



Research Article

Screening for Precancerous Cervical Lesions by Visual Inspection with Acetic Acid and Lugol in Women Undergoing Hemodialysis in A Resource-Limited Country

Fousseny Diakite^{1, 2, *} , **Aminata Diallo²**, **Ibrahima Koussy Bah^{1, 3}** , **Daniel Williams Athanas Leno^{1, 4}**, **Moussa Traoré^{1, 2}**, **Mamadou Saliou Balde^{1, 2}**, **Mohamed Lamine Kaba^{1, 2}**

¹Faculty of Health Sciences and Technology, Gamal Abdel Nasser University, Conakry, Guinea

²Donka National Hemodialysis Center, Donka National Hospital, Conakry, Guinea

³Obstetrics and Gynecology Department, Ignace Deen National Hospital, Conakry, Guinea

⁴Obstetrics and Gynecology Department, Donka National Hospital, Conakry, Guinea

Abstract

Introduction: Women undergoing haemodialysis represent a particularly vulnerable population due to their chronically altered immune system. Visual inspection with acetic acid and lugol are alternative screening methods that have proved effective in various parts of the world. The aim of this study was to determine cervical abnormalities detected by visual inspection with acetic acid and lugol in women undergoing haemodialysis in a resource-limited country. **Methods:** This was a 3-month descriptive cross-sectional study from February 1 to April 30, 2024, including chronic hemodialysis women who underwent systematic visual inspection with acetic acid and lugol for suspicious cervical lesions. Data were collected by direct interview, literature review, gynecological examination including breast palpation, speculum examination. **Results:** Of the 83 haemodialysis patients, 90.4% had participated in the study, with the greatest number in the 36-55 age group, each accounting for 40%. A third of participants had no education (34.7%). More than half the women (54.7%) were married. The majority of participants were multigestational (62.7%), multiparous (54.7%) and 41.3% of women reported repeated genital infections. The prevalence of suspicious cervical lesions was 5.33%. **Conclusion:** Systematic screening with visual inspection with acetic acid and visual inspection with lugol in hemodialysis centers in Guinea could represent a major advance in the fight against cervical cancer.

Keywords

Screening, Precancerous Lesions, Hemodialysis Patients, Guinea Conakry

1. Introduction

Cervical cancer is a major public health problem, particularly in developing countries where screening programs are

often inadequate [1].

In sub-Saharan Africa, mortality rates associated with this

*Corresponding author: fdiak70@gmail.com (Fousseny Diakite)

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type of cancer remain high, largely due to limited screening and restricted access to appropriate healthcare [2-4].

In Guinea, cervical cancer is the most common cancer among women, underlining the need for effective and accessible screening strategies [3, 5].

Women on haemodialysis represent a particularly vulnerable population due to their chronically altered immune system, making them more susceptible to persistent infection with the human papillomavirus (HPV), the main risk factor for cervical cancer [6]. In addition, the constraints associated with regular dialysis may complicate access to traditional screening services such as the Papanicolaou smear [7].

Visual inspection with acetic acid (VIA) and visual inspection with lugol (VIL) are alternative screening methods that have proved effective in various parts of the world [8-10]. Being simple, inexpensive and feasible at the point of care, these methods are particularly suited to resource-limited environments such as Guinea.

However, there are no specific data on the use of VIA and VILI for cervical cancer screening in women on haemodialysis, hence the choice of this topic, which aims to determine the prevalence of cervical abnormalities detected by visual inspection with acetic acid and lugol in women on haemodialysis at the Donka national hemodialysis center between February and April 2024;

2. Patients and methods

This was a descriptive cross-sectional study lasting 3 months, from February 1 to April 30, 2024.

It consisted of haemodialysis patients followed up at the Centre National d'Hémodialyse Donka during the collection period.

The study focused on haemodialysis patients who had received a visual test during the collection period.

