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Original Research Article

A cross-sectional study of cervical Papanicolaou smear changes in antenatal women

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ABSTRACT

Background: Cervical cancer is a preventable malignancy characterized by a prolonged preinvasive phase that allows early detection. Despite effective screening tools, coverage in India remains inadequate. This study evaluates cervical cytological findings in pregnant women and highlights antenatal care as a valuable opportunity for opportunistic cervical cancer screening, especially in settings where routine screening coverage is low."
Methods: This hospital-based cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, RIMS Imphal. A total of 354 pregnant women fulfilling the inclusion criteria underwent Papanicolaou (Pap) smear screening. Cytological findings were reported according to the Bethesda system. Associations between Pap smear findings and variables were analysed using chi-square test.
Results: Most participants were aged 21-30 years (72.4%) followed by 31-35 years (13%). Pap smear findings revealed negative for intraepithelial lesion or malignancy (NILM) in 76.8% of cases. Inflammatory smears were observed in 9.6%, bacterial vaginosis in 5.4%, unsatisfactory smears in 7.9%, and low-grade squamous intraepithelial lesion (LSIL) in 0.3%. A statistically significant association was observed between socio-economic status and Pap smear findings ($p<0.01$). No significant association was found with education level or age at marriage.
Conclusions: The findings highlight that antenatal care provides an important opportunity for opportunistic cervical cancer screening. Incorporating Pap smear screening into routine antenatal services may improve early detection of cervical abnormalities and strengthen cervical cancer prevention strategies in low-resource settings.

Keywords: Pap smear, Opportunistic antenatal screening, Cervical cytology, Cervical cancer

INTRODUCTION

Cervical cancer remains one of the most common malignancies affecting women worldwide.[1] In developing countries, it ranks as the second most common cancer and the third leading cause of cancer-related mortality after breast and lung cancer.[2,3] More than 85% of newly diagnosed cervical cancer cases occur in low-and middle-income countries, where it is the most common cancer among women after breast cancer.[4] The disease imposes a substantial human, social, and economic burden, disproportionately affecting women during their most productive years. As emphasized by Dr. Rengaswamy Sankaranarayanan of the International Agency for Research on Cancer (IARC), cervical cancer should not be considered a death sentence, even in resource-limited settings, as effective prevention and early detection strategies are available.

Persistent infection with sexually transmitted human papillomavirus (HPV) is the most critical etiological factor in the development of cervical intraepithelial neoplasia (CIN) and invasive cervical cancer. Globally, the prevalence of HPV-16 and HPV-18 among women with

normal cytology is approximately 4.1%. High-risk HPV genotypes 16 and 18 together account for more than 70% of cervical cancer cases worldwide and nearly 76.7% of cases in India.[5]

In India, cervical cancer is the second leading cause of cancer incidence and cancer-related deaths among gynecological malignancies. It is estimated that approximately 96,922 new cases and 60,078 deaths occur annually.[6] Globally, around 604,000 new cases and 342,000 deaths were reported in 2020.[7]

The median age at diagnosis of cervical cancer is approximately 47 years, with a bimodal age distribution showing peaks at 35-39 and 60-64 years.[8] In India, average age of development ranges between 35 and 45 years. Precancerous lesions typically develop 10-15 years before progression to invasive cancer, with most malignancies originating at the squamocolumnar junction of cervix.[9] This prolonged natural history provides a valuable window of opportunity for screening and early intervention.

Regional disparities in cervical cancer burden and screening coverage are evident across India. According to the ICMR National Centre for Disease Informatics and Research, one in every 126 women in Manipur is at risk of developing cervical cancer. Alarmingly, only 2.1% of women in Manipur undergo cervical screening using Pap smear. Data from the national family health survey (NFHS-4) indicate that screening coverage for cervical and breast cancer is significantly lower in the northeastern states compared to the rest of the country.[10]

The introduction of cervical cytology screening by Dr. George Nicholas Pap in the 1940s marked a major milestone in cervical cancer prevention. The Pap smear enables detection of precancerous and early cancerous lesions, leading to a dramatic decline in cervical cancer incidence and mortality in developed nations.[11,12] However, abnormalities in cervical cytology are identified in up to 5% of pregnancies, with the risk of invasive carcinoma ranging from 1 to 10 per 10,000 pregnancies.[13]

