# Knowledge and Behavior of Women on Cervical Cancer in the Northern Region of Cameroon

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**Abstract:** *Background*: Cervical cancer is a major cause of women death worldwide. The reduction of the mortality and morbidity of this pathology depends on the early detection based on powerful suitable screening methods, that will lead to optimal treatment strategies. However in some rural region of developing countries, it is very difficult to get access to standard screening methods, alternative screening methods, cheaper and easy to handle are then useful.

*Objective*: The aim of this work was to test the sensitivity and specificity of VIA (Visual inspection with acetic acid) and VILI (Visual inspection with lugol iodine) as a diagnostic test of cervical cancer compared to the Pap Smear, evaluating the feasibility in health formation in the North Cameroon region, of implementing epidemiological surveillance of cervical cancer based on early diagnosis using the VIA-VILI association

*Method*: 309 women age 20 to 62 years were recruited in this study, 307 were included in the statistical analyzes. Each woman was screened for cervical cancer by a conventional Smear and visual inspection with acetic acid 5% and the lugol solution.

*Results*: We found in our study a prevalence of precancerous lesions of cervix at 12.70%. The risks factors of cervical cancer identified are age, matrimonial status, age of first sexual intercourse and parity. The association of VIA and VILI showed a sensitivity, specificity, positive and negative predictive value respectively about 93.58%; 97.01%; 82.01%, 99.04%.

*Conclusion*: Compared to PAP Smear, VIA or VILI could be used as an alternative screening methods for cervical cancer in developing countries, where it is difficult to access to more accurate test such as colposcopy and biopsy.

**Keywords:** Sensitivity, specificity, diagnosis, VIA-VILI, cervical cancer.

## INTRODUCTION

In developed countries, the incidence and mortality due to cervical cancer is decreasing. For example in United States, between 1955 and 1992, mortality due to cervical cancer has decreased by 70%, today a reduction of 3% is observed each year. Similarly in the United Kingdom, mortality rate has decreased by70% in 2008 compared to 30 years earlier [1]. In Cameroon, cervical cancer incidences as well as the mortality associated are progressively increasing. This growth may be due to the insufficiency of national anti-cancer program against cervical cancer, leading to a limited access to screening, high cost and rarity of vaccine against the HPV (Human Papilloma Virus) in the country, the unavailability of early screening services [2]. Consequently, cancer is diagnosed at advanced stage in Cameroon. 80% of cancer cases diagnosed at a late stage and the major part of patients will die within 12 months from the diagnosis. Cervical cancer is an avoidable and curable disease if the disease is diagnosed and treated early [3]. The slow progression of precancerous lesions to invasive cervical cancer stage could long till 10 years, representing a gap of time in which detection and treatment of lesions should be done to prevent the invasive cancer stage [4]. In developed countries, regular screening of the target population would reduce the incidence of cervical cancer to less than 10% [5]. However, in developing countries, screening is non-existent or covers only a small part of the target [5].

The effectiveness of cervical Smear in the detection of cervical lesions has been demonstrated and this technique has significantly reduced the relative incidence of cervical cancer in developed countries since 1950 [6]. But the limits of this technique for developing countries are important, including cost, logistics and trained human resources to mobilize [7]. The possibility of detecting human papilloma virus (HPV) by molecular biology methods offers another additional approach in screening, but as the Smear its cost is still high and this technique requires sophisticated equipment that is expensive in our context [8].

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Confronted to these challenges, the use of visual inspection tests such as VIA (Visual Inspection with Acetic Acid) and Visual Inspection with Lugol iodine (VILI), which require minimum equipment and a lower cost than other techniques appears to be a viable alternative for low-income countries like ours [9]. The aim of this work was to test in comparison to cervical Smear, the sensitivity and specificity of VIA-VILI as a diagnostic test for cervical cancer and to evaluate the feasibility and efficiency of epidemiological surveillance of cervical cancer based on early diagnosis in health facilities in the Northern region of Cameroon.

