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Christian Chigozie Makwe, Rose Ihuoma Anorlu, Kofoworola Abimbola Odeyemi

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Human papillomavirus (HPV) infection and vaccines: Knowledge, attitude and perception among female students at the University of Lagos, Lagos, Nigeria

Christian Chigozie Makwe ^{a,*}, Rose Ihuoma Anorlu ^a, Kofoworola Abimbola Odeyemi ^b

^a Department of Obstetrics and Gynaecology, College of Medicine, University of Lagos/Lagos University Teaching Hospital, P.M.B. 12003, Idi-Araba, Lagos, Nigeria

^b Department of Community Health and Primary Health Care, College of Medicine, University of Lagos/Lagos University Teaching Hospital, P.M.B. 12003, Idi-Araba, Lagos, Nigeria

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Abstract *Aim:* This study sought to determine knowledge of and attitude towards human papillomavirus (HPV) infection, HPV-related diseases and HPV vaccines among female undergraduate students at the University of Lagos.

Methods: A self-administered questionnaire was administered between May and July 2010, to 368 female students aged 16–29 years, who were selected from two faculties of the University of Lagos using two-stage sampling method. Data collected included: socio-demographic characteristics, sexual history, awareness and knowledge of HPV infection, cervical cancer and genital warts, and HPV vaccine; the perceived risk of acquiring genital HPV infection and developing cervical cancer or genital warts, and the willingness to receive an HPV vaccine.

Results: Only 64 (17.7%) and 52 (14.4%) of the students had ever heard of HPV infection and HPV vaccines respectively. The median HPV knowledge on a 15-item score was 2. Overall, only 11.1% knew that genital HPV infection can cause cervical

* Corresponding author. Tel.: +234 8033358021.

E-mail addresses: makwe285@yahoo.com, ccmakwe@unilag.edu.ng (C.C. Makwe).

cancer. Fourteen (6.9%) of those who were aware of cervical cancer agreed they were at risk of developing the disease. Of the 52 students who had heard of the HPV vaccine, 24 (46.2%) knew it was given for cervical cancer prevention and 30 (57.7%) expressed their willingness to receive the vaccine.

Conclusion: The knowledge of and the perceived susceptibility to HPV infection and HPV-related diseases among female students in the University of Lagos were generally low. The need for a well-designed HPV-educational program to bridge the knowledge gap cannot be overemphasized.

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1. Introduction

Genital human papillomavirus (HPV) infection is one of the most common sexually transmitted infections (STI) [1]. About 50–80% of sexually active women are exposed to at least one HPV type during their lifetime [2]. The peak incidence of HPV infection occurs in most populations within 5–10 years of the first sexual experience and the highest prevalence rates are seen in women aged 20–24 years [3,4]. Individual and group sexual behaviours are important in HPV transmission [5]. The transmission of genital HPV infection is influenced by age at sexual debut, number of sexual partners and acquisition of new partners, characteristics of partners and sexual networks, concurrency and serial monogamy [6]. The persistent infection with specific types of HPV is associated with the development of HPV-related diseases (non-malignant and malignant) [7].

Cervical cancer is the commonest gynaecological cancer in women worldwide. More than 85% of the global burden occurs in developing countries where it accounts for 13% of all female cancers and a major cause of cancer-related deaths [8]. There are specific high-risk HPV types associated with cervical cancer. About 70% of cervical cancer is caused by HPV type 16 and 18 [9]. Genital warts are benign growths that are most often caused by certain low-risk types of HPV [10]. More than 90% of genital warts are related to low-risk HPV type 6 and 11 [10].

Two HPV vaccine types are now available for the prevention of HPV-related diseases. The quadrivalent vaccine targets HPV types 6, 11, 16 and 18, and the bivalent vaccine targets HPV types 16 and 18. Both the quadrivalent and the bivalent vaccines have a high efficacy against HPV types 16- and 18-related cervical intraepithelial neoplasia (CIN) and cervical cancers. The HPV vaccine was licensed in Nigeria in 2008.

