RESEARCH ARTICLE

Knowledge, Perception and Attitude Towards Human Papillomavirus among Pre-university Students in Malaysia

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Abstract

Background: To evaluate the knowledge, perception and attitudes towards human papilloma virus (HPV) among pre-university students in Malaysia. Study design : In this cross sectional study, between November 2013 to March 2014, in a public university, a convenient sampling method was used. A total of 716 respondents were recruited and interviewed with a set of standard questionnaires for assessment of knowledge, perception and attitudes towards HPV and predictor variables associated with level of knowledge. Results: Almost half (48.9%) of the respondents scored less than 5 and were categorised as having poor knowledge. Three hundred and twelve (43.6%) respondents had moderate knowledge and only 54 (7.5%) respondents exhibited good knowledge with the score of 11 and above. Only 142 (20%) students perceived themselves to be vulnerable to HPV infection though 560 (78.2%) students thought that HPV infection is a serious disease. Perceived benefits and desire to be vaccinated were significantly associated with gender (p=0.000) and knowledge of HPV vaccine and cervical cancer (p=0.000). Conclusions: The level of knowledge regarding HPV among the pre-university students was low. However, student intention for vaccination increased with increasing level of knowledge. Thus, efforts to improve knowledge and awareness should be prioritised to increase uptake of the HPV vaccination programme and hence reduce morbidity and mortality from consequences of HPV infection, including cervical carcinoma.

Keywords: Human papillomavirus vaccine - cervical cancer - knowledge - attitude - perception - Malaysian students

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Introduction

Cervical cancer is one of the commonest cancer worldwide. Almost half a million women develop cervical cancer and 274,000 death after diagnosis in year 2002. Among these, 80% of cancer death was from developing countries (World Health Organization 2007). It was the third most common cancer in Malaysian women after carcinoma of the breast and colorectal, where a total of 847 cases being diagnosed in the year 2007. The age-standardised rate (ASR) was 7.8/100,000 populations. Indian females had the highest ASR of 10.3 followed by Chinese (9.5) and Malays (5.3) (Malaysia Cancer Statistic 2007).

National Pap smear screening programme had been started since 1969 in Malaysia. However, despite being free of charge for women attending public health facilities, the coverage of Pap smear programme was rather dissapointed and it is mainly opportunistic based. It was reported in the Third National Health and Morbidity Survey III that coverage of Pap smear was only at the range of 40% (National Health Morbidity Survey III 2008). It was not much differ from our neighbour country i.e. Singapore (42.0%) or Vietnam (40%) (Domingo et al., 2008).

High-risk HPV subtypes was found in almost all cervical cancer, 90% of anal cancer and up to 40% of external genitalia cancer incuding vulva, vagina and penile (Malaysia Cancer Statistic 2007). Where as, low risk HPV subtypes were associated with genital warts (Baseman and Koutsky 2005). HPV was the most common sexual transmitted disease (Baseman and Koutsky 2005). It was estimated that 75-80% sexually active individual would have been infected in their lifetime (Weaver, 2006). As for this, effort was made aiming at primary prevention via HPV vaccination, preferably prior to the begin of sexual activity, along with secondary prevention using Pap smear screening. Low et al. (2012) estimated that 83.2 million Singapore dollars was attributed to the management of cervical cancer, cervical intraepithelial lesion and genital warts over a period of 25 years in Singapore.

Despite significant magnitude of HPV infection, many studies had demonstrated poor knowledge and awareness among their respondents. Wang and Wu reported that

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the knowledge in cervical cancer was lacking among female students in Taiwan (Wang and Wu, 2013). This was supported by Yilmazel and Duman as only 37.2% and 64.3% of their first- and fourth-grade students had heard about cervical cancer (Yilmazel and Duman, 2014). However, half of the respondents obtained overall good knowledge in the study by Ezat et al (2013).

Although HPV vaccination had been introduced since 2006, the level of knowledge and understanding about this vaccine varied. Ragin et al in their population based survey noted that 87% respondents heard about HPV vaccine (Ragin et al., 2009). This was inconsistent with the other studies done by Al-Dubai et al and AL-Nagaar et al, as only 21.7% and 22.4% of their respondents respectively heard about HPV vaccine (Al-Dubai et al., 2010; Al-Nagaar et al., 2012).

