

Awareness and acceptance of human papillomavirus vaccination among health sciences students in Malaysia

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Abstract The major cause of cervical cancer is human papillomavirus (HPV) for which vaccination is available. The success HPV vaccination programme largely depend on the degree of knowledge of the healthcare providers who can recommend to the public. Health sciences students as future healthcare providers play a major role in HPV vaccination initiatives. The objective of this study was to evaluate the knowledge, attitude, practice and to find out the willingness to pay for HPV vaccination among the health sciences students in a private university. The cross-sectional study was conducted among the university students studying health sciences program using a validated questionnaire to measure their awareness and acceptance of HPV vaccination. The students demonstrated moderate knowledge about HPV infection and vaccination with mean knowledge scores of 9.3 out of 17. Students were showing positive attitude towards HPV vaccination with mean scores of 3.80 out of 5. However, low HPV vaccination uptake rate was reported among the students. Most of the students were willing to recommend HPV vaccine. The participants felt that the cost is the major barrier towards HPV vaccination and they felt the government

should cover the cost of vaccination for all. The results of this study may be helpful in establishing educational policies on cervical cancer-related topics in the universities.

Keywords Cervical cancer · Willingness to pay · Pap smear test · HPV · College students

Introduction

Cervical cancer, continues to be significant global health problem and second most frequent cause of cancer death of women in developing countries [26]. The principal aetiological factor of cervical cancer is HPV infection especially, the subtypes HPV-16 and HPV-18 are responsible for approximately 70 % of cervical cancer cases [3]. The prophylactic human papillomavirus (HPV) vaccines against HPV-16 and 18 were indicated as the possible *beginning of the end* for oncogenic HPV infection and its major associated disease, cervical cancer [4, 19]. HPV-Cervarix[®] and Gardasil[®] showed excellent efficacy against HPV infections and showed that the majority of cervical cancer cases are perfectly preventable [11, 23, 25].

Malaysia, a country of emerging economies with diverse ethnicities, cultures, and resources, introduced HPV vaccination successfully in their national programmes based on the WHO recommendation [18]. Despite the efficacy of these HPV vaccines against HPV-16 and 18 in the cervical intraepithelial neoplasias preventions [14, 16], their uptake in Asian population is low [2] and the number of cervical cancer cases are increasing. To overcome this situation, Malaysian Ministry of Health introduced a free vaccination programme to all 13 year-old girls studying in public or private schools [32]. Unfortunately, although preventable,

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there are still large numbers of women who die of cervical cancer in Malaysia.

Health care professionals play a critical role in promoting and delivering immunization programs globally. Success in immunising the community will need to have a team which comprises of health care professionals, scientists and policy makers, as they play a major role in educating the general public. The success of HPV vaccination programme will largely depend on the degree of knowledge of the healthcare providers and the public [15]. Lack of communications and education between health care providers and patients regarding vaccination recommendations were known to be the foremost barriers in HPV vaccination in the general population [17]. Students of health sciences programmes, one of the *stakeholders of future health care professions* will play a significant role in creating public awareness about cervical cancer and HPV vaccination. Hence, it is important to understand the awareness of future health professionals about HPV infection and vaccination and learn what adaptations might be needed for programmes designed to be effective in the future. This study aimed to evaluate the knowledge of health sciences students on HPV infection and cervical cancer and their attitude towards HPV vaccination along with their willingness to pay for HPV vaccination.

Material and methods

Study design and participants

All procedures were approved by an Institutional Review Board (BP I-01/11 (28) 2014). A cross-sectional survey was conducted on the students of school of health sciences in International Medical University, Malaysia from July to September 2014. The only inclusion criterion was students studying health science programmes in this University. The total population of health sciences students in this university was 898. The minimum sample size required was 270, calculated by using RAOSOFT calculator with a 5 % margin of error and 95 % confidence level. 320 health sciences students whom available during the study period were approached to participate in this study.

Sampling technique

Based on the objectives of this study, convenience sampling was done with the proximity to the researcher and the will of the subject to participate in the project. A self-administered validated questionnaire was used in this study. Participants were aware that they could withdraw from the study at any time. Written consent was obtained before the questionnaires were given out to the participants.

The questionnaire was anonymous, confidential and self-responded. The completed questionnaire was returned to an enclosed box to ensure the participants' confidentiality.

Study instrument

A questionnaire had the following main themes; the participants' demographic data, personal habits, knowledge, attitude and practice on cervical cancer, HPV and HPV vaccination and willingness to pay for HPV vaccination. The questionnaire was face validated by content experts and reliability was determined by conducting a pilot survey on 20 participants. The Cronbach's alpha value obtained was 0.873.

