Effectiveness of visual inspection with acetic acid as a test for cervical cancer screening

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ABSTRACT

Objective: To assess the effectiveness of visual inspection of cervix with acetic acid (VIA test) as an accepted method for screening of cervical Cancer.

Materials and Methods: Two hundred women attending the Cervical and Breast Cancer Screening Program and outpatient department (OPD) of Department of Obstetrics and Gynecology at our center were examined by both Pap smear and VIA tests.

Results: Patients were aged between 21 and 70 years (mean 35.8 years). Nearly 45% got married between 16 and 20 years and 44% before 15 years of age. Oral contraceptives users were 23%. Nearly 14% of the women tested positive by VIA. Pap smear showed atypical squamous cells of undetermined significance in 9.5%, low-grade lesion in 6%, and high-grade lesions in 1.5%. Colposcopy showed cervical intraepithelial neoplasia (CIN-I) in 9%, 2% had CIN-II/III, invasive cancer in 1%, and 7% had unsatisfactory colposcopy findings. Thirty-six women required biopsy for histopathological confirmation. Among them, 7.5% had chronic cervicitis/koilocytic changes, 4.5% had CIN-I, 2% had CIN-II, 1.5% had CIN-III, 0.5% had invasive cancer, and 2% had normal result. Sensitivity of VIA was 76.5% and specificity was 91.8%. Sensitivity of Pap smear was 64.7% and specificity was 87.4%.

Conclusion: Sensitivity and specificity of VIA was higher than that of Pap smear test. VIA can be used as an effective screening test to detect the precancerous and cancerous lesions of the cervix in Bangladesh.

Keywords: Cervical cancer, screening, visual inspection of acetic acid

Introduction

Cervix is the lower fibromuscular portion of the uterus measuring 3–4 cm in length and 2.5 cm in diameter.[1] The cervix is composed of epithelium and underlying stroma. On visual examination, it appears reddish in color because the thin single cell layer allows the coloration of the underlying vasculature in the stroma to be seen more easily. As the woman passes from the reproductive to the perimenopausal age group, the location of the new squamocolumnar junction progressively moves on the ectocervix toward the external os. In postmenopausal women, the new squamocolumnar junction is often invisible on visual examination.[2]

Epidemiological studies have identified a number of risk factors that contribute to the development of cervical cancer precursors and cervical cancer. These include infection with certain oncogenic types of human papillomaviruses, sexual intercourse at an early age that is early marriage, multiple sexual partners, multiparity, long-term oral contraceptive use, tobacco smoking, low socioeconomic status, infection with Chlamydia trachomatis, micronutrient deficiency, and a diet deficient
in vegetables and fruits. Worldwide, cervical cancer comprises 12% of all cancers in women, with higher prevalence in developing countries, especially Southeast Asia. Bangladesh and India have an annual incidence of 11,956 and 125,952 patients, respectively. Cervical cancer screening methods include cytology-based screening (Pap smear), unaided visual inspection including visual inspection of cervix after application of acetic acid (VIA), and visual inspection with Lugol's iodine, aided visual inspection (colposcopy), and tests for human papilloma viral markers. On VIA, precancerous lesions temporarily appear white after staining with 3%–5% acetic acid (vinegar). VIA can be implemented in a wide range of settings, as no laboratory processing is required, the results are immediate, and treatment can be suggested in the same visit. Due to the subjective nature of visual assessment, it is important to standardize definitions for positive and negative tests and to give special attention to regular and consistent quality assurance.

In Bangladesh, cervical cancer constitutes about 22%–29% of female cancer in different areas of the country. About 80% of women report for treatment at an advanced stage. One of the important reasons for this is the lack of an effective screening program, and down-staging screening coupled with cytological screening may be useful. Screening tests should be cost effective, acceptable, repeatable, and valid. Some previous reports suggest that VIA can provide similar or better results than Pap smear. This study was conducted to determine the potential of VIA to supplement or substitute the Pap smear in screening to detect cervical cancer.