## MATERIALS AND METHODS

This is a cross-sectional study conducted in the Northern region Cameroon from May to August 2016 in the following hospitals: Regional Hospital of Garoua, District Hospital of Guider and Esperance Hospital of Djamboutou (Garoua). 309 women were recruited, 307 were included in the statistical analyzes. Inclusion Criteria were all women between the ages of 20 and 65 attending hospitals and consenting to participate to the study. Exclusion criteria were women with hysterectomy or cervical conisation, pregnancy, active vaginal bleeding and those with a history of precancerous and cancerous lesions. After written consent was obtained, a survey on the socio-demographic characteristics and the gynecological and obstetric history was administered to each woman. Then they were screened for cervical cancer by a conventional Smear, visual inspection after applying 5% acetic acid and lugol iodine.

### Conventional Smear

The patient reassured and installed in the gynecological position, a sterile speculum was introduced into her vagina until perfect observation of the cervix. A spatula and cytobrush were used to remove the cells by simple scraping. The sample was spread on a slide and immediately fixed with alcohol and dried. All the slides were sent to the anatomo-cytopathology laboratory of the University Hospital Center of Yaoundé, colored and interpreted by an anatomo-pathologist. The results are given according to the classification Bethesda system 2001. Tests readers were blinded to the previews test.

### Visual Inspection with 3-5% Acetic Acid (VIA)

Freshly prepared acetic acid 5% was applied on cervix using cotton swap and interpreted after 1 minute under bright light. Acetic acid colors the abnormal cells. The test considered positive if a white areas, well delimited and near to the squamous junction appears on cervix and negative in the absence of this whitening [9-11].

### Visual Inspection with Lugol (VILI)

Lugol's iodine solution was applied on cervix using cotton swap and interpreted after 1 minute. The normal cells of the cervix contain glycogen and the precancerous or cancerous cells contain very little or not. Through the glycogenic effect on lugol, normal cells absorb lugol and take black or brown coloration. In case of a positive test, iodo-negative area appears and take a mustard or saffron yellow color. The iodo-negative area is clearly delineated and clearly visible [9].

The software R commander version 13.2.0 was used for the analysis of the data. The bilateral Chi2 test was used. A variable was statistically significant at $p < 0.05$. The evaluation of the performance of the tests was carried out by calculating the sensitivity, specificity and the positive and negative predictive values.

## RESULTS

### Performance of Visual Inspection after Application of Acetic Acid (VIA) and Visual Inspection after Application of Lugol's Iodine (VILI)

Pap Smears revealed 39 positive cases corresponding to a prevalence of 12.70%. Table **1** shows the distribution of lesions according to grade.

**Table 1: Distribution of Dysplastic Lesions According to Grade**

| Diagnosis | effectif | Percentage (%) |
|---|---|---|
| ASC-H | 1 | 0.32 |
| ASC-US | 6 | 1.95 |
| HSIL | 9 | 2.93 |
| LSIL | 23 | 7.49 |
| NIL/M | 268 | 87.29 |
| TOTAL | 307 | 100 |

**ASC-H**: Atypical Squamous cell cannot Exclude High grade, **ASC-US**: Atypical Squamous cell of Undefined Signification, **HSIL**: High Squamous Intra-epithelial Lesion, **LSIL:** Low Squamous Intra-epithelial Lesion, **NIL/M**: No Intra-epithelials Lesions or Malignancy.

According to the visual inspection after application of acetic acid, 14.65% (45/307) of cases were positives, 2 cases of false negatives and 8 cases of false positives were identified (Table **2**). This results is

consistent with the study of Akinola *et al.* (2003) on a less large cohort (30/186) [12] or with the study of Sarian *et al.* on a larger cohort [13].

