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Original Research

Cervical Lesion Evaluation in Females of Reproductive Age in Ondo Town, Nigeria

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Abstract

Background: Several African countries, including Nigeria, continue to have a high prevalence of cervical cancer due to a lack of knowledge about screening and prevention measures, with diagnosis most usually confirmed when the prognosis is poorest. This study evaluated the Pap smear pattern and the level of cervical cancer awareness among females of reproductive age in Ondo Town, Nigeria.

Methodology: This cross-sectional study included 102 female participants aged 30 to 54. The stained smears were analyzed and reported using the Bethesda reporting system. A semi-structured questionnaire was used to obtain information from participants, and the data obtained was statistically analysed using ANOVA for variable comparison across groups, with a confidence interval of 95% considered statistically significant and a p-value of less than 0.05 reported.

Results: Findings revealed that 90.2% of the evaluated smears were negative for squamous intraepithelial lesions and malignancy, while low-grade squamous intraepithelial lesions were detected in 7.84% of cases, and reactive cellular changes accounted for 1.96% of the studied population. Additionally, there was a considerable level of awareness regarding cervical cancer (72.5%) and cervical cancer screening (54.9%); however, only 45.1% of the women had ever undergone a Papanicolaou smear, and an even smaller proportion (19.6%) reported routine screening. The low uptake of cervical cancer screening as a routine test may be attributed to the absence of effective, widespread, or systematic cervical cancer screening programs in Ondo town.

Conclusions: There is a significant relationship between age, risk exposure, and development of cervical lesions among participants in this study. Awareness and lifestyle factors are also key determinants of cervical lesion development and the uptake of cervical cancer screening. Although participants demonstrated awareness of cervical cancer, their knowledge of its preventive measures remained limited. It is recommended that health education campaigns be expanded to enhance the uptake of screening services.

Keywords: Cervical Cancer; Awareness; Cancer Screening; Nigeria.

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Introduction

Cervical cancer is the most frequent genital cancer and one of the main causes of mortality among women. Fortunately, this condition is preventable by screening for premalignant lesions and amenable to therapy if discovered early; however, this is rarely provided and hardly utilized [1]. Cervical cancer is still a serious public health problem globally and remains a large burden in underdeveloped nations of Sub-Saharan Africa where organised cervical cancer screening programmes are inadequate [2]. It is the second most frequent cancer in females living in developing nations like Nigeria, with an estimated 570,000 new cases (84% of the new cases globally yearly), accounting for 7.5% of all female cancer mortalities [3, 4, 6]. In terms of exposure risk, it is predicted that about 50.33 million Nigerian women aged 15 and above are at risk of the disease [7]. As of 2019, there were 14, 943 new cases among women in Nigeria, with a 70% case fatality rate [8]. Studies by Kani *et al.*[9] reported a 13.6% prevalence of cervical cancer in Jigawa, Northwestern Nigeria. Despite improved screening technologies, cervical cancer remains a serious public health concern in Nigeria due to a lack of implementation of organized screening and vaccination programmes [10]. Recent government estimates put the number of new cases at 25,000 per year, while worldwide estimates indicate that 493, 000 new cases occur annually and 274,000 women die of the disease yearly [11]. Furthermore, estimates by GLOBOCAN in 2020 documented approximately 604,000 new cases of cervical cancer, with 342,000 deaths annually [12]. The disease's spectrum allows for early detection, adequate treatment, and subsequent cure. Early detection is critical for prevention or treatment, which may be achieved by regular screening, and early detection technologies are becoming more commonly accepted globally. However, many developing nations, like Nigeria, still lack a structured screening strategy that guarantees all females are screened. As a result, a considerable number of females continue to present with advanced stages of the disease, at which point only palliative care is possible [13].

Viral infections account for 15-20% of all human malignancies, and infection with oncogenic viruses can accelerate several phases of carcinogenesis. Approximately 15 different strains of Human papilloma virus (HPV) have been linked to cancer [10]. HPV is the most prevalent viral sexually transmitted infection globally, and it is the leading cause of cervical cancer. A good knowledge of HPV and HPV vaccination, respectively, has been reported to be significantly associated with full acceptance of vaccination [14, 15]. HPV types 16, 18, 31, 33, and 45 are primarily associated with invasive cervical cancer [16, 17, 18],although up to 5% of cancers are not related to HPV persistent infection, only one-tenth of most HPV infections become persistent, leading to the development of precancerous lesions in affected women [12,19]. According to studies, having more consistent partners and having initial sexual intercourse at a young age increases the risk of developing cervical cancer [20].

The lack of knowledge of the risk factors and screening for cervical cancer, with women from developing nations often not having access to screening due to a lack of awareness of screening services, as well as the knowledge of cervical cancer and knowledge of modes of cervical cancer prevention, are critical in determining cervical cancer screening uptake among women and the exposure of women of reproductive age [21, 22, 23, 24]. Enhancing public knowledge about the risk factors and prevention of cervical cancer remains essential in Nigeria. This study underscores the importance of cytologic evaluation in women of childbearing age, highlighting age-related cytologic presentations, identifying risk factors associated with abnormal cytopathologic findings, and assessing attitudes and awareness toward cervical cancer screening in Ondo town.

Methods

Study area

This Pap smear evaluation of the studied participants was carried out at the Histopathology Unit of the University of Medical Science Teaching Hospital Ondo (UNIMEDTH) from May 7 to July 31, 2023.

