Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Biology

Cervical Cancer Screening by Cervicovaginal Smear: A Study of 13,919 Cases Recorded from 2004 to 2016 at the Histology-Embryology and Cytogenetics Laboratory of Dakar

Mame Vénus GUEYE[1]*, Aminata Issa NGOM[1], Ndiaga Diop[1], Amadou Ndiade[2], Mohamed Dieng[3], Ange Lucien Diatta[3], Robert Diatta[4], Abdoulaye Séga Diallo[1], Mama Sy Diallo[1]

[1]Laboratory of Histologie-Embryologie-Cytogenetics, Départment of Biology and fonctionnal explorations, Faculty of Medecine, Pharmacy and Odontolo-Stomatology, Cheikh Anta Diop University of Dakar, Sénégal
[2]Laboratory of Histologie-Embryologie-Cytogenetics, Alioune Diop University of Bambey, Diourbel, Sénégal
[3]Laboratory of Histologie-Embryologie-Cytogenetics, Assane Seck University of Ziguinchor, Sénégal
[4]Laboratory of Histologie-Embryologie-Cytogenetics, Formation and Research Unit of Health Sciences of Thies, Sénégal UFR

DOI: https://doi.org/10.36347/sjmcr.2026.v14i03.054 | **Received:** 12.02.2026 | **Accepted:** 25.03.2026 | **Published:** 28.03.2026

***Corresponding author:** Mame Vénus GUEYE
Laboratory of Histologie-Embryologie-Cytogenetics, Départment of Biology and fonctionnal explorations, Faculty of Medecine, Pharmacy and Odontolo-Stomatology, Cheikh Anta Diop University of Dakar, Sénégal

Abstract | **Original Research Article**

Introduction: Cervical cancer is the fourth most common cancer in women in the world. Effective prevention strategies, such as screening by cervicovaginal smear, can prevent most cervical cancers. The objective of this study was to describe the cytological characteristics of cervicovaginal smears in patients who underwent screening over a period of thirteen (13) years (January 2004 to December 2016) and to describe the results obtained. ***Methods:*** We conducted a retrospective, descriptive, and analytical cross-sectional study over a period of 13 years at the Histology-Embryology and Cytogenetics laboratory of Cheikh Anta Diop University in Dakar (UCAD). All women who underwent a cervicovaginal smear for cervical cancer screening were included; we also collected several epidemiological parameters. ***Results:*** 13,919 cervicovaginal smears (CVS) were recorded. The majority of women were referred by family planning centers (31.70%); screening was the most frequent reason for referral (73.67%); the mean age of patients was 39.69 years with a predominance of the 35-50 age group (44.88%). 88.66% of women had at least one child, with a median of 3 children per woman and a maximum of 15 children. 32.81% of women were using contraceptive methods. Regarding the CVS, 76.71% of smears were dystrophic, of which 71.93% were associated with infection. 2.67% of patients had low-grade lesions and 1.79% had high-grade lesions; carcinoma was suspected in 0.49% of cases. ***Conclusion:*** This 13-year study recorded 13,919 CVS, with dystrophic smears being predominant.

Keywords: Cervicovaginal smear; Papanicolaou ; intraepithelial lesions; screening ; cervical cancer.

INTRODUCTION

In 2022, it was estimated that 660,000 women were diagnosed with cervical cancer worldwide and approximately 350,000 deaths were attributed to this disease according to the World Health Organization (WHO). Almost all cases of cervical cancer (99%) are linked to infection with high-risk human papillomavirus (HPV), a highly prevalent sexually transmitted virus (WHO, 2022) [1]. While most HPV infections resolve spontaneously and are asymptomatic, persistent infection can cause cervical cancer. In Senegal, cervical cancer is the leading cancer among women and ranks ahead of breast and prostate cancer in 2022 (WHO, 2002) [2]. It represents 27.3% of cancers in women and 17.4% of cancers overall, and is also the leading cause of cancer-related mortality (16.3%) (GCO 2022, IARC 2022) [3,4]. When diagnosed, cervical cancer is one of the easiest cancers to treat, provided it is detected early and managed effectively. Among screening methods, Cervicovaginal Smear (CVS) and HPV genotyping play an important role. Cancers diagnosed at an advanced stage can also be controlled with appropriate treatment and palliative care. The objective of this study was to describe the cytological aspects of samples obtained from cervical cancer screening by cervicovaginal smear

from January 2004 to December 2016 at the Histology-Embryology and Cytogenetics laboratory (HEC) of Cheikh Anta Diop University in Dakar (UCAD).

