

Incidental Prostatic Carcinoma in TURP Specimens: A Single-Center Experience from Karbala, Iraq

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Abstract

Background: Prostatic adenocarcinoma incidence is rising in Iraq as the fourth most often confirmed malignancy in men. A medically undetectable neoplasm that is unintentionally discovered during operation for nodular prostatic abnormalities is known as incidental prostate cancer (IPC).

Objectives: This study's primary goal is to assess the prevalence of prostatic cancer that is unintentionally discovered in patients who have symptomatic benign prostatic hyperplasia underwent transurethral resection of prostate in Karbala province and to assess the relation of the age to other pathological parameters like IPC, Gleason grades, associated inflammation, necrosis, metaplastic changes and invasion (peri-neural and/or lympho-vascular). **Material and methods:** this is a retrospective cross sectional study involving data collected from 234 patients underwent transurethral resection of prostate as therapeutic management for clinical benign prostatic hyperplasia at Safeer AL-Imam AL Hussain Specialized Hospital from January 2024 to December 2025 in Karbala province. **Results:** the rate of IPC was (8.5%) with mean age of the patients (67.2 ± 8.6 SD) and (57%) of patients were older than 65 years. Higher percentage (60%) of IPC cases presented with high Gleason scores and grades. There was a significant relation between the age of the patients and Gleason grades of the detected malignant cases, (P value 0.03), however such a relation was not detected between the age and IPC, (P value 0.7). **Conclusion:** Although the overwhelming body of research supports age as an important predictor for prostate cancer worldwide, our analysis shows that this relationship might not hold true for every demographic or clinical contexts which could be attributed to variability in electing patients and diagnostic protocols promising for advanced screening programs to be adapted in the future for youth and those who are elderly in our region.

سرطان البروستات العرضي في عينات استئصال البروستات عبر الإحليل: تجربة مركز واحد في كربلاء، العراق

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الخلاصة

المقدمة: يشهد معدل الإصابة بسرطان غدة البروستات ازدياداً في العراق، حيث يُعد رابع أكثر الأورام الخبيثة شيوعاً بين الرجال. ويُعرّف سرطان البروستات العرضي (Incidental Prostate Cancer, IPC) بأنه الورم الخبيث غير المشخص سريرياً والذي يُكتشف مصادفةً أثناء الفحص النسيجي لعينات استئصال البروستات التي أُجريت لعلاج تضخم البروستات الحميد.

الأهداف: هدفت هذه الدراسة إلى تحديد معدل انتشار سرطان البروستات العرضي بين المرضى الذين خضعوا لعملية استئصال البروستات عبر الإحليل (TURP) بسبب تضخم البروستات الحميد المصحوب بأعراض في محافظة كربلاء، بالإضافة إلى تقييم العلاقة بين عمر المريض والخصائص المرضية، بما في ذلك وجود سرطان البروستات العرضي، ودرجة غليسون (Gleason grade)، ووجود الالتهاب، والنخر، والتغيرات الحؤولية (Metaplastic changes)، والغزو حول الأعصاب (Perineural invasion)، و/أو الغزو اللمفاوي الوعائي (Lymphovascular invasion).

المواد وطرائق العمل: أُجريت هذه الدراسة المقطعية الاستيعابية على بيانات 234 مريضاً خضعوا لعملية استئصال البروستات عبر الإحليل (TURP) كعلاج لتضخم البروستات الحميد المشخص سريرياً في مستشفى سفير الإمام الحسين التخصصي، محافظة كربلاء، العراق، خلال الفترة من كانون الثاني/يناير 2024 إلى كانون الأول/ديسمبر 2025.

النتائج: بلغ معدل انتشار سرطان البروستات العرضي 8.5%. وكان متوسط عمر المرضى 67.2 ± 8.6 سنة، في حين كان 57% منهم بعمر يزيد على 65 عاماً. ومن بين حالات سرطان البروستات العرضي، أظهرت 60% درجات غليسون مرتفعة. كما وُجدت علاقة ذات دلالة إحصائية بين عمر المرضى ودرجة غليسون في الحالات الخبيثة ($P = 0.03$)، بينما لم تُسجل علاقة ذات دلالة إحصائية بين العمر وحدوث سرطان البروستات العرضي ($P = 0.70$).

