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ORIGINAL ARTICLE

Frequency of Significant Prostate Cancer (Gleason Score ≥ 7) in Suspected Patients Having Pi-Rads Score ≥4: Descriptive Study

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ABSTRACT

Background: Most common malignancy among males is prostate cancer causing many deaths.
Aim: To determine the diagnostic accuracy of PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard.
Study Design: Cross-sectional validation.
Methodology: The current project was conducted at Department of Radiology, Armed Forces Institute of Radiology and Imaging, Rawalpindi. Total 114 patients suspicion of prostate carcinoma between 40 to 80 years of age were included. Patients with already diagnosed carcinoma prostate and with inadequate biopsy specimens for diagnosing prostate cancer were excluded. After including the patients in this study, all patients were undergone MRI imaging findings to calculate PI-RADs score as per operational definition. After that biopsy specimens were taken and sent to the histopathology department for determination of Gleason score (GS), a patient was labelled as having significant prostate tumor.
Results: Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard was 84.85%, 83.33%, 87.50%, 80% and 84.21% respectively.
Conclusion: PI-RADS ≥4 is non-invasive modality of choice with high diagnostic accuracy in detecting ca prostate.
Keywords: Prostate Cancer, Prostate Imaging Reporting and Sensitivity

INTRODUCTION

Commonest malignancy that happens in males is prostate cancer thus causing many deaths every year as reported previously.[1] In developing countries, its the health hazard that has prevalence of 14.5%.[2] Literature review showed that key in determining its nature, mortality and progression depends on its early detection/ diagnosis by using PSA screening[3,4].

There is variation in its rates of happening among its populations globally suggest that there is involvement of like genetics, familial predisposition, environmental factors, notably diet.[4] Currently, the majority of prostate cancers are identified in patients who are asymptomatic.

With advancing time, many different screening tests have been developed globally nowadays for its early diagnosis like digital rectal examination, serum prostate specific antigen (PSA) and trans-rectal ultra-sonography (TRUS)[5,6]. These imaging studies serve as a valuable tool for assessment of its pretreatment stage, clinically localization of disease and its management plan as advanced disease require multimodal therapy. Ultrasound (US) and magnetic resonance imaging (MRI) are major imaging tools for prostate cancer detection.[7] However, urologists use trans-rectal ultrasound during prostate biopsy[8]. Fact is that ultrasound has poor tissue resolution so this modality is not clinically used[8].

With the advancement of technology like prostate MRI with different other functional imaging modalities, its role in detecting, localizing, and staging prostate cancer has enhanced several times.[5,6] PI-RADS Score ≥4 is a predictor of significant prostate lesions. One researcher showed that 36% patients had prostate cancer (GS ≥7) in when their PI-RADS ≥4.[8]

The objective of the study was to determine the diagnostic accuracy of PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard.

METHODOLOGY

This study held at Department of Radiology, Armed Forces Institute of Radiology and Imaging, Rawalpindi after approval by the Hospital's Ethical Committee. Total 114 male patients with a suspicion of prostate carcinoma between 40 to 80 years of age were included. Patients with already diagnosed carcinoma prostate and with inadequate biopsy specimens for diagnosing prostate cancer were excluded. After including the patients in this study, all patients were undergone MRI imaging findings to calculate PI-RADs score. After that biopsy, specimens were taken and sent to the histopathology department for determination of Gleason score (GS), a patient was labeled as having significant prostate tumor. All patients were informed about the objectives of the study and a written informed consent was taken. All the study relevant information was noted on a pre-designed Proforma. Data analysis was done SPSS v23. Parameters like age, duration of disease and BMI were presented as Mean ± SD. Frequency and percentage were used to present frequency of significant prostate tumor according to PI-RADs v2 score and GS scores. 2. Stratification of confounder variables e.g. age was done. Post-stratification sensitivity and specificity was calculated again.

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RESULTS

General parameters of enrolled patients were presented as frequency and percentage with their respective means ± SD in table-1.

