

Comparative Study of Pap Smear Verses Visual Inspection with Acetic Acid in Screening for Cervical Cancer

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Abstract

Background: Carcinoma of cervix is 2nd most common cancer globally . India accounts for 4th global burden . Pap smear is screening method in developed countries .VIA can be an alternative screening method to pap smear in developing countries as it is low cost, simple administration, real time screening of results .

Aim of Study : To compare pap smear and VIA in screening for cervical cancer.

Objectives of the Study:

1. To find out the specificity , sensitivity, PPV , NPV of pap smear for detecting carcinoma of cervix
2. To find out the specificity sensitivity PPV, NPV of VIA detecting carcinoma of cervix.
3. To compare the cost effectiveness of performing pap smear and VIA

Methodology : Informed oral consent taken .Cervix is to be visualized using a cuscus speculum .Ectocervix and endocervix samples taken and fixed with cytofix and sent for pathologist .TZ is visualized and 3% acetic acid is applied for 1-2 min . If aceto white areas seen it is positive test . colposcopic guides biopsy done for women with any one test positive .Correlation of the above two tests is done by HPE .

Results: The sensitivity, specificity, PPV, NPV of pap smear 70.83% , 55.56% ,45.95% , and 78.13% .

The sensitivity,specificity, PPV, NPV of VIA 87.50% , 31.11% , 40.38% , 82.35% .VIA is more cost effective than Pap smear test .

Conclusion : Cervical cancer has a long precancerous stage . VIA is more sensitive compared to pap smear. It is simple, safe , cost effective test requires less training. VIA can be used as an alternative screening test.

Keywords : Pap smear , VIA. Cancer cervix, screening

Introduction

Carcinoma of cervix is 2nd most common cancer globally ¹. India alone accounts for one fourth of the

global cervical cancer burden. ¹Lack of resources screening programme and poorly organized health systems for detecting precancerous condition are the reasons for increased incidence in India .²

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Ca cervix can be prevented through primary prevention and early detection and treatment can be done for precancerous lesions before it progresses to invasive cancer .²

The advantages of pap smear is its safe , simple, non invasive and effective method for detection of precancerous ,cancerous, and non cancerous changes in cervix and vagina².

Visual inspection with acetic acid has been advocated as an alternative screening method to PAP smear in developing countries ².

The advantages of VIA include low cost, simple administration, real time screening and donot need lab facilities hence it is more beneficial to developing countries ² ..

Many developing countries do not have ample resources to implement cytology based prevention programs .³

Pap smear screening has markedly reduced mortality from cervical cancer ⁴

Every year around 1.23 lakh women are diagnosed with cervical cancer and 67,500 of women die of the disease in india .⁵

Aim of study : To compare pap smear and visual inspection of acetic acid in screening for cervical cancer.

Objectives of the study:

1. To find out the specificity , sensitivity, PPV , NPV of pap smear for detecting carcinoma of cervix
2. To find out the specificity sensitivity PPV, NPV of Visual inspection with acetic acid for detecting carcinoma of cervix.
3. To compare the cost effectiveness of performing pap smear and visual inspection with acetic acid.

Methodology

Study Population : The study will be conducted on all married women of general population attending pap smear screening camp at various rural areas of Tumkur district.

Study Design: Camp based Population based cross sectional study

Sampling Method : General population

DURATION: 18 MONTHS .

Sample size: 1000

Inclusion Criteria:

- AGE GROUP: All married women with or without risk factors like
- Early marriage
- Early pregnancy
- Multiparity
- Sexual activity at early age .
- Multiple sexual partners.

Exclusion Criteria

- Unmarried women
- Women below 18yrs
- Patient having bleeding PV or active infection during examination
- Women with frank invasive cervical carcinoma
- Post hysterectomy status.
- Women who do not give consent.
- Pregnant women .
- Seriously ill patients.

A cross sectional study will be carried out of general population of various rural areas of Tumkur District .

Patient to be screened will be explained about the procedure to be performed oral informed consent is to be taken a relevant obstetric and gynecological history is to be taken with the patient being reassured that the procedure is painless and effective in screening of carcinoma .