University students and young adults have a high prevalence of genital HPV infection because of their risky sexual behaviour, lack of knowledge of

HPV infection and HPV-related diseases, and misconception about susceptibility [11,12]. Studies conducted among university and college students have shown that the awareness of genital HPV infection ranges from 13% to 78% [11–18], while the awareness of the HPV vaccines ranges from 10% to 87% [16,19–21]. The perceived risk among students of acquiring genital HPV infection ranges from 12.7% to 42% [15,22,23] and of developing cervical cancer ranges from 19.9% to 68% [18,22,23].

A recent search of the literature found only one study on the knowledge of genital HPV infection and the attitude towards HPV vaccination among university students in Nigeria [24]. The study was conducted in northern Nigeria. The objective of this study was to assess the knowledge of HPV infection and the HPV vaccine among female undergraduate students in the University of Lagos, South-West Nigeria, and their attitude towards HPV-related diseases and HPV vaccination.

2. Materials and methods

2.1. Setting

This cross-sectional descriptive study was conducted at the University of Lagos between 30th May and 29th July 2010. The University of Lagos has nine faculties, a college of medicine and a school of post-graduate studies. The University had 8356 full-time, female, undergraduate students who registered for the 2009/2010 academic year.

2.2. Study design and sample

The minimum sample size was calculated using a formula for finite population and adjusted for anticipated non-response by 10%. Assuming 50% of the students had sufficient knowledge about HPV infection, a random sample of 398 female undergraduate students was selected using a two-stage sampling technique with 95% confidence and 5%

reliability. The faculties in the University were considered as the primary sampling units. The Faculty of Education and the Faculty of Social Sciences were selected and the study participants were then selected from a sample frame of full-time, undergraduate, female students from these two faculties using the simple random sampling technique.

The students were contacted and recruited through their classrooms. They had group counselling. They were informed that participation in the study was voluntary, and they had the option to opt out of the study at any point. The objectives of the study and the methods to be used were explained fully to the students, and they were also assured of the confidentiality of the data that they would provide.

2.3. Study instrument

A 51-item, self-administered, anonymous, pre-tested, structured questionnaire with closed- and open-ended questions was used to obtain data. The questions were adapted and modified from previous studies by Wong et al. [16] and Chan et al. [25]. It was divided into three parts: the first part determined socio-demographic characteristics; the second part assessed awareness and knowledge of HPV infection, HPV-related diseases and HPV vaccine; and the third part determined the attitude towards HPV-related diseases and HPV vaccine.

Demographic characteristics and sexual history were assessed using nine items. Information on the awareness was assessed using four items with yes–no responses. The knowledge of cervical cancer, genital warts, HPV infection and HPV vaccine were assessed using 15 items with true/false/I do not know responses. One point was given for each correct answer and the points summed to create a knowledge score. The possible knowledge score ranged from 0 to 15 points; low knowledge score was a score of 0–7, intermediate was 8–10 and high was 11–15.

Four attitudes about HPV vaccine were assessed based on the health belief model, i.e., health beliefs, perceptions of who should receive the vaccine, normative beliefs and intention to receive the vaccine. The health belief model was measured by seven items assessing the views and self-perceived risk of HPV infection, cervical cancer and genital warts. There were five items on perception of who should receive the vaccine. Normative belief was assessed by five items on the participants' belief in persons who are important to them, who would approve of their receiving the HPV vaccine. There was one question to assess their intention

Table 1 Sociodemographic characteristics.

