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Research Article

Precancerous Cervical Lesion and Associated Factors Among Women on Antiretroviral Therapy at Public Health Facilities in Hawassa City, Southern Ethiopia, 2024

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Abstract

Background: Cervical cancer is a malignant neoplasm that originates in the cells of the cervix, the lower part of the uterus. Early detection and appropriate treatment make it one of the most preventable malignant diseases. A precancerous cervical lesion (PCCL) is an abnormality in the cervix's cells that have the potential to progress to cervical cancer. These pathological alterations could be early warning signs of cancer. Its primary cause was a persistent infection with human papillomavirus, which is an infection acquired during sexual relations. It is more intensified among patients living with HIV/AIDS. Women infected with HIV shown a median three-fold higher incidence of cervical lesions than uninfected women. *Objective*: To assess the magnitude of PCCL and associated factors among women on Antiretroviral therapy (ART) at Public Health Facilities in Hawassa, Southern Ethiopia, 2024. *Methods*: A facility based cross-sectional studies was conducted from July15 to August 30, 2024, by using a structured interviewer administered questionnaires. A systematic random sampling technique was used to enroll a total of 402 study subjects. The data were coded, cleaned, and entered into Epidata 3.1 and exported to SPSS 26 for analysis. Bivariate and multivariable logistic regressions were used to determine the presence and the degree of association between dependent and independent variables. Finally, independent variables with a P-value < 0.05, was considered as variable has statistically significant association. *Result*: The magnitude of PCCL was 20.4% with 95% CI (17.79 - 23.37). The odds of developing PCCL among women who have one sexual partner in life time were decreased by 71% (AOR= 0.29, 95% CI: 0.13 - 0.63) as compared to women have multiple partners. Women who smoke cigarettes were 5.6 times more likely to have PCCL compared as those who did not smoke (AOR=5.57, 95% CI: 2.10-14.74). Likelihoods of having PCCL among women who rural residence was 8.6 times more likely to develop PCCL compared with to those women from urban residence (AOR=8.58, 95%CI: 3.11 -23.66). Also, women who had a previous history of STI were 1.94 times as likely to develop PCCL as those who had not previous history of STI (AOR=1.94, 95%CI: 1.14 - 3.32). *Conclusion*: This study found that about one-fifth of HIV-positive women developed PCCL. According to this study, there was a significant association between PCCL among HIV-positive women and having history of STI, having multiple sexual partners, Cigarette smoking and rural residence. In order to reduce PCCL, policy makers and concerned bodies should pay particular attention to this issue.

Keywords

Precancerous Cervical Lesion, Associated Factors, ART Patients

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1. Introduction

Cervical cancer is a malignant neoplasm that originates in the cells of the cervix, the lower part of the uterus [1]. It is one of the most preventable malignant diseases when early detected and treated adequately [2-4]. A precancerous cervical lesion (PCCL) is an abnormality in the cells of the cervix that could eventually develop into cervical cancer. Its primary cause was a persistent infection with human papilloma virus (HPV) which is the most common infection acquired during sexual intercourse [3, 5-7].

The PCCL are considered to be more intensified among patients living with HIV/AIDS. Women infected with HIV shown a median three-fold higher incidence of cervical lesions than uninfected women [8]. One in four HIV-positive women were developed PCCL in Sub-saharan Africa [9]. The magnitude of PCCL among HIV positive women varies across Ethiopia including 7.5% in Addis Ababa [10], 18.7% in Southwest Ethiopia [11] and 22.1% in South Ethiopia [12]. It is recommended to initiate screening at the time of HIV diagnosis irrespective of their age following sexual exposure. Also, it is advised to conduct screenings every five years [13].

The global strategy to fast-track the eradication of cervical cancer by 2030 includes the following targets for each of the three pillars: achieving 90% HPV vaccination coverage for eligible girls, attaining 70% screening coverage with a high-performance test, and ensuring that 90% of women with a positive screening test receive appropriate management [14].

