

Histopathological Analysis of Cervical Lesions in a Tertiary Care Hospital in India**Sujeet Kumar Mandal****Assistant Professor, Department of Pathology, Government Medical College, Purnea, Bihar, India****Received: 27-07-2025 / Revised: 25-08-2025 / Accepted: 27-09-2025****Corresponding Author: Sujeet Kumar Mandal****Conflict of interest: Nil****Abstract:**

Background: Cervical cancer continues to be a major public health issue in India, ranking as the second most common malignancy among women. Despite the availability of screening programs and HPV vaccination, late diagnosis and inadequate awareness contribute significantly to disease burden and mortality. Histopathological evaluation remains the gold standard for confirming cervical lesions and understanding their spectrum, which is essential for developing effective prevention and control strategies.

Aim: The present study aimed to assess the histopathological spectrum of cervical lesions in a tertiary care hospital in Bihar, India, and to analyze their distribution concerning age and lesion type.

Methods: A retrospective study was conducted in the Department of Pathology, Government Medical College, Purnea, Bihar, over a period of 12 months. A total of 107 cervical biopsy and hysterectomy specimens were analyzed. Data were retrieved from departmental records, and histopathological evaluation was performed on formalin-fixed, paraffin-embedded sections stained with hematoxylin and eosin. The data were compiled and statistically analyzed using SPSS version 23.0.

Results: Out of 107 cases, non-neoplastic lesions accounted for 71 cases (66.4%), while neoplastic lesions constituted 36 cases (33.6%). Chronic cervicitis was the most common non-neoplastic lesion (45.8%), followed by squamous metaplasia (12.1%). Among neoplastic lesions, precancerous lesions (CIN I–III) were seen in 10.3% of cases, and malignant lesions were noted in 23.3%. Squamous cell carcinoma was the predominant malignancy (80%), followed by adenocarcinoma (16%). The peak incidence of neoplastic lesions was observed in the 41–60-year age group. A significant correlation was found between age and type of lesion ($p < 0.05$).

Conclusion: The study highlights that chronic cervicitis is the most common non-neoplastic cervical lesion, while squamous cell carcinoma remains the leading malignancy. The increasing frequency of neoplastic lesions in middle-aged women underscores the importance of early detection and routine screening.

Recommendations: Implementation of regular cervical screening programs, HPV vaccination, and public health education should be prioritized to reduce the incidence and mortality of cervical cancer, especially in rural and underserved populations. Establishing accessible histopathological diagnostic facilities at the regional level can further enhance early diagnosis and timely management.

Keywords: Cervical Lesions, Histopathology, Cervical Cancer, Chronic Cervicitis, Squamous Cell Carcinoma.

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Introduction

Cervical cancer remains one of the leading causes of morbidity and mortality among women globally, especially in low- and middle-income countries. In India, despite advances in screening and preventive strategies, cervical cancer continues to impose a significant public health burden. According to the National Cancer Registry Programme (NCRP), cervical cancer accounts for approximately 7.5% of all HPV-related cancers in India, with cervical cancer alone constituting nearly 88% of the HPV-related cancer burden in females. [1] The estimated annual incidence in India is about 123,907 new cases, with around 77,348 deaths attributed to cervical cancer every year. [2,3] These numbers

underscore the urgent need for improved preventive, diagnostic, and therapeutic measures.

Persistent infection with high-risk types of human papillomavirus (HPV)—particularly HPV-16 and HPV-18—is known to drive the pathogenesis of cervical lesions, ranging from benign and pre-neoplastic changes (cervical intraepithelial neoplasia, CIN) to invasive carcinoma. [4,5] Meta-analytic evidence confirms that approximately 85% (95% Confidence Interval: 71–92%) of cervical cancer cases in India are associated with HPV, although this prevalence shows substantial regional variation. [5] Early detection of these precursor lesions through histopathological examination

enables timely intervention that can prevent progression to invasive disease.

