

RESEARCH ARTICLE

Knowledge about Human Papillomavirus and Cervical Cancer: Predictors of HPV Vaccination among Dental Students

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Abstract

Background: The objective of this study is to determine the influence of dental students' knowledge and attitude regarding human papillomavirus infection of cervical cancer on willingness to pay for vaccination. **Basic research design:** A convenience sampling method was used. The minimal sample size of 136 was calculated using the Raosoft calculator with a 5 % margin of error and 95% confidence level. **Participants:** The study population were all final year dental students from the School of Dentistry. **Methods:** A self-administered questionnaire was used to measure knowledge levels and attitudes regarding human papillomavirus vaccination. Contingent valuation was conducted for willingness to pay for vaccination. **Main outcome measures:** The Center for Disease Control and Prevention has stated that human papillomavirus are associated with oropharynx cancer and the American Dental Association insist on expanding public awareness of the oncogenic potential of some HPV infections. Thus, as future dental practitioners, dental students should be aware of human papillomavirus and their links with cancer and the benefits of vaccination. **Results:** Knowledge on HPV and cervical cancer did not impact on attitudes towards vaccines. However, significant correlation existed between knowledge and willingness to pay for vaccination. **Conclusions:** Dental students' knowledge on HPV and cervical cancer has no influence on their attitude towards HPV vaccines. However, their willingness to pay for HPV vaccination is influenced by their knowledge of cervical cancer and HPV vaccination.

Keywords: Dental students- Malaysia- Willingness to pay- HPV vaccine- cervical cancer

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Introduction

Worldwide, more than 250,000 women die each year from cervical cancer (Sexual and reproductive health, 2013; The Cervical Cancer Initiative, 2012; Gan and Dahlui, 2013). It is primarily caused by the human papillomavirus (HPV). There are over 100 types of HPV among which HPV types 16 and 18 together cause precancerous lesions and progress to 70% of all cervical cancers (Human papillomavirus and cervical cancer, 2016). Early diagnosis, prevention, and treatment can reduce cervical cancer mortality (Patterson et al., 2001). HPV vaccines that act against HPV 16 and 18 infections are now available and have the potential to bring down the incidence of cervical cancer and other anogenital cancers.

Despite the availability of Pap smear test, HPV is considered the most frequent carcinogen in humans, with most cases occurring in developing countries. (Tota et al., 2011; Mammas et al., 2010). In Malaysia, cervical cancer remains the second most common genital cancer afflicting women in Malaysia (Comprehensive cervical cancer prevention and control, 2016). Current estimates show that every year 2145 women are diagnosed with

cervical cancer. The government had implemented the National HPV (NHPV) immunization programme where all 13-year-old girls from public or private schools can receive the 3 doses of HPV vaccine for free of charge (Ezat et al., 2013).

The growing prevalence of oropharyngeal cancer, precisely oropharyngeal squamous cell carcinoma (OSCC) related with human papillomavirus (HPV), is a major concern for the oral care (Gillison et al., 2008). The majority of HPV-positive oropharyngeal cancers are related with HPV-16 and HPV-18 that are usually linked with cervical cancer (Dayyani et al., 2010). The ratio of oropharyngeal cancers arising from HPV sites which are classically linked, is substantially high. Age is one of the major risk factors for oral and oropharyngeal cancers along with the utilization of tobacco and excessive alcohol use (Chaturvedi et al., 2011). Nevertheless, HPV infection is nowadays considered as a validated risk factor for OSCC in both men and women, even in the absence of tobacco and excessive alcohol use (Chaturvedi et al., 2011). The prophylactic HPV vaccines may reduce OSCC incidence by protecting against HPV-16 and HPV-18 infection (Muñoz et al., 2003). The American Dental

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Association Council on Scientific Affairs encourages dentists to develop themselves and their patients around the relationship between HPV and oropharyngeal cancer (ADA Council on Scientific Affairs, 2012). The ADA Council suggests to expand public awareness of the oncogenic potential of some HPV infections (ADA Council on Scientific Affairs, 2012).