Eventhough the respondents might be aware of HPV, misconceptions persist despite extensive efforts made to increase awareness. Wong et al in their review showed that many respondents believed that Pap smear is not necessary in an asymptomatic woman. They also thought that Pap smear was used to detect existing cancer (Wong et al., 2009). Thus, this survey attempts to study the knowledge, attitude and perception towards HPV and HPV vaccination among pre-university students in Malaysia. In addition, our national HPV vaccination programme only covers secondary school girls aged 13 years old. Thus, these pre-university girls have missed their chance. This survey also provide some idea whether they would vaccinate themselves in near future.

Materials and Methods

Study design

This was a cross sectional study done between November 2013 to March 2014 in a public university that offers pre-university programme in Kuala Lumpur, Malaysia. All local students in the pre-university aged between 18 to 25 year old, who agreed to participate were recruited. Foreign students and those who refused to participate were excluded.

Procedure

Approval was obtained from the ethics committee, UKM Medical Centre. Permission to conduct the survey was given by the director of the pre-university programme. Students were briefed regarding the study in the lecture hall before their class started. Convenience sampling technique was used. Information sheets were provided followed by obtaining written consents.

A set of questionnaire was used in this survey. It was a validated questionnaire used in earlier study by other authors (Shafiee et al., 2013). An approval was obtained from the original author.

The items in the questionnaire consist of dermographic characteristics of the respondents and 19 closed ended questions assessing knowledge related to the 'HPV and cervical cancer'; 'awareness of HPV vaccine and cervical cancer prevention'; and lastly evaluating the respondents' attitude towards HPV vaccination in cervical cancer prevention using Health Belief Module. Each correctly answered question will be given a score of '1' while a score of '0' will be given for wrong answer. Those unsure answer will not be given any score. The scores from all the sections were added up. Higher total score indicates better knowledge with '18' being the highest score. The score for level of knowledge was subsequently subdivided into 3 categories: poor (score≤5), moderate (score 6-10) and good (score≥11).

The respondents were given 15 to 20min to complete the questionnaire. They were reminded not to discuss the answers among themselves in order to avoid their answers being influenced by others. The respondents' personal details and responses were kept confidential.

Statistical analysis

All data were collected in an electronic database and analysed using SPSS Version 16.0. Mean was used for normally distributed continuous variables and student T-test was used to compared mean score for the knowledge. Multivariate logistic regression analysis was used to determine the association between predictor variables and students' attitudes towards HPV infection and HPV vaccination.

Results

A total of 780 students were approached and the response rate was 91.8%, hence, 716 students were recruited. The mean age was 18.85±0.359 years old. Female students were greater in number than the male students (449 *vs* 267). Majority of them were Malays (97.5%) followed by other ethnic group (1.5%) and Chinese (1.0%). All were single. Most (98.5%) students were Muslim and more than half of them studied biological science while others studied physical science (61.9% *vs* 38.1%).

Among 584 respondents who aware of HPV vaccine, a third of them received information from internet (32%). Other resources include TV news (17%), newspaper (15%), school (11%), poster (8%) and others. For those who had no idea about HPV vaccine, they wished to obtain this information from internet (45%) follow by newspaper (15%), magazine (11%) and others (Figure 1).

Almost half (48.9%) of the respondents scored less than 5 in the section 'HPV infection and cervical cancer' as well as 'HPV vaccine and cervical cancer'. There were 312 (43.6%) respondents being categorised to have moderate knowledge and only 54 (7.5%) respondents exhibited good knowledge with the score 11 and above (Figure 2).

The mean scores for 'knowledge of HPV infection and cervical cancer' was 3.04±2.080 with the maximal score of 11.0. Female students scored higher than male counterpart and it was statistically significant, [$t(485)=2.878$, $p=0.006$, $\alpha=.05$] (Table 1).

Surprisingly, almost every question in the section 'knowledge of HPV infection and cervical cancer' was badly answered except question No 2 'HPV can cause cervical cancer' and question No 9 'A vaccine exists to prevent HPV infection'. There were only less than a third of the respondents correctly answered all questions. However, female students performed better compared to

male students in 6 out of 11 questions (Table 1).

