

## Research Article

# Cervical Cancer Screening with Pap Smear and VIA Using a Novel VIA Kit in a Tertiary Care Hospital in South India

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## Abstract

**Introduction:** Cervical cancer contributes to a considerable toll of deaths in the developing countries despite the availability of screening procedures. Screening forms the cornerstone for reducing the burden of cervical cancer. Improvisations in the screening procedures to further lessen the morbidity and mortality associated with cervical cancer play a vital role in reaching the goal.

**Aims and objectives:** To evaluate the combined use of Pap smear and VIA based screening of cervical cancer in a tertiary care hospital using a newly designed VIA kit. And also, to evaluate the efficacy of the VIA kit.

**Methods:** Hundred women attending the gynecology outpatient in a medical college hospital were recruited for the study. Pap smear followed by VIA test was conducted as a screening for cervical cancer. Further cervical biopsy was done if VIA was positive or if indicated by Pap smear. The VIA test was done using a VIA kit which contained all the necessary things including a pre-prepared solution of 5% acetic acid.

**Results:** Majority of the patients in our study were aged between 30-39 yrs of age. Vaginal discharge was the most common presenting complaint. Detecting latent infections and treating them timely is an added benefit of the screening tests. Cervicitis could lead to erosions and unhealthy-looking cervix which bleeds on touch and may not always be premalignant in nature. In our study VIA was highly specific in comparison to Pap smear however sensitivity could not be determined due to small sample size.

**Conclusion:** Combining VIA and Pap tests will reduce the number of visits to the hospital. Stringent criteria for differentiating VIA positive cases will improve the specificity of VIA. The ready to use kit was useful in the outpatient setting as a standardized approach and this will be of help in reducing interpretation issues and automated image analysis in the future.

**Keywords:** Cancer cervix; Screening; VIA kit; Pap smear

## Abbreviations

WHO: World Health Organization; VIA: Visual inspection with Acetic Acid; LSIL: Low-Grade Squamous Intraepithelial Lesion; HSIL: High-Grade Squamous Intraepithelial Lesion; OPD: Outpatient Department; CIN: Cervical Intraepithelial Neoplasm

## Introduction

Cervical cancer is one among the top three cancers affecting women younger than 45 years in 146 of 185 countries assessed by the World Health Organization in 2018 [1]. It estimated a total of 569,847 new cases of cervical cancer globally with approximately 311,365 deaths [1]. About 85% of these deaths occurred in low-and middle-income countries [2]. China and India together contributed to more than a third of the global cervical

cancer burden [1]. The high mortality rate from cervical cancer globally can be reduced through a comprehensive approach that includes primary prevention, effective screening, and treatment programs [2]. Effective screening is a powerful tool to reduce the burden of mortality and morbidity of cervical cancer. Novel improvisations in screening methods are the need of the hour.

The present study aims to look towards one such simple measure of a readily available VIA Kit for screening of cervical cancer. The objective was to get an understanding on conducting cervical cancer screening in outpatient center by gynecologist using naked eye VIA method using a disposable readily available VIA Kit and to evaluate if combined screening with Pap and VIA had any added benefit in a tertiary care center. In addition to this the secondary objective was to obtain feedback on VIA based kit testing in the existing healthcare infrastructure.

## Materials & Methods

This was a cross sectional study involving a total of 100 women who were recruited in the out-patient unit of Gynecology department of Kempegowda Institute of Medical Sciences and Hospital. Institutional Ethical Committee approval was obtained for the study and patient consent was taken [3]. The recruited women were aged between 30-65 yrs of age with no previous history of hysterectomy and presented to the gynecology outpatient unit with various complaints. Brief clinical history was obtained followed by naked eye inspection of cervix and

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vagina. Pap smear sample was collected which was followed by visual inspection with acetic acid using a disposable kit. The VIA Basic Kit developed by Dalrada Health consisted of a bivalve speculum, gloves, saline solution for cleaning the secretions, cotton buds, pre-prepared 5% acetic acid, water proof drape to be placed under the buttocks which are needed to perform VIA test on the cervix. Biopsy was done for all the cases which were either VIA positive or Pap smear showed any epithelial abnormality and as part of case management protocol of the institute.

All cases were examined by an experienced gynecologist. VIA results were documented as positive or negative using stringent WHO criteria [4] Pap smear results were documented as per Bethesda classification.