Despite being largely preventable, cervical cancer continues to be the most common cancer among women in India. Approximately 365.71 million women aged over 15 years are at risk.[14] About 6.6% of women in the general population are estimated to harbor cervical HPV infection, predominantly with high-risk genotypes.[15] Limited access to organized screening programs remains a major barrier, and it is estimated that even 25% lifetime screening coverage is unlikely to be achieved in near future without significant improvements in healthcare infrastructure.[16]

Colposcopy has emerged as an important adjunct to cytology, particularly in cases with persistent abnormalities or discordant findings. Evidence suggests that colposcopy plays a crucial role even in the absence of squamous intraepithelial lesions on cytology.[17] During pregnancy, the incidence of invasive cervical cancer is approximately 1.2 per 10,000 pregnancies.[18] Although Pap testing is recommended during the initial prenatal visit, diagnosis is often delayed due to misattribution of symptoms such as bleeding to pregnancy-related causes.[19]

Routine cytological screening remains the cornerstone of cervical cancer prevention. Dysplasia typically peaks about a decade earlier than invasive cancer, reinforcing the need for screening in sexually active women above 21 years of age. The Pap smear has demonstrated sensitivity of 70-80% for high-grade squamous intraepithelial lesions (HSIL) and specificity of 95-98%. In developed countries, organized screening programs have reduced cervical cancer incidence by nearly 80% and mortality by the 60%.[20-21]

HPV is a non-enveloped, double-stranded DNA virus belonging to the Papilloma *Viridae* family. More than 120 HPV types have been identified, of which approximately 40 infect the genital mucosa. These are classified into low-risk and high-risk types based on oncogenic potential. The World Health Organization recognizes 12 high-risk HPV types, including HPV-16 and HPV-18, which are most strongly associated with cervical cancer. Persistent infection with high-risk HPV leads to expression of viral oncoproteins E6 and E7, which disrupt tumor suppressor pathways involving p53 and retinoblastoma protein, resulting in genomic instability and malignant transformation.[22]

Cervical carcinogenesis follows a multistep process beginning with HPV infection, progressing through low-grade and high-grade precursor lesions, and eventually leading to invasive cancer over a period of 10–30 years in a minority of cases. This long latency period underscores the effectiveness of screening and early treatment of precursor lesions in preventing invasive disease.

Pregnancy presents unique opportunity for cervical cancer screening, particularly in populations with poor healthcare access. Studies have shown that prevalence of abnormal Pap smear results in pregnant women is comparable to that in non-pregnant women of similar age. Antenatal visits provide valuable platform to improve screening coverage and create awareness among women who may otherwise not seek preventive healthcare services.

METHODS

This hospital-based cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences (RIMS), Imphal, in collaboration with the Department of Pathology. The study was carried out over a period of 18 months from December 2022 to May 2024. Ethical approval for the study was obtained from the research ethics board, RIMS, Imphal, and written informed consent was obtained from all participants prior to enrolment. Participants were informed about the purpose of the study and were specifically asked for consent regarding disclosure of results in event of an

abnormal Pap smear suggestive of cervical malignancy. Appropriate counselling and management were provided to all participants according to hospital protocol. The study population consisted of pregnant women attending the antenatal outpatient department of department of obstetrics and gynaecology during the study period. Pregnant women who attended the antenatal clinic and provided consent were included in the study. Women with a history of threatened abortion, history of miscarriage, placenta previa in current pregnancy, and those with a previous caesarean section associated with dense adhesions and a pulled-up cervix were excluded from the study. The sample size was calculated using formula $n=4PQ/L^2$, where P represents the prevalence of abnormal cervical cytology (31.2%), Q=100-P, and L denotes the allowable margin of error (5%). Based on this calculation, the required sample size was 343. During the study period, a total of 354 pregnant women fulfilling the inclusion criteria were recruited.

