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Knowledge and Attitude Towards HPV Infection, its Sequelae and Vaccination Program among Malaysians

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Abstract

Basic knowledge about the agent of Human papillomavirus (HPV) infection, its mode of transmission and prevention including vaccination is important to reduce the burden of HPV infection and its sequelae nationwide. This study was designed to assess the knowledge and attitude towards HPV infection, its sequelae and vaccination program among Malaysian aged 18 to 29 years old. A cross sectional study was conducted among 115 Malaysian aged between 18 to 29 years old. The findings show there is a positive correlation between gender and awareness on the existence of HPV with the p-value of 0.003. P-value for age group and knowledge on HPV being a factor of cervical cancer is 0.023; hence there is a positive correlation too. Pearson correlation between age group and education level with awareness of HPV vaccination program in Malaysia show positive correlation with the p-value of 0.012 and 0.036 respectively. There is a positive correlation between gender and willingness to be vaccinated against HPV as the p-value obtained is 0.030. T-test shows significant difference between gender and the mean score on HPV vaccination (0.008).It is clear to see that there is a highly positive correlation between gender and awareness on the existence of HPV as the p-value is the smallest out of all. It also seems that female have significantly higher mean score comparing to male on the topic of HPV vaccination, with the mean score of 4.61 comparing to 2.90.

Key words: Autoinoculation, Papovaviridae, Colposcopes, Malignancy, Introitus.

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1. Introduction

Human papilloma virus (HPV) is a common sexually transmitted infection in Malaysia associated with increased risk of cancer. It is a well-established cause of cervical cancer and is responsible for a significant fraction of anogenital cancers (anus, vagina, vulva and penis) and head and neck cancer [1-2].

According to Globocan statistics (2012), every year there is an estimation of 500,000 cases and 275,000 deaths due to cervical cancer globally. While in Malaysia, there are 2145 new cervical cancer cases with 621 deaths annually [3]. Out of the 13 oncogenic HPV types, HPV-16 and HPV-18 are the highest causes of cervical cancer [4].

As an effort to combat this infection and its sequelae, Malaysia government has adopted HPV vaccination nationwide in August, 2010. The vaccine is currently given free of charge to all female Malaysian secondary students, with the target age of 13 years old. In year 2017, Malaysian females that met the criteria of born between the years 1990 to 1996, single, not pregnant and does not have serious allergic that requires immediate medical care are eligible to receive free HPV vaccination from any Klinik Nur Sejahtera LPPKN in the country. They will be given 3 doses of HPV vaccination within a span of 6 months [5].

Malaysia is the first middle-income country to introduce HPV vaccination program without financial support from other organization. 95% of consents were obtained out of all returned parental consent forms. Additionally, the acceptance of third dose of HPV vaccine was 90.8% as of October 2011 [6]. This study was designed to assess the knowledge and attitude towards HPV infection, its sequelae and vaccination program among Malaysian aged 18 to 29 years old.

2. Literature Review

2.1. The Virus

The human papilloma viruses are small, non-enveloped double stranded DNA viruses of the Papilloma virus genus of the family Papovaviridae. There are more than 100 types of HPVs and approximately half of them are capable of infecting the genital tract [7]. At least 13 of the HPVs are oncogenic, they are the subtypes 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 66, and 69 [8]. HPV-16 and HPV-18 are the highest causes of cervical cancer and they account for 70% of cervical cancer worldwide [4].

According to the data published by International Union against Cancer, the most common HPV types detected in vulvar intraepithelial neoplasia grade 1were HPV subtypes 6, 16 and 11. For vulvar intraepithelial neoplasia grade 2 and 3 and vulvar carcinoma were HPV subtypes 16, 33 and 18. For vaginal intraepithelial neoplasia grade 1, the most common HPVs detected were HPV-16, 56 and 51. While for vaginal intraepithelial neoplasia grade 2 and 3, the common subtypes are HPV-16, 18 and 58. In vaginal carcinoma, HPV-16, 18 and 31 are frequently found. HPV-16, 6, 18 and 11 are the common causes for anal intraepithelial neoplasia grade 1. For grade 2 and 3, it is mostly caused by HPV-16, 18, 33 and 58. For anal carcinoma, it is predominantly caused by HPV-18 and 33 [8]. According to these data, HPV subtypes 16 and 18 are most frequently found in HPV-positive cervical, vulvar, vaginal and anal carcinomas comparing to other oncogenic subtypes.

