RESEARCH ARTICLE

Editorial Process: Submission:05/06/2023 Acceptance:08/17/2023

Awareness, Knowledge and Attitude Regarding Cervical Cancer among Women Living with HIV in the Souss-Massa Region, Southern Morocco: A Cross-Sectional Study

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Abstract

Background: Human immunodeficiency virus- positive women have an increased risk of precancerous lesions and invasive cervical cancer. This study aims to identify the level of awareness/knowledge and attitudes toward cervical cancer among women living with Human immunodeficiency virus in the region of Souss-Massa in southern Morocco. **Methods:** This is a multicenter cross-sectional study conducted in the Souss-Massa region (southern Morocco) among women attending Human immunodeficiency virus treatment and care centers between March 2022 and September 2022. A questionnaire was used for data collection. The Chi-square test and logistic regression were deployed to identify factors associated with cervical cancer awareness among the target population. **Results:** A total of 494 respondents to the questionnaire, 440 (89.1%) are aware of cervical cancer. Nevertheless, 405 (82.0%) and 369 (74.7%) were unaware of cervical cancer risk factors and symptoms, respectively. Only 125 (25.3%) knew the exact frequency of cervical cancer screening among Human immunodeficiency virus positive women, whereas 221 (44.7%) had ever been tested for cervical cancer. Factors associated with women's awareness of cervical cancer are as follows: level of education (adjusted Odds Ratio = 3.78 with 95% CI, 1.23-11.65), time since diagnosis of Human immunodeficiency virus (adjusted Odds Ratio = 4.31 with 95% CI, 1.12- 16.52), knowledge of women with cervical cancer (adjusted Odds Ratio = 6.30 with 95% CI, 1.87-21.18) and heard the pap- smear/visual inspection with acetic acid (adjusted Odds Ratio = 4.92 with 95% CI, 2.35-10.33). **Conclusion:** The general knowledge of seropositive women regarding cervical cancer remains very low, which justifies the integration of cervical cancer prevention services with Human immunodeficiency virus care, and pinpoints the crucial role of patient education.

Keywords: Uterine cervical neoplasm- Awareness- risk factors- Knowledge- HIV-positive women- Morocco.

Asian Pac J Cancer Prev, **24 (8)**, 2875-2884

Introduction

Cervical cancer is a real public health problem in the world. It occupies the second position after breast cancer in low- and middle-income countries, home to more than 84% of new cases worldwide (Fitzpatrick et al., 2020). In Morocco, cervical cancer is the second and yet most widespread cancer in women after breast cancer. The annual standardized incidence rate of cervical cancer is 10.4 per 100,000 women, while the mortality rate is 5.8 per 100,000 women per year (Sung et al., 2021).

The human papillomavirus (HPV) is the cause of several of the most common sexually transmitted infections in the world as well as 99% of cases of cervical cancer (Fitzpatrick et al., 2020).

Human immunodeficiency virus-1 (HIV) infection increases the risk of HP infection and the lengthening of life expectancy due to the effectiveness of combination antiretroviral therapy may allow persistent HPV infections to progress to cancer (Massad et al., 2017). Therefore, women living with HIV and given their immunocompromised status are 2 to 12 times more likely to develop precancerous lesions that lead to cervical cancer than HIV-negative women (Kimondo et al., 2021;

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Mapanga et al., 2018). Globally, an estimated 6% of new cases of cervical cancer in 2018 were diagnosed in women living with HIV, and 5% of all cases were attributable to HIV infection (Stelzle et al., 2021). In Morocco, 8,500 women are living with HIV, representing 43% of people living with HIV according to the national strategic plan to fight aids, extension plan 2023.

