Scientific Research Publishing

Open Journal of Obstetrics and Gynecology, 2022, 12, 1031-1041
https://www.scirp.org/journal/ojog
ISSN Online: 2160-8806
ISSN Print: 2160-8792

Contribution of Colposcopy in the Diagnosis of Precancerous Lesions of the Uterine Cervix at the Douala Gynaeco-Obstetric and Pediatric Hospital, Cameroon

Diane Estelle Modjo Kamdem[1*], Alphonse Nyong Ngalame[1,2], Inna Rakya[1,3], Robert Tchounzou[1,2], Darolles Wekam Mwadjie[1], Humphry Tatah Neng[1], Bilkissou Moustapha[1,4], Julie Batta[1], Patricia Metouom Kamdem[5], Charlotte Nguefack Tchente[4], Emile Mboudou[1,6]

[1]Douala Gynaeco-Obstetric and Pediatric Hospital, Douala, Cameroon
[2]Faculty of Health Sciences, University of Buea, Buea, Cameroon
[3]Faculty of Medicine and Biomedical Sciences, University of Garoua, Garoua, Cameroon
[4]Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon
[5]University of Pittsburg Medical Center-Mckeesport, Pittsburg, USA
[6]Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon
Email: *dianeestelleondoa@gmail.com

How to cite this paper: Kamdem, D.E.M., Ngalame, A.N., Rakya, I., Tchounzou, R., Mwadjie, D.W., Neng, H.T., Moustapha, B., Batta, J., Kamdem, P.M., Tchente, C.N. and Mboudou, E (2022) Contribution of Colposcopy in the Diagnosis of Precancerous Lesions of the Uterine Cervix at the Douala Gynaeco-Obstetric and Pediatric Hospital, Cameroon. *Open Journal of Obstetrics and Gynecology*, **12**, 1031-1041.
https://doi.org/10.4236/ojog.2022.1210086

Received: August 7, 2022
Accepted: October 16, 2022
Published: October 19, 2022

Abstract

Introduction: Cervical cancer is a public health problem in Cameroon, due to low screening and late diagnosis. We sought to assess practice of colposcopy at the Douala Gyneco-Obstetric and Pediatric Hospital (DGOPH) in Cameroon and its contribution to the fight against cervical cancer in our context. ***Method***: This is a retrospective cross-sectional study of 99 colposcopies after which 71 exploitable biopsies were retained at the Douala for a period of 1year (December 1, 2019-December 1, 2020). The nomenclature of the French Society of Colposcopy and Cervico-Vaginal Pathology (SFCPCV) was used. ***Results:*** Mean age of the participants was 44 years, mostly multiparous (80%). Cytological abnormalities were the main reference pattern. During the examination 22% of colposcopies were found to be normal, 37% of TAG 1-2A, 31% of TAG 2B-C, and 5% suspected of cancer. After histological analysis of biopsies guided by colposcopy, we found 42% (30/71) of Cervical Intraepithelial Neoplasia (CIN) 1, 15.5% (11/71) of CIN 2 - 3, and 24% (17/71) cancer. Upon analysis of the diagnosed CIN1/CIN2-3/Cancers, we noted a concordance with colposcopy in 62% (23/37), 37% (10/27) and 85% (6/7) respectively. Colposcopic performance in the detection of high-grade lesions and above was 36% (26/71), with a sensitivity of 92.86%, specificity 83.33%, PPV 78.79% and NPV 94.59%. ***Conclusion:*** Despite the difficult so-

cioeconomic context, colposcopy retains all its importance in the diagnosis of precancerous lesions of the uterine cervix. With the imminent putting in place of a national health policy, the goals 90-70-90 by 2030 of the World Health Organization for the fight against cervical cancer can be achieved in our sub-Saharan African countries.