الاستنتاج: أظهر سرطان البروستات العرضي معدلاً ملحوظاً بين المرضى الذين خضعوا لاستئصال البروستات عبر الإحليل بسبب تضخم البروستات الحميد. وعلى الرغم من أن التقدم في العمر يُعد من أهم عوامل الخطورة للإصابة بسرطان البروستات وفقاً للدراسات العالمية، فإن هذه الدراسة لم تجد علاقة معنوية بين العمر وحدوث سرطان البروستات العرضي. وتؤكد هذه النتائج أهمية الفحص النسيجي الروتيني لجميع عينات استئصال البروستات عبر الإحليل، كما تدعم الحاجة إلى تطوير برامج أكثر فعالية للكشف المبكر عن سرطان البروستات بما يتناسب مع خصائص السكان في منطقتنا.

1. Introduction

Prostatic adenocarcinoma is one of the most prevalent malignancy in men, affecting 7.3% of all men. It accounts for 3.8% of mortality caused by cancer globally, making it one of the major sources of sickness and among the top five causes of fatalities for men (Myint and Qasrawi, 2021). Prostatic carcinoma is increasing in Iraq, with a prevalence of 8.46% at 2021, ranking as the fourth most often frequently diagnosed malignancy among men. In contrast, in 2012, the prevalence of prostate carcinoma ranked seventh, with an annual rate of 4.53%. previously, studies showed that incidental of the prostate is diagnosed in approximately 5.5% to 21% of transurethral resection of the prostate (TURP) specimens, a procedure commonly performed for the management of benign (nodular) prostatic hyperplasia (Waly and Barraaj, 2025). Clinically Incidence of prostate cancer IPC defined as undetectable neoplasm that is unintentionally identified during surgical procedures performed for benign prostatic conditions (İlkteç *et al.*, 2021; Bologna *et al.*, 2024). Such tumors are neither palpable on digital rectal examination nor visible on imaging assessments and are most often discovered incidentally in TURP specimens or following a radical cysto-prostatectomy performed for individual with bladder cancer. IPC is classified as clinical stage T1a or T1b based on the proportion of malignant tissue identified, with T1a representing $\leq 5\%$ and T1b $> 5\%$ of the resected specimen. Certain IPCs, particularly those with a high Gleason score and classified as stage T1b, have been shown to be clinically significant (Klein *et al.*, 2022; Yang *et al.*, 2022; Mishra *et al.*, 2023). Prostatic biopsy remains the cornerstone for the diagnosis, surveillance, and follow up of prostate cancer. Transurethral resection of the prostate and open prostatectomy are among the commonly used methods for obtaining diagnostic tissue, and both procedures are generally safe (Tidd-Johnson *et al.*, 2022). Autopsy studies demonstrated that incidence or latent prostatic carcinoma is detected in approximately 15% to 70% of inspected cases. In addition, the prevalence of IPC shows noticeable correlation with patients age and the extent of histological sectioning performed on biopsy specimens. Tumor-positive TURP specimens may represent extensive conventional adenocarcinoma originating from the peripheral zone or, less commonly, carcinoma arising from the transitional zone. Multiple screening modalities for prostatic abnormalities are used clinically including serum prostatic specific antigen PSA measurement, however a comprehensive histopathological examination remains the golden standard method for diagnosis and detection of an early malignant changes in the sampled prostatic tissue (Taylor *et al.*, 2002; Barman, Talukdar and Musfique, 2025). Indeed, it was demonstrated that 27% of

