Original Article

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Non gonococcal cervicitis among women attending the Gynaecology Clinic of a Teaching Hospital in Southern Nigeria

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ABSTRACT

Background: Gonococcal and nongonococcal organisms are known as important causes of cervicitis worldwide; however, their effect on the cervical epithelium has not been well established. **Methodology:** This cross-sectional comparative study was carried out to compare the cytological changes in gonococcal and nongonococcal cervicitis among women attending the gynaecology clinic of the University of Uyo Teaching Hospital, Nigeria. Pre-coded structured questionnaires were administered to 107 consenting women. Endo-cervical swabs and Papanicolaou smears were collected from each participant for microscopy, culture, sensitivity and cytology respectively. The data collated were analysed using Statistical Package for Social Sciences version 20 (SPSS 20). **Results:** Sixty-two women (57.9%) were aged 15 to 29years.Most of the women resided in urban areas (71.0%), were well educated (57.0%), and of low parity (69.2%). The most common risk factor for cervicitis was unprotected sexual intercourse (96.3%). Abnormal vaginal discharge occurred in all the women (100%) while purulent endocervical exudates and endocervical bleeding were the most common examination findings (100% each respectively}. The most common non-gonococcal organism isolated was Gardnerella vaginalis. Eleven (10.3%) women had abnormal cervical cytology, and the most common cytological change was low-grade squamous intraepithelial lesion. Women with nongonococcal cervicitis had significantly more abnormal cytological changes compared with women with gonococcal cervicitis(p=0.001). The odds of having abnormal cervical cytology in gonococcal cervicitis were 5.7 times that of non-gonococcal cervicitis. **Conclusion: T**he prevalence of non-gonococcal cervicitis among the study participants was significantly higher than that of gonococcal cervicitis. Gonococcal and nongonococcal cervicitis were not associated with high-grade cytological changes of the cervical epithelium. It is important to increase screening for chlamydial and gonorrhoeal cervical infections, particularly in young women, to prevent the adverse reproductive consequences of the prolonged presence of these microbes in the reproductive tract.

Keywords: Cervical cytology, gonococcal cervicitis, non-gonococcal cervicitis

INTRODUCTION

The main burden of cervical cancer is in developing countries, as they are home to more than 85% of the total global burden of the disease. [1] This is particularly true in sub–Saharan Africa, where cancer of the cervix is the second most common malignancy in women. [2]According to the Africa cervical cancer multi-indicator incidence and mortality scorecard, Nigeria ranks thirtieth in the incidence of cervical cancer and is thirty-second in terms of mortality from the disease.[3] The situation is different in the developed world, where cancer of the cervix is uncommon due to a combination of screening, education, and access to quality health care.[2]

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It has been established that invasive cervical cancer is the end result of progressive changes beginning with precursor lesions, namely cervical dysplasia or cervical intraepithelial neoplasia (CIN), also called squamous intraepithelial lesion (SIL), to carcinoma in-

situ (CIS) and lastly invasive carcinoma.[4] Available evidence shows that there is usually a time lag between the appearance of pre-malignant changes in the cervix and the actual development of cervical cancer[5]. Cervical screening of women using cervical cytology, Pap smear, and human papilloma virus testing has led to a reduction in the incidence of cervical cancer in developed countries and also a reduction and prevention of deaths from the disease[2]. In these countries, pre-malignant changes are identified early and treated. Malignant changes are diagnosed in their earliest stages when treatment is possible. In under-developed and developing countries, particularly those in Sub-Saharan Africa, the situation is largely different, where screening is mostly opportunistic, probably because of the cost of the screening procedures and inadequacy of qualified personnel.[6]

It has been suggested that human papilloma virus (HPV) infection alone may not be sufficient to promote cervical carcinogenesis and that other cofactors could be involved.[6] A number of risk factors that contribute to the development of cervical cancer, including low socioeconomic class, sexual intercourse at an early age, multiple sexual partners, grand multiparity, tobacco smoking, vitamin deficiency and sexually transmitted infections (STI) including Gonorrhoea, Chlamydia trachomatis and Herpes virus type II have also been identified[7].The presence of these pathogenic microbes in the cervix gives rise to cervicitis which is an inflammation of the uterine cervix, characteristically diagnosed by a visible, purulent or mucopurulent endocervical exudate in the endocervical canal or on an endocervical swab specimen and/or sustained, easily induced endocervical bleeding when a cotton swab is gently passed through the cervical os.[8]