MATERIALS AND METHODS

All women who underwent a cervicovaginal smear for cervical cancer screening were included. During the interview, parameters such as origin, reason for referral, age, parity, marital status (polygamous or monogamous), and contraceptive use were collected. After the interview, the patient was positioned on a gynecological table for sample collection. Two samples were taken: one from the endocervix and the other from the exocervix. Each sample was spread on a slide and fixed with spraycyte or hairspray. The slides were dried and stained according to the Papanicolaou method (Table I).

Table I: Papanicolaou staining method at the HEC laboratory of UCAD

Medium	Duration and effect
Alcool 70°	1mn remove excess fixative
Distilled water	3mn remove excess fixative
Harris' Hematoxylin	5mn (nuclear stain)
Tap water	5 minutes
HCL* 5%	10 seconds (for différentiation)
Alcool 70°	5mn
Alcool 70°	5mn
OG6**	5mn (cytoplasmic stain)
Alcool 95°	1mn
EA50	5mn (cytoplasmic stain)
Alcool 100°	5mn
Alcool 100°	5mn
Xylene	Mounting medium

*Chlorhydric Acid **Orange G 6

RESULTS

This study collected 13,919 cervicovaginal smear from the Histology-Embryology and Cytogenetics laboratory. The results were collected and analyzed over the period from January 2004 to December 2016. The distribution of the samples per year is summarized in Table II.

Table II: Distribution of patients per year

Year	Frequency(N)	Relative frequency(%)	Confidence interval(%)
2004	1147	8,24	7,80-8,71
2005	996	7,16	6,74-7,60
2006	1147	8,24	7,80-8,71
2007	932	6,70	6,29-7,12
2008	961	6,90	6,49-7,34
2009	866	6,22	5,83-6,64
2010	1390	9,99	9,50-10,50
2011	1626	11,68	11,16-12,23
2012	1613	11,59	11,07-12,13
2013	1234	8,87	8,40-9,35
2014	861	6,19	5,80-6,60
2015	511	3,67	3,37-4,00
2016	631	4,56	4,23-4,92
Total	**13919**	**100,00**	

This activity involved a relatively constant number of patients, with an average of 1070.69 patients per year. The patients who came for screening came from several health structures (Table III).

Table III: Frequency According to Patient Origin

Provenance	Frequency (N)	Relative Frequency (%)	Confidence Interval (%)
Private	1061	7,62	7,19-8,08
Family planning center	4412	31,70	30,93-32,48
Health district	3039	21,83	21,15-22,53
Outpatient treatment Center	534	3,84	3,53-4,17

Provenance	Frequency (N)	Relative Frequency (%)	Confidence Interval (%)
Medical-social Center	516	3,71	3,40-4,07
Hospitals	4357	31,30	30,54-32,08
Total	**13919**	**100,00**	

The women referred to our laboratory for cervicovaginal smear testing came mostly from hospitals and family planning centers, with a test request form indicating the reason for the request **(Table IV).**

Table IV: Distribution of patients according to the reason for sampling

Motif du prélèvement	Frequency(N)	Relative frequency(%)	Confidence interval(%)
Amenorrhea	135	0,97	0,82-1,15
Contraception assessment	2483	17,84	17,21-18,48
Infertility assessment	71	0,51	0,40-0,64
Control	135	0,97	0,82-1,15
Screening	10254	73,67	72,90-74,37
Abdomino-pelvic pain	205	1,47	1,29-1,69
Dyspareunia	27	0,19	0,13-0,28
Myomatose	107	0,77	0,64-0,93
Leukorrhea	249	1,79	1,58-2,02
Metrorrhagia	237	1,70	1,50-1,93
Pruritus	16	0,11	0,07-0,19
Total	**13919**	**100,00**	

The mean age of our sample is 39.69 years with a variance of 125.43 and a standard deviation of 11.20. The minimum age is 15 years and the maximum is 88 years. The mode is 40 years. The age group]35-50] years predominates with 44.88% of our sample **(Table V).** Screening activity is low before the age of 20. And there is a significant decrease in older women with only 1.81% for those over 65 years. The age was not specified on 78 tests request forms.

Table V: Distribution of patients by age group N=13,841

Age group	Frequency(N)	Relative frequency(%)	Confidence interval(%)
<= 20 ans	171	1,24	1,06-1,43
]20-35 ans]	4642	33,54	32,76-34,33
]35-50 ans]	6212	44,88	44,05-45,71
]50-65 ans]	2566	18,54	17,90-19,20
> 65 ans	250	1,81	1,60-2,04
Total	**13841**	**100,00**	

Women were nulliparous about 11.34%. Primiparous and multiparous women grouped together and represented 88.66% of women. The median number of children per woman were 3, with a variance of 6.7 and a standard deviation of 2.6. The maximum were 15 children.