prostatic cancer were unintentionally discovered by TURP prior to the PSA era (Begum *et al.*, 2015). Transurethral resection primary samples the transitional zone, which account for approximately 25% of prostate cancers, while tumors arising in the periurethral zone that constitute about 5% with the majority of malignancies originating in the peripheral zone (Lee *et al.*, 2015). Overall, approximately 10-20% of surgically resected benign prostatic hyperplasia BPH samples unexpectedly harbor prostate cancer. Prostate adenocarcinomas is routinely graded using the Gleason grading and scoring system, which is widely accepted worldwide (Janjua *et al.*, 2021; Mohamed *et al.*, 2023). when appropriately treated in timely manner, incidentally detected prostate carcinoma is typically identified at an early stage and is associated with a favorable prognosis. Consequently, early diagnosis may prevent the serious complications associated with advanced disease (Sarwar *et al.*, 2016; Naeem *et al.*, 2020). The aim of this study is to determine the histopathological characteristics, frequency and clinical significance of incidental prostate carcinoma discovered in TURP specimens at a single tertiary care institution in Karbala province, Iraq. In addition, the study aimed to evaluate tumor grading and stages and to assess the relevant of these results in the context of early diagnosis and patient prognosis.

2. Materials and Methods

The current study is retrospective cross-sectional study that conducted in Karbala province at Safer AL-Imam AL Hussain Specialized Hospital from January 2024 to December 2025. During this period, data were collected from patient's pathological reports in the pathology department of the hospital after institutional ethical evaluation council permission. A total of 234 cases were enrolled in the study, with patients' ages ranging from 42 to 95 years. All participants showed clinically symptoms benign prostatic hyperplasia BPH and were treated surgically by transurethral resection of the prostate TURP. Patients with incomplete data with incomplete data or those with confirmed diagnosis of prostate cancer prior to surgery were excluded from the study. The study population was classified into two age groups: patients younger than 65 years defined as group I, and patients aged 65years and older defined as group II. All histopathological slides were independently assessed by two experienced pathologists. The clinicopathological parameters included patients age, presence of associated inflammation, tissue necrosis, metaplastic changes, benign prostatic lesions (hyperplasia), and incidentally detected malignant foci. Malignant cases, Gleason scores and grades were used along with the evaluation of lymph vascular and perineural invasion.

Statistical analysis was performed using the latest version of SPSS software. The Chi-square test was applied to assess associations between variables, particularly the relationship between age and the presence of incidental malignant changes as well as Gleason grades. A p-value < 0.05 was considered statistically significant. The collected information was analyzed statistically using the latest version of SPSS. To determine the relationship across parameters like the relation between the age and each of incidental malignant changes and Gleason grades, the Chi-Square test was employed with significant p value being less than 0.05.

3. Results

This retrospective study included 234 patients who underwent TURP. The mean age of the study participants was 67.2 ± 8.6 years, with age ranging from 42 to 95 years. Of the total cases, the majority of patients (133 cases; 57%) were older than 65 years, while 101 patients (43%) were younger than 65 years. All enrolled cases underwent TURP. The majority of the patients (224 cases; 91.5%) were diagnosed with benign prostatic hyperplasia, while 20 (8.5%) cases diagnosed with malignant adenocarcinoma as shown in Table 1. The distribution of additional pathological markers such as inflammation, cellular necrosis, and metaplastic changes, in the collected samples are presented in Table 2. Interestingly, associated inflammation was noticed in 51 cases (21%), followed by cellular necrosis in 6 samples (2.6%) and metaplastic changes in five samples (2.1%), as shown in Table 2. Over all 20 cases diagnosed with incidental malignant prostatic adenocarcinoma, the distribution of Gleason scores is presented in Table 3. Histopathological examination of hematoxylin and eosin H&E-stained sections revealed that a higher Gleason score Grade 5 was noticed in 12 cases (60%), shown for more than half of the malignant specimens, where 8 samples (40%) exhibited lower scores (Grades 2, 3, and 4) as presented in Fig. 1. In respect to malignant invasion including lymphovascular and perineural invasion, invasive features were diagnosed in 13 samples equal to 65% of the 20 adenocarcinoma cases. Among these, lymphovascular invasion was defined in 3 samples (23%) compared to 10 cases (77%), demonstrated perineural invasion, as presented in Table 4. The relation between the age and the prostatic lesions including BPH and incidental malignant adenocarcinoma is summarized in Table 5. Indeed, a higher proportion of both benign and malignant lesions was observed among patients aged 65 years, with 12 (60%) samples of malignant adenocarcinoma and 121 (56.6%) cases of BPH recorded in this age group. Although, nearly half of the incidental carcinoma cases (8 of 20 cases) were diagnosed in patients younger than 65 years, no significant association was found between age

and type of prostatic lesion as presented in Table 6. There was a significant statistical relation between higher Gleason grades and the old age in the current sample, p value <0.05 . In the current study the relation between age of the patients and other pathological changes like inflammation, necrosis and metaplasia were demonstrated in Table 7. Hence, no statistically significant differences were noticed between patients aged older or younger than 65 years regarding the presence or absence of inflammation, necrosis, or metaplasia with P -values of 0.3, 0.1 and 0.4 respectively.