**Table 2: Contingency Table of Smear Results with VIA Results**

| Results of smear | Results of VIA | |
|---|---|---|
| | Negative | Positive |
| ASC-H | 0 | 1 |
| ASC-US | 0 | 6 |
| HSIL | 0 | 9 |
| LSIL | 2 | 21 |
| NIL/M | 260 | 8 |

The visual inspection after application of lugol's iodine revealed 14.33% (44/307) of positive cases. 3 cases of false negatives and 8 cases of false positives were identified (Table **3**). The sensitivity (Se), specificity (Sp), positive predictive values (PPV) and negative values (NPV) of the several tests are presented in Table **4**.

**Table 3: Contingency Table of Smear Results with VILI Results**

| Result of smear | Result of VILI | |
|---|---|---|
| | Negative | Positive |
| ASC-H | 0 | 1 |
| ASC-US | 0 | 6 |
| HSIL | 0 | 9 |
| LSIL | 3 | 20 |
| NIL/M | 260 | 8 |

## Combined Performance of VIA and VILI.

The association of the VIA with the VILI yields sensitivity, specificity, positive predictive value and a negative predictive value of 94.87%; 97.01%; 82.22% and 98.5% respectively. Higher negative predictive values obtained in this study means that if a subject is declared negative to the test, we can effectively accept that result at 100%.

## Relationship between Socio-Demographic Characteristics and Results of Smear

Table **5** presents the relationship between socio-demographic characteristics and the onset of cervical dysplasia. We found that a higher proportion of dysplastic lesions occurred in women over 30 year's olds. The average age of beginning of precancerous lesions is relatively young at 36.89 years. This study reports a significant difference between age and appearance of dysplasia ($p < 0.04$). This is consistent with data reported by Mpiga *et al*. (2015) and Nkegoum *et al*. (2001) which found a peak appearance of dysplasia between 36 and 40 years [14,15].

Marital status was associated with the presence of cervical dysplasia lesions. Unmarried women had significantly ($p <0.02$) more dysplasia than those who keep on in marriage. Our study benefited from information on the number of sexual partners for each participant in the study. Although women with multiple sexual partners had a higher proportion of dysplastic lesions, we did not find a significant difference ($p <0.35$) between the number of sexual partners and precancerous lesions [4].

The average age of first sexual intercourse was 17.52 years. According to our analysis, 75% of women had sexual intercourse before 19 years old. We noticed a significant association ($p <0.008$) between age at the first intercourse and dysplasia lesions. Those who had sexual intercourse between 13 and 18 years had significantly more dysplasia. This result is consistent with findings of Duport in 2008 and the WHO in 2007 which evoke early age at first sexual intercourse as a determining risk factor. Since HPV is sexually transmitted, early age sexual intercourse could be correlated to higher risk of infection [16,17].

Parity has been described elsewhere as risk factor for cervical cancer it. A parity greater or equal to 5 is considered as a risk factor for cervical cancer [16]. In our study, we observed an increased proportion of dysplasia in relation to the number of pregnancies in the study population, but association between the

**Table 4: Sensitivity (Se), Specificity (Sp), Positive Predictive Value (PPV), Negative Predictive Value (NPV)**

| | Se en % | Sp en % | PPV en % | NPV en % |
|---|---|---|---|---|
| VIA | 94.87 | 97.01 | 82.22 | 99.23 |
| VILI | 92.30 | 97.01 | 81.81 | 98.85 |
| Association VIA/VILI | 94.87 | 97.01 | 82.22 | 99.23 |

