

# Cervical Cytology and its Correlation with Cervicovaginal Infection in Antenatal Patients: A Study in a Tertiary Care Hospital

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## ABSTRACT

**Aim:** To study cervical cytology and cervicovaginal infection in antenatal women.

**Objectives:** To find out by pap smear for inflammatory, atypical squamous cells of undetermined significance (ASCUS), atypical glandular cells of undetermined significance (AGUS) and premalignant lesions in antenatal women.

- To find out cervicovaginal infection by wet mount among antenatal women.
- Correlation of cervical cytology with cervicovaginal infection.

**Materials and methods:** Five hundred antenatal women, irrespective of gestational age, were enrolled as subjects in this prospective clinical study for blood investigations, wet mount examination of cervical discharge and pap smear.

**Results:** Out of 500 smears, 385 women were having inflammatory smears out of which 301 were having bacterial vaginosis followed by 89 vaginal candidiasis followed by 12 were having trichomoniasis, in which 339 had a preterm delivery.

**Conclusion:** Antenatal visits are a potential opportunity to perform screening by Pap smear and wet mount study to prevent preterm labor and improve perinatal mortality.

**Keywords:** Cervical intraepithelial neoplasia, Human papillomavirus, Pap smear, Wet mount.

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## INTRODUCTION

Cervical cancer is one of the three most common malignancy among females, worldwide.<sup>1</sup> Majority of these cases (80%) are in developing countries. India represents 26.4% of all women dying of cervical cancer globally. It is the leading cause of mortality and morbidity among women worldwide, and it is considered a preventable disease because it has long preinvasive state.<sup>2</sup> Reported incidence rates to vary between 1.30 and 2.7 per 1000 pregnancies. Pregnancy seems to be a risk factor for cervical infection due to increased hormonal level or immunosuppression.<sup>3</sup> High parity, early age at 1st pregnancy and long term OCPs use further increases the risk.<sup>4-7</sup> The direct precursor of cervical cancer is represented by CIN, which is screened by a pap test. The pap test is the foundation of cervical cancer screening. Almost 1% of the population of reproductive age annually screened for cervical cancer will be diagnosed as CIN.<sup>8</sup> The antenatal period is one event when, according to WHO, pregnant women are advised to seek at least four check-ups and with this idea, the present study was undertaken to screen pregnant women for premalignant lesions in the cervix and cervicovaginal infections. Cervicovaginal discharge during pregnancy can be physiological or pathological because of change in the balance of normal vaginal flora. The most common vaginal infections are bacterial vaginosis, trichomoniasis and vulvovaginal candidiasis leading to preterm labor and delivery, chorioamnionitis, postcesarean endometritis, postabortion pelvic inflammatory disease (PID) and cervicitis.<sup>9,10</sup>

## MATERIALS AND METHODS

The study was carried out in 500 antenatal women throughout one and a half year in Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

## Inclusion Criteria

- Irrespective of parity and gestational age.
- History of at least 7 days of abstinence.

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**Exclusion Criteria**

- Carcinoma cervix
- Unexplained vaginal bleeding
- Established labor
- Premature rupture of membranes
- History of vaginal irrigation within 24 hours
- History of tampon use within 24 hours.

Inclusion and exclusion criteria were considered for the study and investigations. Papanicolaou smear and wet mount (two slides, one with normal saline and other with 10% KOH) were conducted. Wet mount slides were first examined under low power, and then a high power microscope and any abnormalities (yeast, trichomoniasis, bacterial vaginosis—Amsel’s criteria) were noted. Subjects showing evidence of ASCUS, low grade squamous intraepithelial lesion (LSIL), or high grade squamous intraepithelial lesion (HSIL) on pap smear according to Bethesda classification 2001 were subjected to HPV-DNA and colposcopy.

**RESULTS**

The total number of cases studied were 500. The maximum number of women were in the age group between 21 years and 25 years. The maximum number of women were primigravida, i.e., 35%. Majority of women belonging to the second trimester, i.e., 42%. The mean age of marriage and 1st marriage was 20.96 years as presented in Table 1.

Out of 500 smears, 486 were adequate smears. A maximum number of smears, i.e., 79.2% were inflammatory whereas only 20.7% were NILM. No smear was showing ASCUS, AGUS in our study (Table 2).

