

# Epidemiological and Cytopathological Profile of Dysplastic Lesions of the Cervix in South-Kivu/Dr Congo

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**How to cite this paper:** Olivier, N., Fabrice, K., Albert, T., Prosper, K., Prosper, K. and Baptiste, K.J. (2021) Epidemiological and Cytopathological Profile of Dysplastic Lesions of the Cervix in South-Kivu/Dr Congo. *Open Journal of Obstetrics and Gynecology*, 11, 162-182.

<https://doi.org/10.4236/ojog.2021.112018>

**Received:** January 20, 2021

**Accepted:** February 22, 2021

**Published:** February 25, 2021

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## Abstract

**Background:** Cervical cancer is one of the most common cancers in women in the world. The recrudescence of dysplastic lesions is increasing, especially in developing countries, because of the absence of screening. The objective of this work is to determine the prevalence of dysplastic lesions of the cervix in women who are sexually active in South Kivu province. **Methods:** It was a cross-sectional, descriptive and analytical study of 625 women who came for gynecological consultation, all of whom had cervical-uterine Pap smears, during the period from January 1st, 2017 to December 31st, 2018 at Panzi General Referral Hospital (South Kivu, DR Congo). Data analysis was done using Epi Info software version 7. **Results:** The median age of the respondents was 34 years, 47.0% of them were married, and 59.0% had a low socio-economic level. The majority had first sexual intercourse between the ages of 15 and 20 (67.5%), a number of former sexual partners estimated at 1 - 5 (87.8%), did not use tobacco (97.4%) and did not use contraception (78.1%). Pap smear was normal in 82.88% of cases, inflammatory in 2.4% of cases and with cytologic abnormalities in 14.72% of cases. Rates of dysplastic lesions were significantly higher among women aged  $\geq 35$  years ( $p = 0.0245$ ), brides ( $p = 0.0183$ ) and multiparous ( $p = 0.0042$ ). Multivariate analysis revealed the adjusted OR (95% CI) statistically insignificant ( $p < 0.05$ ) for the age group, marital status and parity respondents. **Conclusion:** Cervical can-

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cer remains a real scourge in the world, especially in sub-Saharan Africa, where the diagnosis is often made when the pathology is at its stage almost incurable. Early detection of dysplastic lesions by Pap smear is therefore imperative in the eradication of this pathology.

## Keywords

Dysplastic Lesions, Cervix, South Kivu, DRC

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## 1. Background

Cervical cancer is one of the most common cancers in women worldwide [1] [2] [3]. In 2018, 569,847 cases were diagnosed with 311,000 deaths [4]. Women in low- and middle-income countries appear to be the most affected, compared with those in developed countries [1] [5] [6]. In addition, mortality from cervical cancer is expected to increase by 42% to 442,926 deaths in 2030; the largest increase will be in low-income and middle-income countries, where currently about 85% of cervical cancers and 87% of cervical cancer deaths occur [4].

Several factors contribute to this resurgence of cervical cancer in developing countries: lack of screening, early intercourse, multiple sexual partners, and STIs [1] [3] [5].

In Africa, the incidence of cervical cancer is increasing every year. The human papillomavirus, which is the causative agent of cervical cancer in 99% of cases, is the basis of 14.2% of cancers in sub-Saharan Africa, including cervical cancer [7]. The latter disproportionately affects this part of the African continent, where 9% of the world's female population over the age of 15 represents 14% of its incidence and 18% of its global mortality [7].

East Africa, like other parts of the continent, has incidence rates (42.7 per 100,000) and mortality (27.6 per 100,000) of cervical cancer well above the incidence of cervical cancer. (14.0 out of 100,000) and global mortality (6.8 out of 100,000) [8]. However, in most countries in sub-Saharan Africa, epidemiological data on cervical cancer are not documented. Only 17% of African countries have a national program and a specific budget to fight cervical cancer, and where the program exists, effective coverage may be low [9].

In the Democratic Republic of Congo, the health system is less organized and underfunded and many health facilities have been destroyed as a result of armed conflict, especially in the east of the country, where surviving hospitals are often poorly equipped and deprived of qualified medical personnel.

There is very little data on the prevalence of cervical dysplastic lesions in the DRC [9] [10] [11] [12]. This could be extrapolated from data collected in sub-Saharan Africa [12]. Thus, it is with the objective of having a more reliable reference, as regards the East of the DR Congo and more particularly the Province of South Kivu, that the present study was conducted.

## 2. Methods

### 2.1. Type and Population of Study

This is a cross-sectional, descriptive and analytical study carried out in women who came to a gynecological consultation for cervical cancer screening during the period from January 1, 2017 to December 31, 2018 at the Panzi GRH (South Kivu, DR Congo). In total, we recorded 625 women, all of whom had Pap smears.

