

## ORIGINAL ARTICLE

## Perineural Invasion and Histological Grades of Prostatic Adenocarcinoma

GHAZIA FATIMA<sup>1</sup>, ZAFAR IQBAL<sup>2</sup>, FAIZ AHMAD FAIZ<sup>3</sup>, HIRA GHAFAR<sup>4</sup>, SIBGHA NAZ<sup>5</sup><sup>1</sup>Assistant Professor Histopathology, Continental Medical College, Lahore<sup>2</sup>Associate Professor Haematology, Continental Medical College, Lahore<sup>3</sup>Assistant Professor Pathology, Islam Medical College, Sialkot<sup>4</sup>Assistant Professor Microbiology, Continental Medical College, Lahore<sup>5</sup>Pathology Department, Continental Medical College, Lahore

Correspondence to Dr. Ghazia Fatima, Assistant professor Histopathology, Continental Medical College, Lahore

## ABSTRACT

**Aim:** Perineural invasion and Histological grades of Prostatic adenocarcinoma**Study design:** Analytical descriptive cross sectional**Study setting:** Department of Pathology, KEMU, Lahore in collaboration with other tertiary care hospitals.**Duration of study:** 6 months**Methodology:** 60 cases of prostatic carcinoma were enrolled in this study. Detailed demographics of included patients were recorded after taking informed written consent. Formalin fixed, processed and paraffin embedded tissue blocks of prostate adenocarcinoma collected.**Results:** Out of 60 biopsies, 57(95%) were TURP, 1(1.67%) was a TRUS guided biopsy, 1(1.67%) was a core needle biopsy and 1(1.67%) was a radical prostatectomy specimen. Perineural invasion was identified in 27 cases. There was insignificant association between perineural invasion and histological grades of prostatic carcinoma and  $p$ -value = 0.613. Among all high grade tumors with Gleason score (8-10), 23 cases were positive for perineural invasion and 25 were negative.**Conclusion:** Perineural invasion was identified in 27 cases i.e. 45%. There was insignificant association between perineural invasion and histological grades of prostatic carcinoma.**Key words:** Prostate, adenocarcinoma, perineural invasion, association, TURP,

## INTRODUCTION

In 2015, about 220,800 new<sup>1</sup>. Prostatic carcinoma has the highest incidence in America, Canada, Australia, France as compared to Asian countries. However, the mortality rate is greater in low risk countries than other high-risk countries. By 2030, it is estimated that the universal load of new cases of prostate carcinoma would be increased upto 1.7 million along with 499,000 deaths due to massive increase in global population<sup>2</sup>.

Prostate cancer rates show wide variation throughout the world because of different investigative techniques, treatment modalities, lifestyle modifications including dietary as well as genetic factors<sup>3</sup>. Prostate carcinoma has an incidence of 3.8% in Pakistan being the fourth most common malignancy of men<sup>4</sup>. This is due to deficiency in screening practices and lower life expectancy<sup>5</sup>. The age-adjusted incidence rate of prostatic cancer is recorded as 5.3 per 100,000 person-years in Pakistan which is greater than that of China and a little lesser than India. This shows that both environmental and lifestyle factors, particularly tendency of urbanization and change in socioeconomic status may have ensued its risk in developing countries<sup>6</sup>.

Prostate cancer has an unclear etiology despite of high morbidity and mortality. Race, increasing age along with positive family history are its established risk factors. High androgen levels, fatty meals, red meat consumption, minimum exercise and obesity are also other risk factors being reported, but their role in development of disease is controversial<sup>7</sup>.

## METHODOLOGY

This descriptive cross sectional study was conducted at Department of Pathology, King Edward Medical University, Lahore after getting permission from KEMU Ethical Committee. Duration of study was 6 months from 01-05-2016 to 31-10-2016. 60 cases of Prostatic carcinoma diagnosed on supra pubic prostatectomy samples, TURP (Transurethral Resection of Prostate), TRUS (Diagnostic transrectal ultrasound-guided sextant biopsies), and core needle biopsies. Patients already receiving chemotherapy/radiotherapy for prostatic carcinoma, patients receiving preoperative hormonal neoadjuvant treatment, recurrent prostatic

cancers, insufficient/non diagnostic biopsies, autolysed specimens and nonspecific inflammatory lesions were excluded. 60 formalin fixed, processed and paraffin embedded tissue blocks of prostate adenocarcinoma collected from the Mayo Hospital, Lahore, PGMI, Lahore, SIMS, Lahore and AIMC, Lahore. approval by ethical Board.