We included in this study all female hemodialysis patients, regardless of age, who systematically underwent VIA and VILI and who agreed to participate in our study.

Women with a history of hysterectomy or paraclinically proven pre-cancerous or cancerous lesions of the cervix, as well as those who had never had sexual intercourse, were not included in our study.

We carried out an exhaustive recruitment of patients in accordance with our selection criteria.

Gynaecological variables:

Age of first sexual intercourse: corresponded to the age at which the patient reported having had her first vaginal intercourse, whether voluntary or involuntary. It was expressed in completed years at the time of first intercourse.

Multiple sexual partners: the proposed modalities were:

- Yes: the participant had had several sexual partners during her life or during a specific period.
- No: the participant had only one sexual partner.

Sexually active: the options were:

- Yes: if the participant had had sexual intercourse of any

frequency during the last 3 months prior to the study.

- No: if the participant had not had sexual intercourse during this period.

Number of gestures: the number of gestures was grouped into four categories:

- Nulligest: the participant has never been pregnant.
- Primigeste: the participant has been pregnant only once.
- Paucigeste: the participant has been pregnant two to three times.
- Multigeste: the participant has been pregnant four or more times.

Age at first gestation: corresponds to the patient's age in completed years at the time of her first pregnancy.

Number of parities: the number of parities was grouped into three categories:

- Nulliparous: the participant has never given birth (although she may have been pregnant).
- Primipara: the participant has given birth once.
- Paucipare: the participant has given birth 2 to 3 times.
- Multipare: the participant has given birth 4 times or more.

Repeated genital infections: the modalities were:

- Yes: the participant has had several episodes of genital infections in the past.
- No: the participant has not had repeated genital infections.

HIV (human immunodeficiency virus) infection: this variable identifies participants living with HIV. The modalities proposed were:

- Yes: the participant is infected with HIV, confirmed by a positive test.
- No: the participant is not infected with HIV, or has a negative test.

Metrorrhagia: the proposed modalities were:

- Yes: the participant had abnormal uterine bleeding outside menstruation (metrorrhagia).
- No: the participant had no abnormal uterine bleeding.

Pelvic pain: the proposed modalities were:

- Yes: the participant had experienced or was currently experiencing pelvic pain.
- No: the participant reported no pelvic pain.

Leucorrhoea: the proposed modalities were:

- Yes: the participant had abnormal vaginal discharge (excessive quantity, unusual color or odour).
- No: the participant did not report abnormal vaginal discharge.

Hydorrhea: the proposed modalities were:

- Yes: the participant presented with an abnormal vaginal discharge of the aqueous type (clear, water-like).
- No: the participant did not report a watery vaginal discharge.

VIA (Visual Inspection with Acetic Acid): is a method used to screen for precancerous and cancerous lesions of the cervix. The technique involves applying a 3 or 5% acetic acid solution to the cervix and observing changes in the color of the cervical mucosa.

The result can be:

- 1) Negative: the cervix remains pinkish, with no whitish areas.
- 2) Positive: appearance of thick, whitish areas on the cervix, indicating suspicious lesions requiring further investigations such as colposcopy, HPV testing and biopsy.

Lugol's Visual Inspection: is a method used to screen for precancerous and cancerous lesions of the cervix. This method involves applying a solution of Lugol's iodine to the cervix to observe the tissue reaction. The principle is based on the ability of the Lugol's solution to stain normal cervical cells. Lugol's solution, which contains iodine, is absorbed by the cells of the uterine mucosa. Normal cells, rich in glycogen, turn dark brown. The result can be:

- 1) Negative: the cervix turns a uniform dark brown.
- 2) Positive: the abnormal cells, which have a low glycogen content, do not take on a dark brown coloration and appear straw or mustard yellow, which may be a sign of suspicious cervical lesions. This warrants further investigation such as colposcopy, HPV testing or biopsy to confirm the nature of these lesions.