2.2. Transmissions

HPV infection is most commonly spread via sexual contact. Just like other sexually transmitted infections, the virus is carried in body fluids such as blood, vaginal fluid and semen. The virus will either enter the body through the tough outer skin due to cuts or needle inoculation, or enter into the body via fragile inner skin that lines the inside of vagina, penis, anus and mouth. However, virgins, infants and children can be affected by HPVs as well. Moreover, laryngeal papillomatosis is due to peripartum transmission of HPV-6 and 11 from infected mother to the infants [9]. So it became acknowledged that HPVs can be transmitted via vertical and horizontal routes [10].

Vertical transmission includes intrauterine and perinatal transmission [11]. A case-control study was conducted to evaluate the presence of 'high risk' HPV in human breast milk collected from 21 cases and 11 controls. This study concluded that there is absence of 'high risk' HPV in all samples of the study. Hence, transmission through breast milk is not an established cause [12].

Autoinoculation is one of the horizontal transmissions, where the virus can be transmitted via kissing or digital contacts. The virus can also be transmitted via fomites, especially in gynecology clinics. This is because disinfectants are unable to kill HPV on transvaginal ultrasound probes, colposcopes and other equipment used [13].

2.3. Pathogenesis

HPV can infect all types of squamous epithelium. Benign squamous papillomas (warts) usually develop 3 months after inoculation. Acanthosis and hyperkeratosis are features of warts and is the result of proliferation of epidermal layers that had been infected by HPV [14]. The HPV genome remains in nonintegrated form in benign warts and inpreneoplastic lesions. However, when the viral DNA integrated into host cell genome, it will result in malignancy. The viral DNA is integrated into random site of the host chromosome, but for a given cancer, the integration site is the same [15].

During the process of integration, the viral DNA is usually interrupted within the E1/E2 open reading frame of viral genome. This interruption results in over-expression of E6 and E7 proteins of HPV subtypes 16 and 18. E6 and E7 proteins enhance p53 degradation, causing stopping of apoptosis and growth arrest [16].

2.4. Symptoms

Most infected person does not realize that they are infected as the virus lives in the skin or mucous membrane and does not cause symptoms. Some may develop cutaneous warts, and it usually appears within an average period of three months. Common warts are exophytic and have well-defined borders. Plantar and palmar warts are usually painful, while planar warts are more common in children [14].

Sexually transmitted HPV will commonly result in anogenital warts. The preputial cavity is the most commonly affected area in uncircumcised men, while for those circumcised; the penile shaft is more commonly affected. Anal warts are more frequently found in homosexual men. For women, warts are commonly found over the posterior introitus, the labia and the clitoris. Women with genital warts should go for further investigation to find out the subtypes of HPV, to rule out the possibility of cervical carcinoma [14].

Laryngeal papillomatosis, also known as recurrent respiratory papillomatosis is the disease of larynx and airway. In children, it is acquired intrapartum. While for adults, it is mainly due to oral-genital contact. Patient will present with hoarseness of sound or an altered cry. Complications include obstruction, stridor, infection and respiratory distressed which requires surgical excision [14].

2.5. Diagnosis

According to Indian Journal of Sexually Transmitted Diseases, electron microscopy and certain immunological methods are not suitable for HPV diagnosis. Besides that, HPV cannot be culture by using cell culture [17].For visible warts present at anogenital area; HPV can be diagnosed by visual inspection with acetic acid (VIA). If warts are not visually present, tests such as colposcopy and acetic acid test, biopsy, DNA test and Pap smear can be used to diagnose HPV infection. Positive acetowhite staining is observed in HPV positive patients after applying gauze that had been soaked in 3-5% of acetic acid on the suspected lesions for 5 to 10 min [17]. According to a study conducted in Thailand, visual inspection with 5% of acetic acid demonstrated 50% sensitivity and 66.7% specificity for abnormally histology of cervical cells that had been infected by HPV [18]. Colposcopy can be coupled with the use of acetic acid to examine the cervix, vagina and vulva. Colposcopy allows biopsy of the targeted suspected area and excisional biopsy is indicated when colposcopic appearances show high grade abnormality. Biopsy of the suspected area is important as treatment will depend on the severity of the sample collected [17].

HPV can be diagnosed by using DNA techniques. One of the tests is hybrid capture 2 high-risk HPV DNA test, which is approved by the FDA [19]. The test have high sensitivity and specificity, it can detect as little as 1pg of HPV DNA/ml [17]. The second technique is by using polymerase chain reaction. Pap smear can detect premalignant and malignant changes and HPV infection. Scraping is taken by using Ayre's spatula at the squamocolumnar junction. The scraping is then examined under microscope to find out any abnormalities. Positive test requires further confirmatory tests like coloscopy, cervical biopsy, and DNA tests like PCR [17].

