



COMPARISON OF PAP SMEAR AND VISUAL INSPECTION WITH ACETIC ACID UNDER MOBILE MAGNIFICATION (VIAM) IN THE DETECTION OF PREMALIGNANT LESIONS OF CERVIX: A VALIDATION STUDY

Obstetrics & Gynaecology

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ABSTRACT

Invasive cervical cancer is a preventable disease because it has a long pre-invasive state, and the implementation of a screening programme can reduce the incidence and mortality rates. VIAM is a simple, cost-effective screening test which can be used as an alternative for PAP smear specially in the low resource setting. This study aimed to validate the diagnostic accuracy of VIAM (using mobile camera app) with PAP smear for screening and to evaluate the clinical performance of VIAM as a simple test. This was a prospective clinical study done in 130 women attending the Gynecology OPD. Study done in Women aged 25 or older, who seek consultation in Gynecologic OPD with several complaints. The study concluded that the Sensitivity of VIAM showed comparable results with PAP smear, hence VIAM can be used as a good alternative to PAP smear in mass screening of large population.

KEYWORDS

Ca Cervix, PAP smear, VIAM

INTRODUCTION

Cervical cancer is an important women's health problem. Human papillomavirus persistence is considered to be the primary cause of cervical cancer [1]. The disease progression from dysplasia to invasive cancer is usually slow, providing the opportunity to detect and treat pre-cancerous changes early. Primary prevention with HPV vaccination and secondary prevention with screening and treatment of precancerous lesions will prevent most of the cervical cancers and it is one of the most successfully treatable form of cancer, if detected early and managed effectively. In low-resource situations, visual inspection with acetic acid (VIA), which uses acetic acid during visual examination of the cervix, has been proposed as an alternative to PAP smears. HPV DNA testing is a new screening technique but it is expensive.

Visual inspection with acetic acid (VIA) which causes the precancerous cell to appear white temporarily which helps in its detection. VIAM's advantages include its inexpensive cost, ease of use, real-time results of screening, and accuracy comparable to PAP smears. By combining VIA with mobile magnification - VIAM or mobile telemedicine, we can aim to achieve better accessibility and low-cost screening. This study aimed to validate the diagnostic accuracy of VIAM (using mobile camera app) with PAP for cervical cancer screening and to evaluate the clinical performance of VIAM as a simple test in a tertiary care centre, so that this can be used as an effective screening tool in low resource setting.

MATERIALS AND METHOD

Study Design: Prospective clinical study of 130 women attending the Gynecology OPD

Sample Population: Women aged 25 or older, who seek consultation in Gynecology OPD as a part of routine health plan screening or with several complaints

Exclusion criteria: Patient who refused to participate, Severe lower genital infections,

Table 1. Descriptive analysis of cytology results (pap smear) in the study population

CYTOLOGY	Freq.	Percent
NORMAL PAP	107	82.3
ABNORMAL PAP	23	17.7
Total	130	100.00

Bleeding PV, Surgery on cervix

Sample size: 130

Study Period: One year

Our study was approved by the Institutional Ethics Committee.

DATA COLLECTION METHOD

After written informed consent Cervix will be inspected and findings recorded. Cervical photos will be taken with mobile phone camera. The device that will be used is a new nokia 7 plus phone with 12 megapixel camera using the mobile app magnifying glass + flashlight (4x magnification) used exclusively for the study. A plain photographic image of cervix is taken first. 3% acetic acid is applied on the cervix, which is also a standard of care and photographic image is captured roughly at 1 minute and 2 minutes intervals. Interpretations of the VIAM will be compared with cytology. All patients with abnormal cytology or VIAM will be referred for colposcopy and biopsy if required. The Pap reports will be compared with VIAM. The findings of colposcopy and mobile phone photography will be compared.