The obtained formalin-fixed, paraffin-embedded tissue blocks were cut by microtome, the slides were prepared and stained with hematoxylin and eosin (H&E). Data entry and analysis was done by using SPSS- 22 version.

## RESULTS

This study includes a total of 60 cases of prostate adenocarcinoma. The mean age of cases was 67.3±8.8 year with minimum and maximum age of 45 and 85 years. Out of 60 biopsies, 57(95%) were TURP, 1(1.67%) was a TRUS guided biopsy, 1(1.67%) was a core needle biopsy and 1(1.67%) was a radical prostatectomy specimen (Table 2). Perineural invasion was identified in 27 cases and was not identified in 33 cases. There was insignificant relationship between perineural invasion and histological grades of prostatic carcinoma with  $p$ -value=0.613. Among all high grade tumors with Gleason score (8-10), 23 were positive for perineural invasion and 25 were negative (Table 4).

Table 1.Descriptive statistics of patient's age (n=60)

Age (yrs)	
Mean ± SD	67.3±8.8
Ranges	45-85

Table 2.Frequency of prostatic biopsies received (n=60)

TURP	57(95%)
Trus guided	01(1.7%)
Core needle biopsy	01(1.7%)
Suprapubic prostatectomy	01(1.7%)

Table 3: Descriptive Statistics of Gleason score (n=60)

Gleason's Score	
Mean ± SD	8.2 ± 1.08
Ranges	6–10

Received on 10-11-2022

Accepted on 25-02-2023

Table 4. Perineural invasion and Histological grades of Prostatic adenocarcinoma

Perineural invasion	Histological grade			Total
	Low grade (Gleason score 6)	Intermediate (Gleason score 7)	High grade (Gleason score 8-10)	
	Positive	2(3.33%)	2(3.33%)	23(38.33%)
	Negative	5(8%)	3(5%)	25(42%)
Total	7(12%)	5(8%)	48(80%)	60

p- value = 0.613 (NS)

Fig 1: Adenocarcinoma prostate with perineural invasion

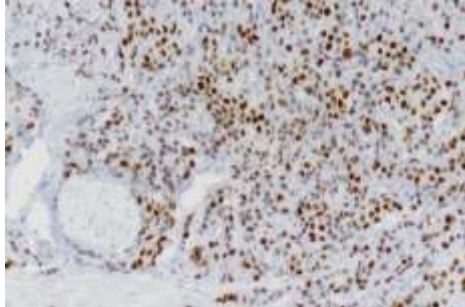
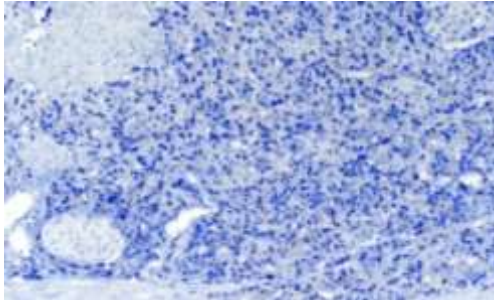


Fig 2: Adenocarcinoma Prostate with Perineural invasion



**DISCUSSION**

Prostate cancer has acquired 2nd place among all malignancies found in males all over the world. A very high incidence of prostate cancer is found in USA<sup>2</sup>. Numerous factors are responsible for worldwide variation in incidence of prostatic carcinoma which include differences in the lifestyle factors such as western diet (fatty and dairy items), treatment, detection practice and genetics<sup>3</sup>. It is the fourth commonest cancer among males in Pakistan<sup>4</sup>.

The age range of prostatic adenocarcinoma patients was found as 45-95 years with mean±SD of 67.4±11.3 years by Bhurgari et al (2009)<sup>11</sup>. Another study done by Baek et al (2012) showed that the median age of patients with prostate carcinoma is 67.2 years with an age range of 49 to 80 years<sup>5</sup>. In our study, the mean age was 67.3±8.8 years.