## Results

A total of 100 women were screened with Pap smear and VIA using the disposable VIA kit. Among the 100 cases, 2 PAP smears were reported as inadequate. Hence comparison of VIA vs Pap is done on 98 cases.

### Clinical characteristics of the subjects

The age wise distribution, the clinical symptoms and signs of the subjects are tabulated as follows in Table 1. Majority of the patients were aged between 30-39 yrs of age and the group between 60-65 yrs of age had the least no of cases.

The finding of cervix bleeding on taking a Pap smear was seen in 44 cases, out of which three women had presented with post-menopausal bleeding. This finding could be attributed to infection or trauma.

### Comparison between Pap and VIA

The comparison between the outcomes of Pap and VIA was done in 98 cases since two Pap smears were inadequate. VIA was negative in 96.9% (95/98) of cases. And Pap smear showed no intraepithelial lesions in 94.8% (93/98) of cases. The comparison between Pap and VIA results is as follows in Table 2.

VIA was 96.8% specific while sensitivity could not be determined in comparison to Pap as we did not have any true positives in our study.

The correlation of VIA positive and VIA negative cases in relation to Pap smear and biopsy reports are shown in Table 3 and 4 as follows.

Table 3 shows correlation of the positive VIA cases with Pap and biopsy report.

The second case in the above table with VIA being positive had LSIL on biopsy, while the Pap smear was not sensitive.

Table 4 shows correlation of negative VIA cases with Pap and biopsy report. Focal koilocytic atypia in the 3rd case was not reflected in the VIA test.

### Associated findings

13/100(13%) cases presented with complaints of white discharge per vaginum which was concurrent with clinical examination findings in 5 cases (5%). And 12 of them had inflammatory Pap smear and one being inadequate. VIA in these cases did not show any acetowhite changes except one. In six of these 12 cases microbial organism was identified and *Trichomonas Vaginalis* was the commonest infection. On clinical examination 30/100 (30%) cases had some nature of

**Table 1:** Characteristics of patients in the study.

	Characteristic	Sample size
Age group	30-39	40
	40-49	39
	50-59	14
	60-65	5
SYMPTOMS		
Discharge per vaginum	Present	13
Post-menopausal bleeding	Present	6
	Absent	94
SIGNS		
Clinical discharge PV	Present	30
	Absent	70
Cervix bleeds on touch	Present	44
	Absent	56

(PV: Per Vaginum)

**Table 2:** Comparison of VIA and Pap.

	Pap Positive	Pap Negative
VIA Positive	0	3
VIA Negative	2	93

(VIA: Visual Inspection with Acetic Acid; PAP: Papanicolaou test)

**Table 3:** VIA positive cases and corresponding Pap and Biopsy result.

Positive	Inflammatory smear	Chronic cervicitis
Positive	Inflammatory smear	Chronic cervicitis with LSIL
Positive	Inflammatory smear	Chronic non-specific cervicitis

(LSIL: Low Grade Squamous Intraepithelial Lesion)

**Table 4:** VIA negative cases where Pap/Biopsy was positive.

VIA	Pap result	Biopsy result
Negative	LSIL	HSIL
Negative	Inflammatory smear: atypical endocervical cells, Not otherwise specified	Chronic cervicitis
Negative	Inadequate smear	Hyper plastic ectocervical epithelium with focal koilocytic atypia

((LSIL: Low Grade Squamous Intraepithelial Lesion; HSIL: High grade Squamous Intraepithelial Lesion)

discharge per vaginum when examined per speculum and only five of them complained of discharge per vaginum. 27/30 showed inflammatory smears. 6 out of these showed *Trichomonas Vaginalis*, Candidial infection or bacterial vaginosis. So, vaginitis could prevail without symptoms or signs of discharge per vaginum.

Post-menopausal bleeding was complained by 6 patients of which 3 had normal VIA and pap smear results. There was one case where VIA was negative however Pap smear showed LSIL and subsequent biopsy showed HSIL. In another case VIA was negative but Pap smear showed some atypical endocervical cells. Biopsy showed chronic cervicitis, but post hysterectomy showed endocervical adenocarcinoma. One case VIA was negative however Pap smear was inadequate, rendering the comparison between Pap and VIA not plausible.

44/100 cases had bleeding on touch specially after collecting the Pap smear sample. However only 3 of these showed acetowhite areas on VIA and all three were negative for intraepithelial lesion on Pap smear and one of these 3 VIA positive cases showed LSIL on biopsy as shown in Table 3. Bleeding from the cervix on taking Pap smear could be due to infection or trauma and may be VIA is more sensitive in these cases than Pap smear.

