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Visual Inspection with Acetic Acid in the Early Detection of Cervical Cancer and Precursors in a District Hospital: A Hospital-Based Study

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ABSTRACT
Background: *Organized cytology screening programs are not sustainable in many poor countries, which account for four-fifths of the global cervical cancer burden. Among other alternative techniques for prevention, unassisted visual inspection (to detect cervical lesions) has been demonstrated to be inadequate, especially in detecting pre-invasive lesions. The aim of the study was to evaluate the Visual inspection with acetic acid in the early detection of cervical cancer and precursors*
Methods: *The study subjects were 711 women aged over 30 years attending the 250 bed Sadar Hospital Brahmanbaria, from January 2020–to December 2020. These women presented themselves for a routine examination or were referred from elsewhere to rule out cervical pathology. Collected data were entered, checked, and edited (to remove the outliers) with the help of the Statistical Package for Social Sciences (SPSS) software, version 26, and analyzed. The data were expressed as frequency and percentage, mean ± SD was calculated for normally distributed data. P-value<0.05 was considered statistically significant.*
Results: *The mean age of the study population was 38.9 years (SD 7.3 years). 67.09% were illiterate, 71.17% of the participants were from urban areas, 68.78% of the participants were housewives by occupation, and 40.65% of the participants had a monthly income of 10,000 or less. 69.20% of the participants were mothers of 3 children or more. The mean age of marriage among the participants was 16.92 ± 2.20 years, with an age range of marriage ranging from 11 to 33 years. 3.66% of the participants showed no complications prior to VIA. Leukorrhea was the most commonly presenting complication, observed in 45.29% of the participants. Among the remaining 708 participants, 58 were VIA positive, while the remaining 650 patients were VIA negative. Biopsy confirmed invasive cancer for the 3 patients whose VIA was not done. The VIA-positive patients were sent to a colposcopy clinic to perform colposcopy. Colposcopic findings of the participants revealed mild dysplasia (CIN I) in 34.48% of the participants, moderate (CIN II) in 13.79%, and severe (CIN III) in 6.90%. The remaining 26 patients were lost at follow-up.*
Conclusions: *IA is an effective screening test because of its non-invasive nature and processability, as well as the prompt availability of data, which facilitate colposcopy and treatment of pre-invasive lesions at the time of examination.*
Keywords: *Acetic acid, cervical cancer, precursors*

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I. Introduction

Cervical cancer is the fourth most common cancer among women worldwide. It is the second most cause of death among Bangladeshi women of reproductive age group. Each year, over 5 million new cases of cervical cancers are diagnosed, and over 3 million women die of it throughout the world. In Bangladesh, the incidence is 8068 and 5214 women died from the disease.[1]The World Health Organization has identified cervical cancer as a public health issue. This has resulted in an intense focus on the disease burden, available resources, and the feasibility of adopting comprehensive screening and treatment systems that might achieve successful cervical cancer control in resource-limited nations like Bangladesh. While the normal methods used in first-world countries for screening for cancer are either a pap-smear test or an HPV test, such methods are extremely expensive as a screening method and are not technologically feasible for countries in the developing world. [2] Currently, the emphasis on a screening method is substantially skewed towards a quick,

technologically less demanding, and cost-effective process. Visual Inspection of the cervix with acetic acid (VIA) is an effective and inexpensive screening test. [3]Several studies have attested to the effectiveness of the VIA test as a cervical screening method, with sensitivity and specificity as high as 82% and 92%. [4]Among the participants with a positive VIA result, colposcopy, histology, and even a biopsy were performed, when necessary, to determine the nature of lesions and the pre-cancerous stage of the patients. Most importantly, VIA is used as a simple, inexpensive test for initial screening, and the outcome of the VIA test can be combined with simple treatment procedures for early cervical Lesions. [5]The benefits of VIA testing are many, including the fast outcome of the result, and the easy-to-train testing methods. This is especially beneficial in countries like Bangladesh where the large patient population is hard to test with relatively few professionals. Any health worker with basic skills can be trained as a test provider, greatly reducing the burden of testing on the doctors. VIA is also feasible for low-resource areas, where it is difficult to implement high-quality cytology programs. VIA is recommended as the primary screening test to be performed by a trained nurse in many low and middle-income countries.[6] Scaling up and inclusion of VIA-based programs into national programs is already taking place in also many countries.[7]Even in Bangladesh, the government has made the VIA test completely free for any woman over the age of 30 years, resulting in the fast detection of lesions and early detection of cancerous lesions. The evaluation of the impact of the VIA screening program would largely determine the success of the program when it is introduced into routine healthcare.

