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Effect of Health Education Intervention on Knowledge of HPV Infection and Vaccine among Parents of Adolescent in Kano Metropolis, Nigeria

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Abstract

Introduction: *Human papillomavirus (HPV) is one of the most common sexually transmitted infections in both men and women and has been implicated as a cause of the majority of cases of cervical cancer. It is the second most common cancer in women in Nigeria and is preventable with the use of HPV vaccines.*

Objectives: *To determine the effect of health education intervention on knowledge of HPV infection and vaccine among parents of adolescent in Kano Metropolis, Nigeria.*

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Methodology: *A quasi-experimental study was conducted among 440 respondents (220 each in the intervention and control groups, respectively), The respondents were selected by multi stage sampling technique. Data was collected at pre and post- intervention using a pre-tested, interviewer-administered questionnaire. Respondents in the intervention group received health education intervention and data were analysed with SPSS version 20.0 at 5% a level of significance.*

Results: *The mean ± (standard deviation) ages of the respondents in the intervention and control groups were 44.6 ± 11.46 and 44.7 ± 11.10 years, respectively. The respondents' knowledge of HPV infection and vaccine in the intervention and control groups at baseline were 26.3% and 22.3% respectively. Post intervention, it increased to 65.9% in the intervention group ($p < 0.001$) and 24.8% in the control group. After adjusting for confounders the independent predictors of knowledge of HPV infection and vaccine were education [aOR=0.3, 95% CI (0.13-0.91)], while those who had no formal education were 70% less likely to have good knowledge of HPV infection and vaccine and occupational status [aOR=3.1, 95% CI (1.29-7.67)], while parents that are employed were three times more likely to have good knowledge of HPV infection and vaccine.*

Conclusion: *Health education intervention was found to be effective at improving the knowledge of HPV infection and vaccine in the intervention group. A sustained health education programme and use of multiple media channels to educate the parents of adolescents would invariably reduce the infection and its consequences.*

Keywords: HPV, vaccine, knowledge, health education, Kano

INTRODUCTION

Human Papilloma Virus (HPV) is a sexually transmittable infection that infects approximately 70% of people during their lifetime.[1] It can cause several types of cancers such as anal and penile cancer, cancer in the head and neck area as well as cervical cancer; the latter being

the most frequently occurring HPV-related cancer.[1] Global prevalence of HPV infection is about 11-12% and Nigeria has reported overall HPV prevalence of up to 26.3.[2] Every year, about 528,000 women around the world are diagnosed with cervical cancer and about 266,000 women die from the disease.[3] Cervical cancer ranks as the second most frequent cancer among women in Nigeria, with about 47 million women aged 15 years and older being reported to be at risk of developing cervical cancer, almost 14,089 Nigerian women are diagnosed with cervical cancer and 8240 die from the disease yearly.[3] About 23.7% of women and 73% of men in the general population in Nigeria carry HPV genital infection which can lead to different malignant lesion.[4] HPV vaccination is the primary measure currently recommended to prevent the infection, a quadrivalent vaccine was approved by the Food and Drug Administration (FDA) in 2006 against HPV 16 and 18 as well as HPV 6 and 11 (6 and 11 are responsible for benign ano-genital warts and recurrent respiratory papillomatosis) and in 2009, a bivalent vaccine was also approved by the FDA in October 2009 against HPV types 16 and 18 (these two types cause 70% of cervical cancers in most part of the world).[5] Both vaccines are effective when administered prior to infection with HPV, which is acquired by most individuals shortly after sexual debut.[6]

HPV vaccines offer the best protection to women and men who receive the recommended three doses in the appropriate sequence and have time to develop an immune response before becoming sexually active. Initiation of HPV vaccination is recommended for girls and boys beginning when they are aged 9 to 13 years.[7] But after review by The Centres for Disease Control and prevention (CDC) it recommended that 11 to 12 year old to receive two doses of HPV vaccine at least six months apart rather than the previously recommended three doses to protect against cancers caused by HPV infections. Teens and young adults who start the series of HPV vaccines later, at ages 15 through 26 years will still need three doses of HPV vaccine to protect against cancer-causing HPV infection.[8]

