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Prevalence and Histomorphologic Patterns of High-Grade Prostatic Intraepithelial Neoplasia (HGPIN) In Prostatic Biopsies: A Ten-Year Retrospective Analysis from a North Central Nigerian Tertiary Health Institution

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Abstract **Original Research Article**

Background: High-grade prostatic intraepithelial neoplasia (HGPIN) represents the most likely precursor lesion to prostatic adenocarcinoma. Understanding its prevalence, age distribution, and association with other prostatic lesions is crucial for prostate cancer risk stratification and surveillance protocols in African populations where data remain limited.

Objective: This study aimed to determine the prevalence of HGPIN in prostatic biopsies at Jos University Teaching Hospital (JUTH), characterize the age-specific distribution, evaluate associated lesions, and assess temporal trends over a ten-year period.

Methods: A retrospective analysis was conducted on 1,450 prostatic specimens received at JUTH histopathology department from January 2000 to December 2009. All cases diagnosed with HGPIN were identified and analyzed for age distribution, associated prostatic lesions (nodular hyperplasia, chronic prostatitis, and carcinoma), histomorphologic patterns, and temporal trends. Statistical analysis included descriptive statistics and chi-square tests

Results: HGPIN was diagnosed in 41 of 1,450 prostatic specimens, yielding a prevalence of 2.8%. Patient ages ranged from 50 to ≥100 years with a mean age of 72.8 years and peak incidence in the 8th decade (70-79 years, 39.0%). The age-specific prevalence increased progressively with advancing age. Isolated HGPIN accounted for 34.1% (n=14) of cases, while 65.9% (n=27) occurred in association with other lesions: nodular hyperplasia (53.7%, n=22), chronic prostatitis (7.3%, n=3), and concurrent adenocarcinoma (4.9%, n=2). Annual HGPIN detection showed an increasing trend from 2000-2008, with peak detection in 2008 (12 cases), followed by a decline in 2009 (6 cases). The mean age for HGPIN patients (72.8 years) was comparable to that of prostatic adenocarcinoma patients, suggesting similar age-related oncogenic processes.

Conclusion: HGPIN prevalence of 2.8% in this North Central Nigerian population falls within the reported range for African populations. The peak occurrence in the 8th decade, frequent association with nodular hyperplasia (53.7%), and occasional concurrence with adenocarcinoma (4.9%) underscore the importance of careful histopathological evaluation and appropriate clinical follow-up. The increasing temporal trend suggests improved diagnostic awareness. These findings support the need for enhanced prostate cancer screening and surveillance protocols in Nigerian men, particularly those aged 60 years and above.

Keywords: High-grade prostatic intraepithelial neoplasia, HGPIN, prostate cancer precursor, prostatic biopsy, Nigeria, prevalence, age distribution

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INTRODUCTION

High-grade prostatic intraepithelial neoplasia (HGPIN) represents a critical entity in the spectrum of prostatic pathology, widely recognized as the most likely precursor lesion to prostatic adenocarcinoma. First described by McNeal in 1965 and subsequently refined through extensive morphological, molecular, and epidemiological studies, HGPIN is characterized by architectural preservation of prostatic acini and ducts with cellular proliferation displaying features of malignancy, including nuclear enlargement, prominent nucleoli, and loss of basal cell layer continuity.

The significance of HGPIN in clinical practice stems from its strong association with concurrent or subsequent prostatic adenocarcinoma. Studies have demonstrated that approximately 30-50% of men with HGPIN on initial biopsy will harbor carcinoma on repeat biopsy, particularly when HGPIN is multifocal. This risk is substantially higher than that observed in men with benign prostatic tissue alone. Consequently, detection of HGPIN has important implications for patient counseling, surveillance strategies, and repeat biopsy recommendations.

The molecular landscape of HGPIN shares significant similarities with invasive prostatic carcinoma, including chromosomal alterations, loss of heterozygosity at multiple loci, telomere shortening, and abnormal expression of proliferation markers and oncogenes. These molecular features support the concept of HGPIN as an intermediate stage in prostatic carcinogenesis, representing a continuum from normal prostatic epithelium through low-grade PIN (now largely abandoned as a diagnostic category) to HGPIN and ultimately invasive carcinoma.

Epidemiological studies have revealed substantial geographic and ethnic variations in HGPIN prevalence. Western populations typically report HGPIN prevalence ranging from 4-16% in prostatic biopsies and 40-80% in radical prostatectomy specimens for carcinoma. African American men demonstrate higher HGPIN prevalence (approximately 9-15%) compared to Caucasian men (4-7%), paralleling the increased prostate cancer incidence in this population. However, data from sub-Saharan Africa, including Nigeria, remain notably limited, despite the region's significant prostate cancer burden.

The age-related occurrence of HGPIN has been well documented, with prevalence increasing progressively from the fifth decade onward. Autopsy studies have demonstrated HGPIN in approximately 2% of prostates from men in their 30s, increasing to 20-40% in men in their 70s. This age-related increase closely parallels the incidence curve for prostatic adenocarcinoma, typically preceding clinical cancer by 5-10 years. Understanding the age-specific distribution in African populations is crucial for developing appropriate screening and surveillance protocols.