Variable	N = 362 n(%)	Mean (SD)
<i>Age (years)</i>		21.5 (3.0)
16–20	152 (42.0)	
21–25	172 (47.5)	
26–30	38 (10.5)	
<i>Academic year of study</i>		
1	80 (22.1)	
2	186 (51.4)	
3	32 (8.8)	
4	64 (17.7)	
<i>Faculty</i>		
Education	234 (64.6)	
Social sciences	128 (35.4)	
<i>Marital status</i>		
Single	338 (93.4)	
Married	24 (6.6)	
<i>Religion</i>		
Christianity	306 (84.5)	
Islam	56 (15.5)	
<i>FDR who is a healthcare provider^a</i>	138 (38.0)	
Sexually active	150 (41.4)	
Age at first intercourse (years)		19.8 (2.9)
<i>Number of lifetime sexual partners</i>		1.97 (1.37)
0	212 (58.6)	
1	76 (21.0)	
2	40 (11.0)	
≥ 3	34 (9.4)	

^a FDR = First degree relative.

to receive the vaccine. Responses to all attitudinal variables were assessed using 5-point Likert-type scales ranging from strongly agree, agree, neither agree nor disagree, disagree, to strongly disagree.

A verbal consent was obtained before a student was included in the study. The questionnaires were given out in the classroom, by hand, to the participants. They completed the questionnaires straight away and returned them to one of the investigators (C.C.M.). They were not given any financial or material incentive. Institutional ethical approval was obtained for the study.

2.4. Data analysis

Data were entered, processed and analysed using the EPI-Info version 6.04 statistical package. The analysis results of participants' demographics and baseline variables were summarized using descrip-

Table 2 Knowledge of HPV infection, HPV-related diseases and HPV vaccine.

Variables	N = 362	Mean (SD)
Awareness	Yes (%)	
Ever heard of cervical cancer	204 (56.4)	
Ever heard of genital warts	80 (22.1)	
Ever heard of HPV infection	64 (17.7)	
Ever heard of HPV vaccine	52 (14.4)	
	Correct response	
Knowledge of cervical cancer (N = 204)	n (%)	
Cervical cancer is the most common cancer of the FRT ^a	136 (66.7)	
Pap smear can prevent cervical cancer	26 (12.7)	
Cervical cancer is caused by persistent HPV infection	40 (19.6)	
Cervical cancer is related to sexual activity	74 (36.3)	
HPV infection is the most common STI	16 (7.8)	
There are specific HPV types that cause cervical cancer	20 (9.8)	
Early onset of sexual debut increases risk of cervical cancer	58 (28.4)	
Multiple sexual partners increase the risk of cervical cancer	90 (44.1)	
Smoking increases the risk of cervical cancer	46 (22.5)	
Knowledge of genital warts (N = 80)		
Genital warts are transmitted by sexual intercourse	32 (40.0)	
Proper use of condom reduces the risk of genital warts	36 (45.0)	
There are specific HPV types responsible for genital warts	16 (20.0)	
Knowledge of HPV vaccine (N = 52)		
HPV vaccine should be given to prevent:		
HPV infection	38 (73.1)	
Cervical cancer	24 (46.2)	
Genital warts	20 (38.5)	
Knowledge score		2.48 (2.11)
Low 0–7	322 (90.0)	
Intermediate 8–10	28 (7.7)	
High 11–15	12 (3.3)	

^a FDR = First degree relative.

tive statistics; expressed as mean (standard deviation) or median (range) for continuous variables and percent for categorical variables. Comparisons of categorical responses were evaluated using Chi-square test. Statistical significance was assessed using two-tailed tests with an alpha error level of 0.05. A *p*-value <0.05 was considered to be statistically significant.

3. Results

A total of 368 female students participated in the survey and a response rate of 92.5% was achieved. Data were complete for 362 respondents and these were analysed. The mean age of participants was 21.5 ± 3.0 years. Most (51.4%) of the participants were in their second year in the University.

3.1. Sexual history

Two hundred and twelve (58.6%) of the students were not sexually active. The mean age at sexual

debut was 19.8 ± 2.9 years (range of 8–26 years) for those who were sexually experienced. The lifetime number of sexual partners was 1–6 partners with a median of one partner (mean = 1.97, SD = 1.37) (Table 1).