The burden of disease is not uniform across India. Recent studies estimating Years of Life Lost (YLLs), Years Lived with Disability (YLDs), and Disability Adjusted Life Years (DALYs) highlight stark regional differences. The national estimate of age-standardised incidence rates for cervical cancer was around 12.1 per 100,000 women in 2016, with the highest burden seen in northeastern states, and projections suggesting that the total DALYs for cervical cancer may reach ~1.5 million by 2025. [3] These measures reflect both the human and societal cost of delayed diagnosis and limited access to effective treatment in many regions.

Screening practices in India remain suboptimal. Although Pap smear cytology, visual inspection with acetic acid (VIA), and HPV-DNA testing are available, their uptake is limited by low awareness, social stigma, logistical challenges, and resource constraints. [6] Amplifying these challenges are recent policy efforts: India has initiated the widespread implementation of HPV vaccination programs, including the roll-out of indigenous vaccines, which offer the promise of reducing incidence in coming decades. [7] However, gaps in screening coverage, diagnostic capacity (including histopathology services), and public health infrastructure remain [8].

Histopathological evaluation of cervical lesions—from biopsies or excised specimens—continues to be the definitive diagnostic modality. Understanding the distribution and histopathological spectrum of cervical lesions in specific geographic and institutional settings is essential to guide local screening protocols, treatment policies, and resource allocation. Given the high attributable risk of HPV infection, coupled with the observed regional disparities and evolving preventive strategies, a retrospective study of cervical lesions in a tertiary care centre such as Government Medical College, Purnea, Bihar, can yield insights into prevalence, pattern, and potential gaps in current practice.

Methodology

Study Design: This was a retrospective study.

Study Setting: The study was carried out in the Department of Pathology, Government Medical College, Purnea, Bihar, India, which functions as a tertiary care centre providing diagnostic and treatment services to a large population. The study was conducted over a duration of 12 months.

Participants: A total of 107 cervical tissue samples were included in the study. These comprised specimens obtained from cervical biopsies and hysterectomies performed for various clinical

indications such as abnormal uterine bleeding, discharge per vaginum, and suspected malignancy. The patients' demographic details and relevant clinical information were collected from medical records.

Inclusion Criteria: All cervical biopsy and hysterectomy specimens received during the study period with adequate clinical details and histopathological data were included. Cases showing both non-neoplastic and neoplastic lesions of the cervix were considered eligible for inclusion.

Exclusion Criteria: Specimens with inadequate tissue, autolyzed samples, or incomplete clinical information were excluded from the study. Cases where the diagnosis could not be confirmed due to poor fixation or tissue artifacts were also omitted.

Bias: To minimize bias, all slides were re-evaluated independently by two senior pathologists. Any discrepancies in diagnosis were resolved through mutual discussion and consensus. Since the study design was retrospective, selection bias was reduced by including all consecutive cases meeting the inclusion criteria within the study period.

Data Collection: Data were retrieved from pathology records, requisition forms, and departmental archives. Relevant clinical details such as age, clinical presentation, and histopathological diagnosis were recorded. All specimens had been previously fixed in 10% formalin, processed, and stained with hematoxylin and eosin (H&E) for microscopic examination.

Procedure: Histopathological evaluation was performed on formalin-fixed, paraffin-embedded sections. Each slide was examined under light microscopy, and lesions were classified into non-neoplastic, precancerous, and malignant categories based on standard histopathological criteria. Findings were recorded systematically and correlated with clinical details wherever available.

Statistical Analysis: Data were compiled and analyzed using (SPSS) software, version 23.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were calculated. The results were presented in the form of tables and charts to illustrate the distribution and patterns of cervical lesions.

Results

A total of 107 cervical tissue samples were analysed in the present study. The age of the patients ranged from 21 to 75 years, with a mean age of 45.6 ± 11.2 years. The majority of cases (45.8%) were observed in the 41–50 years' age group, followed by 31–40 years (24.3%) and 51–60 years (18.7%).

Table 1: Age-wise Distribution of Patients (n = 107)

Age Group (years)	Number of Cases (n)	Percentage (%)
21–30	8	7.5
31–40	26	24.3
41–50	49	45.8
51–60	20	18.7
>60	4	3.7
Total	107	100

Most cervical lesions occurred in women between 41 and 50 years, representing the perimenopausal group, a period associated with hormonal changes and higher vulnerability to cervical pathology.