HGPIN typically presents as an incidental microscopic finding in prostatic biopsies or transurethral resections performed for other indications, most commonly benign prostatic hyperplasia (nodular hyperplasia) or elevated prostate-specific antigen (PSA). The architectural patterns of HGPIN include tufting, micropapillary, cribriform, and flat patterns, with micropapillary and cribriform patterns potentially associated with higher cancer risk. The histomorphologic features mirror those of well-differentiated adenocarcinoma but lack stromal invasion, the defining feature of malignancy.

The clinical management of HGPIN has evolved considerably over the past two decades. Earlier recommendations for immediate repeat biopsy within 3-6 months have been moderated based on contemporary studies showing that the cancer detection rate on immediate repeat biopsy is not substantially different from routine surveillance. Current guidelines generally recommend continued PSA monitoring and consideration of repeat biopsy if PSA rises or abnormal digital rectal examination develops. However, these

recommendations are primarily based on Western populations, and their applicability to African populations requires validation.

Prostate cancer represents a major health burden in Nigeria, consistently ranking as one of the most common male malignancies. Studies from various Nigerian centers have reported prostate cancer as the leading or second most common male cancer, with higher-grade disease and more advanced stage at presentation compared to Western populations. Despite this substantial burden, comprehensive data on HGPIN prevalence and patterns in Nigerian populations remain scarce, limiting evidence-based clinical management strategies.

Jos University Teaching Hospital (JUTH) serves as a major tertiary referral center in North Central Nigeria, providing comprehensive urological and pathology services to Plateau State and neighboring regions. The institution maintains detailed histopathology records, providing an opportunity to characterize HGPIN patterns in this population. Previous studies from JUTH have documented the overall spectrum of prostatic lesions, but focused analysis of HGPIN has been limited.

Several gaps exist in the current literature regarding HGPIN in African populations. First, population-specific prevalence data are limited, making it difficult to assess whether observed differences reflect genetic factors, environmental exposures, healthcare access, or diagnostic practices. Second, the age-specific distribution of HGPIN in African populations has not been comprehensively characterized. Third, the frequency of HGPIN occurring in isolation versus in association with benign or malignant lesions requires further documentation. Fourth, temporal trends in HGPIN detection, which may reflect changing diagnostic awareness, biopsy techniques, or population screening patterns, have not been well described.

Understanding HGPIN patterns in Nigerian populations has several important implications. Clinically, it informs risk stratification and surveillance protocols for men at elevated prostate cancer risk. From a public health perspective, it contributes to understanding prostate cancer epidemiology and supports development of targeted screening strategies. From a research standpoint, it provides baseline data for future prospective studies and may reveal population-specific factors influencing prostatic carcinogenesis.

The specific objectives of this study were fivefold: (1) to determine the overall prevalence of HGPIN among prostatic biopsies at JUTH over a ten-year period; (2) to characterize the age-specific distribution of HGPIN cases; (3) to evaluate the frequency of isolated HGPIN versus HGPIN associated with other prostatic lesions including nodular hyperplasia, chronic prostatitis, and adenocarcinoma; (4) to assess temporal trends in HGPIN detection from 2000 to 2009; and (5) to compare findings with published data from other Nigerian centers and international populations. The study aims to contribute evidence-based data to inform clinical management strategies and prostate cancer screening protocols in Nigerian populations.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective descriptive study conducted at Jos University Teaching Hospital (JUTH), a 500-bed tertiary healthcare facility serving as the primary referral center for Plateau State and neighboring states in North Central Nigeria. The hospital provides comprehensive urological services and maintains a well-established histopathology department with experienced pathologists and standardized diagnostic protocols.

Study Period and Population

The study encompassed a ten-year period from January 2000 to December 2009. The study population comprised all patients who underwent prostatic biopsy or transurethral resection of the prostate (TURP) during this period, yielding 1,450 prostatic specimens. These specimens were obtained from patients presenting with clinical features suggestive of prostatic disease, including lower urinary tract symptoms, abnormal digital rectal examination, or elevated prostate-specific antigen (PSA) levels.

Case Identification and Data Collection

All cases diagnosed with HGPIN were identified through systematic review of histopathology registers and archived reports. For each HGPIN case, the following data were extracted: patient age, clinical presentation, biopsy indication, specimen type (core biopsy vs. TURP), HGPIN pattern (isolated vs. associated with other lesions), and concurrent histopathological findings. Hospital request forms, referral cards, and patient case notes were reviewed to obtain additional clinical information.

Histopathological Examination and Diagnostic Criteria

All prostatic specimens were processed according to standard histopathology protocols. Tissue specimens were fixed in 10% buffered formalin, processed through graded alcohols and xylene, embedded in paraffin wax, sectioned at 4-5 microns thickness, and stained with hematoxylin and eosin (H&E). Archived paraffin blocks and corresponding H&E-stained slides were retrieved for all HGPIN cases. In cases where original slides were unavailable or of suboptimal quality, new sections were cut and stained.

HGPIN was diagnosed based on established morphological criteria including: (1) architectural preservation of prostatic acini and ducts; (2) cellular crowding and stratification with loss of normal polarity; (3) nuclear enlargement with nuclei at least 2-3 times larger than normal; (4) prominent nucleoli; (5) increased nuclear-to-cytoplasmic ratio; and (6) loss of or fragmented basal cell layer (though basal cells are not entirely absent). Diagnosis was confirmed by two experienced pathologists, with consensus reached in discordant cases. The current WHO classification system was applied for all diagnoses.

