Original Article

Detection of Cervical Precancer Using Visual Inspection Method with Acetic Acid

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ABSTRACT

Background: Cervical cancer screening is the priority activity of the government. Visual inspection with Acetic acid (VIA), Pap smear Liquid-based cytology, and HPV DNA testing are different methods of screening. VIA-based screening is the cost-effective method of screening in a resource-constrained setting like in our country as this doesn't require cyto-histological testing, can be performed by trained paramedics too, and is as accurate as a cytological test.

The aim is to explore pre-cancer cervical lesions by screening women in the community by visual inspection using acetic-acid.

Methods: Community-based cross-sectional study done at a health camp setting for three months from March to June 2023. The married non-pregnant women of 30-60 years were screened. Descriptive tests as well as sub-group analysis performed by Chi-Square tests.

Results: From ten community health camps, 1255 cases were screened and screen positivity was 14.3%. Positive results were proportionately distributed to all parity by 13-19%. Half of the positive results (47.2%) were in the 34-40 age group. There were no significant differences in screen positivity by parity or vaginal discharge. Menopausal women had 7.7% screen positivity.

Conclusions: The prevalence of VIA positivity in the community was found double the previous facility-based prevalence; and there was no significant difference by parity, menopausal status, and vaginal discharge. The positivity was more in 30-45 years of age.

Keywords: Cervical pre-cancer; screening; VIA.

INTRODUCTION

Cervical cancer screening is a cost-effective public health intervention to prevent cervical cancer as a secondary prevention method.[1] Screening methods are visual, cytology, and HPV DNA-based.[2,3] Colposcopy and guided biopsy will aid in confirming the lesion.[4] Ablative therapies are therapeutic.[5] VIA has better sensitivity than the Pap smear test,[6] and the visual method is better in resource-limited regions and LBC in resourced regions like easy availability of screening kits and cytopathologists.[7] Current HPV DNA detection-based WHO guidelines to prevent cervical cancer are different from previous VIA-based screening guidelines.[8] Nevertheless, VIA-based guideline is widely used in low-resource setups because of minimal cost.

VIA positivity rate in facility-based screening in an institution was 5.9% among 12000 women in 2012-2015.[9] Still, the community-based prevalence at the current time is lacking at the local level. Thus, the screening health camps were organized in collaboration with the local government within the limit of fiscal year activity. A preliminary study of screening is completed.

METHODS

A cross-sectional and exploratory prospective study was carried out in the community of two municipalities of Kathmandu Valley for three months from March to June 2023. The study setting was a free health camp in ten different locations. Before each health camp, an informative awareness program was conducted to provide the importance of cervical cancer screening. 30-60-year-old non-pregnant married women were

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included with written informed consent approved by the Nepal Health Research Council. Technical support was from the Gynecological Oncology Society of Nepal and Tumamcare Foundation, and financially supported by the health office of local government. Trained health service providers and specialists were in all camps for the quality screening and data. A minimum sample size was achieved as per Cochrane's formula. Freshly prepared 3% Acetic Acid solution was applied over the cervix using a cotton swab stick with the aid of a vaginal speculum. The visible white color produced over the cervical epithelium was taken as a positive result. VIA-positive cases were referred to the designated public center for further work-up as planned in the beginning. A preliminary screening study is completed and the next phase of screening and treatment will be continued. Data were presented by descriptive statistics as well as sub-group analysis using inferential statistics like Chi-Square tests.

