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Sero-prevalence of HPV-16 IgG Antibodies and Its Association with Socio Demographic Features of Women in Lokoja, Kogi State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To determine the sero-prevalence of Human Papilloma Virus type 16(HPV-16) immunoglobulin G antibodies and its association with socio-demographic features of women attending some clinics in Lokoja, Kogi State, Nigeria.
Study Design: Hospital based cross sectional study.
Place and Duration of Study: Kogi State specialist hospital and Federal medical Centre, Lokoja. Kogi State, Nigeria, between June and October, 2015.
Methodology: We included 400 participants (380 pregnant and 20 non pregnant women; age range 15 to 45 years) attending the hospitals during the duration of the research. Serum samples were analysed for human papilloma virus type 16 IgG using the Enzyme Linked Immunosorbent Assay and questionnaire was also administered to obtain demographic features of the participants.
Results: The prevalence of human papilloma virus type 16 IgG antibodies was found to be 10%. The occurrence of IgG antibodies to human papilloma virus was found to be statistically associated with educational status and occupation (P = 0.020 and 0.036 respectively).
Conclusion: The prevalence of human papilloma virus was high. Cervical screening centres should be established in all areas of the state and awareness campaigns should be organized to afford young women the knowledge and dangers of cervical cancer and preventive measures.

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1. INTRODUCTION

Human papillomavirus (HPV) is a non-enveloped deoxyribonucleic acid (DNA) virus belonging to the family *papillomaviridae*. This family includes more than 130 genotypes, many of which infect the mucosal areas of the human upper digestive tract and the anogenital region through sexual contact, leading to increased risk of development of cancer [1,2]. Human papillomavirus infection is one of the main causes of sexually transmitted diseases in the world, especially in developing countries where the prevalence of the asymptomatic form varies from 2 to 44%, depending on the population [3]. Evidence shows that most sexually active individuals are exposed to infection from this virus at some moment in their lives [4].

More than 120 different HPV types have been catalogued so far, and about 40 infect the epithelium of the anogenital tract and other mucosal area of the body. At least 15 of these oncogenic or high-risk HPV (HR-HPV), are strongly associated with progression to invasive cervical cancer [5]. The most prevalent type found in all the studies was HPV 16. However, the prevalence of both HPV 16 and the other types differs considerably according to the degree of the geographic region [6].

Virtually all cases of cervical cancer worldwide are caused by persistent infection with one or more of approximately a dozen carcinogenic genotypes of Human Papilloma Virus [7,8,5].

In a recent meta-analysis, global HPV prevalence in North America and Europe was estimated at 21% with sub Saharan Africa topping the list at 24% [9,10]. In Nigeria, the prevalence of HPV is high in all female groups and highest in women aged 15-23 yrs [10,11].

Nigeria has a fairly high cervical cancer incidence (ASR at 29.0 per 100.000 women/year)' and has a low cervical cancer screening in both urban and rural areas. The low coverage of screening may be due to lack of awareness. Previous studies done in many parts of the world and especially in sub Saharan Africa have revealed low knowledge in Human Papilloma virus and its precursor lesions in the development of cervical cancer. Therefore, this study was aimed at providing information of the sero-prevalence of human papilloma virus type 16 and its association with socio-demographic features of women within the study location.

2. METHODOLOGY

2.1 Study Area

This study was carried out in two hospitals in Lokoja metropolis of Kogi State. Lokoja is located at latitude 7.8degree north and 6.7degree and Longitude 06 44'E and 07 48'E. Lokoja lies at the confluence of the Niger and the Benue rivers and is the capital of Kogi state. It shares boundaries with Nassarawa State to the North East; Benue State to the East; Enugu, Anambra and Delta States to the south; Ondo ,Ekiti and Kwara States to the West; and Niger State to the north. Abuja Federal capital territory also borders Kogi to the north. Kogi State consists of 21 local government areas and is divided into three senatorial districts/Zones namely: The East, West and Central districts respectively.

2.2 Study Population

Study population comprised of 380 pregnant women of all ages and 20 non pregnant women making a total of 400 women from all works of life attending antenatal clinic from each of the hospitals, (Kogi State specialist hospital and Federal medical Centre, which are both located in Lokoja) Who were willing and consented to be enlisted in the study. For those below the ages of 18, consent was sought from their family members.

2.3 Control Population

Female patients visiting the hospital other than pregnant women were used as control population.

2.4 Inclusion Criteria

This research study included all pregnant women of all ages attending antenatal clinic within the study period that expressed interest in participating and gave consent to the interview irrespective of the trimester or stage of their pregnancy.