3.2. Awareness and knowledge of HPV infection, HPV-related diseases and HPV vaccine

Of the participants, 214 (56.4%) were aware of cervical cancer, 64 (17.7%) were aware of HPV infection and 52 (14.4%) were aware of HPV vaccine. The median HPV knowledge on a 15-item score was 2 with a range of 0–13 (mean = 2.48, SD = 2.11). Majority (90%) of the students had a low knowledge score (Table 2). Overall, only 40 (11.1%) of the participants knew that persistent genital HPV infection causes cervical cancer. Most of those who had heard of cervical cancer were not aware of its association with HPV infection, sexual activity, age at sexual debut and multiple

Table 3 Attitude towards HPV infection, HPV-related diseases and HPV vaccines.

Variables	Strongly/Somewhat agree n (%)
Cervical cancer (N = 204)	
I worry about having cervical cancer	60 (29.4)
Suffering from cervical cancer will affect my daily life	92 (45.1)
I am at risk of cervical cancer	14 (6.9)
Genital warts (N = 80)	
I worry about having genital warts	30 (37.5)
Suffering from genital warts will affect my daily life	44 (55.0)
I am at risk of genital warts	10 (12.5)
HPV infection (N = 64)	
I am at risk of genital HPV infection	4 (6.25)
HPV vaccines (N = 52)	
HPV vaccine should be given,	
To girls before they become sexually active	22 (42.3)
To boys before they become sexually active	22 (42.3)
To all sexually active females	30 (57.7)
To all sexually active males	30 (57.7)
Only to individuals who have multiple sexual partners	10 (19.2)
HPV vaccine	
I am willing to receive the HPV vaccine	30 (57.7)
Who will you seek approval from before receiving the HPV vaccine?	
I will seek the opinion of my healthcare provider	48 (92.3)
I will seek the opinion of my mother	26 (50.0)
I will seek the opinion of my sister/brother	20 (38.5)
I will seek the opinion of my father	12 (23.1)
I will seek the opinion of my friends	6 (11.5)

sexual partners, and only 26 (12.7%) knew that it could be prevented by Pap smear (Table 2). Less than 50% of students who were aware of HPV vaccine knew it is for prevention of cervical cancer (Table 2); 40 (76.9%) out of the 52 students who were aware of the HPV vaccine felt their self-assessed knowledge of the vaccine was not sufficient, while only 2 (3.9%) of them felt their knowledge was sufficient.

3.3. Sources of HPV information

The most common source of information on HPV infection and HPV vaccine was from television/radio (21%), followed by print media (12.7%), health campaigns (12.2%), family/friends (9.9%) and healthcare providers (9.4%).

3.4. HPV-related beliefs and acceptance of HPV vaccine

Of those who were aware of HPV infection, only 6.25% agreed (somewhat/strongly) that they could be at risk of acquiring the infection, while 6.9% of

those who had heard about cervical cancer agreed they could be at risk of developing the disease (Table 3). Of the 52 participants who had heard about the HPV vaccine, 22 (42.3%) agreed it should be given to girls before they become sexually active and 30 (57.7%) agreed it should be given to all sexually active females. More than half of the students who had heard of the HPV vaccine stated their willingness to be vaccinated and most (92.3%) of them indicated that they would seek the opinion of their healthcare providers before receiving the vaccine (Table 3). Student level in the University showed a significant association with the awareness of HPV infection and HPV vaccine (p -value < 0.001) (Table 4).

4. Discussion

This study showed a poor knowledge of genital HPV infection and HPV vaccine among female undergraduate students at the University of Lagos. Less than one-fifth of the students had ever heard of HPV infection. This is lower than what was obtained in similar studies in Italy (23.3%) [22], Fin-

Table 4 Baseline characteristics as predictors of awareness of HPV infection and HPV vaccine.