The World Health Organization (WHO) recommends priority targeting the HPV vaccine for girl's ages 9–13 years. Screening and prompt treatment are the most effective methods to reduce the chance of women already exposed to the virus from developing cervical cancer [15, 16]. These preventive strategies are considered highly cost-effective in the fight against cervical cancer [13, 14]. The WHO recommends screening program through visual inspection with acetic acid (VIA) in low-resource settings to overcome this situation [17, 18, 14]. It is one of the screening modalities for PCCL, which provides quick results and helps to get early treatment [13, 19].

Many studies tried to assess factors associated with PCCL among general populations. But, it is poorly understood about factors associated with PCCL among HIV positive women. Identifying factors associated with PCCL among HIV positive women in the study area; play a crucial role in designing specific and cost-effective intervention strategies. Also, it helps to reduce the morbidity and mortality of the women through designing intervention strategies. Therefore, this study aimed to assess the magnitude of PCCL and associated factor among HIV Positive women on ART in Hawassa city public health facilities.

2. Method and Materials

2.1. Study Area

The study was conducted at public health facilities in Hawassa city, the capital of the Sidama regional state and located 275 km away from Addis Ababa. There are four public hospitals and seven health centers in the city administration from which only five health facilities provide ART services; they are Hawassa University compressive specialized (HUCS) hospital, Adare general hospital, Tulla general hospital, Motite Fura primary hospital and Millennium health center. According to the city health department health information management system (HIMS) report, of 6095 HIV-infected people on ART follow-up in the health facilities at Hawassa city, 3654 were adult women. The study was conducted from July 15 to August 30, 2024.

2.2. Study Design

Facility based cross sectional study.

2.3. Source and Study Population

2.3.1. Source Population

All HIV positive women on ART attending public hospital in Hawassa city administration.

2.3.2. Study Population

All women on ART attending randomly selected public health facilities in Hawassa city administration.

2.4. Eligibility Criteria

2.4.1. Inclusion Criteria

All HIV positive women on ART at public health facilities in Hawassa City administration.

2.4.2. Exclusion Criteria

HIV positive women on ART at public health facilities who are severely ill and unable to speak were excluded from the study.

2.5. Sample Size and Sampling Technique

Sample size was calculated by using single population proportion formula by considering the following assumptions: 18.7% Magnitude of PCCL among HIV positive women in South West Ethiopia [11], 4% margin of error, 95% confidence level (1.96) and 10% for possible non-response rate, calculated as following.

$$n = \frac{(Z\alpha/2)^2 \ P(1-P)}{d^2}$$

$$n = \frac{(1.96)^2 \ 0.187(0.813)}{(0.04)^2} = 365$$

Finally, 10% was added for compensating possible non-response rate. A total sample size was assumed to be 402.

The study was conducted on four randomly government hospitals; HUCS Hospital, Adare General Hospital, Tulla General Hospital and Motite Fura Primary Hospital. There are 3,584 women on the ART follow-up reported in four health facilities. The total sample size was distributed across selected hospitals using proportionally to the patient. Systematic random sampling techniques were used to select each study participant. The sampling interval (k=N/n = 3584/402 =8.9 ≈ 9) was consistent across all hospitals. The first client was selected randomly, and then every ninth client within the study period was participated in the study. The ART registration book was used to obtain participants information.

2.6. Study Variables

2.6.1. Dependent Variable

Precancerous cervical lesion (Yes/No).

2.6.2. Independent Variables

Age, Residence, Education status, Occupation, marital status, Age at menarche, Age at first marriage, Parity, Age at first sexual intercourse, Age at first birth, Base line CD4 count, WHO clinical staging, Duration of ART, HAART Adherence, Viral load, Multiple sexual partners, Smoking history, Current smoking, Family history of cervical cancer, History of STD, Alcohol drinking, Partner History of STI.