Keywords

Colposcopy, Cervix, Dysplasia, Cancer, DGOPH

1. Introduction

Cervical cancer is the fourth most common cancer in women worldwide. In 2020, 604,127 women were affected, with 341,831 deaths [1]. Every two minutes, a woman dies from cervical cancer. The majority of these cases are found in low-income countries, especially in sub-Saharan Africa [2] [3]. Since 2018, the World Health Organization has formally labeled cervical cancer as a public health problem [2].

In Cameroon, the situation is worrisome, with cervical cancer affecting 40 women out of 100,000 each year [3]. It is the second gynecological cancer in Cameroonian women (26.6%) after breast cancer [4].

However, it is one of those diseases with an efficient means of screening [2]. These screening methods, combined with colposcopy, allow for a more effective diagnosis and treatment of cervical dysplasia. The principle of colposcopy relies on the detection of macroscopic color and morphological changes in the cervical mucosa, with the possibility of sampling for histological diagnosis [5].

In countries with an organized screening system for cervical cancer, colposcopy has permitted thanks to targeted biopsies of cervical abnormalities, to go between high-grade and low-grade precancerous lesions, resulting in fewer conizations and other unnecessary treatments. In fact, it has contributed to the reduction of the incidence of cervical cancer by more than 80% [6].

Due to the lack of an organized national screening system in Cameroon, we have become accustomed to offering individualized screening to clients in our routine gynecological practice. We use Visual Inspection by Acetic Acid (VIA) and Visual Inspection by Lugol's Iodine (VILI) in rural areas, and Pap Smear or High-Risk Human Papilloma Virus (HR/HPV) predominantly in urban areas or otherwise as per the client's means.

The abnormalities detected by each of these methods should normally be investigated by colposcopy, in order to facilitate confirmatory diagnosis and appropriate management. Though colposcopy is seldom available in most health facilities in the country, it is mainstay practice at our tertiary health facility, the Douala Gynaeco-Obstetric and Pediatric Hospital (DGOPH). After over three years of use, coupled with the fact that no study has been conducted to elucidate the role of colposcopy in routine gynaeco-oncologic practice, it was timely to

assess the contribution of this modern technique in the diagnosis and management of precancerous lesions in our environment.

2. Materials and Method

We conducted a retrospective cross-sectional study from December 1st 2019 to December 1st 2020 in the Colposcopy unit of the Douala Gynaeco-Obstetric and Pediatric Hospital (DGOPH). The study received administrative and ethical approval from the DGOPH Ethics Committee.

The colposcopy unit was created in 2017, housed in the outpatient department of Gynaecology and Obstetrics. It is supervised by 2 Obstetrician-Gynecologist consultants who have received formal training in colposcopy at the University of Angers in France and assisted by two paramedical staff.

The most common indications for colposcopy were cytological abnormalities, clinical abnormalities (cervicitis, contact bleeding), signs of virological involvement and previous treatment for dysplasia.

The procedure was explained to the patients, and consent obtained. The different stages of colposcopy were carried out after placing the patients in the lithotomy position in the room dedicated for this purpose. The examination started with the introduction of a single-use speculum and took place in 3 stages. The first step was the examination with the naked eye and without preparation, after cleansing with saline in case of leucorrhoea. The second step involved the examination after application of 5% acetic acid and observation after 60 seconds. The third step was the examination after application of Lugol's solution. These different liquids are applied using cotton balls specially designed for the examination.

In specific cases involving post-menopausal women, an estrogen therapy was prescribed to be taken during the 14 days preceding the examination in order to be sure of haven exteriorized the squamo-columnar junction.

The colposcopic diagnosis was based on:

- Abnormal reactivity to acetic acid (intense acidophilia, irregular mosaics),
- The changes of the glandular orifices (inner sign),
- Straw-yellow iodo-negativity in the Schiller's test.

The terminology used is that of the French Society of Colposcopy and Cervico-Vaginal Pathologies (SFCPCV). In case of multiple abnormalities associated, only the more severe was retained. In the event of any major abnormality, a directed biopsy was performed and the sample sent to the laboratory for histopathological analysis.

