



A CROSS-SECTIONAL OBSERVATIONAL STUDY FOR SCREENING OF CERVICAL CANCER BY PAP SMEAR AMONG ALL ANTENATAL WOMAN ATTENDING THE CLINIC AT TERTIARY CARE CENTER IN RURAL AREA

Obstetrics & Gynaecology

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ABSTRACT

Background: Cervical cancer is one of the most prevalent gynaecological malignancies among Indian women and a leading cause of cancer-related mortality in low-resource settings. The Pap smear is a simple and cost-effective screening tool for detecting cervical abnormalities. Pregnancy presents a unique opportunity for screening, as most women seek medical attention during this period. This study was undertaken to screen for cervical cancer by Pap smear among antenatal women attending a rural tertiary care centre. **Material and Methods:** Patients were included in the study groups based on the inclusion criteria of the study. The purpose of the study was conveyed to all patients and an Informed consent form were collected from all participants. Cervical cancer screening questionnaire was asked of each participant. Demographic data such as name, age, etc. was collected. Obstetric history and present data was collected. Laboratory investigations including random blood sugar (RBS), coagulation profile, complete blood count (CBC), and Thyroid etc results was collected. History of drug uses were assessed in detail. The study was conducted on all antenatal patients visiting our Antenatal clinic willing for the screening at krishna mohan medical college and hospital, Pali dungra sonkh road, Mathura. Women ready to participate in the study was enrolled and Informed consent form was collected from all patients enrolled for the study. The patient was positioned for a lithotomy. A Cusco's speculum was inserted into the vagina to view the cervix. Ayre's spatula will be used to gather the smear. All smears were applied a fixative right away and delivered to the pathology department. The cytological abnormalities were reported as per modified Bethesda classification (2014). Atypical squamous/glandular cells (or more of them), and atypical squamous cells of undetermined significance (ASC-US), atypical squamous cells that cannot exclude high-grade squamous intraepithelial lesions (HSIL), lowgrade squamous intraepithelial lesions (LSIL), atypical glandular cells not otherwise specified (AGC-NOS) was considered as abnormal results. The results was statistically analyzed. P value less than 0.05 will be considered significant. **Results:** Out of 120 antenatal women screened, 50.83% had abnormal Pap smear findings. Inflammatory changes were the most common (43.33%), followed by LSIL (5%), ASC-US (1.67%), and HSIL (0.83%). The mean age was 27.3 years. Multigravida status was seen in 55.83% of patients. A statistically significant association was observed between Pap smear abnormalities and parity ($p = 0.001$), socioeconomic status ($p = 0.003$), and gross cervical appearance ($p = 0.003$). No significant association was found with age or gestational age. **Conclusion:** Pregnancy is the period during which a woman definitely seeks medical care and antenatal clinics provide opportunities for screening. The antenatal period is when majority of women will have the opportunity to contact a health care worker irrespective of their educational status. It thus becomes imperative that this opportunity is not lost. Routine screening for cervical cancers in India although being carried out lacks a national policy or framework unlike western countries where women are routinely invited for testing and diligent records are kept. Clinicians should make every effort to educate, counsel and screen pregnant women if they have not had a Pap test in the past. A robust screening system is thus the need of the hour.

KEYWORDS

Pap smear, Cervical cancer, Pregnancy, Antenatal women, Rural population, Bethesda system

INTRODUCTION

Cervical cancer is the third most common carcinoma among Indian women, contributing significantly to cancer-related mortality. It accounts for approximately 6–29% of all female malignancies in India, with certain regions such as Papumpare district in Arunachal Pradesh reporting the highest incidence in Asia at 27.7 per 100,000 population¹. Persistent infection with high-risk human papillomavirus (HPV) types, particularly HPV-16 and HPV-18, is the predominant etiological factor in the pathogenesis of cervical cancer^{2,3}.

HPV is primarily transmitted through sexual contact, and risk factors associated with persistent infection include early initiation of sexual activity, multiple sexual partners, high parity, tobacco use, and co-infection with HIV^{4,5,6}. These risk factors contribute to the development of cervical intraepithelial neoplasia (CIN), which may progress to invasive carcinoma if undetected. The transformation zone of the cervix, particularly the squamocolumnar junction, is highly susceptible to these changes^{7,8,9}.

The Pap smear remains the cornerstone of cervical cancer screening. It is a simple, cost-effective cytological technique that facilitates early detection of pre-malignant and malignant lesions^{10,11}. Although Pap smear screening has led to a 50–70% reduction in cervical cancer mortality in high-income countries¹², its implementation in India remains inconsistent. Rural populations are particularly underserved, with low levels of awareness and limited access to routine gynecological care^{13,14}.