The mean scores for knowledge of 'HPV vaccination and cervical cancer prevention' was 2.0±1.808 out of total scores of 7. Again, the mean score in female students was statistical significantly higher (2.68±1.698) compared to male students (2.25±1.953), [t(499)=3.1, p=0.003, α=.05] (Table 1).

Further analysis showed that, students performed better in 'HPV vaccination and cervical cancer prevention' as compared to questions in 'HPV infection and cervical cancer'. Among the seven questions that were given, only two questions had been anwered correctly by more than 50% of the students. Similarly, female students performed better as compared to the male counterpart in 4 out of total 7 questions and this was statistically significant. (Table 1).

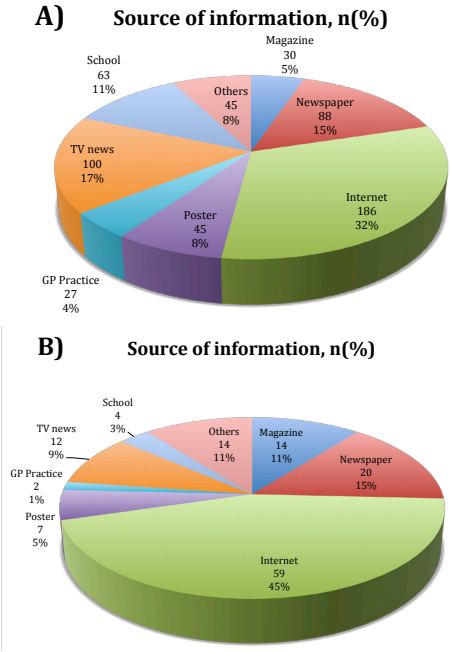

Figure 1. Source of Information. (A) For students who had heard of HPV vaccine. **(B)** For students who were not heard of HPV vaccine and would like to obtain the information from

There were less than 20% students perceived themselves vulnerable to HPV infection. Half of the students were uncertain about this and less than a third (27.0%) did not think that they were vulnerable to HPV infection. However, there were 560 (78.2%) students thought that HPV infection was a serious disease. Nonetheless, almost two third of them were willing to be vaccinated. Female students perceived susceptibility, seriousness and benefits greater than male students, all were statistically significant. (X^2=32.335, p=0.000; X^2=27.240, p=0.000 and X^2=69.465, p=0.000) (Table 2).

There were more than half (56.0%) of the students thought that the cost was high in order to be vaccinated. Other reasons that prevent students being vaccinated include worried about adverse effect (14.8%), uncertain effectiveness (11.3%), 3 dosages needed (9.2%) and others (8.7%). This was statistically significant between both gender (X^2=26.250, p=0.000). Both female and male students agreed that doctor's recommendation (60.8%) would be the main priority factor that influencing their decision to be vaccinated followed by family opinion (15.5%), self decision (13.3%), mass media campaign (7.3%) and others (3.2%) (Table 2).

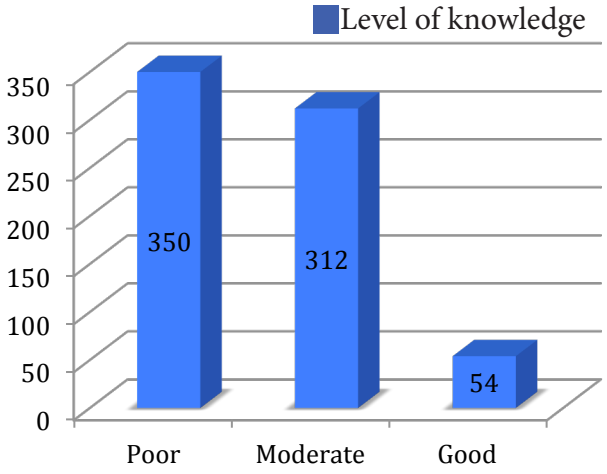

Figure 2. Level of Knowledge Among Respondents

Table 1. Students who had Correctly Answered in Knowledge of HPV Infection and Cervical Cancer, and HPV Vaccination and Prevention of Cervical Cancer, and their Total Scores