Firstly the cervix is to be visualized using a cuscus speculum or using anterior vaginal wall retractor and Sims vaginal speculum . A pap smear will be taken with Ayer spatula and cytobrush . Pap smear is taken from two samples from ecto and endo cervix . Ectocervix samples is to be taken using the ayers spatula and Endo cervix samples is to be taken using Cyto brush. The pap

smear slide is to be immediately fixed with a mixture of 50% ethyl alcohol and 50% ether (cytofix).

After taking Pap smear cervix is to be washed with normal saline. The slides are to be stained using papanicolaou stain and reporting is to be done according to Bethesda classification.

The VIA is to be performed using a cotton swab soaked in 3% acetic acid for 1 to 2 min and then the cervix is to be carefully inspected for any aceto white lesions, particularly in the transformation zone. The test outcome is considered positive if any distinct acetowhite lesions areas is to be detected on the cervix. If no acetowhite lesions is detected or if the whitish appearance is to be doubtful or faint the test was scored negative.

Colposcopic guided biopsy was offered for women who had positive VIA test or positive pap smear test and the sample was procured for Histopathological examination.

Cervical cytology and VIA results were correlated with histopathological finding which were taken as gold standard. CIN 1 or higher grade lesions diagnosed by histopathology were taken as true positive cases.

Statistical Analysis

Data was entered in excel and analysis was carried out using SPSS (Version 20). Descriptive statistics was performed for socio demographic variables. Categorical variables were expressed as frequencies and percentage. Quantitative variables were tested for normality using Kolmogorov Smirnov test. Present age, age at the time of marriage were expressed in Median and Inter Quartile Range. Setting Histopathological results as gold standard, Sensitivity, Specificity, Positive predictive value, Negative Predictive Value and Accuracy of Pap Smear and VIA were computed and compared. Kappa statistic was also calculated.

Results

Age distribution of study subjects :

In our study 358 women (35.8%) were in the age group between 31 – 40 years.

Median of age at marriage and duration of married life of study subjects :

Mean age of the population in the present the study was 40 years.

Mean age at marriage of the population in our study was 20 years.

Mean of married life of women in our study was 20 years.

Occupations of women in the study :

In the present study 371 women 37.1 % of women were laborer by occupation, 344(34.4%) women were house wife.

Cytology results of women in the study :

In our study 925 women (92.5%) were negative for intraepithelial lesion or malignancy. 42 women (4.2%) of women had low grade squamous intra epithelia lesion on cytology.

21 (2.1%) women had high grade squamous intraepithelial lesion. 11 (1.1%) women showed ASCUS. 1 (0.1%) Women has SCC on pap smear.

Distribution of neoplastic lesions based on cytology :

In our study 63 (6.3%) had premalignant and malignant changes on pap smear. Out of which 41 (66.13%) had Low grade squamous intraepithelial lesion, 21 (33.87%) women had high grade squamous intraepithelial lesion, 1 (1.59%) had squamous cell carcinoma on pap smear.

Comparison of Cytological diagnosis with Histopathological Diagnosis :

In our study 4 out of 9 cases of CIN1 were correctly diagnosed as LSIL on cytology. Pap smear missed 3 HSIL. One case was diagnosed as squamous cell carcinoma on both cytology and histology.

Diagnostic accuracy of cytology in neoplastic lesions :

In our present study, the diagnostic accuracy of cytology for low grade squamous intra epithelial lesion was 44.4%. It was 78.6% for high grade lesions and 100 % for squamous cell carcinoma.

VIA pattern in study subjects :

In our present study VIA was positive in 161 (16.1%) women .

Final Diagnosis of Histopathology :

Final diagnosis by histopathology was taken as gold standard . Only 69 women were willing for biopsy for Histopathological examination . Out of this 69 women 25 (36%) women were negative for intra epithelial; lesion 20 (29%) women had chronic cervicitis , 9 (13%) had CIN 1 , 7 (10%) women had CIN11 , 1 women had squamous cell carcinoma .

Comparison of Pap smear with biopsy examination in the diagnosis of cervical neoplasm:

In our study 24 out of 69 were true positive for presence of pre malignant and malignant lesions. Pap smear picked 17 out of 24 cases , 7 cases were missed on pap smear .