Sampling technique

A purposive sampling technique was used in this study. Cervical smear samples were collected from the squamocolumnar junction of the cervix of the studied participants after informing them of the study's aim and obtaining their written informed consent.

Ethical considerations

The Ethical Review Committee of the University of Medical Sciences Ondo/UNIMEDTHC granted ethical permission with approval number NHREC|TR|UNIMED- HREC-Ondo St. 22|06|23. All subjects provided written informed consent before being enrolled in the study.

Sample size

The sample size was determined in accordance with Awodele et al. [24]. The research included 102 females aged 30 to 54.

Cytological evaluation of Pap smear

The Pap smear samples were obtained from the ectocervix as described by Kamal [25]. The smear was immediately transferred onto a prelabelled clean, grease-free slide and fixed in 95% ethyl alcohol before staining with the Papanicolaou staining procedure[26].

Data collection

After obtaining written informed consent from the participants, a self-administered, pre-tested structured questionnaire was used to obtain information about the women's socio-demographic characteristics, knowledge of risk factors, symptoms and prevention of cervical cancer, and attitude towards cervical cancer screening and uptake. Participants for the study were recruited from a variety of locations, including worship centres, the surrounding environment of the study area, and the university environment. This diverse recruitment strategy aimed to ensure the inclusion of women from different backgrounds and walks of life. Following recruitment, the participants were asked to visit the University of Medical Sciences Clinic Center, where their samples were collected and transported to the UNIMEDTHC Histopathology unit for further processing. Participants who did not comprehend English language were asked questions in "Yoruba" language, and the interview lasted 25-30 minutes per participant. The Inclusion criteria constituted healthy females of childbearing age between the ages of 20-54 years, while females below the age of 20, pregnant females, women above 54 years and menstruating females were excluded from the study.

Data analysis

Statistical analysis was performed using a statistical package for social sciences version 25.0 (SPSS Inc., Chicago, IL, USA), and data were analysed using ANOVA for variable comparison between groups, with a confidence interval of 95% regarded statistically significant. The findings were compiled into tables and graphs.

Results

The Pap smears of participants were analysed and reported using the Bethesda system for reporting cervical cytology and graded as Negative for squamous intraepithelial lesion and malignancy (NILM), Low grade squamous intraepithelial lesion (LSIL), High-grade squamous intraepithelial lesion (HSIL), Reactive cellular changes (inflammatory smear), and non-neoplastic cellular variations (atrophic smears) as no malignancy was detected upon screening.

Table 1 shows the demographic and gynecologic cytological profile of the study participants, who ranged in age from 30 to 54 years. In addition, parity, contraceptive use, and age of menarche were also assessed. The females aged 35 to 39 had the highest NILM, accounting for 29% (30), while females aged 50 to 54 had the lowest NILM value 7.8% (8). Females aged 40 to 44 had LSIL, accounting for 3.9% (4) of all studied participants. Furthermore, females aged 45 to 49 had 3.9% (4) LSIL and 1.9% (2) non-neoplastic cellular variation (atrophy). The parity of females with two live births constituted the largest proportion of the study's participants 27.6% (28), whereas nulliparous females accounted for 7.8% (8) of the screened population. While females who are nulliparous or have one, two, or four live births had NILM, females with three live births accounted for 7.8% (8) of LSIL, with 1.9% (2) having atrophic smears.

Data gathered based on contraceptive usage revealed that females using birth control pills accounted for 7.8% (8) of the studied population, whereas 11.8% (12) of females using Implanon and IUCD had NILM. Participants utilising patches and contraceptive injections accounted for 1.96% (2) of the LSIL, respectively. Females who did not utilise contraception constituted the largest proportion of the study's participants 52.9% (54), with 3.9% (4) having LSIL and 1.96% (2) having atrophic smears. Furthermore, considering menarche age, females who had their first menstruation between the ages of 14 and 16 accounted for the largest proportion of participants in this study 54.9% (54), of which 5.9% (4) had LSIL. Females who reached menarche between the ages of 11 and 13 had 29% (30) NILM and 1.96% (2) LSIL, whereas females over the age of 16 accounted for 5.9% (6) of the studied population, with 1.96% (2) having LSIL and atrophic smears. There were no HSIL or malignancies among the study participants (Table 1).

Table 1: Demographic and Gynecological cytology profile of study participants. n=102

