Several recent studies tested various diagnostic tools for screening cancer screening options. Both Pap smear and VIA techniques are viable and effective, and cervical cytology testing seems to have a lower false positive rate than VIA, with specificity estimates that are higher than Pap smear cytology. Although Pap smear and VIA have been studied extensively in low-resource environments, and nurses, licensed physicians, and unlicensed community health workers performed them outside the clinical setting, they take minutes to complete and are often difficult to provide in low-resource areas. VIA techniques do not require laboratory facilities, can be performed immediately to diagnose and treat abnormal cervical lesions with cryotherapy or specialty referral for larger, more advanced lesions. VIA also allows for immediate diagnosis and treatment of precancerous lesions with ablative or excisional procedures. VIA may be useful as an adjunct to improve the sensitivity of cervical cytology.

However, the necessity of more research is clear to evaluate the performance of these new tools in different screening settings and with different cancer incidence. The aim of the present study was to evaluate the accuracy of the Pap smear and VIA to compare these screening tests for detection of cervical neoplasia.

**INTRODUCTION**

Cervical cancer was the second most common cancer among women 15-44 years of age and in 2012, it was the fourth most frequent cancer and cause of cancer death among all women in the world. The World Health Organization (WHO) has predicted that the percentage of new cervical cancer cases and deaths will increase by 40% and 46% from 2008 to 2025 in the developing world. Primary prevention with safe and effective HPV vaccines is readily available, however, vaccine campaigns can be costly and complicated related to distribution requirements, like refrigeration and a three dose series. Secondary prevention through screening with Pap smear cytology with or without Human Papillomavirus (HPV) testing and treatment of precancerous lesions with ablative or excisional procedures can also be difficult to provide in low-resource areas.

Pap smear cytology alone has worked to reduce cervical cancer incidence and mortality rates with serial testing. However, cervical cytology and HPV testing is costly and resource intensive, requiring laboratory facilities, trained staff, and patient follow-up capabilities that may be difficult to implement in low-resource areas.

Cervical cancer “see and treat” programs, endorsed by the WHO, Pan American Health Organization (PAHO), and Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO), offer a low cost and low resource alternative to Pap smear cytology and HPV testing. “See and treat” cervical cancer screening utilizes naked eye visual inspection of the cervix after the application of acetic acid (AA) or Lugol's iodine and, in the case of VIA, visualization can be assisted by a low-level, handheld magnification device followed by immediate diagnosis and treatment of abnormal cervical lesions with cryotherapy or specialty referral for larger, more advanced lesions. VIA techniques do not require laboratory facilities, can be performed outside the clinical setting, take minutes to complete, and are often performed by non-medical staff. Prior studies of VIA have used licensed nurses, licensed physicians, and unlicensed community health workers (CHWs).

VIA have been studied extensively in low-resource environments, and their sensitivities and specificities found to be comparable to Pap smear cytology. VIA have shown higher sensitivity and lower specificity estimates than Pap smear cytology. Although Pap smear cytology testing seems to have a lower false positive rate than VIA, both Pap smear and VIA techniques are viable and effective cervical cancer screening options.

Several recent studies tested various diagnostic tools for screening. However, the necessity of more research is clear to evaluate the performance of these new tools in different screening settings and with different cancer incidence. The aim of the present study was to evaluate the accuracy of the Pap smear and VIA to compare these screening tests for detection of cervical neoplasia.

**MATERIAL AND METHOD**

A prospective study was conducted in the department of obstetrics and gynecology S.P. Medical College Bikaner on 500 gynecological cases. The PAP was evaluated by the Bethesda system and VIA was performed. All positive cases of VIA and Pap smear were scheduled for biopsy and histological evaluation. Statistical analysis was done.

**Results:** The sensitivity of VIA was higher (63.16%) than that of Pap smear (52.63%). The specificity of VIA was lower (97.62%) as compared to Pap smear (99.13%). The positive predictive value of Pap smear was 83.33% and that of VIA was 68.57%. The negative predictive value of Pap smear was 96.22% and that of VIA was 96.99%. The diagnostic accuracy of VIA was 95.0% which was comparable to that of Pap smear (95.6%). VIA may be considered as an alternative to Pap smear in resource poor settings. However, in areas where cytology-based screening is available, VIA may be useful as an adjunct to improve the sensitivity of cervical cytology.

