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Research Article

Prevalence and Associated Risk Factors of Abnormal Pap Smear in First Trimester of Pregnancy

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Abstract:
Among women, cervical cancers rank as the fourth most common cancer occurring globally. Highest incidences are seen in low middle income countries (LMICs). The higher incidence rates are due to the lack of access to cervical cancer vaccines, regular screening, and early treatment programs. Pap Smear is a simple, cost effective and safe screening tool and is advised as a part of prenatal care to guarantee the early diagnosis of cervical abnormalities. The study aimed at determining the frequency of abnormal Pap smear results in women during the first trimester of pregnancy and identifying the associated risk factors.
Methodology: The cross-sectional observational study was carried out in the department of obstetrics & gynecology in peri-urban medical college, located in the central India. 314 first trimester pregnant women aged above 21 years were enrolled in the study. Interpretations of the Pap smear results were made using The Bethesda System 2014.
Results: Most participants, 96.18%, had Pap smear results indicating NILM (Negative for Intraepithelial Lesions or Malignancy). However, abnormal findings included 0.64% for Atypical squamous cells of undetermined significance (ASC-US), 2.55% for low-grade squamous intraepithelial lesion (LSIL), and 0.64% for high -grade squamous intraepithelial lesion (HSIL). The abnormal findings were significantly high lower socioeconomic groups, age of first intercourse <21 years, low education status, and multiple sexual partners.
Conclusion: Pap smears are straightforward, cost-effective, and safe and should be part of prenatal treatment to detect cervical abnormalities early. Approximately 4% women had abnormal pap smear and were followed up for further management.

Key Words: Pap smear, cervical cancer, pregnancy

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Introduction:

Among women, cervical cancers rank as the fourth most common cancer occurring globally. Highest incidences are seen in low middle income countries (LMICs). In addition to underlying social and economic issues, the higher incidence rates are due to the lack of access to cervical cancer vaccines, regular screening, and early treatment programs. (no date) These are some of the significant factors contributing to the high mortality rates.

Among the women under 25 years of age, Human Papilloma Virus (HPV)-related cervical diseases often resolve spontaneously, but co-infection with multiple HPV types can increase cancer risk. (Sueblinvong et al. 2005) The primary cause of cervical cancer is persistent infection with high-risk HPV, particularly types 16 & 18 responsible for approximately 70% of cervical cancer universally. Risk factors for cervical cancer include early sexual activity, multiple sexual partners,

smoking, and the use of oral contraceptives. (Ghosh et al. 2016; Manini & Montomoli 2018)

It has been discovered that 5% of pregnancies develop abnormalities related to cervical cytology. Precancerous alterations, called dysplasia, occur when aberrant cells begin to emerge in the cervical tissue before the development of cancerous cells. (2022a) If these aberrant cells are not removed or treated, they have the potential to develop into cancerous cells that invade the cervix and beyond. Unusual vaginal bleeding, such as bleeding during or after sex, in between periods, after menopause, or heavier than typical cycles, might be a worrying indicator of the illness. (2024)

The use of Pap smear (Papanicolaou test) is critical for the early detection of cervical abnormalities. In developed countries, well-regulated screening programs aid in the detection of cervical cancer at the early stage & precancerous lesions. Such widespread screening programs have significantly reduced the incidence and mortality from cervical cancer substantially. (Mohindroo et al. 2019) However, many developing nations including India comprehensive national screening program are still in initial phases of implementation.

Routine Pap smear screening is advised as a part of prenatal care to guarantee the early diagnosis of cervical abnormalities. (Bal et al. 2012) The Pap test has a sensitivity of about 70.80% for identifying high-grade squamous intraepithelial lesions. (Ansari et al. 2012) When the Pap test is combined with an HPV DNA test, the sensitivity for early detection of precancerous lesions is increased. (Patel, Pandya & Modi 2011)

The first trimester of pregnancy is pivotal for both maternal and fetal health, as it is the developmental stage of the baby. It is especially crucial to identify abnormal cervical cytology in the first trimester so that early intervention can be carried out and prevent the progression of these abnormalities, ensuring better outcomes for both the mother and the fetus. (2022b; no date) An abnormal Pap smear result in the first trimester can indicate HPV infection (no date) , precancerous lesions (no date), or cervical cancer (no date).

Therefore, this study aims to address this research gap by determining the frequency of abnormal Pap smear results in women during the first trimester of pregnancy and identifying the associated risk factors. The specific objectives of the study were to assess the prevalence of abnormal Pap smear findings during the first trimester and to investigate the correlation between various risk factors, such as socioeconomic status, age at first intercourse, parity, history of multiple sexual partners and the incidence of abnormal Pap smear results.