Parameters	NILM	LSIL	Atrophic smear	HSIL	Total	p-value
Age (years)						
30-34	16 (15.7%)	-	-	-	16 (15.7%)	0.005*
35-39	30 (29.4%) *	-	-	-	30 (29.4%)	
40-44	22 (21.6%) *	4 (3.9%)	-	-	26 (25.5%)	
45-49	16 (15.7%)	4 (3.9%)	2 (1.96%)	-	22 (21.7%)	
50-54	8 (7.8%)	-	-	-	8 (7.8%)	
Parity						
P0	8 (7.8%)	-	-	-	8 (7.8%)	0.01*
P1	20 (19.6%) *	-	-	-	20 (19.6%)	
P2	28 (27.6%) *	-	-	-	28 (27.6%)	
P3	24 (23.5%) *	8(7.8%) *	2 (1.96)	-	34 933.3)	
P4	12 (11.8%)	-	-	-		
Contraceptives usage						
Birth control pill	8 (7.8%)	-	-	-	8 (7.8%)	0.01*
Implanon	12 (11.8%) *	-	-	-	12 (11.8%)	
IUCD	12 (11.8%) *	-	-	-	12 (11.8%)	
Patch	-	2 (1.9%)	-	-	2 (1.96%)	
Contraceptives injection	6 (5.9%)	2 (1.9%)	-	-	8 (7.8%)	
No contraceptive	54 (52.9%) *	4 (3.9%)	2 (1.96%)	-	60 (58.8%)	
Ageat menarche						
11-13	30 (29.4%)	2 (1.9%)	-	-	32 (31.2%)	0.007*
14-16	54 (54.9%) *	6 (5.9%) *	-	-	60 (58.8%)	
>16	6 (5.9%)	2 (1.9)	2 (1.96)		10 (9.8%)	

*= ($p<0.05$) significant.

Figure 1 shows the prevalence of inflammatory smears in different age groups. Females aged 30 to 34 accounted for 15.6% (16) of the inflammatory smears, whereas females aged 35 to 39 had the highest volume of inflammatory smears at 25.5% (26). Females aged 40–44 and 45–49 made up 15.7% (16) and 17.6% (18) of the screening population, respectively. Females aged 50 to 54 had the lowest prevalence of inflammatory smears, at 3.9% (4). Additional studies revealed that females with 2-4 parity had the highest prevalence of inflammatory smears (41.2%), whereas females with single births accounted for 16.5% (18). Nulliparous females made up 5.8% (6) of the inflammatory smears in the study (Figure 2). Table 2 shows a comparative analysis of the inflammatory smear across different age groups. Females aged 35-39 years had substantially higher inflammatory smears than those aged 30-34 years ($p<0.05$). However, comparisons between women aged 40-44 and 45-49 with the 35-39 age group were not statistically significant ($p>0.05$). Also, comparison with the 50-54 age group was considerably reduced relative to the 30-34 years age bracket ($p<0.05$). Females aged 35-39 had substantially higher inflammatory smear levels than those aged 40-44, 45-49, and 50-54 ($p<0.05$). Females aged 50-54 had significantly lower levels of inflamed smear compared to those aged 40-44 ($p<0.05$) (Table 2).

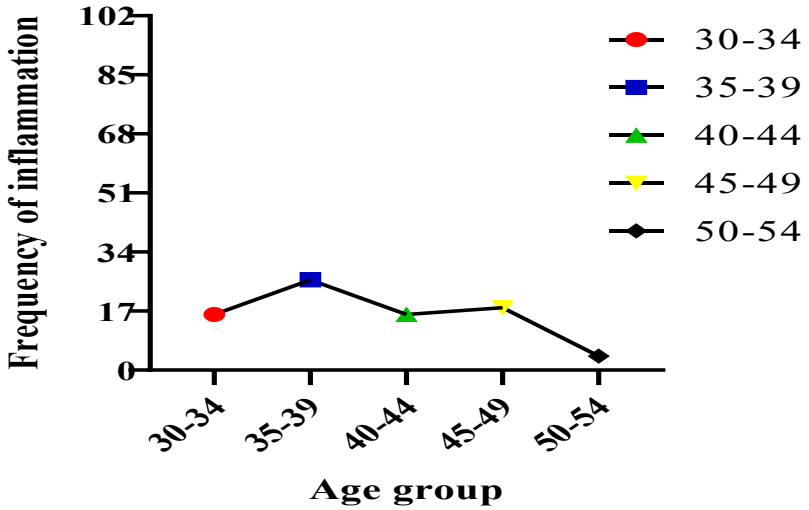

Figure 1. Frequency of inflammation in relation to age groups

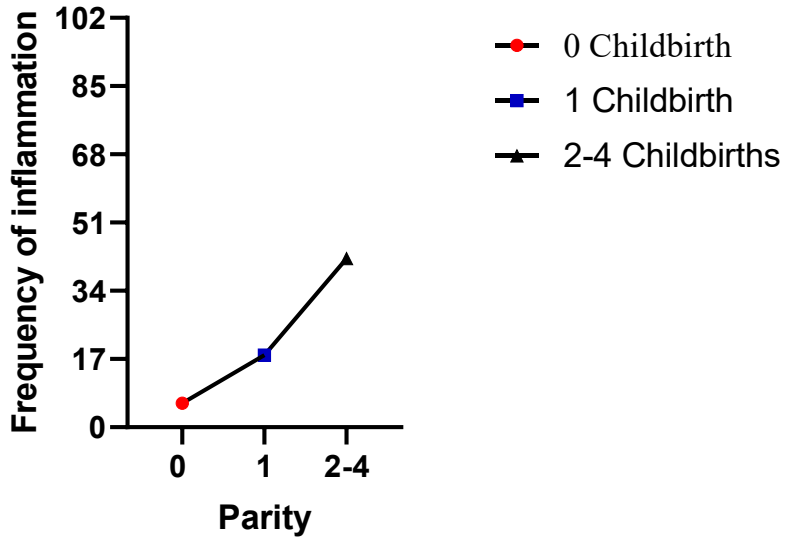

Figure 2: Frequency of inflammation in relation to parity.

Table 2: Comparative analysis of reactive cellular changes associated with inflammation across the various age groups.