	Total n(%)	Male n (%)	Female n (%)	p value
HPV infection & cervical cancer				
HPV can cause genital warts	243(33.9)	88(36.2)	155(63.8)	X^2=0.782, p= 0.676
HPV can cause cervical cancer	437(61.0)	125(28.6)	312(71.4)	X^2=36.286, p= 0.000
Most people with genital HPV have no visible signs or symptoms	206(28.8)	73(35.4)	133(64.6)	X^2=1.121, p= 0.571
If a woman's Pap smear is normal, she does not have HPV	74(10.3)	28(37.8)	46(62.2)	X^2=8.419, p= 0.015
Changes in a Pap smear may indicate that a woman has HPV	222(31.0)	62(27.9)	160(72.1)	X^2=12.316, p= 0.002
Pap smear will almost always detect HPV	77(10.8)	35(45.5)	42(54.5)	X^2=12.804, p= 0.002
HPV can be passed from mother to her baby during birth	172(24.0)	70(40.7)	102(59.3)	X^2=3.725, p= 0.155
A negative test for HPV means that you do not have HPV	43(6.0)	15(34.9)	28(65.1)	X^2=18.736, p= 0.000
A vaccine exists to prevent HPV infection	477(66.6)	143(30.0)	334(70.0)	X^2=34.739, p= 0.000
Having one type of HPV means that you cannot acquire new type	129(18.0)	55(42.6)	74(57.4)	X^2=5.531, p= 0.063
I can transmit HPV to my partner even if I have no HPV symptoms	95(13.3)	40(42.1)	55(57.9)	X^2=3.572, p= 0.168
Total scores, Mean ± SD	3.04 ± 2.080	2.75 ± 2.291	3.21 ± 1.926	p=0.006
HPV vaccination and cervical cancer prevention				
HPV vaccine protects against cervical cancer	486(67.9)	144(29.6)	342(70.4)	X^2=37.971, p=0.000
HPV vaccine did not protects against all types of the virus strain that causes cervical cancer	124(17.3)	57(46.0)	67(54.0)	X^2=7.807, p=0.020
HPV vaccine did not protects against all sexually transmitted infections	189(26.4)	77(40.7)	112(59.3)	X^2=1.315, p=0.518
HPV vaccine is only available for woman currently in Malaysia	305(42.6)	108(35.4)	197(64.6)	X^2=4.869, p=0.088
Women who receive HPV vaccine still need frequent pelvic examination	141(19.7)	46(32.6)	95(67.4)	X^2=3.085, p=0.214
Women who receive HPV vaccine still have to get Pap smear	147(20.5)	46(21.3)	101(68.7)	X^2=6.638, p=0.036
Currently, HPV vaccine is available in Malaysia	413(57.7)	123(29.8)	290(70.2)	X^2=23.535, p=0.000
Total scores, Mean ± SD	2.52 ±1.808	2.25 ± 1.953	2.68 ±1.698	p=0.002

Table 2. Perception and Attitude Towards HPV Vaccine

Variable	Total n (%)	Male n (%)	Female n (%)	p value
[Perceived susceptibility]				
Do you think you can be easily infected with HPV?				
Yes	142(19.8)	31(11.6)	111(24.7)	X^2=32.335
No	193(27.0)	100(37.5)	93(20.7)	
Uncertain	381(53.2)	136(50.9)	245(54.6)	p=0.000
[Perceived seriousness]				
Do you think HPV infection is a serious disease?				
Yes	560(78.2)	181(67.8)	379(84.4)	X^2=27.240
No	23(3.2)	12(4.5)	11(2.4)	
Uncertain	133(18.6)	74(27.7)	59(13.1)	p=0.000
[Perceived benefits]				
Would you be vaccinated against HPV if HPV infection is preventable?				
Yes	446(62.3)	118(44.2)	328(73.1)	X^2=69.465
No	59(8.2)	43(16.1)	16(3.6)	
Uncertain	211(29.5)	106(39.7)	105(23.4)	p=0.000
[Perceived barriers]				
If you do not want to be vaccinated, what are the barriers for having a HPV vaccine?				
High cost	401(56.0)	130(48.7)	271(60.4)	X^2=26.250
3 dosages	66(9.2)	26(9.7)	40(8.9)	
Adverse effect	106(14.8)	33(12.4)	73(16.3)	p=0.000
Uncertain effectiveness	81(11.3)	40(15.0)	41(9.1)	
Others	62(8.7)	38(14.2)	24(5.3)	
[Cue to action]				
Whose recommendation would be most effective in encouraging you to get a HPV vaccine?				
Doctor recommendation	435(60.8)	147(55.1)	288(64.1)	X^2=9.419
Family opinion	111(15.5)	46(17.2)	65(14.5)	
Mass media campaign	52(7.3)	22(8.2)	30(6.7)	p=0.051
Self-decision	95(13.3)	38(14.2)	57(12.7)	
Others	23(3.2)	14(5.2)	9(2.0)	