**Table 5: Relationship between the Socio-Demographic Characteristics and the Result of the Smear**

| Socio-demographic variables | Effectives | Dysplasia in % | P value |
|---|---|---|---|
| **Age** | | | |
| [20-29] | 97 | 6.10 | 0.040 |
| [30-39] | 123 | 13.83 | |
| [40-62] | 87 | 18.39 | |
| **Marital statut** | | | |
| Married | 236 | 11.44 | 0.027 |
| Not married | 71 | 16.90 | |
| **Age of first sexual intercouse** | | | |
| [13-18] | 212 | 16.03 | 0.008 |
| [19-30] | 95 | 5.26 | |
| **Number of sexual partners** | | | |
| [1] | 147 | 10.88 | 0.35 |
| [2-10] | 160 | 14.37 | |
| **Number of births** | | | |
| 0 | 36 | 2.77 | 0.015 |
| [1-4] | 156 | 10.25 | |
| [5-14] | 115 | 19.13 | |
| **Number of pregnancies** | | | |
| 0 | 27 | 3.70 | 0.35 |
| [1-3] | 109 | 10.09 | |
| [4-15] | 171 | 15.78 | |

number of pregnancies and the presence of precancerous lesions was not significant ($p < 0.35$). On the other hand, we found a significant association ($p < 0.01$) between parity and dysplasia. Women with a number of births greater or equal to 5 have more dysplasia than those with a lower number of births.

## DISCUSSION

Conscious on the critical role of early diagnostic in cancer management, cancer research has led to the development of many fast and non invasive screening methods that allow not only to diagnose the disease, but also help in providing an idea concerning treatment outcomes. In developing countries, colposcopy or cytology based screening methods for cervical cancer are difficult of access due to low capacity of health services in rural area. The use of alternative low-cost technique screening based on visual inspection such as VIA and VILI has been proposed for cervix cancer detection in developing countries [9,17]. In this study we evaluated how PAP Smear test, VIA and VILI could be used as screening methods in Nord west of Cameroon. The gold standard test for cervical cancer screening is indeed colposcopy, it has been used to demonstrated limit of the PAP Smear in terms of accuracy, sensitivity, specificity, and negative predictive values in detecting high-grade, cervical, pre-malignant lesions [18]. But in the context of our study, we were unable to get access to this test. However considering the robust metaanalysis made by Peirson *et al.* on 24 studies, it emerges that the use of PAP Smear screening is associated with a reduction in the incidence of invasive cervical cancer and cervical cancer mortality [19]. Giving this fact the value of PAP Smear as controls is based on substantial protective effect that it has demonstrated [20,21]. In this study made on 307 women from the Nord West region of Cameroon, taking PAP Smear as the standard test, we found that VIA and VILI screening methods displayed sensitivity and specificity above 92% and 97% respectively, corresponding as described in other studies, to a large overlapping between visual inspection methods and PAP Smears [22,23]. The VIA identified 100% of precancerous lesions of high grade

and failed to identified 2 precancerous lesions of low grade on the 29 confirmed by the Pap Smear, corresponding to an error of 6.89%. Similarly, in regard to PAP Smears result from VILI gave 3 false negatives and 8 false positive. The sensitivity of our VIA is higher than that obtained in a study in Gabon but with a lower specificity [15]. In more robust studies, VIA has demonstrated higher sensitivity in detection of precancerous lesions of the cervix, but its implementation is associated to high numbers of false-positive results [17]. Akinoa *et al.* have observed that the negative predictive Value of VIA is 100%, while the positive predictive value is too low [12]. Here we associated VIA and VILI screening, for the purpose to define a more accurate system based on the use of the two methods. In accord with the study of previous published studies, we found that there was no advantage to associate the two visual inspection methods for Cervix cancer screening [23,24]. Our result in accord with Huchko *et al*. [24] didn't show any significant difference between the VIA and VILI methods in terms of sensitivity, specificity, positive predictive value and negative predictive value. So, each of these two visual methods could be used alone. Rather, Consul *et al*. [23] has suggested that a association of screening methods should improve sensitivity, but at a cost of low specificity and more false-positive results [23].

Overall our data showed that VIA alone or VILI alone could be implemented as valuable test to screen cervix cancer in rural regions where it is difficult to implement more expensive screening test.

## AUTHORSHIP CONTRIBUTION

All authors contributed to the design, preparation, editing, and final review of the manuscript.

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