Colposcopy: in our study, colposcopy could not be performed due to equipment failure at the time of the examination.

Squamocolumnar junction: refers to the transition zone between the stratified squamous epithelium of the ectocervix and the columnar epithelium of the endocervix. This junction is an important structure in the detection of cervical abnormalities, as it is often the site of precancerous or cancerous lesions, particularly in cases of cervical dysplasia. Due to the unavailability of colposcopy during our study, we observed the squamocolumnar junction using the speculum only. The proposed modalities were:

- 1) Squamocolumnar junction fully visible: the junction is fully visible during the examination.
- 2) Squamocolumnar junction partially visible: a portion of the junction is visible.
- 3) Squamocolumnar junction not visible: the junction is not visible.
- 4) Absence of lesions: the absence of lesions in the visual inspection tests with acetic acid (VIA) or Lugol's iodine (VILI) in our study means that no visible abnormality was detected on the cervix. In other words, the cervix shows no white areas (in the case of VIA) or straw-yellow or mustard coloration (in the case of VIL).

Suspicious lesions: in our study, these are positive VIA and/or Lugol's tests. With VIA, suspicious lesions appear as areas that turn white after the application of acetic acid, and with VILI, suspicious lesions turn straw or mustard yellow after the application of iodine solution to the cervix. When a suspicious lesion is identified, further tests such as colposcopy and biopsy are required to confirm the nature of the lesion (benign or malignant).

History of cervical cancer screening: the proposed modalities were:

Screening performed: the patient has a history of cervical

cancer screening, attested by medical documents or a patient statement indicating that a smear or visual test or HPV test has been performed at some time prior to the study.

Screening not performed: the patient has not undergone cervical cancer screening or has no verifiable information on this subject.

Collection procedure: our study was carried out in three (03) phases.

1st Phase (Preliminary): this consisted of administrative approaches to the management of the CNHD and CERFFO-PCG, during which we counted the number of haemodialysis patients and organized their schedules.

Phase 2 (Data collection): this involved interviews with haemodialysis patients, followed by gynaecological examinations and visual screening tests, and completion of screening and survey forms.

Screening was carried out in groups of 10 patients (every Monday-Wednesday), by a team of three (03) gynecologists from the CERFFO-PCG.

The screening technique was as follows:

Patient preparation:

Patients selected for the study were placed in the gynaecological position after being informed of the examination steps and having given their informed consent.

Performance of visual inspection with acetic acid (VIA):

Material:

Sterile speculum, suitable light, swabs, 5% dilute acetic acid.

Procedure:

- a) A sterile speculum was inserted to explore the cervix.
- b) Dilute acetic acid was applied evenly to the cervix using a sterile swab.
- c) A wait of approximately 1-2 minutes was observed to allow the chemical reaction to take place.

Observation:

Whitish areas (acetic whitening) were looked for, indicating possible precancerous or cancerous lesions.

Results recorded:

- a) Negative: normal cervix with no whitening
- b) Positive: presence of whitish areas indicating suspicious lesions requiring further evaluation (colposcopy and biopsy).

Visual inspection with Lugol's iodine (VIL):

Material:

Suitable light, Lugol's iodine solution.

Procedure:

- a) After the VILI test, Lugol's solution was applied to the cervix using a sterile swab.
- b) Immediate observation was carried out to analyze staining reactions.

Observation:

- a) Uniform dark brown staining was sought, indicating healthy glycogen-rich cervical tissue.
- b) Areas showing straw-yellow or mustard coloration were noted as suspect.

Recorded results:

- a) Negative: normal cervix entirely colored dark brown
- b) Positive: presence of straw-yellow or mustard-colored areas indicating a suspicious lesion requiring further evaluation (colposcopy and biopsy).

Patients with a negative visual test have been informed that periodic follow-up is necessary to ensure that no pathological changes have occurred.

Patients who tested positive for cervical cancer (positive visual tests IVA and IVL) were referred for cervical biopsy and HPV testing to confirm diagnosis and assess associated risks.