HPV vaccine was licensed in Nigeria since April 2009, The vaccine is available at some private and public hospitals in Nigeria at a cost ranging between nine thousand naira to fifteen thousand naira

(N9,000:00 - N15,000:00) per dose, however, very few adolescents have been immunised against HPV since its introduction but National Primary Health Care Development Agency is working hard to introduce it into the routine national immunization schedule.[9] Despite this, there are still gaps in level of parents' knowledge of HPV infection and vaccine especially in northern Nigeria where parents are suspicious and hesitant to vaccinate their children. Health education would be effective for improving knowledge of HPV infection and vaccine among parents. World Health Organization (WHO) also issued a position paper on HPV vaccination, it recommended that routine HPV vaccination be included in national or state-wide immunization programmes provided that cervical cancer or other HPV-related disease prevention measures are a public health priority for the country.[9] Knowledge of HPV infection and genital cancers are some of the significant predictors of readiness to accept HPV vaccine.[10] However, improving the knowledge about HPV infection and vaccine through health education has potential to increase vaccination rates among adolescents.[10] Educational interventions on HPV knowledge and vaccine were found to be effective by increasing HPV knowledge scores in the intervention group. Similarly, a study documented raised demand for HPV vaccine among parents through provision of health information.[10]

Educational instruction on HPV-related diseases has been demonstrated to effectively raise HPV knowledge and vaccine acceptability in many countries.[11] Adequate knowledge is a prerequisite for making informed decisions to accept the vaccine. For this reason, providing information (to improve knowledge) is essential.[12] Parents also indicated that one of the main reasons why their daughters have not received HPV vaccine is a lack of information about HPV and the vaccine, Therefore education interventions are potentially effective strategy for increasing HPV vaccination, but few educational interventions addressed these in Nigeria, rather more emphasis has been on cervical cancer screening which is a secondary preventive measure.[12] Health education is a key intervention for improving knowledge, attitude and practice for many health issues, and is therefore pertinent to study its value in shaping

HPV upcoming programme in Nigeria that would improve access to HPV vaccine for both genders.[27] This is to assess the effect of health education intervention on knowledge of HPV infection and vaccine among parents of adolescent and the findings can help in addressing the identified gap by the stakeholders.

METHODOLOGY

Study area

Kano metropolis is located in Kano State North-western geo-political zone of the country and the most populous, second most industrialized state in Nigeria, a centre of commerce and the economic nerve centre of the north. The predominant language is Hausa/Fulani and considerable proportion is made up of Igbo, Yoruba, Kanuri, Egbira, Igala and other many other tribes while Islam is the predominant religion then Christians and followers of other religions.[13]

Administratively, the State has 44 Local Government Areas with a population of 9,383,682 million people, 4,844,128 (51%) males and 4,539,554 (49%) females, according to the 2006 census by the National Population Commission,[13] and majority of the inhabitant are in metropolitan LGAs.[14] However, according to United Nation Population Fund (UNFPA) 2017 the adolescents population in Kano State was 19.4% male and 18.8% female.[33] The Multiple Indicators Cluster Survey 2017 showed that Kano State has vaccination coverage of 16.5% for routine immunization.[107] and HPV vaccine is available only in private facilities in Kano metropolis.

Study sites

The study was carried out in Kano metropolis. The metropolis is made of eight Local Government Areas (LGAs) consisting of Kano municipal, Dala, Fagge, Gwale, Kumbotso Nassarawa, Tarauni, and Ungoggo LGAs.[15] Tarauni and Gwale were selected by simple random sampling technique and assigned by toss of coin into intervention and control LGA respectively, Tarauni and Gwale has a distance of about 15km apart.

Study design

Quasi-experimental design with pre and post-intervention data collection was used.

Study population

Parents of adolescent residing in the intervention and control LGAs for at least six months were included while parents who have already vaccinated their adolescent and those that were not around during the study were excluded.