II. Methods

The study subjects were 711 women aged 30 and above years attending the 250 bed Sadar Hospital, Brahmanbaria, from January 2020 to December 2020. These women presented themselves for a routine examination or were referred from elsewhere to rule out cervical pathology. the risk of cervical cancer increases greatly among women older than 30 years. One of the non-costly methods of initial cancer screening is VIA, which is a Visual Inspection of the cervix with 5% Acetic acid. Visual inspection of the cervix has reemerged as a screening tool for low-resource settings, despite its limited specificity, since it is economical and provides immediate results. The VIA is done to observe the health of the cervix. It is done by using a lifter to dab a cotton ball in 5% acetic acid and use the cotton ball to cover the cervix and the squamocolumnar junction (SCJ) for 1minute. Afterward, we remove the cotton ball and observe the state of the cervix. If there are no changes, we can determine the VIA test as negative, and the cervix as healthy. But if there are any changes in the SCJ, or there appear any Acetowhite areas in the cervix, the VIA test is deemed to be positive. Positive VIA patients are then sent to the colposcopy clinic to perform colposcopy. Colposcopy in this stage can determine the status of the lesions found and can help in the early detection of cancer, as cervical cancer is the only type of cancer with a pre-cancerous stage. VIA is recognized as an effective method for early detection of cancer, especially in our country, where we follow the "See and Treat" method of testing. VIA is a completely free test supported by the Bangladesh government for any woman older than 30 years of age. Data was collected regarding patients from the respective departments. Informed consent was obtained from the participants, and ethical approval was also obtained from the ethical review committee of the study hospital. The collected data were entered, checked, and edited (to remove the outliers) with the help of the Statistical Package for Social Sciences (SPSS) software, version 26, and analyzed. The data were expressed as frequency and percentage, mean ± SD for normally distributed data. P-value <0.05 was considered statistically significant.

III. Results

The mean age of the study population was 38.9 years (SD 7.3 years). Observing the education level of the participants, the majority (67.09%) were illiterate, 14.35% had education up to the primary level, and 12.10% had received education up to the secondary level, while the remaining 6.47% were high school graduates at the minimum. The majority (71.17%) of the participants were from urban areas, while only 28.83% of the total study population belonged to rural areas. 68.78% of the participants were housewives by occupation, while 40.65% of the participants had a monthly income of 10,000 or less. Another 40.96% had monthly income between 10,001 to 25000. Very few of the participants (4.92%) had no children, while the majority (69.20%) of the participants were the mother of 3 children or more. The mean age of marriage among the participants was 16.92 ± 2.20 years, with an age range of marriage ranging from 11 to 33 years. Before VIA testing was done, the patients visited the hospital either for a regular checkup or for other complications. 3.66% of the participants showed no complications prior to VIA. Leukorrhea was the most commonly presenting complication, observed in 45.29% of the participants. Some other complications like urine infection, uterine infection, PV bleeding, urinary inconsistency, dysmenorrhea, back pain, pain and bleeding during intercourse, and cervicitis were observed in very few patients, ranging from 0.28% to 0.98% of the participants. 8.58% of the participants complained about itching problems, while 36.57% of the participants reported other forms of complications. While preparing the participants for the VIA test, tumors were observed in the cervical canal of 3 patients, who

were promptly sent away for biopsy. Among the remaining 708 participants, 58 were VIA positive, while the remaining 650 patients were VIA negative. Biopsy confirmed invasive cancer for the 3 patients who's VIA was not done. The VIA-positive patients were sent to a colposcopy clinic to perform a colposcopy. Colposcopic findings of the participants revealed mild dysplasia (CIN I) in 34.48% of the participants, moderate (CIN II) in 13.79%, and severe (CIN III) in 6.90%. The remaining 26 patients were lost at follow-up.

Table 1: Socio-demographic features of the study population (N=711)

Variables	Frequency	Percentage
Age Group		
31-40	480	67.51%
41-50	231	32.49%
Mean±SD	38.9±7.3	
Education		
Illiterate	477	67.09%
Primary Level	102	14.35%
Secondary Level	86	12.10%
High School and above	46	6.47%
Location		
Rural	205	28.83%
Urban	506	71.17%
Occupation		
Housewives	489	68.78%
Day Laborers	206	28.97%
Services	14	1.97%
Business	2	0.28%
Monthly Income		
≤10000	289	40.65%
10001-25000	291	40.93%
25001-50000	127	17.86%
>50000	4	0.56%
Number of Children		
0	35	4.92%
1-2	184	25.88%
≥3	492	69.20%
Age at Marriage		
Mean	16.92 ± 2.20	
Age Range	11-33	

Table 2: Pre-VIA Complications among the participants (n=711)

Variables	Frequency	Percentage
leukorrhea	322	45.29%
Itching	61	8.58%
Urine Infection	5	0.70%
Uterine Infection	5	0.70%
PV Bleeding	5	0.70%
Urinary incontinence	1	0.14%
Dysmenorrhea	7	0.98%
Back Pain	4	0.56%
Pain During Intercourse	7	0.98%
Bleeding During Intercourse	6	0.84%
Cervicitis	2	0.28%
Other	260	36.57%

No Complications	26	3.66%

Table 3: VIA test Outcomes of the participants (n=711)

Variables	Frequency	Percentage
VIA Positive	58	8.16%
VIA Negative	650	91.42%
Not Done	3	0.42%

Table 4: Colposcopic Findings of VIA positive Patients (N=58)

	Frequency	Percentage
Mild Dysplasia CIN I	20	34.48%
Moderate Dysplasia CIN II	8	13.79%
Severe Dysplasia CIN III	4	6.90%
Lost at Follow-up	26	44.83%