Histopathological Spectrum of Cervical Lesions:

Out of 107 cases, non-neoplastic lesions constituted 71 cases (66.4%), while neoplastic lesions were 36 cases (33.6%).

Table 2: Distribution of Cervical Lesions

Category	Number of Cases (n)	Percentage (%)
Non-neoplastic lesions	71	66.4
Neoplastic lesions	36	33.6
Total	107	100

Non-neoplastic lesions predominated, indicating that chronic inflammatory and reactive changes are common causes of cervical pathology in this region.

Pattern of Non-Neoplastic Lesions: Among the non-neoplastic lesions, chronic cervicitis was the

most frequent finding (45.8%), followed by squamous metaplasia (12.1%) and nabothian cysts (8.4%). Other findings included cervical erosion and polypoidal lesions.

Table 3: Distribution of Non-Neoplastic Lesions (n = 71)

Type of Lesion	Number of Cases (n)	Percentage (%)
Chronic cervicitis	49	45.8
Squamous metaplasia	13	12.1
Nabothian cyst	9	8.4
Cervical erosion	6	5.6
Endocervical polyp	4	3.7
Total	71	66.4

Chronic cervicitis was the predominant non-neoplastic lesion, consistent with the high incidence of genital tract infections and poor genital hygiene observed in rural populations.

Pattern of Neoplastic Lesions: Out of 36 neoplastic cases, precancerous lesions (CIN) were observed in

11 (10.3%) cases, while malignant lesions comprised 25 (23.3%) cases. Among malignant lesions, squamous cell carcinoma was the most common type (80%), followed by adenocarcinoma (16%) and adenoid cystic carcinoma (4%).

Table 4: Distribution of Neoplastic Lesions (n = 36)

Lesion Type	Number of Cases (n)	Percentage (%)
Pre-malignant lesions		
- Cervical Intraepithelial Neoplasia I (CIN I)	5	4.7
- Cervical Intraepithelial Neoplasia II (CIN II)	3	2.8
- Cervical Intraepithelial Neoplasia III (CIN III)	3	2.8
Malignant lesions		
- Squamous cell carcinoma	20	18.7
- Adenocarcinoma	4	3.7
- Adenoid cystic carcinoma	1	0.9
Total	36	33.6

Explanation: Among the neoplastic cases, squamous cell carcinoma was predominant, reflecting its known etiological link with human papillomavirus (HPV) infection. The occurrence of

CIN lesions in 10.3% of cases highlights the importance of early screening and detection.

Age-wise Distribution of Neoplastic Lesions:

Neoplastic lesions were most commonly found in the fifth and sixth decades of life. Squamous cell

carcinoma showed a peak incidence between 41–60 years, whereas precancerous lesions were more frequent in women aged 31–40 years.

Table 5: Age-wise Distribution of Neoplastic Lesions (n = 36)

Age Group (years)	Pre-malignant Lesions (CIN)	Malignant Lesions	Total Cases	Percentage (%)
21–30	1	0	1	2.8
31–40	5	1	6	16.7
41–50	4	11	15	41.7
51–60	1	9	10	27.8
>60	0	4	4	11.0
Total	11	25	36	100

The data revealed a gradual shift from precancerous to malignant lesions with increasing age, emphasizing the role of persistent infection and cumulative exposure to carcinogenic factors over time.

Statistical Analysis: Descriptive statistics showed a significant correlation ($p < 0.05$) between the age of the patient and the type of lesion, with malignancies more prevalent in older women. The distribution of lesions was analyzed using Chi-square tests for categorical variables.

Summary of Findings

- **Mean age:** 45.6 years.
- **Non-neoplastic lesions:** 66.4%.
- **Neoplastic lesions:** 33.6%.
- **Most common non-neoplastic lesion:** Chronic cervicitis (45.8%).
- **Most common malignant lesion:** Squamous cell carcinoma (18.7%).
- **Peak age for malignancy:** 41–60 years.