Statistical analysis

Data analysis was performed using the SPSS software version 22.0. Descriptive and univariate analyses were done to find out the population characteristics, knowledge, attitude and practice. The knowledge scores were categorised as low (0–5), moderate (6–11) and high (12–17). The attitude scores were categorised as negative (1–34) and positive (35–70). The willingness to pay was presented in sample means. Statistical tests such as, *t* test, one-way analysis of variance followed by post hoc Bonferroni test were applied ($p < 0.05$). A stepwise multiple linear regression analysis model was used to check the relation between independent (gender, ethnicity, religion, and relationship status) and dependent variables (knowledge and attitude). Confidence level and level of significance were fixed at 95 and 5 % respectively.

Results

Demographic and sexual habits

Out of 320 students, 273 students completed this study. The response rate was 85.3 %. Table 1 provides an overview of the sample demographic characteristics. The recruited participants were 273 students (85.3 %). The mean age of participants was 22.2 for students. The number of female participants was around three times of male participants. Only 23.1 % has sexual intercourse before and 3.2 % were mentioned that they had their first sexual intercourse within 17 years of their age. The respondents were answered about the number of sexual partners and only 2.1 % were mentioned that they have more than 1 partner. Less than half of the population who are sexually active (45.5 %) were mentioned that they use condom always during their sexual intercourse. Good lifestyle habits were used by the participants as most of them had never smoked and did not take in alcohol.

Table 1 Knowledge about cervical cancer, HPV and HPV vaccination of students

	n (%)	p value
HPV can cause cervical cancer	219 (80.2)	0.902
HPV infections are preventable	242 (88.6)	0.278
Condom use can prevent HPV infection	152 (55.7)	0.299
HPV is a sexually transmitted disease (STD)	172 (63.0)	0.016
HPV infection is frequent	101 (37.0)	0.098
HPV infection can last for years	152 (55.7)	0.067
Cervical cancer is caused by persistent HPV infection	157 (57.5)	0.013
HPV may infect both, men and women	149 (54.6)	0.724
Most HPV infection resolves spontaneously	36 (13.2)	0.299
HPV can infect you without symptoms	160 (58.6)	0.017
HPV can cause genital warts	174 (63.7)	0.775
HPV can cause other anogenital cancers (e.g. penis, anus)	130 (47.6)	0.824
HPV vaccine prevents around 70 % of cervical cancer	163 (59.7)	0.007
Pap-smear can screen cervical cancer	179 (65.6)	0.002
Pap-smear is very or relatively effective in screening cervical cancer	156 (57.1)	0.001
Pap-smear should be done every 3 years	78 (28.6)	0.179
Pap-smear can be done after the age of 21	114 (41.76)	0.117
Mean knowledge score (SD)	9.3 (3.91)	0.001

Descriptive statistics was employed to summarise participants' responses. Participants who responded 'Yes' for knowledge questions were tabulated as percentages of correct answers

Source of information

Many of the students who knew about HPV had acquired the knowledge through mass media (28.5 %) and friends

and family (28.3 %). The internet also been mentioned as one of the major source of information (14.2 %). Only 12 % reported that they knew about HPV through a health centre and clinic. The results were mentioned in Fig. 1.

Fig. 1 Source of information about cervical cancer, HPV and HPV vaccination among the students

