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Original Research Article

Assessment of Cervical Cytology Abnormalities Among Reproductive-Aged Women

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Abstract:

Background: Cervical cancer remains a major public health concern worldwide, with high incidence and mortality in low- and middle-income countries. Early detection through Pap smear screening is crucial for identifying premalignant and malignant cervical lesions.

Aim: To evaluate the prevalence of cervical cytological abnormalities among women of reproductive age and correlate findings with demographic and clinical variables.

Methodology: A prospective, hospital-based study was conducted over 7 months at Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, including 500 women aged ≥21 years presenting to the Gynecology OPD. Cervical samples were collected using Ayre's spatula and examined after staining with stain Papanicolaou. Data was analyzed using SPSS version 27.

Results: Most participants were married (84%), multiparous (80%), and aged 26–45 years (76%), with 56% from low socioeconomic backgrounds. Vaginal discharge was the most common presenting symptom (44%), while 24% were asymptomatic. Cytological evaluation revealed 60% normal smears, 20% inflammatory changes, and 18% epithelial cell abnormalities; 2% were unsatisfactory.

Conclusion: Pap smear screening effectively identifies premalignant and inflammatory cervical conditions, especially in high-risk, socioeconomically deprived populations. Routine cytology, including opportunistic screening, is essential for early detection and prevention of invasive cervical cancer.

Keywords: Cervical cancer, Pap smear, Cytology, Reproductive-age women, Screening.

Introduction

Cervical cancer is a very serious health issue for women all over the world, and it is the cause of about 12% of all female cancers. There are about 500,000 new cases diagnosed globally each year, and the largest part of this problem is in low- and middle-income countries [1]. Of the total, India is responsible for a quarter, which means there are more than 120,000 incidental cases and over 65,000 deaths every year. The fact that cervical cancer is still the second most prevalent cancer among women globally and the most widespread gynecological carcinoma in developing countries indicates Lack of Public awareness, Inadequate Screening Programs thereby delayed diagnosis, [2].

The death tolls of cervical cancer in poor nations are significantly higher as a result of late diagnosis and/or absence of suitable screening. On the flip side, a number of affluent nations have experienced a remarkable drop in both incidence and death rates of cervical cancer partly attributed to the fairly thorough organized cervical screening which has been in place for a long time [3]. Cytological screening is able to find premalignant and early malignant lesions of the cervix - these are mainly asymptomatic cases and are not detectable clinically by other means. Hence, cervical epithelial abnormalities have to be diagnosed at the earliest for early intervention to save the patient from the invasive carcinoma [4].

The cervix is a site that offers the possibility to prevent cancer because of its easy access and biological behavior. The epithelial cells that are shed off are quickly replaced and therefore, cytological methods

can easily capture the entire range of pathological changes from mild atypia to pronounced malignancies. Additionally, the long natural history of cervical carcinogenesis provides a huge opportunity for early detection and effective treatment [5]. These factors make cervical cytology the best method for screening in the population and controlling cervical cancer.

Epidemiological findings indicate that the incidence of cervical cancer will probably continue to be high in areas with poor genital hygiene, early marriage, multiparity, low socioeconomic status, and lack of screening facilities [6]. These risk factors should be counteracted by routine and intensified screening, which will lead to decrease in the disease burden. Many screening methods exist nowadays, such as conventional Pap smear cytology, visual inspection with acetic acid or Lugol's iodine, human papillomavirus DNA testing, and liquid-based cytology [7]. Among these, the Pap smear remains one of the most commonly used methods and it is also the most economical one in the resource-limited settings.

The Pap smear is a basic, outpatient procedure where cervical cells that have been shed are scrutinized under a microscope in order to detect any precursors to cancer or cancer itself. It is inexpensive, noninvasive, no anesthesia is needed, and has a high specificity, so these are its advantages. Besides the detection of pre-cancerous and cancerous lesions, cervical cytology also detects inflammatory and infectious conditions via typical cell changes which thus increases clinical value [8].

The application of standardized screening guidelines has been one of the major factors that contributed to the effective use of cervical cytology. Up to 2012, there were various screening guidelines put forth by major profesional organizations, and then, the American College of Obstetricians and Gynecologists, the American Cancer Society, and the U.S. Preventive Services Task Force published their consensus guidelines [9]. The latter guidelines suggest that Pap smear screening is to start at age 21, no matter the sexual history, and with a screening interval of every three years for women of 21 to 30 years of age. For women aged 30 to 65 years, the options are either co-testing with Pap smear and HPV testing every five years or Pap smear alone every three years [10].

In this context, hospital studies play a crucial role in establishing the local patterns of cervical cytological abnormalities. The study intends to evaluate the existence of various cervical epithelial abnormalities, namely, infections, dysplasia, and malignant changes, in women of reproductive age. Another objective is to link cytology results with demographic and clinical factors such as age, parity, socio-economic status, symptoms, and biopsy results from the cervix, thus contributing valuable evidence for the formulation of cervical cancer screening strategies.