After obtaining informed consent, each participant was placed in the lithotomy position and the cervix was visualized using a Cusco's speculum. Cervical samples were collected from the transformation zone using an Ayre's spatula by rotating it 360 degrees three times. The collected material was evenly spread onto a clean glass slide and immediately fixed in 95% ethanol. The slides were subsequently stained using the Pap staining technique with Harris or Gill hematoxylin, Orange G-6, and EA-50/EA-65 stains, followed by intermediate rinsing in tap water and graded ethanol. The slides were cleared using absolute alcohol and xylene and mounted with a permanent mounting medium. All slides were examined by experienced cytopathologists in the Department of Pathology, and cytological findings were reported according to the Bethesda system. Data were collected using a structured proforma that included demographic characteristics, obstetric and menstrual history, gestational age, presenting complaints, and relevant medical history. General physical examination included assessment of blood pressure, pulse rate, temperature, respiratory rate, body mass index, and signs of anaemia, oedema, jaundice, or dehydration. Obstetric examination included abdominal examination for gestational age, fetal presentation, and fetal heart rate, followed by pelvic examination when indicated. Data were entered and analysed using statistical package for social sciences (SPSS) software version 25.0 (SPSS Inc., Chicago, USA). Continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as frequencies and percentages. Associations between variables were assessed using the chi-square test, and a $p<0.05$ was considered statistically significant.

RESULTS

A total of 354 pregnant women attending the antenatal clinic of the Department of Obstetrics and Gynaecology, RIMS, Imphal were included in the study over a period of 18 months. The majority of participants were aged 21-30 years (72.4%), followed by 31-35 years (13%), while 3.1% belonged to the 36-40-year age group. With regard to obstetric characteristics, most women were multigravida, with gravida two (39.5%) being the most common, followed by gravida one (29.7%) and gravida three (25.7%). In terms of parity, 38.4% of women were nulliparous, while 36.4% had parity one and 21.2% had parity two. Regarding educational status, 42.7% of participants had completed education up to the 12th standard, 31.9% up to the 10th standard, and 25.4% were graduates. The majority of women were Hindu (67.2%), followed by Muslims (29.4%). Most participants belonged to the middle socioeconomic class (38.4%), followed closely by the upper-lower socioeconomic group (37.9%). All participants reported having a single sexual partner, and early marriage (≤20 years) was observed in 41.5% of women. Pap smear examination showed that 76.8% of women had negative findings for intraepithelial lesion or malignancy (NILM). Inflammatory smears were observed in 9.6%, while unsatisfactory smears accounted for 7.9% of cases. Bacterial vaginosis was detected in 5.4% of women. LSIL was identified in one participant (0.3%). A statistically significant association was observed between age and Pap smear findings (p=0.026), with inflammatory smears being most common in the 26-30-year age group. Socioeconomic status was also significantly associated with Pap smear findings (p<0.01), with inflammatory and unsatisfactory smears more frequently observed among women from the middle and upper-lower socioeconomic groups. No significant association was found between Pap smear findings and education level or age at marriage.

Table 1: Sociodemographic and obstetric characteristics of study participants, (n=354).

Variables	Category	N (%)
Age group (in years)	18-20	41 (11.6)
	21-25	128 (36.2)
	26-30	128 (36.2)
	31-35	46 (13.0)
	36-40	11 (3.1)
Gravida	1	105 (29.7)
	2	140 (39.5)
	3	91 (25.7)
	4	12 (3.4)
	5	3 (0.8)
	6	3 (0.8)

Continued.

Variables	Category	N (%)
Parity	0	136 (38.4)
	1	129 (36.4)
	2	75 (21.2)
	3	14 (4.0)
Educational status	Up to 10th standard	113 (31.9)
	Up to 12th standard	151 (42.7)
	Graduate	90 (25.4)
Religion	Hindu	238 (67.2)
	Muslim	104 (29.4)
	Others	12 (3.4)
Socioeconomic status	Lower	5 (1.4)
	Upper lower	134 (37.9)
	Middle	136 (38.4)
	Upper middle	75 (21.2)
	Upper	4 (1.1)

Table 2: Sexual practice among the study subjects.

Sexual practice	N	Percentages (%)
Single	354	100
Multiple	0	0
Total	354	100

Table 3: Age at marriage.

Age at marriage (in years)	N	Percentages (%)
≤20	147	41.5
>20	207	58.5
Total	354	100

Table 4: PAP findings among the study subjects.

PAP	N	Percentages (%)
NILM	272	76.8
Inflammatory smear	34	9.6
Unsatisfactory	28	7.9
Bacterial vaginosis	19	5.4
LSIL	1	0.3
Total	354	100

Table 5: Comparison of PAP findings according to age.