Before progressing to neoplastic disease, cervical cancer has a long pre-invasive phase, which makes it possible to detect precancerous changes through screening. In Morocco, several studies have reported a low participation rate of Moroccan women aged between 30 and 49 in the cervical cancer screening program (Belglaiaa et al., 2015; Ouasmani et al., 2016; Selmouni et al., 2016). Most of them were diagnosed at locally advanced stages(BerrahoBendahhou et al., 2012; BerrahoObtel et al., 2012; Elmarjany et al., 2015; Khalil et al., 2015; Moulki et al., 2017; Ouasmani et al., 2016; Saadi et al., 2015). Regarding Moroccan women living with HIV, there is a high prevalence of HPV infections (74.5% and 39.3%) (Belglaiaa et al., 2015; Ouladlahsen et al., 2018) and HPV-HR (Hight risk) (75.0 %) (Ouladlahsen et al., 2018). This higher prevalence was significantly associated with an abnormal Pap test and a low cervical cancer screening rate (Belglaiaa et al., 2015; Ouladlahsen et al., 2018).

Raising women's awareness/knowledge is necessary to ensure better results in the struggle against cervical cancer, mainly with respect to associated risk factors, screening services, and available treatments. Integrating cervical cancer prevention into HIV services will reduce not only cancer morbidity but also the mortality associated with invasive cervical cancer and hence improve HIV treatment outcomes (Emru et al., 2021; Ezechi et al., 2013).

The purpose of our study being a continuation of previous work done on the systematic review of cervical cancer in Morocco (Arechkik et al., 2022) is to assess the level of knowledge/awareness among HIV-positive women concerning cervical cancer, practice of screening, risk factors, treatment measures and ultimately their possible adherence to screening.

Materials and Methods

The type and setting of the study

This research involved a cross-sectional, prospective, and multicenter survey, conducted between March and September 2022 with the aim of assessing the level of awareness and knowledge of women with HIV who attended HIV treatment centers in the Souss-Massa region as regards cervical cancer. The Souss-Massa region is located in the south of Morocco, with an estimated population of 2 676 847, according to the last population census of 2014. In Morocco, and in so far as the national strategic plan to fight AIDS, 8500 HIV-positive women have been identified, representing 43% of people living with HIV (PLHIV), with a prevalence lower than that of men (0.07% versus 0.09%).

The study population

Inclusion criteria

HIV-positive women aged 18 and older.

The absence of mental or physical problems prevents women from participating in focused discussions.

Exclusion criteria

Women who have had a hysterectomy with removal of the cervix.

Sampling and recruitment of participants

The sample size was calculated based on a margin of error of 5.0% and a confidence interval (CI) of 95% for a proportion of Moroccan women living with HIV of 43%. The sample size calculation was done via the sample size calculator site "Riskcalc"(james E.Bartlett, 2001). The minimum sample size required for the study was 377 people. A 30% increase to compensate for women not wishing to participate in the study will be established at the sample size obtained. Thus, the women included in the study are 494 participants.

The sample (n = 494) was divided between the Taroudant Provincial Hospital Center (26 women monitored in the hospital center during the study period and who represent all the cases recorded in this center), along with the Hassan II Regional Hospital Center of Agadir (469 participants and who represent all the women attending the center during the study period).

The instrument for measuring and collecting data

A face-to-face questionnaire survey was used for data collection from participants. The first part of the questionnaire is the section reserved for sociodemographic and clinical characteristics such as age, level of education, employment, marital status, place of residence, socioeconomic level (monthly income), health insurance, sexual activity (age of first intercourse, lifetime sexual partners, contraceptive method), reproductive life (age of first menstruation, parity), smoking, the time elapsed since diagnosis of HIV-AIDS, duration of treatment antiretroviral, baseline CD4+ cell count, CDC (Centers for Disease Control and Prevention) classification and co-infections. In the second section, awareness of cervical cancer was assessed if and only if the answer to the question "Have you ever heard of cervical cancer?" was "yes." The participants were asked to answer specific questions about cervical cancer, such as risk factors, symptoms, prevention, and treatment. They were also asked about their source of information, whether they had ever heard of cervical cancer screening (pap smear/ visual inspection with acetic acid (IVA)), and whether they knew any woman who had been infected by cervical cancer.

The third section was devoted to exploring HIV-positive women's attitudes toward cervical cancer screening, particularly whether or not they had ever been screened, factors preventing these women from being screened, and whether they would be screened in the future. HIV status and immunity were verified in the patient's medical record. At the end of the questionnaire, the women were informed about the importance of regular cervical cancer screening.

