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# Colposcopic changes in the cervix during normal pregnancy and puerperium

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**Abstract**
**Background:** Cervical cancer is one of the most important preventable malignancies in women. Incidence of cervical cancer in pregnant women is same as in non-pregnant women. Colposcopy is an important tool to confirm cervical lesion in the setting of abnormal Pap smear. A number of physiological changes occurring in pregnancy make interpretation of colposcopy difficult during pregnancy. Knowledge of normal is essential before interpretation the abnormal.
**Subjects and Methods:** With this aim colposcopy was done in 50 normal pregnant and post-partum women.
**Results:** Mean age was 25 years; there was an equitable distribution among all trimesters and puerperium. Per speculum changes were seen in 72% patients, most common were congestion (34%) and papillary lesions (30%). Colposcopic examination was adequate in 96% cases. Acetowhite lesions were seen in 76%, most were mild intensity (69%). With advancing gestation their size increased. Partial uptake of iodine was seen in 12% patients. Vascular pattern changes were seen in 52% patients, most (80%) were coarse vessels. Overall 66% patients had normal colposcopy, 10% had erosions, 16% had CIN 1 and 8% had CIN 2 lesions. Pap smear correlation was seen in only 60% patients. In first trimester cervix showed congestion, papillary lesions, mildly intense, limited area acetowhite lesions, partial uptake of iodine and coarse punctuate vascular pattern. In second trimester cervix showed maximum congestion, acetowhite areas increased in intensity and area of distribution, and vascular pattern showed fine vessels and coarse punctuate and mosaic vessels. In third trimester cervical changes were similar to second trimester but aceto-white areas further increased in intensity and size, and vascular changes were more marked. In puerperium the congestive changes disappeared, only papillary lesions remained, acetowhite areas decreased in intensity and were all mildly intense; their size also reduced. Vascular changes also reverted back to those present in first trimester.
**Conclusion:** Colposcopy is safe and feasible in pregnancy and puerperium. Colposcopy changes in pregnancy and puerperium are varied and protean but show definite patterns with period of gestation. Abnormal colposcopic findings can be elucidated with ease once different pattern recognition skill as required during pregnancy is acquired. Pap smear shows poor correlation during pregnancy.

**Keywords:** Pregnancy, colposcopy, cervical changes

## Introduction
Pregnancy produces dramatic alterations in the gross and histological appearance of the cervix. The physiologic changes of the cervix during pregnancy are due to high estrogen status and include remodelling of the surface contour, increased vascularity and abundant mucus production. As a result of these physiologic structural changes in the cervix, evaluation of this otherwise easily accessible structure becomes difficult during pregnancy.
As the incidence of cervical pathology is not dissimilar between pregnant and non- pregnant patients, cervical evaluation becomes necessary during pregnancy especially in symptomatic patient. Commonly used methods are Cytologic and colposcopic examinations of the cervix. Cytologic abnormalities may occur in up to 5% of pregnant patients but they are generally low grade and require no treatment. However, colposcopy is mandatory in all these patients for ruling out significant abnormality.
Colposcopy is a safe and reliable procedure for the evaluation of abnormal cervical cytology during pregnancy. The goal of the colposcopic examination in the pregnant patient with abnormal cervical cytology is to exclude the presence of invasive disease, avoiding the need for cervical conization and allowing treatment to be deferred until the postpartum period. Pregnancy itself causes many physiological alterations in the cervix which make colposcopy during

pregnancy difficult, and interpretation of the colposcopic findings challenging. Colposcopic changes of the cervix in pregnancy demand different pattern recognition skills compared with examination of the cervix in the non-pregnant patients.
Familiarity and in depth understanding of normal physiological changes along with their variations is an essential pre-requisite before any interpretation of pathological findings can be done, especially is an area as dynamic and varied as cervix in pregnancy and puerperium. This study was undertaken to define these normal changes in the context of Indian population.