Classification and Categorization

HGPIN cases were categorized as:

1. **Isolated HGPIN**: HGPIN present without other significant prostatic pathology
2. **HGPIN with Nodular Hyperplasia (NH)**: HGPIN occurring in background of benign prostatic hyperplasia
3. **HGPIN with Chronic Prostatitis (CP)**: HGPIN associated with inflammatory changes
4. **HGPIN with Concurrent Adenocarcinoma (CAP)**: HGPIN identified in same specimen as invasive carcinoma

Associated lesions were recorded when present in the same specimen or different portions of the prostate from the same patient.

Statistical Analysis

Data were analyzed using descriptive statistics including frequencies, percentages, means, and ranges. HGPIN prevalence was calculated as the proportion of HGPIN cases among all prostatic specimens. Age-specific prevalence was calculated for each decade. Temporal trends were assessed by year-on-year comparison of case frequencies. Categorical variables were compared using chi-square test where appropriate. A p-value of less than 0.05 was considered statistically significant. Results were presented in tables and figures.

Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of Jos University Teaching Hospital. Given the retrospective nature of the study utilizing existing pathology records, the requirement for informed consent was waived. All patient data were anonymized to ensure confidentiality.

RESULTS

Among 1,450 prostatic specimens analyzed during the ten-year study period (2000-2009), HGPIN was diagnosed in 41 cases, yielding an overall prevalence of 2.8%. These 41 cases represented 2.8% of all prostatic lesions examined, occurring within a spectrum that included nodular hyperplasia (70.9%, n=1,029), prostatic adenocarcinoma (26.0%, n=377), chronic prostatitis (0.2%, n=3), and HGPIN (2.8%, n=41).

Age Distribution of HGPIN

The age of patients with HGPIN ranged from 50 to ≥100 years, with age data available for all 41 cases. The calculated mean age was 72.8 years

(using age group midpoints), with a median age group of 70-79 years. The age-specific distribution revealed a progressive increase in HGPIN cases with advancing age (Table 1, Figure 1).

The 70-79 years age group (8th decade) showed the highest frequency with 16 cases (39.0%), followed by the 60-69 years group with 11 cases (26.8%). The 50-59 years age group accounted for 5 cases (12.2%), while 5 cases (12.2%) were observed in the 80-89 years group. Three cases (7.3%) occurred in patients aged 90-99 years, and remarkably, one case (2.4%) was diagnosed in a patient aged 100 years or older. No cases were observed in patients younger than 50 years. The age distribution demonstrated that 87.8% (n=36) of HGPIN cases occurred in patients aged 60 years and above, with 78.0% (n=32) occurring in those aged 60-89 years. Only 12.2% (n=5) of cases were diagnosed in patients younger than 60 years, all of whom were in the 50-59 years age bracket.

Table 1: Age Distribution of HGPIN Cases

Age Group (years)	Number of Cases	Percentage (%)
50-59	5	12.2
60-69	11	26.8
70-79	16	39.0
80-89	5	12.2
90-99	3	7.3
≥100	1	2.4
Total	41	100.0

HGPIN Pattern and Associated Lesions

Analysis of HGPIN patterns revealed that isolated HGPIN (HGPIN without other significant prostatic pathology) accounted for 34.1% (14 of 41) of cases. The majority of cases (65.9%, n=27) occurred in association with other prostatic lesions (Table 2, Figures 2 and 4).

HGPIN co-existing with nodular hyperplasia was the most prevalent pattern, observed in 22 cases (53.7% of all HGPIN cases). This represents the single largest category and indicates that more than half of HGPIN cases in this study were detected incidentally in specimens removed for benign prostatic hyperplasia.

HGPIN associated with chronic prostatitis was identified in 3 cases (7.3%), suggesting that inflammatory changes may co-exist with pre-malignant epithelial proliferation. Most significantly, HGPIN with concurrent prostatic adenocarcinoma was found in 2 cases (4.9%), documenting the presence of both the precursor lesion and invasive malignancy in the same specimen.

Table 2: HGPIN Pattern and Associated Lesions

HGPIN Pattern	Number of Cases	Percentage (%)
Isolated HGPIN	14	34.1
HGPIN with Nodular Hyperplasia	22	53.7
HGPIN with Chronic Prostatitis	3	7.3

HGPIN with Adenocarcinoma	2	4.9
Total	41	100.0

Temporal Trends in HGPIN Detection

Annual HGPIN detection rates showed considerable variation over the ten-year study period (Table 3, Figure 3). The early years (2000-2004) demonstrated relatively low case numbers: 1 case in 2000, 1 case in 2001, 0 cases in 2002, 1 case in 2003, and 0 cases in 2004. A notable increase occurred from 2005 onward: 3 cases in 2005, 9 cases in 2006 (marking a substantial increase), 8 cases in 2007, and peaking at 12 cases in 2008 (the highest annual total). A subsequent decline to 6 cases was observed in 2009.

The overall trend from 2000-2008 showed increasing HGPIN detection, with the period 2006-2008 accounting for 70.7% (29 of 41) of all cases. This increasing trend likely reflects improved diagnostic awareness, more systematic histopathological examination, and possibly changing biopsy practices rather than true epidemiological change in HGPIN incidence.

