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CLINICOPATHOLOGICAL EVALUATION OF GLEASON SCORE AND GRADING GROUP IN PROSTATIC ADENOCARCINOMA IN BASRAH CITY (2019_2023) SCIENTIFIC COUNCIL OF THE ARAB BOARD OF ANATOMIC PATHOLOGY

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ABSTRACT

Introduction: One of the most common types of cancer in males worldwide and a leading cause of cancer-related mortality is prostatic cancer. The diagnosis and aggressiveness of prostatic adenocarcinoma is based on two scoring systems, namely the Gleason score system and the grade group system both of them being included in the pathology report. The most widely used grading scheme for prostatic cancer is the Gleason system. **Aim:** To estimate the incidence of the Gleason score and grade group in prostatic adenocarcinoma and assess the association of them with the clinicopathological parameters: age and perineural invasion. **Methodology:** A total number of 210 cases were collected from governmental and private histopathologic laboratories in Basra city, the study period was conducted from beginning of January 2019 to the end of December 2023. **Results:** Among Two hundred and ten cases of prostatic adenocarcinoma, the most frequent Gleason score was 8 and 7 and the most frequent grade group-4. There was a significant statistical association between Gleason score and age group, also between Gleason scores, grade group and the existence of perineural invasion. **Conclusion:** The most frequent Gleason score was 8 (32.4%) and 7 (30.0 %), and the most grade group was group- 4 (31.9%). There was a significant association between Gleason score and grade group with ages and perineural invasion.

INTRODUCTION

The second most common disease in males is prostatic cancer, it's the main cause of death from cancer.[1]

The incidence of prostatic adenocarcinomas (PAC) has been increasing worldwide in recent times. Every year, 350,000 men died from prostatic cancer, accounting for about 1.2 million new cases of the disease.[2]

The pathology report includes two scoring systems that are used to determine the prognosis of prostatic adenocarcinoma: the grade group system and the Gleason score system.[3]

The most popular prostatic cancer grading system is the Gleason system. Understanding the Gleason score and its correlation with other variables is crucial as it aids in identifying the suitable course of therapy and predicting the outcome for individuals identified as having prostatic cancer.[4]

The most common risk factor for prostatic adenocarcinoma is age, as its frequency increases with it, and almost 75% of the cases are age 65 or older. [5,6] Also smoking, alcohol consumption, obesity, sexual transmitted disease, and diet play a role in development of prostatic carcinoma.[6]

Acinar and ductal are the two main histologic subtypes of prostatic adenocarcinomas. More than 90% of all primary prostate carcinomas are acinar adenocarcinomas. Although comparatively uncommon, ductal adenocarcinoma is the second most prevalent subtype of prostatic carcinoma.[7,8]

Gleason score is based on the neoplastic glands architectural characteristics that the pathologists know after viewing tissue samples under a microscope. it ranges from 3-5 pattern.

- Gleason pattern-3, glands will be single and it's either minute or large, the preservation of at least a small amount of stroma between adjacent glands is a crucial component.[9]

- Gleason pattern- 4, its variable, exhibits 4 main architectural patterns, Hypernephroid, cribriform, glomeruloid and poorly formed glands. Gleason pattern -4 diagnosis should be discernible at low and medium power magnification.[9,10]

- The ISUP 2005/2014 grading system does not specifically specify ductal adenocarcinoma (Papillary architecture); nonetheless, it was previously listed in the Gleason pattern-4 descriptions. Ductal adenocarcinoma is characterized by papillary formations lined by tall columnar cells with elongated nuclei and pseudostratification.[11]
- Gleason pattern -5 has two morphology:

A. Comedonecrosis is characterized by karyorrhexis or central necrosis with intraluminal necrotic cells within papillary or cribriform gaps.[12]

B. Individual cells: potentially developing into cords, potentially possessing vacuole (Signet ring cells) but without glandular lumens This pattern might resemble lymphocytes on low-power.[13]