The knowledge and expertise of dental professionals regarding prevention of complications and lesions in cancer patients are critical (Epstein et al., 2014). Students from dentistry field are future health care providers who can help to increase the awareness of the public about cervical cancer. They have a direct contact with the patients and therefore educate them about the prevention with the availability of effective and safe HPV vaccines. Dental students are expected to provide appropriate dental services for cancer patients facilitating appropriate care at the appropriate time (Alpöz et al., 2013). Hence, it is essential to assess knowledge of dental students to know their understanding and attitude toward HPV vaccination for cervical cancer prevention (Sexual and reproductive health, 2013). This study aimed to determine the knowledge level regarding symptoms, risk factors, prevention and screening of cervical cancer and willingness to pay (WTP) for HPV vaccination to prevent cervical cancer among Dentistry students in a university.

Materials and Methods

Ethical approval and Study design

The research protocol was approved by the Institutional Review Board (BPI-01/11 (28) 2014). This cross-sectional survey was conducted at a University. The data were collected using a validated and self-administrated questionnaire.

Sampling method and sample size

A convenience sampling method was used in this study. The sample size was calculated using the Raosoft calculator with a 5 % margin of error and 95% confidence level. Based on this, the minimum sample size required to be 136 for this study. The study population was of final year dental students from the School of Dentistry in a university. The only inclusion criterion was students studying the Bachelor of Dentistry programme at the university. The participants were given a study information sheet and an informed consent form, along with a survey questionnaire. Participants were aware that they could withdraw from the study at any time. Their anonymity and confidentiality were preserved.

Study instruments

A self-administered questionnaire was adapted and modified from previous studies (Uzunlar et al., 2013; Hoque et al., 2014; Makwe et al., 2012). The revised questionnaire was validated by a pilot study with a recruitment of 20 dental students. Reliability study results revealed the Cronbach alpha value of 0.72. The validated questionnaires were distributed to the study participants. The questions were structured into three sections. The first section focused on demographic data. The second

section addressed the participants' level of knowledge of HPV infection, cervical screening (i.e. Pap smears) and HPV vaccine. The third part measured the attitude of the participants towards HPV vaccination. The fourth part focused their willingness to pay for the HPV vaccination.

Data analysis

Analysis of data was performed using the Statistical Package for Social Sciences (SPSS) version 22.0. Descriptive statistics including frequencies and percentages were tabulated for each variable in the questionnaire. Level of knowledge of the respondents was categorized based on the total score for the correct answer with one mark for each correct answer and the maximum score was 17. The category included, high, moderate and low level of knowledge. Attitudinal variables were assessed using 5-point Likert scales ranging from strongly agree to strongly disagree. Respondents' attitude was classified into positive, neutral, and negative based on the total score obtained. A contingent valuation questions on WTP consisted of opened-ended questions which determined the mean amount in Malaysian Ringgits that the participants were willing to pay for vaccination was obtained, where a starting point value was not provided. The participants provided a value. The Spearman Rho test was employed to find out the correlations between knowledge and willingness to pay and attitude towards cervical cancer by the dental students. The absolute value 0.25 or above with p-value of less than 0.05 was considered as statistically significant at 95% confidence level. Linear regression was used to find out the contribution of predictor variables. The data obtained for pilot study was not included into the main data.

Results

Out of the 150 questionnaire distributed to the dental students, 142 were returned with a response rate of 94.7%. The majority of the students (66.2%) were female with age between 18 and 27 and most were Chinese students. 59.2% were Buddhist and 2 were married. 78.9% of the respondents were in a relationship. The complete demographic information was tabulated in Table 1. The most common source for dental students in getting information about cervical cancer prevention, HPV infection and HPV vaccines was through media (26.1%), followed by internet (21.8%), friends/family and health centres/clinic (both 16.9%). Details of the reported information sources were listed in Table 2.