**Subjects and Methods**
The present study was conducted in the department of Obstetrics and Gynaecology. It comprised of 50 pregnant (all three trimesters) and post-partum (puerperal) women attending the Out Patients Department of Obstetrics and Gynaecology. All were informed regarding the study and written consent was obtained. Ethical approval was taken prior to the study. Colposcopy was performed in all these cases looking for normal changes in the cervix during pregnancy. Cases with abnormal colposcopic findings were also sent for Pap smear to detect deviations of the normal determined pattern. Detailed history of the patient pertaining to age, presenting complaints, parity, marital / social history, contraceptive history, family history, socioeconomic status, hygiene and addiction to smoking or drugs was taken. General physical, systemic and antenatal examination was done.

**Colposcopic examination**
Colposcopic Examination was done in pregnant women and women in puerperium. Cases were explained about the procedure in detail including the assurance that the examination will not impair the pregnancy or baby. The informed consent of the case was taken. The case was examined in lithotomy position. With the help of a large vaginal speculum the cervix was examined starting with low power. The cervix is gently cleaned with cotton balls soaked in normal saline to remove excess cellular debris and cervical mucus. The entire cervix was scanned with white light and findings were noted. Then cervix was painted with 3-4% acetic acid and findings noted. Lugol's iodine was then applied over the entire cervix to look for iodine negative areas. Then higher magnification is used to carefully document the abnormal vascular patterns with the help of green filters. Colposcopy was called satisfactory when the entire transformation zone, including the entire squamous-columnar junction was visualized. The borders of all lesions are entirely seen. The cervix was photographed and pictures of the lesions were drawn and labeled. A total of four photographs were taken for each patient: one in low power using white light, second after application of acetic acid in white light, third after the application of Lugol's iodine using white light, and last using green filter. The speculum was gently removed. Patients were instructed to report for foul odour or discharge, pelvic pain or fever. The colposcopic examination was done with utmost gentleness, due to increased tissue fragility in pregnancy.

**Interpretation of Colposcopy**
Colposcopy findings were noted under four categories *viz*: Vascular pattern, Colour Tone and Opacity, Demarcation and Surface Contour. They were further interpreted based on International Colposcopic Terminology (Rome 1990) and colposcopy grading suggested by Algotor *et al*. [1]

**Protocol followed for abnormal colposcopic Findings**
Pap smear was done for all patients with abnormal colposcopic findings. Based on colposcopic and cytological findings treatment was tailored according to patient and treating physician's preferences. In general patients were kept in follow up and repeat evaluation was done 8-12 weeks post-partum along with a cervical biopsy if indicated.

**Results**
The mean age of patients was 24.7 years with the range of 18-35 years. There was an equitable distribution of patients in all three trimesters and postpartum state. There were 82% (41) antenatal patients and 18% (9) post natal patients. The distribution of patients according to the gestational age was 10(20%), 17(34%), 14(28%) and 9(18%) in first, second, third trimester and puerperium respectively. Among antenatal patients 12 were primigravida, 19 were para 1, 11 para 2 and 8 were multipara. Among the post-partum patients, 4 patients were primigravida, 2 were para 1, and 3 were multiparous.

**Colposcopic findings-per speculum findings**
Cervical changes were observed in 72% of patients examined. Most common changes were presence of papillary lesions (30%), congestion (34%), and hypertrophy in 4% cases. Other changes included interiorization of transformation zone and multiple infected Nabothian cysts in one patient each.
The colposcopic examination was adequate i.e. entire transformation zone was seen in 96% patients. In one of the two patients interioization of cervix was present, and in the other patient excessive post-partum discharge prevented adequate colposcopic examination.

**Colour tone and opacity**
**Acetowhite areas – regional distribution**
On application of acetic acid, changes in colour, tone and opacity as seen by the presence of acetowhite areas was noted in 76% patients. The regional distribution of these acetowhite areas seen was 11(29%) anterior lip, 13 (34%) posterior lip and 14(37%) annular.

**Acetowhite areas - intensity**
Most of the acetowhite areas were of mild intensity, 27 patients (69%). Only two patients had intense acetowhite areas, both were in third trimester and their colposcopic interpretation was normal. Moderate intensity was seen in 8 (21%) patients.