Colposcopy was termed satisfactory when the entire transformation zone was visualized. In the opposite case, a complementary exam via endocervical curettage was performed. We systematically performed endocervical curettage of our patients with known positive HPV 18 test.

For this study, we retrospectively collected the records of patients who had undergone colposcopy at the DGOPH during the study period. Information from physical or electronic files of the patients were extracted and entered into a

pre-tested questionnaire by one of the investigators. The following data were collected: socio-demographic and gynaeco-obstetrical characteristics of the patients (Age, marital status, religion, residence, level of education, pregnancy, parity), whether she has carried out a previous screening, indications of the colposcopy, and results of the colposcopy according to the nomenclature of the SFCPCV. When a biopsy was indicated and performed, we studied the correlation between the colposcopic diagnosis and the result of histology.

These were excluded: pregnant women, women with macroscopic signs of carcinomatous invasion of the cervix, women in menstrual period and those having had a medication by vaginal route within the 48 h preceding the procedure.

The data were analyzed retrospectively using a free medico-statistical calculation tool [7]. Parameters used to assess the validity of colposcopy for the diagnosis of high-grade lesions were the following:

- Sensitivity: proportion of high-grade and more correctly identified lesions (TP/Sum of TP + FN)
- Specificity: proportion of lesions other than high grade and more correctly identified
- Positive Predictive Value: probability of having a lesion of high-grade lesion and above
- Negative Predictive Value: probability of not having a f high grade lesion and above
- Concordance: proportion of cases where the colposcopic diagnosis is in perfect match with the histological diagnosis.
- Colposcopic accuracy: proportion of patients in whom there is a correlation between colposcopic findings and histological diagnosis at a close grade.
- Performance of colposcopy in detecting high-grade lesions: ability of colposcopy to differentiate high-grade lesions from other colposcopic abnormalities.

3. Results

A total of 104 patients were received in colposcopic consultation during the study period. At the beginning of the study, 5 cases were rejected due to incomplete records.

Of the 99 retained, 73 benefited from a cervical biopsy. Finally, 71 files were fully exploited, and 2 files had no histological results.

The study population was made up of women aged 24 to 69 years, with an average age of 44 years. The ¾ of the participants were multiparous, with 26% of grand multiparous women (**Table 1**).

Of these 99 women, 53% had undergone previous screening for cervical cancer at least once in their life, either by Pap smear or by High-Risk HPV testing. As summarized in **Table 2**, paraclinical Pap smear/HPV/VIA/VILI abnormalities constituted the largest referral pattern (56% of the study population). The clinical indications are mainly metrorrhagia (26/99).

Table 1. Socio-demographic data.

Variables	Effective	Percentage (%)
Age		
[≤30 years old]	3	2.97
[31 - 44 years old]	55	54.45
[45 - 64 years old]	35	34.65
[≥65 years old]	5	5.05
Total	99	100.0
Parity		
[0 - 1]	18	17.82
[2 - 4]	56	55.44
[5 and +]	25	24.75
Total	99	100.0
Marital status		
Single	26	25.74
In a relationship with	9	8.91
Bride	62	61.38
Divorcee	2	1.98
Total	99	100.0
Socioeconomic level		
Trader	10	9.9
Employee	35	34.65
Student	3	2.97
Housewife	44	43.56
Other	7	6.93
Total	99	100.0
Place of residence		
Douala	86	85.14
Out of Douala	13	12.87
Total	99	100.0

Table 2. Colposcopy indications.

Directions	NOT	Percentage %
Suspicion cervix	10	10.10
pathological pap smear	43	43.03
HPV-HR positive	10	10.10

Continued

Hydrorrhea	3	3.03
Vulvovaginal lesions	2	2.02
Post coital bleeding	18	18.18
Abnormal uterine bleeding	8	8.08
Low-grade lesion follow-up	1	1.01
Abnormal VIA/VILI	3	3.03
Total	99	100.0

HPV-HR: High Risk Human Papilloma Virus. FCV: Cervico-Vaginal smear. VIA: Visual Inspection using Acetic acid. VILI: Visual Inspection using Lugol Iodine.