RESULT

PAPSMEAR RESULTS ESTIMATION:

Out of the 130 PAP smears, 23 (17.7%) had abnormal PAP smear report. 8 out of 23 was reported as LSIL and 12 as HSIL, and 2 showed ASCUS group and 1 AGC. Out of the rest 107, 36 showed inflammatory smear, 5 showed cervicitis, 4 showed candida albicans, 3 showed clue cells suggesting Bacterial vaginosis. Rest 59 Pap smear reported normal

VISUAL INSPECTION WITH ACETIC ACID UNDER MAGNIFICATION RESULTS:

In all 130 women PAP test was followed by VIAM. VIAM test was considered positive if sharp, distinct, dense, well defined acetowhite areas with or without raised margins including leukoplakia was found post application of 3% acetic acid. On VIAM, 22 women were found to have positive results (16.9%) whereas PAP found 23 accounting for 17.7%. Although the remaining 108 women tested negative for VIAM, 20 women had erosion of the cervix, 1 had leukoplakia, 5 participants had inflamed cervix, 10 participants had hypertrophy of the cervix. 5 participants had multiple Nabothian cysts.

Table 2. Descriptive analysis of VIAM in the study population

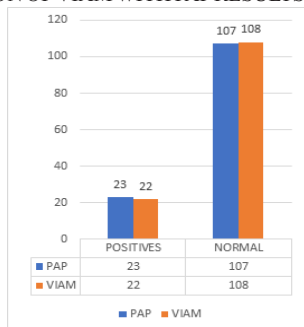
VIAM	Frequency	Percent
Normal	108	83.1%
Abnormal	22	16.9%
Total	130	100.00

Table 3. Comparing VIAM and PAP with the gold standard Colposcopy guided biopsy.

STATISTIC	VIAM	PAP
SENSITIVITY	90.00%	85.00%
SPECIFICITY	73.33%	60.00%
Positive likelihood ratio	3.37	2.12
Negative likelihood ratio	0.14	0.25
Positive predictive value	81.82%	73.91%
Negative predictive value	84.62%	75.00%
Accuracy	82.86%	74.29%

GRAPH 1. Graph showing the number of PAP and VIAM positives

COMPARISON OF VIAM WITH PAP RESULTS:



Thus, in our study we found VIAM had comparable results with Pap. In the present study, a comparison was done between Pap smear and VIAM. The sensitivity of VIAM was found to be 90% (versus Pap smear, which had 85%) while the specificity of VIAM was 73.33% (versus Pap smear, which had a specificity of 60%). Thus, VIAM showed slightly higher sensitivity and specificity compared to Pap smear.

DISCUSSION

This study was designed to evaluate the clinical performance of visual inspection with acetic acid with magnification (VIAM) as a simple test and if it is a suitable alternative to PAP smear for early detection of cervical cancer. 130 women were included in this study in a tertiary referral centre. As a protocol all women attending the departments of Obstetrics and Gynecology and Gynecologic Oncology opportunistic screening with cytology or downstaging with direct speculum examination depending on the financial situation. HPV testing is also offered if affordable.

Out of the 130 women enrolled, maximum number of women were in the age group 36 to 46 years (30%) followed by 36 to 40 years (18%). As per our inclusion criteria, all sexually active women above 21 years were included in our study.

20 out of 130 women had abnormal cytology (including LSIL, HSIL, ASCUS) 45% of the SIL were found in the age group between 36 years to 41 years and 25% in the age group between 41 years to 45 years. Maximum prevalence of SIL was found between the ages 36 to 45 years (65 %). There were no positive cases in the age group 46 to 55 years. Ngelangel(4) conducted four different screening exams: visual inspection with acetic acid, magnified visualization with acetic acid (VIAM), spatula + cotton swab PAP smear and cervical brush PAP smear. Ngelangel concluded that the acetic acid visualization and VIAM methods are recommended for initial cervical cancer screening in the Philippines

In our study all patients were subjected to Pap test and VIAM. Positive findings in VIAM or any abnormality in pap smear report or with abnormal looking cervix was subjected to colposcopy and guided biopsy. Out of 130 patients studied, 22 women were positive for VIAM and 23 women had abnormal PAP test. The distribution of abnormal PAP smear ranges from 3% -8% in various studies. Our high prevalence might be attributed to the fact that we included patients being referred to the department of Gynecologic Oncology.

