Associated factors of positive visual inspection of cervix with acetic acid test among women screened for cervical cancer at public health facilities in Woliso town, Southwest Shoa, Ethiopia: A case–control study

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Abstract

Objectives: Screening for precancerous cervical lesions and providing access to effective treatment can significantly improve the likelihood of survival. To identify associated factors of positive visual inspection of the cervix with acetic acid test for precancerous cervical lesions among women screened for cervical cancer at public health facilities in Woliso Town, Southwest Shoa, Ethiopia.

Methods: A facility-based unmatched case–control study was conducted on 86 cases and 172 controls. Cases were women who had a positive result for the visual inspection of the cervix with acetic acid test, and controls were women with a negative result. Data were collected using a pretested structured questionnaire and organized using SPSS version 20. Descriptive analysis and logistic regressions were performed. The adjusted odds ratio with a 95% confidence interval was used, and statistical significance was declared at p-value <0.05.

Results: The study found that women aged 40–44 years (adjusted odds ratio = 4.11, 95% confidence interval (1.20–14.50)), greater or equal to five deliveries (adjusted odds ratio = 2.78, 95% confidence interval (1.39–5.56)), age at first birth less than 20 (adjusted odds ratio = 5.45, 95% confidence interval (1.41–21.04), age at first sexual intercourse less than 18 (adjusted odds ratio = 4.73, 95%, confidence interval (1.79–12.48)), ever used condom (adjusted odds ratio = 11.06, 95% confidence interval (3.93–31.14), having a history of sexually transmitted diseases (adjusted odds ratio = 4.05, 95% confidence interval (2.15–7.76), having a history of multiple sexual partners (adjusted odds ratio = 4.81, 95% confidence interval (1.37–16.90)), and being human immunodeficiency virus positive (adjusted odds ratio = 3.85, 95% confidence interval (1.68–8.83)) were associated factors of positive visual inspection with acetic acid test for precancerous cervical lesions.

Conclusion: Given the above-associated factors of positive visual inspection with acetic acid test for precancerous cervical lesions, the health facilities should target women with these factors and timely screen them with the application of acetic acid on the cervix.

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Introduction

Cervical cancer is the growth of abnormal cells in the lining of the cervix. The surface of the cervix is lined with squamous and columnar epithelium. Most cervical cancers arise from the squamocolumnar junction.[1,2] Cervical cancers arise from precursor lesions of the cervix called cervical intraepithelial neoplasia. They are the abnormal growth of cells in the transformation zone of the cervix.[2,3] Depending on the depth of cervical epithelium, precancerous cervical lesions are graded into mild dysplasia, moderate dysplasia, and severe dysplasia or carcinoma *in situ*. These precancerous lesions either regress or progress to cervical cancer over some years.[2,4]

Human papilloma virus (HPV) infection is the main risk factor for cervical cancer.[5,6] There are also other numerous associated factors such as sociodemographic factors, socioeconomic factors, sexual and reproductive health-related factors, medical or surgical comorbidities, and other factors that play different roles in the occurrence of precancerous cervical lesions and cervical cancer.[2,7–10]

Globally, there are different strategies to control the increase in the magnitude of cervical cancer. Screening for precancerous cervical lesions is one of these strategies.[1,2,9,10] There are different methods of cervical cancer screening including Papanicolaou smear, HPV DNA test, and visual inspection with acetic acid (VIA) methods. Screening with VIA in resource-limited settings is a commonly preferred method compared to HPV test and cytologic or Pap smear.[11,12] This is because it does not need more advanced testing requirements.[13]

In countries like Ethiopia, where the resource is scarce, prevention and timely diagnosis of precancerous cervical lesions is the single most effective way of maintaining the health of the community.[8,9] A cervical cancer screening program using VIA is among the different strategies Ethiopia is implementing.[8] Therefore, this study aimed to identify associated factors of positive VIA test for precancerous cervical lesions at public health facilities in Woliso town, Southwest Shoa, Ethiopia.