Out of 13,717 women, 4,501 used a contraceptive method, representing 32.81%, with different methods employed (Figure 1).

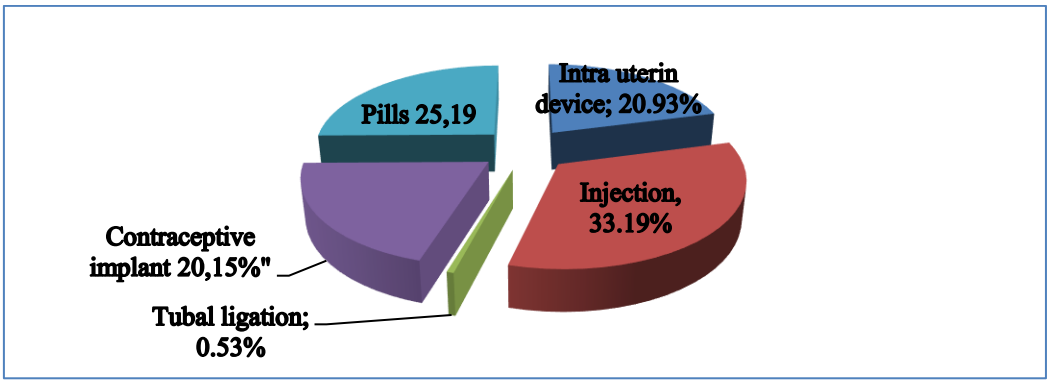

Figure 1: Distribution of patients according to the contraceptive method used

Cytologically, the cervicovaginal smear yielded the following results: Normal smears accounted for 18.35% of the study population. There was a predominance (76.71%) of dystrophic smears (mild, moderate, intense) in the form of atypical cells of undetermined significance (ASC-US) or cannot exclude high-grade lesion (ASC-H). 4.46% of the sample had dysplastic lesions in the form of low-grade (2.67%) or high-grade (1.79%) intraepithelial lesions. A small percentage (0.49%) was suspected of invasive cancer. 71.93% of dystrophies (10,413) were associated with bacterial, parasitic, or viral infections **(Table VI).**

Table VI: Distribution according to the type of associated infection

Type of infection	Frequency(N)	Relative frequency(%)	Confidence interval (%)
Bactériennes	5661	54,37	50,41-56,95
Parasitaires	2344	25,51	21,58-29,02
Virales	2408	23,12	19,39-27,62
Total	**10413**	**100,00**	

Among bacterial infections, those caused by Gardnerella vaginalis were more represented with 34%. 57.59% of parasitic infections are caused by Candida albicans and are the most represented. 68.77% of viral infections are due to HPV. HPV being the main factor implicated in dysplasias, we performed a cross-test between HPV and dysplasias **(Table VII).** The P-value obtained was less than 0.05 with an Odds Ratio of 6.06.

Table VII: Dysplasias and HPV

		Dysplasia		Total
		Yes	No	
HPV	Yes	212 (12,80%)	1444	1656
	No	132 (2,36%)	5453	5585
Total		**344**	**6897**	**7241**

DISCUSSION

A total of 13,919 significant tests were performed with an annual average of 1,070 tests. We noted a higher annual number from 2011 to 2013, likely due to awareness and information campaigns targeting the female population.

In 78.42% of patients, age was between 20 and 50 years, corresponding to the peak period of genital-sexual and reproductive activity, where they are most likely to consult for reasons of genital infection, family planning, pregnancy follow-up, postnatal consultations, or infertility assessment of the couple. Our results are consistent with the study of Diallo A.S et al. in 2003 in the same department, which reported that screening activity was low in women under 20 and over 50 years old, with a predominant age group of]21-40] years[5]. The mean age was 39.69 years with extremes of 15 and 88 years and a mode age of 40 years. These results appear higher compared to those of Diallo A.S et al. [5] where the mean was 33 years. These values are lower that the study of Traore S *et al.,* 2005 [6] where the mean age of women undergoing screening varies between 15 and 25 years. In France, this mean age is 25 years with 65.08% of screening cases (Hasnaoui R, 2017). In contrast, it is 40 years in the United States [7]. The mean age found in some African countries are similar to those of our sample. This is the case in Zimbabwe with a mean age of 29 years and in Nigeria with a mean age of 39.8 years (Mboumba B *et al.,* 2017) [8]. In Yaoundé, Cameroon, the mean age was 38.8 years (Mittal S *et al.,* 2017) [9]. This suggests that when the population is young, the mean age is lower as awareness is more effective.