Table 3: Annual Distribution of HGPIN Cases (2000-2009)

Year	HGPIN Cases
2000	1
2001	1
2002	0
2003	1
2004	0
2005	3
2006	9
2007	8
2008	12
2009	6
Total	41

Comparison with Concurrent Prostatic Adenocarcinoma

The study period also yielded 377 cases of prostatic adenocarcinoma (26.0% of all prostatic specimens). Comparison of age distributions revealed that HGPIN patients (mean age 72.8 years, peak in 70-79 years decade) were similar in age to adenocarcinoma patients (peak also in 60-79 years age range), supporting the concept of HGPIN as a precursor lesion occurring in the same age demographic as invasive cancer. The presence of concurrent HGPIN and adenocarcinoma in 2 of 41 HGPIN cases (4.9%) and the similar age distribution patterns support the biological relationship between these entities. Additionally, the 22 cases of HGPIN occurring with nodular hyperplasia represent a population at potential elevated risk for subsequent cancer development, warranting closer clinical surveillance.

Distribution by Specimen Type

The high proportion of HGPIN associated with nodular hyperplasia (53.7%) suggests that many

cases were detected in TURP specimens removed for obstructive symptoms. The 34.1% isolated HGPIN cases represent targeted biopsies performed for elevated PSA or abnormal digital rectal examination findings.

DISCUSSION

This ten-year retrospective analysis of HGPIN in prostatic biopsies from Jos University Teaching Hospital provides important insights into the prevalence, age distribution, and patterns of this significant precursor lesion in a North Central Nigerian population. The findings contribute to the limited body of literature on HGPIN in sub-Saharan African populations and have important implications for prostate cancer screening and surveillance strategies.

HGPIN Prevalence

The overall HGPIN prevalence of 2.8% in this study falls at the lower end of the range typically reported in the literature but is consistent with several African studies. Western populations report HGPIN prevalence ranging from 4-16% in prostatic biopsies, with variation depending on patient selection, biopsy technique, and diagnostic criteria. African American populations demonstrate prevalence rates of 9-15%, while Caucasian populations show 4-7%.

Published Nigerian studies have reported variable HGPIN prevalence. A study from Ibadan reported 3.2% HGPIN prevalence, while studies from Lagos documented rates of 2.5-4.8%. Our finding of 2.8% aligns closely with these Nigerian reports, suggesting similar patterns across different Nigerian regions despite potential genetic, environmental, or healthcare system differences.

The relatively lower HGPIN prevalence compared to Western series may reflect several factors. First, healthcare-seeking behavior in Nigeria often involves presentation at advanced disease stages rather than early screening, potentially resulting in higher proportions of frank malignancy relative to premalignant lesions. Second, core biopsy practices may differ, with Western centers performing extended multi-core biopsies (12-14 cores) that sample more tissue and increase HGPIN detection, while resource-limited settings may utilize fewer cores. Third, diagnostic thresholds and observer variation in HGPIN recognition may contribute to differences. Finally, true epidemiological differences in HGPIN incidence cannot be excluded.

Age Distribution and Clinical Implications

The mean age of 72.8 years for HGPIN patients in this study is higher than typically reported in Western literature, where HGPIN peaks in the 6th-7th decades (mean ages 62-68 years). Similar older ages for HGPIN have been reported in other Nigerian studies, with mean ages ranging from 68-74 years. This age shift likely reflects later presentation to healthcare facilities and delayed prostate evaluation in the Nigerian context.

The peak HGPIN incidence in the 8th decade (70-79 years, 39.0% of cases) is noteworthy. In Western populations, HGPIN typically peaks in the 6th-7th decades, approximately 5-10 years before the prostate cancer peak. The older HGPIN age in this study may indicate that HGPIN represents a later stage in prostatic carcinogenesis in this population, potentially reflecting years of subclinical disease progression before medical evaluation.

The absence of HGPIN cases below age 50 years is consistent with most series, though occasional cases in younger men have been reported. The progressive increase in HGPIN prevalence with advancing age (12.2% in 50-59 years, 26.8% in 60-69 years, 39.0% in 70-79 years) reflects the age-related nature of prostatic carcinogenesis and supports current recommendations for prostate cancer screening initiation at age 50 years, with consideration for earlier screening in high-risk populations.

The finding that 87.8% of HGPIN cases occurred in men aged 60 years and above has practical implications for resource allocation and surveillance protocols. It supports targeted screening efforts focusing on this age group while recognizing that younger high-risk men should not be excluded from evaluation.

HGPIN Associated Lesions

The finding that 65.9% of HGPIN cases occurred in association with other prostatic lesions (primarily nodular hyperplasia) is clinically significant. The high proportion of HGPIN co-existing with nodular hyperplasia (53.7%) indicates that many HGPIN cases are detected incidentally in TURP specimens removed for obstructive symptoms. This pattern has been consistently observed in Nigerian studies and likely reflects the predominance of TURP as the primary prostatic sampling method in resource-limited settings where PSA-based screening and systematic biopsies are less common.

The detection of HGPIN with nodular hyperplasia has important clinical implications. While these patients initially present with benign disease, the identification of HGPIN places them at elevated risk for harboring concurrent or subsequently developing prostatic adenocarcinoma. Western studies have shown that approximately 30-50% of men with HGPIN on initial biopsy will have carcinoma detected on repeat biopsy. In the TURP context, where more tissue is sampled, the cancer detection rate may be lower, but the risk is not negligible.