2.7. Data Collection and Quality Control

Data were collected using structured interviewer-administered questionnaire and data abstraction checklists. The data collection tool was developed by reviewing existing literature and modified according to the specific objectives of this study. Initially, the tool was prepared in English and translated into Amharic by language experts, retranslated the tool back into English to assess tool consistency, language clarity and accuracy. Data were collected by face-to-face interview using a structured and pre-tested questionnaire. Four nurses were recruited as data collectors and two supervisors were recruited to supervise data collection process.

The data collection tool was pre-tested on 5% of the sample in Millennium Health Center one week prior to data collection to identify any necessary adjustments required for the data collection tool. Depending on the result of pretest, correction and modification were done on questionnaires before applying on the study population. For data collectors and supervisor one-day training was provided on the study's purpose, questionnaire details, data handling and maintaining respondent confidentiality. Relevant experts were reviewed the data collection to ensure it aligns with the study objective. During the data collection process, the principal investigators and supervisors closely supervise and monitor the procedure on the daily basis.

2.8. Data Processing and Analysis

The completed data were coded, cleaned and entered into a computer using EPI-data 3.1 and exported to the SPSS version 26 windows programs for additional analysis. Bivariable logistic regression analysis was used to identify candidate variables for multivariable logistic regression at P-value of ≤ 0.25. The strength of association was determined using multivariable logistic regression at p-value < 0.05 and Adjusted Odd Ratio (AOR) with 95% CI. Assumptions of logistic regression were checked before the final multivariable analysis.

2.9. Operational Definitions

1) PCCL positive: When an acetowhite lesion with well-defined margins is observed within the vicinity of the transformation zone, and/or if the whole cervix turned white by VIA screening (VIA positive for the precancerous cervical lesions) [20].
2) PCCL negative: when there is no acetowhite lesion on the surface of the cervix by VIA screening (VIA negative for the precancerous cervical lesions [20].

2.10. Ethical Consideration

Ethical clearance was obtained from Institutional Research Ethical Review Committee (IRERC) of Pharma college school of graduate studies. A formal letter was written to each health facility from Hawassa city health department. Informed verbal consent was obtained from each study participant to confirm willingness for participating after explaining the objective of the study. To keep the privacy, each of the respondents was interviewed separately in a quiet room prepared for this purpose. The respondents were assured that neither the data collectors nor the supervisors would have access to their responses.

3. Results

3.1. Socio-demographic Characteristics

The final analysis was thus based on data obtained from 397 (98.7%) of the study participants. The mean age of the study participants was 38 years (SD±8.2). The majority of respondents 374 (94.2%) were urban residents. About 171 (43.1%) women living with HIV attend primary education. Near to half 173 (43.6%) of them were married. About 171 (43.1%) were attended primary school level. One-third 128

(32.2%) of respondents were housewives and 79 (19.9%) had monthly income of less than 1500 ETB.

Table 1. Socio-demographic characteristics of participants in Hawassa, Southern Ethiopia, 2024.

Variables	Frequency (n)	Percentage (%)
Age in years (N=397)		
≤35	147	37
>35	250	63
Residence (N=397)		
Urban	23	5.8
Rural	374	94.2
Marital Status (N=397)		
Single	113	28.5
Married	173	43.6
Divorced	78	19.6
Separated	21	5.3
Widowed	12	3.0
Educational Status (N=397)		
No formal education	51	12.8
Primary	171	43.1
Secondary	105	26.4
College and above	70	17.6
Family income in birr (N=397)		
≤1500	79	19.9
1501–3000	60	15.1
3001–4500	58	14.6
>4500	200	50.4
Occupation (N=397)		
Employer	33	8.3
Housewife	128	32.2
Merchant	106	26.7
Daily laborer	45	11.3
Student	80	20.2
other	5	1.3

3.2. Sexual and Reproductive Health Characteristics

The mean age at first sexual intercourse was 18.86 (SD±3.24) years. Three-fourth 300 (75.2%) of the study participants had given birth at least once. Majority 357 (89.9%) were ever used contraceptive methods. About 25 (6.3%) women had experience abortion at least once in their life time. Almost two-thirds 288 (72.5%) of the participants had a regular menstrual pattern and 35 (8.8%) had history of Post coital bleeding. About 300 (75.6%) studies participants had birth history. About 24 (6.04%) of the respondents had Family history of cervical cancer.