Table 3. Associations between Predictor Variables and Perceived Susceptibility, Perceived Seriuosness, Perceived Benefits and Barrier for having a HPV Vaccine (Doubt and Worry about HPV Vaccine and Adverse Effects)

Predictor variables	Logistic regression OR (95%CI)											
	Perceived susceptibility			Perceived seriousness			Perceived benefits			Doubt and worry of HPV vaccine and adverse effects		
	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
Gender	0.254	0.155-0.416	0	0.053	0.189-1.010	0.053	0.122	0.065-0.228	0	0.943	0.666-1.334	0.74
Knowledge of HPV infection and cervical cancer												
	1.04	0.916-1.182	0.544	0.894	0.716-1.116	0.322	1.165	0.991-1.369	0.064	0.951	0.865-1.045	0.295
Knowledge of HPV vaccine and cervical cancer												
	0.894	0.770-1.038	0.141	0.964	0.727-1.231	0.681	0.67	0.555-0.808	0	0.962	0.863-1.073	0.491

*Model 1-perceived susceptibility: Hosmer and Lemeshow test, $X^2(8)$=14.011, p=0.081; Cox and Snell R^2=0.097; Nagelkerke R^2=0.131; Model 2-perceived seriousness: Hosmer and Lemeshow test, $X^2(8)$=10.331, p=0.243; Cox and Snell R^2=0.009; Nagelkerke R^2=0.033; Model 3-perceived benefits: Hosmer and Lemeshow test, $X^2(8)$=2.987, p=0.935; Cox and Snell R^2=0.124; Nagelkerke R^2=0.240.

Logistic regression analysis revealed that perceived susceptibility i.e. vulnerability to HPV infection was statistically significant associated with gender (OR=0.254; 95% CI=0.155-0.416, p=0.000). However, knowledge of HPV infection and HPV vaccine were not associated with perceived susceptibility. Perceived seriousness was correlated well with gender and knowledge of HPV. Where as, perceived benefits i.e. students wants to be vaccinated was statistically significant associated with gender (OR=0.122, 95% CI=0.065-0.228, p=0.000) and 'knowledge of HPV vaccine and cervical cancer' (OR=0.670, 95% CI=0.555-0.808, p=0.000). As shown in the footnote of Table 5, p value>0.05 for the Hosmer and Lemeshow test indicated a good model fit for the regression model above (Table 3).

Further logistic regression analysis revealed that perceived barrier of having HPV vaccine was not statistically significant associated with gender (OR=0.943, 95% CI=0.666-1.334, p=0.740) and 'knowledge of HPV infection' (OR=0.951, 95% CI=0.865-.045, p=0.295) and 'HPV vaccine' (OR 0.962, 95% CI=0.863-1.073, p=0.491). Since the p value for the Hosmer and Lemeshow test was less than 0.05 but the Chi-square was small, the model fit was acceptable (Table 3).

Discussion

The final result of our study showed that the knowledge of the students were much below our expectation. Almost half of them obtained score of 5 and below (categorized as poor knowledge), 43.6% had moderate knowledge and only 7.5% possessed good knowledge. Of note, our study was conducted 3 years after the introduction of National HPV vaccination programme in our country. This was consistent with the study done by Wang and Wu, on 150 female college students in Taiwan, where the students exhibited a moderate level of knowledge regarding HPV vaccine (Wang and Wu, 2013). Other study also reported

similar findings. Hanisch et al conducted a study on 454 women in five different hospitals and clinics in Columbia where only 7.8% respondents had high knowledge while majority (79.3%) were considered low knowledge (Hanisc et al., 2008). However, these studies were not incongruent with Ezat et al who conducted a study on 155 women attending Obstetrics and Gynaecology clinic. They reported 51% respondents obtained overall good knowledge regarding cervical cancer, HPV and HPV vaccine (Ezat et al., 2013).