Statistical analysis

The qualitative variables were represented in

frequencies and percentages, and the quantitative variables of normal distribution in mean plus or minus standard deviation, median (interquartile interval, (IQR)) for the variables of non-Gaussian distribution.

The Chi-square (χ^2) test or Fisher's exact test was performed according to their specific conditions of application to find differences in the proportions of categorical variables between two groups (a group of respondents with a level of cervical cancer awareness and those without cervical cancer awareness).

In addition, univariate and multivariate logistic regression analyses were conducted to identify factors associated with cervical cancer awareness in the study population. All statistically significant independent variables in the univariate logistic regression were considered in the multivariate logistic regression analysis. P-values <0.05 were in turn considered to indicate statistical significance. Data management and statistical analysis were performed using the Jamovi software package for Windows (version 2.3).

Ethical approval and consent to participate

The ethics committee for biomedical research of the Mohammed V Faculty of Medicine and Pharmacy in Rabat approved this research (N/R: file number 75/21), and informed consent was obtained from each female participant.

Results

The sociodemographic and clinical characteristics of the study population

The total number of women included in this study is 494 HIV-positive women. The average age of HIV-positive women was 42.5 ± 9.77 years. The extreme ages were (20-78 years), and 125 (25.3%) women were older than or equal to 50 years. Most women are illiterate (57.5%) and unemployed (63.6%); married women represent (35.6%), had puberty at an age below 12 years (8.5%), and had their first sexual intercourse at an age below 16 years (14.6%).

Most women (66.8%) reside in urban areas, 94.3% are poor, and 38.5% have no healthcare coverage. A total of (34.7%) reported having more than one sexual partner. The majority (63%) did not use contraception, and (21.3%) were nulliparous. According to the women's avowals, (7.9%) are current smokers. The date since HIV diagnosis alternates between 1 month and 25 years. The median duration of antiretroviral treatment (ART) treatment was eight years (4-11 years). Most women (47.4%) using ART had CD4+ cell counts of less than 200 cells/mm^3, and 51.4% were classified as CDC stage A. Regarding associated infections, 27 women had tuberculosis, and 12 had syphilis. Finally, 442 (89.5%) declared they had no family history of cervical cancer.

Knowledge of HIV-positive women about cervical cancer

Among our findings, 440 (89.1%) and 326 (66%) had heard talk about cervical cancer and cervical cancer screening, respectively. 25 women (5.1%) had heard of the HPV vaccine, and 125 (25.30%) knew a woman with cervical cancer. 219 (44.30%) agreed that HIV-positive women are more likely to develop cervical cancer.

As for the sources of information, the most dominant source was the mass media (radio/television) with a percentage of (n=262, 53%), followed by friends (n=101, 20.4%), family (n=53, 10.7%) and healthcare professionals (n=33, 6.7%).

To assess women's general level of knowledge about cervical cancer, participants were asked a series of questions about risk factors, symptoms, prevention, and treatment modalities. On the one hand, the vast majority of participants (82%) did not know the risk factors, while among the 440 women (89.10%) who had already heard of cervical cancer, 87 (19.8%) were able to cite at least one risk factor. Sexually transmitted infections (STIs) and multiple sexual partners were mentioned as risk factors by 11.1% and 6.5% of participants, respectively.

On the other hand, no one could identify HPV as a factor of risk of cervical cancer. Most participants (74.7%) could not identify any signs of cervical cancer. The most cited symptoms were abnormal bleeding between periods by 92 women (18.6%) and bleeding and pain after intercourse by 23 women (4.7%). 86 women (17.4%) knew that the onset of cervical cancer could be prevented. The use of condoms (10.5%), regular screening (Papanicolaou test) (7.3%), and limiting the number of sexual partners (3.2%) were mentioned as preventive measures against cervical cancer. In what concerns treatment, 33.4% of

Table 1. HIV-Infected Women's Attitude toward Cervical Cancer Screening and Barriers to Screening.