Sample size estimation

Sample size was calculated using formula for determining minimum sample size for comparing proportions,[16] with $Z_{\alpha} = 1.96$, the probability of type II error (ß) of Power at 80%=0.84. Possible non-response of 10% was factored into the estimated sample size. Hence, an estimated sample size of 220 was obtained per community.

Sampling technique

A multi-stage sampling technique was used with five stages for this study.

Stage one: Selection of intervention and control LGA

Two metropolitan LGAs (25% of the LGAs) were randomly selected from the eight metropolitan LGAs in the state using simple random sampling by balloting and then using a simple toss of coin to assigned intervention and control LGA respectively. Tarauni and Gwale were selected and assigned by toss of coin into intervention and control LGA respectively.

Stage two: Selection of wards from the selected LGAs

Three wards (25% of the wards) were selected from the list of Ten (10) wards in each Local Government Area (Tarauni intervention LGA and Gwale control LGA) using simple random sampling by balloting.

Stage three: Selection of settlements

One settlement (25% of the settlements) was selected using simple random sampling by balloting from the list of all settlements in each selected ward. The 3 selected wards in Tarauni LGA had 3, 4 and 3 settlements respectively. One settlement was randomly selected by balloting from each selected ward. The 3 selected wards in Gwale LGA each had 3 settlements. One settlement was randomly selected by balloting from each selected ward. (Three settlements were selected in the study and control communities respectively).

Stage four: Selection of houses

Systematic sampling method was used to determine the sampling interval by dividing the number of houses by the sample size allocated proportionately to each settlement.

After calculating the sampling interval, the first house (starting point) was identified by selecting a random number between one and the sampling interval (by balloting method). Subsequent houses were then identified by adding the sampling interval to the serial number of the first sampled house. When more than one household was found in a house, one was selected by balloting and when a compound or storey building was found only one household was randomly selected by balloting. In the sampled houses with no eligible respondent, the next house was selected.

Stage five: selection of the respondents

In the household a parent of adolescent was approached to ascertain eligibility. When a parent of adolescent that satisfied the eligibility criteria, informed consent was obtained and interviewed. Where more than one parents of adolescent are eligible, one was selected using simple random sampling by balloting.

Data collection method

An interviewer–administered, pre-tested, questionnaire adapted from previous studies,[17,18] was used to collect data from the eligible respondents pre-intervention and six months post intervention. Four research assistants were recruited and trained for this study (2 males

and 2 females). They were trained four days which covered the objectives of the study, questionnaire administration, ethical issues in research, communication skills, health education and 25 purposively selected parents of adolescent were studied in pretesting the data collection tool outside the study area.

Health education intervention were carried out in batches in the intervention community only and same health education was given to the control community after data collection so that they would also benefit from the information given to the intervention community. Methods employed in the health education include lectures (power point presentation on topics that covered HPV infection and HPV vaccine, diseases associated with HPV infection, vaccine recommendations, dosage schedule, vaccine efficacy, safety, myths and misconceptions). Pamphlets were distributed to the participants and monthly SMS reminder was sent on the content of health education.) an incentive of free medical check-up including checking of blood pressure, weighing and sugar level was done for each participant.

Data Management

A fifteen point scale,[17, 18] was used to score knowledge, a point for each correct answer was given and no point was given for No or I don't know answers, the score was then used to grade knowledge of the respondents based on previous studies as having good 11-15, fair 8-10 and poor 0-7 knowledge respectively.

Statistical Analysis

All data collected were entered into excel spread sheet and subsequently checked for errors and consistencies then analysed using the IBM SPSS version 20.0.

Means (and standard deviations), medians (and interquartile range) and proportions of the socio-demographic variables of parents of adolescent in the intervention and control communities were calculated and compared. At bivariate level, Chi square test was used to find difference in categorical variables between the intervention and control communities at baseline, while independent t-test and

Mann Whitney -U test were used to test for differences in quantitative variables. After the intervention, only differences for knowledge of HPV infection and vaccine were tested. Furthermore, Chi square test was used to identify factors associated with knowledge of HPV infection and vaccine in both intervention and control communities pre-intervention and post-intervention. McNemar's test was used to compare the respondents' knowledge of HPV infection and vaccine at baseline and end line in each community. In all test of significance, $P<0.05$ was considered statistically significant.