Methods

Study setting and period

The study was conducted in Woliso town, Southwest Shoa, Ethiopia. It is located in Oromia regional state and is 126 km away from Addis Ababa toward South West. The total number of women, in Southwest Shoa, aged greater than 15 years is 319,116. Southwest Shoa Zone has 2 Hospitals and 54 Health centers. Saint Luke Catholic Hospital and eight health centers are among the health facilities in Southwest Shoa, which provide cervical cancer screening with the application of acetic acid. This hospital was established in 2000 and provides comprehensive health services for approximately 1.5 million people. It started giving cervical cancer screening and treatment in 2015. The study was conducted from 1 September 2018 to 15 October 2018.

Study design

A facility-based unmatched case–control study design was employed for this study. To include as many variables as possible, matching was not carried out.

Study population

All screened women who were attending cervical cancer screening centers in Southwest Shoa Zone during the study period were between 30 and 49 years of age group. Cases were women screened positive for precancerous cervical lesions after application of acetic acid to the cervix. Controls were women screened negative for precancerous cervical lesions. Women who were severely ill and unable to communicate during data collection and women who were previously diagnosed with cervical cancer were excluded from the study.

Sample size determination and sampling procedure

The sample size was calculated by using Epi-Info based on the following assumption: 95% confidence level, power at 80%, the proportion of exposure (initiation of sexual intercourse before 16 years) of cases from a study done in Jimma Zone to be 44.3% with adjusted odds ratio (AOR) of 2.2[14] and case to control the ratio of 1–2. By adding a 10% nonresponse rate, the final sample size was 258 with 86 cases and 172 controls.

The health facilities (one hospital and eight health centers), which give routine cervical cancer screening using VIA, were purposely selected. The total sample size was allocated using probability proportionate to size according to the proportion of average monthly client flow reviewed from the report. The study subjects were selected consecutively from those screened with the application of acetic acid. For one case, we interviewed two controls.

Operational definitions

Precancerous lesion of the cervix: A premalignant lesion of the uterine cervix that can progress to cervical cancer if left untreated.

Visual inspection of the cervix with acetic acid: Screening method, which involves naked-eye inspection of the uterine cervix 1 min after application of a 3%–5% solution of acetic acid using a cotton swab.

Cases: The appearance of acetowhite areas in the transformation zone, close to the squamocolumnar junction, or the cervical os by VIA test.

Controls: The absence of acetowhite areas in the transformation zone, close to the squamocolumnar junction or the cervical os by VIA test.

Study variables

Dependent variable: VIA test result.

Independent variable: Sociodemographic characteristics, reproductive health characteristics, and sexual characteristics.

Data collection procedures

Data on sociodemographic, socioeconomic, reproductive, lifestyle, and sexual behavior were collected using a structured interviewer-administered questionnaire, which was developed by reviewing different works of literature.[8,13–23] A pretest was conducted on 5% of study participants (5 cases and 10 controls) at Woliso Health Center Number s1 and 2, which are located in Southwest Shoa. Ten nurse professionals were recruited and trained to collect data. All questionnaires were checked for completeness by the principal investigator.

Statistical analysis

Data were coded and then entered into SPSS version 20 for analysis. Categorical variables have been expressed as frequencies and percentages. The odds ratio (OR) along with their 95% confidence intervals (CIs) were calculated. All variables that had a *p*-value of <0.25 in the bivariate analysis were included in the multivariate logistic regression analysis model to determine the factors associated with precancerous cervical lesions.

Results

Sociodemographic characteristics of the study participants

A total of 86 cases and 172 controls from 30 to 49 years were interviewed making a response rate of 100%. Among the study participants, 30 (34.9%) of cases and 64 (37.2%) of controls were found to be in the age group of 35 to 39 years. Regarding marital status, 68 (79.1%) of cases and 153 (89.0%) of controls were married. During the study period, 44 (51.2%) of cases and 79 (45.9%) of controls, were never attended formal education (Table 1). Among study participants, 60 (69.8%) of cases and 111 (64.0%) of controls were housewives.

Reproductive health characteristics of study participants

Among the study participant, 67 (77.9%) of cases and 138 (80.2%) of controls had ever used hormonal type of

contraceptive methods. Fifty-three (61.6%) of cases and 73 (42.4%) of controls had five and more deliveries. Sixty-seven (78.8%) of cases and 94 (57.7%) of controls gave birth to the first child before the age of 20. Fifty-seven (66.3%) of cases and 80 (46.5%) of controls had a history of one or more abortions. Regarding the family history of cervical cancer of the study participants, only 4 (4.7%) of cases and 6 (3.5%) of controls had a family history of cervical cancer (Table 2).