Materials and Methodology:

This analytical cross-sectional study was conducted in the Department of Obstetrics and Gynecology at a tertiary care hospital, after obtaining institutional ethics committee approval. A total of 314 first-trimester pregnant patients, willing to participate in the age group of 21 years and above, were enrolled in the study. Informed written consent was obtained from all the patients. Women with acute vaginal infections, recent vaginal medication or intercourse within 48 hours, or unwilling to participate were excluded.

History was taken in detail from each participant i.e. demographic data, socio-economic status, obstetric history, sexual history, & knowledge of Pap smear screening methods was elicited. Detailed general physical and obstetric examinations were performed; routine antenatal investigations were conducted as per department protocol.

Pap smear was taken with the patient placed in a lithotomy position. A sterile Ayres spatula was introduced to obtain cellular material from the squamocolumnar junction of the cervix. These were then smeared onto glass slides and fixed with 95% ethanol for cytological studies.

Interpretations of the Pap smear results were made using The Bethesda System 2014 (Pangarkar 2022). Statistical analysis was done by the software STATA. Quantitative variables were described in terms of mean and SD; qualitative variables were described by frequencies and percentages. Variables associations were done by either Chi-square test or Fischer's exact test, with a significant p-value of < 0.05.

Results:

The study selected 314 women in their first trimester of pregnancy. Most participants, 96.18%, had Pap smear results indicating NILM (Negative for Intraepithelial Lesions or Malignancy). However, abnormal findings included 0.64% for Atypical squamous cells of undetermined significance (ASC-US), 2.55% for low-grade squamous intraepithelial lesion (LSIL), and 0.64% for high -grade squamous intraepithelial lesion (HSIL) (table 1).

Table 1: Overall Frequency of Abnormal Pap Smears

Pap Smear Findings	Number of Cases	Percentage (%)
NILM	302	96.18
ASC-US	2	0.64
LSIL	8	2.55
HSIL	2	0.64
Squamous Cell Carcinoma	0	0
Atypical Glandular Cells	0	0

The association of pap smear reports with various factors is summarized in table 2. The low socio-economic class had significantly abnormal pap smear report (P value 0.0003). The abnormal Pap smear rates were significantly higher among participants whose first sexual intercourse was before the age of 21 years, when compared to those whose first intercourse was after the age of 21 with P value of 0.0003.

Table 2. Factors affecting the pap smear reports among 314 first trimester pregnant women

Variables		No of cases (%)	PAP SMEAR report				P-value
			NILM	ASCUS	LSIL	HSIL	
Total		314 (100%)	302 (96.2%)	2 (0.64%)	8 (2.5%)	2 (0.64%)	
Socioeconomic status	Upper middle	8 (2.5%)	8 (100%)	0	0	0	0.0003
	Lower middle	143 (45.45%)	142 (99.3%)	0	1 (0.7%)	0	
	Upper lower	80 (25.6%)	75 (93.75%)	1 (1.25%)	4 (5%)	0	
	Lower	83 (26.4%)	77 (92.8%)	1 (1.2%)	3 (3.6%)	2 (2.4%)	
Age of first intercourse	<21 Years	94 (29.9%)	85 (90.2%)	2 (2.1%)	6 (6.4%)	1 (1.1%)	0.0003
	>21 years	220 (70.1%)	217 (98.6%)	0	2 (0.9%)	1 (0.45%)	
Education level	Primary	33 (10.5%)	32 (96.97%)	0	0	1 (3.03%)	0.0012
	secondary	58 (18.47%)	55 (94.83%)	0	2 (3.45%)	1 (1.72%)	
	High school	53 (16.88%)	52 (98.1%)	0	1 (1.92%)	0	
	Intermediate	117 (37.26%)	111 (94.87%)	2 (1.71%)	4 (3.42%)	0	
	Graduate	53 (16.88%)	52 (98.1%)	0	1 (1.92%)	0	
Parity	Primipara	128 (40.67%)	121 (94.53%)	2 (1.56%)	4 (3.12%)	1 (0.78%)	0.06
	Multipara	186 (59.24%)	181 (97.350	0	4 (2.15%)	1 (0.54%)	
Multiple sexual partner	Yes	6 (1.9%)	4 (66.67%)	0	1 (16.67%)	1 (16.67%)	<0.0001
	No	308 (98.1%)	298 (96.75%)	2 (0.65%)	7 (2.27%)	1 (0.32%)	
Oral Contraceptive usage	Yes	31 (9.87%)	30 (96.77%)	0	1 (3.22%)	0	0.48
	No	283 (90.13%)	272 (96.11%)	2 (0.71%)	7 (2.47%)	2 (0.71%)	

Lower educational level was associated with a higher prevalence of abnormal Pap smear results (p=0.0012), as compared to the very minor abnormalities detected among the women with higher levels of education.

The analysis revealed no statistically significant relationship between parity and the incidence of abnormal Pap smear results (p=0.06); however, primigravida women exhibited marginally elevated rates of abnormal smears.

