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PAP SMEAR TESTING AND VISUAL INSPECTION WITH ACETIC ACID AND ITS CORRELATION WITH HUMAN PAPILLOMA VIRUS DNA IN A TERTIARY CARE HOSPITAL

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ABSTRACT **Background:** Cervical cancer remains a leading cause of morbidity among Indian women, especially due to inadequate screening coverage in rural areas. **Aims And Objectives:** To compare the effectiveness of VIA and Pap smear in cervical cancer screening and confirm HPV involvement using DNA testing. **Method:** A cross-sectional study was conducted on 1200 symptomatic women over 18 years using VIA, Pap smear, and HPV DNA testing. **Results:** Pap smear detected abnormalities in 12.5% of participants, while VIA showed 11% positivity. Combined testing achieved a diagnostic accuracy of 97.35%, with Pap smear alone at 60.65% and VIA at 50.32%. HPV DNA testing demonstrated 78.06% diagnostic accuracy, with Type 16 being the most prevalent strain (56.4%). Rural and lower socioeconomic groups showed higher test positivity. Statistically significant associations were found between HPV positivity, family history, and low socioeconomic status. **Conclusion:** VIA and Pap smear are effective, especially in combination. HPV DNA testing adds diagnostic value and confirms viral etiology.

KEYWORDS : PAP smear, HPV DNA, Visual inspection with acetic acid.

INTRODUCTION

Cervical cancer is a major health concern for women worldwide, with India having the highest number of cases. [1,2] One in five women are diagnosed from cervical cancer globally. Despite the availability of national screening guidelines, the coverage remains alarmingly low, primarily due to disparities in infrastructure, resources, and a large population.

Invasive cervical cancer typically develops over time from precancerous lesions that can be detected early through screening. Early detection and treatment of these lesions can prevent the disease from advancing to an invasive stage. By focusing screening efforts on women aged 30 and older, it is possible to reduce cervical cancer-related deaths. However, screening coverage among Indian women aged 18-69 is just 2.6%, with rural areas at a lower rate of 2.3%. To reduce the burden of cervical cancer, there is a need for a screening method that is both highly sensitive and accessible, particularly in remote areas. [1,2]

The Pap smear test has been an part of cervical cancer prevention. However, it is difficult to implement in low-resource settings due to a lack of infrastructure and trained personnel. Visual Inspection with Acetic Acid (VIA) and Visual Inspection with Lugol's Iodine (VILI) are the tests available that can be used by the most practitioners.[3]

VIA allows for diagnosis and treatment in a single visit, which is particularly beneficial in rural settings. The test can be performed by trained paramedical staff with minimal equipment, improving patient compliance.[4] Additionally, VIA has shown to be an accurate alternative to the Pap smear, making it a good candidate for inclusion in national screening programs. [3,4]

A study highlighted that cervical cancer is underrepresented in advocacy efforts, and the need for effective screening methods like HPV testing and VIA is crucial. VIA, when combined with HPV testing, has been shown to provide similar accuracy to traditional cytology methods at a lower cost. A Cluster Randomized Control Trial conducted in Osmanabad, India, confirmed the effectiveness of VIA as a reliable alternative screening method. [5]

VIA is a simple method that provides immediate results, making it suitable not only for rural areas but also for well-equipped hospitals. Integrating HPV testing with VIA has been suggested to increase the accuracy of the screening process, reducing unnecessary referrals while maintaining sensitivity.

When combined with the Pap test, HPV testing has demonstrated sensitivity rates of 96% to 100% in detecting cervical intraepithelial neoplasia, making it a valuable tool in preventing cervical cancer. [6,7]

METHODOLOGY

The study involved women visiting the OPD in the Obstetrics and Gynaecology Department at a tertiary care hospital during the study period with symptoms such as vaginal discharge, postmenopausal bleeding, and abdominal pain, who met the inclusion criteria. Detailed history and consent were taken followed by per speculum and per vaginum examinations, including Pap smear, VIA. HPV DNA testing was performed for positive results, and cervical biopsies were taken if necessary.

Inclusion Criteria

The study included women aged over 18 years, particularly those with risk factors like teenage pregnancy, early sexual activity, multiparity, multiple sexual partners, leukorrhea, and abnormal vaginal bleeding.

Exclusion Criteria

Women below 18 years.

RESULTS

In the present study, a total of 1200 participants underwent Pap smear and VIA testing. The mean age of the participants was 48.39 ± 8.69 years, with ages ranging from 21 to 78 years. The majority of women fell within the 40-49 years age group (43.8%), followed by those aged 50-59 years (31.9%). Most of the participants (58.7%) had parity statuses of Para 1 and Para 2, while a smaller proportion (8.3%) were nullipara. The distribution of participants based on residence showed that a significant number of them (64.9%) came from rural areas, while 35.1% were from urban areas. Socioeconomically, 40.9% of the participants were from the lower socioeconomic class.

Regarding the menstrual status, 58.7% were menstruating, and 41.3% were post-menopausal. When assessing family history, 2.2% of participants had family history of carcinoma, while 89.5% had no co-morbidities. Among those with co-morbidities, hypertension was the most common (5.1%), followed by diabetes mellitus (2.8%). The most frequent presenting complaint among the participants was vaginal discharge (43.8%), followed by lower abdominal pain and post-menopausal bleeding, each reported by around 10% of the participants. In terms of Pap smear findings, NLIM (Negative for Intraepithelial Lesion or Malignancy) was the most common result, found in 51.1% of the cases, followed by inflammatory changes (36.4%).

Among the 1200 participants, 132 (11%) tested positive for the VIA test, and histopathological diagnoses of biopsy samples revealed

chronic non-specific cervicitis in 56.1% of the cases. The diagnostic comparison between Pap smear, VIA, HPV DNA, and histology revealed statistically significant differences in detecting malignancy ($p<0.05$), with the combination of Pap smear and VIA yielding the highest diagnostic accuracy of 97.35%. Pap smear had a higher diagnostic accuracy (60.65%) compared to VIA (50.32%), while HPV DNA testing had a diagnostic accuracy of 78.06%. HPV DNA positivity was notably higher in Pap-positive women (39.1%) compared to VIA-positive women (23.7%).

Further typing of the HPV DNA-positive samples revealed that Type 16 was the most common strain, found in 56.4% of cases, followed by Type 35 (12.8%) and Type 39 (10.3%). Women from lower socioeconomic backgrounds had a higher proportion of positive test results. Vaginal discharge was the most common presenting complaint among those testing positive for Pap smear, VIA, and HPV DNA,.

Finally, the study identified several risk factors associated with the occurrence of cervical carcinoma. These included a family history of malignancy, lower socioeconomic status, and a positive HPV DNA test result, all of which were found to be statistically significant ($p<0.05$). The odds ratio for family history, lower SES, and HPV DNA positivity was found to be 6.99, 6.69, and 9.61, respectively.

CONCLUSIONS

In conclusion, this study demonstrates the effectiveness of Pap smear and VIA testing in identifying cervical malignancies, with Pap smear showing a balanced sensitivity and VIA exhibiting higher sensitivity but lower specificity. HPV DNA testing complemented these findings, with Type 16 being the most commonly detected strain. Risk factors, including a family history of cancer, lower socioeconomic status, and HPV DNA positivity, were found to significantly correlate with cervical carcinoma. These results underscore the need for a multi-faceted approach to screening and early detection, particularly for women in high-risk groups.

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