Table 2. Sexual and RH characteristics of participants at Hawassa, Southern Ethiopia, 2024.

Variables	Frequency (N)	Percentage (%)
Age at menarche		
<12	30	7.6
12-13	330	83.1
≥14	37	9.3
Age at first sexual intercourse		
<15	13	3.3
15-17	136	34.3
≥8	248	62.5
History of contraceptive use (N=397)		
Yes	357	89.9
No	40	10.1
Contraceptive type (N=357)		
Pills	94	26.3
Injectable	208	58.3
Implant	37	10.4
Other *	18	5
History abortion (N=397)		
Yes	25	6.3
No	372	93.7
Frequency of abortion (N=25)		
1	15	60
≥2	10	40
Menstrual Pattern (N=397)		
Regular	288	72.5
Sometimes Irregular	66	16.6
Always irregular	19	4.8
No Menses	24	6
Post coital bleeding (N=397)		
Yes	35	8.8

Variables	Frequency (N)	Percentage (%)
No	362	91.2
Birth history (N=397)		
Yes	300	75.6
No	97	24.4
Number of child (N=300)		
1-4	289	96.3
≥5	11	3.7
Family history of cervical cancer (N=397)		
Yes	24	6.04
No	373	93.9

*Other includes IUCD, Condom and Calendar method

3.3. Lifestyle and Behavioral Characteristics

About 22 (5.5%) of study participants had a history of cigarettes smoking. One-fifth 75 (18.9%) of study participants had a history of drinking alcohol. Three-fourth 298 (75%) study participants had more than one sexual partner in a life-time. Only 43 (10.8%) study participants responded that their Partner had other partner than them.

Table 3. *Lifestyle and behavioral characteristics of participants at Hawassa, Southern Ethiopia, 2024.*

Variables	Frequency (n)	Percentage (%)
History of smoking (N=397)		
Yes	22	5.5
No	375	94.5
Frequency of smoking (N=22)		
Sometimes	5	22.7
frequently	11	50
Always	6	27.3
History of alcohol drinking (N=397)		
Yes	75	18.9
No	322	81.1
Condom use (N=397)		
Always	230	57.9
Sometimes	149	37.5
Never	18	4.5
Life time sexual partner (N=397)		
One	99	25
Multiple	298	75
Does your Partner have other partner than you? (N=397)		
Yes	43	10.8
No	354	89.2
Number of partners' sexual partners (N=43)		
One	16	37.2
Multiple	27	62.8

3.4. Clinical and Immunological Characteristics

The majority 378 (95.2%) of the respondents had been screened for cervical cancer before, and none of them were positive. Mean baseline CD4 count of the participants while initiating HAART was 180.26 copies/mm3 (SD ±31.3) and the recent mean CD4 count was 360.36 copies/mm3 (SD ±93.95). More than half 202 (50.9%) of the participant had a history of STIs. About 320 (80.6%) of the respondents had more than two-year ART Follow up duration. About 342 (86.1%) had recent viral load of <1000 (copy/ml), 322 (81.1%) were categorized under of stage 1 and 375 (94.5%) had good drug adherence history. One-fifth 81 (20.4%) were found to be PCCL positive by VIA test.

