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Original Research Article

IMPORTANCE OF CERVICAL CANCER SCREENING WITH LIQUID BASED CYTOLOGY IN PREGNANT WOMEN IN A TERTIARY RURAL CENTRE

Kalpana Kumari[1], Sanya Tanveer[2], Nupur Mittal[1], Shalini Singh[3], Namita Doharey[3], Shaheen Bano[3]

[1]*Professor, Department of Obstetrics and Gynaecology, UPUMS, Saifai, Uttar Pradesh, India*
[2]*Senior Resident, Department of Obstetrics and Gynaecology, UPUMS, Saifai, Uttar Pradesh, India*
[3]*Assistant Professor, Department of Obstetrics and Gynaecology, UPUMS, Saifai, Uttar Pradesh, India*

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Corresponding Author:
Dr. Shalini Singh,
Assistant Professor, Department of Obstetrics and Gynaecology, UPUMS, Saifai, Uttar Pradesh, India
Email: drshalinisingh81@gmail.com

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ABSTRACT

Background: Cervical cancer is a significant public health concern globally and ranks as the second most common female cancer in India. Despite advancements in screening programs, the disease remains a leading cause of mortality among women. Pregnancy presents an opportune time for screening, especially in countries with limited organized programs like India, where antenatal clinics can serve as platforms for early detection and intervention. Henceforth, we aimed to analyse the importance of cervical cancer screening with liquid based cytology in pregnant women.

Materials and Methods: This hospital based prospective, observational study focused on pregnant women attending antenatal outpatient departments over 18 months. A sample of 110 women meeting inclusion criteria underwent Liquid-Based Cytology (LBC) testing. Data on socio-demographic characteristics, obstetric history, and cervical cytology results were collected and analysed using specialized software.

Results: The majority of participants were between 21 to 30 years old, with low educational levels and socioeconomic status. About one-third had a history of sexually transmitted infections (STIs), correlating with abnormal cervical cytology findings. Regression of cervical lesions was observed in 75% of cases. However, the prevalence of abnormal cervical cytology (ASCUS, LSIL) was 3.6%, highlighting the need for early detection and management.

Conclusion: Cervical cancer screening during pregnancy presents a crucial opportunity for early detection and intervention, particularly in resource-limited settings like India. Efforts to increase awareness, literacy, and access to screening programs are essential for effective prevention strategies. Additionally, educational interventions and HPV immunization campaigns can further augment prevention efforts.

Keywords: Cervical cancer, pregnancy, Liquid-Based Cytology (LBC), screening, antenatal care.

INTRODUCTION

Cervical cancer ranks as the 2nd most common female cancer in India, with 122,844 new cases and 67,477 deaths reported annually. Globally, it remains the 4th most common cancer among women, with an estimated 604,000 new cases and 342,000 deaths per year. The incidence rate of cervical cancer stands at 15.1 per 100,000 annually worldwide and 14.9 per 100,000 in India.

The disease primarily affects women aged over 40, with most deaths occurring in their fifth and sixth decades of life.[1-3] Almost 90% of cervical deaths in the world occurs in developing countries, with India alone accounting for about 25% of the total cases.44 In low-and middle-income countries, there is limited access to these preventative measures and cervical cancer is often not identified until it has further advanced and symptoms develop. The most significant risk factor for cervical cancer is Human

Papillomavirus (HPV), present in over 90% of cases.[5] Certain strains, notably 16 and 18, are prevalent in most cervical cancers. Other risk factors include early age marriage, multiple sexual partners, and weakened immune systems, with HIV infection increasing the risk six-fold.[1,6] The disease progresses from premalignant lesions (ASCUS, LSIL, HSIL) to invasive carcinoma, with several histologic subtypes identified.[7]

Early detection and treatment of premalignant lesions are key to preventing and curing cervical cancer. Screening methods such as Papanicolaou (Pap) smear, Liquid-Based Cytology (LBC), and visual inspections are effective in detecting abnormalities.[8-10] LBC, with its improved sensitivity (76%) and specificity (98%) compared to conventional methods, is favoured for its ability to remove blood and mucus, reducing unsatisfactory smears.[11] Awareness and screening rates remain low in developing countries like India, with only 3.1% of women aged 25-64 years undergoing screening. Pregnancy presents an opportunity for screening, as 1-3% of cervical cancer cases are diagnosed during pregnancy or postpartum. However, hormone-induced changes in the cervix during pregnancy complicate evaluation.[12,13] Nevertheless, visits for antenatal check-ups by women are a potential opportunity to perform this test and educate them regarding the significance of screening. Hence the present study was done at our tertiary care centre to analyse the importance of cervical cancer screening with liquid based cytology in pregnant women and determine the prevalence of abnormal cytological smear in pregnant women and guide them for further management.