Age groups	Mean Diff.	95.00% CI of diff.	P Value
30-34 vs. 35-39	-10	-16.27 to -3.732	0.002**
30-34 vs. 40-44	-0.5	-6.768 to 5.768	0.9989 ns
30-34 vs. 45-49	-2	-8.268 to 4.268	0.8428 ns
30-34 vs. 50-54	12	5.732 to 18.27	0.0004***
35-39 vs. 40-44	9.5	3.232 to 15.77	0.0031**
35-39 vs. 45-49	8	1.732 to 14.27	0.011*
35-39 vs. 50-54	22	15.73 to 28.27	<0.0001****
40-44 vs. 45-49	-1.5	-7.768 to 4.768	0.9365 ns
40-44 vs. 50-54	12.5	6.232 to 18.77	0.0003***
45-49 vs. 50-54	14	7.732 to 20.27	<0.0001****

Keys: ns= non-significant, *=Significant, Mean Diff= mean difference, CI of diff.= Confidence interval of difference.

Table 3 summarises the knowledge of participants in this study on cervical cancer screening and preventive measures. About 72.5% (74) of the women knew about cervical cancer, whereas 54.9% (56) were aware of cervical cancer screening. Furthermore, 45.1% (46) of the women had previously had a Papanicolaou smear test, whereas 19.6% (20) claimed to do so regularly. The research participants' awareness of cervical cancer prevention was low, with approximately 88.24% (94) unaware of preventative strategies (Table 3).

Table 3: Knowledge of cervical cancer, screening and prevention. n=102

Parameter (s)	Number	Percentage (%)
Knowledge of Cervical Cancer		
Yes	74	72.5%
No	28	27.5%
Knowledge of Cervical Cancer Screening		
Yes	56	54.9%
No	46	45.1%
I have done a Papanicolaou smear test before		
Yes	46	45.1%
No	56	54.9%
I go for the Papanicolaou smear test often.		

Yes	20	19.6%
No	82	80.4%
There is prevention for cervical cancer.		
Yes	12	11.76%
No	94	88.24%

Discussion

Cervical cancer is a serious concern for developing nations, and the importance of early detection using Pap smears for effective care cannot be overstated. Generally, cancer incidence in Nigeria is low compared to developed countries, which may not truly represent the burden of the disease. This might be owing to weak population-based data and poor health patronage of orthodox medical treatment [27]. Despite being a preventable disease, poor perception, ignorance, and low level of awareness owing to the lack of preventative programmes that are either nonexistent or poorly executed are some of the highlighted variables that continuously perpetuate the problem, as observed in this study [28]. This study evaluated cervical smears in females of reproductive age in Ondo town. The findings showed that women aged 35 to 39 constituted the majority of the study participants. Among the NILM category, inflammatory smears were predominant, accounting for 78.4% of cases. This aligns with the findings of Alrajjal *et al.* [29], who reported a high prevalence of NILM (94%), and Gothwal *et al.* [30], who documented an 86.51% prevalence rate. Similarly, Chris-ozoko *et al.* [31] reported NILM prevalence rates of 75%, 77%, 81%, 75%, and 75% in a five-year retrospective study (2013–2017), which is comparable to our findings. However, our results contrast with those of Ducray *et al.* [32], who reported a significantly lower NILM prevalence (20%) in a study conducted in a South African city. Among participants aged 45 to 49, 3.9% had LSIL, 1.96% had atrophic smears, and 50 to 54 had normal smears. Sachan *et al.* [28] observed that low-grade lesions were most common among women aged 41 to 50, while Chris-ozoko *et al.* [31] reported LSIL prevalence in females aged 45 to 49, which is consistent with the findings of this study. Although not a standard, since abnormal cases have been documented in different age groups for numerous research, some of which include 31-40 [33], less than 30 [34], an average age of 53 at diagnosis [35], and the 40-60 age bracket [28] and so on. The variation in age groups may be dependent on research region, study purpose, and participant turn-out, with studies suggesting that cervical cancer most often develops in the fifth decade, although the precursor lesions occur 5-10 years before the onset of invasive malignancy [33]. In this study, 7.84% of participants had LSIL. Previous investigations reported a 6.56% prevalence rate for LSIL [30,36].

However, Thushara & Rupashree [33] and Alrajjal *et al.* [29] reported in their studies that 2.5% and 1.7% of all Pap smear tests were interpreted as NILM, respectively. All subjects who had LSIL reported abnormal vaginal discharge, lower back discomfort, and genital itching. Previous studies have linked these symptoms to cervical cancer and infection with high-risk HPV [37, 38, 39, 40].

Statements by the European Society of Gynaecologic Oncology (ESGO) and the European Federation of Colposcopy (EFC), documented that only 0.5-1% of abnormal smears were classified as HSIL, while the majority of abnormal smears were comprised of atypical squamous cells of undetermined significance (ASC-US) and LSIL, with rates of about 3-5% and 1-2%, respectively [41].The ESGO and EFC prevalence rates for HSIL support the findings of this study, which reported 0% for high-grade lesions. This is also consistent with the low prevalence of 0.3% by Alrajjal *et al.* [2021] and 0.76% reported by Thushara and Rupashree [33], respectively.