Little is known regarding the role of these pathogenic microbes (particularly the gonococcal and nongonococcal organisms) in the development of pre-malignant and malignant lesions of the cervix and evidence shows that baseline information regarding their prevalence, epidemiology and associated cervical cytological changes in women in Nigeria, particularly in the South-south geopolitical zone is lacking. Hence, this study will fill in the gap and ascertain if there is any relationship between the presence of these organisms in the cervix and development of abnormal cervical cytology patterns. The aim of this study therefore is todetermine the prevalence of gonococcal and nongonococcal cervicitis and compare the cytological changes in gonococcal and nongonococcal cervicitis in women attending the gynaecology clinic of the University of Uyo Teaching Hospital (UUTH) Uyo.

METHODS

SITE OF THE STUDY

This study was conducted at the obstetrics and gynaecology department of the University of Uyo Teaching Hospital (UUTH), located in Uyo, the capital of Awa Ibom State, in the south-south geopolitical zone of Nigeria.

STUDY POPULATION

All women with symptoms and signs of cervicitis presenting in the gynaecological clinic during the period of this study were counselled individually on the purpose of the study. Confidentiality of any information was assured, and participation in the study was voluntary, with the right to opt out at any point emphasized. A written informed consent was obtained from all the women who were screened and recruited into the study. All women with symptoms of cervicitis who met the inclusion criteria were consecutively recruited into the study.

INCLUSION CRITERIA

Women aged 15 to 65 years, those who consented, and those who presented with cervicitis.

EXCLUSION CRITERIA

Any patient who refused to participate in the study, those who were outside the age range of 15 to 65 years and those with cytological changes suggestive of HPV infection like koilocytosis.

STUDY DESIGN

This was a hospital based comparative analytical study which was carried out in the gynaecological clinic of the University of Uyo Teaching Hospital. A

structured pre-coded questionnaire was administered to each eligible respondent by trained research assistants at the main hall of the gynaecology clinic after the purpose, general content and confidentiality of the study had been explained and consent obtained from each respondent. The contents of the questionnaire included socio-demographic data of the respondents, risk factors for cervicitis as well as its clinical features.

DETERMINATION OF SAMPLE SIZE

A similar study by Odigie et al[9], was conducted in Benin City, Nigeria revealed a prevalence of non-gonococcal cervicitis of 7.6%. Using the prevalence-based formula for comparative studies as explained by Pourhoseingholi al,[10]:

$N = Z^2 P (1 - P)/ d^2$

Were,

N= sample size

Z= statistic for level of confidence (1.96 for 95%)

P= Prevalence

d= Precision

For a confidence interval of 95%, Z= 1.96, Prevalence = 0.076 (7.6%) and d, precision of 5% (0,05)

$N = (1.96)^2 \times 0.076 \times 0.924/ 0.05 \times 0.05$

N =107 (This was the sample size required for the study)

SPECIMEN COLLECTION

At the emergency room of the obstetrics and gynaecology department of the University of Uyo Teaching Hospital, an endocervical swab (ECS) and a conventional Pap smear were collected by the researchers and trained research assistants after explaining the procedure to each of the patients. Two ECS samples were taken using a sterile swab stick while observing standard protocol. Excess mucus was then removed using cotton wool, and the hook end of an Ayre's spatula was inserted into the external cervical Os of the cervix and swept through 360 degrees to scrape the squamocolumnar junction of the transformation zone. Using the spatula, a smear was made on two pre-labelled frost-clean grease free slides in a thin layer of cells and promptly immersed in 95% ethyl alcohol fixative contained in a coupling jar

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The endocervical swab (in Stuarts and Amies transport media) and the alcohol-fixed smeared slides were sent to the microbiology and the histopathology departments of the hospital. The other sample was used for Chlamydia detection using the Chlamydia detection device. The endocervical swab was subjected to immediate and direct examination by gram staining, microscopy and culture by a Microbiologist. The alcohol-fixed smeared slides were then stained using the standard protocol at the histopathology laboratory of the hospital. The 2014 Bethesda System (TBS) of reporting cervical cytology[11] was used as the basis for cytology classification.