2.5 Exclusion Criteria

All pregnant women who declined to participate in the study or failed to give consent to the

interviewer and those below the ages of 18 whose family members did not consent for their enrolment in this study.

2.6 Ethical Consent

Ethical approval was obtained from the Research and Ethical Committee of Kogi State Ministry of Health, Kogi State and Ethical committee of the Federal Medical Center, Lokoja in order to be allowed to carry out the research. Consent form was issued to individuals whose blood were to be collected to indicate that they were willing and have voluntarily agreed to participate in this study without any compulsion.

2.7 Sample Size Determination

The sample size for this study was determined by using the formula by Naing et al. [12] and a prevalence of 42.9% from a previous study [13].

The calculated sample size was 376, hence a total of 400 samples were collected from Federal Medical Center and Kogi State Specialist Hospital Lokoja. Out of the 400 samples collected 380 were from pregnant women (study population) and 20 were from non- pregnant women (control population).

2.8 Data Collection

Prior to the sample collection, a structured questionnaire was administered which obtained information on socio-demographic features of the participants.

2.9 Collection of Samples

The samples were collected with the help of laboratory technicians, between the months of June and October 2015.

Using a sterile disposable syringe, 3 ml of venous blood was collected aseptically by a clinician into plain vacutainer tubes. The tubes were then labeled appropriately with patient's laboratory number.

Sera from the blood sample for ELISA technique was separated by allowing to clot at room temperature followed by centrifugation at 250 rpm for 5 minutes. The sera were then removed using clean Pasteur pipettes, transferred into serum containers and stored at -20^{o}C until when required.

2.10 Laboratory Diagnosis using Enzyme-Linked Immunosorbent Assay

Serum samples were analyzed according to manufacturer's instruction using Enzyme-Linked Immunosorbent Assay (ELISA) for HPV IgG Kit from Diagnostic Automation Inc, USA.

2.11 Data Analysis

The data obtained from the questionnaire and the results of the laboratory analysis were analyzed using SPSS (statistical package for social sciences) version 20. The results obtained were reduced to percentages and figures. The Pearson chi square test at 95% level of significance was used to determine the relationships between the demographic data and prevalence.

3. RESULTS

Analysis showed that 40 (10%) of the 400 women enrolled for the study were positive for human papilloma virus type 16 IgG, with most cases (11.3%: 26/230) coming from Federal Medical Centre Lokoja (Table 1).

Relating the presence of the IgG antibodies with the ages of the respondents revealed that respondents that were in age group 26-30 years had the highest prevalence of IgG antibodies to HPV type 16 (9.3%: 15/162) while those in age group 15-20 years had the lowest prevalence (0.0%: 0/7) (Table 2). Age therefore, was not statistically associated with the presence of IgG antibodies to HPV type 16 in the study population ($\chi2$ = 8.805, df = 5, P=0.117). Distribution of HPV infection based on marital status revealed that the married women had the IgG antibodies to HPV type 16 prevalence of 8.5% (29/340) while the widows had a prevalence of 30% (3/10). There was no statistically significant association between marital status and IgG antibodies to HPV type 16 ($\chi2$ = 7.298, df =3, P = 0.063).

Taking level of education as a factor, it was observed that women that had no form of education had the highest rate of infection (25%: 5/20) while those that attended tertiary institutions had the lowest (6.7%: 12/180). There was a statistically significant association between level of education and IgG antibodies to HPV type 16 ($\chi2$ = 8.962, df = 3, P = 0.030). Women that fell into the "Others" category had the highest rate of HPV infection, (25.0%:7/28) while the civil servants had the lowest (8.4%: 9/250).

There was a statistically significant association between occupation and IgG antibodies to HPV (χ^2 = 9.222, df = 3, P = 0.026).

4. DISCUSSION

Human Papilloma virus type 16 antibodies were detected in serum samples from 40 out of the 400 women studied, giving a seroprevalence of 10%. The prevalence found to be 10% in this study indicates that the women had been infected and the virus is circulating in Kogi State. Infection with HPV type 16 is a major factor contributing to the development of cervical intra epithelial neoplasia and invasive cervical carcinoma. This result comparable to the report of [14] and much higher than the 4.0% and 1.2% reported in Ibadan and Enugu, Nigeria respectively [15,16]. The prevalence is slightly lower than 10.3% reported in Imo State, Nigeria [17]. The obtained prevalence is much lower than, 32% and 48% reported in, Tanzania and Brazil respectively [18,19]. The differences in the prevalence reported in the previous studies and the present study could be attributed to the fact that only HPV type 16 was considered in this study, coupled with variation in population size and geography.