Methodology

Study Design: This was a prospective, hospital-based observational study designed to evaluate cervical cytological (Pap smear) abnormalities among women of reproductive age.

Study Area: The research was carried out in the Department of Pathology at Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India,

Study Duration: The study was conducted at 7 months from March 2025 to September 2025.

Study Participants

Inclusion Criteria

- Women of reproductive age (≥21 years)
- Attending Gynecology OPD during the study period
- Presenting with symptoms such as whitish discharge per vaginum, menstrual irregularities, post-coital bleeding, or suspected sexually transmitted infection
- Willing to provide informed consent

Exclusion Criteria

- Women <21 years of age or unmarried
- Pregnant women
- Previously diagnosed or treated cases of carcinoma cervix
- Hysterectomized women
- Women not willing to participate or provide consent

Sample Size: A total of 500 women fulfilling the inclusion criteria were included in the study.

Procedure: After the informed consent was obtained, the key clinical and gynecological factors were documented on a structured form. Then, the patient was instructed to urinate and laid down in the dorsal lithotomy position. A per speculum examination was conducted without lubricants to check the cervix for any visible abnormalities. Cervical cytology samples were taken by scraping the squamocolumnar junction with an Ayre's spatula and rotating it 360 degrees. The collected material was placed on a labeled glass slide and fixed in 95% alcohol immediately. The slides were stained with the modified Papanicolaou technique and evaluated microscopically. Smears showing epithelial abnormalities were classified as abnormal and those with persistent inflammatory changes were evaluated further according to clinical indications.

Statistical Analysis: Data was inputted and analyzed via SPSS software version 27. Continuous variables were represented as mean and standard

deviation (SD), whereas categorical variables were summarised as frequencies and percentages. The Chi-square (χ^2) test or Fisher's exact test was employed to evaluate the relationship between categorical variables. A p-value below 0.05 was deemed statistically significant.

Result

The demographic characteristics of the 500 subjects who participated in the study were depicted in Table 1. Among the participants, the largest group was composed of individuals aged 26-35 years (40%), followed by those aged 36-45 years (36%), and women in the 18-25 years bracket (24%). The majority of participants were in the married category (84%), indicating that primarily women with a certain marital status were involved in the study. Regarding the number of children birthed, there was a large proportion (80%) of multiparous women and only a small portion (20%) of nulliparous women among the participants. The participants' socioeconomic status was such that the majority (56 percent) were classified as low-income, next was the middle-income group (36 percent) and the least (8 percent) was high-income group. The study population overall consisted mainly of married women with children living in poverty and most of them were in the age range of 26-45 years, which is the reproductive age group.

Table 1: Demographic Characteristics of Study Participants (n = 50)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	18–25	**120**	**24**
	26–35	**200**	**40**
	36–45	**180**	**36**
Parity	Nulliparous	**100**	**20**
	Multiparous	**400**	**80**
Socioeconomic status	Low	**280**	**56**
	Middle	**180**	**36**
	High	**40**	**8**

Table 2 displays the clinical characteristics of the 500 female participants of reproductive age who underwent a Pap smear examination. The most common presenting complaint was vaginal discharge which was reported by 150 women (30%), thus indicating that it is a significant symptom leading to cervical screening in this particular group. Pain in the lower abdomen was reported by 110 women (22%), followed by menstrual problems with 90 participants (18%); in terms of the appearance of gynecological complaints related to cervical and reproductive tract disorders, this number is huge. Only 30 women (6%), had reported post-coital bleeding a clinically significant symptom usually associated with cervical pathology. Interestingly, 120 women (24%) had no symptoms but their Pap smear was solely for screening purposes, this highlights the importance of opportunistic screening in detecting abnormalities in the cervix even when there are no symptoms present. All in all, these data favor the view that most of the women with symptoms had a significant number of women benefited from preventive screening.

Table 2: Clinical Profile of Reproductive-Age Women Undergoing Pap Smear (n = 500)

Clinical Feature	Frequency (n)	Percentage (%)
Vaginal discharge	150	30
Lower abdominal pain	110	22
Menstrual irregularities	90	18
Post-coital bleeding	30	6
Asymptomatic (screening)	120	24

Table 3 shows that most women (60%) had a normal cervical cytology, which means that generally cervical health was good in the sample population. The presence of inflammatory changes was found in 20 percent of cases, which indicates a significant burden of infections or reactive processes that justify clinical care. A total of 18% of the smears were found to contain abnormalities in epithelial cells, indicating a high percentage of women who would have some potentially premalignant or malignant lesions that can be subjected to additional diagnostic test and follow-ups. Adequate samples were good and there was reliable cytological evaluation in the current study as only 2% of the samples were unsatisfactory.