Items	n	%
Ever been screened		
Yes	221	44.7
No	273	55.3
If yes, what type of screening		
Pap test	211	95.48
VIA	10	4.52
In your opinion, the frequency of CC screening among HIV women		
Monthly	16	3.2
Once a year	133	26.9
Twice a year	125	25.3
Three times a year	12	2.4
Four times a year	24	4.9
I did not know	184	37.2
The barriers to screening		
No symptoms	105	21.3
No medical prescription	25	5.1
Financial reason	30	6.1
No acceptance from husband	5	1.0
Fear of positive results	13	2.6
Never heard or lack of knowledge	95	19.2
Will you agree to be screened in the future		
Yes	465	94.1
Non	29	5.9

CC, cervical cancer; VIA, Visual Inspection with Acetic Acid.

Table 2. Bivariate Analysis (Chi-2 test) of Sociodemographic and Clinical Factors Associated with Cervical Cancer Awareness among HIV-Positive Women in the Souss-Massa Region.

Characteristics	Aware of cervical cancer No, n (%)	Aware of cervical cancer Yes, n (%)	p-value
Age at interview (year)			0.618
< 30	7 (17.1)	34 (82.9)	
30-39	15 (10.2)	132 (98.8)	
40-49	19 (10.5)	162 (89.5)	
≥50	13 (10.4)	112 (89.6)	
Education level			0.048
Illiterate	38 (13.4)	246 (86.6)	
Primary level	12 (10.3)	104 (89.7)	
Secondary/university	4 (4.3)	90 (95.7)	
Employment			0.028
No	27 (8.6)	287 (91.4)	
Yes	27 (15)	153 (85)	
Marital status			0.303
Single	13 (16.9)	64 (83.1)	
Married	17 (9.7)	159 (90.3)	
Divorced	14 (11)	113 (89)	
Widowed	10 (8.8)	104 (91.2)	
Age at puberty			0.221*
<12	3 (7.1)	39 (92.9)	
between 12 and 13	13 (16.5)	66 (83.5)	
>13	38 (10.2)	335 (89.8)	
Age at first intercourse (years)			0.036
<16	13 (18.1)	59 (81.9)	
≥16	41 (9.7)	381 (90.3)	
Place of residence			0.045
Rural	11 (16.7)	55 (83.3)	
Urban	28 (8.5)	302 (91.5)	
Semi-Urban	15 (15.3)	83 (84.7)	
Sociale Class[§](family income)			0.419*
Poor	51 (10.9)	415 (89.1)	
Middle Class	2 (8)	23 (92)	
Rich	1 (33.3)	2 (66.7)	
Health Insurance			0.121
No	26 (13.7)	164 (86.3)	
Yes	28 (9.2)	276 (90.8)	
Sexual Partners			0.700
Unique	34 (10.6)	288 (89.4)	
Multiple	20 (11.7)	151 (88.3)	
Actual contraceptive method			0.801*
Pill	14 (14)	86 (86)	
Condom	7 (9.2)	69 (90.8)	
IUD	0 (0)	3 (100)	
Injectable	0 (0)	4 (100)	
None	33 (10.6)	278 (89.8)	
Parity			0.865
0	13 (12.4)	92 (87.6)	
1	13 (10.7)	109 (89.3)	
>1	28 (10.5)	239 (89.5)	

Table 2. Continued

Characteristics	Aware of cervical cancer No, n (%)	Aware of cervical cancer Yes, n (%)	p-value
Tobacco use			0.683*
Never	46 (11)	374 (89)	
Former Smoker	5 (14.3)	30 (85.7)	
Current Smoker	3 (7.7)	36 (92.3)	
Date since HIV diagnosis (year)			0.035*
<1	5 (31.3)	11 (68.8)	
1-2	5 (12.8)	34 (87.2)	
>2	44 (10)	395 (90)	
Date since start of ART treatment (year)			0.035*
<1	5 (31.3)	11 (68.8)	
1-2	5 (12.8)	34 (87.2)	
>2	44 (10)	395 (90)	
Baseline CD4+ (cells/mm^3)			0.233
<200	30 (12.8)	204 (87.2)	
200-500	19 (10.7)	158 (89.3)	
>500	5 (6)	78 (94)	
CDC Classification			0.721
A	29 (11.4)	225 (88.6)	
B	16 (9.5)	153 (90.5)	
C	9 (12.7)	62 (87.3)	
Related infections			1.000*
No	50 (11)	404 (89)	
Yes	4 (10)	36 (90)	
Family history of cc			0.008
No	54 (12.2)	388 (87.8)	
Yes	0 (0)	52 (100)	