Table 3 shows a maximum number of cases, i.e. 391 women with bacterial vaginosis seen as pus cells and fishy odor on wet mount, whereas 97 women with vaginal candidiasis seen as budding yeast cells on smears and only 2.4% women with trichomoniasis seen as trophozoites. This is statistically significant with a *p* value of <0.001

Table 4 reflects that out of 385 women with inflammatory smears, 301 were having bacterial vaginosis followed by 72 showing vaginal candidiasis and only 12

**Table 1:** Subjects profile

Mean age group	25.34 years
Mean gravida	35% (primigravidas)
Mean trimester	49% (second)
Mean age of marriage and 1st pregnancy	20.96 years

**Table 3:** Distribution of cases according to wet mount findings

Wet mount	Bacterial vaginosis	Vaginal candidiasis	Trichomoniasis	<i>p</i> value
Budding yeast cells	0 (0%)	97 (19.4%)	0 (0%)	
Pus cells/ fishy odor	391 (78.2%)	0 (0%)	0 (0%)	<0.001
Trophozoites	0 (0%)	0 (0%)	12 (2.4%)	

had evidence of trichomoniasis, whereas women with NILM, bacterial vaginosis was seen in 76 followed by vaginal candidiasis in 25. This is statistically significant showing a positive correlation of inflammatory and NILM smear with cervicovaginal infections mainly with bacterial vaginosis. This is statistically significant with a *p* value of <0.001.

Table 5 depicts that a maximum number of women having cervicovaginal infections, i.e., 339 had preterm delivery whereas only 161 women delivered at term. When the type of cervicovaginal infections was correlated with preterm delivery it was found that a maximum number of women 89.6% had bacterial vaginosis whereas 10.3% had vaginal candidiasis. It was found that women who had trichomoniasis had delivery at term. This is statistically significant with a *p* value of <0.001.

**DISCUSSION**

Pregnancy offers young female an opportunity to have cervical cytological screening and wet mount study for cervicovaginal infection as a part of routine examination which may help in early diagnosis of CIN during pregnancy (Matsubara et al.). This study was done among 500 antenatal women as it is the best opportunity for the screening of premalignant lesions of the cervix and cervicovaginal infections by Pap smear and wet mount studies, respectively. In our study, mean age of the cases is

**Table 2:** Distribution of cases according to the adequacy of Pap smear

Pap smear	Total	Pap smear finding	frequency	%
Inadequate	14 (2.8%)			
Adequate	486 (97.2%)	Inflammatory	385	79.2
		NILM	101	20.8

**Table 4:** Correlation of Pap smear findings with cervicovaginal infections

Pap smear findings	Total	Bacterial vaginosis	Vaginal candidiasis	Trichomoniasis	<i>p</i> value
Adequate	486	377 (77.5%)	97 (20%)	12 (2.5%)	
Inflammatory	385	301 (78.2%)	72 (18.7%)	12 (3.1%)	
NILM	101	76 (75.2%)	25 (24.7%)	0 (0%)	<0.001
ASCUS	0	0 (0%)	0 (0%)	0 (0%)	
AGUS	0	0 (0%)	0 (0%)	0 (0%)	

**Table 5:** Correlation of cervicovaginal infections with the timing of delivery

Timing of delivery	Total	Bacterial vaginosis	Vaginal candidiasis	Trichomoniasis	<i>p</i> value
Term	161 (32.2%)	87 (54%)	62 (38.5%)	12 (7.4%)	<0.001
Preterm	339 (67.8%)	304 (89.6%)	35 (10.3%)	0 (0%)	



25.34 years which is consistent with the study conducted by Khaengkhor et al. on 143 antenatal women where participants were between 15 to 41 years with the mean age of 27.09 years.<sup>11</sup> Neelima et al. also found the overall mean age of the women in the study was around 25 years.<sup>12</sup>

A study conducted by Khaengkhor et al. where the majority of women, i.e., 50.3% were primigravidae as compared to multigravidae in 49.7% which is consistent with our study.<sup>11</sup> A cross-sectional study conducted by Ingprasarn et al. on 472 antenatal women in which maximum number (50%) of women were primigravidae.<sup>13</sup>