Table 4. *Clinical and Immunological characteristics of participants at Hawassa, Southern Ethiopia, 2024.*

Variables	Frequency (n)	Percentage (%)
Previously screened for cervical lesion (N=397)		
Yes	378	95.2
No	19	4.8
Previous history of partners' STI status (N=397)		
Yes	202	50.9
No	195	40.1
PID history (N=202)		
Yes	143	70.8
No	59	29.2
Genital ulcer (N=202)		
Yes	68	33.7
No	134	66.3
When did you Diagnosed HIV? (N=397)		
1-24 months	11	2.8
25-48 months	57	14.4

Variables	Frequency (n)	Percentage (%)
>48 Months	329	82.9
ART Follow up duration (N=397)		
1-24 months	13	3.3
25-48 months	64	16.1
>48 Months	320	80.6
Baseline CD4 Count (N=397)		
<200	314	79.1
≥200	83	20.9
Recent CD4 count (N=397)		
<200	62	15.6
≥200	335	84.4
Viral load (copy/ml) (N=397)		
<1000	342	86.1
≥1000	55	13.9
Drug adherence (N=397)		
Good	375	94.5
Poor	22	5.5
Clinical stage (N=397)		
Stage 1	322	81.1
Stage 2	45	11.3
Stage 3	17	4.3
Stage 4	13	3.3
PCCL VIA test result (N=397)		
Positive	81	20.4
Negative	316	79.6

3.5. Factors Associated with Precancerous Cancerous Cervical Lesions

In Bivariable logistic analysis variables such as Residence, Smoking, Number of lifetime sexual partners and History of STI were variables significantly associated with precancerous cancerous cervical lesions at p-value ≤ 0.25. After controlling the effect of other confounding factors on multivariable analysis, Residence, Smoking, Number of lifetime sexual partners and Previous history of STI were found to be significantly associated with PCCL at p-value < 0.05. The odds of developing PCCLs among women who have one life time sexual partners were decreased by 71% (AOR= 0.29 95% CI: 0.13 - 0.63) as compared to women have multiple lifetime partners. Women who smoke cigarettes were 5.6 times more likely to have PCCL compared as those who did not smoke cigarettes (AOR=5.5795%CI: 2.10-14.74). Likelihoods of having PCCL among women who rural residence was 8.6 times more likely to develop PCCLs compared with to those women from urban residence (AOR=8.58: 95%CI: 3.11 -23.66). Similarly, women who had history of STI were 1.94 times as likely to develop PCCL as those who had no history of STI (AOR=1.94: 95%CI: 1.14 - 3.32).

Table 5. Logistic regressions for factors associated with magnitude of PCCL at Hawassa, Southern Ethiopia, 2024.

Variables	PCCL		COR (95%CI)	AOR (95%CI)	P-value
	Positive	Negative			
Smoking					
Yes	13	9	6.52 (2.68 - 15.87)	5.57 (2.10-14.74)	0.001
No	68	307			
Number of sexual partners					
One	13	86			
Multiple	68	230	0.51 (0.27 -0.97)	0.29 (0.13-0.63)	0.002
Residence					
Rural	14	9	7.13 (2.96 - 17.15)	8.58 (3.11-23.66)	0.000
Urban	67	307			
Previous history of STI					
Yes	51	151	1.86 (1.12 - 3.07)	1.94 (1.14-3.32)	0.015

Variables	PCCL		COR (95%CI)	AOR (95%CI)	P-value
	Positive	Negative			
No	30	165			

4. Discussion

The magnitude of PCCLs among HIV-positive women was 20.4% with 95% CI (17.79 - 23.37). The result is comparable with study conducted in Northwest Ethiopia 20.2% [21] and Southern Ethiopia 18.7% [11]. Similar result was reported in this study could be used of similar screening methods and similar social structure. The magnitude of PCCL was Lower than study conducted Tanzania 26.8% [22], Kenya 26.7% [23] and Northwest Ethiopia 24.48% [24]. The possible reason for the observed discrepancy might be due to socio demographic characteristics, sexual practices of the study participants, screening methods, availability and accessibility of the VIA test. The other explanation might be these studies conducted in urban settings, and they might have access to information and this might lead them to have early screening for the PCCLs. The magnitude of PCCL was higher than study carried out in Cameroon 12.2% [25], Dukem Central Ethiopia 16% [26], Amhara Region 9.9% [27] and systematic review 15.34% [28], Central Ethiopia 15.7% [29], Addis Ababa 14.1% [30].

