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ORIGINAL ARTICLE

Prenatal Cervical Cancer Screening Using Visual Inspection with Acetic Acid in a Low Resource Setting

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Abstract

Purpose Cervical cancer is one of the most common malignancies among women in low resource setting. The objective of this study was to assess the acceptability of prenatal cervical cancer screening using visual inspection with acetic acid (VIA) in a low resource setting.

Methods This was a cross-sectional study conducted at Moi Teaching and Referral Hospital. Over a period of 12 months, we enrolled 331 women who were attending antenatal care clinic with a gestation of age of less than 22 weeks. We screened them for cervical cancer by applying 5% acetic acid to the cervix (VIA Method). Visualization of aceto-white lesions was interpreted as a positive VIA test. A cervicography was obtained for independent review by two clinicians. A repeat VIA test or colposcopy and biopsy were recommended at 6 weeks postpartum for those with a positive VIA test.

Results Mean gestational age was 16 weeks. Seventy five percent of participants (n = 247) had used contraceptives, 31.1% (n = 103) had previously been screened for cervical cancer and 9.1% (n = 14) were HIV positive. The study clinician detected 11.3% VIA positive while first and second independent reviewers reported 22.5% and 7.7% VIA-positive results, respectively. About 85.7% of the participants did not experience any immediate adverse reaction as a result of the procedure. However, 3.8%, 38.4% and 0.7% experienced pain, burning sensation and bleeding respectively. Overall, 98.4% (n = 306) indicated that they would recommend the test, and 99% (n = 307) indicated that they would return for a repeat test 6 weeks postpartum. HIV status had no influence on VIA-positive rates (p = 0.909).

Conclusion The rate of VIA positive was 13.8% among the pregnant women. It is acceptable to use VIA to screen pregnant women for cervical cancer.

Keywords Cervical cancer screening · Pregnancy · VIA

Introduction

About 3% of women diagnosed with cervical cancer are either pregnant or postpartum at the time of diagnosis [1]. Half of these cases are diagnosed prenatally, and the other half are diagnosed within 12 months of delivery [2]. Cervical cancer is a common malignancy in pregnancy, with an estimated incidence of 0.8–1.5 cases per 10,000 live births [3]. Cervical cancer is often first suspected when a screening test for the disease is abnormal. The performance characteristics of the Papanicolaou test do not appear to differ significantly between pregnant and non-pregnant women [4]. Overall, the rate of significant cytological abnormalities among obstetrical patients has been reported to be 5–8% and is similar to that of the non-pregnant population [5].

Management of an abnormal screening cervical cytology in pregnancy should follow the 2006 Bethesda consensus guidelines [6]. Current cervical cancer screening protocols typically include a combination of cervical cytology and human papilloma virus (HPV) testing. Visual inspection of the cervix has reemerged as the preferred screening tool for low resource settings, despite its limited

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specificity, since it is economical and provides immediate results. Visual inspection can be performed with acetic acid (VIA) or Lugol's iodine (VILI). Visual inspection is indicated for women for whom cervical cancer screening is recommended and for whom these methods are the best screening option (i.e., women who do not have access to cervical cytology and HPV testing).

Cervical cancer is a leading cause of mortality and morbidity among women in Kenya. Prenatal screening is one of the ideal settings to increase the screening coverage. According to Kenya Demographic Health Survey [7], the number of pregnant women attending antenatal care has increased to 96%, compared to 53% seeking postnatal care and 12% seeking cervical cancer screening. The antenatal care setting therefore provides the best opportunity to reach most women for cervical cancer screening.

VIA can easily be implemented in low resource setting because it can be performed in a primary healthcare facility and by trained nurses or paramedical staff, particularly where there are few or no physicians. It requires little technology and staff training to perform, process and interpret test results. In addition, the results of a VIA test are immediate.

The main objective of this study was to determine the acceptability of prenatal cervical cancer screening using VIA in a low resource setting and establish the VIA-positive rate among pregnant women.

Materials and Methods

This was a cross-sectional study carried out from October 2016 to September 2017 at Moi Teaching and Referral Hospital (MTRH). The study population was pregnant women above the age of 18 years with a gestation below 22 weeks. Women with high-risk pregnancies and those known to be allergic to acetic acid were excluded from the study.

A sample size of 331 was calculated using Cochran formula [8]. We aimed at including all pregnant women at 22 weeks gestation and below, who attend antenatal clinic at MTRH. Over a 1-year period, 340 pregnant women were found eligible to participate in the study. Out of these, nine declined to give consent for participation in the study. The remaining 331 women gave consent and were enrolled into the study.

The study clinician interviewed the participants who consented and obtained their socio-demographic information, medical history, contraception history, obstetric history and history of cervical cancer screening using a semi-structured questionnaire. After obstetric examination, the study clinician conducted a speculum examination in the presence of a female chaperone. VIA test was conducted by inserting a speculum into the vagina and applying a 3–5% acetic acid on the cervix. The cervix was then examined for the presence of aceto-white lesion after waiting for 1 min. A photograph of the cervix was taken and sent to two independent reviewers. The participants were immediately informed about their VIA test results. For those with VIA-positive results, a repeat VIA and possible colposcopy and biopsy were recommended 6 weeks after delivery. For those with VIA-negative results, a repeat VIA test was recommended 6 weeks after delivery.