The reason for increased prevalence of SIL mainly is due to incidental selection bias. As majority of women were screened from gynec-oncology opd who were referred cases from other cancer institutes. Out of the 23 PAP positives, 8 was LSIL and 12 was HSIL. Our ASCUS rate was only 2, AGC was reported in 1.

In the present study the sensitivity of VIAM was 90%, better than the PAP-smear which showed 85% sensitivity, the specificity of the VIAM (73.3%) was also better than PAP-smear (60%). The higher sensitivity of VIAM could be due to the tests being supervised by the senior faculty in oncology setup.

In the literature, Pap-smear sensitivity and specificity values show a wide distribution. Pap-smear sensitivity ranged from 11-99%, and specificity ranged from 14-97%.(5).

In our study we consider PAP smear and VIAM as screening tests.

Colposcopy and guided biopsy are taken as confirmatory gold standard diagnostic tests. So, when doing statistical analysis, instead of comparing PAP and VIAM directly, we compared them separately with the gold standard.

Out of 20 cases, VIAM was able to identify 18 and had only 2 false negatives, thus pushing the sensitivity to 90%. PAP on the other hand identified 17 cases but had 3 false negatives, pushing the sensitivity to 85%. PAP and VIAM also had quite a few false positives at 6 and 4 giving a specificity of 60% and 73.3% respectively.

Statistical analysis was done and significant analytics are tabulated below.

Table 4. STATISTIC RESULTS.

STATISTIC	VIAM	PAP
SENSITIVITY	90.00%	85.00%
SPECIFICITY	73.33%	60.00%
Positive likelihood ratio	3.37	2.12
Negative likelihood ratio	0.14	0.25
Positive predictive value	81.82%	73.91%
Negative predictive value	84.62%	75.00%
Accuracy	82.86%	74.29%

From the analysis VIAM was marginally ahead of PAP in all the parameters comparing screening tests. This might have happened because most of the VIAM testing was done by trained medical post graduates. But the results we got clearly show VIAM has got comparable results with PAP test in identifying the premalignant lesions of cervix and can be efficiently used as screening test.

In our study the false positives of VIAM and PAP smear are relatively low hence sensitivity of both is quite high when compared to other studies done in India. This is because the study was done in a tertiary centre and most of the VIAM testing was done by trained medical post graduates and was reconfirmed by Gynae-oncology consultants and Pap smear was done by expert pathologist with expert training. Though we may not be able to replicate same findings in a low resource setting, our study was able to show that VIAM is definitely a valid screening test when compared to PAP. In a low resource setting, VIAM may even outshine PAP smear as it does not require so much expertise in smear collection, slide preparation or analysis. VIAM has got another advantage in that, the image obtained by VIAM can further be analysed by an expert sitting elsewhere in the country through telemedicine. These images can also be kept as a document for future reference. The increasing availability of mobile phones, also makes VIAM easy to use or implement in programs. Thus, VIAM has definitely got an edge over Pap smear in low resource setting, with comparable efficacy.

In 2010 Pakhee Aggarwal et al (6) did a study comparing of Pap smear with visual detection tests in screening for cervical cancer and to identify the optimal strategy for low resource settings concluded that alternative methods of screening such as VIA/VIAM can be a valuable alternative to the Papanicolaou test for cervical cancer screening in low resource settings.

Adding a visual test to cytology or HPV testing in parallel combination resulted in a substantial increase in sensitivity, with a moderate decrease in specificity. The parallel combination of VILI and HPV testing resulted in a sensitivity of 92.0% and a specificity of 79.9%. As a single test, cytology had the best balance of sensitivity and specificity. The study concluded that visual tests are promising in low-resource settings, such as India. The use of both VIA and VILI may be considered where good quality cytology or HPV testing are not feasible. The sensitivity of cytology and HPV testing increased significantly when combined with VIA or VILI.

CONCLUSION

Cancer Screening is the main weapon for early detection of cervical cancer at a premalignant stage. The Sensitivity of VIAM showed comparable results with PAP smear, hence VIAM can be used as a good alternative to PAP smear in mass screening of large population.

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