Our findings showed atypical transformations of low grade (TAG 1-2A) in 37% of cases, high grade (TAG 2B-C) in 31% of cases, and colposcopic signs of invasion in 5% of patients (Table 3).

As shown in Table 4, of the 71 colposcopy-directed biopsies, histopathologic results showed that 18% (13/71) had no dysplasia, 42% (30/71) had low grade squamous intraepithelial lesions (LSIL), 15.5% (11/71) of high grade squamous intraepithelial lesions (HSIL) and 24% (17/71) of cancers. We found a perfect concordance between colposcopic diagnosis and histological diagnosis in 54.92% (39/71) of patients.

Colposcopic precision, assessed as good colpo-histological concordance within one grade, was observed in 71.4% (69/71) of patients. On the LSIL/HSIL/Cancer diagnosed histologically after analysis of the cervical biopsies, the concordances with the colposcopic findings were 62% (23/37), 37% (10/27) and 85% (6/7) respectively. The colposcopic diagnosis was overrated in 11% (8/71) and underestimated in 17% (12/71) cases. The colposcopic performance in the detection of high-grade lesions and more was 36% (26/71).

In evaluating our practice of colposcopy in the detection of the high-grade abnormalities and cancers, we found a sensitivity of 92.86%, a specificity of 83.33%, a positive predictive value (PPV) of 78.79%, a negative predictive value (NPV) of 94.59%, a Yule Coefficient of 0.97 and an Index of Youden of 0.76.

4. Discussion

Our study has permitted us to make an assessment of 3 years of activity of the colposcopic consultations within our hospital institution.

Colposcopy is a paraclinical exam seldom requested by colleagues, due to few indications arising from the lack of a national cervical cancer screening strategy. We can equally incriminate the fairly raised user fees and cost of conducting this exam which stands at over 34,000 FCFA (51 Euros, USD 61). This amount is practically equivalent to the guaranteed minimum interprofessional wage of Cameroon, which stands at 36,270 FCFA.

Table 3. Colposcopic impression according to the nomenclature of the SFCPCV.

Colposcopic diagnosis	NOT	Percentage %
Colposcopic signs of invasion	5	5.05
TAG2C	7	7.07
TAG2B	24	24.24
TAG2A	14	14.14
TAG1	15	15.15
Ectropion	1	1.01
Polyp	8	8.08
Leukoplakia	1	1.01
Vulvar warts	2	2.02
Normal	22	22.22
Total	99	100.0

SFCPCV: French Society of Colposcopy and Cervico-Vaginal Pathologies. TAG 1: Atypical Grade 1 Transformation. TAG 2: Atypical Grade 2 Transformation (A, B, C).

Table 4. Agreement between colposcopic impression and histological diagnosis of cervical biopsies.

Colposcopic diagnosis	Normal/benign	CIN 1	CIN 2 - 3	Cancer	Total
TAG1-2A	12 (92)	23 (76.6)	1 (9)	1 (5.88)	37
TAG2B-C	0	7 (23.3)	10 (90)	10 (58.8)	27
Suspicion Cancer	1 (7.69)	0	0	6 (35.29)	7
Total	13 (100)	30 (100)	11 (100)	17 (100)	71

CIN 1: Cervical Intraepithelial Neoplasia grade 1; CIN 2 - 3: Cervical Intraepithelial Neoplasia grade 2 or 3.

The average age of patients referred for colposcopy was 44 years, which corresponds to the incidence of detection of dysplasia of the cervix in Cameroon (40 - 45 years) found respectively by Tebeu *et al.* in 2013 [8] and Sandjong *et al.* in 2015 [9]. In an older study from 1999, Kouam *et al.* found precancerous lesions in women as young as 38.8-year-old [10]. We note a certain decline in the age of appearance of precancerous lesions over the last 20 years. This could be explained socio-demographically by the precocious age at first sexual intercourse, the decrease in the age at first pregnancy or the late awareness of the importance of screening to these women due to financial in access.