Human Papilloma virus 16 IgG antibodies was found to be highest in participants that were between ages 41-45, The findings agrees with those of [20,21] who reported a higher HPV prevalence among older women but differ from

Table 1. Seroprevalence of human papilloma virus type 16 IgG antibodies among women attending antenatal clinics in Lokoja, Kogi State

Hospital	Number analysed	Number positive (%)	p-value
FMC	230	26(11.3)	0.312^{ns}
KSSH	170	14(8.2)	
Total	400	40(10)	

Key: FMC=Federal Medical Center, KSSH= Kogi State Specialist Hospital, ns = Not Significant

Table 2. Seroprevalence of human papilloma virus 16 IgG antibodies based on some socio-demographic features of women attending antenatal clinics in Lokoja, Kogi State

Parameter	Number screened	Number positive (%)	P value
Age (years)			
15-20	7	0(0.0)	0.117^{ns}
21-25	80	4(5.0)	
26-30	162	15(9.3)	
31-35	74	9(12.2)	
36-40	67	9(13.4)	
41-45	10	3(30.0)	
Marital status			
Single	20	3(15.0)	0.063^{ns}
Married	340	29(8.5)	
Divorced	30	5(16.7)	
Widowed	10	3(30.0)	
Highest level of education			
Primary	110	15(13.6)	0.030*
Secondary	90	8(8.7)	
Tertiary	180	12(6.7)	
None	20	5(25.0)	
Occupation			
Civil servant	250	21(8.4)	0.026*
Business	112	12(10.7)	
Farming	60	10(16.7)	
Others	28	7(25.0)	

the findings of [22,23 and 17] that reported a higher prevalence among younger women. There was no statistical association between age and HPV prevalence and this agrees with the findings of [24]. The higher HPV prevalence observed in older women could be attributed to the fact that HPV has a long incubation period and as such older women tend to have higher prevalence than the younger ones.

Distribution of HPV IgG antibodies based on marital status revealed that those respondents that were divorced and widowed had the highest rate of prevalence. This is observation is similar to the findings of [25,26,27] that reported a higher HPV prevalence among married women, because even though they are no longer with their husbands, they were once married. The finding however contrasts that of [28] that reported higher prevalence in single women. This finding also, does not agree with that of [13] that reported a similar HPV prevalence in both the single and married women. The absence of HPV infection in the single women could be because most of them take protective measures (using barriers) when having sex with their partners due to their fear of getting pregnant or contracting sexually-transmitted diseases. In addition, the number of single women enrolled in the study was small.

Taking level of education as a factor, it was observed that women that had no formal education had the highest prevalence while those that went to tertiary institutions had the lowest. This could be due to an increased level of awareness on ways of contracting and preventing STI's as one advances in education and therefore decreasing prevalence rate with higher education which agrees with the finding of [29] that more education plays in fostering a lifestyle that reduce the risk of invasive cervical cancer. The data suggesting important elements of such a lifestyle include latter age at first sexual intercourse, a limited number of pregnancy, and greater likelihood of undergoing cytological screening and reduce exposure to carcinogen in household environments. This observation is similar to those of [29,25,20,13] that reported highest prevalence in elementary educated women, there was a statistically significant association between HPV infection and education.

Taking into consideration the occupation of the respondents and HPV prevalence, there was a statistically significant association between infection and occupation. This is in line with the findings of [24] that reported a statistically significant association between occupation and cervical HPV infection. Women who fell into the "others" group and farmers as well as those that were into business had the highest rate of HPV infection while the Civil servants had the lowest. This could be due to a low socio-economic status as most of them were peasant farmers and petty traders. It is generally accepted that poor socio-economic status could lead one to indulge in some risky lifestyles such as promiscuity that may cost their health.

5. CONCLUSION

The prevalence of human papilloma virus type 16 among women in Lokoja, Kogi State, Nigeria was found to be 10%. Occurrence of Human papilloma virus type 16 was found to be statistically associated with highest educational status attained and occupation. It is recommended that cervical cancer screening centers should be instituted in all areas of the state, and awareness campaigns as well as workshops should be organized, both at the federal, state and local government levels, that will serve to encourage young ladies and women to go for the screening exercises at least once in 3 years so as to prevent themselves from having cervical cancer in future.

CONSENT

All participants in the study gave their consent to participate in the study.

ETHICAL APPROVAL

Ethical approval was obtained from the Research and Ethical Committee of Kogi State Ministry of Health, Kogi State and Ethical committee of the Federal Medical Center, Lokoja in order to be allowed to carry out the research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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