LABORATORY PROCEDURES

DIRECT EXAMINATION

Gram staining was carried out on the endocervical swabs and examined with 100X objective under oil immersion for Gram- negative diplococci. A presumptive diagnosis of gonococcal infection was based on the presence of Gram-negative intracellular diplococci on microscopy. Gardnerella vaginalis was identified by a combination of Gram staining reaction, the pH of the discharge and abundance of 'clue cells' [squamous epithelial cells whose surfaces were smothered with masses of micro-organisms]. For Trichomonas vaginalis wet mounts were examined under low power (x10) and high power (x40) magnifications. Trichomonas vaginalis was identified based on its morphology and darting movements.

The Chlamydia Rapid Test Device was used for the identification of Chlamydia. The test is a qualitative, lateral flow immunoassay for the detection of Chlamydia antigen from a cervical swab. Antibodies specific to Chlamydia are coated on the test line region of the device. Exposure of the sample to the extracted antigen solution causes a reaction with an antibody coated on the particles. The mixture migrates up to react with antibodies to Chlamydia on the membrane and generates a coloured line in the test

line region. The presence of this coloured line indicates a positive Chlamydia result while its absence indicates a negative result.

CULTURE

For the isolation of Neisseria gonorrhoeae, swabs were directly inoculated on the chocolate agar plate containing vancomycin, colistin and Amphotericin-B and incubated in 5-10% carbon dioxide for 24-48 hours. Isolates were identified as N. gonorrhoeae on the basis of colony morphology, Gram staining, oxidase test and rapid carbohydrate utilization test.

CYTOLOGY

The trichrome stain, a combination of one nuclear stain, haematoxylin, and two counterstains, OG-6 and EA-50 were used. OG-6 was used to stain keratin, while EA-50 was used to stain the cytoplasm of squamous epithelial cells, nucleoli, and red blood cells. The progressive method was used. The intensity of nuclear staining was controlled by the immersion of the slide into a blueing agent (Scotts tap water pH 8.02) after the nucleus had been stained to the required intensity with haematoxylin. Staining made individual nuclei visible in low and high power, and appear blue/purple to black in colour as well as granular and crisp. For the cytoplasm, superficial squamous cells appeared pink, less mature cells (intermediate and metaplastic) appeared blue/green, while fully keratinised cells appeared orange. The 2014 Bethesda System (TBS) of reporting cervical and vaginal cytology[11] was used as the basis for cytology classification. In addition to TBS, 'Inflammation' was added to describe cytology pattern of increased inflammatory cells without cellular atypia.

DIAGNOSIS OF CERVICITIS IN THIS STUDY

For the purpose of this study, a diagnosis of cervicitis was made based on the presence of mucopurulent discharge from the endocervical canal on speculum examination and the presence of sustained bleeding from the endocervical canal on passage of a cotton tipped swab stick[12].Gonococcal cervicitis was diagnosed based on the presence of Gram negative intracellular diplococcic during Gram staining and microscopy of the mucopurulent endocervical swab sample or isolation of gonorrhoea on culture. Nongonococcal cervicitis was diagnosed based on the presence of Trichomonas vaginalis or Gardnerella vaginalis during microscopy of the purulent endocervical sample or a positive test of the mucopurulent endocervical sample on chlamydial testing.

DATA ANALYSIS

The data collated was analysed using statistical package for social sciences version 20 (SPSS 20). Tables were expressed in numbers of observations with prevalence in percentages. Analysis of independent associations between sociodemographic variables, microbiology results and Pap smear findings was done using Chi-square test. Statistically significant association was considered at P-value≤0.05.

ETHICAL CONSIDERATIONS

Formal approval for his study was obtained from the Ethical Research Committee of the University of Uyo Teaching hospital Uyo.

RESULTS

Of all the 107 women who participated in the study, 27 (25.2%) tested positive for nongonococcal organisms. Thus, the prevalence of nongonococcal cervicitis in this study was 25.2%. Only three women had Gram-negative diplococci (presumptive evidence of gonorrhoea) on Gram staining and microscopy. Thus, the prevalence of gonococcal cervicitis in this study was 2.8%. Non-gonococcal cervicitis was 9 times more common than gonococcal cervicitis among the women.

