

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

## 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.

*Keywords: Human papilloma virus type 16, women, Lokoja*

## 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 15-23yrs [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

47 sero-prevalence of human papilloma virus type 16 and its association with socio-demographic  
48 features of women within the study location.

## 49 **2. METHODOLOGY**

### 50 **2.1 Study Area**

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

### 58 **2.2 Study Population**

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

### 64 **2.3 Control Population**

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

### 66 **2.4 Inclusion Criteria**

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

### 70 **2.5 Exclusion Criteria**

71 All pregnant women who declined to participate in the study or failed to give consent to the interviewer  
72 and those below the ages of 18 whose family members did not consent for their enrolment in this  
73 study.

### 74 **2.6 Ethical Consent**

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

### 80 **2.7 Sample Size Determination**

81 The sample size for this study was determined by using the formula by [12] and a prevalence of  
82 42.9% from a previous study [13].

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

### 87 **2.8 Data Collection**

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

## 90 **2.9 Collection of Samples**

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

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

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

## 98 **2.10 Laboratory Diagnosis using Enzyme-Linked Immunosorbent Assay**

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

## 101 **2.1 Data Analysis**

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

## 106 **3 RESULTS**

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

110 Relating the presence of the IgG antibodies with the ages of the respondents revealed that  
111 respondents that were in age group 26-30 years had the highest prevalence of IgG antibodies to HPV  
112 type 16 (9.3%: 15/162) while those in age group 15-20 years had the lowest prevalence (0.0%: 0/7)  
113 (Table 2). Age therefore, was not statistically associated with the presence of IgG antibodies to HPV  
114 type 16 in the study population ( $\chi^2 = 8.805$ ,  $df = 5$ ,  $P=0.117$ ). Distribution of HPV infection based on  
115 marital status revealed that the married women had the IgG antibodies to HPV type 16 prevalence of  
116 8.5% (29/340) while the widows had a prevalence of 30% (3/10). There was no statistically significant  
117 association between marital status and IgG antibodies to HPV type 16 ( $\chi^2 = 7.298$ ,  $df = 3$ ,  $P = 0.063$ ).

118 Taking level of education as a factor, it was observed that women that had no form of education had  
119 the highest rate of infection (25%: 5/20) while those that attended tertiary institutions had the lowest  
120 (6.7%: 12/180). There was a statistically significant association between level of education and IgG  
121 antibodies to HPV type 16 ( $\chi^2 = 8.962$ ,  $df = 3$ ,  $P = 0.030$ ). Women that fell into the "Others" category  
122 had the highest rate of HPV infection, (25.0%:7/28) while the civil servants had the lowest (8.4%:  
123 9/250). There was a statistically significant association between occupation and IgG antibodies to  
124 HPV ( $\chi^2 = 9.222$ ,  $df = 3$ ,  $P = 0.026$ )

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130 **Table 1: Seroprevalence of Human Papilloma Virus Type 16 IgG Antibodies among women**  
 131 **Attending Antenatal Clinics in Lokoja, Kogi State**

Hospital	Number Analysed	Number Positive (%)	p-value
FMC	230	26(11.3)	0.312 <sup>ns</sup>
KSSH	170	14(8.2)	
Total	400	40(10)	

132 KEY  
 133 FMC=Federal Medical Center  
 134 KSSH= Kogi State Specialist Hospital  
 135 ns = not significant

136 **Table 2: Seroprevalence of Human Papilloma Virus 16 IgG Antibodies based on some Socio-**  
 137 **demographic Features of Women Attending Antenatal Clinics in Lokoja, Kogi State**

Parameter	Number screened	Number positive (%)	P value
<b>Age (years)</b>			
15-20	7	0(0.0)	0.117 <sup>ns</sup>
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)	
<b>Marital status</b>			
Single	20	3(15.0)	0.063 <sup>ns</sup>
Married	340	29(8.5)	
Divorced	30	5(16.7)	
Widowed	10	3(30.0)	
<b>Highest level of education</b>			
Primary	110	15(13.6)	0.030 <sup>*</sup>
Secondary	90	8(8.7)	
Tertiary	180	12(6.7)	
None	20	5(25.0)	
<b>Occupation</b>			
Civil servant	250	21(8.4)	0.026 <sup>*</sup>
Business	112	12(10.7)	
Farming	60	10(16.7)	
Others	28	7(25.0)	

138 **4. DISCUSSION**

139 Human Papilloma virus type 16 antibodies were detected in serum samples from 40 out of the 400  
 140 women studied, giving a seroprevalence of 10%. The prevalence found to be 10% in this study  
 141 indicates that the women had been infected and the virus is circulating in Kogi State. Infection with  
 142 HPV type 16 is a major factor contributing to the development of cervical intra epithelial neoplasia and  
 143 invasive cervical carcinoma. This result comparable to the report of [14] and much higher than the  
 144 4.0% and 1.2% reported in Ibadan and Enugu, Nigeria respectively [15, 16]. The prevalence is slightly  
 145 lower than 10.3% reported in Imo State, Nigeria [17]. The obtained prevalence is much lower than,  
 146 32% and 48% reported in, Tanzania and Brazil respectively [18, 19]. The differences in the  
 147 prevalence reported in the previous studies and the present study could be attributed to the fact that  
 148 only HPV type 16 was considered in this study, coupled with variation in population size and  
 149 geography.

150 Human Papilloma virus 16 IgG antibodies was found to be highest in participants that were between  
151 ages 41-45, The findings agrees with those of [20, 21] who reported a higher HPV prevalence among  
152 older women but differ from the findings of [22, 23, and 17] that reported a higher prevalence among  
153 younger women. There was no statistical association between age and HPV prevalence and this  
154 agrees with the findings of [24]. The higher HPV prevalence observed in older women could be  
155 attributed to the fact that HPV has a long incubation period and as such older women tend to have  
156 higher prevalence than the younger ones.

157 Distribution of HPV IgG antibodies based on marital status revealed that those respondents that were  
158 divorced and widowed had the highest rate of prevalence. This is observation is similar to the findings  
159 of [25, 26, 27] that reported a higher HPV prevalence among married women, because even though  
160 they are no longer with their husbands, they were once married. The finding however contrasts that of  
161 [28] that reported higher prevalence in single women. This finding also, does not agree with that of  
162 [13] that reported a similar HPV prevalence in both the single and married women. The absence of  
163 HPV infection in the single women could be because most of them take protective measures (using  
164 barriers) when having sex with their partners due to their fear of getting pregnant or contracting  
165 sexually-transmitted diseases. In addition, the number of single women enrolled in the study was  
166 small.

167 Taking level of education as a factor, it was observed that women that had no formal education had  
168 the highest prevalence while those that went to tertiary institutions had the lowest. This could be due  
169 to an increased level of awareness on ways of contracting and preventing STI's as one advances in  
170 education and therefore decreasing prevalence rate with higher education which agrees with the  
171 finding of [29] that more education plays in fostering a lifestyle that reduce the risk of invasive cervical  
172 cancer. The data suggesting important elements of such a lifestyle include latter age at first sexual  
173 intercourse, a limited number of pregnancy, and greater likelihood of undergoing cytological screening  
174 and reduce exposure to carcinogen in household environments. This observation is similar to those of  
175 [29, 25, 20, 13] that reported highest prevalence in elementary educated women, there was a  
176 statistically significant association between HPV infection and education.

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

## 185 **5. CONCLUSION**

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

## 193 **CONSENT**

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

## 195 **ETHICAL APPROVAL**

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

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