The mean HPV knowledge score for dental students was 10.43 (SD = 3.03, median = 11). The majority of students (57.7%) achieved a moderate level of knowledge. Details of the knowledge score are presented in Table 3. Overall, 83.1% of students recognized that HPV can have cervical cancer. Almost all students (94.4%) knew that HPV infections were preventable. Almost two-thirds of students believed that HPV infection involved both men and women. 52.1% of students were aware that HPV was associated with other anogenital cancer. Most of the students (72.5%) knew Pap-smear could help in screening for cervical cancer. However, only 33.8 % of students were

Table 1. Sociodemographic Characteristics of Respondents

Groups	Students (N = 142)
Variables	N (%)
Gender	
Male	48 (33.8)
Female	94 (66.2)
Age	
18-27	142 (100)
28-37	0
38-47	0
48-57	0
Race	
Chinese	135 (95.1)
Indian	7 (4.9)
Others	0
Educational level	
Degree	142 (100)
Master	0
PhD	0
Religion	
Islam	0
Buddhist	84 (59.2)
Hindunism	5 (3.5)
Christianity	39 (27.5)
Free thinker	14 (9.8)
Marital status	
Single	140 (98.6)
Married	2 (1.4)
Sexual relationship	
In a relationship	112 (78.9)
Not in a relationship	30 (21.1)
Living with	
Alone	27 (19.0)
Parents	91 (64.1)
Partner	2 (1.4)
Friends	22 (15.5)
Income	
Not applicable	136 (95.8)
<RM 1,000	4 (2.8)
RM 1,001-3,000	1 (0.7)
RM 3,001-5,000	1 (0.7)
>RM 5,000	0

aware that screening for cervical cancer should be done every 3 years. The highest misunderstanding observed was, for the statement ‘most HPV infection resolves spontaneously’ with only 9.9% of students answered correctly.

Most of the Dental students agreed strongly that cervical cancer could be prevented, but only one-third of students felt that they were susceptible to HPV infection. 46.5% of students agreed that HPV-vaccinated young

Table 2. Information Sources about Cervical Cancer Prevention, HPV Infection and HPV Vaccines

	(N=142)
	n (%)
Friends and Family	24 (16.9)
Media	37 (26.1)
Gynaecologist	2 (1.4)
General practitioner	7 (4.9)
Health centres / Clinics	24 (16.9)
Pharmacist	4 (2.8)
Internet	31 (21.8)
Do not know/remember	13 (9.2)

people would not become sexually active. Most of the students (89.4%) would not want their children to be infected with HPV. About 90% of students would be vaccinated if sufficient information was available. The mean attitude score for students was 3.86 (SD = 0.37, median = 3.83). The majority of students (66.2%) had a positive attitude toward HPV. Details of the attitude score were shown in Table 4.

Most of the Dental students were willing to pay Ringgit Malaysia (RM) 500 or less for themselves, and the number of students kept declining as the price went up to a maximum of RM 5,000. The total mean of money

Table 3. Respondents' Knowledge about HPV Infection, Prevention and Vaccine

Variable	Students (N = 142) n (%)	p value
HPV can cause cervical cancer.	118 (83.1)	0.388
HPV infections are preventable.	134 (94.4)	0.38
Condom use can prevent HPV infection.	107 (75.4)	0.9
HPV is a sexually transmitted disease (STD).	108 (76.1)	0.484
HPV infection is frequent.	67 (47.2)	0.645
HPV infection can last for years.	96 (67.6)	0.656
Cervical cancer is caused by persistent HPV infection.	93 (65.5)	0.16
HPV may infect both, men and women.	96 (67.6)	0.905
Most HPV infection resolves spontaneously.	14 (9.9)	0
HPV can infect you without symptoms.	83 (58.5)	0.016
HPV can cause genital warts.	110 (77.5)	0.551
HPV can cause other anogenital cancers (e.g. penis, anus).	74 (52.1)	0.515
HPV vaccine prevents around 70% of cervical cancer.	97 (68.3)	0.52
Pap-smear can screen cervical cancer.	103 (72.5)	0.119
Pap-smear is very or relatively effective in screening cervical cancer.	86 (60.6)	0.086
Pap-smear should be done every 3 years.	48 (33.8)	0.046
Pap-smear can be done after the age of 21.	47 (33.1)	0.009
Mean knowledge score (SD)	10.43 (3.03)	0.383
Low 0-5	10 (7.0)	
Moderate 6-11	82 (57.7)	
High 12-17	50 (35.2)	

