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Original Article

Correlation of visual inspection with cytological and histopathological findings in cervical neoplasia

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ABSTRACT

Background: Cervical cancer is one of the commonest malignancies and a leading cause of morbidity and mortality among women. The aim of this study was to evaluate the diagnostic value of Papanicolaou (PAP) smear and visual inspection with acetic acid as methods of cervical cancer screening.

Materials and Methods: This was an observational cross-sectional study conducted from the period of 2068.11.01 to 2069.11.01. The study population consisted of women with histologically confirmed cervical intraepithelial neoplasia or invasive carcinoma who had undergone prior PAP smear.

Result: During the study period 160 patients underwent both PAP smear and cervical biopsy. Of these patients, 49 had a histological diagnosis of cervical intraepithelial neoplasia or invasive carcinoma. The histopathological and cytological diagnoses were compared. visual inspection with acetic acid status was available for 31 of the 49 cases. The sensitivity of PAP smear was 61%, specificity 97%, Positive predictive value 91%, negative predictive value 85% and diagnostic accuracy 86% for detection of cervical neoplasia. Visual inspection with acetic acid had a sensitivity of 74%, specificity 48%, Positive predictive value 64%, Negative predictive value 60% and diagnostic accuracy of 63%. Combining the two procedures increased sensitivity by 26%, Negative predictive value by 11% and diagnostic accuracy by 2%.

Conclusion: PAP smear has a higher specificity, Positive predictive value, Negative predictive value and diagnostic accuracy but lower sensitivity than Visual inspection with acetic acid. Visual inspection with acetic acid by itself is not an effective screening method. A combination of PAP smear and Visual inspection with acetic acid can ensure adequate screening of cervical neoplasia.

INTRODUCTION

Carcinoma of the uterine cervix is one of the most common cancer in women worldwide. It is one of the leading causes of cancer death among women. The estimated new cases worldwide per year are 500,000 of which 79% occur in the developing countries.[1] Cervical cancer is preventable and potentially curable if detected at an early stage using proper screening tools.[2] Early detection, followed by appropriate therapy could make a very large difference to survival rates.[3] Cervical screening in many respects is an ideal screening test. It has a defined pre-malignant phase of many years, which allows repeated tests to significantly reduce the

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Table 1: Comparison of results of PAP smear, VIA and their combination

		Biopsy					Biopsy					Biopsy		
		+ve	-ve	Total			+ve	-ve	Total			+ve	-ve	Total
PAP	+ve	30	3	**33**	VIA	+ve	23	13	**36**	PAP and VIA	+ve	27	15	**42**
	-ve	19	108	**127**		-ve	8	12	**20**		-ve	4	110	**114**
Total		**49**	**111**	**160**	**Total**		**31**	**25**	**56**	**Total**		**31**	**125**	**156**

impact of false negative rate.[4] Depending on the resources available, there are a number of screening methods like visual inspection tests, PAP smear and HPV DNA tests.

The current study is aimed at finding out the diagnostic accuracy of PAP smear at a tertiary level hospital considering histopathology results as the gold standard. The diagnostic value of PAP smear is also compared with the results of VIA, in available cases in order to determine if VIA can be used as a primary screening tool in resource limited settings. This study intends to evaluate and compare the commonly used screening modalities so that we can help clinicians reach to an early diagnosis and treatment of cervical neoplasia, thus giving women an opportunity for a better quality of life.

MATERIALS AND METHODS

This was a prospective study carried out over a period of 1 year from 2068.11.01 to 2069.11.01 at the Department of Pathology, Institute of Medicine, Tribhuvan University Teaching Hospital, Kathmandu, Nepal. Approval of the study protocol by the institutional review board of Institute of Medicine was obtained.

The study population consisted of women with histologically confirmed cervical intraepithelial neoplasia or invasive carcinoma who had undergone a prior PAP smear test. However, women with previous history of cervical cancer were excluded from the study. Detailed clinical data was obtained and noted in a structured proforma. Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 16.

RESULTS

During the study period, a total of 160 patients underwent both PAP smear and cervical biopsy. Out of these 160 cases, 49 had positive results in biopsy specimen and were included in the study. Among the 49 cases, 30 had positive result and 19 had negative result in PAP smear. Three patients had positive PAP smear with negative biopsy results and 108 had negative results in both. A total of 56 patients had underwent both VIA and cervical biopsy. Among them, 31 patients had positive result in biopsy (23 VIA positive and 8 VIA negative) and were included in the study. Thirteen patients were VIA positive with negative biopsy and 12 had negative results in both (Table 1).

Minimum age of the patient was 23 years and the maximum age was 82 years. The mean age of the patient was 42 years.

Table 2: Relation between age and cervical neoplasia

Age Group	LSIL	HSIL	SCC
21-30 years	4	2	1
31-40 years	8	9	1
41-50 years	13	3	0
51-60 years	1	1	2
61-70 years	0	0	3
71-80 years	**0**	**0**	**0**
81-90 years	**0**	**1**	**0**

HSIL was more common in the age group 31-40 years, LSIL in 41-50 years and squamous cell carcinoma in 61-70 years (Table 2). A significant statistical association of cervical intraepithelial lesion and malignancy with parity was established with a p-value of 0.024. Only 1 (2%) nulliparous woman had cervical neoplasm whereas 25 (51.02%) women with cervical neoplasm had three or more children.