Variable	Awareness of HPV infection		df	χ^2	p-Value
	Yes (n = 64)	No (n = 298)			
<i>Age</i>					
16–20	24	128	2	0.00	0.974
21–25	36	136			
26–30	4	34			
<i>Level (years)</i>					
First	4	76	3	22.42	<0.001
Second	32	154			
Third	4	28			
Fourth	24	40			
<i>FDR who is a healthcare provider</i>					
Yes	26	112		0.21	0.649
No	38	186			
<i>Sexual experience</i>					
Yes	30	110		2.20	0.138
No	34	188			
Variable	Awareness of HPV vaccine		df	χ^2	p-Value
	Yes (n = 52)	No (n = 310)			
<i>Age</i>					
16–20	20	132	2	0.14	0.709
21–25	30	142			
26–30	2	36			
<i>Level (years)</i>					
First	6	74	3	13.90	<0.001
Second	22	164			
Third	6	26			
Fourth	18	46			
<i>FDR who is a HCP</i>					
Yes	24	114		1.66	0.197
No	28	196			
<i>Sexual experience</i>					
Yes	20	120		0.00	0.973
No	32	190			

df = degree of freedom.

FDR = First degree relative.

HCP = Healthcare provider.

land (33%) [26], Florida (78%) [18] and Malaysia (85%) [16]. The existence of comprehensive and effective HPV educational programs in these countries may have resulted in a higher level of HPV awareness. Most of the students in this study did not know that HPV infection causes cervical cancer, despite the fact that more than half of them had heard of cervical cancer. Overall, only 11.1% of the respondents knew that genital HPV infection causes cervical cancer. A study by Gerend et al. [18] showed that over 90% of university students correctly identified the association between HPV and cervical cancer. Only 12.7% of the students

who were aware of cervical cancer knew that Pap smear test is for prevention of the disease. The median HPV knowledge was 2, and this was relatively lower than the score of 3–4 in similar studies [15,16,18]. The poor knowledge of genital HPV infection in spite of the relatively high cervical cancer awareness may be due to insufficient information on HPV in the various educational materials used in cervical cancer awareness programs in Nigeria.

The awareness of genital warts was very low compared with 95.4% among first-year female college students in the United States [14]. It is also

of great concern that, in this study, only 40% of the students who were aware of genital warts knew that it is sexually transmitted.

Less than 10% of students who were aware of HPV infection knew that they could be at risk of getting infected. The poor knowledge of HPV infection and the low self-perceived susceptibility to HPV infection and HPV-related diseases observed in this study highlight the need for a well-designed educational program on HPV infection in Nigeria.

Less than half of the students who were aware of HPV vaccine agreed it is best given to girls before sexual debut. Also, about three-fifths of the students who were aware of the vaccine thought it should be given to all sexually active females. This is a reflection of their poor knowledge and/or misunderstanding of genital HPV infection and HPV vaccine. Both of the currently available HPV vaccines have been approved for the prevention of cervical cancer and ideally should be given before sexual debut.

About 60% of the students who were aware of HPV vaccines expressed their desire to get vaccinated. A similar study in Italy [22] showed that 81.7% of respondents were willing to have the HPV vaccine. The relatively higher level of vaccine acceptance in Italy may be due to the impact of HPV educational programs and the national HPV immunization program, which offers free vaccinations for girls aged 12 years. Interestingly, this study showed that a significant proportion of the students who were aware of the HPV vaccine would seek the approval of their healthcare providers and their mothers before receiving the vaccination. This implies that the HPV educational programs in Nigeria should target many population groups.

The main source of HPV information was television/radio and this finding was consistent with similar studies in Florida and Malaysia [18,27]. Television and radio are electronic mass media commonly utilized by young adults for leisure and entertainment, and could also be used to disseminate information on HPV infection and HPV vaccine.

Student level in university had a significant association with the awareness of HPV infection and HPV vaccine. A study in Brazil [23] showed that respondents with higher educational attainment were more likely to have a better knowledge of HPV infection.

A potential limitation that should be considered when interpreting this study is that the information obtained was collected using a self-administered questionnaire, and so the possibility exists that some respondents may have given incorrect information.

5. Conclusion

The level of awareness and knowledge of genital HPV infection and HPV vaccines among female undergraduate students at the University of Lagos was generally low. Their self-perceived susceptibility to HPV infection and HPV-related diseases was also low. This study underscores the need to develop a well-designed educational program on HPV in Nigeria. The educational materials used for cervical cancer control and prevention programs in Nigeria, should be updated to contain current scientific knowledge on the causes and prevention of cervical cancer.

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