Pregnant women, those with a sexually transmitted disease other than HIV, those already receiving cervical cancer treatment and those who refused to respond to the questionnaire were excluded from the study.

### 2.2. Collection of Data

A pre-established form was completed by the clinical physician during the interview with the women who consented to the study, and gathered information on socio-demographic characteristics (age, marital status, occupation, level of education, socio-economic level, etc.), sexual and gynecological obstetrics (age at menarche, age at first sexual intercourse, number of previous sexual partners, type of sexual intercourse, age at first pregnancy, notion of sexual violence involving rape with penetration, notion of smoking, hormonal contraception, parity and HIV antecedent).

All the women included in the study benefited from cervical uterine smear sampling. This sampling was carried out after sensitization by a qualified medical staff and in respect of all ethical considerations. The cytopathological results made it possible to describe the different cytopathological aspects of cervical lesions.

### 2.3. Variables

The following variables were studied:

- Dependent variable:

It was represented by the cytopathological results. The cytopathological examination of the smear revealed the following aspects: normal and inflammatory smear, atypical lesions (ASC-US and AGC), low-grade squamous intraepithelial lesions (LSIL) and high-grade squamous intraepithelial lesions (HSIL). These results were grouped into two classes: atypical, low-grade and high-grade intraepithelial lesions (ASC-US + AGC + LSIL + HSIL) that are precancerous and those related to normal smear (normal + inflammatory smear; the latter being a lesion non-precancerous).

- Independent variables:

They were constituted by socio-demographic, sexual and gynecological characteristics of the women examined.

### 2.4. Data Analysis

Data analysis was done using Epi Info version 7 software. Descriptive statistics were used to describe women by sociodemographic, sexual and gynecological variables. The associations between the dependent variable and the set of expla-

natory variables (in terms of proportions observed in the contingency tables) were tested using Pearson's Chi-2 test and Fisher's exact test for qualitative variables. Odds ratios (ORs) with a 95% confidence interval were used to measure the level of association between variables. For multivariate analysis, logistic regression was used to calculate adjusted ORs to identify possible determinants of dysplastic lesions. The materiality threshold was set at  $p < 0.05$ .

Ethical considerations were taken into account, as mentioned above, after favorable opinion of the local ethics committee and UNILU (University of Lubumbashi).

### 3. Results

#### 3.1. Characteristics of the Respondents

Nearly half of the women surveyed were aged 35 and over (49.1%), with a median age of 34 and married (47.0%). The housewife accounted for 39.7% of the respondents, while 40.2% had a low socio-economic level (**Table 1**).

**Table 1.** Sociodemographic characteristics.

Variable (n = 625)	Median (P25-P75)	n	(%)
<b>Age</b>			
15 - 24 years	34 (23 - 46)	175	(28.0)
25 - 34 years		143	(22.9)
≥35 years		307	(49.1)
<b>Marital status</b>			
Single		155	(24.8)
Married		294	(47.0)
Others (widow, divorced, polygamy)		176	(28.2)
<b>Profession</b>			
Housewife		248	(39.7)
farmer		139	(22.2)
Others (civil servant, seller, ...)		238	(38.1)
<b>Level of education</b>			
Illiterate		163	(26.1)
Primary		167	(26.7)
Secondary		251	(40.2)
Superior		44	(7.0)
<b>Socio-economic level</b>			
Low		369	(59.0)
Way		256	(41.0)

Just over half of the women had menarche between 14 and 15 years of age (51.8%), with an average age of  $13.9 \pm 1.6$  years. The majority of them had their first sexual intercourse between the ages of 15 and 20 (67.5%), and a number of former sexual partners estimated at 1 - 5 (87.8%). Normal sex was the most common type (94.7%). The age at first pregnancy was in most cases between 15 and 20 years (68.8%). The majority of women did not experience sexual violence (73.9%), did not use tobacco (97.4%) and did not use contraception (78.1%). Several of them (59.0%) were multiparous. Those who reported an antecedent of HIV accounted for 21.9% (**Table 2**).

### 3.2. Cytopathological Aspects Observed in the Respondents

For all the respondents (**Table 3**), the cervical uterine smear was normal in 82.88% and inflammatory in 2.4% of the cases, whereas the cytological abnormalities, which were found in 14.72% of the cases, included 9.44% of atypia (8.8% of ASC-US, 0.48% of AUC-H and 0.16% of AGC), 4.48% low-grade squamous intraepithelial lesions (LSIL) and 0.8% high-grade squamous intraepithelial lesions (HSIL).

- **Cytopathological results in the respondents.**

Thus, out of a total of 625 women examined, 92 or 14.7% (95% CI: 12.1% - 17.8%) had dysplastic lesions (ASC-US, ASC-H, LSIL, HSIL and AGC) against 85.3% with normal and inflammatory smear.