There were 437 (61.0%) respondents heard of HPV and cervical cancer. This was much lower than study done by Tan, Hesham & Oodriyah. Among 675 university students from Pharmacy and Allied Health Sciences, 577 (85%) were aware of cervical cancer (Tan et al., 2010). Similar percentage was expected before the start of our study as our study population was pre-university students. It would be reasonable to assume that their level of knowledge regarding HPV infection and cervical cancer were similar to university students. Furthermore, HPV vaccination had been introduced into our national vaccination programme where all secondary school girls will receive free vaccination for HPV. However, our result is lower. Gerend & Magloire conducted a study in Florida State University College of Medicine on 124 students aged 18-26 reported that 78% of the participants awared of HPV (Gerend and Magloire, 2008).

Further analysis on knowledge about 'HPV infection and cervical cancer', there were 437 (61.0%) respondents awared that HPV could cause cervical cancer. This was much greater than study done by Moraros et al where merely 15% awared that HPV causes cervical cancer (Moraros et al., 2006). Another study done by Dursun et al included 1434 women from Turkey reported that 45% heard of HPV and 40% knew that HPV was associated with cervical cancer (Dursun et al., 2009). However, the result was much encouraging when the study population is medically trained personnel. Study by Awodele et al. on 200 nurses in Lagos University, Nigeria reported that almost all respondents heard of cervical cancer and 92% of them knew that cervical cancer is caused by HPV (Awodele et al., 2011).

With regards to HPV vaccine, our study showed that 584 (81.6%) respondents heard of HPV vaccine and 67.9% respondents knew that HPV vaccine is able to protect against cervical cancer. Our findings agreed with the population based survey done by Ragin et al that 87% respondents had heard of HPV vaccine (Ragin et al., 2009). However, this was contradicting with Al-Dubai et al where only 21.7% of their respondents heard of HPV vaccine and 25.3% respondents correctly answered: 'HPV vaccine protects against cervical cancer' (Al-Dubai et al., 2010). Study by Arrossi et al also reported lower rate of HPV vaccine awareness (36.5%) (Arrossi et al., 2012).

Among 584 students who aware of HPV vaccine, their information was mainly obtained from Internet. This was followed by TV news, newspaper, school, poster and others. It was consistent with study done by Ezat et al. who reported that mass media was the main source of information followed by printed media and others (Ezat et al., 2013). Other studies also reported similar findings (Awodele et al., 2011; Khoo et al., 2011). For students who had never heard of HPV vaccine, most of them wished to obtain further information from Internet followed by newspaper, magazine and others. It was undeniable that our young adults nowadays spend most of their time on Internet and thought that information obtained via this route was somehow reliable. Therefore, effort should be made to disseminate more updated and verified information regarding HPV infection, HPV vaccine and cervical cancer through formal, reliable and safe websites, to increase the knowledge and awareness of our younger generation.

A serious misconception was noted among our study population in the statement: 'women received HPV vaccination still have to get Pap smear examination'. There were only 20.5% respondents gave correct answer to this statement. This was of great concern as previous local study had demonstrated that our women still unsure of the purpose and benefits of Pap smear screening (Rashwan, Lubis and Ni, 2011). Wong et al in their review showed that respondents believed that Pap smear is used to detect existing cancer and is not required if a woman is asymptomatic (Wong et al., 2009). If misconception persist among our young generation, this would jeopardise the effort of our government to increase the uptake of cervical cancer screening rates. It had been showed that women's knowledge was the strongest predictors for repeated screening (Wong et al., 2009). Therefore, regular health promotion campaigns should be organised to educate and encourage them in order to enable early detection hence treatment could be administrated promptly. Some study also suggested providing educational leaflet as one of the method to enhance HPV vaccine uptake (Wong and Sam, 2010).