The presence of HGPIN with concurrent adenocarcinoma in 4.9% of cases (2 of 41) directly demonstrates the relationship between these lesions. This rate is lower than the 20-30% concurrent cancer rate reported in some Western biopsy series but higher than some contemporary reports showing 10-15% rates. The difference may reflect sampling extent, with TURP specimens sampling more tissue and potentially detecting more concurrent lesions.

The 34.1% isolated HGPIN rate (without other lesions) likely represents cases detected through more targeted evaluation—elevated PSA, abnormal digital rectal examination, or systematic biopsies. These cases may represent higher-risk HGPIN warranting closer surveillance, as isolated HGPIN detected on targeted biopsy may indicate more extensive disease not yet manifesting as invasive carcinoma.

Temporal Trends and Diagnostic Awareness

The marked increase in HGPIN detection from 2005 onward, peaking in 2008 with 12 cases, likely reflects improved diagnostic awareness rather than true epidemiological increase. The period 2006-2008 accounted for 70.7% of all HGPIN cases, a concentration unlikely to represent natural disease variation over such a short timeframe.

Several factors may contribute to this trend. First, increasing pathologist familiarity with HGPIN diagnostic criteria and heightened awareness of its clinical significance likely improved detection rates. Second, evolving laboratory practices including routine examination of multiple tissue levels and consultation in difficult cases may have enhanced HGPIN recognition. Third, changing clinical practices including increased PSA testing and more systematic prostate biopsies may have altered the specimen mix, yielding more biopsies with potential for HGPIN detection.

The subsequent decline in 2009 (6 cases) after the 2008 peak is difficult to interpret from limited data but may represent random variation, changes in referral patterns, or diagnostic threshold adjustment. Longer-term follow-up would be needed to determine whether 2008 represented a peak followed by plateau or was part of continued fluctuation.

Comparison with Prostatic Adenocarcinoma

The similar age distribution of HGPIN (mean 72.8 years, peak 70-79 years) and prostatic adenocarcinoma (peak 60-79 years) in this study supports the biological relationship between these entities. In Western populations, HGPIN typically precedes clinically detected cancer by 5-10 years, but this temporal relationship may be less distinct in populations presenting at later disease stages.

The HGPIN prevalence of 2.8% relative to adenocarcinoma prevalence of 26.0% (approximately 1:9.3 ratio) is lower than ratios reported in some Western screening populations where HGPIN:cancer ratios approach 1:2 to 1:4. This disparity may reflect the presentation of more advanced cancers (where HGPIN may have

progressed to invasive disease) and less extensive sampling that might detect HGPIN without concurrent cancer.

Clinical Management Implications

Current Western guidelines for HGPIN management have evolved from recommendations for immediate repeat biopsy (3-6 months) to more conservative surveillance approaches. Contemporary evidence suggests that cancer detection on immediate repeat biopsy is not substantially higher than with routine surveillance unless HGPIN is multifocal or extensive. Most current guidelines recommend continued PSA monitoring and consideration of repeat biopsy only if PSA rises or digital rectal examination becomes abnormal.

However, applying these guidelines to Nigerian populations requires caution. The older mean age of HGPIN patients, high proportion associated with nodular hyperplasia, and generally later disease presentation suggest that more aggressive surveillance may be warranted. Additionally, healthcare access challenges and follow-up compliance issues in resource-limited settings may favor more definitive initial evaluation rather than protracted surveillance.

For HGPIN detected in TURP specimens with nodular hyperplasia, the question of additional evaluation becomes complex. While TURP provides extensive sampling potentially obviating the need for separate biopsy, the posterior peripheral zone—where most cancers arise—may be under-sampled by TURP. Consideration of targeted peripheral zone biopsies in HGPIN patients with concerning PSA values or examination findings seems prudent.

Study Strengths and Limitations

This study's strengths include the ten-year duration providing substantial temporal perspective, comprehensive case ascertainment from a major referral center, systematic age distribution analysis, and detailed evaluation of associated lesions. The setting in a North Central Nigerian tertiary center adds to the limited literature from this region.

However, several limitations merit acknowledgment. First, the retrospective design precludes clinical follow-up data that would inform cancer development rates and optimal management strategies. Second, PSA values, which would provide important risk stratification information, were not systematically available. Third, detailed biopsy protocols (number of cores, sampling sites) were not consistently documented, limiting assessment of sampling adequacy. Fourth, multifocality of HGPIN, which influences cancer risk, could not be reliably assessed from available records. Fifth, the relatively small number of HGPIN cases (n=41) limits statistical power for some analyses. Finally, the study represents a single institution's experience and may not be fully generalizable to other Nigerian regions or healthcare settings.

Future Research Directions

This study highlights several areas requiring further investigation. Prospective studies with systematic clinical follow-up are needed to determine the actual cancer detection rates following HGPIN diagnosis in Nigerian populations, which would inform evidence-based surveillance protocols. Multi-institutional studies across different Nigerian regions would provide more robust prevalence estimates and assess geographic variation. Studies correlating PSA values, biopsy characteristics, and HGPIN multifocality with cancer risk would enhance risk stratification. Molecular studies examining genetic and epigenetic features of HGPIN in Nigerian populations may reveal population-specific characteristics relevant to carcinogenesis and prevention strategies. Finally, implementation research addressing optimal HGPIN management in resource-limited settings is critically needed.