**Conclusion:** VIA may be considered as an alternative to Pap smear in resource poor settings. However, in areas where cytology-based screening is available, VIA may be useful as an adjunct to improve the sensitivity of cervical cytology.

**KEYWORDS:** Cervical intraepithelial neoplasia, Human Papillomavirus, Pap smear, Visual Inspection with Acetic Acid.
regular menstrual cycle followed by 8.8% had irregular menstrual cycle and 6.6% had achieved menopause. The women present with following complaints i.e. 42.2% cases had complaint of discharge, 39% cases had pelvic pain, 8.2% had UTI, 6.4% had inter-menstrual bleeding, and 4.2% had post-coital bleeding (Fig 1).

Fig: 1 Distribution of patients according to chief complaints.
On Per speculum findings we found that 64.8% cases had unhealthy cervix on per speculum finding, 35.2% had healthy cervix on per speculum findings (Fig 2).

DISCUSSION

Invasive cancer cervix is considered now as a preventable disease, PAP smear test is proved to be an effective screening method for early pre invasive change that precede invasive cancer especially when applied in an systematic organized regular set and has a wide coverage. Cost and effectiveness of various preventive strategies are therefore of great concern for health policy makers, other screening tools include human Papilloma virus (HPV) testing alone or with annual PAP smear and VIA test. HPV testing is not cost effective especially in developing countries. Many studies have been done to compare PAP to VIA smears for cervical cancer screening. Most of them were looking at sensitivities and specificities for both tests. The present study was conducted to evaluate and compare the role of cytology and acetic acid test as cervical cancer screening tools.

The disease were more prevalent from age group 21-50 years. In concordance with this Dessari et al found that 305 cases (61%) were 21 to 40 years of age and 160 cases (32%) were 4-60 years of age; the mean age was 40.54 years. Most of the cases were observed in females within active reproductive age group. Khodakarami et al. found that the mean age of participating women was 36.0 years (SD, 7.9) and most of them (47%) were in the age category of 31–40 years.

Here, the most common complaint was discharge (42.2%), pelvic pain (39%). Saha R and Thapa M reported vaginal discharge as the most common presenting complaint in their study. Divya Hegde et al. also reported white discharge per vagina as the most common presenting complaint in cases of precancerous and malignant lesions.

In present study 31.2% had parity of 1-2, 64.4% had parity of 3-4. In concordance with this Nakash et al found that 48% had parity of >4 followed by 31.4% a had parity of 3-4, 6.4% had parity of 1-2. Hinkula et al found that Multiparity seems thus to be an independent risk factor of cervicitis also in a country with effective national programmes for an early detection and treatment of CINs. Young age at first birth also plays a significant role in the aetiology of cervicitis and CIN.

In our study majority 64.8% cases had unhealthy cervix on per speculum finding which includes erosion, ulceration, congested cervix, cervical growth and cervical polyp, 35.2% had healthy cervix on per speculum finding. In consistent with this study by Malathi et al found On per speculum examination (naked eye appearance) of these 200 women; 119 (59.5%) cervices were found to be unhealthy (either having discharge, erosion, congestion, hypertrophy or polyp) while 81 (40.5%) cervices were healthy.

Majority of cases (93%) were VIA negative and 35 cases (7%) were VIA positive. 20 (4%) cases had LSIL and 4 (0.8%) cases had HSIL type lesion in pap smear test which shows that there were total 24 cases were pap smear test positive. And, on VIA, 35 cases (7%) were VIA positive and rest 93% cases were VIA negative. Finally, we found that 71.8% cases were normal histopathology, 20.6% cases had chronic cervicitis, 2.2% had CIN-3, 4% had CIN-2 and 1.4% had CIN-2 on biopsy findings.

On comparing Pap smear and VIA with biopsy examination in diagnosis of cervical neoplasm we found that 38 out of 500 cases were positive for the presence of pre-malignant and malignant lesions in biopsy. Pap smear picked up 20 out of these 38 subjects. 18 subjects were missed on Pap smear and 4 cases were false positive and VIA picked up 24 out of these 38 subjects. 14 subjects were missed on VIA and 11 cases were false positive.