RESULTS

There were 1255 cases screened in 3 months. The age group screened was 30-60 years (Mean = 41.87, Median = 41, SD = 7.9 years). Around 30% were above 45 years and half of them were over 50 years of age. Thus, the maximum (70%) was in the age group of recommended one-time screening period in a lifetime. The community prevalence of screen positivity was 12.3% (14.34% from 180 out of 1255 total cases, and 14.28% from 178 out of 1246 after excluding past radiotherapy and chemotherapy), and were advised to attend the designated public referral center for follow-up. VIA negative cases were advised to rescreen in 3 years. The 30-45 age group had a maximum (82.2%; 148 out of 180) number of VIA positivity and by 50 years, it reached 90.6%. The 30-45 age group had a similar proportion of VIA positivity by 15-20%. [Table-1 and Figure-1]

Table1. Age group-wise distribution of VIA positivity. (N=1255)

Age group in years	VIA Positive	VIA Negative	Total	Proportion of positivity
30-34	52	203	255	20.4%
35-39	50	215	265	18.9%
40-44	46	254	300	15.3%
45-49	15	163	178	8.8%
50-54	9	135	144	6.3%
55-60	8	105	113	7.1%
Total	180	1075	1255	

Almost half of the VIA positivity was concentrated (n=85; 47.2%) between 34 to 40 years of age against the one-third (n=408; 32.5%) screened population within this age range. [Figure-1]

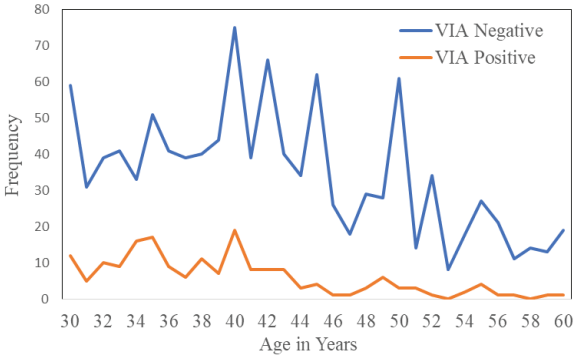

Figure1. Age-wise distribution of screened population and screen-positive cases. (N=1255)

The bulk of clients (n=995; 79.2%) were multipara ($p_{\geq 2}$). Parity-wise distribution of VIA positivity was proportionately similar (Chi-Square tests: Pearson 2.865, p-0.897 and Likelihood Ratio 4.702, p-0.696) in all parity. The proportion was similar (n=12;14.8%) even in the grand-multipara ($p_{\geq 4}$) despite few cases (n=81; 6.5%) screened in this parity group. [Table-2]

Table2. Parity-wise distribution of VIA positivity. (N=1255)

Parity	VIA Positive	VIA Negative	Total	Proportion of positivity
0	0	7	7	0
1	37	216	253	14.6%
2	106	615	721	14.7%
3	25	168	193	13.0%
4	9	50	59	15.2%
5	3	13	16	18.8%
6	0	4	4	0
7	0	2	2	0
Total	180	1075	1255	

Chi-Square tests: Pearson 2.865, p-0.897 and Likelihood Ratio 4.702, p-0.696

VIA positivity was found in 11.8% of clients having vaginal discharge and 14.8% without vaginal discharge. It doesn't have a significant difference by Chi-Square tests.

Table3. VIA positivity by vaginal discharge. (N=1255)

Vaginal discharge	VIA positive	VIA negative	Total	Proportion of positivity
Present	24	180	204	11.8%
Absent	156	895	1051	14.8%
Total	180	1075	1255	

Chi-Square tests: Pearson 1.318, p-0.251; Likelihood Ratio 1.376, p-0.241

One-fourth (329; 26.4%) had past screening history with normal report. Three clients had received radiotherapy and six had chemotherapy in the past; one in each had a VIA positive screen result. These were taken to counsel for further follow-up advice if required. Contraception practice found in one-fifth (258; 20.6%) of the clients screened. Only 16 clients (1.3%) had a history of irregular bleeding and four of them were VIA positive.

Only 19 clients had a history of vaginal medication in the recent past but not currently and three had VIA-positive reports. Out of 219 clients who had some uterine surgery, 22 (10%) had positive VIA screen results.

Out of 248 menopausal clients, 19 were VIA positive (7.7%); and out of 43 with secondary amenorrhoea, five had positive (11.6%) results.

DISCUSSION

The prevalence of this community-based screening was found to double (12.3%) the past facility-based (5.9%) screening.[9] This could be because of the health service seeking due to symptoms of different gynecological conditions and the asymptomatic cases were missing. The health camps in the community covered all women irrespective of their symptoms. This is likely to increase the detection rate.