Table 1. shows the sociodemographic characteristics of the study population. A total of 107 women participated in the study. Sixty-two (57.9%) were aged 15 to 29 years, while those aged 60 – 65 years comprised only 2.8% of the study population. Seventy-six (71.0%) of the women resided in Urban areas, 58(54.2%) were single, sixty-one (57%) women were educated up to the secondary and post-secondary levels, while 49 were traders (45.8 %)

Table 1: Sociodemographic Characteristics of the study population

Variable	Groups	Number	Percentage
Age Groups	15-29	62	57.9
	30-44	34	31.8
	45-59	8	7.5
	60-65	3	2.8
Residence	Rural	31	29
	Urban	76	71
Marital Status	Single	58	54.2
	Married	42	39.3
	(Widowed/Divorced/Separated/Cohabiting)	7	6.5
Number of co-Wives	Zero	65	60.7
	One	37	34.6
	Two	4	3.7
	Four	1	0.9
Education	Primary	10	9.3
	Secondary	36	33.6
	Post Sec	61	57
Occupation	Student	26	24.3
	Trader	49	45.8
	Public Servant	20	18.7
	Artisan/Housewife	12	11.2
Ethnicity	Ahaoda	1	0.9
	Andoni	1	0.9
	Annang	15	14
	Bette	1	0.9
	Efik	3	2.8
	Ibibio	55	51.4
	Igbo	19	17.8
	Ikwere	1	0.9
	Oron	6	5.6
	Urobho	1	0.9
	Yala	1	0.9
	Yoruba	3	2.8
Religion	Christian	105	98.1
	Muslim	2	1.9
Parity	0	74	69.2
	1 to 2	18	16.8
	3 to 4	8	7.5
	≥5	7	6.5
Previous Pregnancy	No	18	16.8
	Yes	89	83.2
	Total	**107**	**100**

Table 2: Risk Factors for Cervicitis

Variable		Number	Percent (%)
Unprotected Sexual intercourse		103	96.3
More than One Sexual partner		37	34.6
Number of Sexual partners	0	5	4.7
	1	46	43.0
	2	43	40.2
	3 – 6	13	12.1
Previous Sexually Transmitted Infection		42	39.3
HIV infection		4	3.7

Table 2 shows the risk factors used in screening women for cervicitis in this study. The most common risk factor for cervicitis was unprotected sexual intercourse (96.3%). Others were having more than one sexual partner (34.6%) and a previous history of sexually transmitted infection (39.3%). Four of the women (3.7%) reported being HIV-positive.

All the 107 women complained of abnormal vaginal discharge. Other common symptoms were lower abdominal pain (74.9%) and dysmenorrhea (72.0%). Only 34.6% complained of postcoital bleeding.

All the women (100%) had both mucopurulent discharge on speculum examination and bleeding from the endocervical canal on gentle introduction of a cotton-tipped swab. Other findings were erythema of the cervix (84.1%), suprapubic tenderness (68.2%) a strawberry cervix (9.3%).

The commonest non-gonococcal agent isolated from the endocervical samples of the women was Gardnerella vaginalis (14%), while the least was Trichomonas vaginalis (10.3%). Gram-negative intracellular diplococci were identified in three women (2.8%) - Table 3.

Table 3: Microbial agents isolated

Microbes	Number	Percent (%)
T vaginalis	11	10.3
G vaginalis	15	14.0
Chlamydia	12	11.2
Gram Negative Diplococci (Presumptive evidence of Gonorrhoea)	3	2.8

Though all the women recruited into this study had endocervical discharge and endocervical bleeding (cervicitis) on speculum examination, not all their endocervical samples yielded microbial agents on gram staining, microscopy, and culture. Also, more than one non-gonococcal microbial agent was occasionally isolated in one endocervical sample. This explains the balance between the total number of women in the study (107) and the number that had non-gonococcal cervicitis (27) and gonococcal cervicitis (3)

Table 4 shows the distribution of gonococcal and non-gonococcal cervicitis across the study population using sociodemographic variables. The prevalence of nongonococcal cervicitis was higher than that of gonococcal cervicitis across all sociodemographic variables. Both gonococcal and nongonococcal cervicitis were more prevalent in women aged 15 to 29 years and among rural women (25.8% vs 25.0%,

3.2% vs 2.6%) compared to urban women. Married women had greater prevalence of nongonococcal cervicitis compared to single women (31.0 % vs 22.4%), while gonococcal cervicitis was more common among single women compared to married women (5.2% vs 0%). Traders had the greatest prevalence of both types of cervicitis (34.7% vs 4.1%)

Table 4: Distribution of Gonococcal and Nongonococcal cervicitis across sociodemographic variables n-107