### 3.3. Sociodemographic Characteristics and Cytological Aspects

The rate of dysplastic lesions was significantly higher among women in the age group  $\geq 35$  years, the risk being doubled compared to their counterparts aged 25 - 34 (OR 95% CI: 2.1 [1, 10 - 4.24],  $p = 0.0245$ ). The difference was also significant ( $p = 0.0183$ ) for brides and other marital statuses (widowed, divorced, polygamous) compared to single women, with the risk of having a dysplastic lesion being multiplied by about two, respectively (OR 95% CI: 1.97 [1.003 - 4.12]) and three (95% OR: 2.61 [1.28 - 5.62]). On the other hand, there was no significant difference ( $p < 0.05$ ) in women's occupation, education level and socio-economic level (**Table 4**).

### 3.4. Sexual, Gyneco-Obstetric and Cytological Characteristics

The rate of dysplastic lesions was very significantly higher in nulliparas and in primiparous and pauciparous patients, the risk being respectively nearly five and three times higher compared to multiparas (OR 95% CI: 4.73 [1.69 - 18.36] and 3.33 [1.08 - 13.75],  $p < 0.0042$ ). In contrast, there was no significant difference in dysplastic lesions between menarche age groups ( $p = 0.9794$ ), age groups at first intercourse ( $p = 0.8144$ ), number of previous sexual partners ( $p = 0.4448$ ), type of sexual intercourse ( $p = 0.4496$ ), age at first pregnancy ( $p = 0.7535$ ), notion of sexual abuse ( $p = 0.3552$ ), smoking concept ( $p = 0.5734$ ), hormonal contraception ( $p = 0.1181$ ) and HIV antecedent ( $p = 0.158$ ) among respondents (**Table 5**).

**Table 2.** Sexual and gynecological obstetrical characteristics.

Variable (n = 625)	Mean (standard deviation)	n	(%)
<b>Age at menarche</b>	<b>13.9 (1.6)</b>		
≤13 years		259	(41.4)
14 - 15 years		324	(51.8)
≥16 years		42	(6.7)
<b>Age at first intercourse</b>			
<15 years		140	(22.4)
15 - 20 years		422	(67.5)
>20 years		63	(10.1)
<b>Number of previous sexual partners</b>			
1 - 5		549	(87.8)
≥6		76	(12.2)
<b>Type of sexual intercourse</b>			
Normal		592	(94.7)
Other		33	(5.3)
<b>Age at first pregnancy (n = 552)</b>			
<15 years		61	(11.1)
15 - 20 years		380	(68.8)
>20 years		111	(20.1)
<b>Sexual violence</b>			
Yes		163	(26.1)
No		462	(73.9)
<b>Tobacco</b>			
Yes		16	(2.6)
No		609	(97.4)
<b>Hormonal contraception</b>			
Yes		137	(21.9)
No		488	(78.1)
<b>Parity</b>			
Nulliparous		91	(14.6)
Primo-paucipares		165	(26.4)
Multiparous		369	(59.0)
<b>HIV antecedent</b>			
Yes		137	(21.9)
No		488	(78.1)

**Table 3.** Cytopathological aspects observed in the respondents.

Cytopathological results	Frequency	%
Normal smear	518	82.88
Inflammatory	15	2.4
ASC-US	55	8.8
ASC-H	3	0.48
LSIL	28	4.48
HSIL	5	0.8
AGC	1	0.16
<b>Total</b>	<b>625</b>	<b>100</b>

**Table 4.** Sociodemographic characteristics and cytological aspects.

Variables	n	Dysplastic lesions %	Gross OR (CI 95%)	Khi <sup>2</sup> (ddl)	P
<b>Age</b>					
15 - 24 years	21	12.0	1.25 [0.58 - 2.78]	7.4187 (2)	<b>0.0245</b>
25 -34 years	14	9.8	1		
≥35 years	57	18.6	2.1 [1.10 - 4.24]		
<b>Marital status</b>					
Single	13	8.4	1	7.9968 (2)	<b>0.0183</b>
Married	45	15.3	1.97 [1.003 - 4.12]		
Others (widow, divorced, polygamy)	34	19.3	2.61 [1.28 - 5.62]		
<b>Profession</b>					
Housewife	36	14.5	1.05 [0.61 - 1.82]	0.5161 (2)	0.7725
farmer	23	16.5	1.23 [0.65 - 2.28]		
Others (civil servant, seller...)	33	13.9	1		
<b>Level of education</b>					
Illiterate	24	14.7	1.10 [0.59 - 2.01]	0.7916 (3)	0.8515
Primary	26	15.6	1.17 [0.65 - 2.12]		
Secondary	34	13.5	1		
Superior	8	18.2	1.41 [0.52 - 3.45]		
<b>Socio-economic level</b>					
Low	57	15.4	1.15 [0.71 - 1.87]	0.2512 (1)	0.3095
Way	35	13.7	1		