*P value obtained with Fisher's exact test. ART, Antiretroviral Therapy;CDC, Centers for Disease Control and Prevention; IUD, intrauterine device; CC, Cervical Cancer. §, According to the High Commission for Planning of Kingdom of Morocco

respondents knew that cervical cancer could be treated by chemotherapy, radiotherapy, or surgery.

The practice/attitude of HIV-positive women regarding cervical cancer screening

A percentage of 44.7% (221) of the participants have been screened for cervical cancer, of which 95.48% have had a pap test, and only 4.52% have ever had a VIA test. According to 25.3%, the frequency of cervical cancer screening among women living with HIV is twice yearly (every six months). For the 273 women (55.3%) who had never been screened, the reasons given were as follows: absence of symptoms (21.3%), lack of knowledge (19.2%), financial reasons (6.1%), lack of medical prescriptions (5.1%), fear of positive results (2.6%) and non-acceptance by the husband (1%). Finally, when asked about the possibility of cervical cancer screening in the future, 94.1% expressed acceptance (see Table 1).

Level of cervical cancer awareness according to the sociodemographic and clinical characteristics of the study population

The Bivariate analysis between cervical cancer awareness and sociodemographic and clinical characteristics is summarized in Table 2. A significant association was observed with the participants' education level, employment, age at first sexual intercourse, place of residence, time since HIV diagnosis and time since start of ART treatment. Concerning the level of education, the results show that women who have a secondary/university level are more aware than women who have a primary level and are illiterate (95.7% vs. 89.7% and 86.6%, p= 0.048). Concerning the age at first sexual intercourse, the results show that women who had sexual intercourse after 16 years are more aware than those who had intercourse before 16 (90.3% vs. 81.9%, p = 0.036).

Women who live in urban and semi-urban areas are more aware than women who live in rural areas (91.5% and 84.7% vs. 83.3%, p= 0.045). Family history of cervical cancer, employment, time since HIV diagnosis and time since start of ART treatment are also associated with HIV-positive women's awareness of cervical cancer (p=0.008; p= 0.028; p=0.035 and p=0.035, respectively).

Factors associated with the level of awareness of cervical cancer among the study population

In the univariate analysis and according to simple logistic regression: level of education (secondary/

Table 3. Factors Associated with Cervical Cancer Awareness among HIV-Positive Women in the Souss-Massa Region.