3rd phase (Data entry): data were entered directly onto an electronic form using the KoboCollect application as they were collected.

Data analysis:

Data entered on the electronic form were downloaded in Excel format and imported into R software version 4.2.2.1 for analysis. The data were cleaned before being recoded.

3. Results

Table 1. Distribution of the 75 women undergoing hemodialysis according to socio-demographic characteristics.

Variables	Number	%
Frequency	83	100
Women screened	75	90.4
Women not screened	8	9.6
Age(years)		
[16-35]	16	21.3
[36-55]	30	40
[56-75]	26	34.7
[>75]	3	4.0
Median age (1 ^{er} et 3 ^{ème} quartile) 48 (37 et 60)		
Profession		
Employed	8	10
Self-employed	8	10
Housewife	59	78.7
Education		
None	26	34.7
Primary	23	30.7
Secondary	19	25.3
Higher	7	9.3
Marital status		

Variables	Number	%
Single	7	9.3
Divorced	6	8
Married	41	54.7
Widowed	21	28
Polygamous partner		
No	27	36
Yes	48	64

Table 2. Distribution of patients by clinical characteristics.

Variables	Number	%
Number of gestures		
Nulligeste	6	8
Primigeste	5	6.6
Paucigeste	17	22.7
Multigeste	47	62.7
Median age first gestation (1st and 3rd quartile) 18(17.0 and 20.0)		
Number of parities		
Nullipare	6	8
Primipare	9	12
Paucipare	19	25.3
Multipare	41	54.7
Repeated genital infections		
No	44	58.7
Yes	31	41.3
History of cervical cancer screening		
No	73	97.3
Yes	2	2.7
Gynaecological signs		
No signs	41	54.7
Leucorrhoea	19	25.3
Pelvic pain	15	20
Hydorrhea	10	13.3
Bleeding	2	2.7

Table 3. Distribution of patients according to the different tests performed.

Screening results	Number (%)
Speculum examination	
Squamocolumnar junction fully visible	73 (97.3%)
Squamocolumnar junction partially visible	2 (2.7%)
Visual inspection with acetic acid	
Negative	71 (94.7%)
Positive	4 (5.3%)
Visual inspection with Lugol's	
Negative	71 (94.7%)
Positive	4 (5.3%)

4. Discussion

The relatively small sample size, the unavailability of a colposcope at the CERFFO-PCG center and the low income level of patients for biopsy and HPV testing were our main difficulties.

The results, although not exhaustive, demonstrate the value of comprehensive care for haemodialysis patients and the importance of cervical cancer screening for women on haemodialysis.

During this systematic screening, we observed a high representation of female participants (90.4%). Patients aged between 36 and 55 represented 40.0% of the sample, with a median age of 48 (IQR: 37. 60). This finding underlines that the majority of women studied are in a period of life when the risk of developing precancerous and cancerous lesions of the cervix is high. Indeed, according to Zhang et al [11], and Bruni et al [12] in 2022, women in this age group are particularly at risk, underlining the importance of regular screening of this population. These results indicate that women aged 36-55 should be a priority target for cervical cancer screening programs. This age group is often associated with a higher incidence of cervical lesions.

Housewives were in the majority, and less than ten percent had a higher level of education, probably reflecting lower socio-economic status and limited access to health information and services. This low level of education could explain their poor knowledge of cancer risks and prevention measures, making targeted health education initiatives crucial.

More than half the women (54.7%) are married, and a significant proportion (28.0%) are widows. This predominance of married women is in line with results found by Mutyaba et al [13] in 2010 in Uganda, suggesting that marital status could play a key role in access to cervical cancer screening. Our results also corroborate those of Kjaer et al [14] in 2002, who showed increased persistence of high-risk HPV in married women, suggesting that hemodialysis women, particularly

married ones, should be priority targets for screening programs.