64% of women referred for a smear came from public hospitals or family planning centers; these two structures being the most frequented for economic reasons. The reason for sampling most frequently indicated on the test request forms is "screening" for cervical lesions in 73.64% of our sample. In the study by NGABA et al. in 2014, pruritus (44.12%) and leukorrhea (37.25%) were the most represented reasons for consultation among women in the Bonassama district of Cameroon (Ngabaa GP *et al.,* 2014) [10].

The percentage of normal smears was 18.35%. This figure is higher than that of the study by Diallo et al. which collected smears from 1980 to 1999 in the same department and found a percentage of 9.7% in a population of 100,358 patients (Diallo Aset al 2003) [5]. This difference could be explained by better management of patients in health centers and increasing awareness among women of childbearing age, as well as mass screening campaigns. However, this percentage is lower than in developed countries such as France with a rate of 79% (Turker LB *et al.,* 2016) [11]. In contrast, in developing countries like Mali, Traoré S. [6] found a rate almost similar to ours with 18.8%. In Tunisia, a smaller study of 140 patients found a very low rate of normal smears with a percentage of 8.7 (Ben H *et al.,* 2007) [12].

In this study, the rate of dystrophic smears is 76.71%, with over 71% associated with an infection. A study conducted in Douala, Cameroon in 2014 found a frequency of infections of 70.59% (Ngaba GP *et al.,* 2014) [10]. These dystrophies are of bacterial origin in over 54% of cases. This rate is similar to that of a study

conducted among South African adolescents, which was 54.9% (Puran AC *et al.,* 2024) [13]. In contrast, it is higher than a study conducted in India where 28.6% of dystrophies are of bacterial origin (Boursas A *et al.,* 2016)[14] and mainly due to Gardnerella vaginalis (Prussia P *et al.,* 2002) [15]. The other infectious dystrophies in our sample are of parasitic (25.51%) and viral (23.12%) origin. In Bhutanese women, viral dystrophies, mainly those due to HPV, are 8.9%, a low rate compared to that of our study, which is 23.12%. This rate is alarming given the implication of HPV in the carcinogenic process. Given that dysplasias are mostly caused by persistent HPV infection, it would be appropriate to associate HPV typing with cervicovaginal smear to better evaluate the impact of HPV and reduce the progression of precancerous lesions of the cervix as much as possible. Low-grade intraepithelial lesions are 2.67% and high-grade lesions are 1.79% for a total of 4.48%. The age group most represented by women with precancerous lesions was 35 to 50 years with a mean of approximately 44 years. This age is slightly lower than the WHO studies conducted in 2014, where the age of women was between 50 and 60 years. This early onset of precancerous lesions in Senegalese women in particular and black African women in general can be explained by societal factors such as early sexual intercourse, polygamy, multiple sexual partnerships, and multiparity (Diallo AS *et al.,* 2003) [5]. The correlation between dysplasias and HPV infection is highly significant, with a 6-fold higher risk in HPV-positive women than in HPV-negative women. A study conducted among Barbadian women in 2002 showed that 60.3% of patients with high-grade and low-grade dysplastic smears had a viral HPV infection (Prussia P *et al.,* 2002) [15], and this percentage is close to that of studies conducted in Hungary with a rate of 60% (Szentirmay Z *et al.,* 2017) [16]. Worldwide, HPV is estimated to cause approximately 70% of cervical cancer cases (Abreu ALP *et al.,* 2012) [17]. Cervical cancer is the leading cancer in women in Senegal (WHO, 2022)[2]. This study allowed us to note that it occurs in Senegal in women with a mean age of 52 years. In Malawi, a study reported that the mean age of cervical cancer onset was 44.9 years (Rudd P et al 2017) [18]. It was suspected in nearly 0.5% of patients in this study; however, histopathological control was not performed. This rate is lower than that of the study conducted by Diallo et al. in 2000, which reported a percentage of 8.34%, showing the impact of screening and treatment of precancerous lesions undertaken and expanded, and better management of patients since 1980.

CONCLUSION

This study, which consisted of a review of thirteen years (2004-2016) of cytological screening in Senegalese women, yielded interesting results. 76.71% of smears were dystrophic, often associated with an infection. It is demonstrated that chronic infections are the breeding ground for the development of precancerous lesions, hence the importance of reducing this rate of dystrophic smears as much as possible through early screening and adequate follow-up of women. At the end of this work, we can say that there has been a clear improvement in cytological screening in Senegal. Efforts have been made through awareness campaigns but also through the follow-up of women with dystrophies or dysplasias detected early.