**Iodine negative areas**
No frank iodine negative areas were seen in the study population. However partial uptake of iodine was seen in 6 patients (12%). Three of these patients had CIN 2 lesion, two had CIN 1 and one had normal colposcopy.

**Vascular pattern**
Changes in the vascular pattern in the study population were observed in 52% cases. They included presence of fine vessels in 6 patients (23%) and coarse vessels in 20 patients mosaic in 5 (19%) and punctate in 15 (58%). Four patients also showed abnormal vessels in the form of dichotomous branching in two, and stellate pattern in two patients.

**Surface Pattern**
Surface contour was smooth in majority of patient, 25 patients

(50%). Three patients had coarse contour, two due to hypertrophy and one due to multiple infected Nabothian glands. Patients with papillary lesions on per speculum examination had papillary surface contour. (22patients - 44%)

**Clarity of Demarcation**

The demarcation of the lesion from surrounding normal area was diffuse in 35 patients (70%) and sharp in rest. There was no correlation between the clarity of demarcation and colposcopic impression in our study population.

**Impression**

Most patients had normal colposcopic findings, 33 patients (66%). Low grade squamous intraepithelial lesions CIN 1 (8 patients, 16%) and cervical erosions (5 patients, 10%) were present in 26% patients. Only 8% patients showed CIN 2 lesions. No CIN 3, carcinoma in situ or invasive carcinomas were detected in our study.

**Pap smear**

Pap smear was done in patients with abnormal colposcopic findings (17 patients, 34%).It showed inflammatory changes in 7 patients, mild dysplasia (pertaining to CIN 1 in 5 patients, moderate dysplasia pertaining to CIN 2 in 3 patients, and was normal in 2 patients.

**Correlation of PAP smear with colposcopic findings**

Most of the Pap smear findings correlated well with colposcopic findings as shown in [Table 1].

**Table 1:** Showing pap smear findings and their correlation with colposcopic findings.

| Colposcopic Findings (No. of Patients) / Pap Smear Findings | Cervicitis and Erosion | CIN 1 | CIN 2 | Total |
|---|---|---|---|---|
| Normal | 1 | 1 | 0 | 2 |
| Inflammatory / Reactive | 4 | 2 | 1 | 7 |
| CIN 1 | 0 | 4 | 1 | 5 |
| CIN 2 | 0 | 1 | 2 | 3 |
| Total | 5 | 8 | 4 | 17 |

There was no effect of age on colposcopic findings of presence of acetowhite areas, their intensity and distribution, presence of abnormal vascular pattern and presence of abnormal colposcopic impression. However, elder age group was found to be associated with a higher incidence of visible changes (papillary lesions / congestion) on per speculum examination, 100% in those over 30 years to 75% in patients in 21-30 years age to 35% in those younger than 21 years. This result was statistically significant p=0.019. [Figure 2]

This effect was more marked on presence of papillary lesions whose prevalence increased from 35%in patients younger than 21 years to 50% in those between 21 and 30 years to 70% in those above 30 years. This result was also highly significant p=0.008, [Figure 3].

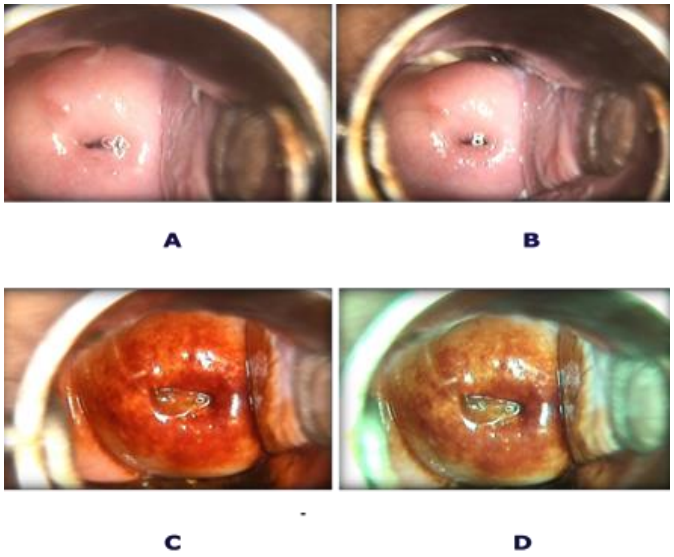


**Fig 1:** Colposcopy technique a First photograph in white light B Second after application of acetic acid C Third after Lugols Iodine D Fourth with green filter.