Pregnancy provides a critical opportunity for screening, as antenatal care (ANC) visits are often the only interaction many women have

with healthcare services¹⁵. Studies have shown that cervical cytology can be safely and effectively performed during pregnancy without adverse fetal outcomes¹⁶. Integrating Pap smear screening into routine ANC visits can significantly enhance early detection and improve patient outcomes.

The present study was undertaken to screen for cervical cancer using Pap smear among all antenatal women attending a tertiary care center in a rural area. The study also aims to assess correlations between smear findings and demographic, obstetric, and clinical characteristics. It highlights the importance of utilizing ANC as a platform for cervical cancer prevention.

MATERIAL AND METHODS

Study Design and Setting

This cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology at Krishna Mohan Medical College and Hospital, Mathura, a tertiary care teaching hospital in a rural setting. The study was carried out over a period of 18 months. Ethical approval was obtained from the Institutional Ethics Committee prior to the commencement of the study.

Study Population

All antenatal women attending the antenatal outpatient department during the study period were assessed for eligibility. Women who provided informed written consent and met the inclusion criteria were enrolled consecutively.

Inclusion Criteria

- All antenatal women visiting the clinic at any gestational age.

- Willingness to participate in the study and undergo Pap smear screening.

Exclusion Criteria

- History of Pap smear within the last three years.
- Active vaginal bleeding at the time of examination.
- History of sexual intercourse, vaginal medication, or douching within the previous 48 hours.
- Preterm premature rupture of membranes or dilated cervix suggesting imminent labor.

Data Collection

After obtaining informed consent, demographic information, obstetric history, and clinical data were collected using a structured questionnaire. Maternal age, parity, period of gestation, education level, and socioeconomic status were recorded. Routine antenatal investigations, including complete blood count (CBC), random blood sugar (RBS), thyroid function, and coagulation profile, were noted.

Pap Smear Procedure

All participants underwent Pap smear testing during their antenatal visit. The procedure was performed with the patient in lithotomy position using Cusco's speculum for visualization of the cervix. The ectocervix and endocervix were sampled using an Ayre's spatula and endocervical brush. The samples were immediately fixed in 95% ethanol and sent to the pathology department for cytological evaluation.



Fig 1.: PAPSmeat kit

Cytological Evaluation

All smears were reported using the 2014 Bethesda System for Cervical Cytology. The following findings were classified as abnormal:

- Atypical squamous cells of undetermined significance (ASC-US)
- Low-grade squamous intraepithelial lesion (LSIL)
- High-grade squamous intraepithelial lesion (HSIL)
- Atypical squamous cells, cannot exclude HSIL
- Atypical glandular cells not otherwise specified (AGC-NOS).

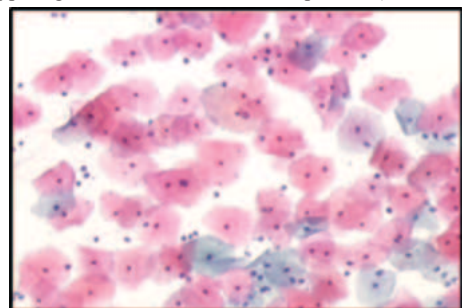


Fig.2 : Superficial Squamous Cells.

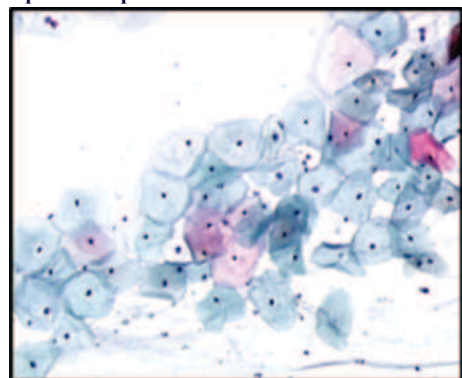


Fig.3 : Intermediate Squamous Cells

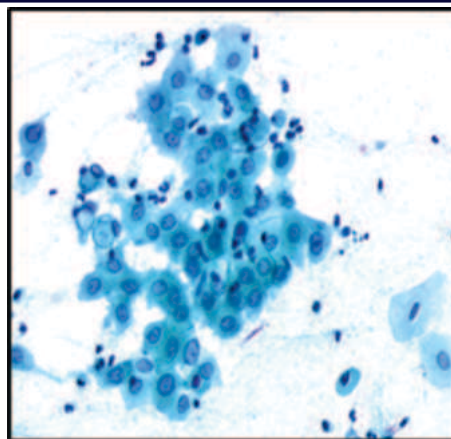


Fig.4 : Parabasal Cells

Statistical Analysis

Data were compiled and analyzed using SPSS version 24. Descriptive statistics were expressed as frequencies, percentages, means, and standard deviations. Associations between categorical variables (e.g., Pap smear findings vs. age, parity, gestational age, socioeconomic status) were tested using the Chi-square test or Fisher's exact test as appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 120 antenatal women were screened using the Pap smear technique during their visit to the antenatal clinic. The objective was to detect cytological abnormalities and correlate the findings with age, parity, gestational age, socioeconomic status, and gross appearance of the cervix.