Materials and Methods

This cross-sectional study was conducted at Bangabandhu Sheikh Mujib Medical University from January to June 2007. About 200 married women who attended Cervical and Breast Cancer Screening Program and outpatient department (OPD) of Department of Obstetrics and Gynecology were selected conveniently. Exclusion criteria were unmarried women, being in menstrual period, to have not abnormal uterine bleeding for any cause, hysterectomy or wedge resection, and diagnosed cervical cancer. A structured pretested questionnaire and checklist were used, and data were collected by face-to-face interview and clinical examinations and procedures.

All women were informed about the procedure, and after cervical examination, Pap smear and VIA tests were performed. VIA test was considered positive when Aceto-White reaction could be seen clearly. Pap smear test was considered positive when cytology report showed atypical squamous cells of undetermined significance (ASCUS) lesions or more. Detailed colposcopic examination and colposcopic-directed biopsy were carried out as and when indicated. The results of cytology examination and visual inspection of cervix were compared with colposcopic and/or histological diagnosis. The colposcopic examination was done in all patients irrespective of the results of the two screening procedures. Biopsy, however, was done in only those patients where colposcopic abnormalities were discovered. The colposcopic finding was considered as the gold standard against which the sensitivity and specificity of cytology and acetic acid application were evaluated using standard statistical methods.

Results

The 200 women included in the study were aged between 21 and 70 years (mean 35.8 ± 7.8 years). Religion of most women was Islam (96.0%). Almost 41.0% of women had primary education, 21.0% were illiterate, and 30.0% had secondary or higher secondary education. Nearly 91.5% women were homemakers and 4.5% were in government services. Almost 21% had a monthly income of less than Tk. 3000 and 43% had a monthly income between Tk. 3000 and 8000. Mean monthly income of the family was Tk. 7742.5. About 21% of women came from poor class and 43% from lower middle class. Women from higher middle class and rich class were 25% and 11%, respectively.

Obstetrical and gynecological characteristics

Forty-five percent were married in 16–20 years and 44.0% were married before 15 years. Nearly 64.0% had delivered their first child at age 16–20 years and 11.5% delivered their first child before 15 years. Among the women, 99.5% were married once and only 0.5% were married twice. Almost 39.5% were married for more than 20 years and 28.0% for 11–15 years. About 45.0% of the women had 1–2 children, 35.5% had 3–4 children, and 1.5% had no children. Nearly 72.5% of the women had a history of normal delivery and 9.0% had cesarean section.

Almost 35.5% women had irregular menstrual cycles. Sanitary pads were used by 53% women and the rest used cloth. Cloths were used repeatedly during menstruation by 20% of the study population after washing with soap or water. About 52.5% of the women had a history of whitish discharge and 86.5% had a history of irregular bleeding, per vaginam. Barrier contraception was used by 46% respondents, and various...
hormonal contraceptive methods were used jointly by 26.5%. Nearly 97.5% women had no family history of cervical cancer. The frequency of coitus was 6–10 times per month among 50.5% of the respondents. About 77.5% reported pain during coitus and only 3.5% had postcoital bleeding.

**Awareness about cervical cancer**

It was found that 83.5% of the study population had heard about cervical cancer and only 9.5% knew its consequence. Almost 81.0% women had some knowledge about cervical cancer screening. Nearly 71.50% of the study population knew about Pap smear and only 7.50% knew about VIA. About 88.0 women obtained information about cervical cancer screening from doctors and only 7.0% got information from radio/TV or poster/brochure.

**Characteristics related to test findings**

Nearly 8.50% of the study population suffered from different types of cervical cancer. About 14% of the women were VIA positive and 86% were VIA negative [Table 1]. The table shows the distribution of Pap smear findings. ASCUS and worsen lesion considered as Pap smear positive. Seventeen percent of the women had Pap smear positivity (ASCUS or worse lesions), 81% of the women had normal colposcopy, 12% women had abnormal colposcopic findings, and 7% had unsatisfactory procedure.

Table 2 summarizes the screening test findings and distribution of the action according to those findings.

