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Cervical cancer screening by simple visual inspection after acetic acid

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***Abstract*---**Background: Naked-eye visual inspection of the cervix with acetic-acid wash (VIA), or cervicoscopy, is an alternative to cytology in screening for cervical cancer in poorly resourced locations. Aims: This study were to determine whether visualization of cervix after acetic acid can identify early cancer, and to detect lesions in symptom free women. Results: In present study mean age of cancer cervix is 35-39 yrs. Low socio-economic status, early age of marriage, early age at first child birth, high parity was associated with cervical cancer. Patients who had erosions, leukoplakia or unhealthy cervix should take as high-risk group and subject to screening procedures. 26.8% patients with healthy cervix had positive acetowhite areas and were proven for cervical cancer by biopsy. Most common symptom with which the patients presented were white discharge per vagina, menorrhagia. These symptoms correlated with the associated cervical cancer in 90% of cases. All patients with positive biopsy showed acetowhite areas. Conclusion: All the patients with acetic acid positive areas should be subjected to colposcopy and biopsy before treating them directly to avoid false positive cases, since biopsy is the gold standard.

***Keywords*---**acetic acid, colposcopy, biopsy, cervical cancer.

Introduction

Although cervical cancer is the leading cause of cancer associated death in women in most of the developing world, successful cervical cancer screening programmes have been difficult to implement at low resource settings because of many factors. Foremost is the expense of maintaining the infrastructure and technical expertise required for cytological screening. Hence as an alternative low-

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cost rapid screening technology such as direct visual inspection of cervix with application of 3 to 5% acetic acid was included for its known potential at low cost[1]. Cytology based screening programmes for cervical cancer cannot be provided on a large scale in developing countries because they are based on transportation, communication, follow-up and training[2]. Visual inspection with acetic acid (VIA) is a simple, inexpensive test with moderate sensitivity and specificity for screening that can be combined with simple treatment procedures for early cervical lesions. Health workers or nurses can be trained as test providers; the results are available immediately. VIA is feasible in many low-resource areas where it is difficult to sustain high-quality cytology programs.[3]

An expert group also recommended to the Government of India the use of VIA as the primary screening test to be performed by trained nurses or health workers in primary healthcare. Scaling up and inclusion of VIA-based programs into national programs is already taking place in many low- and middle-income countries.[4,5] The evaluation of its impact on the service delivery will largely determine the success of the program when introduced into routine healthcare. We report our experience of VIA testing in the early detection of cervical cancer and pre-cancers in a rural south Indian population where there are no organized cervical screening programs.

Materials and Methods

The cases for the present study Nine hundred patients who attended OPD's of the above hospital were studied. Patients were selected randomly. They belonged to age group of 25-45 years. They belonged to a variety of parity, socio-economic status and mixed complaints. History was taken regarding name, complaints, age at marriage, menstrual history, contraception habits and family history.

Inclusion criteria: Women aged between 25 and 45 years, not pregnant and with no history of previous cervical cancer
Exclusion criteria: Growth in cervix, unmarried and postmenopausal women

Eligible women aged between 25-45 years were invited for cervical screening conducted either in the fixed cancer screening. Women who were not pregnant, with intact uterus, and no previous history of CIN or cancer who were willing to undergo screening were asked to participate. A basic proforma with identification numbers and general information is collected for each woman. After explaining the need for, and the procedure, after taking verbal consent, patient put in dorsal position and cervix visualized. Three percent acetic acid is applied to the cervix, after waiting for one minute, cervix is inspected using a 100 Bulb. Patient with doubtful lesions will be followed by colposcopy and colposcopy guided biopsy. Colposcopy was carried out with a binocular portable field colposcope using 10 X magnification on all screen positive women in the same visit itself after applying 4% acetic acid and Lugol's iodine and followed by guided cervical punch biopsies. These specimen were transported to the Pathology department for histopathological confirmation as normal, squamous metaplasia, chronic cervicitis or probable low-grade (LSIL)/high-grade squamous intraepithelial (HSIL) lesion, invasive cancers, or inconclusive for lesions. These results were obtained within 3-4 weeks.

Results

Table – 1: Age wise distribution

Age group (yrs)	No .of cases (VIA+)	Carcinoma cervix	Percentage
25-29	12	3	25.0
30-34	12	3	25.0
35-39	24	18	75.0
40-45	28	12	42.9
Total	76	27	35.5
Socio-Economic Status	No. of cases (VIA+)	Carcinoma cervix	Percentage
High	6	-	-
Middle	24	7	25.9
Low	46	20	74.1
Total	76	27	100
Parity	No. of cases (VIA+)	Carcinoma cervix	Percentage
P1	1	1	100
P2	32	7	21.9
P3	30	10	33.3
P4	11	7	63.6
P5	2	2	100
Total	76	27	35.5

From the above table we can note that the age group varied from 24-45 years. This study encompasses reproductive and perimenopausal women. Most patients who had carcinoma cervix were between 35-39 years of age (75%). Mean age for carcinoma cervix was 36.9 years. Table shows that socio-economic status was divided into high, middle and low class and most cases of carcinoma cervix (74.1%) belonged to low socio-economic status. Multiparity and early age at first child birth can be taken as high risk for carcinoma cervix.