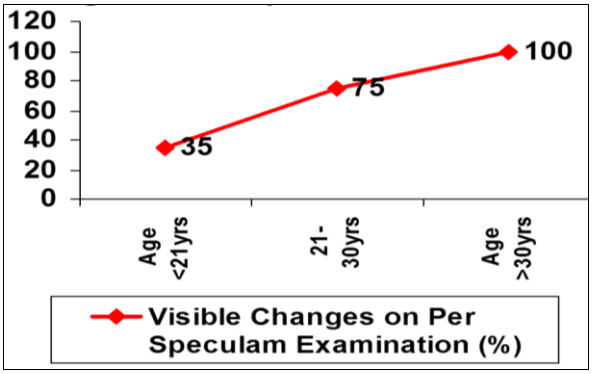


**Fig 2:** Correlation of age with visible change on per speculum examination

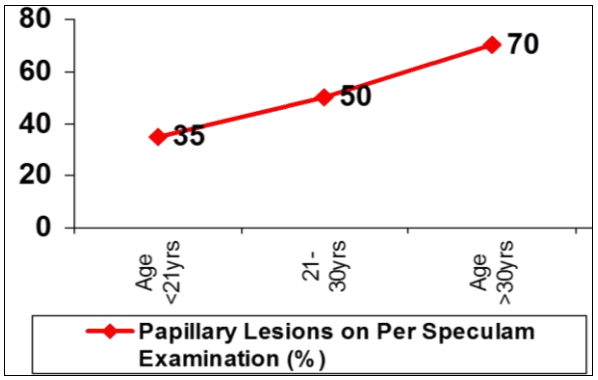


**Fig 3:** Correlation of age with presence of papillary lesions on per speculum examination

**Effect of parity on colposcopic findings**

There was no effect of parity on colposcopic findings of presence of acetowhite areas, their intensity and distribution, presence of iodine negative areas, presence of abnormal surface and vascular pattern and presence of abnormal colposcopic impression.

**Effect of period of gestation on colposcopic findings**

**Per speculum findings**

Congestion of the cervix, although present in all the trimesters, was most marked in second trimester and conspicuously absent in puerperium. Papillary lesions were present in all three trimesters and puerperium with maximum frequency in puerperium.

**Acetowhite areas**

Presence of acetowhite areas showed no correlation with period of gestation. However maximum acetowhite areas were present in puerperal patients.

**Distribution of acetowhite areas**

Distribution of acetowhite areas showed a strong correlation with advancing period of gestation, with more widespread distribution in second and third trimester as compared to first trimester. This result was statistically significant p=0.016.

**Intensity of acetowhite areas**

Intensity of acetowhite areas showed some correlation with period of gestation but the result was not statistically significant. First trimester had all mildly intense lesions while subsequent trimesters had increase in intensity of acetowhite lesions which again decreased in puerperium,

**Iodine negative areas**

The presence of partial uptake of iodine was seen in 30% patients in first trimester and 12% in third, while no patient in second trimester or puerperium had partial uptake of iodine.

**Vascular pattern**

Twenty six patients had changes in vascular pattern. The presence of vascular changes increased with increasing period of gestation.

**Type of vascular change**

Coarse punctuate vessels were predominantly present in first trimester and puerperium while second and third trimesters had all types of vascular changes present, namely fine vessels, coarse punctuate and mosaic vessels.

**Impression**

The overall colposcopic impression was not statistically different according to the period of gestation. However patients in third trimester had a high percentage of abnormal colposcopic impression.

**Discussion**

Carcinoma cervix is a common malignancy in women, which can potentially be treated if detected early. Many screening modalities are available for early detection of carcinoma cervix such as Pap smear, colposcopy, Visual Inspection of cervix (VIA), HPV DNA testing etc. Pap smear is the most widely used modality but it has a significant number of false negative results (10-29% in various studies, Koss, 1989) [8].