**Discussion**

The current study was carried out to determine the effectiveness of VIA as a test for cervical cancer screening in the Cervical and Breast Cancer Screening Program and outpatient department (OPD) of Department of Obstetrics and Gynecology. In this study, 200 were included purposively, majority of whom were Muslin, which is the usual scenario of Bangladesh. Among the study participants, 21.0% were illiterates. Around the time of the study, the literacy rate of the adult women was 52.2%; hence, literacy rate in our study was a bit higher than the national average. Most women (91.5%) were homemakers which is the scenario of the Bangladeshi lower middle-class families attending public hospitals. Mean monthly income of the family was Tk. 7742.5, which was slightly lower than the national average of Tk. 11,480 during 2010.

In this study, 14.0% of the women had VIA positivity. A study by Gaffikin et al. reported VIA screen positive rate as 12.4%. Sensitivity of VIA was 76.5% and specificity was 91.8%. Sensitivity of Pap smear was 64.7% and specificity was 87.4%. In a previous study, sensitivity of VIA was 82.1% and specificity was 50.0%. Another study reported sensitivity of VIA to be 100%, whereas that of Pap smear was 85.7%. This study proposed that VIA is a credible
alternative to Pap smear in resource-challenged settings. Our results are largely consistent with these earlier studies.

The proportion of cervical cancer among our study population was calculated in relation to colposcopic findings, which was considered as the gold standard investigation. Biopsy, however, was done in only those patients where colposcopic abnormalities were discovered. Our study shows that 8.5% of the study population suffered from different types of cervical cancer which was found to be much lower than the 21.5% figure quoted in the cancer registry report of Bangladesh.[31]

Conclusion

Sensitivity and specificity of VIA was found to be higher than that of Pap smear test. The study showed that VIA can be used as an effective screening test to detect the precancerous and cancerous lesions of the cervix in Bangladesh. We conclude that the VIA for cervical cancer screening is a credible alternative to Pap smear in resource-challenged settings.

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Conflicts of interest

There are no conflicts of interest.