MATERIALS AND METHODS

This hospital based prospective, observational study was conducted at the Department of Obstetrics and Gynaecology, UPUMS, Saifai from January 2021 to June 2022. The study was approved by the Institutional Ethical Committee. The study population comprised women attending antenatal OPD fulfilling the inclusion criteria.

Inclusion criteria:

1. Pregnant women aged 18-45 years with gestational age more than 10 weeks after dating scan.
2. No history of threatened abortion in current pregnancy.
3. No history of intercourse, vaginal examination, any vaginal medication in past 48 hours.
4. No history of preterm premature rupture of membrane, preterm labor
5. Spontaneous conception
6. Willing for the procedure

Exclusion criteria

1. Non pregnant women
2. Pregnant women with history of cervical cytology done within 3 years.

Liquid based cytology (LBC) was applied while collecting the samples. Cervical exfoliated cells were collected by plastic cervical brush, detachment of the brush followed by placement into vial containing liquid alcohol based preservatives to prevent air drying, retrieval of cells from the vial through filtration and centrifugation which then deposited on slide as thin layer, staining and mounting of slides for microscopy. Interpretation of slides by modified Bethesda system 2014.[12]

Statistical Analysis: The data collected was entered into a Microsoft Office Excel worksheet and analysed using specialized software (version 21), employing appropriate standard statistical formulas. Tables and graphs were generated to visualize the results, aiding in the interpretation and presentation of findings. This comprehensive analysis facilitated a deeper understanding of the relationships and patterns observed in the study, enhancing the robustness and reliability of the conclusions drawn.

RESULTS

Total 110 antenatal women were included in the study. The majority of the study subjects fell within the age range of 21 to 30 years, constituting 93.6% of the participants, with a mean age of 25.32 ± 3.28 years. 54.5% antenatal women were between 21 -30 weeks. 43.6% were second gravida with an average gestational age of 26.81 ± 6.33 weeks. A significant proportion (56.36%) of cases had education levels below the 10th grade, and 40.00% belonged to the lower socioeconomic class. We document 28% antenatal women married before 20 years of age and majority between 21-25 years i.e. 56% [Table 1]. Out of total 110 cases, 31 had a prolonged history of sexually transmitted infections (STIs), with 58.06% of these cases presenting abnormal cervical cytology, highlighting the risk posed by persistent vaginal infections, particularly with HPV, for future cervical cancer development. In our study we document only 3.64% of cases with oral contraceptives use, making it challenging to establish a clear relationship between contraceptive use and cervical cancer risk [Figure 1]. Per speculum examination revealed that the majority of women had a healthy cervix (74.55%), followed by those with cervical discharge (20.91%) and cervical erosion (4.55%), with none having cervical growth [Figure 2]. LBC reports indicated that 52.73% of cases were negative for intraepithelial lesion or malignancy (NILM), while 43.64% showed inflammatory changes. The prevalence of abnormal cervical cytology (ASCUS, LSIL) was 3.6% [Table 2]. Antenatal women were asked about their knowledge of cervical cancer screening methods. Among them, five women with graduate-level education were aware of cervical cancer screening; however, none had undergone any form of screening [Table 3]. Approximately 34.55% of the participants had one or more risk factors for cervical cancer,

such as early age at marriage, a prolonged history of sexually transmitted infections (STIs), multiple sexual partners, having a spouse with multiple partners, smoking, and the use of oral contraceptive pills (OCPs). Early age at marriage exhibited a strong correlation with premalignant lesions of cervical cancer [Figure 3]. Regression of cervical lesions was observed in 75% of cases, with persistence noted in 25% (1 case of LSIL). The presence of abnormal cervical cytology did not show a significant association with socioeconomic status, as indicated in [Tables 4]. However, significant changes were observed in LBC results from antepartum to post-partum, as depicted in [Table 5].

Table 1: Demographic parameters of enrolled patients (N=110).

Demographics		Frequency	Percentage
Age (years)	≤20 years	3	1.8
	21-30 years	101	93.6
	31-40 years	6	4.5
Gravida	Primigravida	38	34.5
	Second gravida	50	43.6
	Third gravida	14	12.7
	Fourth gravida	5	4.5
	Fifth gravida	3	2.7
Gestational age (weeks)	10-20weeks	18	16.3
	21-30weeks	57	54.5
	31-40weeks	35	29.0
Education	Illiterate	26	23.64
	<10th standard	62	56.36
	12th standard	11	10.00
	Graduate	11	10.00
	Post graduate	0	0.00
Socioeconomic status	Upper	0	0.00
	Upper middle	4	3.64
	Upper lower	23	20.91
	Lower Middle	39	35.45
	Lower	44	40.00
Age at marriage	≤20 years	31	28.18
	21-25 years	62	56.36
	>25 years	17	15.45

Table 2: Distribution of the study subjects based on the LBC report.