PAP		Age group (in years)					Total
		18-20	**21-25**	**26-30**	**31-35**	**36-40**	
NILM	N	31	104	97	36	4	272
	%	11.4%	38.2%	35.7%	13.2%	1.5%	100.0%
Inflammatory smear	N	2	8	15	6	3	34
	%	5.9%	23.5%	44.1%	17.6%	8.8%	100.0%
Unsatisfactory	N	4	8	8	4	4	28
	%	14.3%	28.6%	28.6%	14.3%	14.3%	100.0%
Bacterial vaginosis	N	4	8	7	0	0	19
	%	21.1%	42.1%	36.8%	0.0%	0.0%	100.0%
LSIL	N	0	0	1	0	0	1
	%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Chi square		28.75					
P value		0.026*					

*statistically significant

Table 6: Comparison of PAP findings according to education.

PAP		Education			Total
		Upto 10th	Upto 12th	Graduate	
NILM	N	86	121	65	272
	%	31.6%	44.5%	23.9%	100.0%
Inflammatory smear	N	8	14	12	34
	%	23.5%	41.2%	35.3%	100.0%
Unsatisfactory	N	12	12	4	28
	%	42.9%	42.9%	14.3%	100.0%
Bacterial vaginosis	N	7	4	8	19
	%	36.8%	21.1%	42.1%	100.0%
LSIL	N	0	0	1	1
	%	0.0%	0.0%	100.0%	100.0%
Chi square		12.19			
P value		0.14			

Table 7: Comparison of PAP findings according to SES.

PAP		SES					Total
		Lower	Upper lower	Middle	Upper middle	Upper	
NILM	N	5	103	101	63	0	272
	%	1.8%	37.9%	37.1%	23.2%	0.0%	100.0%
Inflammatory smear	N	0	11	16	4	3	34
	%	0.0%	32.4%	47.1%	11.8%	8.8%	100.0%
Unsatisfactory	N	0	12	12	4	0	28
	%	0.0%	42.9%	42.9%	14.3%	0.0%	100.0%
Bacterial vaginosis	N	0	8	7	4	0	19
	%	0.0%	42.1%	36.8%	21.1%	0.0%	100.0%
LSIL	N	0	0	0	0	1	1
	%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Chi square		114.5					
P value		<0.01*					

*statistically significant

Table 8: Comparison of PAP findings according to age at marriage.

PAP		Age at marriage (in years)		Total
		≤20	>20	
NILM	N	117	155	272
	%	43.0%	57.0%	100.0%
Inflammatory smear	N	14	20	34
	%	41.2%	58.8%	100.0%
Unsatisfactory	N	8	20	28
	%	28.6%	71.4%	100.0%
Bacterial vaginosis	N	8	11	19
	%	42.1%	57.9%	100.0%
LSIL	N	0	1	1
	%	0.0%	100.0%	100.0%
Chi square		2.89		
P value		0.58		

DISCUSSION

Carcinoma of the cervix is one of the most preventable and readily detectable malignancies when appropriate screening strategies are employed. The Pap smear remains the gold standard screening tool for identifying pre-invasive cervical lesions, which are amenable to early intervention. Although invasive cervical cancer is more common in the peri-menopausal age group, premalignant changes often begin much earlier, frequently in the second and third decades of life. Consequently, cervical cancer screening is recommended from the age of 21 years in all

sexually active women. Pregnant women commonly fall within this age group, and Pap smear testing can be safely performed during pregnancy.[23] In addition to detecting premalignant lesions, it also helps identify asymptomatic genital infections that may adversely affect pregnancy outcomes if left untreated. Hence, the present study was undertaken to evaluate Pap smear changes among antenatal women attending RIMS, Imphal.

In the present study, the majority of women belonged to the 21-30-year age group (72.4%), followed by 31-35 years (13%), which is consistent with findings reported by Agrawal et al, Ngaojaruwong et al, Dinc and Manikkam.[24-26] These observations reflect the reproductive age profile of pregnant women attending antenatal clinics and provide an important opportunity for cervical cancer screening and awareness. However, Himabindu et al reported a relatively younger age distribution, highlighting regional variations in reproductive patterns.[6,27]

With respect to obstetric profile, most women in the present study were multigravida, findings that are comparable to those reported by Agrawal et al and Ngaojaruwong et al although a higher proportion of primigravida was noted in some studies.[24,25] Early initiation of sexual activity is a known risk factor for cervical pathology. In the present study, 41.5% of women were married at or before 20 years of age, findings comparable to studies by Ethirajan et al and Manikkam.[26,28] Studies from Thailand have reported a higher proportion of early sexual activity, which may contribute to the higher incidence of cervical cancer in that population.[29]