Table – 2: Carcinoma cervix in relation to age at marriage

Age at marriage (Yrs)	No. of cases (VIA+)	Carcinoma cervix	Percentage
14-16	8	7	87.5
17-19	18	5	27.8
20-22	50	15	30.0

According to the table the average age at marriage was 18.7±2.5 years. This can be compared with the study done by P. Lunt and MPH where, the average age at marriage was 18 years. Earliest age of marriage in the study was 14 - 16 years showed by 8 patients of which 7 patients (87.5%) had carcinoma cervix.

Table-3: Symptoms and carcinoma cervix

Symptoms	No. of cases (VIA+)	Carcinoma cervix	Percentage
WDPV	30	19	63.3
Pain abdomen	25	5	20.0
Backache	6	1	16.7
Menorrhagia	2	2	100
None	13	-	-

WDPV : White discharge per vagina

Most common symptom was white discharge per vagina which accounted for a overall of 63.3%. Menorrhagia was also an associated symptom of carcinoma cervix. Most complaints overlapped although white discharge per vagina predominated.

Table – 4: Per-speculum and carcinoma cervix

Lesions	No. of cases (VIA+)	Carcinoma cervix	Percentage
Erosion	17	15	88.2
Hypertrophied	12	-	-
Red inflamed	5	-	-
Leukoplakia	1	1	100
Healthy	41	11	26.8

Although the cervix looked healthy in 41 cases, erosion was seen in 17 cases (88.2%) who had cancer cervix and 1 patient with leukoplakia corresponded (100%) to carcinoma cervix. We can consider patients with erosion, leukoplakia as high risk group and subject to screening procedures. Of 41 patients who had normal healthy cervix, 11 (26.8%) had acetowhite positive areas and confirmed by biopsy. Red inflamed cervix was not associated with carcinoma because it could be due to local inflammation otherwise. Hypertrophied cervix correlated with chronic cervicitis.

Table -5: Colposcopy findings in 76 VIA +ve cases

Colposcopy	No. of cases	Percentage
Atypical vasculature	4	5.3
Fine punctation	17	22.4
Erosion	1	1.3
Increased vascularity	22	28.9
Mosaicism with atypical vasculature	19	25.0
Leukoplakia1	1	1.3
Normal	12	15.8
Total	76	100

Of the 76 patients who were positive by visual inspection with acetic acid, when subjected to colposcopy, the above lesions were seen. Atypical vasculature with or without mosaicism was shown by 19 (25%) and 4 (5.3%) patients respectively, 17

(22.5%) fine punctation, 1 (100%) patient showed leukoplakia. 1 (1.3%) patient had erosion.

Table – 6: Biopsy findings in 75 VIA +ve cases

Biopsy	No. of cases	Percentage
Normal	15	19.7
Chronic cervicitis	30	39.5
Chronic cervicitis with squamous metaplasia	5	6.6
Polypoidal Endo-cervicitis	4	5.3
Atypical squamous metaplasia	6	7.9
Squamous metaplasia	2	2.6
Mild dysplasia1	1	1.3
CIN II	1	1.3
Hyperplastic squamous metaplasia with koilocytosis	1	1.3
Keratinizing squamous epithelium	1	1.3
Invasive cancer	10	13.2
Total	76	100

All the patients with positive VIA when subjected to colposcopy guided biopsy the reports were as follows - Atypical squamous metaplasia was seen in 6 (7.9%) patients, chronic cervicitis was seen in 30 (39.5%), 10 (13.2%) patients had invasive cancer, 1 (1.3%) patient mild dysplasia, 1 (1.3%) CIN II, 2 (2.6%) had squamous metaplasia, 1 (1.3%) had keratinising squamous epithelium and 15 (19.7%) had normal biopsy reports. Most of the dense white lesions showed positive biopsy for carcinoma cervix and were as pale white lesions showed more benign lesions.

Table –7: colposcopy in carcinoma cervix

Colposcopy	No.	Biopsy	No.
Atypical vasculature	4	Atypical squamous metaplasia	4 (100%)
	17	Atypical squamous metaplasia	2(11.8)
		Chronic cervicitis	11(66.7)
		Chronic cervicitis with sq. metaplasia	3 (17.6)
		Hyperplastic sq.epithelium with koilocytosis	1(5.9)
Erosion	1	Chronic cervicitis	1
	22	Chronic cervicitis	15(68.2)
		Keratinised sq. epithelium	1 (4.5)
		Polypoidal Endo-cervicitis	3 (13.6)
		Normal	3 (13.6)
Mosaicism with	19	Infiltrative Squamous cell	10(52.6)

atypical vasculature		carcinoma	
		Mild dysplasia	1(5.2)
		Squamous metaplsaia	4 (21.1)
		Chronic cervicitis	4 (21.1)
Leukoplakia	1	CIN II	1 (100)
Normal	12	Normal	12 (100)
Total	76	Total	76

When compared between colposcopy and biopsy, 4 (100%) patients showing atypical vasculature had atypical squamous metaplasia. Of 19 patients with mosaicism with atypical vasculature, 10 (52.6%) had infiltrative squamous cell carcinoma, 1 (5.2%) had mild dysplasia, 4(21.1%) had squamous metaplasia. 1 patient Leukoplasia with showed CIN II (100%) on biopsy. Of 17 patients who showed fine punctation on colposcopy, 2 (11.8%) had atypical squamous metaplasia, 3 (17.6%) chronic cervicitis with squamous metaplasia, 1 (5.9%) hyperplastic squamous epithelium with koilocytosis. 12 patients who had normal colposcopy findings had normal biopsy reports.