Table1: Distribution of Prostatic Lesions in The Collected Cases

Prostatic lesions	Number (n)	Percentage (%)
Benign prostatic hyperplasia	214	91.5 %
Adenocarcinoma	20	8.5 %
Total	234	100

Table2: Distribution of Pathological Changes in The Studied Cases (n=234)

Pathological changes	Positive n(%)	Negative n(%)
Inflammation	51(21.8%)	183(78.2%)
Cellular necrosis	6(2.6%)	228(97.4%)
Metaplasia	5(2.1%)	229(97.9%)

Table3: Distribution of Gleason Scores and Grades in Incidental Prostatic Carcinoma (n=20)

Gleason Scores (Pattern)	ISUP Grade groups	n	Percentages (%)
6 (3+3)	Grade 1	0	0%
7 (3+4)	Grade 2	4	20%
7(4+3)	Grade 3	3	15%
8(4+4 or 3+5)	Grade 4	1	5 %
9–10 (4+5, 5+4, 5+5)	Grade 5	12	60%
Total	20		100%

Table4: Frequencies of Invasive Prostatic Adenocarcinoma in Studied Patients (n=13)

Type of invasions	n	Percentage (%)
Lympho-vascular invasion	3	23%
Peri-neural invasion	10	77%
Total	13	100%

Table5: Association Between Age and Prostatic Lesions in The Studied Subjects (n=234)

Prostatic lesions	≤65 years n(%)	> 65 years n (%)	Total	P value
Incidental prostatic AC*	8(40%)	12(60%)	20(100%)	0.7
BPH*	93 (43.4%)	121(56.6%)	214(100%)	

AC*: adenocarcinoma, BPH*: benign prostatic hyperplasia

Table6: Correlation Between Age and Gleason Grades in Studied Cases n=20

Table 1: Correlation between Age and Gleason Grades in Studied Cases n = 20				
Gleason Grade group	≤65 years n(%)	> 65 years n(%)	Total	P value
Grade I	0 (0%)	0 (0%)	0 (0%)	0.03
Grade II	4 (20%)	0 (0%)	4 (20%)	
Grade III	0 (0%)	3 (15%)	3 (15%)	
Grade IV	1 (5%)	0 (0%)	1(5%)	
Grade V	3 (15%)	9 (45%)	12(60%)	
Total	8 (40%)	12 (60%)	20 (100%)	
Chi-square test; p = 0.03 (statistically significant)				

Table 7: Association Between Age and Pathological Changes the Studied Patients n=234

Pathological changes	≤65 years n(%)	> 65 years n(%)	Total	P value
Inflammation				
Positive	25(49%)	26(51%)	51(100%)	0.3
Negative	76(41.5%)	107(58.5%)	183(100%)	
Necrosis				
Positive	1(16.7%)	5(83.3%)	6(100%)	0.1
Negative	100(43.8%)	128(56.2%)	228(100%)	
Metaplasia				
Positive	3 (60%)	2 (40%)	5 (100%)	0.4
Negative	98 (42.7%)	131(57.3%)	229 (100%)	