LBC Report	Frequency	Percentage
Unsatisfactory	0	0.00
NILM	58	52.73
Inflammatory changes	48	43.64
ASCUS	2	1.82
LSIL	2	1.82
HSIL	0	0.00

Table 3: Association of educational status and awareness of cancer cervix screening by LBC.

Education	Aware that LBC is a screening test for cervical cancer (%)	History of LBC screening in the past (%)
Illiterate (n=26)	0 (0.0%)	0 (0.0%)
<10th standard (n=62)	0 (0.0%)	0 (0.0%)
12th standard (n=11)	0 (0.0%)	0 (0.0%)
Graduate (n=10)	5 (100%)	0 (0.0%)
Post graduate (n=0)	0 (0.0%)	0 (0.0%)

Table 4: Association of socioeconomic status and their correlation with LBC status.

Socioeconomic status	Abnormal LBC Report		Normal LBC Report		p- Value
	n	%	N	%	
Upper	0	0.0	0	0.0	X2= 2.34
Upper middle	1	25.0	3	75.0	p= 0.504
Lower middle	16	41.02	23	58.97	
Upper lower	11	47.82	12	52.17	
Lower	24	54.54	20	45.45	

Table 5: Changes of LBC from antepartum to post-partum.

LBC report	Ante-Partum LBC Report		Post-Partum LBC Report		p-Value
	n	%	N	%	
NILM	58	52.73	102	92.72	X2= 42.98
Inflammatory changes	48	43.64	7	6.36	p<0.001
ASCUS	2	1.82	0	0.00	
LSIL	2	1.82	1	0.90	
HSIL	0	0.00	0	0.00	

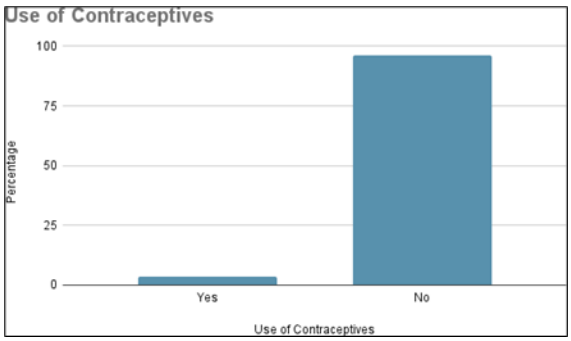

Figure 1: Distribution of study subjects according to use of contraceptives.

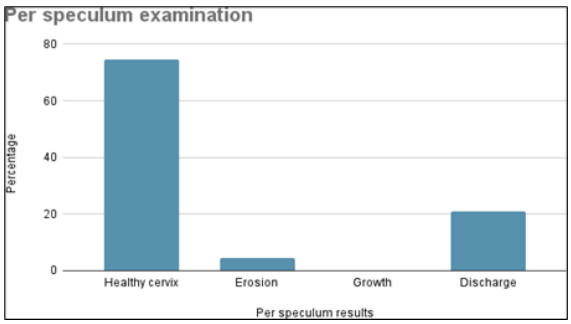

Figure 2: Distribution of study subjects based on the per speculum examination.

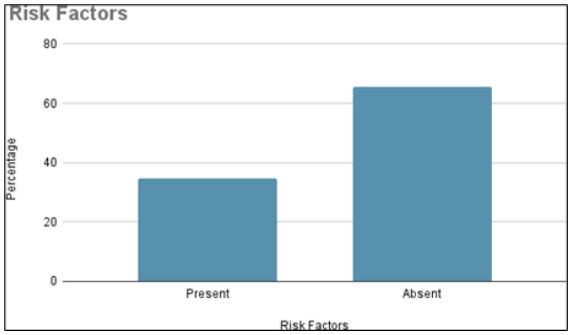

Figure 3: Risk factors for cervical cancer.