Sensitivity analysis of Pap smear :

In our study the sensitivity of pap smear in detecting pre cancerous and cancerous lesion was 70.83%. Specificity was 55.56% , Positive predictive value is 45.95% , negative predictive value 78.13% . The overall diagnostic accuracy was 60.87% .

Comparison of VIA with biopsy examination in the diagnosis of cervical neoplasm :

In our study , VIA was positive in 21 out of 24 true positive cases , 3 cases were missed on VIA.

Sensitivity analysis of VIA :

In our study Visual inspection with acetic acid was more sensitive test than pap smear , where as pap smear was more specific test compared to visual inspection with acetic acid .

Cost Effective Analysis of Pap Smear vs VIA:

In our present study the cost per pap smear test was 300 rupees , the cost per VIA test was 30 rupees.

37 women underwent pap smear and colposcopic guided biopsy for HPE total cost was 41,400 rupees .

52 women underwent VIA and colposcopic guided biopsy for HPE total cost was 22,770 rupees .

Discussion

Comparison of age distribution with other studies :

In our study 35 .85 % of women were in the age group of 31 – 40yrs , Our study was similar to the study done by Niyodusenga A et al ⁶ 32.3% of women were in age group 41- 50 yrs . By a study done by Zahan .N et al ⁷ 25 .7 % women were in the age group of 26-30 years .

Comparison of age of marriage in years with other studies:

In present study age of marriage was < 20 yrs in 57.1 % of women . Our study was similar to the study done by Nath JD et al ²⁰ age of marriage was < 18 yrs in 82.3% . A study done by Rashid MH et al ¹⁶ 45 % of women were married at the age < 15 years .

Comparison of Duration of marriage / Married life in years with other studies

In the present study duration of marriage / married life was in the range between 11- 20 yrs . Our study was similar to study done by Nakash .A et al⁸ . A study done by Nath .J.D et al ²⁰ , 50 % of women in the study were married for > 20 yrs .

Comparison of Occupation of women with other studies : 37.1% of women in our study were labourer by occupation , 34.4 % of women were house wife .

A study done by Rashid MH et al¹⁶ 91.5% of women were home makers and 4.5% of women were govt employee .In a study done by Nakash A et al ⁸ 80.10 % of women were house wife and 10.90% of women were teacher by occupation

Table 1: Comparison of Cytology/ Pap smear results with other studies :

Cytology	Percent
Sinha .S 9 et al 2020	
NILM	91.5%
HSIL	3.5%
LSIL	5 %
Squamous cell carcinoma	0 %
Sinha P et al 12 2018	
NILM	89.66%
HSIL	0.6%
LSIL	3.6%
Squamous cell carcinoma	1.6%
Abiodun A et al 13 2017	
NILM	95.9%
HSIL	1.25%
LSIL	2.8%
Squamous cell carcinoma	00
Nakash .A et al 8 2017	
NILM	56.40%
HSIL	5.2%
LSIL	13.4%
Squamous cell carcinoma	1.20%
Verma A et al 14 2017	
NILM	92%
HSIL	2.5%
LSIL	5.5%
Squamous cell carcinoma	00
PRESENT STUDY	
NILM	92.5%
HSIL	2.1%
LSIL	4.2%
Squamous cell carcinoma	0.1%

Our study was similar to study done by Sinha .S et al , Our study results were also similar to the study done by Abiodun A et al and Verma A et al .

In our present study the ratio of premalignant to malignant lesion was 62:1 .

Our study is similar to study Sokkary H.H i.e 49:1 .

Comparison of Different Cytologic Categories with Other Studies :

Table : 2 Comparison of Distribution of Neoplastic Lesions with Other studies :

STUDY	LSIL	HSIL	CARCINOMA	TOTAL
Niyodusenga . A et. al 6 2020	20 (25.3%)	6 (7.5%)	53 (67%)	79
Sinha. P et al 12 2018	11(61.1%)	2(11.1%)	5(27.7%)	18
El Sokkary HH 10 2017	36 (72 %)	13 (26%)	1 (2%)	50
Nakash .A et al 8 2017	21 (67.7%)	8 (25.8%)	2 (6.4%)	31
Present study	42 (66.13%)	21 (33.87 %)	1(1.59 %)	64

Our study was similar to the study done by Nakash .A et al .