Variable	Univariate analysis OR (CI95%)	Univariate analysis p-value	Multivariate analysis aOR (CI95%)	Multivariate analysis p-value
Age (year)				
[30-39] -<30	1.81 (0.68-4.79)	0.231		
≥40 – <30	1.76 (0.72-4.30)	0.213		
Level of education				
Primary (ref: Illiterate)	1.34 (0.67-2.66)	0.406	1.68 (0.77-3.65)	0.185
Secondary/university (ref: Illetrate)	3.48 (1.20-10.01)	0.021	3.78 (1.23-11.65)	0.020
Employment				
No (ref: Yes)	1.88 (1.06-3.31)	0.030	1.70(0.91-3.17)	0.092
Marital status				
Married (ref: Single)	1.90 (0.87-4.14)	0.106		
Widowed (ref: Single)	2.11 (0.87-5.10)	0.096		
Divorced (ref: Single)	1.64 (0.72-3.70)	0.234		
Age at puberty (year)				
Less than 12 (ref: more than 13)	1.47 (0.43-5.00)	0.533		
Between12 et 13 (ref: more than 13)	0.57 (0.29-1.14)	0.113		
Age at first intercourse (year)				
More than16 (ref: less than 16)	2.05 (1.04-4.05)	0.039	1.60 (0.73-3.48)	0.232
Place of residence				
Semi-Urban (ref: rural)	1.11 (0.47-2.59)	0.815	0.76 (0.28-2.08)	0.603
Urban (ref: rural)	2.16 (1.01-4.59)	0.046	1.19 (0.49-2.91)	0.688
Sociale class§ (family income)				
Middle Class (ref: poor)	1.41 (0.32-6.17)	0.646		
Rich (ref: poor)	0.24 (0.021-2.76)	0.255		
Sexual partners				
Unique (ref: multiple)	1.12 (0.62-2.02)	0.701		
Contraceptive method				
Condom (ref: None)	1.17 (0.49-2.76)	0.719		
Pill (ref: None)	0.72 (0.37-1.43)	0.356		
Parity				
1 Child (ref: None)	1.18 (0.52-2.68)	0.684		
More than one child (ref: None)	1.21 (0.59-2.43)	0.600		
Tobacco use				
Current Smoker (ref: Never)	1.47 (0.43-4.98)	0.531		
Former Smoker (ref: Never)	0.73 (0.27-2.00)	0.550		
Date since HIV diagnosis				
Between 1 and 2 years (ref: less than one year)	3.09 (0.75-12.71)	0.118	2.52 (0.46-13.74)	0.283
More than two years (ref: less than one year)	4.08 (1.35-12.28)	0.012	4.31 (1.12-16.52)	0.033
Date since start of ART treatment				
Between 1 and 2 years (ref: less than one year)	3.09 (0.75-12.71)	0.118		
More than two years (ref: less than one year)	4.08 (1.35-12.28)	0.012		
Baseline CD4+ (cells/mm3)				
Between 200 and 500 (ref: less than 200)	1.22 (0.66-2.25)	0.519		
More than 500 (ref: less than 200)	2.29 (0.85-6.13)	0.097		
Related infections				
Yes (ref: no)	1.11 (0.38-3.26)	0.844		

Ref, reference; OR, Odds-Ratio; CI 95%, 95% Confidence Interval; aOR, adjusted Odds Ratio; §, According to the High Commission for Planning of Kingdom of Morocco; CDC, Centers for Disease Control and Prevention; VIA, Visual Inspection with Acetic Acid; RAMED, Medical Assistance Regime for the Economically Deprived; CNSS, National Social Security fund; CNOPS, National Fund for Social Security Organizations; CC, Cervical Cancer.

Table 3. Continued

Variable	Univariate analysis OR (CI95%)	Univariate analysis p-value	Multivariate analysis aOR (CI95%)	Multivariate analysis p-value
CDC classification				
B (ref: class: A)	1.23 (0.64-2.35)	0.525		
C (ref: class: A)	0.88 (0.39-1.97)	0.771		
Knew women with cervical cancer				
Yes (ref: no)	6.52 (2.00-21.29)	0.002	6.30 (1.87-21.18)	0.003
already heard by pap smear/VIA				
Yes (ref: no)	6.18 (3.03-12.60)	<0.001	4.92 (2.35-10.33)	<0.001
Health insurance				
Medical Assistance Regime (RAMED) (ref: None)	1.39 (0.76-2.56)	0.277		
CNSS (ref: None)	2.81 (0.94-8.36)	0.063		
CNOPS (ref: None)	0.79 (0.16-3.82)	0.772		
Familial history of CC				
Yes (ref: no)	28.04 (0.00-ND)	0.985		

Ref, reference; OR, Odds-Ratio; CI 95%, 95% Confidence Interval; aOR, adjusted Odds Ratio; §, According to the High Commission for Planning of Kingdom of Morocco; CDC, Centers for Disease Control and Prevention; VIA, Visual Inspection with Acetic Acid; RAMED, Medical Assistance Regime for the Economically Deprived; CNSS, National Social Security fund; CNOPS, National Fund for Social Security Organizations; CC, Cervical Cancer.

university level [OR= 3.48; [95% CI: 1.20-10.01]), employment (no [OR= 1.88; 95% CI: 1.06-3.31]), age at first sexual intercourse (over 16 years old [OR= 2.05; 95% CI: 1.04-4.05]), place of residence (urban [OR= 2.16; 95% CI: 1.01-4.59]), time since HIV diagnosis (over two years [OR= 4.08; 95% CI: 1.35-12.28]), time since start of treatment (more than two years [OR= 4.08; 95% CI: 1.35-12.28]), knowing a woman with cervical cancer (yes [OR= 6.52; 95% CI: 2.00-21.29]), already heard by pap smear/VIA (yes [OR= 6.18; 95% CI: 3.03-12.60]), are significantly associated with HIV-positive women's awareness of cervical cancer (Table 3).