Inflammatory changes on Pap smear were observed in 9.6% of women in the present study, which is lower than rates reported by Priya et al and other studies. Persistent cervical inflammation, if untreated, is known to increase the risk of CIN.[30-32] Bacterial vaginosis was identified in 5.4% of women, a finding comparable with studies by Nantaka Ngaojaruwong et al and Agrawal et al.[24,25]

Unsatisfactory smears constituted 7.9% of cases, likely attributable to technical factors such as inadequate sampling or drying artifacts. Comparable rates have been reported in previous studies by Priya et al with lower rates observed where better training and standardized techniques were employed.[30]

Abnormal cytology was rare in the present study, with LSIL detected in only 0.3% of women which was at par with previous study by Mannikkam.[26] This finding is comparable with other Indian and international studies, although the prevalence of abnormal cytology in pregnancy varies widely depending on the population screened. Pregnancy often represents the first healthcare contact for many women in India, offering a crucial opportunity for cervical cancer screening.

In conclusion, Pap smear screening during pregnancy is safe, effective, and comparable to screening in non-pregnant women. In addition to detecting pre-invasive lesions, it facilitates early diagnosis and management of inflammatory and infectious conditions associated with adverse pregnancy outcomes. Therefore, Pap smear testing should be integrated into routine antenatal and postnatal care to enhance early detection, treatment, and long-term cervical cancer prevention.

CONCLUSION

In developing countries where organized cervical cancer screening remains limited, pregnancy offers an important opportunity for opportunistic screening. Antenatal women have regular contact with healthcare services, which can be utilized for early detection of cervical abnormalities. The Pap smear is a simple, safe, and cost-effective test that can be performed during pregnancy without affecting its course. In the present study, most smears were negative for intraepithelial lesion or malignancy, while a proportion of inflammatory smears and infections such as bacterial vaginosis were identified. Early detection and management of these conditions during pregnancy may improve maternal health outcomes. Although premalignant lesions were infrequent, incorporating Pap smear screening into routine antenatal care may strengthen opportunistic cervical cancer screening and contribute to improved reproductive health outcomes.

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REFERENCES

1. Denny L. Cervical cancer: prevention and treatment. Discov Med. 2012;14:125-31.
2. Arbyn M, Weiderpass E, Bruni L, de Sanjosé S, Saraiya M, Ferlay J, et al. Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. Lancet Glob Health. 2020;8:e191-203.
3. Accuracy of visual screening for cervical neoplasia: results from an IARC multicentre study in India and Africa. Int J Cancer. 2004;110:907-13.
4. World Health Organization. The global burden of disease: 2004 update. Geneva: World Health Organization; 2008. Available at: https://apps.who.int/iris/ handle/10665/43942. Accessed on 13 May 2025.
5. PR 223- Latest World Cancer Statistics Global Cancer Burden Rises to 14.1 million New Cases in 2012: Marked Increase in Breast Cancers must be Addressed. IARC. 2013.
6. Ginsburg O, Bray F, Coleman MP. The global burden of women's cancers: a grand challenge in global health. Lancet. 2017;389:847-60.
7. Stelzle D, Tanaka LF, Lee KK, Khalil AI, Baussano I, Shah AS, et al. Estimates of the global burden of cervical cancer associated with HIV. The lancet