Variable	Groups	Total	Non-gonococcal (%)	Gonococcal (%)
Age Groups	15-29	62	16 (25.8)	3 (4.8)
	31-45	34	8 (23.5)	0 (0)
	45-59	8	3 (37.5)	0 (0)
	60- 65	3	0 (0)	0 (0)
Residence	Rural	31	8 (25.8)	1 (3.2)
	Urban	76	19 (25.0)	2 (2.6)
Marital Status	Single	58	13 (22.4)	3 (5.2)
	Married	42	13 (31.0)	0 (0)
	(Widowed/Divorced/Cohabiting/Separate)	7	1 (14.3)	0 (0)
Education	Primary	10	3 (30.0)	1 (10.0)
	Secondary	36	9 (25.0)	0 (0)
	Post Sec	61	15 (24.6)	2 (3.3)
Occupation	Student	26	5 (19.2)	1 (3.8)
	Trader	49	17 (34.7)	2 (4.1)
	Public Servant	20	4 (20.0	0 (0)
	Artisan/Housewife	12	1 (8.3)	0 (0)
Religion	Christian	105	27 (25.7)	3 (2.9)
	Muslim	2	0 (0)	0 (0)
Parity	0	74	18 (24.3)	2 (2.7)
	1 –2	18	5 (27.8)	1 (5.6)
	3—4	8	2 (25.0)	0 (0)
	≥5	7	2 (28.6)	0 (0)
Previous Pregnancy		89	24 (27.0)	2 (2.2)

Table 5 shows the distribution of gonococcal and non-gonococcal cervicitis across the sociodemographic characteristics of the study population. The difference in proportion in the distribution of gonococcal and non-gonococcal cervicitis across variables was statistically not significant (p>0.05). The p-value across all the independent variables was greater than 0.05(p>0.05).

Table 5: Distribution of gonococcal and nongonococcal cervicitis across sociodemographic variables of the participants

Variable	Groups	Total	Non-G	Gonococcal	Chi-square	p-value
Age Groups	18-30	62	13 (21.0)	3 (4.8)	6.15	0.39
	31-45	34	10 (29.4)	0 (0)		
	45-60	8	4 (50.0)	0 (0)		
	>60	3	0 (0)	0 (0)		
Residence	Rural	31	9 (29.0)	1 (3.2)	0.71	0.83
	Urban	76	18 (23.7)	2 (2.6)		
Marital Status	Single	58	11 (19.0)	3 (5.2)	4.58	0.32
	Married	42	14 (33.3)	0 (0)		
	Others (DCS)	7	2 (28.6)	0 (0)		
Education	Primary	10	3 (30.0)	1 (10.0)	3.63	0.42
	Secondary	36	8 (22.2)	0 (0)		
	Post Sec	61	16 (26.2)	2 (3.3)		
Occupation	Student	26	6 (23.1)	1 (3.8)	3.53	0.74
	Trader	49	14 (28.6)	2 (4.1)		
	Public Servant	20	6 (30.0)	0 (0)		
	Artisan/Housewife	12	1 (8.3)	0 (0)		
Religion	Christian	105	26 (24.8)	3 (2.9)	2.26	0.48
	Muslim	2	1 (50.0)	0 (0)		
Parity	None	74	15 (20.3)	2 (2.7)	7.3	0.23
	1 –2	18	7 (38.9)	1 (5.6)		
	3—4	8	4 (50.0)	0 (0)		
	≥5	7	1 (14.3)	0 (0)		
Previous Preg	No	18	5 (27.8)	1 (5.6)	1.33	0.48
	Yes	89	22 (24.7)	2 (2.2)		
	Total	**107**	**27 (25.2)**	**3 (2.8)**		

Non-G = non-gonococcal

Table 6 shows the Pap smear results of the women**.** Ninety-six women (89.7%) had normal cervical cytology, while 11(10.3%) had abnormal cervical cytology (LGSIL and ASCUS).

Table 6: Cervical cytology pattern among the participants

Pap smear Result	Frequency	Percent
Normal (NSIL)	96	89.7
Abnormal ((LGSIL + ASCUS)	11	10.3
Total	107	100

NSIL – Negative for Squamous Intraepithelial Lesion

LGSIL- Low Grade Squamous Intraepithelial Lesion

ASCUS – Atypical Squamous Cells of Undetermined Significance

Table 7 shows the comparison of cytological changes among the women. Out of a total of 27 women (25.2%) who had nongonococcal cervicitis, 2 (1.9%) had ASCUS, 7 (6,5%) had LGSIL, while 18 (16.8%) had NSIL on Pap smear testing.