Most of the patients were married and financially independent. This tied logically with the fact that access to screening is clearly conditioned by a certain socioeconomic level.

Since it is equally known that multiparity is a risk factor for cervical cancer, it was not surprising that 3/4 of the patients included were multiparous, with 30%

haven given birth less than 5 times. Okwonko *et al.* [11] in one of our surrounding countries, Nigeria, found a similar profile.

Only half of our patients (53%) had once done a screening test for cervical cancer in their lifetime. This situation is also criticized by Ekane *et al.* who found the following factors as reasons for the low screening rate: the fear of pain, the cost of screening, the fear of cancer diagnosis and the lack of time. Only 3.6% of their study population had an acceptable level of knowledge on the screening for cervical cancer [12]. Therefore, this low screening rate is the driving factor to explain the fewer indications for colposcopy in our context and thus impacting negatively on the fight against cervical cancer.

Knowing that the aim of the colposcopy is regain the high-grade lesions and more for their optimal care, it seemed important for us to assess the concordance between our colposcopic impression and the histological diagnosis as well as our colposcopic accuracy to assess the presence of a high-grade lesions. In the literature the sensitivity of the colposcopy to detect a high-grade lesion and more is of 30% - 70% [13]. The sensitivity of our colposcopic exam to predict the presence of a high-grade lesion and more was evaluated at 92.86%, this high sensitivity could be explained by the number of directed biopsies that we performed (2 - 3 minimum), and systematic endocervical curettage in patients who were tested HPV 18+ as well as in postmenopausal patients.

In our study, we noted a perfect concordance between colposcopic findings and histological diagnosis on biopsies in 54.9% of cases with a good agreement to within one grade of 71.4% of the patients. These figures are lower than those of Fan *et al.* who found perfect agreement within one grade of 65.5% of their population with a concordance at a close range of 98.7% [14]. Olaniyan *et al.* in a meta-analysis find a concordance of 61% with a colposcopic accuracy of 89% [15]. This difference could be explained by the relatively small size of our study population, arising from timid number of weekly colposcopic consultations.

Our colposcopic performance in the detection of high-grade lesions and above is comparable to the 35% recommended by Luesly *et al.* for patients referred for colposcopy irrespective of the reason [16]. This correct performance of colposcopy in predicting the existence of a high-grade lesion in our series is probably still linked to the fact that we performed multiple biopsies in the pathological zone when the indication arises. This has also been found in some studies [13] [17] [18] [19] where it is clearly demonstrated that an increase in the number of biopsies directed at 2 or more suspicious sites improved the diagnosis of high-grade lesions.

We have underestimated the colposcopic diagnosis of one patient with HPV 18, who fortunately was caught by endocervical curettage with histological diagnosis of adenocarcinoma. With this case we join the college of other authors who think that endocervical curettage despite the many controversies retains its indication under certain conditions [20].

According to our results, we can affirm that colposcopy, despite its high cost in our socio-economic context, should systematically be the step following a pa-

thological Pap smear or a clinically abnormal vaginal or exo-cervical mucosa on speculum exam, as asserted already by Ajah *et al.* in 2014 in Nigeria [21].

5. Study Limitations

Relatively, small sample size makes it difficult to generalize our findings. Equally, the retrospective enrollment of participants led to the exclusion of some cases due to incomplete files and thus might have introduced some selection bias, hence weakening the internal validity of the study.

6. Conclusion

Through our study, we portrayed the severity of cervical neoplastic pathology within our semi-urban population and by extrapolation in Cameroonian women. Using colposcopy, we have improved the management of patients presenting precancerous cervical lesions and we were able to catch up with cancers of the cervix at the initial stages in our hospital. Our study thus recalls the importance of this tool in the diagnostic process when faced with a clinical or pre-clinical abnormality of the cervix. In order to reduce the incidence of cervical cancer in our setting, it is necessary to apply proven preventive methods: raising women's awareness on the issue of cervical cancer, encouraging vaccination of young girls and women before their maiden sexual exposure, implementing a national screening strategy including the generalization of colposcopy as a diagnostic aid tool, in order to detect lesions early enough on a larger scale and treat precancerous lesions efficiently.