The observed variations in the magnitude of PCCL could be potentially attributed to differences in socio-demographic and clinical characteristics of study population. Most of these studies included general population, whereas the present study exclusively focused on HIV patients. The HIV-positive individuals are known to be at a higher risk of developing PCCL due to factors such as compromised immune function and a higher magnitude of persistent HPV infection.

This study showed that the odds of developing PCCL among women who had a history of STI were 1.94 times higher odds than those women who had no history of STI. The possible reason could be the co-infection of STIs with HPV, which severely affects immune compromised women and makes them vulnerable to other opportunistic infections. This is in harmony with studies conducted in Uganda [31], Systematic review and meta-analysis [28, 32], Northwest Ethiopia [21], Addis Ababa [10], Northwest Ethiopia [33] and Southern Ethiopia [34], Central Ethiopia [29], Dukem Central Ethiopia [26], Addis Ababa [30]. Majority of evidence suggested that cervical cancer is caused by a viral infection, and which spreads through sexual contact. Often, patients with STI have a history of multiple sexual partners, which increases their exposure to HPV a primary cause of PCCL.

The present study found that those who had one lifetime sexual partner were 71% times less likely to develop PCCL than those having multiple partners. The result was comparable with studies conducted in Amhara Region [27], Northwest Ethiopia [21], Northwest Ethiopia [33], Southern Ethiopia [34] and Systematic review and meta-analysis [28, 32], Dukem Central Ethiopia 16% [26], Addis Ababa [30]. Also it is supported by studies conducted in different parts of world [22, 35]. The possible explanations might be those women who had multiple sexual partners could develop PCCL because of the number of sexual partner's increases they become more prone to acquiring the HPV infection, which is the causative agent for cervical cancer.

Women who had history of smoking were 5.57 times more likely to have PCCL than those who did not have history of smoking. The result is comparable with previous studies conducted in Japan [36] and Southern Ethiopia [37]. Smoking inhibits the immune response to HPV and infected cells are exposed to smoking carcinogens that cause DNA damage [38, 39].

According to the results of the present study the odds of developing PCCL among women who from rural residence was 8.6 times higher odds than those women who from urban residence. The result is parallel with previous studies done in Northwest Ethiopia [24], Northwest Ethiopia [33]. Urban residents may have a better awareness of the importance of early screening and treatment [31, 40, 41].

5. Conclusion

The present study identified relatively high magnitude of PCCL (20.4%) among HIV positive women screened though VIA test. The study found that Residence, Smoking, Number of lifetime sexual partners, and history of STI were significantly associated with PCCL. This result highlights need action at prevention of the acquisition of the STI, decreasing the number of sexual partners, avoids cigarette smoking and awareness creation to rural community. In order to reduce PCCL, policy makers and concerned bodies should pay particular attention to this issue.

Abbreviations

AOR	Adjusted Odd Ratio
ART	Anti-Retroviral Therapy
COR	Crude Odd Ratio
PCCL	Pre-Cancerous Cervical Lesions

STI	Sexual Transmitted Infection
VIA	Visual Inspection with Acetic Acid

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Author Contributions

Mihretu Yonas: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Solomon Tesfaye Doelaso: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

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Data Sharing Statement

The data used to support the findings of this study are available from the corresponding author up on request.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] NCI., What is Cervical Cancer? 2023. 2024, National Cancer Institute WHO.

[2] WHO., Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020, World Health Organization: Geneva.

[3] WHO., Comprehensive Cervical Cancer Control: A Guide to Essential Practice., n. edition, Editor. 2014, World Health Organization.