High parity positively correlates with cervical cancer, with multiple pregnancies above six considered potential risk factors for the development of cervical lesions [17, 42, 43]. Furthermore, long-term usage of hormonal steroids in women has also been linked to an increased risk of cervical cancer [17, 44]. Experiments using HPV-16 transgenic mouse models have demonstrated that animals treated with longer periods of oestrogen are more likely to develop larger tumours and have a much higher frequency of tumours than those treated with a shorter duration, supporting the human observations of a susceptible cervix to carcinogenic progression by continuous exogenous oestrogen exposure or elevated endogenous oestrogen levels [45, 46]. In this study, however, the link between parity and abnormal cytology smear in the examined participants was found to be 7.8% of LSIL and 1.96% of atrophic smear in females with three childbirths, whereas other groups seemed normal. Parity and age at first birth are connected with major social, biological, and health consequences for women and the connections of these reproductive characteristics with the risk of breast and ovarian malignancies have been reported [47, 48].Ashar *et al.*[20] documented that first sexual intercourse and high parity were the most important variables in precancerous cervical lesions. Menarche, age of first sexual intercourse, increasing number of sexual partners, and high parity were all found to be major risk factors for the development of pre-cancerous cervix lesions. Also, the age at first intercourse (<20 years), higher parity (>4 children), and having more than one sexual partner increase the chances of developing cervical cancer compared to lower parity and having just one sexual partner[20]. However, Fujita *et al.* [49] identified low parity, smoking, and early menarche as independent risk factors for gynecologic malignancies.

The utilization of healthcare services and the prevalence of sexually transmitted diseases are significantly associated with the development of cervical cancer. Although the length of use of various contraceptive kinds in the participants was not reported in this study, the general opinion is that long-term use of contraceptives is a risk factor for the development of cervical lesions [17, 44]. Furthermore, the total risk of invasive carcinoma on oral contraceptive usage has been reported to be significant with known or unknown HPV status and longer duration of oral contraceptive pill use [50, 51]. HPV can be sexually transmitted and is one of the incriminate viruses contributing to the statistics of malignant diseases with high risk. HPV-DNA is identified in 99.7% of cervical cancer specimens [52]. About 90% of HPV infections resolve or become inactive after 12 to 24 months of viral exposure. However, infections by high-risk HPV strains remain, increasing the chance of progression to cervical cancer [54]. The development of cervical lesions, as well as cellular changes associated with the use of contraception has been indicated with studies documenting that the use of contraception for more than 24 months is a predictor of the expression of high-risk human papillomavirus E6/E7 mRNA [55].

Furthermore, the age of menarche less than or equal to 16 years is a risk factor for the development of cervical lesions [56]. In this study, we discovered that the age of menarche was linked with LSIL, with females who began menstruation between 11- and 13-years old accounting for 1.9% of LSIL, 14 to 16 years old accounting for 5.9%, and females above 16 years old accounting for 1.9% of LSIL in the study population. The study's findings demonstrated a reasonable level of awareness about cervical cancer (72.5%) and screening (54.9%). However, 45.1% have previously done the Papanicolaou smear test, and only 19.6% of the study participants undergo screening regularly. In a study conducted on female public secondary school teachers in Mushin local government area of Lagos State, Nigeria, Toye *et al.* [56] reported that female school teachers had high knowledge of cervical cancer screening methods, with the Papanicolaou smear test being the most often used. Conversely, investigations done in the Somolu Local Government Area of Lagos, Nigeria, by Amu *et al.* [23]found that participants had little understanding of cervical cancer but a good attitude towards screening. Additional research by Ahmed *et al.* [1]revealed that Nigerian market women in Zaria, Nigeria, had a decent understanding of cervical cancer and screening, but their practice of screening was low. The poor rate of acceptance of cervical cancer screening as a routine test may be attributable to the absence of effective, extensive, or systematic cervical cancer programmes in Nigeria. A similar study by Rimande-Joel & Ekenedo [57] on women in Taraba state, Nigeria, reported that an average of 82.2% of participants were aware of cervical cancer,

screening, symptoms, and prevention. Furthermore, studies by Oluwole *et al.*[11] reported a low level of cervical cancer awareness and screening uptake among rural women in Lagos State, Nigeria, as well as a general lack of understanding about the disease, which is consistent with our study's findings, as a higher percentage of participants had little information on cervical cancer symptoms, even among those who indicated awareness of cervical cancer, screening, and prevention. According to studies by Olubodun *et al.* [22], only 12.8% were aware of cervical cancer, with the report indicating that knowledge of cervical cancer, screening, and HPV immunisation was poor, with approximately 64.3% of participants not considering themselves at risk for cervical cancer. The stated level of participant's knowledge in our study is consistent with the findings of Eze *et al.* [13], who reported that the majority of respondents were aware of cervical cancer. However, just 29% of our survey participants reported having strong knowledge about cervical screening, even though 54.9% were aware of screening information. Additional studies on the knowledge, attitudes, and views of cervical cancer and the adoption of cervical cancer screening in Nigeria by Uchendu *et al.* [58] also reported that knowledge was poor among the general population, and even the uptake among persons informed of the screening was low, with barriers to cervical cancer screening highlighted as worries about modesty and permission from partners [59]. Studies by Kashyap *et al.* [16] reported a positive link between cervical cancer and education, site of residence, use of old cloth sanitary napkins, young age at marriage, number of husband's partners, genital washing after sexual intercourse, and access to health services. The barriers to cervical cancer screening test uptake reported in this study include painful sample collection, screening costs, the gender of the attending scientist, and apprehension about visiting the hospital for such a test, while a good number of the participants made no decision, and this can be concluded to be due lack of knowledge about the disease, the screening methods available and the prevention methods. Major inadequacies noted in prior research included the shortage of physicians and qualified personnel, as well as a lack of the requisite diagnostic treatment equipment at hospitals, forcing patients to travel further for care [4]. Another study indicated financial constraints, misconceptions about cervical cancer and cervical cancer screening, modesty, and stigmatisation as additional obstacles to cervical cancer screening among Nigerian women [7].