The data were collected using a semi-structured questionnaire. Data analysis was done using R statistical software [9]. Gaussian assumptions for continuous data were assessed using Shapiro–Wilk test, histograms and normal probability plots. Continuous variables were compared using independent samples t test. Categorical variables were compared using Pearson's Chi-square test. Fisher's exact test was used whenever the Chi-square assumptions were violated.

Results

A total of 331 participants were recruited into the study. The participants had socio-demographic characteristics as described in Table 1.

The mean age was 26.7 years with a minimum and a maximum of 18.0 and 42.0, respectively. The mean gestational age was 16.1 weeks with a minimum and a maximum of 2.0 and 22 weeks, respectively. Up to 152 (46.2%) were nulliparous, and 52 (16.2%) had history of miscarriages. Three-quarters (75.3%) of the participants previously used contraceptives. The main method of family planning that was used by the participants was depomedroxyprogesterone acetate (DMPA) injections (43.3%). One-third (31.1%) of the participants had been screened

Table 1 Socio-demographic characteristics

Variable	*N*	Mean ± SD or *n* (%)
Age (years)	331	26.7 ± 4.9
Range (Min.–Max.)		18.0–42.0
Marital status		
Married	331	271 (81.9%)
Single		60 (18.1%)
Education level		
Primary		60 (18.1%)
Secondary	331	105 (31.7%)
College		95 (28.7%)
University		71 (21.5%)

before for a cervical cancer. They were mainly screened using VIA/VILLI (88.3%).

Speculum examination showed that 89.4% of the participants had grossly normal cervix. There were 26 (8.4%) whose cervix had hyperemic lesions. There were two participants who presented with suspicious cervical mass. Colposcopy and biopsy were done for these two participants. Screening using VIA/VILLI showed that 35 (11.3%) of the participants had aceto-white lesions, two (0.6%) presented with suspicious mass and 273 (88.1) had a negative VIA test. Samples of cervical photographs for various lesions are shown in Figs. 1, 2 and 3.

Two independent clinicians reviewed cervicographies of the participants. The results of the reviewers showed that reviewer number 1 identified 70 (22.5%) positive cases, and reviewer number 2 identified 24 (7.7%) positive cases.

Overall the observed agreement between the two reviewers was 78.8%, with a kappa statistic of 0.31 (95% CI: 0.21, 0.42). This gave a fair level of agreement between the two reviewers [10]. The Chi-square test assessed the agreement between the two reviewers. The results show that both reviewers were more likely to disagree on the diagnosis for a participant ($p < 0.001$).

The reports from the study clinician and the first independent reviewer (reviewer 1) agreed for 10 and 172 positive and negative diagnoses, respectively. This gives 70.0% overall proportion of agreement. There was no evidence of a relationship between study clinician and first reviewer reporting ($p = 0.523$).

The reports of the study clinician and the second reviewer agreed on a total of 219 (82.6%) participants. The observed difference between the clinician and the second reviewer was not statistically significant ($p = 0.318$).

Reviewer 1 was more likely to report VIA positive among the participants who did not know their HIV status (41.3%) compared to the HIV positive (21.9%) and the HIV negative (14.8%), $p = 0.011$. The results of this reviewer reveal that the proportion of VIA-positive participants was high among the HIV positive (21.9%) compared to the HIV negative (14.8%) participants.