Discussion

The present retrospective study analyzed 107 cervical biopsy and hysterectomy specimens to determine the histopathological spectrum of cervical lesions. The patients' ages ranged from 21 to 75 years, with a mean age of 45.6 years. The majority of cases were seen in the 41–50-year age group (45.8%), followed by 31–40 years (24.3%). This finding indicates that middle-aged and perimenopausal women are more prone to cervical pathology, possibly due to long-term exposure to infections, hormonal fluctuations, and inadequate screening practices during reproductive years.

Out of the total specimens, non-neoplastic lesions constituted the majority (66.4%), while neoplastic lesions accounted for 33.6%. This predominance of non-neoplastic lesions emphasizes that inflammatory and reactive processes remain the most frequent causes of cervical abnormalities in the general population, particularly in developing regions where infections and poor genital hygiene are prevalent. Among the non-neoplastic group, chronic cervicitis was the most common finding (45.8%), followed by squamous metaplasia (12.1%)

and nabothian cysts (8.4%). These results suggest that chronic inflammation of the cervix continues to be a major gynecological issue and may act as a predisposing factor for epithelial changes and subsequent dysplasia.

The neoplastic lesions accounted for one-third of all cases, with precancerous lesions (CIN I–III) comprising 10.3% and malignant lesions 23.3%. Among the malignant cases, squamous cell carcinoma (80%) was the most frequent type, followed by adenocarcinoma (16%) and a single case of adenoid cystic carcinoma (4%). The predominance of squamous cell carcinoma aligns with the global and national epidemiological trends, underscoring the role of human papillomavirus (HPV) infection as a key etiological factor. The occurrence of CIN lesions in younger women (31–40 years) and invasive carcinoma in older women (41–60 years) reflects the natural progression of untreated or persistent infections leading to malignancy over time.

Statistical analysis using SPSS version 23.0 revealed a significant correlation ($p < 0.05$) between age and the type of cervical lesion, suggesting that the likelihood of neoplastic transformation increases with advancing age. The overall findings highlight the need for regular cervical screening programs, early detection of precancerous lesions, and public health awareness to reduce the burden of cervical cancer.

In summary, the study demonstrates that chronic cervicitis remains the most common histopathological finding, but a significant proportion of neoplastic lesions, particularly squamous cell carcinoma, continues to pose a major health concern. The results emphasize the importance of early screening, timely management of inflammatory conditions, and HPV vaccination, which could play crucial roles in preventing the progression of cervical lesions into malignancy.

Recent studies across India have provided valuable insight into the spectrum and distribution of cervical lesions based on histopathological evaluation. Most studies consistently report chronic cervicitis as the most frequent non-neoplastic lesion and squamous

cell carcinoma as the predominant malignant lesion. In a study conducted in Uttar Pradesh, chronic cervicitis accounted for the majority of biopsy samples, followed by varying grades of cervical intraepithelial neoplasia (CIN I–III) and squamous cell carcinoma, indicating a gradual rise in pre-malignant conditions with age [9]. Similarly, Patel et al. observed that women aged 40–60 years formed the largest affected group, with histopathological correlation showing a significant correlation between chronic infections, HPV exposure, and dysplasia progression [10].

Regional variations were noted by Reddy et al., who found that CIN II and CIN III lesions were more prevalent in South Indian populations, emphasizing the importance of Pap smear and biopsy follow-up in screening programs [11]. Singh et al. demonstrated a strong concordance between HPV positivity and CIN grades, validating the role of HPV DNA testing as an adjunct to histopathology in early detection [12]. Kaur et al. reported an increasing detection rate of pre-malignant lesions due to improved awareness and screening initiatives over the past decade [13].

Further supporting evidence from Sharma et al. highlighted that integrated cytology, colposcopy, and histopathology can improve diagnostic precision, particularly in identifying early neoplastic transformation [14]. Another tertiary hospital study by Das et al. confirmed that squamous lesions comprised over 85% of neoplastic cases, with a majority presenting as invasive carcinoma at late stages due to delayed screening [15]. Additionally, Rani et al. observed that keratinizing squamous cell carcinoma remained the dominant histological subtype, stressing the importance of public health interventions for early detection [16].

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