The commonest abnormal cervical cytology in women with nongonococcal cervicitis was LGSIL. Out of a total of 3 (2.8%) women who had gonococcal cervicitis, each (0.9%) had NSIL, LGSIL, and ASCUS, respectively

Table 7: Comparison of cervical cytology changes among women with nongonococcal cervicitis and gonococcal cervicitis.

	Cervical Cytology Patterns			
Variable	**NSIL**	**ASCUS**	**LGSIL**	**Total**
Non-gonococcal cervicitis	18 (16.8)	2 (1.9)	7 (6.5)	27 (25.2)
Gonococcal cervicitis	1 (0.9)	1 (0.9)	1 (0.9)	3 (2.8)

The comparison between abnormal cervical cytology in women with gonococcal cervicitis and those with nongonococcal cervicitis is shown in Table 8**.**

Seventy–seven (71.9%) women had endocervical mucopurulent exudates and endocervical bleeding, but their endocervical exudates on Gram staining, microscopy, chlamydia testing, and culture did not yield any microbes. Out of these 77 women, 2(2.6%) had abnormal cervical cytology on Pap smear testing.

Out of a total of 3 women who had gonococcal cervicitis, 2 (66.7%) had abnormal cervical cytology, while of the 27 women who had non-gonococcal cervicitis, 7(25.9%) had abnormal cervical cytology. The association between the presence of nongonococcal and gonococcal cervicitis and abnormal cervical cytology was statistically significant (p=0.001).Comparing gonococcal and nongonococcal cervicitis, the risk of having abnormal cervical cytology was higher in gonococcal cervicitis compared to nongonococcal cervicitis - Two (66.7%) out the 3 women that had gonococcal cervicitis had abnormal cervical cytology while seven (25.9%) out of the 27 women who had nongonococcal cervicitis had abnormal cervical cytology. Using Odds ratio (OR), the odds of having abnormal cervical cytology in gonococcal cervicitis was 5.7 times that of having abnormal cervical cytology in non-gonococcal cervicitis.

Table 8: Comparing the risk of having abnormal cervical cytology in Gonococcal and Nongonococcal cervicitis

Variable	Total	Abnormal cervical cytology	p-value	OR (95%CI)
Cervicitis (Nonmicrobial)	77	2 (2.6)	0.001	0.08 (0.02 - 0.4
Gonococcal Cervicitis	3	2 (66.7)		5.7 (0.4 - 73.2
Non-gonococcal Cervicitis	27	7 (25.9)		1
Total	107	11 (10.3)		

DISCUSSION

A total of 107 women with cervicitis participated in the study. Out of these, about a quarter had nongonococcal cervicitis while 2.8% had gonococcal cervicitis. The remaining women had cervicitis even though no organisms were identified following swab collection, microscopy and culture.

The diagnosis of nongonococcal cervicitis in this study was based on the presence of T-vaginalis, G-vaginalis, and Chlamydia in the mucopurulent endocervical exudates of the women, while that of gonococcal cervicitis was based on the presence of intracellular gram-negative diplococci in the endocervical sample on gram staining and microscopy. Gonorrhoea as an organism was not directly isolated on culture. This is probably because most of the women may have abused and misused a lot of antibiotics before presenting to the hospital. Ateshim et al,[12] in their study, showed that the prevalence of self-medication with antibiotics in their environment was as high as45.1%, and this has been known to influence identification of organisms in microbiological specimens. Microscopy of endocervical samples or discharges can be used as a test to provide an immediate presumptive diagnosis of gonorrhoea[13]as was done in this study. The specificity of this method is greater than 95% when screened by trained personnel.[14]

This study also showed that the prevalence of non-gonococcal cervicitis was higher than that of gonococcal cervicitis among the women. This is consistent with the results of Burett et al[15], who reported a higher prevalence of Chlamydia related cervicitis compared to gonorrhoea related cervicitis in their study. However, the prevalence of nongonococcal cervicitis in this study did not conform to what was obtained by the same authors. This difference may be explained by the fact that the authors only studied Chlamydia related cervicitis, while this study focused on gonococcal and nongonococcal organisms as causes of cervicitis.