The results of the multiple logistic regression have shown that the factors associated with the awareness of HIV-positive women in terms of cervical cancer are the followings: the level of education (the secondary/university level [Adjusted OR =3.78; CI 95%: 1.23- 11.65]), time since HIV diagnosis (more than two years [Adjusted OR = 4.31; 95% CI: 1.12-16.52]), knowing a woman with cervical cancer (yes [Adjusted OR = 6.30; 95% CI: 1.87 -21.18], already heard by Pap smear/VIA (yes [Adjusted OR = 4.92; 95% CI: 2.35-10.33]) (Table 3).

Discussion

This study aims to assess the level of knowledge/ awareness among HIV-positive women concerning cervical cancer, practice of screening, risk factors, treatment measures and ultimately their possible adherence to screening in the Souss-Massa region. The results have demonstrated that the majority of women attending HIV treatment centers in the Souss-Massa region (Morocco) are aware of cervical cancer (89.1%) and cervical cancer screening (66.0%). These results disconfirm those already found in the Belglaiaa et al. study, where 80% of women who attended the HIV treatment center in Laayoun (southern Morocco) had never heard of cervical cancer and its screening (Belglaiaa et al., 2018). The same finding was, however, reported in a study in northern Tanzania (Kimondo et al., 2021). Other studies in Zimbabwe and Ethiopia have had similar results and shown a high awareness of cervical cancer among women living with HIV (Erku et al., 2017; Fitzpatrick et al., 2020; Shiferaw et al., 2018). This level of awareness does not necessarily reflect better knowledge of the disease since no woman could identify HPV as a significant risk factor for cervical cancer, the same observation reported in the Belglaiaa et al., (2018)' s study.

Concerning the other risk factors, 48.8% of the women did not know that their immunological status constitutes a risk of cervical cancer, and this is the same observation reported in a study carried out in Lao PDR (Sichanh et al., 2014). On the other hand, two studies in Uganda and Ethiopia reported that 60% and 50.3% of women knew they were at increased risk of developing cervical cancer due to their HIV status (Mitchell et al., 2017; Shiferaw et al., 2016).

Overall, the participants showed a low level of knowledge with respect to the risk factor, which goes in congruency with the studies carried out in Ethiopia and Nigeria (Adibe and Aluh, 2018; Erku et al., 2017). This situation remains alarming because the knowledge of cervical cancer risk factors is substantial to adopt the prevention measures and the appropriate attitudes.

As for the knowledge of the symptoms, the majority of the participants (74.7%) could not name any sign; the same result reported in the study of Belglaiaa et al., (2018) where this percentage is approximately 80.8%. In contrast, in Shiferaw et al., (2018) and Erku et al., (2017) studies conducted in Ethiopia, only 38.4% and 9.3% could not identify any symptoms of cervical cancer.

Regarding prevention and treatment, the participants

displayed an abysmal level of Knowledge. Consequently, the majority (82.6%) of HIV- positive women in our study ignore the prevention measures against cervical cancer; this proportion was 79.1% in the study by Belglaiaa et al., (2018). In addition, this percentage was lower in other studies in Ethiopia, amounting to 24.7%, 21.2%, and 49.4% (Erku et al., 2017; Shiferaw et al., 2016; Shiferaw et al., 2018). Concerning the treatment, most participants (66.6%) were unaware of the curable character of cervical cancer. In the same direction, the Belglaiaa et al., (2018)'s study showed that 80.8% of the women were unaware of this character. On the contrary, some studies have reported a higher level of knowledge in this direction, namely the study of Erku et al., (2017), Shiferaw et al., (2016) and Shiferaw et al., (2018) where 73.8%, 64.5%, and 66.2% women living with HIV believed in curable nature of cervical cancer, respectively. In the present study, the mass media was the primary source of information (53%), and only 8.5% of participants had health professionals as a source of information. In the same vein, the studies of Belglaiaa et al., (2018), Shiferaw et al., (2018) and Adibe and Aluh, (2018) revealed that the mass media constituted the primary source.