global health. 2021;9(2):e161-9.
8. Gilbert TJ, Sugarman JR, Cobb N. Abnormal Papincolaou smears and colposcopy follow-up among American Indian and Alaskawomen in the Pacific North-West. J Am Fam Pract. 1995;8(3):183-8.
9. Kyrgiou M. Premalignant and Malignant Disease of the Cervix. Dewhurst's Textbook of Obstetrics & Gynaecology. 2018;858.
10. ICMR-NCDIR, Report on Monitoring Survey of Cancer Risk Factors and Health System Response in North East Region (NER) of India. 2022.
11. Drew PA, Wilkinson EJ. Conventional cytology. In: Apgar BS, Brotzman GL, Spitzer M, editors. Colposcopy principles and practice, An integrated textbook and Atlas. 2nd ed. Philadelphia PA: Saunders Elsevier. 2008;59-5.
12. Bergström R, Sparén P, Adami HO. Trends in the cancer of the cervix uteri. Br J Cancer. 1999;81:159-66.
13. Morice P, Uzan C, Gouy S, Versharaegen C, HaieMeder C. Gynaecological cancers in pregnancy. Lancet. 2012;379:558-69.
14. Sankaranarayanan R, Ferlay J. Worldwide burden of gynecological cancer: The size of the problem. Best Pract Res Clin Obstet Gynaecol. 2006;20:207-25.
15. Singh N. HPV and Cervical cancer - prospects for prevention through vaccination. Indian J Med Paediatr Oncol. 2005;26:20-3.
16. Senapathy JG, Umadevi P, Kannika PS. The present scenario of cervical cancer control and HPV epidemiology in India: An outline. Asian Pac J Cancer Prev. 2011;12:1107-15.
17. Dasari P. A grossly abnormal cervix: Evidence for using colposcopy in the absence of a squamous intraepithelial lesion by the conventional Papanicolau's test. J Gynecologic Surg. 2011;27(1):5-8.
18. International Agency for Research on Cancer Global Cancer Observatory. Available at: http://gco.iarc.fr/today/data/factsheets/populations/356-india-fact-sheets.pdf. Accessed on 15 August 2025.
19. Centers for Disease Control and Prevention. Global Cancer Statistics. Available at: http://www.cdc.gov/cancer/international/statistics.htm. Accessed on 13 May 2025.
20. Gonçalves CV, Duarte G, Costa JSD da, Marcolin AC, Bianchi MS, Dias D, et. al. Diagnosis and treatment of cervical cancer during pregnancy. Sao Paulo Med J. 2009;127:359-65.
21. Shaw PA. The History of Cervical Screening I: The PAP. Test. J SOJC. 2000;22(2):110-4.
22. WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre). Summary report on HPV and cervical cancer statistics in India. 2007. Available at: https://hpvcentre.net/link_media/HPV Report2007.pdf Accessed on 3 December 2025.
23. Mishra V, Dorairajan G, Neelaiah S, Chinnakali P. Prevalence of abnormal PAP smear during pregnancy in a teaching hospital in South India. Int J Reproduct Contracept Obstet Gynecol. 2015;4(5):1296-9.
24. Agarwal P, Gupta R, Kakkar M, Mishra T, Agrawal D, Dahiya S. Comparison of Liquid-based Cytology and Conventional Papnicolaou Smear as a Screening Tool in High-risk Females. J S Asian Federat Obstetr Gynaecol. 2018;11(3):156-60.
25. Ngaojaruwong N, Vuthiwong C, Punpuckdeckoon P, Thongsorn N. Prevalence of abnormal Papanicolaou smear in pregnant women at Phramongkutklao Hospital. Thai J Obstet Gynaecol. 2008;16:179-85.
26. Manikkam B. Screening for cervical cancer during pregnancy. Int J Community Med Public Health. 2016;3(9):2493-8.
27. Himabindu P, Kanwal A, Vasudha. PAP Smear in Antenatal Women-Routine Screening in Low Resource Settings. IOSR J Dental Med Sci. 2015;14(4):4-5.
28. Ethirajan S, Srinidhi R, Jayashree K. PAP smear in antepartum women: an opportunity to screen and create awareness. Int J Reproduct Contracept Obstet Gynecol. 2018;7:4093-6.
29. Khaengkhor P, Mairaing K, Suwannarurk K, Thaweekul Y, Poomtavorn Y, Pattaraarchachai J, et al. Prevalence of abnormal cervical cytology by liquid-based cytology in the antenatal care clinic, Thammasat University Hospital. J Med Associat Thailand. 2011;94(2):152.
30. Priya SS, Shankar R. PAP smear in pregnancy: a hospital-based study. Int J Reproduct Contracept Obstet Gynecol. 2018;7(12):4924-9.
31. Bhutia K, Puri M, Gami N, Aggarwal K, Trivedi SS. Persistent inflammation on PAP smear: Does it warrant evaluation? Indian J Cancer. 2011;48(2):220-2.
32. Barouti E, Farzaneh F, Sene A. The pathogenic microorganism in papanicolaou vaginal smears and correlation with inflammation. J Family Reproduct Health. 2013;7(1):23-7.

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