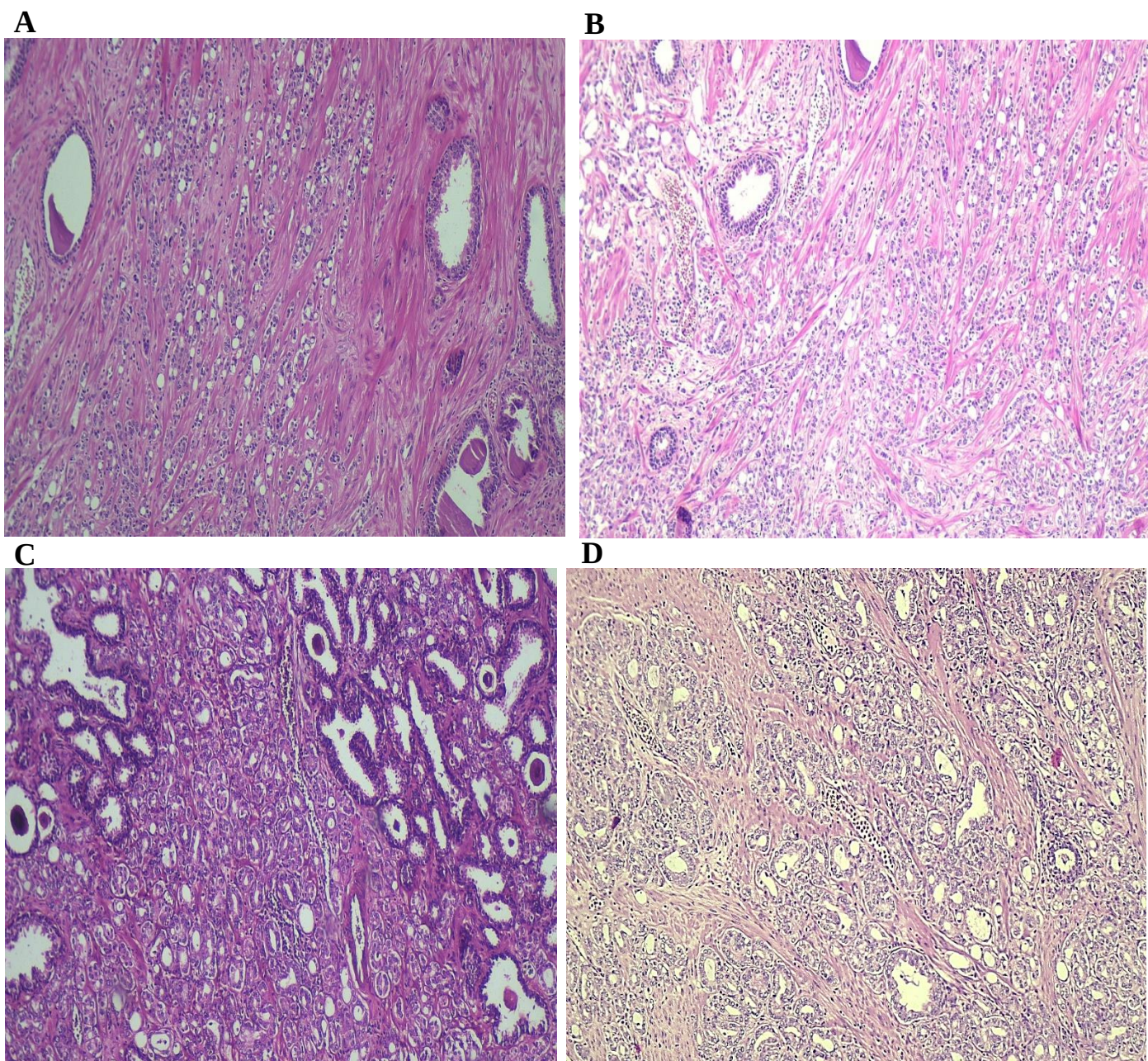


Figure1: Describes Histopathological Findings in Prostatic Tissue H&E Staining. A) prostatic tissue showing benign prostatic hyperplasia, characterized by increased glandular proliferation embedded within fibromuscular stroma. B) prostatic tissue section showing chronic inflammatory infiltrates, predominantly lymphocytes within the stromal tissue. C) prismatic section exhibiting adenocarcinoma, showing crowded irregular malignant glands with loss of normal architecture, consistent with a higher Gleason score. D) prostatic adenocarcinoma histological section characterized with infiltration of malignant glands within the stroma consistent with high-grade disease.