What Is Already Known on the Subject

Colposcopy is the gold standard diagnostic tool in case of cytological, virological or clinical abnormality of the cervix.

Contribution of the Study

Colposcopy is applicable in routine medical practice in sub-Saharan Africa. It is the first study that addresses this aspect of colposcopy in Cameroon.

Acknowledgements

We owe much gratitude to the following persons: Mr. Ebimbe Jean Blaise for his involvement in the design of the database; Ms. Ndengue and Tafoana B. for the management and collection of histopathological results; Ms. More Nicole and Batalong Patricia for their assistance during colposcopic exams.

Conflicts of Interest

All authors acknowledge having no conflict of interest in this study.

Authors' Contributions

Manuscript design/data collection: Diane Estelle Modjo Kamdem, Data collec-

tion and proofreading of the manuscript: Alphonse Nyong Ngalame/Inna Rakya/Bilkissou Moustapha/Humphry Tatah Neng/Robert Tchounzou/Darolles Mwadjie/Julie Batta/Patricia Metouom Kamdem. Correction of the manuscript/expert opinion: Charlotte Nguefack Tchente/Emile Mboudou.

All authors have read and approved the final version.

References

[1] Ferlay, J., Ervik, M., Lam, F., Colombet, M., Mery, L., Piñeros, M., Znaor, A., Soerjomataram, I., Bray, F. (2018) Global Cancer Observatory: Cancer Today. International Agency for Research on Cancer, Lyon. https://gco.iarc.fr/today

[2] Wealth Health Organization (2020) Global Strategy to Accelerate Tea Elimination of Cervical Cancer Ace Has Public Health Problem. Wealth Health Organization, Geneva. https://who.int

[3] Vasilikos, P., Tebeu, P.M., Halle-Ekane, G.E., Sando, Z., Kenfack, B., Baumann, F., *et al.* (2019) Twenty Years of Struggle against Cervical Cancer in Sub-Saharan Africa. *Revue Médicale Suisse*, **15**, 601-605. https://doi.org/10.53738/REVMED.2019.15.642.0601

[4] Sung, H., Ferlay, J., Siegel, R.L., Laversanne, M., Soerjomataram, I., Jemal, A. and Bray, F. (2021) Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA*: *A Cancer Journal for Clinicians*, **71**, 209-249.

[5] Sideri, M., Garutti, P., Costa, S., Cristiani, P., Schincaglia, P., de Bianchi, P.S., *et al.* (2015) Accuracy of Colposcopically Directed Biopsy: Results from an Online Quality Assurance Program for Colposcopy in a Population Based Cervical Screening Setting in Italy. *BioMed Research International*, **2015**, Article ID: 614035. https://doi.org/10.1155/2015/614035

[6] Sankaranarayanan, R. (2014) Screening for Cancer in Low and Middle-Income Countries. *Annals of Global Health*, **80**, 412-417. https://doi.org/10.1016/j.aogh.2014.09.014

[7] Statistical Tool for Evaluating a Predictive Value of a Diagnostic Test. https://aly-abbara.com/

[8] Tebeu, P.M., Sando, Z., Ndoumba, A., *et al.* (2013) Prevalence and Geographical Distribution of Precancerous Lesions of the Uterine Cervix in Cameroon. *Journal of Cytology & Histology*, **4**, Article No. 183.

