading cause of cancer mortality (16.5% of total cancer deaths) (Blake et al., 1999). Researchers in Jamaica reported age-standardized prostate cancer incidence rates of 56.4 and 65.6 per 100,000, respectively, over consecutive 4-year periods, (1993 to 1997 and 1998 to 2002) using data from the largely urban-based Jamaica Cancer Registry (Hanchard et al., 2001; Gibson et al., 2008). In a more recent study, reported age-standardized prostate cancer incidence rate was 78.1 per 100,000 over the 4-year period

2003–2007 (Gibson et al., 2010).

This study examines the clinicopathological features of patients with prostate cancer consecutively diagnosed at a private Diagnostic Radiology Centre in Western Jamaica over a 6-year period.

Materials and Methods

Data collection

This is a single-centre retrospective study performed at a private Diagnostic Radiology Centre in Western Jamaica in which the medical records, including the pathology reports, of 423 consecutive patients who had transrectal ultrasonography (TRUS)-guided prostate biopsy between January 2006 and December 2011 were reviewed. Prostate biopsies were performed by consultant radiologists. A minimum of ten tissue cores were obtained from right and left sides of the base, middle and the apical regions of the prostate. Additional cores were obtained from nodules, if present. All biopsies were performed using the 18-gauge, 20 cm long, Trucut core needle biopsy under ultrasound guidance, with a Ge Logic P5 ultrasound machine and Ge

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E8CS MHz endorectal probe. Prior to and after biopsy procedure, all patients received appropriate antibiotic coverage. The formalin preserved specimens were stored at room temperature and shipped to the Study centre for histopathological examination.

The specimens were examined for presence or absence of high-grade prostatic intraepithelial neoplasia (HGPIN), presence or absence of cancer, Gleason score of cancer, location of cancer, perineural invasion, laterality, percentage of tumor and positive margins.

Data analyses

Values for the continuous variables are expressed as mean ±S.E. Comparisons of clinicopathologic variables of patients were performed using unpaired students' t tests for independent samples, with a level of P < 0.05 considered as statistically significant. Statistics were computed using SPSS 11.5 (SPSS Inc., Chicago, Illinois, United States).

Results

During the 6-year study period, there were 423 patients of which 191 (45.15%) were diagnosed as having adenocarcinoma of the prostate. The majority of patients were diagnosed in 2007 (Table 1). The age was normally distributed with the mean age for prostate adenocarcinoma being 68.49 ± 0.59 years (range, 44-92 years). All of the patients with prostate adenocarcinoma were of African descent with the majority in the 70-79 year age group (43.45%) followed by the 60-69 year age group (37.50%) (Figure 1).

Histologically, there were 191 acinar adenocarcinoma with all assigned a Gleason score. The median Gleason score was 7 and the mode was 6. Moderately differentiated carcinomas (Gleason score of 6) comprised the largest group with 78 cases (35.29%), and moderate to poorly differentiated carcinomas was the next most frequently with 76 cases (34.39%); poorly differentiated cancers with Gleason scores of 8 - 10 comprised 67 cases (30.32%) (Table 2).

Table 1. The Number of Prostate Cancer Cases Diagnosed Per Year

Year	Number of cases	Cumulative number
2006	42	42
2007	63	105
2008	37	142
2009	12	154
2010	37	191
2011	30	221

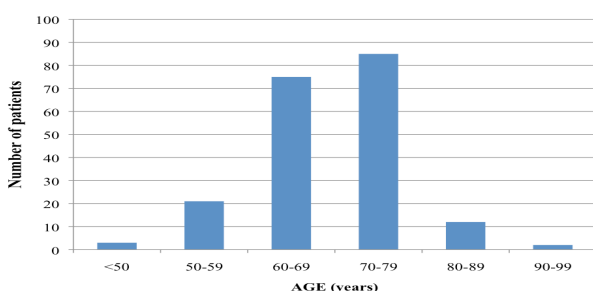


Figure 1. Age Distribution of Prostate Cancer Patients

Table 2. Pathological Findings in Prostate Cancer Patients

Pathological finding	TUR biopsy N (%)
Gleason Score: 6	78 (35.29)
7	76 (34.39)
8	37 (16.74)
9	29 (13.12)
10	1 (0.46)
Perineural invasion: Present	15 (6.79)
Absent	206 (93.21)
HGPIN: Present	9 (4.07)
Absent	212 (95.93)
% Biopsy involved: 1-25	55 (27.36)
26-50	52 (25.87)
51-75	40 (19.90)
76-100	54 (26.87)

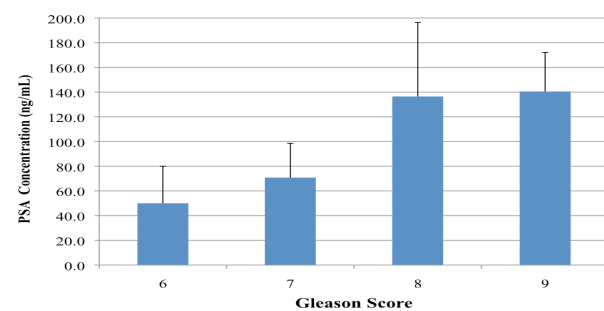


Figure 2. The Gleason Score of Prostate Cancer Biopsies and PSA Levels of Men in the Study