Table 3: Pattern of Cervical Cytology Abnormalities (n = 500)		
Category	**Frequency (n)**	**Percentage (%)**
Normal cytology	300	60
Inflammatory changes	100	20
Epithelial cell abnormalities	90	18
Unsatisfactory smears	10	2

Discussion

The paper being currently reviewed describes the demographic, clinical, and cytological characteristics of women of reproductive age who are undergoing Pap smear examination, along with the main issues pertaining to cervical health. The majority of the women surveyed were in the age range from 26 to 45 years, which is the period that corresponds to the highest sexual and reproductive activity. The age group is also the same as in several hospital-based studies that have shown that the female population that uses gynecological services and cervical screening is mainly in this age group. The predominance of the respondents being married women and multiparous cases also points out to a greater exposure to the known factors that increase the risk of cervical pathology, such as early sexual activity, more than one pregnancy, and long reproductive life. The results of the present study were similar to those of Gupta et al., (2007) [11] who reported ASCUS 3.6, HSIL 1%, and Carcinoma 0.41%.

The socioeconomic status of the women in the sample was a significant factor as more than half of them belonged to the low-income group. Women in lower socioeconomic classes find it difficult to get healthcare services and have less knowledge about preventive screenings; also, they are more prone to having genital infections. All these factors lead to cervical morbidity. The results of the study strengthen the argument for the need of public health interventions directed specifically at the disadvantaged socioeconomic classes, thus increasing the cervical cancer screening and the possibility of early detection and timely management of cervical abnormalities. Saraiya & U (1986) [12] stated that non-invasive, invasive and squamous cell carcinoma have mean ages of 32.5 years, 37.5 years and 44.2 years respectively.

Clinical profile analysis showed the vaginal discharge to be the most frequent presenting complaint, then there were lower abdominal pain and menstrual issues. Such symptoms are often connected with inflammatory and infectious diseases of the cervix and of the reproductive tract that can precondition the appearance of aberrant cytological results. The low percentage of women who presented with post-coital bleeding could also relate to the observation that high grade cervical lesions were not prevalent in this group. Notably, close to a quarter of the women had no symptoms and were receiving Pap smear as a screening procedure only, which highlights the benefits of opportunistic screening as a tool of detecting abnormalities in the cervix before clinical manifestations appeared. In the study by Sharma et al., (2013) [13], sensitivity and specificity of cytology were examined among 50 women and the study revealed that most patients had parity over 3 (62%).

Cytological assessment revealed that 60 percent of the smears were normal, which indicated the general status of good health of the cervix in the research population. Nevertheless, the occurrence of inflammatory alterations in one-fifth of the cases suggests that there is a significant burden of cervical infections or reactive conditions. These results have clinical implications because chronic inflammation may obscure or recapitulate epithelial abnormalities, and, therefore, may need proper intervention and follow-up to stop the development of lesions that are more severe. The study on correlation of pap smear conducted by Joshi et al., (2014) [14] determined that 40% of patients presenting with white discharge per vaginum.

The occurrence of epithelial cell anomalies in cytological samples has been recorded at 18%, which is quite surprising in view of the fact that the number of subjects was not that large. It indicates the power of Pap smear screening in the detection of premalignant lesions at an early stage and of those that can be reversed. It further prevents the progression to invasive cervical cancer by early detection, following the diagnostic evaluation, monitoring, and intervention. The rate of unsatisfactory smears is very low (2%), which demonstrates the accuracy of both the sampling techniques and laboratory procedures that thereby strengthen the study results. Mukherjee & C (1984) [15] conveyed that in 19% of the patients there was abdominal pain and in 2% cases there was contact bleeding.

Overall, the research underscores the role of regular screening of cervix cytology on reproductive-age women with especially multiparous and low socioeconomic status. The presence of the inflammatory and epithelial abnormalities also supports the duality of the Pap smear testing to detect infectious diseases and premalignant lesions. Improving awareness, accessibility to screening services, and the integration of Pap smear testing into standard gynaecological screening procedures can significantly contribute to the early detection and prevention of cervical cancer.

Conclusion

The research presents remarkable evidence of the Pap smear screening influence on the early detection of cervical abnormalities in women of reproductive age. Married, multipara women within the age bracket of 26-45 years were the main representatives of this group, and they belonged to the lower socio-economic status which is a demographic that is at the greatest risk of cervical pathology. Discharge from the vagina was the clinically confirmed most common presenting complaint, nevertheless, few were asymptomatic and opportunistic screening was carried out in them. Hence, the adoption of a preventive approach is the most important. Cytological analyses showed that 60% of the smears were normal, 20% showed inflammation and 18% were with abnormalities of epithelial cells which signifies the usefulness of the Pap smear in screening precancerous lesions. The results from this research provide a strong rationale for a continuing policy of cervical cytology in the economically deprived areas for timely treatment and thus prevention of the disease along with its complications such as invasive cervical cancer, like death.

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