Table 4. Respondents' Attitude Toward HPV Infection and Vaccination

Groups Variables	Students (N = 142) Agree/Strongly agree n (%)	P value
Attitude		
Cervical cancer is a severe disease.	132(93.0)	0.308
Cervical cancer is preventable.	117 (82.4)	0.001
I am susceptible to HPV infection.	47 (33.1)	0.06
HPV vaccine is helpful to prevent cervical cancer.	124 (87.3)	0.004
HPV vaccine is safe.	102 (71.8)	0.935
There is less risk involved in being vaccinated than in having HPV infection.	78 (54.9)	0.562
HPV vaccination will not lead to complicated sexual activities.	67 (47.2)	0.934
Vaccinating young people against HPV would not encourage them to become sexually active.	66 (46.5)	0.834
I would not want my children to be infected with HPV.	127 (89.4)	0.641
Information on HPV helps me to decide whether my children should be vaccinated against HPV.	128 (90.1)	0.446
If my doctor thinks HPV vaccination is a good idea, I would have my children vaccinated against HPV.	117 (82.4)	0.247
I would have my children vaccinated against HPV if the vaccination is freely available	122 (85.9)	0.596
Mean attitude score(SD)	3.86 (0.37)	0.12
Negative 1-2.33	1 (0.7)	
Neutral 2.34-3.67	47 (33.1)	
Positive 3.68-5	94 (66.2)	

willing to pay by students for HPV vaccine was RM 1304. In the aspect of willingness to pay for their children now or in future, most of the students (34.5%) RM 1001-2000 in order to vaccinate their children. Students were willing to pay for a mean amount of RM 1477.7 to vaccinate their children in the future with the HPV vaccine (Figure 1)

The Spearman correlation test was used to measure the relationship between knowledge and willingness to pay and attitude (Table 5). The results showed that there is a significant correlation exists between knowledge and willingness to pay are (134) = 0.562, $p=0.001$. This indicates that when the students' knowledge towards cervical cancer and HPV vaccination increases, their willingness to pay for vaccination also increases. There was no significant correlation exists between knowledge and attitude towards HPV vaccination.

Table 5. Correlation between Knowledge, Attitude and Willingness to Pay

	Willingness to pay	Attitude
Correlation Coefficient	0.562**	0.31
Knowledge Sig. (1-tailed)	0.001	0.121

** $P<0.01$

Table 6. Knowledge is a Predictor of Willingness to Pay

	B	Std. error	β	R ²
Willingness to pay	9.58	1.55	0.568**	0.232

** $P<0.01$

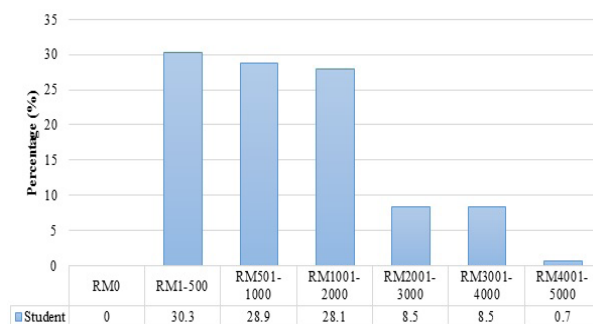


Figure 1. Respondents' Willingness to Pay for HPV Vaccination

This study used knowledge as a predictor variable, whereas, willingness to pay and attitude as criterion variables. Table 6 indicates that knowledge is a significant predictor of willingness to pay and attitude. Knowledge of students about cervical cancer and HPV vaccination predicts 23% ($R^2 = 0.232$, $F = 60.55$, $P < 0.01$) of willingness to pay for HPV vaccination by the students.