Table 3: Comparison of Diagnostic accuracy of cytology for cervical cancer with other studies :

Study	Diagnosis based on HPE	Diagnosis based on cytology	Percentage
K.pushpalath et al 11 2017	4	4	100 %
El Sokkary HH 10. 2017	1	1	100%
Nakash .A et al 8 2017	2	2	100%
Mohamed KA15 et al 2016	13	16	81.25%
Present study	01	01	100 %

The diagnostic accuracy of our study was 100 % , all other studies have similar results except Mohamed KA et al where the diagnostic accuracy is 81.25% , this can be attributed to sampling errors .

Comparison of Diagnostic accuracy of cytology for HSIL with other studies: The diagnostic accuracy of cytology for HSIL in our study is 78.6% . Our study results were similar to study done by Mohammed KA (73.86%) .

Comparison of Diagnostic accuracy of cytology for LSIL with other studies :

In the present study the diagnostic accuracy of cytology for LSIL IS 44.4% .

Our study results were similar to the study done by M Mrudula D.M. with the diagnostic accuracy of cytology for LSIL is 52.3% .

Table 4 :Comparison of Proportion of Women Screened Positive with VIA and Pap smear with Other studies :

STUDY	VIA POSITIVE	PAP SMEAR POSITIVE
Niyodusenga .A et al 6 2020	94 (47.47%)	79(39.89%)
Vahedpoor Z et al 17 2019	92(21%)	22 (50.5%)
Mrudula .DM et al 182018	156 (31.2%)	110 (27.7%)
Sinha P et al 12 2018	38 (12.6%).	31 (10.3%)
K.Pushpalath et al 11 2017	29(5.34%)	417 (76.8%)
Mohamed KA et al 15 2016	200 (6%)	164 (5%)
Present study	161 (16.1 %)	64 (6.4%)

In our study the proportion of women screened positive with VIA was 161 (16.1%) and for pap smear was 64 (6.4%) .Our study results were similar to the study done by Sinha p et al .

.Table 5 : Comparison of Diagnostic value of VIA and Pap Smear with Other Studies :

STUDY	SCREENING TEST	SENSITIVITY	SPECIFICITY	PPV	NPV
Sinha .S 9et al 2020	VIA Pap Smear	88.23% 88%	78.68% 52.63%	53.57% 47.05%	96% 90.9%
Niyodusenga .A et al 6 2020	VIA Pap Smear	88.5% 80.45%	84.68% 91.89%	81.91 % 88.6%	90.38% 85.71%
Sinha P 12 et al 2018	VIA Pap smear	93.3% 93.8%	60% 72.9%	36.8% 48.4%	97.3% 97.7%
EI Sokkary HH et al 10 2017	VIA Pap Smear	66.7% 83.3%	91% 90.7%	46.1% 50.8%	95.9% 97.9%
Present study	VIA Pap Smear	87.50% 70.83%	31.11% 55.56%	40.38% 45.95%	82.35% 78.13%

A study done by Niyodusenga et al showed similar results as our study .

Table 6 : Comparing the cost effective analysis with other studies :

	PRESENT STUDY (N= 1000 women)	Lince-Deroche N19 et al 2015 (N = 1202 women)
Cost per pap smear test	300 Rupees	US \$ 130 .63
Cost per VIA Test	30 Rupees	US \$17.05
Cost of true positive cases with pap smear and Colposcopic guided biopsy	10, 200 Rupees	US\$ 38, 915
Cost of true positive cases with VIA and Colposcopic guided biopsy	6930 Rupees	US \$ 4383

Our study was similar to the study done by Lince-Deroche N et al , which concluded that VIA was more cost effective than pap smear .

Conclusion

Cervical cancer is second most commonest cancer among women in India .

Cervical cancer has a precancerous stage and takes long time to progress from precancer stage to cancer stage .

Pap smear has been successfully used as a screening test to prevent cancer cervix in developed countries . Such screening has been less successful in developing countries because of complexities involved with the procedure .

In this study we found that VIA is more sensitive compared to pap smear. It has advantage of being simple , safe , cost effective test .VIA requires less training even health workers can do it . Any screening test which has high sensitivity is good screening test . Hence we recommend the use of VIA as an alternative screening test for diagnosing precancerous lesions of cervix .

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