A retrospective secondary data analysis from several primary health centers in four years in Jakarta was 4.7% similar to the facility-based study in Nepal. The VIA positivity rate is higher (15-20%) in 30-44 years in this study without difference by parity, and a similar result was from Jakarta (30-40 years had a higher positive rate) but significantly more in multipara. They argued that the pregnancy-induced immunosuppression and the changes in the transformation zone could have increased the risk of epithelial changes.[10] Another study that was cytology-based revealed 7.1% abnormality in a refugee camp in Nepal.[11]

Vaginal discharge was not significantly associated with VIA positivity in the current study but among refugees of the 25-49 years age group in Ethiopia, the VIA-positive prevalence was 9% and STI had a significant association (3.97 times more likely). This could be due to the high-risk sexual behavior among them.[12]

VIA positivity was higher (24.5% in 30-44 years) in Honduras screened between 2015 and 2018. HPV screen-positive cases with visible transformation zone were recruited for VIA testing in this study; this could be the reason getting a higher rate of VIA positivity. There were more women likely to have VIA positivity in 30-44 years than in the older age group ($p<0.001$).[13] There was a higher proportion of VIA positivity of 15-20% in the same age group in the current study as well.

There were a few screen-positive menopausal women (n=19;7.7%) who needed colposcopy and were referred for further evaluation like in the study done in Honduras where the cases were referred for colposcopy if the transformation zone was greater than type I.[13] Therefore, a further study with screen and treat approach is required because the test accuracy is acceptably high in VIA-based screening.[14-18] Screen-diagnose-and-treat approach can also be opted for as the facility permits to acquisition of tissue evidence for the intervention. Still, the screen-and-treat approach has been effective in low-resource settings so far.[19] Cost-analysis of HPV-based screening stands over the VIA or cytology-based screening approach if the technology supports it.[20]

CONCLUSIONS

Prevalence of VIA positivity in the community was 12.3%; and there was no significant difference by parity, menopausal status, and vaginal discharge. The positivity was more in 30-45 years of age. Thus, the next phase of screening, further verification, and treatment is required.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Mezei AK, Armstrong HL, Pedersen HN, Campos NG, Mitchell SM, Sekikubo M, et al. Cost-effectiveness of cervical cancer screening methods in low- and middle-income countries: A systematic review. Int J Cancer. 2017;141:437-46.doi: https://doi.org/10.1002/ijc.30695

2. Bouvard V, Wentzensen N, Mackie A, Berkhof J, Julia Brotherton J, Giorgi-Rossi P, et al. The IARC Perspective on Cervical Cancer Screening. N Engl J Med. 2021; 385:1908-18. doi: 10.1056/NEJMsr2030640

3. Narasimhamurthy M, Kafle SU. Cervical cancer in Nepal: Current screening strategies and challenges. Front Public Health. 2022;10:980899. doi: 10.3389/fpubh.2022.980899

4. Ren H, Jia M, Zhao S, Li H, Fan S. Factors Correlated with the Accuracy of Colposcopy-Directed Biopsy: A Systematic Review and Meta-analysis. J Invest Surg. 2022;35(2):284-92. doi: 10.1080/08941939.2020.1850944

5. Basu P, Meheus F, Chami Y, Hariprasad R, Zhao F, Sankaranarayanan R. Management algorithms for cervical cancer screening and precancer treatment for resource-limited settings. Int J Gynecol Obstet. 2017;138:26-32.doi: https://doi.org/10.1002/ijgo.12183

6. Arbyn M, Sankaranarayanan R, Muwonge R, Keita N, Dolo A, Mbalawa CG, et al. Pooled analysis of the accuracy of five cervical cancer screening tests assessed in eleven studies in Africa and India. Int J Cancer. 2008;123:153-60.doi: https://doi.org/10.1002/ijc.23489

7. Chen C, Yang Z, Li Z, L Li. Accuracy of Several Cervical Screening Strategies for Early Detection of Cervical Cancer: A Meta-Analysis. International Journal of Gynecologic Cancer 2012;22:908-921.doi: https://doi.org/10.1097/IGC.0b013e318256e5e4

8. WHO guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention, second edition. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.