Table-1: Parameter Of All Subjects (n=114)

Variables	Groups	Frequency	%age
Age (years)	40-60	61	53.51
	61-80	53	46.49
Mean ± SD (years)	61.91 ± 6.60		
Duration of disease (days)	≤9	67	58.77
	>9	47	41.23
Mean ± SD (months)	8.73 ± 1.84		
BMI (kg/m^2)	≤27	61	53.51
	>27	53	46.49
Mean ± SD (kg/m^2)	29.78 ± 5.72		

PI-RADS supported the diagnosis of prostate cancer in 64(56.14%) patients. Histopathology confirmed prostate cancer in 66(57.89%) cases where as 48(42.11%) patients revealed no prostate cancer. In 64 PI-RADS positive patients, 56 (True Positive) had prostate cancer and 08 (False Positive) had no prostate cancer on histopathology as shown in table-2. Overall sensitivity, specificity and diagnostic accuracy of PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard was 84.85%, 83.33% and 84.21% respectively.

Table-2: Diagnostic accuracy of PI-RADS ≥4 lesions in predicting prostate tumor

	Histopathology^{++}	Histopathology--
Positive on PI-RADS	56	08
Negative on PI-RADS	10	40

P value 0.0001* *Statistically Significant

PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard with respect to age (40-60yrs) had sensitivity (87.50%), specificity (82.76%) and diagnostic accuracy (85.25%) respectively as shown in table-3.

Table-3: Stratification of diagnostic accuracy with respect to age (40-60yrs)

	Histopathology++	Histopathology--
Positive on PI-RADS	28	05
Negative on PI-RADS	04	24

P value 0.001* *Statistically Significant

PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard with respect to age (61-80yrs) had sensitivity (82.35%), specificity (84.21%) and diagnostic accuracy (83.02%) respectively as shown in table-4.

Table-4: Diagnostic Accuracy with Respect to Age (61-80yrs)

	Histopathology++	Histopathology--
Positive on PI-RADS	28	03
Negative on PI-RADS	06	16

P value 0.001* *Statistically Significant

DISCUSSION

With the advancement of technology like prostate MRI with different other functional imaging modalities, its role in detecting, localizing, and staging prostate cancer has enhanced several times.[9,10] During the later years, the ESUR developed an updated version of PIRADS version 1, known as PIRADS version 2.0.[11]

In my study, sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of PI-RADS ≥4 lesions in predicting prostate tumor keeping histopathology as gold standard was 84.85%, 83.33%, 87.50%, 80.0% and 84.21% respectively. A study conducted by Foreman et al. found significant prostate cancer (GS ≥7) in 36% patients having PI-RADS ≥4.[12] A study conducted by Dola et al. concluded that When a PI-RADS v2 score of ≥4 has sensitivity 88.04%, specificity 93.4%, PPV 100% and NPV 100% for detection of clinically significant prostate cancer.[7] While a study conducted by Woo et al. concluded that PI-RADs v2 is 95% sensitive and 73% specific in detecting clinically significant prostate cancer.[13]

One researcher reported that PIRADS score for detecting prostate cancer among patients having high prostate serum antigen (upto 15 ng/mL) had sensitivity (93%), NPV (89%), specificity (41%) and PPV (51%).[14] Another recent study showed that patients having PSA between 4-10 ng/mL than a PIRADS score ≥ 4 was the cut-off for predicting CSPCa[15,16].

One researcher evaluated the impact of PIRADS 3 score in differentiating equivocal lesions as malignant or benign. He reported that PIRADS 3 lesions were only benign conditions. Hence, only PIRADS 3 score fails to be used as an absolute marker for their clinical management.[15] Another study showed that the sensitivity and specificity of PIRADS scoring were 77.0% and 73.8% for reader 1 respectively.[17]

Limitations: It was a single centre study and we did not perform genetic workup among patients in-order to find the genetic cause.

CONCLUSION

We concluded that PI-RADS ≥4 is the non-invasive modality of choice with high diagnostic accuracy in detecting prostate cancer, and has dramatically improved our ability of correct diagnosis of the disease and a better prognosis of the patients by having exact diagnosis. So, we recommend that PI-RADS system should be done routinely in all suspected cases of prostate cancer for accurate assessment of patients.[18]

Author's contribution: **MB&SS:** Conceptualized the study, analyzed the data, and formulated the initial draft, **MN&SAA:** Contributed to the histomorphological evaluation, **SKA&TL:** Overall review and formatting of an article

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