The PSA levels increased with Gleason score. The mean PSA levels for men with Gleason score of 6 was 50.11 ± 29.99 ng/mL compared with 70.78 ± 27.80 ng/mL in patients with Gleason score of 7, 136.50 ± 59.90 ng/mL in patients with Gleason score of 8 and 140.46 ± 31.75 ng/mL in patients with Gleason score of 9 (Figure 2). There were no significant differences between the PSA levels in patients with Gleason score of 6 compared with Gleason score of 8 (P = 0.214); and Gleason score of 6 compared with those of Gleason score of 9 (P = 0.130). There were no low-grade tumours (Gleason score of 2-4) in this study. Perineural invasion was present in 7.85% of the cases overall; HGPIN was present in 4.71% of the biopsies.

Discussion

Prostate adenocarcinoma is predominantly a disease of older men and is uncommon in men aged less than 50 years. A retrospective study of 86 patients with clinical stage T2 cancer showed that males younger than 50 years account for 1% of all patients with prostate cancer (Aprikian et al., 1994). In this study, there were three patients younger than 50 years who had prostate cancer. In a population-based study in Tobago of 259 patients diagnosed with prostate cancer, nine were less than 50 years old at diagnosis (Bunker et al., 2002). In a similar retrospective 6-years study of 529 cases of prostate cancer, two were less than 50 years old at diagnosis (Coard & Skeete, 2008).

The mean age of patients diagnosed with prostate cancer in this study was 68.5 years which is similar to that reported by Farkas et al. (1998) who found a significant

downward trend in age of men in the United States of America from 72 to 68 years at diagnosis due to the introduction and effectiveness of PSA screening. The result of this study was slightly lower than in a similar retrospective study performed at the University Hospital of the West Indies in Jamaica where the mean age was 70.7 years (Coard & Skeete, 2008). However, this mean age was higher than the 61.4 years reported for Blacks in a study of French men of African-Caribbean origin (Raverty et al., 2000), and even more than the 55.9 years in men in the Tobago Prostate Cancer Study which included male residents ages 40-79 years old (Bunker et al., 2002).

In this study, moderately differentiated carcinomas (Gleason score of 6) comprised the largest group of patients and moderate to poorly differentiated carcinomas (Gleason score of 7) followed. There are studies which have found that the highest number of patients with prostate carcinoma has intermediary value of Gleason's score (5-7) (Low et al., 2002). In a study of 241 patients with prostate carcinoma confirmed by biopsy, more than one-half of patients had clinically localized carcinoma and moderate differentiation with predominant intermediary Gleason's score of 6 in the interval of PSA levels from 2.5-4.0 ng/mL (Roehl et al., 2002). The result of our study is also similar to a more recent prospective study of 529 patients where 36.9% of the patients with prostate cancer had a Gleason score of 6 followed by those with a Gleason score of 7 (Coard & Skeete, 2008).

Availability of PSA levels and prostate biopsy has resulted in increased diagnosis of prostate cancer. Gleason grading is an important predictor of prostate cancer outcomes (Gleason, 1992). Gleason grade correlates with volume, extent and prognosis. In this study the proportion of poorly differentiated carcinomas is surprisingly high which means that these patients presented with locally advanced or metastatic stage. Furthermore, the results of this study was lower than an earlier retrospective study conducted in Jamaica where most of the cancers were poorly differentiated with Gleason score of 8 to 10 (Shirley et al., 2002).

Although PSA levels by itself does not accurately predict clinical stage, it increases with advancing disease as reported by Ulmert and colleagues in a case-control study where the majority of advanced cancers (66%) occurred in the 20% of the population with the highest PSA levels (Ulmert et al., 2008). One of the key findings of this study is that PSA levels increases with Gleason score. However, there was only a minor increase in PSA levels between Gleason Score of 8 and 9. Serum PSA levels correlated with total tumour volume but serum PSA levels per cm³ of cancer decreased with increasing grade. This indicated the strong inverse correlation between Gleason grade and the PSA content of prostate cancer (Aihara et al., 1994). The lack of correlation between pathological stage and serum PSA levels might be explained by a decrease in the production of the antigen by higher grade lesions as tumour volume increases (Partin et al., 1990).

The presence of perineural invasion on the prostate needle biopsy specimen has been suggested to be an independent predictor of PSA outcome following radical prostatectomy (D'Amico et al., 2001). The incidence of

perineural invasion in needle biopsies in this study was approximately 7 percent which was less than a similar retrospective study of 33% (Shirley et al., 2002) and a 17%-47% in various studies (Vargas et al., 1999).

In conclusion, the data showed evidence of mean PSA levels and histological grades of Jamaican men diagnosed with prostate cancer at a private facility over a six-year period. While there was a positive correlation between PSA levels and Gleason score of 6-9, there was only a minor increase in PSA levels between Gleason Score of 8 and 9. Furthermore, although the majority of patients had moderate, and moderate to poorly differentiated carcinomas, the number of patients with poorly differentiated carcinoma was high. The significantly elevated PSA and its association with poorly differentiated carcinomas in a number of the patients suggest that the disease is advanced at the time of diagnosis.

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