**Table 5.** Sexual, gynecologic-obstetric and cytological characteristics.

Variable	n	Dysplastic lesions	Gross OR (CI 95%)	Khi <sup>2</sup> (ddl)	P
<b>Age at menarche</b>					
≤13 years	39	15.1	1.06[0.41 - 3.29]	0.0417 (2)	0.9794
14 - 15 years	47	14.5	1.02 [0.39 - 3.12]		
≥16 years	6	14.3	1		
<b>Age at first intercourse</b>					
<15 years	16	11.4	1	0.4105 (2)	0.8144
15 - 20 years	66	15.6	1.43 [0.78 - 2.76]		
>20 years	10	15.9	1.46 [0.55 - 3.68]		
<b>Number of previous sexual partners</b>					
1 - 5	12	15.8	1.09 [0.51 - 2.17]	0.0117 (1)	0.4448
≥6	80	14.6	1		
<b>Type of sexual intercourse</b>					
Normal	88	14.9	1.26 [0.42 - 5.07]	0.0326 (1)	0.4496
Other	4	12.1	1		
<b>Age at first pregnancy</b>					
<15 years old	9	14.8	1	0.5660 (2)	0.7535
15 - 20 years	60	15.8	1.08 [0.49 - 2.63]		
>20 years	20	18.0	1.27 [0.51 - 3.41]		
<b>Sexual Violence</b>					
Yes	22	13.5	1	0.1475 (1)	0.3552
No	70	15.2	1.14 [0.67 - 2.02]		
<b>Tobacco</b>					
Yes	2	12.5	1	0.0107 (1)	0.5734
No	90	14.8	1.21 [0.27 - 11.18]		
<b>Hormonal contraception</b>					
Yes	22	18.6	1.43 [0.80 - 2.47]	1.7843 (1)	0.1181
No	70	13.8	1		
<b>Parity</b>					
Multiparous	66	17.9	4.73 [1.69 - 18.36]	10.9266 (2)	0.0042
Primo-paucipares	22	13.3	3.33 [1.08 - 13.75]		
Nulliparous	4	4.4	1		
<b>HIV antecedent</b>					
Yes	16	11.7	1	1.0011 (1)	0.1584
No	76	15.6	1.39 [0.77 - 2.66]		

### 3.5. Results of Multivariate Analysis

To measure accurately the linkage power between factors associated with dysplastic lesions, a multivariate analysis (logistic regression) was performed as advertised in the methodology and took into account significant independent variables following the bivariate analysis of dysplastic lesions cases observed in the respondents (**Table 4** and **Table 5**).

Multivariate analysis revealed statistically insignificant ORs ( $p < 0.05$ ) for the age, marital status and parity variables of the respondents (**Table 6**).

## 4. Discussion

### 4.1. Sociodemographic Characteristics

#### 4.1.1. Age

Almost half of the women were aged 35 and over (49.1%) with a median age of 34, the modal class being the 15 - 24 age group.

Our observations are similar to those of Massad S *et al.* [13] in the United States (median age 34 years) and Blumenthal PD *et al.* [14] in Ghana (34.0 years). A similar study was carried out by Söderlund S *et al.* [15] who found in Sweden a median age of 43.5 years whereas Catarino R *et al.* [16] in Cameroon and Yessaian A *et al.* [17] in the United States had a median age of 39 years and 42 years respectively. Many other authors have made similar studies; Benoy HI *et al.* in Belgium [18] and Lorin L *et al.* [19] in France reported a median age greater than ours (45 and 52 respectively), whereas Hernadi Z *et al.* [20] in Hungary had a median age slightly lower than ours (32 years).

Thus, the occurrence of dysplastic lesions of the cervix in a relatively mature age could be explained in our environment by the precocity of sexual intercourse and the multiplicity of sexual partners, consequences of a precarious socio-economic level (59.0% of women with a low socio-economic level compared to 41.0% with a way socio-economic level).

#### 4.1.2. Marital Status

In our series, 47.0% of women were married and 24.8% were single. Fatouma B. [21] found in Mali a much higher rate than ours of married women (90%); Catarino R *et al.* [16] reported a rate of 58.2% of married women versus 33.8% of single, almost the same rate as Gordon JR *et al.* [22] (56.0% of married women) and moderately higher than Shin SS *et al.* [23] (48.2% of married women) in their respective studies in India, but much higher than that of Mitchell SM *et al.* [24] in sub-Saharan Africa (10.55% of married women).