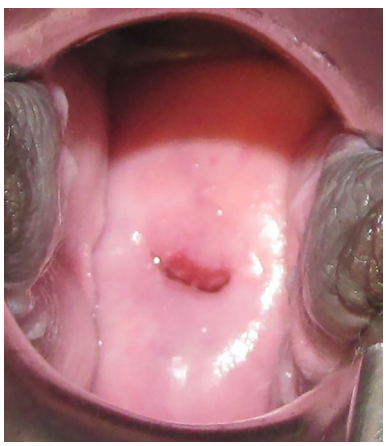

Fig. 1 VIA negative cervix

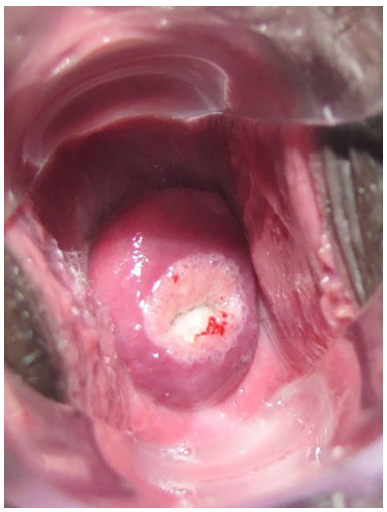

Fig. 2 VIA Positive cervix

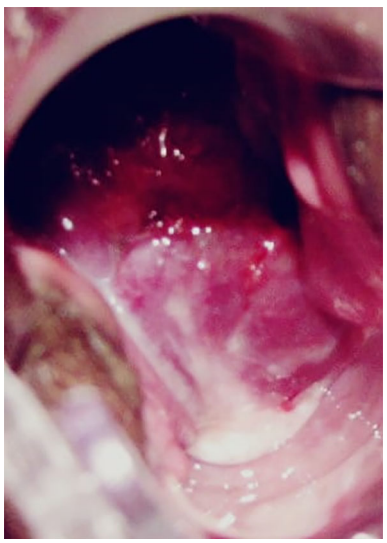

Fig. 3 Suspicious cervical mass

Overall, reviewer 2 reported a smaller proportion of VIA positive (7.6%) compared to reviewer 1 (24.5%) and the study clinician (12.2%). This reviewer, compared to reviewer 1, also reported a higher proportion of VIA positive (8.9%) among the participants who did not know their HIV status compared to the HIV-positive (7.8%) and the HIV-negative participants (4.2%).

Post-screening assessment showed that 123 (40.1%) of the participants did not experience any immediate adverse reaction as a result of the procedure. However, 14.0%, 38.4% and 0.7% experienced pain, burning sensation and bleeding, respectively.

Table 2 Post-screening assessment

Variable	*N*	*N* (%)
Experiences immediately after VIA/VILI		
No pain	312	300 (96.2%)
Pain		12 (3.8.0%)
Burning sensation	307	118 (38.4%)
Bleeding		2 (0.7%)
Other (discomfort)		21 (6.8%)
Comfortable with the procedure	312	213 (68.3%)
Recommend the test for fellow pregnant women		
No		4 (1.3%)
Yes	311	306 (98.4%)
Not sure		1 (0.3%)
Would come back 6 weeks after delivery for a retest		
No		2 (0.6%)
Yes	310	307 (99.0%)
Not sure		1 (0.3%)
Was easy to participate in the study		
No		5 (1.6%)
Yes	310	304 (98.1%)
Not sure		1 (0.3%)

Two-thirds of the participants (68.3%) were comfortable with the procedure. Up to 306 (98.4%) of the screened participants acknowledged that they would recommend the test to fellow pregnant women, 99.0% agreed that they would come back for a retest 6 weeks after delivery and 98.1% said that it was easy to participate in the study. The experience and opinion of participants regarding the VIA procedure is summarized in Table 2.

Discussion

This was the first cross-sectional study done in a low resource setting looking at acceptability of VIA screening and rates of VIA positive among pregnant women. The rarity of cervical cancer in pregnancy makes large trials or randomized studies impossible, and guidelines are currently based on small case series and expert opinion [11]. One-third (31.1%) of the participants had been screened before for cervical cancer compared to the national screening coverage of 12% as per the Kenya Demographic and Health Survey [12].

On speculum examination, 26 (8.4%) participants had cervicitis. There were two participants in whom a suspicious mass was seen. A biopsy was taken in both cases; one case showed squamous cell carcinoma of the cervix on histological examination (clinically staged at 1b2), delivered through cesarean section and referred for chemotherapy and radiation. The second participant and her histology result were lost to follow-up. Smith et al. [13] found 1.5–2 cases in 100,000 of cervical cancer in pregnancy. The study setting was in a developed country where cancer of the cervix is not a leading malignancy.

Study clinician VIA/VILLI findings showed that 35 (11.3%) of the participants had aceto-white lesions, and two (0.6%) presented with suspicious findings. Our findings are significantly higher than the prevalence of 2% found in pregnant population by Insinga et al. [14] using Pap smear. The difference might be attributed to the lower sensitivity of Pap smear as a screening method.

Adverse reaction as a result of the procedure included pain (3.8%), burning sensation (38.4%) and bleeding (0.7%). Two-thirds of the participants (68.3%) were comfortable with the procedure. Up to 306 (98.4%) of the screened participants acknowledged that they would recommend the test for their fellow pregnant women, 99.0% agreed that they would come back for a retest 6 weeks after delivery and 98.1% said that it was easy to participate in the study. Acceptability rate of VIA in this region was found by Orang'o et al. [15] to be lower (11.0%) among the non-pregnant women.

Conclusion

It is acceptable to use VIA to screen pregnant women for cervical cancer in low resource setting.

The rate of VIA positive was 11.3% among pregnant women. The commonest adverse reaction experienced by pregnant women undergoing VIA was burning sensation.

Recommendations

Cervical cancer screening using VIA method should be embraced in low resource settings as one of the integral tests in prenatal care of pregnant women up to a gestation of 22 weeks. We recommend a prospective comparative study to evaluate screening during antenatal and postnatal care.

Funding This study was funded by U54 project.

Compliance with Ethical Standards

Conflict of interest The authors declare no conflict of interest.

Ethical Approval A written consent was obtained from all the participants before enrollment into the study. The study was approved by the Institutional Research and Ethics Committee (IREC) of Moi

University/Moi Teaching and Referral Hospital. Authorization to conduct the study was obtained from the Administration of Moi Teaching and Referral Hospital.

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