At multivariate level, variables that were statistically significant at bivariate analysis and $p<0.10$ were subjected to binary logistic regression analysis to obtain adjusted odds ratio with 95% confidence intervals for predictors of knowledge HPV infection and vaccine.

Ethical Considerations

Ethical approval for the study was obtained from Aminu Kano Teaching Hospital and Kano State Health Research-Ethics Committee (NHREC/21/08/2008/AKTH/EC/2564 and MOH/off/797/T.I/1741). The written informed consent was obtained from all the respondents that participated in the study using consent forms and was given to those who can read to sign before the questionnaire was administered. For those who cannot read and write, details of the consent form was explained to them so that they append their thumbprint to the form to indicate consent. The Helsinki declaration was respected throughout the research.[19]

Results

The response rates among the respondents were 96.8% and 96.0% for intervention and control community, respectively. At post-intervention survey, the attrition rates were 6.8% and 8.2% for intervention and control community respectively.

Socio-demographic characteristics

The mean ages (± Standard Deviation, SD) of the respondents in the intervention and control community were 44.6±11.46 and 44.7±11.10

years, respectively. More than half of the respondents were males. In terms of educational status (31.0% and 33.6% in the intervention and control community) had secondary level of education. A high proportion of the respondents in the intervention and control communities (46.5% and 46.4%) were artisans. However, (61.0% and 57.8%) of the respondents in the intervention and control groups had income below minimum wage with their medians of: ₦22,000 (interquartile range ₦40000) and ₦20,000 (interquartile range ₦42000) respectively (Mann-Whitney U; p = 0.067). There was no statistically significant difference in the socio-demographic characteristics of respondents in both communities as shown in Table 1.

Levels of knowledge of HPV infection and vaccine

At baseline, 26.3% and 22.3% of the respondents in the intervention and control communities had good knowledge of HPV infection and vaccine. There was no statistically significant difference between the overall knowledge of both communities at baseline but after the intervention, 65.9% and 24.8% of the respondents in the intervention and control communities had good knowledge of HPV infection and vaccine. There was statistically significant difference of good knowledge of HPV infection and vaccine in the intervention community when compared to the control community ($p<0.001$) as shown in Figure 1.

Effect of health education intervention on knowledge of HPV infection and vaccine

There was an increase of 39.6% in the good knowledge at the post intervention among respondents in the intervention community and the increase was statistically significant ($p< 0.001$). There was an increase of 2.5% in the proportion with good knowledge in the control community post-intervention but the increase was not statistically significant ($p = 0.71$) as shown in Figure 2.

Educational status ($p = 0.004$) and occupation ($p = 0.001$) of the respondents in both communities were significantly association with knowledge of HPV infection and vaccine and there was also a

significant association between knowledge of HPV infection and vaccine with age (p = 0.013) and monthly income (p = 0.046) of the respondents in the control community. Educational status and occupation were significant predictors of knowledge of HPV infection and vaccine among respondents in both communities. Respondents that are employed in the intervention group were three times more likely to have good knowledge of HPV infection and vaccine when compared to their unemployed counterparts (p = 0.012). Similarly those who had no formal education were 70% less likely [aOR=0.3, 95% CI (0.13 – 0.91)] to have good knowledge of HPV infection and vaccine (p =0.038) as shown in Table 2/3.

DISCUSSION

Despite the vaccine being available in Nigeria since 2009, before the intervention there was high proportion of the respondents with poor knowledge of HPV infection and vaccine in the intervention and control community respectively, this concurs with the finding reported from Kano State, Nigeria.[20] but is lower than the figure obtained from Lagos State, Nigeria which also reported poor knowledge of HPV infection and vaccine.[18] The variation may be due to differences in educational level and socio-economics status of the two states.