Thus, the sensitivity of VIA was higher (63.16%) than that of Pap smear (52.63%). The specificity of VIA was lower (97.62%) as compared to Pap smear (99.13%). The positive predictive value of Pap smear was 88.33% and that of VIA was 68.57%. The negative predictive value of Pap smear was 96.22% and that of VIA was 99.99. The diagnostic accuracy of VIA was 95.0% which was comparable to that of Pap smear (95.6%) (Table 1).

Table: 1 Comparison of sensitivity, specificity, positive predictive value, negative predictive value and accuracy of VIA and Pap smear

| Parameter              | PAP Smear | VIA      |
|------------------------|-----------|----------|
| Sensitivity            | 52.63%    | 63.16%   |
| Specificity            | 99.13%    | 97.62%   |
| Positive Predictive Value | 88.33%    | 68.57%   |
| Negative Predictive Value | 96.22%    | 99.99%   |
| Diagnostic Accuracy    | 95.00%    | 95.00%   |

In our study 38 out of 500 cases were positive for the presence of pre-malignant and malignant lesions in biopsy. Pap smear picked up 20 out of these 38 cases. 18 cases were missed on Pap smear. 4 case were false positive in this study. Thus, sensitivity of pap smear was 52.63%. specificity was 99.12%, positive predictive value was 83.3%, negative predictive value was 96.22% and diagnostic accuracy was 95.60%. The sensitivity and specificity for cytology in the Nakash et al study were 46% and 88% respectively, by Cohn et al. and Gaffikin et al. found that 1279 (45%), 122 (16.26%) and 191 (16.1%) cases were VIA positive and 217 (7.6%), 39 (5.2%) and 226 (19%) cases were pap smear test positive. The variation in the results of VIA positivity may also be attributed to the difference in the categories of the staff who screen the cases. Another factor that could affect the VIA test results is the lack of uniformity in the criteria used for VIA positivity in different studies.

On histopathology we found that 71.8% cases were normal, 20.6% cases had chronic cervicitis on biopsy findings. In concordance with this study conducted by Vadehra et al. Incidence of CIN/cancer cervix in the study population was found to be 5.6%.

In our study 38 out of 500 cases were positive for the presence of pre-malignant and malignant lesions in biopsy. Pap smear picked up 20 out of these 38 cases. 18 cases were missed on Pap smear. 4 case were false positive in this study. Thus, sensitivity of pap smear was 52.63%. specificity was 99.12%, positive predictive value was 83.3%, negative predictive value was 96.22% and diagnostic accuracy was 95.60%. The sensitivity and specificity for cytology in the Nakash et al study were 46% and 88% respectively, by Cohn et al. and Gaffikin et al. found that 44.3% and 90.6% respectively.

Similarly, VIA picked up 24 out of these 38 cases. 14 cases were missed on VIA. 11 cases were false positive in this study. Thus sensitivity of VIA was 63.16%, specificity was 97.62%, positive predictive value was 68.57%, negative predictive value was 96.99% and diagnostic accuracy was 95.00%. The sensitivity reported by

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Nakash et al.14 study was 84.6% which significantly higher than that for pap smear (46%) is a finding similar to that reported by Ghaemmaghami et al.20 where the sensitivity of VIA and pap smear was 74.3% and 37.1% respectively, and also by Cohn et al.,21 were the sensitivity of VIA was 76.7% which is higher than sensitivity of pap smear 4403%. Also by Rana et al.,22 were the sensitivity for VIA was 93% which was significantly higher than that for pap smear (83%).

The overall comparison is that in present study, the sensitivity of VIA was higher (63.16%) than that of Pap smear (52.63%). The specificity of VIA was lower (97.62%) as compared to Pap smear (99.13%). The positive predictive value of Pap smear was 83.33% and that of VIA was 68.57%. The negative predictive value of Pap smear was 96.22% and that of VIA was 96.99%. The diagnostic accuracy of VIA was 95.0% which was comparable to that of Pap smear (95.6%). In concordance with the results in the present study is comparable to the study by Vadehra K et al. (100) in which sensitivity of VIA and Pap smear was 96.4% and 71.4% respectively. The specificity of VIA was 37.5% and that of cytology was 56.3%. The positive predictive value for VIA and Pap smear was 73% and 71.4% respectively. The negative predictive value for VIA and Pap smear was 85.7% and 52.9% respectively.