Pap Smear Findings Distribution

Among the participants, 50.83% (n = 61) had abnormal Pap smear findings, while 49.17% (n = 59) were cytologically negative for intraepithelial lesion or malignancy (NILM). Inflammatory changes were the most frequent abnormality.

Table 1: Pap Smear Findings

Pap Smear Findings	Number	Percentage
Inflammatory	52	43.33%
ASC-US	2	1.67%
LSIL	6	5.00%
HSIL	1	0.83%
Negative (NILM)	59	49.17%



Fig 5: Pap Smear Findings

This high prevalence of cytological abnormalities reinforces the potential role of routine cervical screening during antenatal visits.

Correlation of Pap Smear Findings with Clinical and Demographic Variables

1. Age Group

There was no statistically significant correlation between age and Pap smear results ($p = 0.442$). Abnormal smears were observed across all age groups.

Table 2: Correlation with Age Group ($p = 0.442$)

Pap Smear Findings	<20 yrs	21–25 yrs	26–30 yrs	31–35 yrs	Total
Inflammatory	6	25	20	1	52

ASC-US	0	1	1	0	2
LSIL	0	1	2	3	6
HSIL	0	0	0	1	1
Negative	6	26	18	9	59

2. Parity

A statistically significant association was found between parity and abnormal cytological findings ($p = 0.001$). Multigravida women showed a higher frequency of inflammatory and dysplastic changes.

Table 3: Correlation with Parity ($p = 0.001$)

Pap Smear Findings	Primigravida	Multigravida	Total
Inflammatory	13	39	52
ASC-US	1	1	2
LSIL	2	4	6
HSIL	0	1	1
Negative	37	21	59



Fig. 6: PAP Smear Findings by Parity

This suggests a possible cumulative effect of multiple pregnancies on cervical epithelial health.

3. Gestational Age

No statistically significant correlation was observed between gestational age and smear results ($p = 0.792$), suggesting that Pap smear screening is feasible at any trimester.

Table 4: Correlation with Gestational Age ($p = 0.792$)

Pap Smear Findings	<14 wks	14–28 wks	>28 wks	Total
Inflammatory	15	25	12	52
ASC-US	1	1	0	2
LSIL	1	5	0	6
HSIL	0	1	0	1
Negative	27	29	3	59



Fig. 7: PAP Smear Findings by Gestational age

4. Socioeconomic Status

A statistically significant association was noted between lower socioeconomic status and abnormal smear results ($p = 0.003$). This finding emphasizes the vulnerability of women from economically disadvantaged groups.

Table 5: Correlation with Socioeconomic Status ($p = 0.003$)

Pap Smear Findings	Lower	Lower-Middle	Upper-Middle	Total
Inflammatory	14	36	2	52
ASC-US	1	0	1	2
LSIL	4	2	0	6
HSIL	1	0	0	1
Negative	19	31	9	59

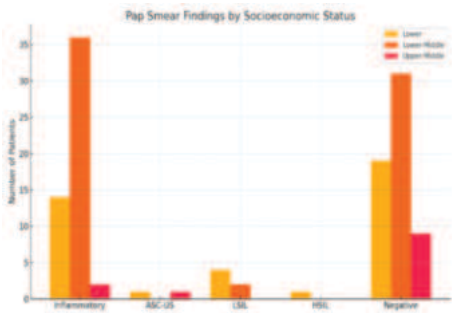


Fig. 8: PAP Smear Findings by Socioeconomic Status

5. Gross Cervical Appearance

A highly significant correlation was found between gross cervical abnormalities (e.g., growth or hyperemia) and abnormal Pap smear findings ($p = 0.003$). None of the patients with visible lesions had negative cytology.

Table 6: Correlation with Gross Cervical Appearance ($p = 0.003$)

Pap Smear Findings	Healthy Cervix	Growth	Hyperemia	Total
Inflammatory	52	0	0	52
ASC-US	0	2	0	2
LSIL	4	1	1	6
HSIL	0	1	0	1
Negative	59	0	0	59

This underscores the need for cytological evaluation in patients with abnormal cervical appearance on speculum examination.

Key Summary

- Abnormal smear rate was 50.83%, with inflammation being most frequent.
- Significant associations were seen with parity, socioeconomic status, and cervical appearance.
- Age and gestational age did not show significant correlation, indicating universal screening utility.
- These findings reinforce the need for routine Pap smear testing during antenatal care, especially in rural populations.