The educational intervention in this study has effectively raised knowledge of HPV infection and vaccine in the intervention community. After the educational intervention there was an increase in knowledge by a factor of 39.6% in good knowledge among respondents in the intervention group. The proportion of respondents with good knowledge increased from 26.3% to 65.9% in the intervention group and this increase was statistically significant. Though an increase of good knowledge of 2.5% was seen in the control group, it was not statistically significant. This finding conforms with studies in Nigeria,[10] Egypt,[21] India,[22] and China.[11] These findings further buttresses the importance of health education intervention in improving the knowledge of HPV infection and vaccine of the respondents in the intervention community.

At base line, respondents with formal education had more knowledge of HPV infection and vaccine than those with non-formal education in both communities. Education is strongly linked with health status and studies conducted in Nigeria and other countries have separately showed a clear relationship between high education and knowledge of HPV infection and vaccine in Nigeria, Egypt and India.[10,21,22] Education has been shown to promote understanding of health related message, increase awareness of HPV infection and vaccine, and promote informed decision making by parents and their adolescents.[12,23,24,25,26] However, respondents that were less than forty years of age had good knowledge of HPV infection and vaccine than those with age above forty years in the control community as it conforms with study[26] that showed participants less than forty years of age had more knowledge about HPV infection and vaccine than the older participants.

In this study, respondents that were employed were found to have a good knowledge of HPV infection and vaccine than their counterparts who were unemployed in both communities which conform to the study in China.[27] Civil servants are more likely to have better education than their counterparts.

Monthly income was found to influence knowledge of HPV infection and vaccine as respondents with monthly income above national minimum wage tends to have good knowledge of HPV infection and vaccine than those with monthly income below minimum wage in the control group. This is consistent with the study findings of industrialized countries[28, 26, 29] and the findings from Nigeria,[30] Ghana[31] and Pakistan[32] indicate that, those with monthly income below minimum wage had poor knowledge of the infection and the vaccine which is keeping with this study. This variability may be explained by the peculiarity of developing countries where the trends of poverty remain unchanged.

CONCLUSION

Low level of knowledge of HPV infection and vaccine was observed before intervention in both communities but following the

intervention, there was a statistically significant increase in the knowledge of HPV infection and vaccine among the respondents in the intervention community only. Health education intervention was found to be effective at improving the knowledge of HPV infection and vaccine; there is need for the sustained effort which will reduce the rate of HPV infection.

What is already known on this topic

Study on effect of health education intervention on knowledge of HPV infection and vaccine among parents of adolescent was previously studied in Nigeria

What this study adds

It provides data on Effect of health education intervention on knowledge of HPV infection and vaccine in Kano Metropolis

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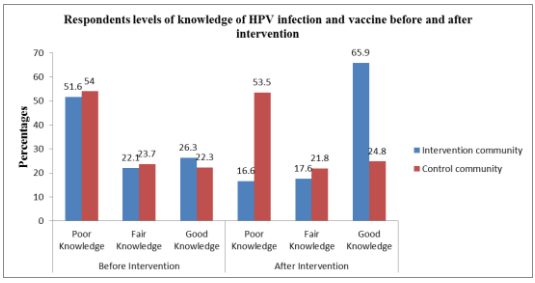
Table 1: Respondents' socio-demographic characteristics