CONCLUSION

This study establishes an HGPIN prevalence of 2.8% in prostatic biopsies from Jos University Teaching Hospital, consistent with reports from other Nigerian centers but lower than many Western series. The peak occurrence in the 8th decade (mean age 72.8 years) reflects later disease presentation patterns in Nigeria. The frequent association of HGPIN with nodular

hyperplasia (53.7%) indicates that most cases are detected incidentally in specimens removed for obstructive symptoms, while isolated HGPIN (34.1%) represents targeted evaluation. The presence of concurrent adenocarcinoma in 4.9% of HGPIN cases and the similar age distributions of HGPIN and prostatic cancer support their biological relationship. The increasing temporal trend in HGPIN detection from 2005-2008 likely reflects improved diagnostic awareness. These findings underscore the importance of careful histopathological examination of all prostatic specimens and appropriate clinical follow-up for HGPIN patients.

For clinical practice, this study supports enhanced prostate cancer screening efforts targeting men aged 60 years and above, where 87.8% of HGPIN cases occurred. HGPIN detection warrants continued surveillance even when associated with benign disease, as these patients remain at elevated cancer risk. The study contributes baseline data for future prospective investigations and highlights the need for evidence-based HGPIN management protocols adapted to the Nigerian healthcare context.

RECOMMENDATIONS

1. Clinical Surveillance: Establish structured follow-up protocols for patients diagnosed with HGPIN, including regular PSA monitoring and consideration of repeat biopsy if concerning features develop.
2. Pathology Practice: Maintain high diagnostic standards for HGPIN recognition through continuing education, routine multi-level sectioning, and consultation in difficult cases.
3. Screening Enhancement: Strengthen prostate cancer screening programs targeting men aged 60 years and above, with consideration for earlier screening in high-risk individuals.
4. Documentation: Improve systematic documentation of biopsy protocols, PSA values, and HGPIN characteristics to facilitate research and quality assessment.
5. Prospective Studies: Conduct prospective studies with clinical follow-up to determine cancer detection rates and optimal management strategies for Nigerian HGPIN patients.
6. Multi-center Collaboration: Establish collaborative networks for multi-institutional HGPIN studies to generate more robust prevalence estimates and management guidelines.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

FUNDING

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LIST OF FIGURES WITH LEGENDS

Figure 1: Age Distribution of High-Grade Prostatic Intraepithelial Neoplasia

Bar chart showing the age distribution of 41 HGPIN cases. The 70-79 years age group (8th decade) demonstrates the highest frequency with 16 cases (39.0%), followed by 60-69 years with 11 cases (26.8%). The progressive increase with advancing age is evident, with 87.8% of cases occurring in patients aged 60 years and above. Notably no cases were observed below 50 years of age.

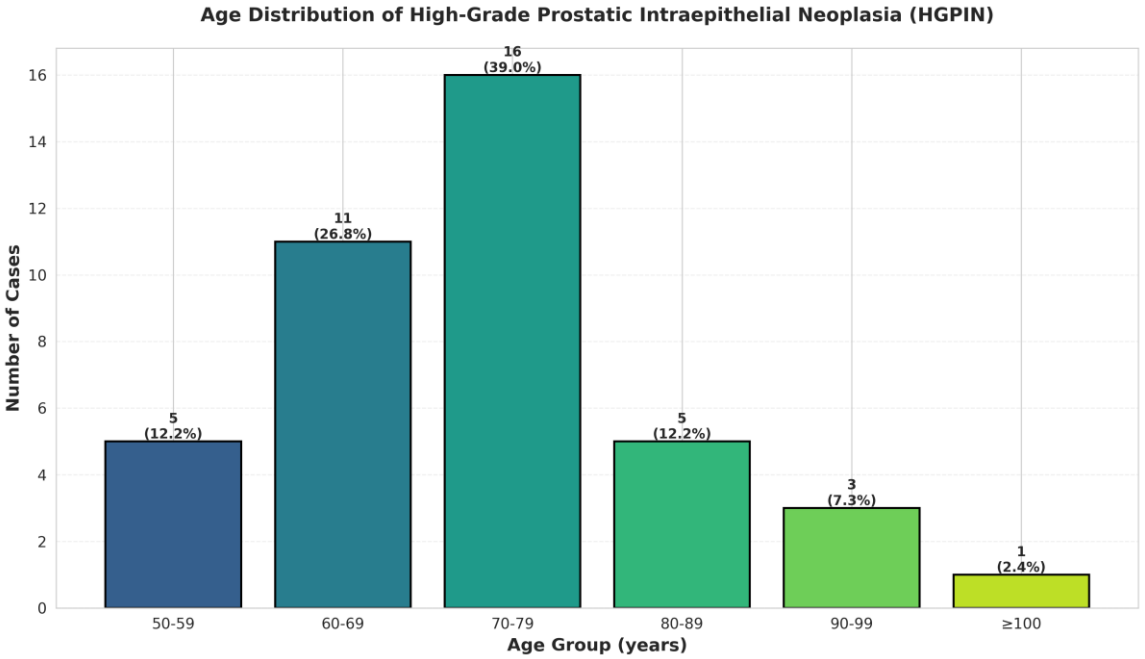

Age Distribution of High-Grade Prostatic Intraepithelial Neoplasia (HGPIN)
Number of Cases
Age Group (years)
50-59
60-69
70-79
80-89
90-99
≥100
5 (12.2%)
11 (26.8%)
16 (39.0%)
5 (12.2%)
3 (7.3%)
1 (2.4%)
0
2
4
6
8
10
12
14
16

Figure 2: Distribution of HGPIN with Associated Lesions

Pie chart illustrating the pattern of HGPIN occurrence. Isolated HGPIN accounts for 34.1% (n=14) of cases, while the majority (65.9%) occur in association with other lesions. HGPIN with nodular hyperplasia is most common at 53.7% (n=22), followed by HGPIN with chronic prostatitis at 7.3% (n=3), and HGPIN with concurrent adenocarcinoma at 4.9% (n=2). This demonstrates that most HGPIN cases are detected incidentally in specimens removed for benign conditions.