9. Rijal P, Chhetri S, Agrawal A, Pradhan T, Bhatta R. Cervical Cancer Screening with VIA in Eastern Nepal - 3 Years Analysis. Nepal J Obstet Gynaecol. 2018;12(2):28-31.[Article]

10. Nuranna L, Donny NB, Purwoto G, Winarto H, Utami TW, Anggraeni TD, et al. Prevalence, Age Distribution, and Risk Factors of Visual Inspection with Acetic Acid-Positive from 2007 to 2011 in Jakarta. J Cancer Prev. 2017;22(2):103-107. doi: 10.15430/JCP.2017.22.2.103. Epub 2017 Jun 30. PMID: 28698864; PMCID: PMC5503222

11. Bhatta MP, Johnson DC, Lama M, Aryal S, Lhaki P, Shrestha S. High-risk human papillomavirus infection and abnormal cervical cytology among Nepali and Bhutanese refugee women living in eastern Nepal. BMC Infect Dis. 2017;17(1):73. [Article]

12. Hailemariam G, Gebreyesus H, Wubayehu T, Gebregyorgis T, Gebrecherkos K, Teweldemedhin M, et al. Magnitude and associated factors of VIA positive test results for cervical cancer screening among refugee women aged 25–49 years in North Ethiopia. *BMC Cancer. 2020;* 20:858. doi: https://doi.org/10.1186/s12885-020-07344-9

13. Sandoval M, Holme F, Lobo S, Slavkovsky R, Thomson KA, Jeronimo J, Figueroa J, Sanjose S. Age patterns of human papillomavirus infection as primary screening test for cervical cancer and subsequent triage with visual inspection in Honduras. Salud Publica Mex. 2020 Sep-Oct;62(5):487-493. English. doi: 10.21149/10979. Epub 2020 Jul 15. PMID: 32697901.

14. Sauvaget C, Fayette J-M, Muwonge R, Wesley R, Sankaranarayanan R. Accuracy of visual inspection with acetic acid for cervical cancer screening. Int J Gynecol Obstet. 2011;113(1):14-24.[Article]

15. World Health Organization. WHO guidelines for screening and treatment of precancerous lesions for cervical cancer prevention. 2013. [Download PDF]

16. Paul P, Winkler JL, Bartolini RM, Penny ME, Huong TT, Nga le T, et al. Screen-and-treat approach to cervical cancer prevention using visual inspection with acetic acid and cryotherapy: experiences, perceptions, and beliefs from demonstration projects in Peru, Uganda, and Vietnam.

Oncologist. 2013;18 Suppl:6-12. doi: 10.1634/theoncologist.18-S2-6. PMID: 24334477.

17. Bedell SL, Goldstein LS, Goldstein AR, et al. Cervical Cancer Screening: Past, Present, and Future. Sex Med Rev. 2020;8:28e37. doi: https://doi.org/10.1016/j.sxmr.2019.09.005

18. Albert SO, Oguntayo OA, Samaila MOA. Comparative study of visual inspection of the cervix using acetic acid (VIA) and Papanicolaou (Pap) smears for cervical cancer screening. eCancer. 2012;6:262. doi: 10.3332/ecancer.2012.262

19. Fokom-Domgue J, Vassilakos P, Petignat P. Is screen-and-treat approach suited for the screening and management of precancerous cervical lesions in Sub-Saharan Africa? Prev Med. 2014;65:138-40. [Article]

20. Simms KT, Keane A, Nguyen DTN, Caruana M, Hall MT, Lui G, et al. Benefits, harms and cost-effectiveness of cervical screening, triage and treatment strategies for women in the general population. Nat Med. 2023;29:3050-8. doi: https://doi.org/10.1038/s41591-023-02600-4