[4] Nkfusai NC., et al., Prevalence of precancerous cervical lesions in women attending Mezam Polyclinic Bamenda, Cameroon. Pan Afr Med J., 2019. 32: p. 1-12.

[5] Menon S., Rossi R., and Z. N., Associations between highly active antiretroviral therapy and the presence of HPV, premalignant and malignant cervical lesions in sub Saharan Africa, a systematic review: current evidence and directions for future research. BMJ Open, 2017. 7(8).

[6] Bloem P. and O. I., Vaccination to prevent human papillomavirus infections: from promise to practice. PLoS Med., 2017. 14(6).

[7] Abraham AG., D'Souza G., and J. Y., Invasive cervical cancer risk among HIV-infected women: a North American multicohort collaboration prospective study. J Acquir Immune Defic Syndr, 2013. 62(4): p. 405-413.

[8] Frick C., et al., Quantitative estimates of preventable and treatable deaths from 36 cancers worldwide: a population-based study.. The Lancet Global health, 2023. 11(11): p. 1700-12.

[9] WHO., Strategic planning for cervical cancer prevention and control in Africa. Training manual - CC BY-NC-SA 3.0 IGO. Participants manual. Baseline Report, 2014.. 2017, World Health Organization: Brazzaville.

[10] Zelalem W., et al., Precancerous Cervical Lesion Among Adult Women With Human Immune Deficiency Virus on Anti Retroviral Therapy At Saint Peter Specialized Hospital, Ethiopia: A Hospital-Based Cross Sectional Study. Front. Oncol., 2022. 12.

[11] Lemu LG., et al., Precancerous cer vical lesions among HIV-Infected women attending HIV Care and Treatment clinics in Southwest Ethiopia: a cross-sectional study. Int J Womens Health, 2021. 13(2): p. 297–303.

[12] Gedefaw A., Astatkie A., and T. GA., The Prevalence of Precancerous Cervical Cancer Lesion among HIV-Infected Women in Southern Ethiopia: A Cross-Sectional Study. PLOS ONE, 2013. 2(12). https://doi.org/10.1371/journal.pone.0084519

[13] FMOH., Guideline for Cervical Cancer Prevention and Control in Ethiopia.. 2015, Federal Ministry Health Ethiopia: Addis Ababa.

[14] WHO., Guideline for screening and treatment of cervical pre-cancer lesions for cervical cancer prevention. 2021, World Health Organization: Geneva.

[15] Kristina SA., Endarti D., and A. H., Global Cancer Facts and Figures t. Edition., Editor. 2018, American Cancer Society. p. 138-144.

[16] Torre LA., et al., Global cancer in women: burden and trends. Cancer Epidemiol Biomarkers Prevent., 2017. 26(4): p. 444-457.

[17] Bray F., et al., Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin., 2018. 68(6): p. 394-424.

[18] Jemal A., Bray F., and F. J., Global cancer statistics: 1999. CA Cancer J Clin., 2011. 49(2): p. 133-164.

[19] Roura E., Castellsagué X., and P. M., Smoking as a major risk factor for cervical cancer and pre-cancer: results from the EPIC cohort. Int J Cancer., 2014. 135(2): p. 453-466.

[20] Teame H., et al., Factors associated with cervical precancerous lesions among women screened for cervical cancer in Addis Ababa, Ethiopia: A case control study. PloS one, 2018. 13(1).

[21] Kassa LS., et al., Precancerous lesions of cervix among women infected with HIV in Referral Hospitals of Amhara Region, Northwest Ethiopia: a cross sectional study. African Health Sciences, 2019. 19(1).

[22] Kafuruki L., Rambau PF., and M. A., Prevalence and predictors of cervical intraepithelial neoplasia among HIV infected women at Bugando Medical Centre, Mwanza-Tanzania. Infect Agent Cancer, 2013. 8(45).

[23] Memiah P., Mbuthia W., and K. G., Prevalence and risk factors associ ated with precancerous cervical cancer lesions among HIV-infected women in resource-limited settings. AIDS Res Treat., 2012.