The most common agent identified in this study as a cause of nongonococcal cervicitis was G-vaginalis. This finding is in contrast to that of Taylor et al[16] who found Tvaginalis to be the commonest infective aetiology in their study. This difference may be because of differences in local microbiology patterns. The findings from these studies imply that the prevalence of bacterial vaginosis and pelvic inflammatory disease, as well as their complications, are likely to be on the rise in the near future, particularly among young women.

Young age was seen as the most common sociodemographic risk factor for nongonococcal and gonococcal cervicitis in this study, as about half of the women aged 15 – 29 years had cervicitis. This is consistent with a recent report from the Centre for Disease Control and Prevention,[17] which reported that adolescent girls and young adults had the highest burden of chlamydia and gonorrhoea. This has a significant impact on reproductive health, particularly in our environment, if these infections are not properly diagnosed, are untreated, or poorly treated in these youths. This may also explain why the secondary infertility rate is as high as 32% in some parts of southernNigeria[18]as secondary infertility is an established sequelae of ascending infection from the endocervix with its severe adverse reproductive, social, and psychological consequences.

Traders had the highest prevalence of cervicitis, as about half of those affected belonged to this occupational group. A recent Nigerian study [19]also revealed a significant association between female traders and vaginitis, Bacterial vaginosis, and co-infection with Trichomonas vaginalis. Though our findings may be incidental because of the proportion of traders in the study population, more studies are needed to explore this relationship.

A higher level of education was associated with a higher risk of gonococcal and nongonococcal cervicitis. This result is at variance with the findings of Pollet et al.[20] who showed that lower educational level was associated with cervicitis. The finding in our study is surprising as highly educated women ought to be well informed about safe sexual practices and also present early to hospital when they notice symptoms such as abnormal vaginal discharge. However, the study was tertiary hospital-based and may not reflect what obtains in the general population.

Most of the women had a normal cervical epithelium (NSIL), while 10.3%had abnormal cervical epithelia, with LGSIL being the commonest abnormal cervical cytological finding. The findings of this study also did not reveal a higher risk of transformation to high-grade cervical lesions in those with gonococcal and nongonococcal cervicitis. This finding is at variance with those of Lehtinen et al,[21] who found that Chlamydiatrachomatis infection was associated with atypical metaplastic cells and an increased risk of cervical cancer. Zhu et al[22], in a meta-analysis of 22 studies with 4291 cervical cancer cases, studied Chlamydia trachomatis infection-associated risk of cervical cancer and concluded that overall, Chlamydia trachomatis infection was significantly linked to cervical cancer risk in prospective studies. This difference between our findings and those of these authors may be because of sample size and study duration.

The association between gonococcal and nongonococcal cervicitis and abnormal cervical cytology was statistically significant, though the risk was higher with gonococcal cervicitis compared to nongonococcal cervicitis. There was no significant difference in the cervical cytological changes in women with gonococcal cervicitis and those with nongonococcal cervicitis.

Our study had some limitations; it relied in part on information obtained with a pre-coded questionnaire, hence some important questions may have been missed, and some of the information obtained may not represent the true situation of the patients as it relies on the patient's capacity to remember. It also relied on results obtained from laboratory procedures; errors may arise from the human element or from the sets of equipment which could influence the results.

CONCLUSION

This study has shown that the prevalence of gonococcal cervicitis among women attending the gynaecology clinic was 2.8%, while that of nongonococcal cervicitis was 25.2%, with nongonococcal cervicitis being more common. Clinically, these findings imply that the risk of ascending infection in the form of pelvic inflammatory disease and its associated complications is probably high. It is therefore important to increase public awareness of the need for screening for chlamydial and gonorrhoeal cervical infections, particularly in young women, to prevent the adverse reproductive consequences of prolonged presence of these microbes in the reproductive tract. Community based enlightenment campaigns should be done to encourage women to present to the hospital once they notice any abnormal vaginal discharge.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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This manuscript is dedicated to the 1st author, Dr Chisom Sokwa Solomon, who unfortunately passed on before it could be sent for publication