Discussion

This study focused on dental students of a university in Malaysia. Though the general practitioners, are the primarily administer of HPV vaccines, the role of dentists in performing oral cancer screening, is an important area to be focused (Tan et al., 2010). In Malaysia, dentists are among the most frequently visited healthcare providers. The regular visit of the patients offers dentists a unique opportunity to contribute to primary prevention of HPV-related oral cancer (Daley et al., 2014). As such, the knowledge and attitude of dental practitioners toward HPV play important roles to educate the general public. Hence. This study focused the undergraduate dentistry students, as they are one of the future practitioners in the health care system and they will get a chance to meet more patients to talk about HPV vaccination.

The demographic data showed that most of the students were female and the age was between 18 and 27 which is supported by literature (Maharajan et al., 2017). This gives an advantage in this study as this age group of undergraduate students are a target for HPV vaccination (Rajiah et al., 2015). As most of the students are single, but in a relationship, both male and female are at the risk of getting infected by sexually transmitted diseases (Maharajan et al., 2015). Male may contract the infection or may transfer HPV infection to their partners (Kubba, 2008).

Mass media is the major source of information about HPV infection and vaccination for the study participants. This is in line with earlier reports (Gillison et al., 2008; Maharajan et al., 2017). The role of media in providing information, especially for the current generation of

students is enormous. The young population depends more on mass media to get a latest update on any topics including the topic about new medicines, and advancements in therapeutics. The students will get new knowledge and update themselves when they are exposed to articles or literature related to HPV infection and its prevention. The role of media in professional education is increasing day by day. The result indicates the effectiveness of media in providing information to the students.

The health care providers' knowledge about HPV infection and its prevention is very much essential to recommend the vaccine to their patients and the general public (Strohl et al., 2015). The study participants had moderate knowledge of HPV infection, prevention and vaccination were among the study participants. This results were in line with other studies conducted among medical, pharmacy and health sciences students (Maharajan et al., 2017; Rajiah et al., 2015 Maharajan et al., 2015). However, in this study more than one third of the study population achieved high scores. As the undergraduate dental students are dealing mostly with the oral health of patients, there is a lesser chance for them to meet HPV infected patients. In spite of that majority of the respondents achieved high scores, may be because of their exposure through media information on cervical cancer and HPV infection. It has been reported earlier that, level of knowledge was low among university students concerning the HPV vaccine in Malaysia (Wong et al., 2008). However, the current results show that university students are much aware about HPV and vaccination. The results also revealed that female students have more knowledge than their male counterparts. These data are in line with an earlier report (Surachat et al., 2015), and suggest that the female population receives sufficient information and can retain and may act on the information about cervical cancer, Pap smear test and HPV.

In this study, the respondents are not sure about the role of Pap smear examination and its application in cervical cancer screening. The knowledge gap in this area among the study population may affect their role in HPV infection and prevention of cervical cancer. Better educational approach should be considered to improve the dental students' understanding about the role of Pap smear test which may help them to gain more knowledge and influence them to recommend Pap smear test. The early detection of HPV infection is one of the promising approach in the prevention of early cervical cancer. The new educational strategies are necessary to improve the knowledge level of dental students in cervical cancer prevention.