The comparison of the histopathological diagnoses with PAP smear and VIA are tabulated (Table 3&4). The sensitivity of PAP smear was 61%, specificity 97%, positive predictive value (PPV) 91%, negative predictive value (NPV) 85% and diagnostic accuracy 86% for detection of cervical neoplasia. VIA had a sensitivity of 74%, specificity 48%, PPV 64%, NPV 60% and diagnostic accuracy of 63%. Combining the two procedures increased sensitivity by 26%, NPV by 11% and diagnostic accuracy by 2% (Table 5).

DISCUSSION

The present study had a spectrum of patients ranging from 23 to 82 years of age. Mean age of the patient was 42 years. Maximum frequency (36.7%) was found in the age group 31-40 years, closely followed by 41-50 years of women constituting 32.7%. Similar results were found in studies performed by Goel et al[5], Dhakal et al[6] and Boicea et al.[7] Thus, since cervical neoplasia is more common between 31-50 years, the screening programs should target women in this age group.

The value of PAP smear in screening for cervical cancer has long been established. VIA is an alternative method especially suited for low resource settings. The sensitivity of PAP smear in our study was 61.2% which is lower than that of VIA (74.1%). The specificity of PAP smear was 97.2% whereas that of VIA was only 48.0%. The PPV of PAP smear was 90.9%, NPV was 85.0% and diagnostic accuracy was 86.2%. VIA had a PPV of 63.8%, NPV of

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Table 3: Comparison between PAP smear and biopsy results

Histopathologic diagnosis	Papanicolaou smear results							
	Negative	ASCUS	AGUS	LSIL	HSIL	SCC	Unsatisfactory for evaluation	Total
LSIL	14	3	1	7	1	0	0	26
HSIL	5	2	1	1	6	0	1	16
Squamous cell carcinoma	0	0	0	0	6	1	0	07
Total	**19**	**5**	**2**	**8**	**13**	**1**	**1**	**49**

Table 4: Comparison of VIA results and biopsy

Histopathologic diagnosis	Visual inspection with acetic acid results			
	Positive	Negative	Not available	Total
LSIL	10	6	10	26
HSIL	9	2	5	16
Squamous cell carcinoma	4	0	3	07
Total	**23**	**8**	**18**	**49**

60.0% and diagnostic accuracy of 62.5%.

This finding is consistent with that of Singh et al who reported sensitivity of 70.0% for PAP smear and 93.1% for VIA, specificity of 97.2% for PAP smear and 86.8% for VIA. They reported PPV of 51.2% for PAP smear, 22.1% for VIA and NPV of 97.0% and 99.0% respectively. The study suggested that due to the high sensitivity of VIA, the test could be valuable in detection of precancerous lesions of the cervix.[8]

The sensitivity of PAP smear and VIA was found to be 50.0% and 96.7% and specificity was 97.0% and 36.4% in a study done by Goel et al. PPV of PAP smear was 97.5% and VIA was 58.0% and NPV of 96.09% and 99.7% were obtained respectively. This study concluded that the main limitation of VIA is a high rate of false positive results, which may lead to overtreatment if a "see and treat" policy is applied.[5]

A study by Consul et al reported that both PAP smear and VIA had equal sensitivity of 84.2%. However, PAP smear showed specificity of 62.1% and VIA of 55.2%. This study also stated that VIA may find a place as an alternative low resource screening tool.[9]

Table 5: Diagnostic value of PAP smear, VIA and their combination

	PAP smear	VIA	Combined PAP smear and VIA
Sensitivity	61.2%	74.1%	87.0%
Specificity	97.2%	48.0%	88.0%
Positive Predictive value	90.9%	63.8%	64.2%
Negative Predictive value	85.0%	60.0%	96.4%
Diagnostic accuracy	86.2%	62.5%	87.8%

Similarly, higher sensitivity and lower specificity of VIA compared to PAP smear was shown in a study performed by Bhatla et al who found PAP smear to be 50.0% sensitive, VIA as 100.0% sensitive and HPV testing as 85.7% sensitive. Specificity of 98.9% for PAP smear, 53.3% for VIA and 89.7% for HPV testing were reported.10 In a study done by Mayrand et al, PAP smear was 55.4% sensitive and 96.8% specific whereas HPV testing was 94.6% sensitive and 94.1% specific. This study concluded that a shift from cellular to viral tests, coupled with education and vaccination will contribute to a more efficient control on cervical cancer.[11]

Vedantham et al found that among control group VIA positivity was 15.5% in women with inflammation and 6.1% in women without inflammation with a p value of <0.001.[12] Davis et al suggested that women with cervicitis were twice as likely to have a positive VIA result as women without cervicitis.[13] In a similar fashion, inflammation could also have contributed to the false positive VIA results observed in our study.

In our study, we also tried to find out whether the combination of PAP smear and VIA improves the diagnostic accuracy of screening for cervical cancer. On combining the two procedures, the sensitivity increased by 26%, NPV by 11% and diagnostic accuracy by 2%. However, the specificity decreased by 9% and PPV by 26%. Our results showed an overall improvement in the performance of the screening tests by using the two methods in combination. Our results are in concordance with studies done by Consul et al[9], Denny et al[14] and Sankarnarayan et al[15], all of which demonstrated that when used in combination PAP smear and VIA had a much better diagnostic performance than each test alone.

CONCLUSION

PAP smear has a higher specificity, PPV, NPV and diagnostic accuracy but lower sensitivity than VIA. The findings of our study shows that VIA by itself is not an effective screening method and further actions based only on its result may prove unnecessary for a number of patients. A combination of PAP smear and VIA can ensure adequate screening of cervical neoplasia.

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