Conclusion

Cervical cancer remains a life-threatening disease that can be effectively prevented if detected at an early stage. The complex interplay of biological processes highlights the critical role of inflammation in cervical pathophysiology, increasing susceptibility to HPV infections. Pap smear testing is a valuable, simple, cost-effective, and safe method for identifying precancerous changes in the cervix and should be widely adopted as a standard screening practice to help lessen the burden of treatment, as well as reduce morbidity and mortality rates associated with cervical cancer. Although no high-grade lesions or malignancies were identified among the study participants, findings revealed that despite being aware of cervical cancer, most women in Ondo lacked knowledge of its symptoms. Additionally, the use of contraceptives, especially Implanon and intrauterine devices, along with factors like parity and age at menarche, were significantly linked to cytological findings, highlighting their complex relationship with the changes seen in Pap smears. Awareness and lifestyle choices were also identified as crucial factors influencing the development of cervical lesions and the willingness to undergo screening.

In summary, improving public knowledge about the risk factors for cervical cancer should be a key focus of prevention programs. Integrating HPV testing into existing screening systems has the potential to significantly reduce cervical cancer morbidity and mortality. Strengthening health education initiatives is strongly recommended to improve the acceptance and utilization of screening services.

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References

1. Ahmed S, Ahmed R, Idris S, Sabitu K. Knowledge, attitude and practice of cervical cancer screening among market women in Zaria, Nigeria. Niger Med J. 2013;54(5):316.

2. Musa J. The need for societal investment to improve cervical cancer outcomes in Nigeria: A commentary. Afr J Reprod Health. 2017;21(4):17–23.

3. Chidinma AU, Uchenna AA. Prevalence of Cervical Cancer in Enugu State: A Critical Review of 5-year Hospital Data in Enugu State, Southeast Nigeria. Texila Int J Public Heal. 2022;10(4):1–10.

4. Geogr JH, Stewart K, Li M, Xia Z, Adewole SA, Adeyemo O, et al. Modeling spatial access to cervical cancer screening services in Ondo State, Nigeria. Int J Health Geogr. 2020;28(19):1–15.

5. John-Akinola Y, Oluwasanu MM, Oladepo O. Urban Poor Community Settings' Knowledge and Screening Practices for Cervical Cancer in Ibadan, Nigeria Abstract. JCO Glob Oncol. 2023;7(7):1024–31.

6. Mafiana JJ, Dhital S, Halabia M, Wang X, Wang X. Barriers to uptake of cervical cancer screening among women in Nigeria: a systematic review. Afr Health Sci. 2022;22(2):295–309.

7. Ogunsola OO, Osayi E, Ajayi OA, Ojo TO, Wudiri K, Amoo B. Cervical cancer screening for people living with HIV; experiences from an innovative cervical screening and treatment program in Nigeria. Research Sq. 2023;8(7):1–17.

8. Kani YA, Muhammad Y, Binji A, Iliya S, Adejumo R, Kamilu IM, Isah M. Prevalence of cervical cancer - A 6-year Retrospective Study in Jigawa State, Nigeria Yamuna. World J Biol Pharm Heal Sci. 2020;04(01):59–76.

9. Chan CK, Aimagambetova G, Ukybassova T, Kongrtay K, Azizan A. Human papillomavirus infection and cervical cancer: epidemiology, screening, and vaccination—review of current perspectives. J. Oncol. 2019;2019(1):3257939.

10. Oluwole EO, Mohammed AS, Akinyinka MR, Salako O. Cervical Cancer Awareness and Screening Uptake among Rural Women in Lagos, Nigeria. J Community Med Prim Heal Care. 2017;29(1):81–8.

11. Bhatla N, Aoki D, Nand D, Rengaswamy S. Cancer of the cervix uteri : 2021 update. Int J Gynecol Obs. 2021;155(1):28–44.

12. Eze GU, Obiebi IP, Umuago IJ. Perspectives of cervical cancer and screening practices among staff of a teaching hospital in South-South Nigeria. J Cancer Res Pract. 2018;5(2):67–73.

13. Adejuyigbe FF, Balogun BR, Sekoni AO, Adegbola AA. Cervical cancer and human papilloma virus knowledge and acceptance of vaccination among medical students in Southwest Nigeria. Afr J Reprod Health. 2015;19(1):140–8.

14. Lott BE, Trejo MJ, Baum C, Mcclelland DJ, Adsul P, Madhivanan P, et al. Interventions to increase uptake of cervical screening in sub-Saharan Africa : a scoping review using the integrated behavioral model. BMC Public Health. 2020;654(20):1–18.