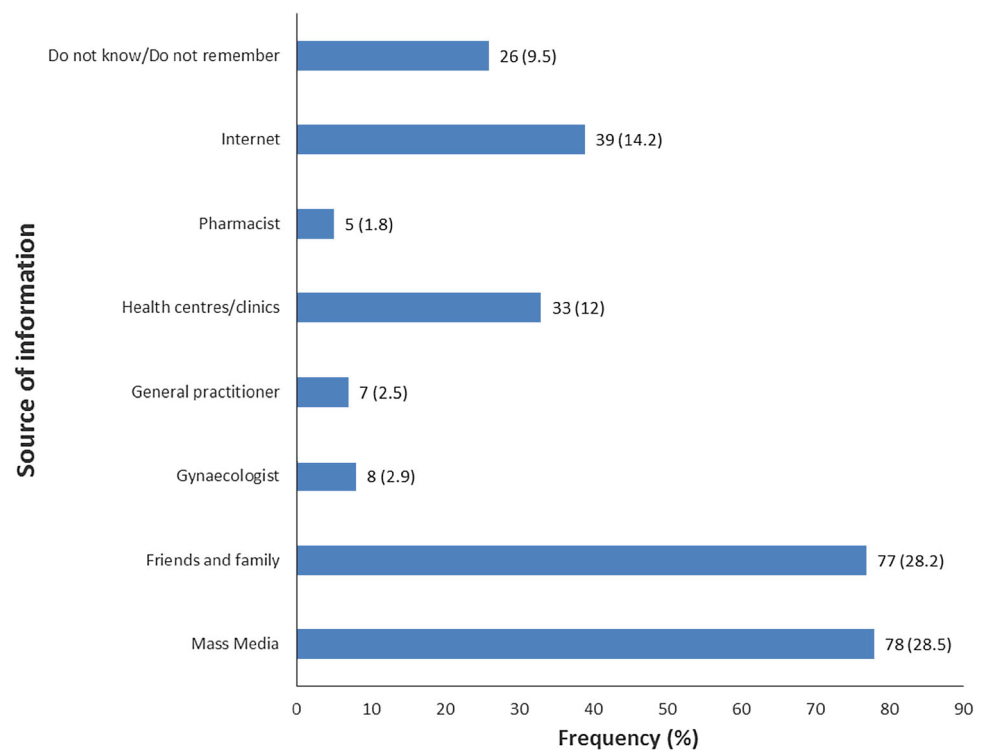


Table 2 Attitude on HPV infection, HPV prevention and HPV vaccine

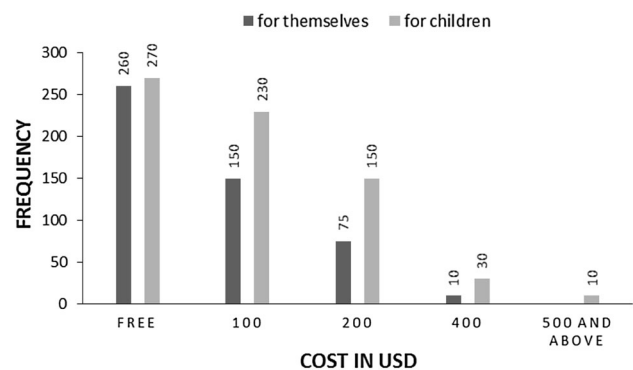
	Agree/strongly agree	<i>p</i> value
Cervical cancer is a severe disease	241 (88.2)	0.094
Cervical cancer is preventable	173 (63.3)	0.306
I am susceptible to HPV infection	70 (25.6)	0.378
HPV vaccine is helpful to prevent cervical cancer	215 (78.7)	0.237
HPV vaccine is safe	177 (64.8)	0.037
There is less risk involved in being vaccinated than in having HPV infection	195 (71.4)	0.004
HPV vaccination will not lead to complicated sexual activities.	100 (36.6)	0.078
Vaccinating young people against HPV would not encourage them to become sexually active	80 (29.3)	0.072
I would not want my children to be infected with HPV	248 (90.3)	0.457
Information on HPV helps me to decide whether my children should be vaccinated against HPV	239 (87.5)	0.436
If my doctor thinks HPV vaccination is a good idea, I would have my children vaccinated against HPV	230 (84.2)	0.401
I would have vaccinated against HPV if the vaccination was freely available	229 (83.8)	0.027
I would pay for my children to get vaccinated as compared to myself	239 (87.5)	0.033
I wish my government bears the cost of HPV vaccines	208 (76.1)	0.010
Mean attitude score (SD)	34.80 (0.51)	0.05

Knowledge about cervical cancer, HPV infection

The students showed moderate knowledge with mean scores of 9.3 out of 17.0. The majority of respondents knew that HPV infection is preventable (88.6 %) and that HPV is a cause of cervical cancer (80.2 %). Pap smear test can screen cervical cancer (65.6 %) was the next item answered correctly by most participants. Meanwhile, knowledge on facts such as ‘Pap-smear should be done every 3 years (28.6 %), most HPV infections resolves spontaneously (13.2 %) were very poor among the respondents. However, the statement ‘HPV cause genital warts was answered correctly by 63.7 %. The number and percentage of participants who answered the questions correctly are shown in Table 1.