To improve the level of Knowledge of seropositive women in terms of cervical cancer, we suggest that health professionals involved in the care of patients living with HIV provide training and awareness sessions related to cervical cancer.

Regarding screening, 44.7% of HIV-positive women have already undergone a screening test (of which 95.48% have undergone a Papanicolaou test); this could be explained by the high percentage of women aware of cervical cancer (89.1%). Similar results were observed in studies carried out in northern Tanzania, Ivory Coast, Kenya, and Ethiopia, where 50.2%, 40.3%, 44%, and 40.1% of women living with HIV said they had ever been screened for cervical cancer, respectively(Assefa et al., 2019; Kemper et al., 2022; Kimondo et al., 2021; Tchounga et al., 2019). Lower figures (30.3%) were reported in a study implemented in Uganda (Wanyenze et al., 2017); furthermore, other studies in Ethiopia and France have had higher percentages (75.2% and 93.3%) (Solomon et al., 2019; Tron et al., 2017). In what concerns the factors preventing screening services, we mainly highlight the absence of symptoms and the lack of Knowledge. The same observation was spotted in a study on the Ivory Coast (Mensah et al., 2020). These factors demonstrate the importance of integrating cervical cancer prevention services with HIV care to increase HIV-positive women's knowledge about cervical cancer. Almost all (94.1%) participants declared the intention to undergo a screening test for cervical cancer in the future. Following the same line of thought, in the study by Ebu et al., 82% of HIV-positive women intended to undergo a screening test (Ebu and Ogah, 2018).

This study has several limitations that should be taken into consideration. First, the fact that some HIV-positive women who do not have access to hospital services cannot be recruited in the study. Second, the present study only explores the current Knowledge of HIV-positive women about cervical cancer and does not consider the subsequent evolution of this level. Finally, the information collected may be affected by particular biases, particularly social acceptability and memory biases, even if anonymity has been ensured to reduce this effect. In conclusion, this study highlighted the low level of knowledge in terms of risk factors, symptoms, and means of prevention related to cervical cancer in this sample exclusive to Moroccan women. Therefore, it is necessary to adopt new approaches to raise knowledge about cervical cancer, notably the community approach. This approach - If well exploited – will provide the health system with essential data to have prevention programs close to the real needs and would be additional proof to integrate the people into managing their health problems by using the existing potential. In this case, the commentators and the patient experts would be involved in patient education.

It is noteworthy that the low level of Knowledge of HIV-positive women regarding cervical cancer is strongly correlated with their level of education. That said, a new impetus in the caregiver-patient relationship must be made by considering the social status, the cultural context, and women's perceptions of illness and health. There is also a need to assess health care providers' knowledge and practice of cervical cancer prevention in HIV clinics.

Author Contribution Statement

AA designed the study, analyzed the data, and wrote the manuscript. LL participated in the design, statistical analysis, data interpretation, and manuscript drafting. MO participated in the manuscript's revision, including the study's methodological aspect. KA and MAB contributed to the statistical analysis and interpretation of the data. RR, in turn, participated in the design, analysis, interpretation of the data, revision of the manuscript, and gave final approval to the published version. All authors had access to the data and participated in the writing of the manuscript. All authors have read and approved the final version of the manuscript..

Acknowledgements

The authors would like to thank the infectious disease department staff at the Hassan II hospital and Mokhtar-Essoussi hospital for the facilities granted for data collection. This study was not funded by any organization. This manuscript has been approved by the Faculty of Medicine and Pharmacy of Rabat, Mohamed V University and it's a part of PhD student thesis. The authors have no competing interests to declare.

Ethical Declaration

The ethics committee for biomedical research of the Mohammed V Faculty of Medicine and Pharmacy in Rabat approved this research (N/R: file number 75/21).

Data accessibility statement

All data generated or analyzed during this study are included in this published article.

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