Lifestyle and sexual characteristics of study participants

Among the study participants, no one had ever screened for precancerous cervical lesions. Eighty-two (95.3%) of cases and 170 (98.8%) of controls were nonsmokers. Sixty (69.8%) of cases and 57(33.1%) of controls had started practicing sexual intercourse before age 18. Twenty-nine (33.7%) of cases and 119 (69.2%) of controls were sometimes using a condom when having sexual intercourse, whereas 57 (66.3%) of cases and 53 (30.8%) of controls had never used a condom when having sexual intercourse. Twenty-seven (31.4%) of cases and 29 (16.9%) of controls had a history of pelvic infections. Forty-three (50.0%) of cases and 28 (16.3%) of controls had a history of sexually transmitted diseases (STDs). Seventy-eight (90.7%) of cases and 106 (61.6%) of controls had two or more sexual partners in their lifetime. Only 8 (9.3%) of cases and 66 (38.4%) of controls had only one sexual partner in their lifetime. Twenty-seven (31.4%) of cases and 12 (7.0%) of controls were human immunodeficiency virus (HIV) positive during the study period (Table 3).

Associated factors of positive VIA test for precancerous cervical lesions among study participants

All variables with a *p*-value <0.25 in the bivariate logistic regression analysis were entered into a multivariate logistic regression analysis model to control for possible confounders. All confounding factors have been adjusted for sociodemographic factors, lifestyle-related factors, and sexual and reproductive health-related factors. Being in the age group of 40–44 years, having five or more deliveries, starting practicing sexual intercourse before age 18, never using a condom when having sexual intercourse with sexual partners, having a history of STDs, having two or more lifetime sexual partners, and being HIV positive were factors found to be associated with positive VIA test for precancerous cervical lesions.

Being in the age group of 40–44 years were four times more at risk of being positive for the VIA test compared to those participants in 30–34 years (AOR=4.11, 95% CI (1.20–14.05)). Women who had five or more deliveries were two times more likely to have positive for the VIA test compared to those with no delivery experience (AOR=2.78, 95% CI (1.39–5.56)). Women who gave birth to their first

Table 1. Sociodemographic characteristics of study participants at public health facilities, Southwest Shoa, Ethiopia, 2018.

Variable	Precancerous cervical lesions	
	Case n (%)	Control n (%)
Age in years		
30–34	35 (40.7)	56 (32.6)
35–39	30 (34.9)	64 (37.2)
40–44	4 (4.7)	27 (15.7)
45–49	17 (19.8)	25 (14.5)
Marital status		
Married	68 (79.1)	153 (89.0)
Divorced	9 (10.5)	11(6.4)
Widowed	9 (10.5)	8 (4.7)
Age at marriage		
10–14	9 (10.5)	20 (11.6)
15–19	61 (70.9)	103 (59.9)
20–24	14 (16.3)	34 (19.8)
25–29	2 (2.3)	15 (8.7)
Educational status		
Unable to read and write	44 (51.2)	79 (45.9)
Read and write	7 (8.1)	10 (5.8)
Elementary(1–8 grade)	14 (16.3)	41 (23.8)
Secondary and above (9–12 grade)	9 (10.5)	27 (15.7)
Certificate and above	12 (14.0)	15 (8.7)
Ethnicity		
Oromo	58 (67.4)	110 (64.0)
Amhara	14 (16.3)	33 (19.2)
Tigrie	2 (2.3)	8 (4.7)
Gurageh	12 (14.0)	21 (12.2)
Average monthly income in USD		
<66	74 (86.0%)	143 (83.1%)
≥66	12 (14.0%)	29 (16.9%)

Table 2. Reproductive health characteristics of study participants at health facilities, Southwest Shoa, Ethiopia, 2018.