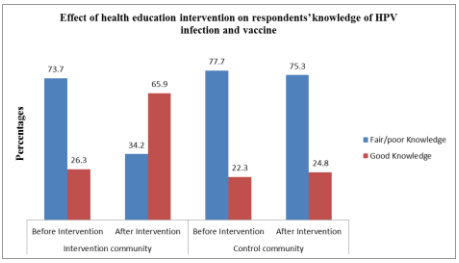
Variables	Intervention Group n=213 n (%)	Control Group n=211 n (%)	p- value
Age group (years)			
25-34	34 (16.0)	31 (14.7)	
35-44	77 (36.2)	81 (38.4)	
45-54	54 (25.4)	54 (25.6)	
55-64	38 (17.8)	34 (16.1)	0.98
65-74	10 (4.7)	11 (5.2)	
Mean ± SD	44.62 ± 11.46	44.73 ± 11.10	0.93
Gender			
Male	109 (51.2)	111 (52.6)	0.77
Female	104 (48.8)	100 (47.4)	
Ethnicity			
Hausa		146 (69.2)	
Fulani	145 (68.1)	26 (12.3)	0.99
Igbo	25 (11.7)	17 (8.1)	
Yoruba	18 (8.5)	13 (6.2)	
Others	14 (6.6)	9 (4.3)	
Religion	11 (5.2)		
Islam		197 (93.4)	0.37
Christianity	193 (90.6)	14 (6.6)	
	20 (9.4)		
Marital status			
Married	193 (90.6)	195 (92.4)	0.83
Divorced	13 (6.1)	10 (4.7)	
Widowed	7 (3.3)	6 (2.8)	
Educational status			
Non-Formal	54 (25.4)	64 (30.3)	
Primary level	19 (8.9)	23 (10.9)	0.18
Secondary level	66 (31.0)	71 (33.6)	
Tertiary level	74(34.7)	53 (25.1)	
Occupation			
Civil servant	37 (17.4)	35 (16.6)	
Trader	50 (23.5)	53 (25.1)	
Farmer	27 (12.7)	25 (11.8)	0.97
Artisan	99 (46.5)	98 (46.4)	
Monthly Income			
< Minimum wage	130 (61.0)	122 (57.8)	
>Minimum wage	83 (39.0)	89 (42.2)	0.55
Median (interquartile range)	22000 (40000)	20000 (42000)	0.067†

† Mann-Whitney U, Minimum wage ₦18,000



p = 0.64 p < 0.001

Figure 1: Respondents levels of knowledge of HPV infection and vaccine before and after intervention



*McNemar's chi-square test

Figure 2: Effect of health education intervention on respondents' knowledge of HPV infection and vaccine

Table 2: Socio-demographic factors associated with knowledge of HPV infection and vaccine among the respondents

Variables	Group					
	Intervention		p-value	Control		p- value
	Poor/fair knowledge n = 213 n (%)	Good knowledge		Poor/fair knowledge n = 211 n (%)	Good knowledge	
Age group (years)						
≤ 40 years	65 (68.4)	30 (31.6)	0.12	64 (69.6)	28 (30.4)	
>40 years	92 (78.0)	26 (22.0)		100 (84.0)	19 (16.0)	**0.013***
Gender						
Male	76 (69.7)	33 (30.3)		85 (76.6)	26 (23.4)	
Female	81 (77.9)	23 (22.1)	0.21	79 (79.0)	21 (21.0)	0.74
Educational status						
Informal	48 (88.9)	6 (11.1)		58 (90.6)	6 (9.4)	
Formal	109 (68.6)	50 (31.4)	**0.004***	106 (72.1)	41 (27.9)	**0.004***
Occupation						
Employed	19 (51.4)	18 (48.6)		19 (54.3)	16 (45.7)	
Unemployed	138 (78.4)	38 (21.6)	**0.001***	145 (82.4)	31 (17.6)	**0.001***
Monthly Income						
< Minimum wage	72 (78.3)	20 (21.7)		81 (84.4)	15 (15.6)	
> Minimum wage	85 (70.2)	36 (29.8)	0.21	83 (72.2)	32 (27.8)	**0.046***

*Statistically significant, Minimum wage ₦18,000

Table 3: Predictors knowledge of HPV infection and vaccine among respondents

Predictor	Intervention group		Control group	
	Adjusted OR (95%CI)	p - value	Adjusted OR (95%CI)	p - value
Age group (years)				
≤ 40 years	1.8 (0.90 – 3.76)	0.094	2.3 (1.13 – 4.63)	**0.021***
> 40 years	1			
Educational status				
Informal	0.3 (0.13 – 0.91)	**0.038***	0.4 (0.14 – 0.94)	**0.044***
Formal	1			
Occupation				
Employed	3.1 (1.29 – 7.67)	**0.012***	2.7 (1.06 – 6.70)	**0.037***
Unemployed	1			
Monthly Income				
< Minimum wage	1.3 (0.40 – 3.95)	0.69	0.7 (0.26 – 2.11)	0.57
> Minimum wage	1			

*Statistically significant, Minimum wage ₦18,000