Since prostatic adenocarcinoma are often made up of different patterns, each specimen is given two patterns. The largest area of the tumor is described by a primary pattern, and the next largest area is described by a secondary pattern. If the Gleason Score is written as 3+4=7, it indicates that the majority of the tumor is pattern- 3, and the next greatest portion is pattern- 4 together make up the total Gleason score. When the tumor is mostly consists of the same pattern, the primary and secondary pattern is doubled up to determine the Gleason score, for example (3+3=6). Typical Gleason scores range from 6-10. Rapid growth and spread of the cancer is more prevalent in cases when the Gleason score is higher.[14]

The International Society of Urological Pathology updated its prostatic cancer grading system, known as the grade group, and published new guidelines in 2014. There are only five grades in the grade group system.[9]

ISUP Prostate Cancer Grade Groups

Grade group	Gleason score	Gleason pattern
1	≤6	≤3+3
2	7	3+4
3	7	4+3
4	8	4+4, 3+5, 5+3
5	9 or 10	4+5, 5+4, or 5+5

Regarding a patient's prognosis and available treatments, the Gleason grading system is still one of the most potent prognostic indicators for prostatic cancer. (15)

METHODOLOGY

This is a cross-sectional retrospective study was done in Basra city /Iraq. Two Hundred and ten cases of prostatic specimens (Prostatic needle biopsy, TURP, Radical prostatectomy) diagnosed with prostatic adenocarcinoma were included in this study, and they were collected from the histopathologic department of governmental hospitals and private laboratories during the period from beginning of January 2019 to the end of December 2023.

RESULT

A total of 210 cases of prostatic adenocarcinoma were analyzed. The ages of patients ranged from 45-93 years with a mean age equal to 69.34

The most the most frequent Gleason score was 8 (32.4%) and score 7 (30%) (Table 1).

Table (1): Distribution of gleason score.

Gleason score	Frequency	Percent
6	42	20.0
7	63	30.0
8	68	32.3
9	27	12.9
10	10	4.8
Total	210	100.0

While the most frequent grade group was Group- 4 (31.9%) (Table 2).

Table (2): Distribution of grade group.

Grade	Frequency	Percent
Group 1	42	20.0
Group 2	21	10.0
Group 3	43	20.5
Group 4	67	31.9
Group 5	37	17.6
Total	210	100.0

It was clear that there was a significant statistical association (p-value= 0.002) between Gleason score and age groups. Age group of 60 years and older had significantly higher frequencies of score 8 and 7. while higher frequency of score 6 in age group 60 and younger (Table 3).

Table (3): The relationship between Gleason Score and Age group.

		Age group		Total
		60 or younger	60 or older	
Gleason score	6	10	32	42
		27.0%	18.5%	20.0%
	7	5	58	63
		13.5%	33.5%	30.0%
	8	8	60	68
		21.6%	34.7%	32.4%
	9	10	17	27
		27.0%	9.8%	12.8%
	10	4	6	10
		10.8%	3.5%	4.8%
Total		37	173	210
		100.0%	100.0%	100.0%

* Pearson Chi-Square, P-value = 0.002

The grade group-5 was significantly higher in 60 years and younger group, while group-2 was significantly lower among this age group (p-value= 0.002) (Table 4).

Table (4): The relationship between grade Group and Age group.

		Age group		Total
		60 or younger	60 or older	
Grade	Group 1	10	32	42
		27.0%	18.5%	20.0%
	Group 2	1	20	21
		2.7%	11.6%	10.0%
	Group 3	5	38	43
		13.5%	22.0%	20.5%
	Group 4	7	60	67
		18.9%	34.7%	31.9%
	Group 5	14	23	37
		37.8%	13.3%	17.6%
Total		37	173	210
		100.0%	100.0%	100.0%

* Pearson Chi-Square, P-value = 0.002

There was a significant statistical association (p-value= 0.0001) between Gleason score and the existence of perineural invasion. Gleason score 8 has higher rate of perineural invasion (Table 5).