**Table 6.** OR adjusted (95% CI) factors associated with dysplastic lesions.

Variables	n = 625	Adjusted OR (CI 95%)	P-value
Age (Age groups)		0.59 [0.03 - 11.14]	0.7251
Marital status		1.94 [0.11 - 33.18]	0.646
Parity		1.40 [0.06 - 33.65]	0.834

Several other studies have been done and have shown the predominance of married women in case of dysplastic lesions of the cervix [25]-[30].

This rate, close to half of the married women in our study, is linked to the increase in early weddings, which is becoming increasingly important, especially in rural areas, the main bastions of the majority of our patients.

#### 4.1.3. Profession

Housewives accounted for 39.7% of the cases in our series. On the other hand, Fatouma B [21] found in Mali 62.2% of housewives compared to 52% for Konate S [31] a year earlier and 31.7% for Catarino R. in Cameroon [16]. Liang X *et al.* [30] reported in their study in China, a rate of 42.4% of housewives in their series.

The slightly high rate of housewives in our series is explained not only by the low level of economic life that compels the woman to adopt a wait-and-see attitude and to settle for the little that the husband can bring, but also by the social cultural constraint of the region, where it is estimated that the woman, regardless of her grade or the value of her degree, is dedicated to the care of the house.

#### 4.1.4. Level of Education

In our study, 7.0% of women had a higher level of education, 40.2% had gone to high school while 26.7% had a primary level of education and 26.1% were illiterates.

Wright TC *et al.* [32] found in Athens a rate, higher than that of our series, of 25.4% of women who attended higher education. Mitchell SM *et al.* [24] reported in their series in sub-Saharan Africa a rate, lower than ours, of 19.09% of women with a high school education. Arora R *et al.* [33] found 45% of illiterates in India, which is higher than that of our series, while Gordon JR *et al.* [22] observed, still in India, several years later a rate of 8 % illiterate, which is far inferior to ours. Husaiyin S *et al.* [25] reported in China a rate, higher than ours, of 68.0% of women with no more than primary education, while Tapera O *et al.* [26] found a higher rate in Zimbabwe than women in our series, of women with a high school education (71%).

The very low rate of women who attended higher education in our region would not only be a consequence of a precarious socio-economic level, but also and especially of the negativist conception of the culture of the environment where some people think that only men should legitimately have access to higher education, while women have to be content with secondary education.

## 4.2. Sexual and Gyneco-Obstetrical Characteristics

### 4.2.1. Age at First Intercourse

Early age at first intercourse is one of the risk factors for the occurrence of dysplastic lesions of the cervix theoretically documented by almost all authors. There are many studies that have been conducted on this subject. Catarino R *et al.* [16] reported in their series in Cameroon that 69.4% of women had their first sexual intercourse before the age of 19. For Arora *et al.* [33], this rate was 50.6%

of women who had had their first sexual intercourse before the age of 19. As for Shin SS *et al.* [23], they reported in India a rate of 51.4% of women who had their first sexual intercourse before the age of 17 years.

Several other studies have shown that the majority of women with dysplastic lesions of the cervix have had their first sexual intercourse at an early age [34] [35] [36] [37]. In our series, 67.5% of women had their first sexual intercourse between the ages of 15 and 20 years. This early age at first intercourse is an immediate consequence of the country's socio-economic level, which is one of the lowest in Africa.

#### **4.2.2. Number of Sexual Partners**

The multiplicity of sexual partners is, along with the early age at first intercourse, a risk factor for the occurrence of cervical dysplastic lesions.

In our series, the number of sexual partners did not exceed five (87%). Several authors made similar studies and came up with the following results: Catarino R *et al.* [16] found in their study in Cameroon that the number of sexual partners was largely between 2 and 5 (45.4%); Shin SS *et al.* [23] also reported in India a rate of 77.3% of women with a number of sexual partners between 2 and 5; Jolly PE *et al.* [34], meanwhile, obtained in their study in Swaziland a rate of 88.6% of women with more than one sexual partner; Wudtisan J *et al.* [35] in Thailand and Hooi DJ *et al.* [37] in the Netherlands, for their part, had rates of 66.7% and 69.9% of women with a number of at least two sexual partners in their respective studies.

Thus, the precarious financial system of the country, at the base of a dismal socio-economic level of the population, would explain this recourse of women to multiple sexual partners, hoping thus to cover their needs.

#### **4.2.3. Type of Sexual Intercourse**

Normal sex was the most common type (94.7%) in our work. Other authors have noted the same observations in their work [34]. This recourse to normal sexual intercourse in our environment are the results of the great conservation of morals emanating from African culture, for which intercourse can only be performed vaginally, while others constitute a prohibition.