A strong correlation is identified between the history of multiple sexual partners and abnormal results of Pap smear. LSIL showed higher rates in multiple partners compared to the others, with ($p < 0.0001$). None of the patients in this study reported smoking, hence no association could be established between smoking and abnormal Pap smear results. There was no significant association detected between oral contraceptive pills usage and abnormal Pap smear results (p=0.48).

Discussion:

This study explored the frequency of abnormal Pap smear results during the first trimester of pregnancy and the associated risk factors. The overall findings indicate that most participants (96.18%) had normal results, LSIL and HSIL were 2.55% and 0.64% respectively. These results highlight the importance of routine Pap smear screening in pregnant women to detect early pre-cancerous lesions that could otherwise progress to cervical cancer. (F et al. 2019; Mohindroo et al. 2019)

Similar findings have been observed in other studies across various regions of India and neighboring countries , indicating that while most Pap smears show normal results, a significant minority exhibit abnormalities that require attention. (Choudhary & Kose 2024)

The finding of low socioeconomic status, which is associated with higher abnormal Pap smear rates, coincides with the literature available Poorer women tend to receive less health care, including cervical screening placing them at a greater risk of undiagnosed cervical abnormalities. Similarly, cases with early sexual intercourse or a history of multiple sexual partners increase the likelihood of reporting an abnormal Pap result, reflecting the established link between sexual history and cervical cancer risk. (Ethirajan, R. & K. 2018; Venkatesh & Gopalan 2020; Na et al. 2022)

There is no critical association of abnormal Pap smears with parity, though there is a slight increase in the rate of normal results among multiparous women compared to primiparous women. (Venkatesh & Gopalan 2020; Na et al. 2022)

Sexual behavior in particular, age at first intercourse and the number of sexual partners is also a potent risk factor. Most studies report that subjects who initiate sexual activity at an earlier age or have more sexual partners give higher yields of abnormal Pap smear results. (Paño et al. 2015) The risks are mitigated by early health education on sexuality and periodic screening for cervical neoplasia . (Liu, Gao & Li 2017; Poli et al. 2020)

This study demonstrated little, if any, correlation between the use of OCPs and abnormal Pap smears. However, long-term use of OCPs has been reported to predispose women to cervical abnormalities. In the present study, smoking did not appear to be a risk factor, although generally it is believed that smoking decreases immune resistance and may promote abnormalities in cervical cells. (Liu et al. 2017; Simms et al. 2019)

The findings of this study are, therefore, consistent with other studies conducted regarding the prevalence of abnormal Pap smears among pregnant women, especially those studies conducted within similar settings. However, the prevalence of abnormal smears differed noticeably, which may be influenced by differences in population characteristics, healthcare access, and screening practices. [19]

Above is the comparison of the present study with similar studies. The result of NILM in the current study is 96.18%, which corresponds to the results obtained from studies by Radha BPT et al. (2022) (Radha Bai Prabhu T, Damodara Velayudham , Swati Nethaji, Harshita singhal, Ramya venkatachalam no date) and Gill et al. (2020) (Gill et al. 2020) . The prevalence of LSIL in the current study is 2.55%, which is relatively higher compared to most previously mentioned studies, except in the study conducted by Mishra et al. (2022) (Mishra et al. 2015), wherein LSIL accounted for 2.78%. The clinically significant detection of HSIL, though with a low incidence rate of 0.64%,

is a high-grade lesion with greater potential of progressing towards malignant transformation if left untreated. (19)

Overall, the findings emphasize targeted interventions and screening, especially among high-risk groups: lower socioeconomic status women, those who begin sexual activity early, or those with multiple sexual partners. Routine Pap smear and HPV vaccination represent cornerstones in decreasing cervical cancer incidence and improving pregnancy outcomes by recognizing and managing cervical abnormalities in their precancerous stages. Early detection and timely management of such lesions in pregnant women will help to avoid adverse outcomes to both the mother and fetus.

Conclusion:

The study concludes that most cases were negative for intraepithelial lesions or malignancies, reflecting the rarity of this abnormal cytological finding in this study population. The abnormal findings have a positive association with high-risk factors, such as lower socioeconomic groups, age of first intercourse <21 years, low education status, and multiple sexual partners. Even though the positive numbers were less, the screening programme should be implemented given the over all benefits.

A positive association was not found between high-risk factors such as multiparity and history of oral contraceptive pills. Overall, the study uses this as an opportunity to screen during pregnancy where the pre-invasive changes can be detected in a simple, cost-effective, and safe way. This also creates an important opportunity to identify high-risk factors and guide them for further screening schedules.

Healthcare policies should focus on expanding cervical cancer screening programs, by implementing routine Pap smear screening during pregnancy, particularly in low-resource settings, to ensure that vulnerable populations have access to early detection and treatment, thus improving outcomes for both mother and their unborn children.

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