The perineural invasion (PNI) is the presence of prostate cancer track around or beside the nerve within the perineural space. It is a forecaster of extraprostatic tissue extension of the tumor or finally recurrence of the tumor. Perineural invasion can be seen in high grade tumors<sup>12</sup>. Vargas et al have revealed perineural invasion in 16.7% of patients and was related with high Gleason score<sup>9</sup>. Another study described PNI (perineural invasion) in 34% cases where it showed a significant relationship with higher Gleason scoring<sup>10</sup>. John O Delancey et al (2013) has reported 20% positive perineural invasion in patients of prostatic carcinoma<sup>13</sup>. This study comprised of 60 cases of prostatic adenocarcinoma, out of which 27(45%) cases showed positive perineural invasion while in remaining 33(55%) cases, no perineural invasion was identified. Greater part of the cases with positive perineural invasion were of high Gleason score (8-10). However, the comparison of high grade adenocarcinomas having positive perineural invasion with those having negative perineural invasion did not show any statistical significance.

The occurrence of PNI among specimen in our study (45%) is lower than the incidence reported by most previous studies, which was typically in the range of 50–80%<sup>16,17</sup>. Prostate cancer cells nearby to nerves show increased proliferation compared to those situated further away<sup>14</sup>. Capsular nerve count as assessed by image analysis has also been shown to be significantly higher in areas contiguous to prostate tumor than normal tissue, suggestive of the initiation of nerve growth<sup>15</sup>.

**CONCLUSION**

Perineural invasion was identified in 27 cases i.e. 45%. There was non significant association between perineural invasion and histological grades of prostatic carcinoma

**Conflict of interest:** Nothing to declare

**REFERENCES**

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2015. *CA Cancer J Clin.* 2015;65(1):5-29.
2. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer.* 2010;127(12):2893-917.
3. Bashir MN. Epidemiology of Prostate Cancer. *Asian Pac J Cancer Prev.* 2015;16(13):5137-41.
4. Baig FA, Hamid A, Mirza T et al. Familial, hereditary and sporadic characterization of prostate cancer and impact on diagnostic modalities. *Pak J Med Dent* 2014; 3(3):24-28.
5. Aziz Z, Sana S, Saeed S, Akram M. Institution based tumor registry from Punjab: five year data based analysis. *JPMA.* 2003;53(8):350-3.
6. Mahmood S, Qasmi G, Ahmed A et al. Lifestyle factors associated with the risk of prostate cancer among Pakistani men. *J Ayub Med Coll Abbottabad.* 2012;24(2):111-5.
7. Mordukhovich I, Reiter PL, Backes DM, et al. A review of African American-white differences in risk factors for cancer: prostate cancer. *Cancer Causes & Control.* 2011;22(3):341-57.
8. Baek KH, Hong ME, Jung YY, et al. Correlation of AR, EGFR, and HER2 Expression Levels in Prostate Cancer: Immunohistochemical Analysis and Chromogenic In Situ Hybridization. *Cancer Res Treat.* 2012 Mar;44(1):50-6.
9. Vargas SO, Jiroutek M, Welch WR, et al. Perineural invasion in prostate needle biopsy specimens: correlation with extraprostatic extension at resection. *Am J Clin Pathol.* 1999;111(2):223-8.
10. Feng FY, Qian Y, Stenmark MH, et al. Perineural invasion predicts increased recurrence, metastasis, and death from prostate cancer following treatment with dose-escalated radiation therapy. *Int J Radiat Oncol Biol Phys.* 2011;81(4):361-7.
11. Bhurgri Y, Kayani N, Pervez S, et al. Incidence and Trends of Prostate Cancer in Karachi South. *Asian Pac J Cancer Prev.* 2009;10:45-8.
12. Potter SR, Partin AW. The significance of perineural invasion found on needle biopsy of the prostate: implications for definitive therapy. *Rev Urol.* 2000;2(2):87-90.
13. DeLancey JO, Wood DP, He C, et al. Evidence of perineural invasion on prostate biopsy specimen and survival after radical prostatectomy. *Urology.* 2013;81(2):354-7
14. Ayala GE, Wheeler TM, Shine HD et al. In vitro dorsal root ganglia and human prostate cell line interaction: redefining perineural invasion in prostate cancer. *Prostate.* 2001;49:213–223.
15. Brundl J, Schneider S, Weber F et al. Computerized quantification and planimetry of prostatic capsular nerves in relation to adjacent prostate cancer foci. *Eur Urol.* 2014;65:802–808.
16. Reeves F, Hovens CM, Harewood L et al. Does perineural invasion in a radical prostatectomy specimen predict biochemical recurrence in men with prostate cancer? *Can Urol Assoc J.* 2015;9:e252–e255.
17. Lee JT, Lee S, Yun CJ, et al. Prediction of perineural invasion and its prognostic value in patients with prostate cancer. *Korean J Urol.* 2010;51:745–751.