Colposcopy has emerged as a valuable tool to confirm or to rule out presence of cervical lesion in patients with abnormal cytology. So much so that ASCCP Consensus Guidelines recommend routine colposcopy instead of repeated Paps since there is a 53% to 76% likelihood of abnormal follow-up cytology results requiring eventual colposcopy

Pregnant women are not immune to cervical cancer as many studies have shown. In fact they have the same incidence of cervical cancer as the non-pregnant women. (Hacker NF, 1982) [7]. Due to various pregnancy related changes in the cervix and vagina, abnormal cytological results are reported in nearly 5% of pregnant women with CIN lesions being present in 2% (Lurain JR, 1979 [10], Yoonessi M, 1982) [15]. In such cases colposcopy is then used for diagnosis. However colposcopy is by itself made difficult due to pregnancy related changes which occasionally mimic pathological changes.

Knowledge of normal and its variations is of paramount importance before a test result can be termed abnormal. While a number of studies are available enumerating the colposcopic changes in the normal pregnancy and puerperium in the Western population, a Medline search did not reveal a single study from the developing countries like India. Hence this study was undertaken to describe the pregnancy related changes in the Indian population, specifically at the medical college level.

**Colposcopic findings**

**Per speculum examination**

Per Speculum findings included normal appearing cervix, congestion, papillary lesions, and hypertrophy and infected Nabothian glands. All these changes have been described by various authors to be present during pregnancy (Coppleson M, 1966) [5].

We however noted that the percentage of congested cervix was highest in second trimester (59%), and it decreased in third trimester (30%) and disappeared in puerperium.

This difference was not statistically significant; however the complete disappearance of congestion in early puerperal period was probably due to increased venous return subsequent to relief of vena cava compression by gravid uterus.

Papillary lesions in cervix were present in all trimesters and in puerperium as described by the multitude of authors. They were the last changes to revert back to normal during puerperium; in fact they were the only change present on per speculum examination during puerperium.

We also noted that abnormal per speculum findings were more common in elder age group (age > 30 years) which may be due to these patients having longer sexually active period predisposing them to cervical infections and having history of multiple interventions e.g. MTP's abortions etc.

Adequacy of colposcopic examination

Many authors (Baldauf JJ, 1995) [3], have reported that colposcopic examination is easier in pregnancy specially after 20 weeks due to exteriorization of the transformation zone on cervix; however some difficulty may be encountered due to thick mucus. We also found this to be the case where exteriorization of transformation zone made examination simple but in two patients in second trimester we found interiorization of the transformation zone of cervix and the resultant examination was unsatisfactory. Both these patients were Gravida 2 and it has been described that cervical eversion is most pronounced in primigravidas (Behnam K, 1982) [4]. Mucus did not pose any difficulty in antenatal period. However excessive discharge in one post natal patient made examination impossible even after repeated swapping. This is likely to be a persistent problem especially in early puerperium.

**Colour tone and opacity**

Immature metaplasia during pregnancy gives rise to presence of acetowhite areas; this is not pathologic as shown by many authors. We found acetowhite areas in 76% of our patients. While the presence of acetowhite areas was similar among all the trimesters and puerperium, their distribution and extent was

different. In the first trimester they were limited to a small area on a single lip of cervix while in later trimesters and puerperium they grew in extent and most of them were annular in late trimesters. This is due to the progressively increasing nature of squamous metaplasia.

The intensity of acetowhite areas depend on degree of cytological changes, while all of first trimester lesions showed mild intensity, nearly 40%of those in second and third trimester showed moderate to severely intense lesions, in puerperium the intensity was again mild in 90% of patients. This may be due to the fact that the metaplasia progressively increases during the pregnancy and then rapidly reverts to normal in puerperium.

**Iodine negative areas**

Although there are no physiological iodine negative areas, partial uptake of iodine can occur due to presence of metaplasia and mucus. This has been reported by Anderson M 1992, and it was present in 12% of our patients.

**Vascular pattern**

Vascular changes are the first changes to occur in any cervical dysplasia but many different vascular changes are also part of normal pregnancy related changes.