CONCLUSION

The sensitivity of acetic acid test is higher than that of cervical cytology. The high sensitivity of VIA is offset by its low specificity and false positive rates as compared to Pap smear. The low specificity of VIA would lead to over-treatment of non-neoplastic lesions if ‘see and treat’ policy is used. Considering the low cost and immediate availability of results, VIA may be considered as an alternative to Pap smear in resource poor settings. However, in areas where cytology based screening is available, VIA may be useful as an adjunct to improve the sensitivity of cervical cytology.

REFERENCES

1. Bruni, I., Barrionuevo-Rosas, L., Albero, G., Aldea, M., Serrano, B., Valencia, S., Castellsagué, J. (2016). ICO Information Centre on HPV and Cancer (HPV Information Centre). Human papillomavirus and related diseases in the world, summary report 2016. Retrieved from http://www.hpicentre.net/statistics/reports/WHO.pdf.
2. WHO Information Centre on HPV and Cervical Cancer. (2010). Human Papillomavirus and Related Cancers in World Summary Report 2010. Geneva, Switzerland: World Health Organization. Retrieved from http://screening.iarc.fr/doc/Human%20Papillomavirus%20and%20Related%20Cancers.pdf.
3. McNeil, E. D. G. (2013, May 9). Cancer vaccines get a price cut in poor nations. The New York Times. Retrieved from http://www.nytimes.com/2013/05/10/health/prices-cut-for-hypervaccine-cancer-vaccines-for-neediest.html?
4. Divya Hegde, S., McCrory, D. C., Myers, E. R., Bastian, L. A., Hasselblad, V., Hickey, J. D., & Matchar, D. B. (2000). Accuracy of the Papacolou test in screening for and follow-up of cervical cytologic abnormalities: A systematic review. Annals of Internal Medicine, 132, 810-819.
5. Nanda, K., McCrory, D. C., Myers, E. R., Bastian, L. A., Hasselblad, V., Hickey, J. D., & Matchar, D. B. (2000). Accuracy of the Papacolou test in screening for and follow-up of cervical cytologic abnormalities: A systematic review. Annals of Internal Medicine, 132, 810-819.
6. Nanda, K., McCrory, D. C., Myers, E. R., Bastian, L. A., Hasselblad, V., Hickey, J. D., & Matchar, D. B. (2000). Accuracy of the Papacolou test in screening for and follow-up of cervical cytologic abnormalities: A systematic review. Annals of Internal Medicine, 132, 810-819.
7. Sankaranarayanan, R. (2003). A practical manual on visual screening for cervical cancer. Indian Journal of Medical Research, 117, 137-146.
8. Ngoma, T., Muwonge, R., Mwaiselage, J., Kawegere, J., Bukori, P., & Sankaranarayanan, R. (2010). Evaluation of cervical visual inspection screening in Dar es Salaam, Tanzania. International Journal of Gynaecology and Obstetrics, 109(2), 100-104.
9. Belinson, J., Qiao, Y. L., Pretorius, R., Zhang, W. H., Elson, P., Li, L., . . . Zahniser, D. (2001). Comparative study of cervical smear and visual inspection with acetic acid for cervical neoplasia in women from rural Shanxi province, China. Journal of Medical Imaging and Radiation Sciences, 34(3), 127-132.
10. Matchar, D. B. (2000). Accuracy of the Papacolou test in screening for and follow-up of cervical cytologic abnormalities: A systematic review. Annals of Internal Medicine, 132, 810-819.
11. Cohn E, Herzog J. New innovations in cervical cancer screening. Clin Obstet Gynecol. 2004;47(2):245-56.
12. Vadehra K, Jha R. Visual inspection using acetic acid and pap smear as a method of cervical cancer screening. Journal of institute of medicine 2006; 36-40.
13. Cohn E, Herzog J. New innovations in cervical cancer screening. Clin Obstet Gynecol. 2001;44:538-49.
14. Rana T, Zia A, Sher S, et al. Comparative evaluation of Pap smear and visual inspection of acetic acid (VIA) in cervical cancer screening program in Lady Willingdon Hospital, Lahore. Annals of King Edward Medical University. 2010;16.