15. Kashyap N, Krishnan N, Kaur S, Ghai S. Risk Factors of Cervical Cancer: A Case-Control Study. Asia-Pacific J Oncol Nurs. 2019;6(3):308–14.

16. Johnson CA, James D, Marzan A, Armaos M. Cervical Cancer: An Overview of Pathophysiology and Management. Semin Oncol Nurs. 2019;35(2):166–74.

17. Ohihoin AG, Okwuraiwe PA, Musa AZ, Olorunfemi G, Onwuamah CK, Ige F, et al. Prevalence and Predictors of High-Risk HPV in Nigeria. Sci Res Publ. 2022;12(4):745–57.

18. Fernandes A, Viveros- Carreno D, Hoegl J, Avila M, Pareja R. Human papillomavirus- - independent cervical cancer. Int J Gynaecol cancer. 2022;32(4):1–7.

19. Ashar H, Kusrini I, Musoddaq A, Asturiningtyas IP. First sexual intercourse and high parity are the most influential factors of precancerous cervical lesions. Maj Obstet Ginekol. 2020;28(3):113.

20. Shrestha AD, Neupane D, Vedsted P, Kallestrup P. Cervical cancer prevalence, incidence and mortality in low and middle income countries: A systematic review. Asian Pacific J Cancer Prev. 2018;19(2):319–24.

21. Olubodun T, Odukoya OO, Balogun MR. Knowledge, attitude, and practice of cervical cancer prevention, among women residing in an Urban slum in Lagos, South West, Nigeria. Pan Afr Med J. 2019;32:1–10.

22. Amu EO, Ndugba SC, Olatona FA. Knowledge of Cervical Cancer and Attitude to Cervical Cancer Screening among Women in Somolu Local Government Area, Lagos, Nigeria. J Community Med Prim Heal Care. 2019;31(1):76–85.

23. Stella NN. Effect of Age and Parity on Practice of Cervical Cancer Screening Among Women of Child Bearing Age in Anambra State. Glob J Cancer Case Reports. 2021;02(02):83–92.

24. Awodele O, Adeyomoye AA, Awodele DF. Cancer distribution pattern in south-western Nigeria. Tanzan J Health Res. 2015;13(2):1–7.

25. Kamal M. Pap Smear Collection and Preparation:Key Points. Cytojournal. 2022;19(24):1–14.

26. Sathawane P, Kamal MM, Deotale PR, Mankar H. Nuances of the Papanicolaou stain. Cytojournal. 2022;43(19):1–14.

27. Sowunmi A, Alabi A, Fatiregun O, Olatunji T, Okoro U, Durosinmi Etti A. Trend of cancer incidence in an oncology center in Nigeria. West African J Radiol. 2018;25(1):52.

28. Sachan P, Singh M, Patel M, Sachan R. A Study on Cervical Cancer Screening Using Pap Smear Test and Clinical Correlation. Asia-Pacific J Oncol Nurs. 2018;5(3):337–41.

29. Alrajjal A, Pansare V, Saha M, Choudhury R, Yousufuddin M, Khan A. Squamous intraepithelial lesions (SIL : LSIL , HSIL , ASCUS , ASC-H , LSIL-H) of Uterine Cervix and Bethesda System. Cytojournal. 2021;18(16):1–24.

30. Gothwal M, Nalwa A, Singh P, Yadav G, Bhati M, Samriya N. Role of Cervical Cancer Biomarkers p16 and Ki67 in Abnormal Cervical Cytological Smear. J Obstet Gynecol India. 2020;71(1):72–7.

31. Chris-ozoko L, Oyem J, Ekanem V. 5-Year Retrospective Study of the Prevalence of Cervical Lesions at the University of Benin Teaching Hospital , Nigeria. Acta Sci Anat. 2020;1(4):235–43.

32. Ducray JF, Kell CM, Basdav J. Cervical cancer knowledge and screening uptake by marginalized population of women in inner-city Durban , South Africa : Insights into the need for increased health literacy. Women's Heal. 2021;17:1–10.

33. Thushara K, Rupashree S. A Study on Pattern of Pap Smear Abnormalities with Respect to Age : Screening for Cervical Cancer. Galore Int J Heal Sci Res. 2020;5(1):98–103.

34. St-martin G, Thamsborg LH, Andersen B, Christensen J, Ejersbo D, Jochumsen K, et al. Management of low-grade cervical cytology in young women . Cohort study from Denmark Management of low-grade cervical cytology in young women . Cohort study. Acta Oncol (Madr). 2021;60(4):444–51.

35. David-west G, Clare CA. A Review of Cervical Cancer: Incidence and Disparities. J Natl Med Assoc. 2020;112(2):229–32.

36. Gothwal M, Singh P, Elhence P, Yadav G, Sharma C, Samriya N. Spectrum of Abnormal Cervical Lesions and its Cytohistological Correlation: a Study from an Institute of National Importance of Western Rajasthan. MEDICA- a J Clin Med. 2022;17(3):636–40.

37. Bai H, Liu J, Wang Q, Feng Y, Lou T, Wang S, et al. Oncological and reproductive outcomes of adenocarcinoma in situ of the cervix managed with the loop electrosurgical excision procedure. BMC Cancer. 2018;18(461):4–9.