Table (5): The relationship between Gleason Score and Perineural invasion.

		Perineural invasion		Total
		Negative	Positive	
Gleason score	6	37	4	41
		24.3%	7.0%	19.6%
	7	45	18	63
		29.6%	31.6%	30.2%
	8	38	31	68
		25.0%	52.6%	32.5%
	9	22	5	27
		14.5%	8.8%	12.9%
	10	10	0	10
		6.6%	0.0%	4.8%
Total		152	58	210
		100.0%	100.0%	100.0%

* Pearson Chi-Square, P-value = 0.0001

It was a statistically significant association between grade group and existence of perineural invasion (p-value= 0.0001), as seen in grade group-4 (50.9 %) (Table 6).

Table (6): The relationship between grade Group and Perineural invasion.

		Perineural invasion		Total
		Negative	Positive	
Grade	Group 1	37	4	41
		24.3%	7.0%	19.6%
	Group 2	17	4	21
		11.2%	7.0%	10.0%
	Group 3	28	15	43
		18.4%	26.3%	20.6%
	Group 4	38	30	67
		25.0%	50.9%	32.1%
	Group 5	32	5	37
		21.1%	8.8%	17.7%
Total		152	58	210
		100.0%	100.0%	100.0%

* Pearson Chi-Square, P-value= 0.0001.

DISCUSSION

In Iraq, prostatic cancer rates as the fifth most prevalent cancer [16]. As the Gleason scoring system play a crucial part in deciding the course of treatment. With more precise grade stratification, a more straightforward five-grade grading system, and the potential to lessen overtreatment of indolent prostatic cancer, the new grade groups increased the utility of the system.[10]

In the current study, 32.4% of cases were in Gleason score 8 and 30.0 % were in Gleason score 7. This is in line with a study conducted by Atif et al [18] in which Gleason score 8 & 9 were noted in 22% and 22.8% respectively.

In this study, 31.9% were in grade group-4 and 10% in grade group-2 which in agreement with a study conducted by Abbas et al[19] in which 38.8% of cases were in grade group-5 and 10% of cases in grade group-1. In contrast to the studies of Stacy et al [20], in which 1% of cases were in grade group-5, 67% in grade group-1 and Pierorazo et al [21] in which 1.6% of cases were in grade group-5 and 66.3% in grade group-1.

According to the relationship between age and Gleason score, the patients who are 60 years and older had significantly higher frequency of Gleason score 8 (32.4%) while 60 years and younger had high frequency of Gleason score 6 (27.0 %). This is in line with study conducted by Muralidhar et al[22] which Showed that Gleason score 8 to 10 increased significantly with increasing age.

In the present study grade group-5 were significantly higher in 60 years and younger, while grade group-2 were significantly lower among this age group (p-value= 0.002). That mean there is inverse relationship between age and grade group while studies conducted by Rebecka et al[23] and Wang et al[24] in which, higher age increase the risk of higher-grade group. The difference in this result may be due to limitation in sample size in this study.

According to relationship between Gleason score and perineural invasion, the higher rate of positive perineural invasion in patient with Gleason score 8, while higher rate of negative perineural invasion in patient with Gleason score 7, this is similar to a study which conducted by Yazdani et al[25] in which the patients with positive perineural invasion had significant rate of high Gleason score.

In current study there is a significant relationship between grade group and perineural invasion, in patient with positive perineural invasion grade group-4 was the highest rate. This is in agreement with studies that conducted by Uzma et al[26] and Renuka et al[27] in which there was a significant association between Perineural invasion and high grade group.

CONCLUSION

- The most frequent Gleason score was 8 and 7.
- Grade group-4 was the commonest group.

- Gleason score increased significantly with increasing age.
- There is inverse relationship between age and grade group.
- The patients with positive perineural invasion had statistically significant higher Gleason score.
- Larger sample size is recommended for better results.

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