Variable	Precancerous cervical lesions	
	Case n (%)	Control n (%)
Ever used hormonal contraceptive methods		
Yes	67 (77.9)	138 (80.2)
No	19 (22.1)	34 (19.8)
Age at menarche		
<13 years	12 (14)	21 (12.2)
13–15 years	66 (76.7)	123 (71.5)
16–18 years	8 (9.3)	28 (16.3)
Parity(delivery experience)		
0	1 (1.2)	9 (5.2)
1–2	18 (20.9)	37 (21.5)
3–4	14 (16.3)	53 (30.8)
≥5	53 (61.6)	73 (42.4)
Age at first birth		
<20	67 (78.8)	94 (57.7)
≥20	18 (21.2)	69 (42.3)
Ever experienced abortion		
Yes	57 (66.3)	80 (46.5)
No	29 (33.7)	92 (53.5)
Family history of cervical cancer		
Yes	4 (4.7)	6 (3.5)
No	82 (95.3)	166 (96.5)

Table 3. Lifestyle and sexual characteristics of study participants at health facilities, Southwest Shoa, Ethiopia, 2018.

Variable	Precancerous cervical lesions	
	Case *n* (%)	Control *n* (%)
Ever Screened for cervical precancerous lesion		
Yes	0 (0)	0 (0)
No	86 (100)	172 (100)
Ever smokes		
Yes	4 (4.7)	2 (1.2)
No	82 (95.3)	170 (98.8)
Age at first sexual intercourse		
<18 years	60 (69.8)	57 (33.1)
≥18 years	26 (30.2)	115 (66.9)
Condom use		
Sometimes	29 (33.7)	119 (69.2)
Never	57 (66.3)	53 (30.8)
Ever had a history of pelvic infection		
Yes	27 (31.4)	29 (16.9)
No	59 (68.6)	143 (83.1)
Ever had a history of STDs		
Yes	43 (50.0)	28 (16.3)
No	43 (50.0)	144 (83.7)
Lifetime sexual partner		
One	8 (9.3)	66 (38.4)
Two or more	78 (90.7)	106 (61.6)
HIV status		
Positive	27 (31.4)	12 (7.0)
Negative	59 (68.6)	160 (93.0)

child before age 20 were five times more likely to have positive for the VIA test compared to those who gave birth at or after 20 (AOR = 5.45, 95% CI (1.41–21.04). Those participants who started practicing sexual intercourse before age 18 were four times more likely to have positive for the VIA test compared to those who started after 18(AOR = 4.73, 95%, CI (1.79–12.48)). Study participants who had never used a condom when having sexual intercourse were almost four times more likely to have positive for the VIA test compared to those who were using a condom(AOR = 11.06, 95% CI (3.93–31.14). Participants having a history of STDs (AOR = 4.05, 95% (CI (2.15–7.76), who had two or more lifetime sexual partners (AOR = 4.81, 95% CI (1.37–16.90)), and positive HIV status (AOR = 3.85, 95% (CI (1.68–8.83)) were more likely to have positive for the VIA test compared to their counterparts (Table 4).

Discussion

The objective of this study was to assess the associated factors of positive visual inspection of the cervix with acetic acid among women screened for cervical cancer at public health facilities in Woliso town, Southwest Shoa, Ethiopia. In this study, numerous associated factors of positive VIA tests were identified among women screened for cervical cancer.

Age is an important factor for cervical cancer.[2] In this study, older women, age at first sexual intercourse, and age at giving birth to the first child were determinants of the positive VIA test. Participants from the age group of 40–44 years were four times more likely to have a positive VIA test compared to participants from the age group of 30–34 years. This is similar to other studies in Ethiopia[8,15] and India.[7] This is possibly due to a long period of exposure to the HPV virus[8] and the time required for a precancerous cervical lesion to develop.[16] Similarly, starting sexual intercourse at an age less than 18 years was found to be an associated factor for the positive VIA test. This finding is consistent with a study conducted in Jimma Ethiopia,[14] Adama,[17] and Brazil.[18] This is because, at a young age, the cervix has an immature membrane, thus making it more susceptible to ontological agents, particularly high-risk types of HPV.[19]

In this study, having repeated deliveries was identified as an associated factor of a positive VIA test. Participants who had five or more deliveries were more likely to have positive VIA tests compared to those with no delivery experience. This is similar to a study conducted in southwest Ethiopia[14] and Tanzania.[20] This might be due to repeated cervical trauma during consecutive births and hormonal adjustment during and after pregnancies, which may create an entry point for the HPV virus.[20]

Table 4. Multivariate analysis of determents of positive VIA test at health facilities in Southwest Shoa, Ethiopia, 2018.