Our study showed that only 19.8% students perceived susceptibility in which only 142 respondents thought that they were easily infected by HPV. Half of the respondents uncertain about this and 27.0% disagreed. However, majority (78.2%) of them thought that HPV infection was a serous disease and 62.3% would like to be vaccinated if the HPV infection was preventable. Our result was slightly better than study by Gerend & Magloire, where, 56% respondents disagreed that they were at risk of HPV infection and only 65% respondents were interested to receive HPV vaccine (Gerend and Magloire, 2008). Another study done by Yacobi et al on 500 university students in Florida agreed with our study where only 21% of respondents perceived risk of infection (Yacobi et al., 1999). Where as, study done in United Kingdom yield a better result as up to 88.1% of their respondents agreed for HPV vaccination although 70.5% of them wanted the vaccination to be free (Walsh et al., 2008).

From our study, those who did not wished to be vaccinated, 56% of them perceived barrier due to the high cost. Another 14.8% of them worried about its adverse effect, 11.3% were uncertain about its effectiveness, 9.2% not happy with the need for repeated dosage and 8.7% due to other reasons. In order to improve the coverage of vaccination programme, a lower vaccine price is an important factor. Therefore, economic incentive is needed in order to reduce the price of HPV vaccine to a more

reasonable range. This is important as the additional costs of introducing vaccination would be offset by the potential treatment cost needed to manage the disease caused by HPV infection and cervical cancer (Annemans et al., 2009). Interestingly, study done by Rashwan H et al among secondary school students in Sarawak, Malaysia showed a different pattern. The author reported that the main reason for refusal of vaccine was 'concern about the safety, side effect and efficacy' (Rashwan, Lubis and Ni, 2011).

Majority of our respondants (60.8%) thought that doctor's recommendation would be the most priority that influence their decision for HPV vaccination. This is probably because of the trust that is given to this profession hence the advice from a doctor is perceived as a more reliable source.

Other factor that influences the uptake of HPV vaccination was the providers' perception. Heatlhcare providers who belief in the safety profile of HPV vaccine had higher rate of providing vaacination to their patients (Perkins and Clark, 2012). From our study, female students were more likely to have heard of HPV and cervical cancer compared to their counter part. This was consistent with study done by Baer et al. and Lenselink et al (Baer et al., 2000; Lenselink et al., 2008). However, we were unclear of the reason.

Previous study showed that willingness to have HPV vaccination correlated well with the level of knowledge. Ezat SW et al showed that level of knowledge on HPV and national immunization programme had significant association with the acceptance of HPV vaccine among their respondents (Ezat et al., 2013). We found that knowledge of HPV vaccine and cervical cancer was significantly correlated with student's perceived benefits i.e. their intention to be vaccinated but not associated well with perceived susceptibility and perceived seriousness. However, the level of knowledge for HPV infection and cervical cancer was not correlated significantly with perceived susceptibility, perceived seriousness or perceived benefits. Gender was found to be significantly associated with perceived susceptibility and perceived benefits.

Doubt and concern about the efficacy and adverse effects was one of the important barrier for not having vaccination. We failed to demonstrate the association of this perception with the level of knowledge as shown in previous studies (Shafiee et al., 2013; Wong and Sam, 2010). Thus, it was suggested that the indicated barrier should be taken into account before a HPV vaccination programme is being implemented (Japers et al., 2011).

In conclusion, The level of knowledge regarding HPV was low among the pre-university students. At the same time, misconceptions about HPV persist despite we are now in the post-vaccine era. This group of students were not benefited from our national HPV vaccination programme. This issue must be taken seriously in order to enhance the uptake of HPV vaccination and improve knowledge and awareness among them. We believe that this study could serve as a useful guide to improve future implementations and policies with regards to improvement in HPV vaccination uptake, increase awareness of HPV infection and reduce the morbidity and mortality from cervical cancer.

There were some limitations in this study so that the results should be analysed and interpreted carefully. First of all, the respondents was recruited only from one pre-university programme, therefore there are reluctance in claiming this study as a representative of the whole population in Malaysia. Besides that, the method used in this study was convenience sampling, which may result in selection bias. Moreover, the questionnaire was answered by the respondents solely without supervision, thus discussion among the students might occur which causing the honesty of the answers to be questionable.

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