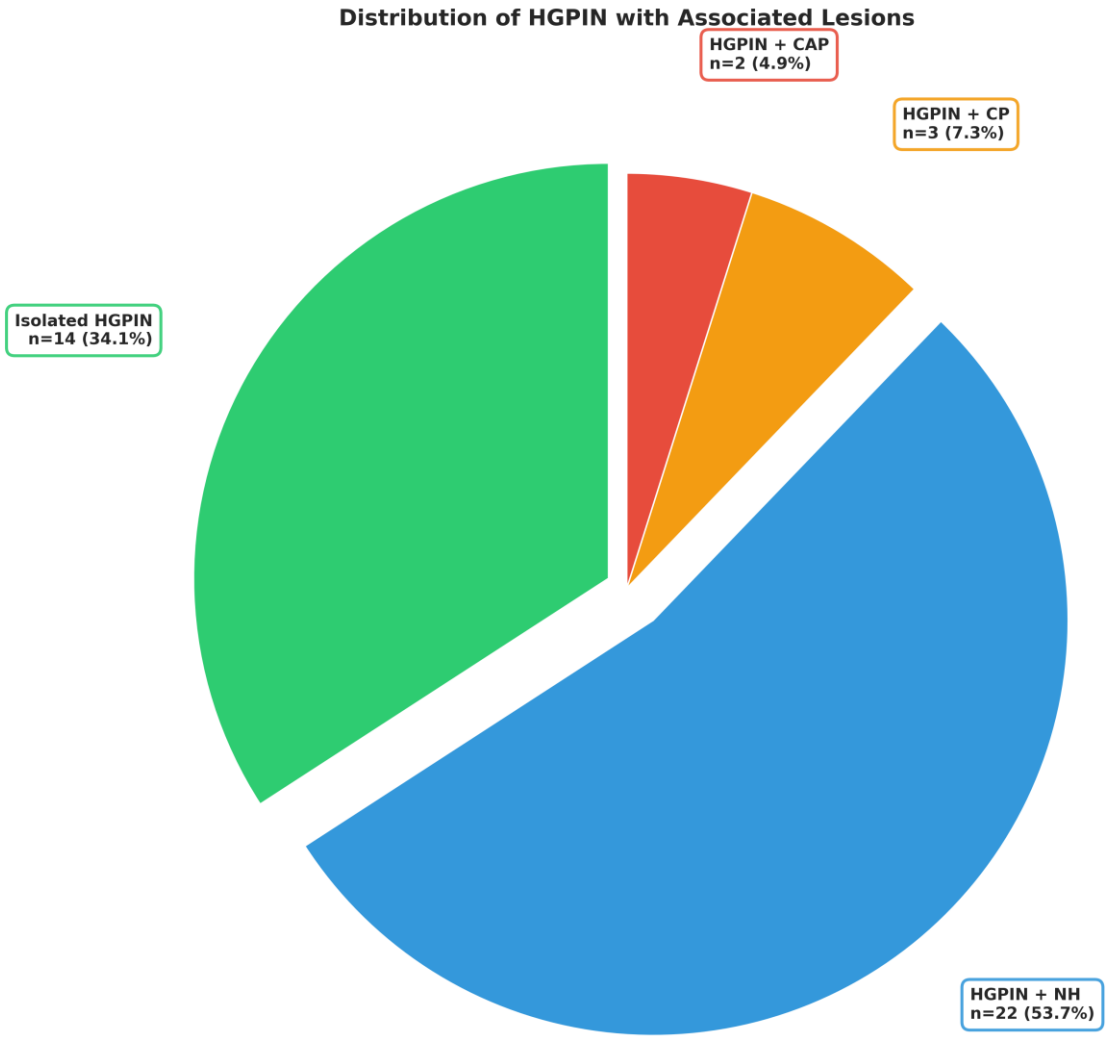


Figure 3: Annual Distribution of HGPIN Cases (2000-2009)

Bar chart with trend line showing temporal patterns in HGPIN detection over the ten-year study period. Early years (2000-2004) show low case numbers (0-1 cases per year), followed by a marked increase from 2005 onward. Peak detection occurred in 2008 with 12 cases, representing 29.3% of all HGPIN cases. The period 2006-2008 accounts for 70.7% of total cases. The increasing trend reflects improved diagnostic awareness and systematic histopathological examination rather than true epidemiological change.