[24] Worku E., et al., Prevalence and risk factors associated with precancerous and cancerous cervical lesions among HIV-infected women in University of Gondar specialized comprehensive referral hospital, Northwest Ethiopia: cross-sectional study design. BMC Women's Health, 2024. 24(322).

[25] Ngwayu CN., Prevalence of precancerous cervical lesions in women attending Mezam Polyclinic Bamenda, Cameroon. Pan Afr Med J., 2019. 32: p. 174.

[26] Lemma TM., et al., Precancerous cervical lesions and associated factors among women on antiretroviral therapy at Dukem Health Center, Central Ethiopia: A cross-sectional study. Health Sci. Rep., 2024. 7: p. 1972.

[27] Belayneh T., Mitiku H., and W. F., Precancerous cervical lesion and associated factors among HIV-infected women on ART in Amhara Regional State, Ethiopia: a hospital-based cross-sectional study. Int J Health Sci., 2019. 13(3): p. 4-9.

[28] Ferede YA., Tassew WC., and Z. AM, Precancerous cervical lesion and associated factors among HIV-infected women in Ethiopia: systematic review and meta-analysis. BMC Cancer, 2024. 24(678).

[29] Merera D. and J. GH., Precancerous Cervical Lesions and Associated Factors Among Women Attending Cervical Screening at Adama Hospital Medical College, Central Ethiopia. Cancer Management and Research, 2021. 13: p. 2181–2189.

[30] Temesgen T., Adhena G., and F. Z., Precancerous Cervical Lesion Among Women in Public Hospitals of Addis Ababa, Ethiopia. Cancer Research Journal, 2020. 8(4): p. 94-99.

[31] Izudi J. and A. N., Precancerous Cervix in Human Immunodeficiency Virus Infected Women Thirty Years Old and Above in Northern Uganda.. J Oncol., 2016.

[32] Zena D., Elfu B., and M. K., Prevalence and Associated Factors of Precancerous Cervical Lesions among Women in Ethiopia: A Systematic Review and Meta-Analysis. Ethiop J Health Sci., 2021. 31(1): p. 189.

[33] Getinet M., et al., Precancerous Lesions of the Cervix and Associated Factors among Women of East Gojjam, Northwest Ethiopia, 2020. Cancer Management and Research, 2021. 13 p. 9401–9410.

[34] Tenkir L, et al., The magnitude of precancerous cervical lesions and its associated factors among women screened for cervical cancer at a referral center in southern Ethiopia. a cross-sectional study. Glob. Womens Health 2023. 4(4).

[35] Ononogbu U., et al., Cervical cancer risk factors among HIV-infected Nigerian women.. BMC Public Health, 2013. 13(582).

[36] Sugawara Y., et al., Cigarette smoking and cervical cancer risk: an evaluation based on a systematic review and meta-analysis among Japanese women. Japanese Journal of Clinical Oncology, 2019. 49(1): p. 77–86.

[37] Teka T, et al., Magnitude and Factors Associated with Precervical Cancer among Screened Women in Southern Ethiopia. Hindawi, 2019.

[38] Castle PE., et al., How does tobacco smoke contribute to cervical carcinogenesis? Journal of Virology, 2008. 82(12): p. 6084–6.

[39] Samina A., The cigarette smoke carcinogen benzo pyrene enhances human papilloma virus. 2008. 82(2): p. 1053.

[40] Nkfusai NC., Prevalence of precancerous cervical lesions in women attending Mezam Polyclinic Bamenda, Cameroon. Pan African Medical Journal 2019. 32: p. 174.

[41] Fentie AM. and T. TB., Factors affecting cervical cancer screening uptake, visual inspection with acetic acid positivity and its predictors among women attending cervical cancer screening service in Addis Ababa, Ethiopia. BMC Womens Health, 2020. 20(1): p. 147.