#### **4.2.4. Sexual Violence**

In our work, 163 women, or 26.1% of the total, had been victims of sexual violence. Several similar studies have been conducted that have found a correlation between cervical cancer and sexual violence [38] [39] [40] [41].

This no insignificant rate of women victims of sexual violence (26.1%) in our series is the exact reflection of the everyday life of the Congolese in the east of the country, the latter being the real theater of decades of wars perpetrated by different armed groups.

#### **4.2.5. Hormonal Contraception**

Taking hormonal contraception in women with oncogenic human papillomavi-

rus increases the risk of progression to cancer by a factor of four [1]. In our study, only 21.9% of women had used hormonal contraception.

Catarino R *et al.* [16] found in their study in Cameroon a lower rate than ours for women who used hormonal contraception (13.9%), while Arora R *et al.* [33] reported in India a higher rate than ours of 43.37% of women who used this type of contraception.

Indeed, the results of the studies on this subject are divergent according to the environment. This is how Godfrey M.A.L *et al.* [42] in their study in the United Kingdom, reported a high rate of 50.0% of women who used oral contraception, compared to 30% observed by Wudtisan J *et al.* [35] in Thailand and 11.2% reported by Thay S *et al.* [29] in Cambodia. Many other studies have also reported a significant percentage of women who used hormonal contraception in the past before developing dysplastic lesions of the cervix [43] [44]. The low rate (21.9%) of women using oral contraception in our environment is the result of the low inclination of women for this practice, for fear of the side effects of contraception, often dramatically exaggerated by the non-caregivers, for lack of information from the majority of the medical profession.

#### 4.2.6. Parity

Most cases of dysplastic lesions of the cervix of our series were multiparous (59%). Arora R *et al.* [33] also reported in India a rate of 61.12% of multiparous women in their study of cervical dysplastic lesions, compared to 40.8% for Lorin L *et al.* [19] in France and 15.2% for Thay S *et al.* [29] in Cambodia. Godfrey M.A.L *et al.* [42] found a significant proportion of 64.5% of multiparous women in the United Kingdom.

Overall, the majority of authors reported a considerable rate of multiparous women in their studies of dysplastic lesions of the cervix [45], which is in the same order as the results of our series.

#### 4.3. HIV Antecedent

The immunosuppression (HIV infection, immunosuppressive therapy, etc.) plays a major role in the occurrence of dysplastic lesions of the cervix [1] [46]. Several studies have supported the coexistence between HIV infection and human papillomavirus [34] [47] [48] [49] [50].

In our series, about a quarter of women, or 21.9%, was HIV positive. This non-insignificant frequency of HIV infection is explained by the low standard of living of the population, pushing girls and women into unsafe sexual practices and unprotected sex.

#### 4.4. Smoking History

Smoking is one of the risk factors for cervical cancer [1] [46]. Our study reveals a low rate of women consuming tobacco (2.5%). Shin SS *et al.* [23] had a slightly lower rate than ours of 1.8% of women who had used tobacco in the past.

Other authors had far greater results than ours regarding women who had

used tobacco in the past: Godfrey M.A.L *et al.* [42] in the United Kingdom (41.9%), Pokomandy A *et al.* [51] in Canada (54.1%); Agorastos A *et al.* [52] in Greece (77.45%), Wudtisan J *et al.* [35] in Thailand (26.7%) and Bogani G *et al.* [53] in Italy (20.9%).

This very low rate of women consuming tobacco in our environment is explained by the absence of this habit in the community, as smoking is considered to be the preserve of men.

#### 4.5. Cytopathological Aspects

Pap smear is the screening tool currently recommended for precancerous and cancerous cervix lesions. The technique developed by Papanicolaou and Babès is inexpensive, simple and acceptable, painless and reproducible, non-invasive, with no contraindications [46]. For more than half a century, it has been effective since its introduction, the invasive carcinoma of the cervix has seen its frequency considerably decreased. However, the biopsy remains the gold standard, it is she who confirms the lesions after detection by cytology and orientation by colposcopy [46]. Biopsy is therefore indicated in cytological lesions of low and high grade [46].