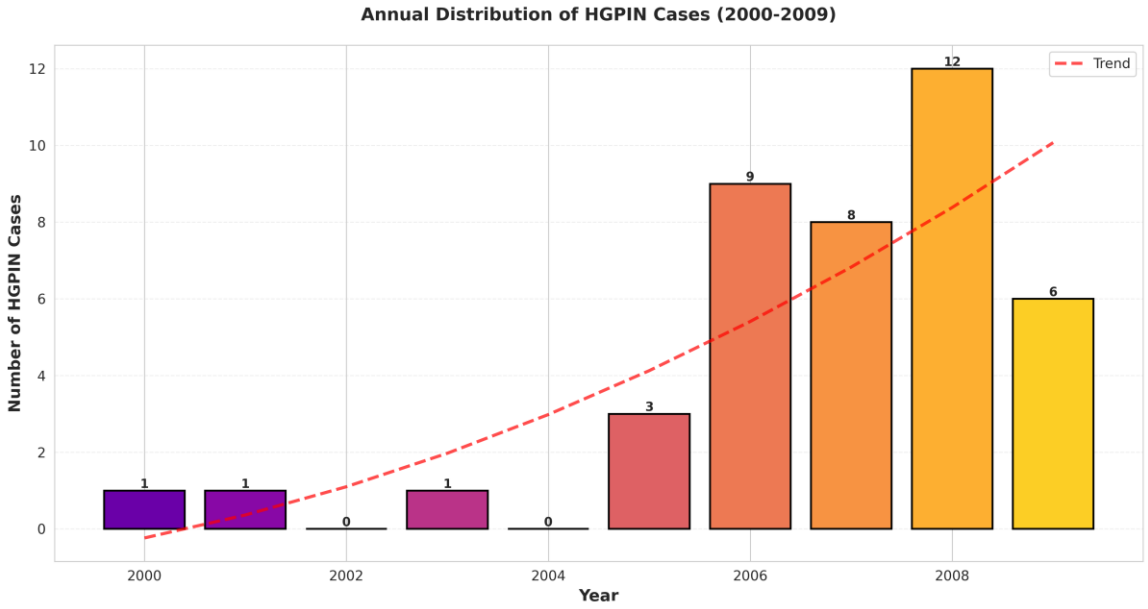
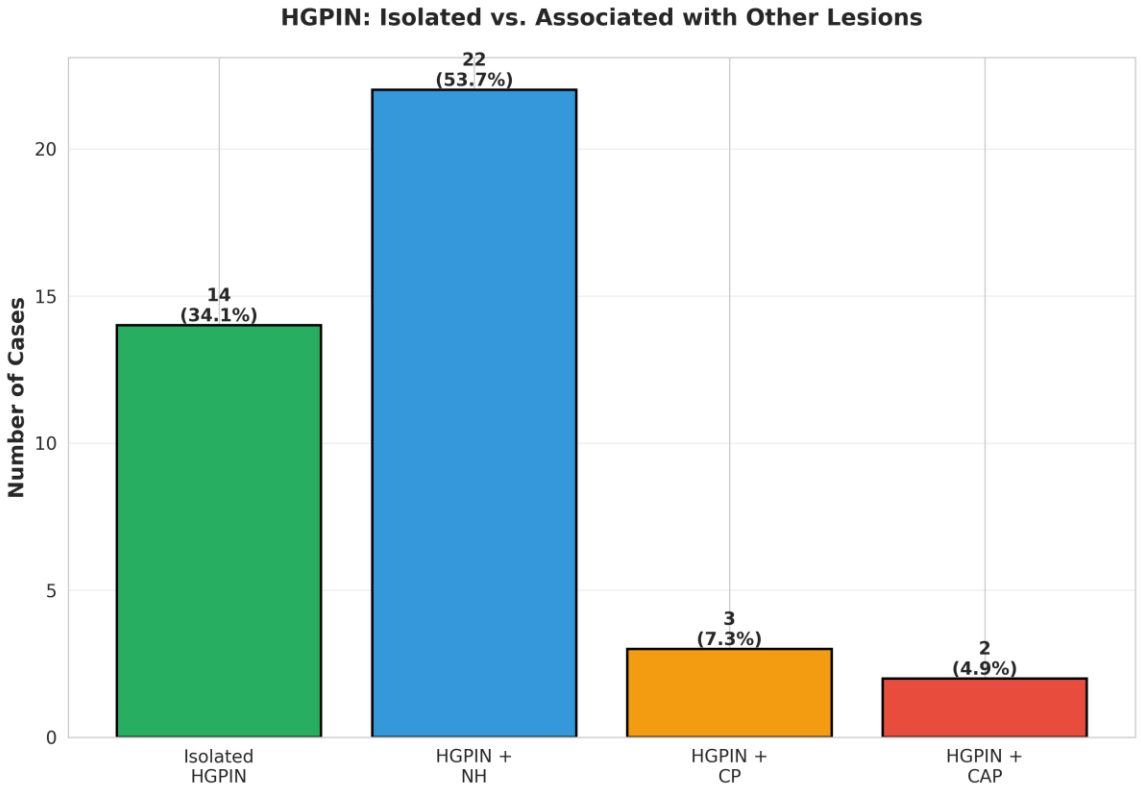


Figure 4: HGPIN - Isolated versus Associated with Other Lesions

Comparative bar chart displaying the frequency of HGPIN patterns. Shows clear visual comparison between isolated HGPIN (14 cases, 34.1%), HGPIN with nodular hyperplasia (22 cases, 53.7%), HGPIN with chronic prostatitis (3 cases, 7.3%), and HGPIN with adenocarcinoma (2 cases, 4.9%). The predominance of HGPIN associated with nodular hyperplasia emphasizes the importance of thorough histopathological evaluation of all prostatic specimens, particularly TURP specimens for benign disease.



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