Our study revealed a predominance of polygamous partners among screened women, which is in line with the observations of Louie et al [15] and Chirenje et al [16] who identified polygamy as a significant risk factor for cervical cancer. Polygamous relationships increase the risk of repeated exposure to HPV, the main cause of cervical cancer. These findings point to the need for targeted screening strategies and specific educational interventions for women in polygamous relationships. By strengthening HPV screening and vaccination programs, as recommended by Bayo et al [17], we can reduce the incidence of cervical cancer in this at-risk population. The majority of participants were multigestational (62.7%) and multiparous (54.7%). The results of our study reflect trends observed in sub-Saharan Africa, where multiparity is common. Anorlu [18] and Leno AD et al [19] point out that high rates of multiparity in this region may exacerbate the risk of cervical cancer. It is crucial to adapt screening programs to take account of these regional and cultural factors. Recurrent hormonal and immune changes associated with pregnancy may contribute to increased susceptibility to HPV infection, as reported by Nessa et al [20] and Tekalegn et al [21].

The median age at first gestation is 18, relatively young, often associated with an increased risk of cervical lesions. In our study, 41.3% of women reported repeated genital infections, and 20% of participants had multiple sexual partners, thus a risk factor for cervical cancer, underlining the need for rigorous medical follow-up.

In our study, 93.3% of patients were not sexually active, which could explain a lower prevalence of HPV infections among this population. According to the American Cancer Society [22] and Bosch et al [23], the absence of sexual activity considerably reduces the risk of contracting HPV, the main etiological factor in cervical cancer. The high rate of sexual non-activity in our study could be explained by the psychological and social impacts of chronic renal failure.

The majority of women (94.7%) had negative VIA and VILI results, indicating the absence of visible lesions. However, 5.33% of women had positive results, suggesting the presence of potential precancerous or cancerous lesions requiring further investigation. The prevalence of suspicious lesions on the IVA and IVL test in our study is comparable to that reported by other studies on similar populations. Cheung and Tang. [24] in 2006 found a prevalence of 4.0% in Australia and New Zealand. Slight variations in prevalence rates may be attributed to differences in screening methods, demographic characteristics of the populations studied, and local clinical practices. The results of our study underline the importance of routine screening for cervical cancer in women undergoing haemodialysis. Although the 5.33% prevalence of suspicious lesions may seem low, it indicates a significant risk that warrants preventive measures and rigorous follow-up.

The four hemodialysis patients who presented with clinical

abnormalities of the cervix require cervical biopsies and histological analysis for confirmation. These four cases show a high prevalence of repeated genital infections, a lack of screening for cervical cancer, and severe medical complications in hemodialysis patients.

5. Conclusion

The widespread adoption of screening techniques using visual inspection with acetic acid and visual inspection with lugol in hemodialysis centers in Guinea could represent a major advance in the fight against cervical cancer, helping to improve the quality of life and overall health of women undergoing hemodialysis.

Longitudinal studies with in-depth analysis could provide valuable information to optimize public health interventions.

Abbreviations

VIA	Visula Inspection with Acetic Acid
VIL	Visual Inspection with Lugol's
HIV	Human Immunodeficiency Virus
HPV	Human Papiloma Virus
CERFFO-PCG	Francophone Regional Center for Training and Prevention of Gynecological Cancers
CNHD	Donka National Hemodialysis Center

Author Contributions

Fousseny Diakite: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Supervision, Validation, Visualization, Writing - original draft, Writing - review & editing

Aminata 1 Diallo: Data curation, Formal Analysis, Investigation, Methodology, Resources, Validation, Visualization

Ibrahima Koussy Bah: Methodology, Resources, Supervision, Validation, Visualization

Daniel Williams Athanas Leno: Methodology, Resources, Supervision, Validation, Visualization

Moussa Traoré Validation, Visualization

Conflicts of Interest

The authors declare no conflicts of interest.

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