In our series, cervical-uterine pap smears was normal in 82.88% and inflammatory in 2.4% of cases, while cytological abnormalities, which were found in 14.7% of cases, included: 9.44% atypia (8.8% ASC-US, 0.4% ASC-H and 0.16% AGC); 4.48% low-grade squamous intraepithelial lesions (LSIL) and 0.8% high-grade squamous intraepithelial lesions (HSIL). Wang JJ *et al.* [54] in China found: normal cervical-uterine pap smears in 71.7% of cases versus 14.8% ASCUS; 8.7% of LSIL and 2.3% of HSIL. Kasap B *et al.* [55] found in their study in Turkey: a rate of 84.9% normal cervical-uterine pap smears; 1.55% ASC-US; 5.3% LSIL and 4.0% HSIL. Garbuglia AR *et al.* [50] in Italy had the following results: normal cervical-uterine pap smears in 76.4% of cases; ASC-US, LSIL and HSIL in 24.4% of cases while Correa CM *et al.* [56] obtained a normal cervical-uterine pap smear in 63.2% in Brazil. Agaba AP *et al.* [57] reported, in Nigeria, 31.7% of normal cervical-uterine pap smears; 39.3% ASC-US; 15.2% of LSIL and 13.8% of HSIL. Takamatsu R *et al.* [58] in Laos resulted in the following results: 90.7% normal cervical-uterine pap smears; 5.3% ASC-US; 0.6% ASC-H; 2.3% of LSIL; 0.9% HSIL and 0.07% SCC.

In view of the results of the above studies, we can say that cervical cytopathology was normal in the majority of cases in our series. This normality of the cervical-uterine pap smears is explained by the sensitivity of this examination which is about 70% to 80%.

#### 4.6. Sociodemographic Characteristics and Cytology

The study of the association between socio-demographic characteristics and cytology (Table 4) shows that the proportion of dysplastic lesions was significantly higher in women  $\geq 35$  years of age (18.6%), more particularly compared to the

25 - 34 age group (9.8%) with almost twice the risk of having dysplastic lesions ( $p < 0.0245$ , OR = 2.1, 95% CI [1.10 - 4.24]). With regard to marital status, brides (15.3%) and widows, divorced and women in polygamous unions (19.3%), compared with single men (8.4%), had a significantly higher ( $p = 0.0183$ ) dysplastic lesions of the cervix with respectively two and three times more risk of developing this type of lesions (OR = 1.97, 95% CI [1.003 - 4.12] and OR = 2.61, 95% CI [1.28 - 5.62]).

On the other hand, we did not note a statistically significant difference according to the occupation, the level of education and the socio-economic level, notwithstanding the risk more or less high to present dysplastic lesions highlighted in the women farmers (OR = 1.23, 95% CI [0.65 - 2.28],  $p = 0.7725$ ), women with a higher level of education (OR = 1.41, 95% CI [0.52 - 3.45],  $p = 0.8515$ ) and women of low socioeconomic status (OR = 1.15, 95% CI [0.71 - 1.87],  $p = 0.3095$ ).

Several studies have been done and have revealed the correlation between socio-demographic characteristics and cytopathology in case of precancerous lesions of the cervix.

Indeed, Adenis A *et al.* [59] found in their study in Guyana a higher risk of developing dysplastic lesions in women aged 50 to 64 than in all women (OR = 4.8, 95% CI [0.6%] 39.5); it was the same for those with a low level of education (OR = 2.1, 95% CI [0.5 - 8.9]) without the difference being significant. Berraho M *et al.* [60] have observed in their series in Morocco a high risk of cervical cancer in divorced women (OR vs. married women = 2.4, 95% CI [1.3 - 4.6]), women with (95% CI 95%), women living in rural areas (OR = 10.7, 95% CI [5.3 - 21.8]) and those with a low socio-economic level (OR = 3.1, 95% CI [1.8 - 5.4]).

Vinodhini K *et al.* [61] found in their study in India that the proportion of dysplastic lesions was statistically higher among illiterate women (OR = 8.28, 95% CI [5.51 - 12.83],  $p < 0.004$ ).

We find that the results are slightly different according to the authors, this would be related to the sample size of each study, a key element for statistical significance.

#### 4.7. Sexual, Gyneco-Obstetrical and Cytology Characteristics

The proportion of dysplastic lesions in our series was very significantly ( $p = 0.0042$ ) higher in multiparous (17.9%) and primiparous-pauciparas (13.3%) than in nulliparous (4.4%), the risk being multiplied by nearly five (OR = 4.73, 95% CI [1.69 - 18.36]) and three (OR = 3.33, 95% CI [1.08 - 13.75]).

In contrast, we did not find a statistically significant difference in the proportion of dysplastic lesions: between age groups at menarche ( $p = 0.9794$ ); between age groups at first intercourse ( $p = 0.8144$ , the risk being slightly higher among women who had their first sexual intercourse beyond 20 years (OR = 1.46, 95% CI [0.55 - 3.68]), based on the number of previous sexual partners ( $p = 0.4448$ ) and the type of intercourse ( $p = 0.4496$ ), with the risk being slightly higher

among women reporting normal sexual intercourse (OR = 1.26 95% CI 0.42 - 5.07), depending on the age at first pregnancy ( $p = 0.7535$ ), the risk being slightly higher for women who had first pregnancy beyond 20 years (OR = 1.27, 95% CI [0.51 - 3.41]), compared to the notion of sexual violence ( $p = 0.3552$ ), smoking ( $p = 0.5734$ ) and hormonal contraception ( $p = 0.1118$ ), with a slightly higher risk for women who used hormonal contraception (OR = 1.43, 95% CI [0.80 - 2.47]) as well as according to the antecedent HIV infection ( $p = 0.1584$ ).