4. Discussion

Prostatic carcinoma ranking as the third highest frequent cancer among Iraqi males alongside to be some of the most prevalent tumors worldwide. Prostate cancer typically has a quiet progress and is one of the cancers with a favorable the long-term outcome in its early stages. In affluent nations, the likelihood of surviving five years for prostate carcinoma is almost 100%. Nevertheless, metastatic prostate cancer remains aggressive and ultimately results in the patient's passing on with an average survival rate of five years of roughly 31% (Mola ahmed and Sulaiman, 2024). In the current study the mean age at time of diagnosis was 67.2 which is parallel to that detected in other Iraqi studies done in Baghdad and Nineveh with mean age of patients 68.4, 73.18 respectively and that in Erbil with median age of 71 years. The mean age of the current study match with that reported from the comparable Middle East figure in which median age was 68 years, meanwhile it may be a little differ from other global reported data. This disparity in the recorded mean age may be related to geographical and genetic factors (Pettersson *et al.*, 2018; Daher, Telvizian, Dagher, Abdul-Sater, Massih, A. EL Chediak, *et al.*, 2021; Daher, Telvizian, Dagher, Abdul-Sater, Massih, A. E. L. Chediak, *et al.*, 2021; Hussein and Al-Khafaji, 2021; Aynoor Abdulkareem Mohammed and Zainab Waleed Aziz, 2025). The result of this study showed that 20(8.5%) out of total 234 cases underwent transurethral resection of prostate in Karbala province as a management for symptomatic benign prostatic hyperplasia were diagnosed to have incidental prostatic carcinoma (IPC). This figure is similar to that reported in Baghdad with a rate of 8.29% (Hussein and Al-Khafaji, 2021). While it was a little higher in Nineveh province reaching to 11.5% of patients were unintentionally discovered to have undetected carcinoma of the prostate in the tissue samples from their transurethral surgical excision and a comparable high result that mentioned by Hassawi and associates in a study conducted in Mosul revealed that 11.9% of participants had an accidentally discovered prostate cancer. This rate is come close to that from Pakistan and Ireland, where 10.7% and 10.3% of those examined had an unexpected prostate cancer detected after TURP (Janjua *et al.*, 2021). In comparison with a lower figure of Turkish and Indian studies that reporting (5.6%) and 6.89 % of patients were diagnosed with unexpected malignancies in the biopsied samples. An additional cohort study presenting lower figures were recorded by Korea, USA, UK, Italy, Brazil and Canada. Variations in practically applied diagnostic protocols for prostate cancer detection could be the cause of these regional variations (Perera *et al.*, 2016; Coman *et al.*, 2022). In the current study higher Gleason score (grade 5) was seen in more than half of cases with incidental malignant changes as 12(60%) out of 20 cases which is close to that recorded in Nineveh province registering (47.0%) of the total cases presented with aggressive high grades while it is more compatible with figure detected in Erbil and higher than opposing figure from Baghdad which show that 26% of the cases enrolled in the study presented with higher Gleason score (Mola ahmed and Sulaiman, 2024). In parallel with Turkish study, the majority of their cases were of lower Gleason grades in that Just (17.6%) displayed a Gleason score of ≥ 7 , while the bulk of the participants (82.4%) had an overall score of 6(3+3) (İlktaç *et al.*, 2021). From India other study showed that 50% of the involved cases diagnosed with higher Gleason grade. Similar factors that affect the rate of prostate cancer, such as race, ethnic background, geography, family history, genetic and nutritional habits that add to these regional variances, may also be responsible for such elevated assessment scores relative to the ones recorded in western societies (Perera *et al.*, 2016; İlktaç *et al.*, 2021). In the current study, of total thirteen cases presented with