Vascular changes were seen in nearly 40% patients in first and second trimester and in 60% patients in third trimester and puerperium.

Fine vessels as a result of increased vascularity were seen in nearly 25% patients especially in latter part of pregnancy, more common were coarse vessels of punctuate and mosaic type distributed in areas of metaplasia in nearly 75% patients as described by Coppelson M, 1966.[5] In our study during first trimester coarse vessels were exclusively punctuate, and this was also the case in puerperium, while in second and third trimester there were both punctuate and mosaic coarse vessels in 2:1 ratio. No clear reason for this distribution is described in the literature. We hypothesize that more extensive squamous metaplasia may give rise to mosaic distribution, while early or resolving metaplasia gives rise to punctuate distribution.

Abnormal vasculature in the form of dichotomous branching vessels and stellate vessels were seen in 2 patients each and they had CIN 1 or 2 lesions. Hence abnormal vessels are associated with dysplastic findings and this has also been shown by Nahhas WA, 1993 [11], and Lundvall L 1989 [9].

**Demarcation**

The demarcation of papillary areas or acetowhite areas was diffuse in most of the cases with normal reporting while it was sharp in cases with cervical dysplasia. This has been shown by Stall E, 1979 who have found clarity of demarcation as an important point in differentiating between physiological and dysplastic changes on colposcopic examination in pregnancy.

**Impression**

Colposcopic examination was normal in 66% patients and abnormal in the rest. Abnormal findings included cervical erosions in five patients (10%), CIN 1 lesions in 8 patients (16%), and CIN 2 lesions in 4 patients (8%). Abnormal colposcopic findings were presence of intensely staining acetowhite areas, abnormal vascular pattern like coarse stellate vessels, presence of partial uptake of iodine, and presence of sharply defined lesion. A combination of all these findings was used to categorize the lesion. The incidence of colposcopic abnormal lesions in the Western literature is around 2-5% (Yoonessi M 1982).[15] With that in perspective the percentage of abnormal colposcopic findings is high in our group, but when we compare figure from the third world countries we find a similar rate. A study by Singh V *et al*. from New Delhi showed abnormal colposcopy findings in 45% of non-pregnant women tested. Similarly in an IARC multicentric study on visual screening in India and Africa, with over 56000 patients found a 17% incidence of abnormal colposcopic findings in non-pregnant women (2004). In view of these findings the high rate of abnormal colposcopy in our study is not surprising. Most of these abnormal colposcopic findings were either inflammatory or low grade (80%). One reason for this high rate may be due to low socioeconomic status of most of the patients with an associated high rate of HPV infection.

**Pap smear**

Pap smear was done retrospectively in all patients with abnormal colposcopic findings for cytological correlation. Our results showed Pap smear correlation in only 60% patients showing the difficulty of cytological examination in pregnancy. Lurain JR, 1979 [10] have shown that nearly 50-75% of abnormal Pap smear during pregnancy eventually turn out to be negative on colposcopy. Because of cytological changes of pregnancy, immature metaplasia and inflammatory infiltrate can all make the interpretation of Pap smear fallacious during pregnancy.

**Conclusion**

In first trimester cervix showed congestion, papillary lesions, mildly intense, limited area acetowhite lesions, partial uptake of iodine and coarse punctuate vascular pattern. In second trimester cervix showed maximum congestion, acetowhite areas increased in intensity and area of distribution, and vascular pattern showed fine vessels and coarse punctuate and mosaic vessels. In third trimester cervical changes were similar to second trimester but aceto-white areas further increased in intensity and size, and vascular changes were more marked. In puerperium the congestive changes disappeared, only papillary lesions remained, acetowhite areas decreased in intensity and were all mildly intense; their size also reduced. Vascular changes also reverted back to those present in first trimester.

Colposcopy is safe and feasible in pregnancy and puerperium. Colposcopy changes in pregnancy and puerperium are varied and protean but show definite patterns with period of gestation. Abnormal colposcopic findings can be elucidated with ease once different pattern recognition skill as required during pregnancy is acquired. Pap smear shows poor correlation during pregnancy.

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