[9] Sandjong, I., Sando, Z., Tebeu, P.M., *et al.* (2015) Evaluation of the Socket in Charge of the Lesions Precancerous from Collar According the Approach See and Treat. *Health Science & Disease*, **16**. http://www.hsd-fmsb.org/index.php/hsd

[10] Kouam, L., Kamdom-Moyo, L., *et al.* (1999) Strategies Therapeutic in Case of Neoplasias Intraepithelial from Collar Uterine at about of One Series of 101 Case to University Hospital of Yaounde. *Medicine from Africa Black*, **46**.

[11] Okonkwo, C.A., Ezeanochie, M.C. and Olagbuji, B.N. (2013) Physical after Effects and Client's Satisfaction Following Colposcopy and Cervical Biopsy in a Nigerian Population. *African Health Sciences*, **13**, 402-406. https://doi.org/10.4314/ahs.v13i2.29

[12] Ekane, G., Obinchemti, T., Nguefack, C., Nkambfu, D., Tchounzou, R., Nsagha, D., *et al.* (2015) pap Smears Screening, the Way Forward for Prevention of Cervical Cancer? A Community Based Study in the Buea Health District, Cameroon. *Open Journal of Obstetrics and Gynecology*, **5**, 226-233.

https://doi.org/10.4236/ojog.2015.54033

[13] Kyeun, N. (2018) Colposcopy at a Turning Point. *Obstetrics & Gynecology Science*, **61**, 1-6. https://doi.org/10.5468/ogs.2018.61.1.1

[14] Fan, A., Wang, C., Zhang, L., Yan, Y., Han, C. and Xue, F. (2018) Diagnostic Value of the 2011 International Federation for Cervical Pathology and Colposcopy Terminology in Predicting Cervical Lesions. *Oncotarget*, **9**, 9166-9176. https://doi.org/10.18632/oncotarget.24074

[15] Olaniyan, O.B. (2002) Validity of Colposcopy in the Diagnosis of Early Cervical Neoplasia: A Review. *African Log of Reproductive Health*, **6**, 59-69.

[16] Luesley, D. and Leeso, S. (2020) Colposcopy and Program Management: Guidelines for the NHS Cervical Screening Programme. NHSCSP Publishing, Sheffield, 27-31. https://doi.org/10.2307/3583258

[17] Nakamura, Y., Matsumoto, K., Satoh, T., Nishide, K., Nozue, A., Shimabukuro, K., *et al.* (2015) Optimizing Biopsy Procedures during Colposcopy for Women with Abnormal Cervical Cancer Screening Results: A Multicenter Prospective Study. *International Journal of Clinical Oncology*, **20**, 579-585. https://doi.org/10.1007/s10147-014-0739-6

[18] Wentzensen, N., Walker, J.L., Gold, M.Y., Smith, K.M., Zuna, D., Mathews, V.S., *et al.* (2015) Multiple Biopsies and Detection of Cervical Cancer Precursors at Colposcopy. *Journal of Clinical Oncology*, **33**, 83-89. https://doi.org/10.1200/JCO.2014.55.9948

[19] Gage, J.C., Hanson, V.W., Abbey, K., Dippery, S., Gardner, S., Kubota, J., *et al.* (2006) Number of Cervical Biopsies and Sensitivity of Colposcopy. *Obstetrics & Gynecology*, **108**, 264-272 https://doi.org/10.1097/01.AOG.0000220505.18525.85

[20] Song, Y., Zhao, Y.Q., Li, L., Pan, Q.-J., Li, N., Zhao, F.-H., *et al.* (2017) A Retrospective Analysis of the Utility of Endocervical Curettage in Screening Population. *Oncotarget*, **8**, 50141-50147. https://doi.org/10.18632/oncotarget.15658

[21] Ajah, L.O., Chigbu, C.O., Onah, H.E., Iyoke, C.A., Lawani, O.L. and Ezeonu, P.O. (2014) Cytologic Surveillance versus Immediately Colposcopy for Women with Has Cervical Dad Smears Diagnosis of Low Grade Squamous Intra Epitnelial Lesions in a Poor Setting in Nigeria. *OncoTargets and Therapy*, **7**, 2169-2173 https://doi.org/10.2147/OTT.S70930