## Discussion

This study of Pap Smear and VIA was done in OPD setting in a tertiary care hospital, while VIA is usually done in peripheral health centres. All cases were examined by an experienced Gynecologist rather than a trained ANM. In our study we used a ready-to use "kit" instead of preparing 5% acetic acid solution each time and procuring the other items like glove, speculum etc. separately. The VIA kit was very handy in conducting the test quickly and easily. The concentration of the acetic acid solution was fixed thereby reducing the variability of the results observed during the study. This could further lead to use of automated image analysis in the future.

The biggest advantage of visual tests is that it can be implemented through primary health-care workers, it does not require a laboratory infrastructure, and the results are obtained immediately following testing, allowing diagnosis and treatment to be instituted during the same visit. For any cervical screening program to be successful in addition to the use of a reliable and accurate screening test, high rates of coverage and the ability to effectively provide treatment to test positive women are important. The pooled estimates of sensitivity and specificity of visual inspection with acetic acid (VIA) and cytology (Pap smear) were found to be 67.65% and 84.32% and 62.11% and 93.51% respectively [5]. The screen positive rate of VIA was 10.5% in the study conducted by Poli et al [6]. However, the criteria for VIA positive in this study was defined as "if an acetowhite area is seen in the transformation zone" and the study was done by ANMs trained in the process. In the same study [6] prevalence of CIN2+ lesion on biopsy was 1.05% and, in our study, it was 1%. The positive rate of VIA was 7.1% in the study conducted by Basu et al [7]. However, screen positive using VIA in our study was 3%. A sufficiently skilled examiner will categorize 8% to 15% of women examined as aceto-positive and 20% to 30% of the acetowhite lesions identified on VIA by the test provider harbour CIN of any grade [4]. While our study showed a lower percentage of 3% as aceto-positivity, we had 33% of them showing CIN. The specificity of VIA in our study was much more than that other studies [5]. The VIA positivity rate being very small in our study as well as the marginally high rate of CIN positivity could be attributed to the stringent definition for positivity by VIA as it was being interpreted by an experienced Gynecologist.

More than 94% of the time VIA and Pap tests results concurred. In one case Pap smear showed no intraepithelial lesion however VIA was positive and biopsy showed LSIL. This could be due to sampling error for Pap smear and VIA was beneficial in this case. VIA was negative in two cases which were detected to have some abnormality by Pap smear. In another case pap smear showed atypical endocervical cells while VIA was negative, followed by chronic cervicitis on biopsy. Biopsy was DONE on clinical and adenocarcinoma cervix on hysterectomy. Biopsy was on clinical suspicion in this case, although VIA was negative. VIA test is done on the ectocervix and transformation zone and not in the endocervical area. Hence this result can be considered as a limitation of the procedure.

Only two out of six cases cases which complained of post-menopausal bleeding showed abnormality in Pap smear. One was an endocervical adenocarcinoma and one reported as LSIL. The case reported as LSIL on Papsmeared turned out as HSIL on biopsy. VIA is not useful in endometrial lesions and adenocarcinoma of cervix, as seen in other studies too.

Discharge per vaginam was noticed during per speculum examination in about 30% of the cases. Implying asymptomatic vaginitis which was confirmed by inflammatory smear on PAP test. PAP test does not pick up all candidial infections and treatment can be initiated based on the clinical findings. Infections are an important aspect to be addressed in women, as untreated they lead to several complications like pelvic inflammatory disease and infertility. Detecting latent infections is an opportunistic benefit of the cervical cancer screening process.

Also, not all erosive unhealthy-looking cervix which bleeds on touch were found to be VIA/Pap positive and this could be attributed to inflammation.

## Conclusion

- Combining VIA and Pap tests will reduce the number of visits to the hospital, as biopsy can be immediately taken in VIA positive case. Patient can come with biopsy report and Pap smear report at the same time. And hence avoid multiple visits and delay in the treatment.
- Using stringent criteria for differentiating VIA positive cases from negative ones will improve the specificity of VIA.
- VIA is of no use in detecting endocervical lesions unlike Pap smear.
- The ready to use VIA Kit was helpful as we always had the necessary items instead of waiting for availability of 5% acetic acid solution, sterilization etc.
- The concentration of the acetic acid solution was fixed thereby reducing the variability of the results which will help in automated imaging analysis in the future.

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