IV. Discussion

VIA is an easy and inexpensive method of screening for cervical cancer. Other methods of screening are often very expensive and are near impossible to perform in countries with limited resources. The VIA testing method, using simple tools and basic training, can save a lot of time and money for both the patient and the doctors. It can help determine whether the patient needs further testing or not, without any necessity of expensive or invasive procedures. In VIA, the use of 5% acetic acid on the cervix for 1minute is all that is necessary for the outcomes. If the patient has any lesions or malignancies, changes in the acetowhite area are observed, and the patient is sent away for further testing, either through colposcopy or biopsy. In this stage, the grade of dysplasia or precancerous stage can be determined. Any alternative screening test in a developing country should be sensitive enough to detect pre-invasive lesions. These lesions are easy to treat and assist to avoid invasive cancer. Many developing countries lack suitable facilities for treating invasive cervical cancer (e.g., radiation), and advanced cervical cancer outcomes are poor in these settings. [8],[9] Early detection of any type of cancer may be tremendously beneficial for in-patient treatment; this is especially true for cervical cancer, which is the only type of cancer that has a pre-cancerous stage. pre-invasive cancer management facilities (colposcopy, LEEP, cryotherapy) can be built for a fraction of the cost of invasive cancer management.[10] The effectiveness of VIA along with colposcopy is extremely effective, as observed in a 1996 study, where 85 subjects with aceto-white lesions on the cervix were subjected to colposcopy; 34 of them had anormal colposcopic appearance and the rest were subjected to biopsy and 13 cervical intraepithelial neoplasia (CIN) lesions were detected among those.[11]Several studies investigated the performance of VIA, with or without magnification, in detecting cervical neoplasia in low-resource settings of Asia (Bangladesh, India, Indonesia) and sub-Saharan. Africa (Kenya, Zimbabwe, South Africa) suggested that VIA performs comparably to the screening tests being investigated in those settings.[12]Sensitivity for VIA has consistently been measured at over60%, and specificity at approximately over 70%. Although the high sensitivity of VIA is offset by lower specificity, the increased costs associated with more false-positivereferrals can be reduced if follow-up colposcopy is performed immediately (during the same visit), even by trained para-medical staff. The feasibility of offering colposcopy and large loop excision of the transformation zone under local anesthesia during the same visit, following a positive screening test, has been well demonstrated in South Africa.[13] Furthermore, improved techniques (recognizing artifacts due to glare from the light source, wiping away extraneous mucus and secretions) and referral of only those with dull aceto-white areas that cannot be wiped away and not those with faint and suspicious aceto-white lesions,cangreatly reduce false positives without compromising sensitivity. Rigorous training ofproviders to preventincorrectly recognizing aceto-white lesions may further improve specificity and reduce false-positive referrals.These improvements may open up new opportunities for disease control, such as one-stage testing with VIA and treatment with options such as cryotherapy/LEEP, keeping the proportion (false positives) treated unnecessarily as low as possible. Asgari*et. al.,* (2020), suggest that local collaboration, extending services to remote populations, decreasing the unnecessary burden on screened women, service providers, and tertiary centers, and capacity building through low-techhigh-yield screening are auspicious strategies for scale-up VIA programs. [14] In the present study, VIA testing resulted positive for 58 of 711 cases, while 3 cases were tumorous and excluded from VIA testing. The 58 cases were then referred to the colposcopy clinic for further testing. These test results were able to determine CIN I in 34.48%, CIN II in 13.79%, CIN III in 6.90%, and 44.83% of cases were lost at follow-up. Here, we can observe that getting VIA test outcomes resulted in the early detection of 12 CIN II and CIN III cases, and 20 CIN I cases, which, if managed properly, will hopefully never develop into cervical cancer. Countries with limited resources and a

heavy burden of cervical cancer, such as Bangladesh established and scaled up VIA-based programs. Despiteits limitations, VIA's simplicity and affordability have legitimated building infrastructure, increasing thenumber of trained healthcare personnel, and expanding a system of multilevel coordination within the health system. VIA screening methods can be easily adopted anywhere in order to reduce the burden of disease. VIA performed by trained female health workers is a safe, acceptable, and effective test that can save lives even in remote areas with few resources. VIA screening performance can be enhanced with efficacious training and supervision as quality assurance is a must for an auspicious VIA program. These results have expressive implications for competent service delivery in cervical screening programs in low resource settings and/or in integrating into primary care services.

V. Conclusion

The non-invasive nature and the easy applicability of the test coupled with the immediate availability of results facilitating colposcopy and treatment of pre-invasive lesions at the time of examination make VIA an attractive screening test. The usefulness of VIA, both in screening for cervical cancer in developing countries and as a case-finding tool in actual clinical practice settings, certainly merits further evaluation.

VI. Recommendation

Awareness about Cervical cancer needs to be created specially in the target groups like married women aged more than 30. Moreover, the VIA screening program should be carried out by trained and specialized manpower to minimize the risk of cervical cancer. A proper screening center and referral center should be developed as well. The burden of long-term morbidity and even mortality due to cervical cancer should be put tothe notice of the concerned authorities.

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