Ingprasarn et al. conducted a study and found that maximum number of antenatal women come in their second trimester, i.e. 56.6% as compared to the first trimester, i.e., 30.6% which coincides with our study.<sup>13</sup>

Our study is in accordance with the study conducted by Manikkam et al. in 2016 where they found that most of the women were married at 20–30 years while only 4.5% were married after 30 years with mean age of marriage 23.4 years.<sup>14</sup>

In our study, the maximum number of women, i.e., 97.2% presented with vaginal discharge. The nature of discharge was mucoid in 79% followed by curdy white in 21% of women. As the majority of women belonged to rural areas and from lower socioeconomic status, so they do not know about personal hygiene. On pap smear, 79.2% of cases were inflammatory smears followed by 20.7% cases were negative for intraepithelial lesion for malignancy. No smears were showing ASCUS or AGUS. In a cross-sectional study by Himabindu et al. on 200 antenatal women pap smear was done out of which 89.5% smears shows inflammation followed by 0.5% LSIL on cytological examination which coincides with our study.<sup>15</sup> Again in a cross-sectional study done by Barouti et al. in 2013, carried out a pap smear on 528 antenatal women out of which 408 (77.2%) women showed inflammatory smears which are in keeping with our findings.<sup>16</sup> Neelima et al. conducted a study on 1000 antenatal women, on Pap smear 55.2% cases were normal, with inflammation seen in 40.8% cases and dysplasia was seen in two women, which is consistent with our study.<sup>12</sup>

On wet mount, 78.2% were showing pus cells on Normal saline, and fishy odor on KOH suggestive of Bacterial vaginosis followed by 19.4% cases were showing budding yeast cells on both normal saline and KOH suggestive of vaginal candidiasis followed by only 2.4% were showing trophozoites on wet mount suggestive of trichomoniasis. A study conducted by Govender et al. found bacterial vaginosis in 52% of the women and was the most common infection diagnosed.<sup>17</sup> During the study it was found that mucoid type of vaginal discharge was

associated with bacterial vaginosis, i.e., 94.3% followed by 2.6% with vaginal candidiasis and 2.46% with trichomoniasis whereas the curdy white type of discharge is typically seen in vaginal candidiasis, i.e., 87% followed by 13% with bacterial vaginosis.

In our study, the maximum number of women having cervicovaginal infections, i.e., 339 had preterm delivery whereas only 161 women delivered at term. When the type of cervicovaginal infection was correlated with preterm delivery it was found that a maximum number of women 89.6% had bacterial vaginosis whereas 10.3% had candidiasis. It was found that women who had trichomoniasis they delivered at term. Association of bacterial vaginosis was studied by Riduan et al. in 1993 on 490 antenatal women evaluated for BV at 16–20 weeks and 28–32 weeks and observed till delivery. They found significant differences between preterm delivery and BV diagnosed at 16–20 weeks gestation but not with BV diagnosed at 28–32 weeks gestation. A study was conducted by Gupta et al. in 2013 on 500 antenatal women and found a positive association of BV with preterm delivery. This association was highly significant ( $p < 0.0001$ ) which was consistent with our study.<sup>18</sup> During the study, it was found that out of 385 women with inflammatory smears, 78.2% were having bacterial vaginosis 23.1% having candidiasis followed by 3.1% were having Trichomoniasis. Whereas among women with NILM, bacterial vaginosis was seen in 75.2% followed by candidiasis in 7.9%. This is statistically significant with a  $p$  value  $< 0.001$  showing a positive correlation of inflammatory pap smear with cervicovaginal infections mainly with bacterial vaginosis, i.e., 78.2%. Baka et al. conducted a study in 2013 established that almost 60% of the women presenting with inflammatory changes on cervical smear tests had positive bacteriological studies for different pathogens.<sup>19</sup>

Burke and Hickey demonstrated that the prevalence of infection was higher in the inflammatory smear group, thus supporting that women with an inflammatory smear are more likely to harbor genital tract infection than women whose smear shows no evidence of inflammation. A maximum number of women who had inflammation on pap smear has been associated with a 30–50% incidence of bacterial vaginosis.