References

1. Sellows JW, Sankaranarayanan R. Colposcopy and Treatment of Cervical Intraepithelial Neoplasia: A Beginners’ Manual. Lyon: IARC Press; 2003.
2. Cervical and Breast Cancer Screening Programme: Standards and Guidelines. Department of Obstetrics and Gynaecology; 2007.
3. Bosch FX, Manos MM, Munoz N, Sherman M, Jansen AM, Peto J, et al. Prevalence of human papillomavirus in cervical cancer: A worldwide perspective. International biological study on cervical cancer (IBSCC) study group. J Natl Cancer Inst 1995;87:796-802.
4. Walboomers JM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. J Pathol 1999;189:12-9.
5. Ferenczy A, Franco E. Persistent human papillomavirus infection and cervical neoplasia. Lancet Oncol 2002;3:11-6.
6. Franco EL, Villa LL, Sobrino JP, Prado JM, Rousseau MC, Desy M, et al. Epidemiology of acquisition and clearance of cervical human papillomavirus infection in women from a high-risk area for cervical cancer. J Infect Dis 1999;180:1415-23.
7. World Health Organization. Cervical Cancer Screening in Developing Countries. Report of a WHO Consultation. Geneva: WHO Press; 2002.
8. Ferlay J, Bray F, Pisani P, Parkin DM, editors. Globocan 2000: Cancer Incidence, Mortality and Prevalence Worldwide. Lyon, France: IARC Press; 2001.
9. University of the Philippines-Department of Health Cervical Cancer Screening Study Group. Delineation of an appropriate and replicable cervical cancer screening program for Filipino women. Manila: Department of Health, 2001.
10. Ferlay J, Bray F, Pisani P, Parkin DM, editors. Globocan 2002: Cancer Incidence, Mortality, and Prevalence Worldwide. Lyon, France: IARC Press; 2004.
11. Alliance for Cervical Cancer Prevention. Planning and implementing cervical cancer prevention and control programs: A manual for managers. Seattle: Alliance for Cervical Cancer Prevention (ACCP); 2004.
12. Akhter PS, Uddin MM, Sharma SK. Patterns of malignant neoplasm – A three years study. Bangladesh Med J 1998;27:29-32.
13. Akhter PS, Uddin MM, Akhter N. Gynaecological cancers – Analysis of 1020 cases in three years. J Teach Assoc SBMCH Bangladesh 1996;7:439-45.
14. Kamaluddin M, Ansary HR, Chowdhury FA, Alam MM, Hossain T, Rahman SM. A study on patients treated with radiotherapy – Analysis of 4267 cases. Ban. Can Reports 1993;14:36-40.
15. Huq SF. Common cancers of Bangladesh: Their trends through last three decades. Bangladesh Med J 1988;17:55-63.
16. Gaffikin L, Lauterbach M, Blumenthal PD. Performance of visual inspection with acetic acid for cervical cancer screening: A qualitative summary of evidence to date. Obstet Gynecol Surv 2003;58:543-50.
17. Roychoudhury NN. Genital malignancy. In: Datta DC, editor. Textbook of Gynaecology. 3rd ed. India: New Central Book Agency; 2001. p. 310-60.
18. Srismoonboon J, Tangchaitrong CA, Bhusawang Y, Chairatana A. Evaluation of colposcopic accuracy in diagnosis of cervical neoplasia. J Med Assoc Thai 1996;79:423-8.
19. Blumberg MS. Chronic Diseases and Public Health. Baltimore: Johns Hopkins; 1996.
20. Reiser S. World Health Forum. 1st and 2nd. 1: WHO; 1980. p. 99-103.
21. Moss TR. Cervical cytology and colposcopy in young patients attending genitourinary medicine clinics: Invalid intrusion or preventive opportunity and definitive audit? Cytopathology 1999;10:2-7.
22. Solar ME, Gaffikine L, Blumenthal P. Cervical cancer screening in developing countries primary care update. Obstet Gynecol 2000;9:118-23.
23. Hall AJ. Cervical screening: Technology, treatment, policy – What is appropriate? Trop Med Int Health 2000;5:835-6.
24. Berek JS, Adashi EY, Hillard PA. Novak’s Gynecology. 12th ed. Baltimore: Williams and Wilkins; 1996.
25. Status of Minorities in Bangladesh [Internet]. http://www.

Table 3: Statistical analysis of sensitivity and specificity of visual inspection of cervix with acetic acid and Pap smear

| VIA       | Disease status | Total | Sensitivity (%) | Specificity (%) |
|-----------|----------------|-------|-----------------|-----------------|
| Positive  | 13             | 28    | 76.5            | 91.8            |
| Negative  | 4              | 172   |                 |                 |
| Pap smear |                |       |                 |                 |
| Positive  | 11             | 34    | 64.7            | 87.4            |
| Negative  | 6              | 166   |                 |                 |

VIA - Visual inspection of cervix with acetic acid
southasianrights.org/wp-content/uploads/2009/10/final-BD-Minority-Report-2011.pdf. [Last accessed on 2016 May 03].

26. Bangladesh - Literacy rate [Internet]. Available from: http://www.indexmundi.com/facts/bangladesh/literacy-rate [Accessed: 03 May 2016].

27. Poverty and Inequality [Internet]. Available at: http://unnayan.org/reports/Poverty_and_Inequality_in_Bangladesh.pdf. [Last accessed on 2016 May 04].

28. Gaffikin L, Lauterbach M, Blumenthal PD. Performance of visual inspection with acetic acid for cervical cancer screening: a qualitative summary of evidence to date. Obstet Gynecol Surv 2003;58:543-50.

29. Sankaranarayanan R, Black RJ, Parkin DM. Cancer Survival in Developing Countries. Lyon, France: IARC Press; 1998.

30. Ardahan M, Temel AB. Visual inspection with acetic acid in cervical cancer screening. J Obstet Gynaecol 2007;27:703-5.

31. Cancer Registry Report [Internet]. Available from: http://www.ban.searo.who.int/LinkFiles/Publication_Cancer_registry_report.pdf. [Last accessed on 2016 May 04].