Table-8 : Diagnostic utility of VIA and colposcopy with biopsy for carcinoma cervix in low resource settings

	VIA + VS Biopsy	Colposcopy Vs Biopsy
Sensitivity	89%	96%
Specificity	77%	78%
PPV	69%	63%
NPV	92%	97%
Efficiency	81%	84%

Overall sensitivity of VIA was 89% and specificity was 77%. Sensitivity of colposcopy was 96%, specificity was 78%. Positive predictive value of VIA was 69% whereas colposcopy was 63%.

Discussion

The study was done on patients attending Gynaecological outpatient. The study is compared with other authors who had done similar studies and results evaluated. In present study nine hundred cases were subjected to VIA Patients with acetowhite areas where subjected to colposcopy and guided biopsy. Benard VB et al,[6] quoted an average age of 20-60 years for carcinoma cervix which is correlating with present study. In the present study mean age of cervical cancer was 36.9±6.4 years which correlated with study. Low socio-economic status is associated with a greater number of patients with cervical cancer. Benard VB et al,[6] stated as majority of the cervical abnormalities 85% detected in women <40 years age indicating that VIA is effective in pre-menopausal age. In our study most patients who had carcinoma cervix were between 35-39 years of age.

Table-8:VIA screening study findings

First author (year)	Country	No. of women	Sensitivity	Specificity	Level or provider
Sankaranarayanan et al[7]	India	1351	96%	65%	Nurse
Sankaranarayanan, et al [8]	India	2935	90%	92%	Cytotechnician
Megevand, et al 9	S.Africa	2426	66%	98%	Nurse
Present study	India	900	89%	77%	Gynaecologist

Study done by Rangaswamy shankaranaryanan et al,[7] 3000 women were examined by both VIA and cytology. Those positive for one or both of the screening tests were subjected for colposcopy and directed biopsy. In their study VIA positive in 298 (9.8%) women and cytology was positive in 307(10.2%) women. Approximate specificities were 92.2°. for VIA and 91.3% for cytology. The positive predictive value was 17% for VIA and 17.2% for cytology. In the present study VIA positivity was assessed based on the type of lesions, on which they were divided into dense white and pale white lesions. There were 35 dense white lesions and 41 pale white lesions. Of 35 dense white lesions 24 (69%) showed positive biopsy reports for cervical cancer and of 41 pale white lesions only 3(7%) were positive for cervical cancer. Sensitivity of dense white lesions after VIA with acetic acid was 89% and specificity was 72%. Positive predictive value was 69% which can be correlated with the above study. Those with acetic add negative areas were not taken into consideration in both the studies. But all the true positive cases had positive acetic add test. Hence in the both studies approximate specificity and sensitivity were calculated. In both studies VIA had high sensitivity and comparatively low specificity. Hence it can be used as a alternative to conventional PAP test in screening at of resource settings.

In study done by Megevand,et al, [9] 2400 patients were subjected to VIA, positive cases were compared with colposcopy and biopsy. 46% of acetowhite areas were proved histologically. Positive predictive value of VIA was 72%. In the present study 27 (35.5%) of all acetowhite area lesions were histologically proven with positive predictive value of 69%. ln study done by Lind Van Le, et al, [10] eighty-five women were referred for colposcopy because of abnormal acetowhite areas on the cervix. Thirteen patients (15%) had cervical intraepithelial neoplasia, 22 (26%) had koilocytosis and 16 (19%) had benign histologic findings. In total, 51 patients had suspicious lesions at colposcopy for which biopsies were performed, and 34 (40%) had normal colposcopy examinations. In the present study of 76 patients who were acetic acid positive 27 (35.5%) had histologically positive results.

Conclusion

During the past decade, much has been written about the challenges involved in detecting cervical cancer in low-resource settings and the strategies that are likely to be most effective in these settings. Many aspects of VIA make it an appealing approach for use in low-resource settings. In most cases, costs associated with launching and sustaining VIA screening are lower than those associated with other methods. VIA is a relatively simple, easy-to-learn approach that is only somewhat reliant upon infrastructure for its adequate performance, assuming

that sufficiently trained providers are available. The approach does not require laboratory involvement and non-physicians can perform the procedure, provided that they receive adequate and ongoing training. As a result, VIA generally has the potential for greater population coverage than other available screening approaches. The results of the procedure are available immediately, making it possible to provide further management, including an offer of immediate treatment of some suspected precancerous lesions during the same visit.

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