## CONCLUSION

Antenatal visits by women are a potential opportunity to perform screening by pap smear for premalignant lesions and wet mount to look for cervicovaginal infections. The present study has highlighted that the majority of women had inflammatory smears on Pap smear examination and they were found to have bacterial vaginosis on wet mount. Thus, proving a positive correlation between

bacterial vaginosis and inflammatory smear. There was a strong observation of preterm delivery associated with bacterial vaginosis, in turn jeopardizing the obstetric outcome in the form of perinatal mortality. Though it is a very small study and a larger randomized trial are needed to validate the statement that every pregnant woman should undergo Pap smear screening and wet mount study to prevent preterm labor and improve perinatal mortality.

## REFERENCES

1. Ferlay J, Autier P, et al. Estimates of the cancer incidence and mortality in Europe in 2006. *Ann Oncol* 2007;18(3):581-592.
2. Bidus MA, Elkas JC, et al. Cervical and vaginal cancer. Berek and Novac's gynecology. 14th edition. Philadelphia: Wolters Kluwer Publishers; 2009.
3. Bandyopadhyay S, Chatterjee R. HPV Viral load determination during pregnancy as a possible cervical cancer risk. *J Exp Clin Cancer Res* 2006;25(1):29-38.
4. Hildesheim A, Herrero R, et al. HPV co-factors related to the development of cervical cancer: results from a population-based study in Costa Rica. *Br J Cancer* 2001;84:1219-1226.
5. International Collaboration of Epidemiological studies of cervical cancer. Cervical carcinoma and reproductive factors: Collaborative reanalysis of individual data on 16,563 women with cervical carcinoma and 33,542 women without cervical carcinoma from 25 epidemiological studies. *Int J Cancer* 2006;119:1108-1124.
6. Smith JS, Green J, et al. Cervical cancer and use of hormonal contraceptive; a systematic review. *Lancet* 2003;361:1159-1167.
7. Ylitalo N, Sorensen P, et al. smoking and oral contraceptives as risk factors for cervical carcinoma in situ. *Int J Cancer* 1999;81:357-365.
8. Dalrymple JL, Gilbert WM, et al. Pregnancy-associated cervical cancer: obstetric outcomes. *J Mat Fetal Neonatal Med* 2005;17:269-279.
9. Sweet RL. Gynaecologic conditions and bacterial vaginosis: implications for the non-pregnant patient. *Infect Dis Obstet Gynecol* 2008;8:184-190.
10. Ugwumadur AH. Bacterial vaginosis in pregnancy. *Curr Opin Obstet Gynecol* 2002;14:115-118.
11. Khaengkhor P, Mairaing K, et al. Prevalence of abnormal cervical cytology by liquid based cytology in the antenatal care clinic, Thammasat University Hospital. *J Med Assoc Thai* 2011;94(2):152-158.
12. Neelima B, Vanamala VG, et al. The incidence of cervical intraepithelial neoplasia in antenatal women by screening: a study in a semi urban area in Telangana, India. *Int J Reprod Contracep Obstet Gynecol* 2017;6(7):2887-2890.
13. Ingprasarn A, Onaium N. Prevalence of Abnormal Conventional Pap Smear in Pregnant Women, Chonburi Hospital. *Thai J Obstetr Gynaecol* 2014 Sep 30:137-142.
14. Manikkam B. Screening for cervical cancer during pregnancy. *Int J Community Medicine and Public Health* 2016;3(9):2493-2498.
15. Himabindu P, Kanwal A, et al. Pap smear in antenatal women-routine screening in low resource settings. *IOSR J Dent Med Sci* 2015;14(4I):04-05.
16. Barouti E, Farzaneh F, et al. The pathogenic microorganisms in papnicoloau vaginal smears and correlation with inflammation. *J Fam Reprod Health* 2013;7(1):23-27.
17. Govender L, Hoosen AA, et al. Bacterial vaginosis and associated infections in pregnancy. *Int J of Gynecol and Obstet* 1996;55(1):23-28.
18. Gupta A, Garg P, et al. Bacterial vaginosis in pregnancy (<28weeks) and its effect on pregnancy outcome: A study from a western UP city. *Indian J Clin Prac* 2011;23:740-744.
19. Baka S, Tsirmpa I, et al. Inflammation on the cervical papanicoloau smear: Evidence for infection in asymptomatic women? *Infect Dis Obstetr Gynecol* 2013;2013:184302.