Attitude towards HPV vaccination

The respondents’ attitudes towards HPV prevention and HPV vaccine were analyzed and the details of the variables were mentioned in Table 2. The students were showing positive attitude with mean scores of 3.80. HPV infection is a severe disease (88.2 %) and HPV vaccine is helpful in preventing cervical cancer and 64.8 % agreed that the HPV vaccine is safe. Some of the students (25.6 %) perceived themselves to be vulnerable to HPV infection. A high proportion of students (71.4 %) felt that, there is less risk involved in being vaccinated than being infected by HPV. The present findings showed that they would not want their children to be infected with HPV (90.3 %) and would vaccinate their children in future (87.5 %). More than half of the respondents (64.8 %) were concerned about safety of the vaccine. Surprisingly,

**Fig. 2** Students’ willingness to pay for HPV vaccination

only 29.3 % mentioned that vaccinating young people against HPV would not encourage them to become sexually active. This means the rest of them (70.7 %) have thought that it will encourage the young population to become sexually active.

Willingness to pay for HPV

Almost all the students wanted the vaccine to be cost free. However, most of the students were willing to pay up to USD 100 to get vaccinated (Fig. 2). The average amounts that the students willing to pay were USD 108.66. Almost half of the respondents were willing to spend around USD 200 for their children. Thus, the participants in this study were willing to pay a higher price for their children to get vaccinated as compared to themselves. Among the participants who were not willing to pay, most of them felt that the cost should be paid by the government.

Table 3 Association of mean knowledge and attitude scores with socio-demographic characteristics

Variables	Knowledge		Attitude	
	Mean \pm SD	<i>p</i> value	Mean \pm SD	<i>p</i> value
Gender				
Male	14 \pm 2.24	0.003*	34.82 \pm 3.17	0.43
Female	12 \pm 4.23		35.28 \pm 2.25	
Ethnicity				
Malay	9.97 \pm 1.88	0.19	34.08 \pm 3.58	0.82
Chinese	12.26 \pm 1.69		34.29 \pm 3.29	
Indian	12.17 \pm 1.78		35.98 \pm 2.71	
Others	7.45 \pm 1.90		34.11 \pm 2.19	
Religion				
Islam	11.38 \pm 1.27	0.27	33.08 \pm 3.23	0.68
Buddhism	11.21 \pm 1.53		34.29 \pm 3.59	
Hinduism	11.58 \pm 1.64		34.98 \pm 3.28	
Christianity	11.54 \pm 1.62		34.67 \pm 3.17	
Free thinker	11.51 \pm 1.79		34.28 \pm 4.53	
Atheist	11.87 \pm 1.53		34.56 \pm 4.69	
Others	10.17 \pm 1.97		34.82 \pm 3.14	
Living condition				
Alone	11.57 \pm 1.62	0.30	34.84 \pm 2.36	0.03*
Parents	12.95 \pm 1.04		34.28 \pm 3.38 ^a	
Friends	11.78 \pm 1.58		36.58 \pm 2.18 ^a	
Colleagues	12.73 \pm 1.78		34.26 \pm 3.23	

Statistical tests applied: *t* test, one-way analysis of variance

^a Statistically significant difference; post hoc Bonferroni test

* Statistically significant difference at $p \leq 0.05$

Respondents' differences in knowledge and attitude

Table 3 showed that, there was a significant difference in knowledge between genders (12 \pm 4.23 males vs. 14 \pm 2.24 females; $p = 0.003$). However, there was no significant difference in attitude between two genders. Though there were no significant differences in respondents' knowledge versus living condition, there were significant differences in attitude by the respondents' living condition. When a post hoc Bonferroni test was applied, mean attitude score among those who were living with parents (34.28 \pm 3.38) was found to be significantly less than among those who were living with friends (36.58 \pm 2.18; $p = 0.03$).

Predictors of knowledge and attitude

The stepwise multiple linear regression analysis was used to estimate the linear relationship between the dependent variables (knowledge score) and independent variables (gender, ethnicity, religion, and living condition) Table 4. Gender was the predictor for knowledge score with the

Table 4 Stepwise multiple linear regression analysis with knowledge, attitude scores as dependent variable among respondents

Model	R	R ²	F	<i>p</i> value
Gender ^a	0.124	0.248	9.562	0.002
Living condition ^b	0.113	0.226	18.856	0.004

^a Predictor of knowledge

^b Predictor of attitude

variance of 24.8 %, $p = 0.002$. The stepwise multiple linear regression analysis to estimate the linear relationship between the dependent variable (attitude score) and independent variables (gender, ethnicity, religion, and living condition). Living condition was the predictor for attitude score with the variance amount of 22.6 %, $p = 0.004$.