REFERENCES

1. Organisation Mondiale de la Santé. Cancer du col de l'utérus dans le monde. 2022; Disponible sur: https://www.who.int/health-topics/cervical-cancer#tab=tab_1
2. Organisation Mondiale de la Santé. Répartition des cancers selonla fréquence par pays. 2022; Disponible sur: https://gco.iarc.fr/today/en/dataviz/maps-most-common-sites?mode=cancer&key=total
3. Global Cancer Observatory. Cancer today. 2022 [cité 12 févr 2026]; Disponible sur: https://gco.iarc.who.int/media/globocan/factsheets/populations/686-senegal-fact-sheet.pdf
4. International Agency for Researgh on Cancer. Incidence et mortalité des cancers au Sénégal. 2022 [cité 12 févr 2026]; Disponible sur: https://gco.iarc.who.int/today/en/dataviz/pie?mode=cancer&types=1&sexes=0&populations=686
5. Diallo AS, Fenton CE, Afoutou JM. Condylomes, dysplasies et carcinomes du col utérin: notre experience en vingt ans (1980 à 1999). Dakar Médical. 2003;48(3):181-4.
6. Traoré S. Le dépistage de néoplasie intra-épithéliale du col de l'utérus par l'inspection visuelle à l'acide acétique et au lugol : à propos de 4632 femmes dépistées dans le district de Bamako. [Mali]: Faculté de médecine de Bamako; 2005.
7. HASNAOUI R. Frottis cervico-utérin de dépistage : la prise en charge des patientes vivant avec le VIH est-elle optimale sur le territoire de la COREVIH Ile De France Nord. [paris 7 Faculté de médecien]: Université Paris Diderot; 2017.
8. Mboumba Bouassa RS, Prazuck T, Lethu T, Meye JF, BE"LEC L. Cancer du col de l'utérus en Afrique subsaharienne : une maladie associée aux papillomavirus humains oncogènes, émergente et évitable. Médecine et Santé tropicales. 2017;27:16-22.
9. Mittal S, Basu P, Muwonge R, Banerjee D, Ghosh I, Sengupta MM, et al. Risk of high-grade precancerous lesions and invasive cancers in high-risk HPV-positive women with normal cervix or CIN 1 at baseline—A population-based cohort study. Intl Journal of Cancer. 15 avr 2017;140(8):1850-9.
10. Ngaba GP, Essomba EN, Kedy Koum C, Ndzengue I, Bika C, Adiogo D. Profil des germes impliqués dans les infections cervicovaginales chez la femme en âge de procréer à l'hôpital de district de

Bonassama. revue de Médecine et de Pharmacie. 2014;4(1):400-8.
11. Turker LB, Gressel GM, Abadi M, Frimer M. Papillary squamous cell carcinoma of the cervix: Two cases and a review of the literature. Gynecologic Oncology Reports. nov 2016 ;18:18-21.
12. Ben Hmid R, Mourali M, Zghal D, Mahjoub S, Naceur C, Sbai N, et al. [Usefulness of colposcopy in inflammatory cervico-vaginal smears: apropos of 140 cases]. Tunis Med. juin 2007;85(6):500-4.
13. Puran AC, Adler D, Wallace M, Bennie T, Phuti A, Abar B, et al. Incidental Findings of Bacterial Vaginosis and Other Infections in Papanicolaou Smears of HIV-infected and HIV-uninfected Adolescent Females in South Africa. J AIDS HIV Res. oct 2014;6(9):172-6.
14. Boursas Afidi B. Influence de l'emploi des contraceptifs oraux oestro-progestatifs sur les modifications cytologiques et histologiques de la muqueuse du col utérin de la femme. Université d'Alger ; 2016.
15. Prussia P, GHE G, Bruce A. Analysis of cervico-vaginal (Papanicolaou) smears, in girls 18 years and under. West indien Med J. 2002;51(1):37.
16. Szentirmay Z, Veleczki Z, Kásler M. Humán papillomavírus asszociált méhnyak-megbetegedések Magyarországon : epidemiológia és a HPV-típusok összefüggése a párhuzamosan végzett citológiai diagnózissal. Orvosi Hetilap. août 2017;158(31):1213-21.
17. Abreu ALP, Souza RP, Gimenes F, Consolaro MEL. A review of methods for detect human Papillomavirusinfection. Virol J. déc 2012;9(1):262.
18. Rudd P, Gorman D, Meja S, Mtonga P, Jere Y, Chidothe I, et al. Cervical cancer in southern Malawi : A prospective analysis of presentation, management, and outcomes. Mal Med J. 23 août 2017 ;29(2):124.