Berraho M *et al.* [60] reported from their study in Morocco: a higher risk of developing cervical dysplastic lesions in women who had menarche between 13 and 14 years than those who had menarche at 15 years and beyond (OR = 3.6, 95% CI [2.1 - 6.2] and OR = 2.4, 95% CI [1.3 - 4.4], respectively); and a higher risk in multiparous women starting from third parity and beyond (OR = 1.4, 95% CI [1.2 - 3.9]), in women practicing oral contraception (OR = 1.8, 95% CI [1.2 - 2.8]) and those with normal sexual intercourse (OR = 3.3, 95% CI [1.8 - 6.4]).

Adenis A *et al.* [59] had the following results in Guyana: a higher risk but no significant difference in large multiparas (OR = 2.1, 95% CI [0.5 - 11.2]), women with age at first intercourse  $\geq 18$  years (OR = 1.5, 95% CI [0.4 - 6.0]) and with only one sexual partner (OR = 8.2, 95% CI 0.8 - 84.5) as well as a higher risk with a significant difference in women taking non-oral contraception (OR = 3.3, 95% CI [1.1 - 10.4]).

As for Vidal AC *et al.* [62], they had noted in Tanzania a higher proportion of dysplastic lesions with a statistically significantly greater difference in oral contraceptives ( $p < 0.003$ ) and HIV infection ( $p < 0.0001$ ). However, the difference was not statistically significant in terms of number of sexual partners ( $p < 0.4$ ), marital status ( $p < 0.6$ ), and smoking status ( $p < 0.6$ ).

Vinodhini K *et al.* [61] found in their study in India that the proportion of dysplastic lesions was higher, with a statistically significant difference, among women who had their first sexual intercourse at age 15 and below (OR = 4.21; 95% [3.82 - 8.82],  $p < 0.04$ ), in case of menarche between the age of 13 and 14 years (OR = 4.19, 95% CI [2.87 - 6.11]  $P < 0.04$ ), in multiparous women with a delivery number  $\geq 3$  (OR = 19.2, 95% CI [10.78 - 34.44],  $p < 0.001$ ) and in women with at least three intercourse per week (OR = 6.70, 95% CI [4.41 - 10.16],  $p < 0.01$ ). On the other hand, they did not note any significant statistical difference with respect to socioeconomic level ( $p < 0.44$ ), marital status ( $p < 0.12$ ) and number of sexual partners ( $p < 0.45$ ).

Ali-Risasi C *et al.* [9], after their study in the city of Kinshasa, the following results with respect to HIV infection: the risk of developing low grade dysplastic lesions (LSIL) was higher among HIV-negative widows compared to HIV-positive widows compared to same-status spouses (OR = 8.33, 95% CI [0.41 - 170.67] and OR = 1.16, 95% CI [0.45 - 2.94]), seronegative multiparas than seropositive (OR = 10.01, 95% CI [1.18 - 75.36] and OR = 1.31, 95% CI [0.49 - 3.51]) in comparison with women with gestations  $\leq 2$  sharing the same serological status.

Also in their study, multivariate analysis revealed a slightly elevated risk for HIV-positive women who had aborted in the past (risk increased by about two-fold) compared to women with gestationality  $\leq 2$  sharing the same serologic status (OR = 1.98, 95% CI [0.83 - 4.75]). It also noted a significantly higher risk for HIV-negative single (OR = 5.26, 95% CI [0.27 - 102.32]) and seronegative widows (OR = 4.34, 95% CI [0.18 - 105.99]) compared to brides with the same serological status.

Thus, several studies have been conducted on the correlation between cytopathology and the sexual or behavioral and gynecological characteristics of women, but the results are slightly different. It has to be said that in the majority of studies the same theoretically documented risk factors predisposing to the development of dysplastic lesions of the cervix are incriminated, even if, according to the studies, the risk ratios look slightly different with various statistics meanings.

## 5. Conclusion

Cervical cancer remains a real scourge in the world, especially in sub-Saharan Africa, where the diagnosis is often made when the pathology is at its stage almost incurable. Early detection of dysplastic lesions by Pap smear is therefore imperative in the eradication of this pathology.

## Acknowledgements

We thank all those who contributed to the realization of this work, and more particularly to our Master, Professor Jean Baptiste KAKOMA

## Competing Interests

We declare, unanimously, that there is no conflict of interest between the authors.

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