REFERENCES

1. Mengesha A, Messele A, Beletew B. Knowledge and attitude towards cervical cancer among reproductive age group women in Gondar town, North West Ethiopia. BMC Pub Health 2020; 20: 209
2. Tobin EA, Ifada SO, Obi AI, Abasiattai AM. Cervical cancer screening risk, perception, uptake and associated factors among female primary health care workers in Edo state, Nigeria. Int J Med Health Dev 2024; 29: 17-27
3. Africa Development Information. 2014 Africa cervical cancer muti-indicator incidence and mortality scorecard 2014.
4. Nedjai B, Reuter C, Ahmad A, Banwait R, Warman R, Carton Set al. Molecular progression to cervical precancerous epigenetic switch or sequential model? Int J Cancer 2018; 143 (7): 1720=1730
5. Esoghene D, Lawan AI, Mohammed AY, Yahaya MD, Yahaya UR. Pattern of pre-malignant cervical lesions among women attending HIV clinics in a tertiary hospital in North-Eastern. TJOG 2020; 37(2): 302-309.
6. Anorlu RI. Cervical cancer: the Sub-Saharan African perspective. Reprod Health Matters 2008; 16(32): 41-49
7. Oluwole EO, Onubogu UC, Kanma-Okafor OJ, Balogun MR. Promoting cervical cancer prevention: what do female high school teachers in Surulere know, think and practice. Annals Clin Sci 2020; 5: 13-21
8. Centres for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines, 2015:

Diseases Characterized by Urethritis and Cervicitis. *MMWR Recomm Rep 2015;64(3)*. June 15, 2015. 51-53.

9. Odigie BE, Odega KI. Cervicitis amongst teenage sex workers in Benin metropolis, Nigeria: the viewpoint of the cytologist. *Afri J Cell Path*. 2013; 1: 34-39
10. Pourhoseingholi MA, Vahedi M, RahimzadehM Sample Size Calculation in Medical Studies. Gastroenterol Hepatol Bed Bench 2013; Winter ;6 (1):15-17.
11. Pangarkar MA. The Bethesda system for reporting cervical cytology. Cytojournal 2022; 19: 28
12. Ateshim Y, Bereket B, Major F, Emun Y, Woldai B, Pasha I et al. Prevalence of self-medication with antibiotics and associated factors in the community of Asmara, Eritrea: a descriptive cross sectional survey BMC Pub Health 2019; 19 (1): 726.
13. Meyer t, Buder S. The laboratory diagnosis of Neisseriagonorrhea: Current testing and future demands Pathogens 2020; 9(2): 91.
14. Hanata IPY, Van Dam AP, Bruistan SM, Van der Loeff MFS, Soebono H, Christiaan de Vries HJ. Value of light microscopy to diagnose urogenital gonorrhea: a diagnostic test study in Indonesian clinic-based outreach sexually transmitted infection services. BMJ Open 2017; 7(8): e016202.
15. Burret AM, Anderson CP, Zwank MD. Laboratory confirmed Gonorrhoea and/or Chlamydia rates in clinically diagnosed Pelvic inflammatory disease and cervicitis. Am J Emerg Med 2012;7: 1114-1117.
16. Taylor SN, Lensing S, Schwebke J, Lillis R, Mena LA, Nelson AL et al. Prevalence and treatment outcomes of cervicitis of unknown aetiology. Sex Transm Dis 2013; 40(1): 379-385
17. Centers for Disease control and prevention. Available at http://www.cdc.gov/std/stats08/tables . Accessed December 3rd 2019
18. Odunubun WO, Oziga DV, Oyeye LO, Ojeogwu CL. Pattern of infertility among infertile couples in a secondary health facility in Delta State, South-South Nigeria. TJOG 2018; 35: 244-248.
19. Enwuru CA, Aiyedobgon AS, Ajayi MB, Osulade KA. Bacterial vaginosis and Trichomonas vaginalis co-infection and bacterial antibiogram profile of pregnant women studied in Lagos, Nigeria. BMC Women's Health 2024;24: 415
20. Pollet S, Calderon M, Heitzinger K, Solari V, Montano SM, Zunt J. Prevalence and predictors of cervicitis in female sex workers in Peru: An observational study.BMC Infect Dis 2013; 30: 195.
21. Lehtinen M, Ault KA, Lyytikamen E, Dilliner J, Garland SM, Ferris DG et al. Chlamydia trachomatis infection and the risk of cervical intraepithelial neoplasia. Sex Trans Infect 2011; 87;372-376
22. Zhu H, Shen Z, Luv H, Zhang W, Zhu X. Chlamydia trachomatis infection associated risk of cervical cancer. A meta-analysis. Medicine 2016; 95(13): e3077