38. Schwock J, Starova B, Khan ZF, Mirkovic J, Ko HM, Rouzbahman M, et al. Cytomorphologic Features of Gastric-Type Endocervical Adenocarcinoma in Liquid-Based Preparations. Acta Cytol. 2020;65(1):56–66.

39. Taku O, Businge CB, Mdaka ML, Phohlo K, Basera W, Garcia-jardon M, et al. Human pillomavirus prevalence and risk factors among HIV-negative and HIV-positive women residing in rural Eastern. Int J Infect Dis. 2020;95(0):176–82.

40. Assefa T, Arefaynie M, Mebratu W, Mohammed A, Addisu E. Determinants of cervical cancer screening utilization among women attending health facilities of Dessie town , Northeast Ethiopia. BMC Cancer. 2022;22(1330):1–8.

41. Kyrgiou M, Arbyn M, Bergeron C, Bosch FX, Dillner J, Jit M, et al. Cervical screening : ESGO-EFC position paper of the European Society of Gynaecologic Oncology (ESGO) and the European Federation of Colposcopy (EFC). Br J Cancer. 2020;123(4):1–8.

42. Delam H, Izanloo S, Bazrafshan M-R, Eidi A. Risk Factors for Cervical Cancer : An Epidemiological Review. J Heal Sci Surveill Syst. 2020;8(3):105–9.

43. Tekalegn Y, Sahiledengle B, Woldeyohannes D, Atlaw D, Degno S, Desta F, et al. High parity is associated with increased risk of cervical cancer: Systematic review and meta-analysis of case–control studies. Women's Heal. 2022;18.

44. Agustiansyah P, Sanif R, Nurmaini S. Epidemiology and Risk Factors for Cervical Cancer. Biosci Med J Biomed Transl Res. 2021;5(7):624–31.

45. Elson DA, Riley RR, Lacey A, Thordarson G, Talamantes FJ, Arbeit JM. Sensitivity of the cervical transformation zone to estrogen-induced squamous carcinogenesis. Cancer Res. 2000;60(5):1267–75.

46. Brake T, Lambert PF. Estrogen contributes to the onset, persistence, and malignant progression of cervical cancer in a human papillomavirus-transgenic mouse model. Proc Natl Acad Sci U S A. 2005;102(7):2490–5.

47. Schüler S, Ponnath M, Engel J, Ortmann O. Ovarian epithelial tumors and reproductive factors: A systematic review. Arch Gynecol Obstet. 2013;287(6):1187–204.

48. Gaudet MM, Carter BD, Hildebrand JS, Patel A V., Campbell PT, Wang Y, et al. Associations of parity and age at first pregnancy with overall and cause-specific mortality in the Cancer Prevention Study II. Fertil Steril. 2017;107(1):179-188.

49. Fujita M, Tase T, Kakugawa Y, Hoshi S, Nishino Y, Nagase S, et al. Smoking, earlier menarche and low parity as independent risk factors for gynecologic cancers in Japanese: A case-control study. Tohoku J Exp Med. 2008;216(4):297–307.

50. Gierisch JM, Coeytaux RR, Urrutia RP, Havrilesky LJ, Moorman PG, Lowery WJ, et al. Oral contraceptive use and risk of breast, cervical, colorectal, and endometrial cancers: A systematic review. Cancer Epidemiol Biomarkers Prev. 2013;22(11):1931–43.

51. Asthana S, Busa V, Labani S. Oral contraceptives use and risk of cervical cancer—A systematic review & meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2020;247:163–75.

52. Walboomers J. M. M, Marcel V. Jacobs, M. Michele Manos, F. Xavier Bosch, J. Alain Kummer, Keerti V. Shah, Peter J. F. Snijders, Julian Peto, Chris J. L. M. Meijer NM. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. J Pathol J Pathol. 1999;189:12–9.

53. Asiaf A, Ahmad ST, Mohammad SO, Zargar MA. Review of the current knowledge on the epidemiology, pathogenesis, and prevention of human papillomavirus infection. Eur J Cancer Prev. 2014;23(3):206–24.

54. Tiiti TA, Selabe SG, Bogers J, Lebelo RL. High prevalence of and factors associated with human papillomavirus infection among women attending a tertiary hospital in Gauteng Province , South Africa. BMC Cancer. 2022;22(854):1–12.

55. Ezechi O, Akinsolu F, Salako A, Abodunrin O, Adewole I, Olagunju M, et al. High-risk human papillomavirus infection among Nigerian women: A systematic review and meta-analysis. J Int Med Res. 2023;51(7):1–17.

56. Toye MA, Okunade KS, Roberts AA, Salako O, Oridota ES, Onajole AT. Knowledge, perceptions and practice of cervical cancer prevention among female public secondary school teachers in Mushin local government area of Lagos State, Nigeria. Pan Afr Med J. 2017;28:1–8.

57. Rimande-Joel R, Ekenedo GO. Knowledge, belief and practice of cervical cancer screening and prevention among women of Taraba, North-East Nigeria. Asian Pacific J Cancer Prev. 2019;20(11):3291–8.

58. Uchendu I, Hewitt-Taylor J, Turner-Wilson A, Nwakasi C. Knowledge, attitudes, and perceptions about cervical cancer, and the uptake of cervical cancer screening in Nigeria: An integrative review. Sci African. 2021;14:e01013. Available from: https://doi.org/10.1016/j.sciaf.2021.e01013