The results of the study population's attitude is interesting when it comes to uptake of HPV vaccination. Most of the students had a positive attitude toward HPV vaccination, which was same as some other studies where the respondents had a positive attitude as well (Maharajan et al., 2017; Rajiah et al., 2015 Maharajan et al., 2015). However, just more than half of the study participants, 55% felt that there is less risk involved in being vaccinated with HPV vaccines. This shows that, still almost half of the participants are not confident on HPV vaccines, though their overall attitude on the HPV vaccine is good. This may

be because of their cultural boundaries and values, and also may be because of many misconceptions regarding the vaccine among the South East Asian population (Tay et al., 2015; Zaridah, 2014). But, though they are not confident about HPV vaccine, most of them are ready to vaccinate, if their doctor thinks HPV vaccination is a good idea, provided the vaccination is freely available. This may be because there is support lack from some doctors (Siu, 2014) and the health authorities of the government failed to provide sufficient awareness about the free availability of HPV vaccine up to age 26 years in Malaysia.

The vaccination rate was low among the dental students. The outcome was same as other studies which reported a lower vaccination rate of 3.6% and 2.1% as well (Luciani and Andrus, 2008). Other than that, the intention to receive vaccination was lower among those who have not received vaccine yet. This may be because they felt that they are not susceptible to HPV infection and they have doubts about the efficacy of the HPV vaccine. Strategies at regional level, community partnerships, should be implemented (Hesham et al., 2012) to increase the vaccine intake. Despite the low vaccination rate, the intention to recommend the HPV vaccine to friends and family was quite high as they knew about the risk associated with HPV and the preventive measure that could be taken to prevent against it. This was same as a study where the nurses had a strong desire to recommend to others, although expressed a low knowledge level (Kaoje et al., 2016; Tirupathy et al., 2015).

Though the vaccination rate is low among these participants, they were willing to pay for a mean amount of about RM1000 for the HPV vaccine, which is higher than the market price of 3 doses around RM800-900. About half of them were willing to pay more than this value for a complete course of HPV vaccine. This is consistent with a study where half of the respondents would vaccinate themselves, even if it is not given free of charge (Donders, 2008). The mean value of money willing to pay by these participants was much higher than a previous study in Malaysia in which the respondents were willing to pay only RM 96.7 for the vaccine (Chung et al., 2011; Sharifa et al., 2013). For those who were not willing to pay for the amount, they felt that government should be responsible in paying for the vaccine with similar results in a study (Liao et al., 2009).

The correlation between knowledge and willingness to pay for vaccination in this study proclaimed that knowledge towards any vaccination will influence the willingness to pay for that vaccination. Similar results have been reported by other studies as well (Surachat et al., 2015; Kruiroongroj et al., 2014). There is no correlation between knowledge and attitude towards HPV vaccination is satire in this study, as other studies have shown that knowledge about vaccination influences the attitude of individuals (Kairu-Wanyoike et al., 2014; MacDougall et al., 2015). In this study, most of them get the information about HPV from mass media and internet. The information provided normally served as the purpose of advertising. The details about HPV infection and the importance of HPV vaccination may not be stressed and explain well. This may be the reason for there is no correlation between

HPV vaccination knowledge and attitude towards it among these respondents. Similar conditions have been described by other studies as well where the major information source of respondents about HPV was mass media (Dayyani et al., 2010; Epstein et al., 2014).

In this study, knowledge about cervical cancer and HPV vaccination of dental students is a significant predictor for their willingness to pay for HPV vaccination. This indicates that more information and awareness on HPV vaccines will further improve the willingness to pay for the vaccination. Programmes with adolescents about HPV vaccination would create chances to strengthen the healthcare system (Goldie et al., 2008).

Limitations

The limitation in this study is, we assumed the HPV vaccine are 100% effective in preventing cervical cancer which do not reflect the real practice and this may lead to some bias in the result.

In conclusions, dental students showed a moderate knowledge and positive attitude toward HPV infection, prevention and vaccination. Knowledge of HPV and cervical cancer has no influence on students' attitude towards HPV vaccines. However, the students' willingness to pay for HPV vaccination is influenced by their knowledge of cervical cancer and HPV vaccination. Most of them were willing to vaccinate both themselves and their children. Institutional education and awareness programmes should be carried out in university campuses by health authorities and health care workers to provide relevant information on risk of HPV infection, preventive measures against it and the benefits of the HPV vaccine.

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