malignant invasion, peri-neural invasion was detected in 10 (77%) with 3(23%) presented with lymphovascular invasion. The current result differs from the statistical profile of Erbil province which reporting 48.5% and 34.5% for peri-neural and lymphovascular invasions respectively. From Nineveh province, the recorded results were 39% for prineural and 30.4% for lymphovascular invasions (Mola ahmed and Sulaiman, 2024). In Indian study the reported malignant invasion was restricted to perineural invasion in 25% of malignant cases with no lymphovascular invasion. The presence of lympho-vascular (LVI) and peri-neural invasions (PNI) are significant predictive factors that influence therapeutic strategies, particularly if paired with more advanced phases of prostate cancer, which increases the potential of dissemination and reduces the life expectancy following radical removal of the prostate (Aynoor Abdulkareem Mohammed and Zainab Waleed Aziz, 2025). In the current study the statistical relations between the age of the patients and other pathological parameters like incidental malignant changes, gleason grades, lymphovascular and perineural invasions, inflammation, necrosis and metaplastic changes were analyzed. Accordingly, the only statistically significant relation was detected between the higher age and higher Gleason scores. Other local Iraqi studies show different results in Baghdad and Nineveh provinces in that both studies present a significant statistical relation between the age and incidental malignancy detected in TURP specimens but not with Gleason grades. meanwhile additional study from Somalia reporting opposing results with the average age of IPC clients was statistically and considerably higher than that of the BPH category (Hussein and Al-Khafaji, 2021). Regarding the current study, our analysis offers a broader interpretation of age as hazardous influencer. Many reasonable predictions for this disparity that underscore crucial issues concerning subsequent studies and medical workout and encourages a thorough analysis of essential contributing aspects. patients polling evaluation and demographics were very important that can significantly affect the age-malignancy link, so whether the studied sample was derived from an opposing environment is an important influencing issue (e.g., rural based vs. premier medical foundation that encounters greater advanced/older cases). Because of this, it is crucial to understand that the results might not accurately reflect the wider society and larger sample size with multicenter analysis is needed in the future.

⁽¹⁶⁾ Throughout the years, prostate malignancy profile has been changed in that malignancies tend to be found at a more youthful " physiological age" especially in patients previously had regular PSA screening, which may attenuate the study's evident correlation concerning age in chronological terms (Ito, 2010; Ilic *et al.*, 2013; Grossman *et al.*, 2018). This may highlight one of limitations of the current study in that it didn't include the PSA level for the patients as an important determinant variable which in combination with other histopathological factors may reflect more realistic figure. According to recent study done in Karbala province which claim that due to the paucity of clinical resources enabling primary healthcare cancer treatment, widespread prostate cancer surveillance has not yet been implemented in Iraq as if it was adopted it can change the figure in detecting the incidental prostatic carcinoma in younger individuals with early stages and grades .Additionally, it possible that there are many undetermined precautionary factors (family history, nutritional, or ecological) that reduce the age-associated hazard observed somewhere else. This emphasizes how crucial it is to use multi-variables techniques, like (early Prostatic Specific Antigen assessment, image and genetic analysis) when deciding particularly for individualized management of prostatic lesions (Ilic *et al.*, 2013; Grossman *et al.*, 2018; Mjali *et al.*, 2025).

Conclusion

The present study conducted in Karbala province showed that the incidental prostatic carcinoma (IPC) was detected in 8.5% of patients who underwent TURP for clinically evident benign prostatic hyperplasia. Clearly, the majority of these incidentally detected cases were characterized by higher Gleason grade groups, suggesting a predominance of biologically aggressive disease. Although a substantial research studies identifies age as a major predictable risk factor for prostate cancer, the results of this work suggest that this association may not be uniformly applicable across all demographic or clinical contexts. The observed variation may be belonging to differences in patient selection criteria, diagnostic practices, and screening strategies. Therefore, these findings underscore the potential need for refined and age-inclusive screening protocols, particularly aimed at both younger patients and the elderly, to improve early detection of clinically significant prostate cancer in future healthcare programs.

Declarations**Ethical Consideration in Human And Animal Studies**

This is a retrospective cross-sectional study conducted following institution ethical guidelines and approval by the institutional ethical committee of Safeer AL-Imam AL Hussain Specialized Hospital, Karbala, Iraq. Patients' confidentiality and privacy were ensured in the study. No animal subjects were used in the study.

Consent of Publication

Not applicable.

Conflict of Interest

The author hereby declares that there is no conflict of interest on publishing this study.

Author's Contribution

Rasha Abd Al Raouf Al Safi conceived and designed the research, carried out the histopathological studies, analyzed and interpreted the results, and prepared and edited the manuscript. The author approved the final version of the manuscript submitted.

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Data Availability

Datasets analyzed in this study are available from the corresponding author on reasonable requests.

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