Variables	Precancerous cervical lesions		COR (CI 95%)	AOR (95% CI)	p-Value
	Case n (%)	Control n (%)			
Age of participants					
30–34	35 (40.7)	56 (32.6)	1.00	1.00	
35–39	30 (34.9)	64 (37.2)	1.33 (0.72–2.44)	1.22 (0.61–2.42)	0.352
40–44	4 (4.7)	27 (15.7)	4.21 (1.36–13.08)	4.11 (1.20–14.05)	0.013*
45–49	17 (19.8)	25 (14.5)	0.91 (0.43–1.94)	1.221 (0.44–3.34)	0.825
Parity (delivery experience)					
0	1 (1.2)	9 (5.2%)	1.00	1.00	
1–2	18 (20.9)	37 (21.5%)	0.22 (0.027–1.94)	6.31 (0.77–51.38)	0.177
3–4	14 (16.3)	53 (30.8)	0.42 (0.49–3.60)	1.61 (0.81–3.17)	0.423
≥5	53 (61.6)	73 (42.4)	0.15 (0.019–1.24)	2.78 (1.39–5.56)	0.011*
Age at first birth					
<20 years	67 (78.8)	94 (57.7)	2.73 (1.49–5.009)	5.45 (1.41–21.04)	0.001*
≥20 years	18 (21.2)	69 (42.3)	1.00	1.00	
Age at first sexual intercourse					
<18 years	60 (69.8)	57 (33.1)	4.65 (2.66–8.14)	4.73 (1.79–12.48)	<0.001*
≥18 years	26 (30.2)	115 (66.9)	1.00	1.00	
Condom use					
Sometimes	29 (33.7)	119 (69.2)	1.00	1.00	
Never	57 (66.3)	53 (30.8)	4.41 (2.54–7.66)	11.06 (3.93–31.1)	<0.001*
History of STDs					
Yes	43 (50.0)	28 (16.3)	5.14 (2.86–9.23)	4.05 (2.15–7.76)	<0.001*
No	43 (50.0)	144 (83.7)	1.00	1.00	
Lifetime sexual partner					
One	8 (9.3)	66 (38.4)	1.00	1.00	
Two or more	78 (90.7)	106 (61.6)	6.07 (2.75–13.37)	4.81(1.37-16.90)	<0.001*
HIV status					
Positive	27 (31.4)	12 (7.0)	6.10 (2.90–12.82)	3.85(1.68-8.83)	<0.001*
Negative	59 (68.6)	160 (93.0)	1.00		

*$p < .05$.

In this study, having multiple sexual partners, not using a condom, and complications from these (STD and HIV positive mothers) were identified as associated factors of positive VIA test among women screened for cervical cancer. Participants who never used a condom during sexual intercourse were 11 times more likely to have a positive VIA test. This is because of the protective effect of condoms from sexually transmitted infections like HPV. Having a history of STDs was one of the associated factors having a positive VIA test. This is consistent with studies conducted in Ethiopia,[8,14,16] and Zimbabwe.[21] This could be related to the fact that women with a history of STD had a higher risk of being infected by the human Papillomavirus.[22] Similarly, HIV-positive participants were more likely to have positive VIA tests compared to their counterparts. This is similar to findings from Ethiopia,[8,9,14,16] and South Africa.[23] This is due to the effect of HIV on the immune system. Participants who had multiple sexual partners were more likely to have a positive VIA test. This finding is consistent with other studies in Ethiopia[14,16,17] and India.[7] This could be due to having multiple sexual partners increasing the risk of infection with high-risk human papillomavirus.

Limitations of the study

This study is conducted on selected health facilities and is thus difficult to generalize for the general population. The pretesting of the survey does not equate to field testing in terms of validating responses. The other limitation was the relatively small sample size, which could lead to high-risk type two errors. In this study, participants were interviewed after the screening procedure. Thus, disclosure or recall bias might also be the other possible limitation. The lack of HPV DNA testing in the study area is also another limitation.

Conclusion

Given the above-associated factors of precancerous cervical lesions, the health facilities should target women with these factors and timely screen them with the application of acetic acid.

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