DISCUSSION

Cervical cancer remains a major public health concern, particularly in low- and middle-income countries like India. According to GLOBOCAN 2020, it accounts for approximately 18.3% of all female cancers in India, ranking second only to breast cancer¹⁷. Despite being largely preventable and treatable if detected early, the implementation of organized cervical cancer screening remains limited in rural areas. Our study aimed to address this gap by screening antenatal women—a population that frequently interacts with the healthcare system—and evaluating cytological abnormalities using Pap smear.

In our study, 50.83% of women screened showed abnormal Pap smear findings, with inflammatory changes (43.33%) being the most prevalent. This observation is consistent with findings by Krithika et al., who reported a high proportion of inflammatory smears among antenatal patients¹⁹. Similarly, Pujitha et al. found inflammatory cytology to be the most common abnormality in their cervical cancer screening cohort¹⁸. These results suggest that a significant number of women, even when asymptomatic, may have underlying cervical pathology during pregnancy.

We observed a statistically significant association between parity and cytological abnormalities ($p = 0.001$). A larger proportion of multigravida women had inflammatory and dysplastic findings compared to primigravida women. This is comparable to the findings of Gul and Iftikhar, who noted increased cytological abnormalities in multiparous women²². Repeated cervical trauma and hormonal changes across multiple pregnancies may play a role in this increased susceptibility²⁰.

A significant correlation was also noted between socioeconomic status and Pap smear abnormalities ($p = 0.003$). The majority of women with abnormal cytological findings belonged to the lower and lower-middle socioeconomic groups, consistent with the study by Karra et al., which emphasized that poor hygiene, lack of awareness, and delayed healthcare-seeking behavior in low-income populations contribute to higher cervical pathology risk²¹.

No statistically significant relationship was found between age and Pap smear abnormalities ($p = 0.442$) in our study. This supports the findings of Ashraf et al., who demonstrated that cytological abnormalities in pregnancy were not limited to older age groups²³. Similarly, Jasa and Listiana observed that cervical abnormalities occurred across the reproductive age spectrum, including younger antenatal women²⁴.

We also found no significant correlation between gestational age and smear results ($p = 0.792$), indicating that Pap smear screening is safe and effective in all trimesters. This observation aligns with the study by Himabindu et al., which showed no significant trimester-based variation in Pap smear outcomes among antenatal women²⁵.

One of the most clinically relevant findings of our study was the strong association between gross cervical appearance and cytological abnormalities ($p = 0.003$). All patients with visible cervical changes—such as growth or hyperemia—had abnormal Pap smear results. This supports conclusions drawn by Himabindu et al., who reported that gross cervical abnormalities correlated strongly with epithelial dysplasia²⁵. This highlights the importance of routine speculum examination during antenatal care, as visual cues may prompt early cytological evaluation even in asymptomatic patients.

In summary, our study reinforces the importance of integrating Pap smear screening into routine antenatal care, especially in rural healthcare settings. The antenatal period presents a unique opportunity for opportunistic screening, as women are already accessing medical services. Incorporating cervical cancer screening into ANC protocols can enable early detection, improve long-term outcomes, and significantly reduce the burden of cervical cancer among Indian women.

CONCLUSION

This cross-sectional observational study confirms that a significant proportion of antenatal women attending a rural tertiary care center harbor cytological abnormalities detectable through Pap smear screening. The findings reinforce that:

- Parity, socioeconomic status, and gross cervical appearance are important determinants of cervical epithelial changes.
- Age and gestational age should not be considered barriers to cervical screening during pregnancy.
- Routine Pap smear screening during antenatal visits is both feasible and clinically valuable.

Given that pregnancy often represents a woman's only point of contact with the healthcare system, this opportunity should not be missed. There is an urgent need to integrate cervical cancer screening into national antenatal care protocols, especially in underserved rural regions. Doing so can significantly contribute to reducing cervical cancer burden and improving women's health outcomes in India.

Recommendations and Implications

1. Integrate Pap Smear in ANC Visits: Antenatal care provides an ideal opportunity for cervical cancer screening, especially in rural settings.
2. Formulate National Guidelines: India should adopt structured protocols for Pap smear screening during pregnancy.
3. Enhance Public Awareness: Community education targeting low socioeconomic groups can improve screening uptake and early detection.
4. Train Healthcare Workers: Capacity building of ANMs and nurses for Pap smear collection and counseling is essential.
5. Implement Follow-Up Systems: Establish digital registries to track abnormal cases and ensure timely referral and management.
6. Encourage Postpartum Follow-Up: Women with abnormal results should be monitored and re-evaluated after delivery.

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