DISCUSSION

Cervical cancer is a leading cause of cancer deaths in women aged 30-69 years, with approximately 1 in 53 Indian women at risk compared to 1 in 100 in industrialized countries. In our study 93.6% women belong to 21-30 years age group followed by 31-40 years age group (4.5%) and ≤20 years (1.8%) with mean age of 25.32±3.28 years. Ahuja R et al. conducted a cross-sectional study involving 308 women who underwent a pap smear in their 1st trimester, with a mean age of 25.4 years.[14] In our study 75% antenatal women who had abnormal cervical cytology were married at age less than 20 years. Similar cross-sectional study conducted by Khalaf M et al. involving 200 women, a significant association was found between early age at marriage and abnormal Pap results (P = 0.001), with 87% of women marrying at ≤18 years showing abnormal Pap results.[15] Priya and Shankar conducted a prospective study with 200 antenatal women aged 20-25 years, finding a significant association between age at marriage and pap smear results, particularly noting higher inflammatory changes with younger age at marriage.[16] Thakur A et al. conducted a case-control study of 226 newly diagnosed cases of cervical cancer, reported that women marrying before age 18 were nearly 3 times more at risk (OR = 2.88) compared to those marrying after age 18.[17] In our study, the percentage of upper, upper middle, upper lower, lower middle and lower socioeconomic strata was 0.00%, 3.64%, 20.91%, 35.45%, and 40.00%, respectively. As our study was conducted in a rural tertiary centre, the majority of study subjects were from lower socioeconomic classes. Similarly, Rani A et al. showed low awareness of Pap smears and cervical cancer vaccines among rural women, with literacy and socioeconomic status playing key roles.[18] Jabeen S et al. in their study found that a majority of cervical cancer patients belonged to lower socioeconomic backgrounds and had less education, emphasizing education's role in improving screening awareness among antenatal women.[19] In our study, percentage of illiterate, <10th standard, 12th standard, graduate and post graduate were 23.64%, 56.36%, 10.00%,10.00%, and 0.00% respectively. Out of 110, 5 cases were aware of LBC as a screening test for cervical cancer and this correlated well with their education. All these 5 women were graduates. Similarly, Manikkam B reported that the education levels varied, with 40.6% illiterates, 44.6% with secondary education, and only 14.8% graduates, impacting knowledge about cervical cancer.[20]

The prevalence of abnormal cytology report in antenatal women screened for cervical cancer in our study was 3.6% which accounted for 1.8% ASCUS and 1.8% LSIL respectively. Gill P et al. reported a prevalence of abnormal cervical cytology at 3.4% among women in Uttarakhand, which aligns with our findings.[3] Priya and Shankar reported a prevalence of 1% in south Indian women specifically in Tamil Nadu.[16] Al Eyd and Shaik found 3% of the screened pregnant women showed abnormal Pap test result which is comparable to our study.[21] In our study out of 4 cases with abnormal cervical cytology, 3 cases showed regression i.e. regression rate of 75%. Similarly, Gill P et al., found that out of 7 women who tested positive in the antenatal period, 6 women had Negative for intraepithelial lesion or malignancy (NILM) and 1 woman was reported positive for High-grade Squamous Intraepithelial Lesion (HSIL) in the postpartum period which accounted for 85.7%.[3] Suzuki K et al. demonstrated a regression of 86% which include 61% in Low-grade (ASCUS & LSIL) and 25% in High-grade (HSIL, ASC-H, and AGC) among Japanese women respectively.[22] Ma L et al. reported a regression of 72.3% in Low-grade (ASCUS & LSIL) and 17% in High-grade (HSIL, ASC-H, and AGC) in Chinese women,[23] while Kaplan K et al. observed a regression of 62% in Low-grade (ASCUS & LSIL) and 0% in High-grade

(HSIL, ASC-H, and AGC) among women from the US.24 In our study the percentage of Inflammatory changes was seen in 43.64%. Similarly, Ahuja R et al. conducted a study, where 308 women underwent a pap smear in their 1st trimester, 31.2% had inflammatory smear.[14] Priya and Shankar reported inflammatory changes in 26% of the subjects,[16] and Gill P et al. reported 21% with benign inflammatory Changes.[3] We also attempted to determine the association of abnormal cervical cytology and bacterial vaginosis (BV) with intrauterine fetal growth restriction, and found no significant association. While establishing the correlation between bacterial vaginosis and intrauterine fetal growth restriction Gill P et al. observed that, out of the 10 neonates of women with bacterial vaginosis, 4 were average for gestational age (AGA) and 6 were small for gestational age (SGA). This correlation was not significant (p-value-0.149), which was similar to our study.[3] Thorsen P et al. found that in nulliparous women, BV was associated with SGA (adj. OR 1.6 (0.7–3.1)) compared to nulliparous women without BV.25 No such associations were seen for multiparous women with BV. Similarly, Svare et al. in Denmark, found that birth weight was significantly lower in infants of women with BV than in infants of women without BV.[26]

CONCLUSION

This study highlights the risk factor associated with abnormal cervical cytology on LBC and those patients must be counselled, educated and followed up to prevent the progression to invasive cancer. In order to reduce the burden of cervical cancer in developing countries where the medical services are sparse in rural areas pregnant women seeking obstetrician for regular antenatal visits must also be screened for possible preinvasive lesion of the cervix also called as opportunistic screening. LBC is easy to perform, cost effective and does not affect the course of pregnancy hence play major role.

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