Discussion

This study population is important as they are the future health professionals who will face the general public and educate them about cervical cancer prevention. In addition to this, the age group of the study population is also a target for HPV vaccination. Hence, measuring their knowledge about HPV infection and cervical cancer is vital to future strategies. The source of information about vaccine showed differences among study population. The influence of mass media in their daily life reflected in the results as majority of the respondents considered that mass media followed by friends and family members are the source of information for the knowledge related to HPV infection and cervical cancer. This findings supports the earlier report of Griffioen et al. [13]. The role of friends and family members in health education and sharing information on vaccination is vital in promoting the HPV vaccination. Though the system of communication has developed a lot, word-of-mouth recommendations can support to spread the message about vaccination and help to reduce the incidence of cervical cancer. Special strategies for disseminating information to the general population to encourage vaccination uptake is needed. The remarkable finding off this study was that the respondents did not consider the health professionals as the primary source of information. Considering the multicultural social set up in Malaysia, the population may be unwilling to seek information about a sexually transmitted disease-related vaccination from healthcare professionals [30].

Overall the participants had greater awareness about the association between HPV infection and cervical cancer compared with earlier reports from various countries [7, 21, 24]. A study by Gerend et al. [12] showed that over 90 % of the university students correctly identified the association between HPV and cervical cancer. The level of

knowledge of health professionals about HPV infection is highly associated with their recommendation of vaccine to the public [5]. The awareness-raising campaigns by the Malaysian Ministry of Health, public and private organization in Malaysia have had a considerable impact on respondents' knowledge about HPV vaccines as a preventive measure for cervical cancer. The present study supported the fact that greater exposure to health information effects in better knowledge [22].

The current study sheds light on health science students, willingness to receive HPV vaccination. The intention to receive the vaccine in this study was comparatively higher than earlier reports [20, 28, 31]. Majority of the respondents expressed their desire to get vaccinated if it is freely available. This may be due to the impact of HPV educational programmes and the national immunization program, which offers free vaccination for girls aged 13. Interestingly, this study showed a significant number of respondents had accepted that they will vaccinate their children if the doctor recommends doing so. This implies that the health professionals can influence the general population and educational programs should target the health care professional group [27]. Though the majority of the respondents have positive attitude, few of them had concerns about safety of the vaccines. Therefore, supportive data about vaccine safety should be highlighted while promoting HPV vaccines. The present results found significant association between intention to receive HPV vaccines with knowledge about HPV infection and cervical cancer prevention. A prime focus should be given to enhance the students' ability to convey the message to the general public.

A significant difference between genders relating to the level of knowledge was identified. We recognised that because HPV vaccination and screening are applied only to females and HPV vaccines protect women from a high proportion of precursor lesions of cervical carcinoma, their knowledge level may be higher. This result supported the review report of Dinas et al. [6].

A significant difference between living condition and the attitude towards HPV vaccination was identified. The respondents who were living with friends had a positive attitude while those who were living with parents had a negative attitude. This difference may be because the respondents who were not living with parents may have felt that they were not at risk of getting HPV. In this study, the predictor of knowledge about HPV infection was consistent with earlier reports [1]. Participants who were living with friends felt more vulnerable to HPV. Eaton et al. [8] found that a high proportion of women who perceived that they were at risk for HPV infection tested positive for the virus. However, no diagnostics tests were done for this study participants.

This study revealed that, the respondents have different attitude towards HPV vaccination depending upon whether vaccine is for them or for their children. Respondents were trading among these attitude differences when they have to pay for vaccination.

Daley et al. [5] and Tissot et al. [29] have reported that, the possibility of paying for vaccines might be a barrier in HPV vaccination. Respondents' willingness to pay for HPV vaccination for their children was much higher in this study as compared to the earlier reports from Malaysia [9, 10]. These finding also exhibited a higher willingness to accept HPV vaccines for the respondent's children compared to themselves. This may be due to the free vaccination availability for the children in Malaysia. However, those who are 18 years old and above are also eligible up to age 26 years to get free HPV vaccination at any of the government clinics around Malaysia according to the National Population and Family Development Board of Malaysia. The respondents in this study being aged less than 26 years, might not be aware of this fact. Therefore, the respondents might have preferred vaccination for their children instead of themselves.

Overall, the knowledge level of cervical cancer, HPV and HPV vaccination among the health sciences students were moderate. The participants had positive attitude towards HPV vaccination. However, the HPV vaccination uptake rate was reported to be low. The major barrier towards HPV vaccination was that the participants felt that the cost of HPV vaccine should be covered by the government. National Population and Family Development Board of Malaysia along with the Malaysian universities can conduct awareness programs about the cost free availability of vaccinations until the age of 26 years. Future studies should be expanded to other universities in Malaysia and a nationwide survey at the large scale in order to provide a nationwide result.

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