2.6. Treatments

Most of the cutaneous warts will resolve by itself, but salicylic acid-based preparations or cryotherapy can be used to remove cutaneous warts. About 70% of cases can be cure by using these 2 treatments [14]. For recurrent respiratory papillomatosis (RRP), surgeries are needed to remove the papillomas. Types of surgeries available involve microdebridement, angiolytic laser, cryotherapy, and carbon dioxide laser. Injection of antiviral medication, cidofovir may be needed, especially for those with moderate-to-severe RRP. Endoscopic treatment is important for removal of papillomas that cannot be access via laryngoscopy and for moderate-to-severe RRP because it allows injection of cidofovir intralesionally [20]. Patients that underwent office-based photoangiolytic laser surgery (UOLS) have reduced voice handicap, and improved voice quality without the complications associated with direct laryngoscopy and general anesthesia [21].

According to CDC, the treatment for anogenital warts depends on its size, number, anatomic site, patient's preference, treatment cost, convenience and adverse effects. Recommended regimens for external anogenital warts include Imiquimod (cream), Podofilox (solution, gel), Sinecatechins (ointment), cryotherapy with liquid nitrogen or cryoprobe, surgical removal either by tangential scissor excision, tangential shave excision,

curettage, laser, or electrosurgery and Trichloroacetic acid (solution) or Bichloroacetic acid (solution). Unfortunately, anogenital warts commonly recur, especially in the first 3 months, even after appropriate treatment is done [22].

3. Experimental

3.1. Study Design and Sample

Malaysian aged between 18 to 29 years old were targeted as the sample. The sampling technique used were non probability, convenient sampling. Online questionnaires were distributed via social network platform such as Facebook and WhatsApp to access the knowledge and attitude of participants towards HPV infection and HPV's sequelae and its vaccination program in Malaysia. Informed consent was given to participant at the top of electronic questionnaire distributed.

3.2. Survey Instrument

The questionnaire was created with the help of Google Forms and it was published in English. The questionnaire from the study titled "Knowledge, Attitude and Practice of Human Papilloma Virus (HPV) Vaccination among Secondary School Students in Rural Areas of Negeri Sembilan, Malaysia" conducted by Fairuz Fadhilah Mohd Jalani from Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia was used as a reference. The questionnaire contain 41 questions, the first few questions are related to participant's demographics such as gender, age group, race and highest educational level. The rest of the questions are to access participant's knowledge about HPV infection and its complications. The last section of the questionnaire was about participant's willingness to receive HPV vaccine. For those who choose the answer 'No' towards receiving HPV vaccine, they are directed to another section to find out their reason for not willing to be vaccinated. Participants are allowed to choose more than one reason for their unwillingness.

3.3. Statistical Analysis

After data collection, Microsoft Excel and IBM SPSS were used to analyze the data. Microsoft Excel was used to calculate the total score for each participant and to create tables for easy evaluation of data. Data was summarized in tables and charts form by using IBM SPSS for easy interpretation.

4. Results and Discussion

The electronic questionnaire was distributed to 142 people, but received a total of 115 responses; hence the response rate was 80.99%. Participants' demographics are given Table 1. Figure 1 and 2 are bar charts those show awareness on the existence of HPV according to male and female and separated by their age group. Table 2 shows the Pearson correlation between gender and the awareness on the existence of HPV. Table 3 and 4 are regarding the awareness on the existence of HPV according to education level. Table 5, 6, 7, 8, 9 and 10 are related to the knowledge of HPV being a STI according to gender, age group and education level. Table 11, 12, 13, 14, 15 and 16 are regarding about the knowledge of HPV being a factor of cervical cancer according to gender, age group and education level. Knowledge of Pap smear being used to diagnose HPV according to gender, age group and education level is recorded in table 17, 18, 19, 20, 21 and 22.Table 23 to 28 summarizes the awareness of HPV vaccination program in Malaysia for different gender, age group and education level. Table 29 to 34 records the willingness of respondents towards being vaccinated against HPV. Table 35 shows

the reason given by respondents that are unwilling to be vaccinated. Scoring on HPV (type of disease, mode of transmission and its sequelae), according to gender, age group and education level is recorded in table 36, 37 and 38. Table 39, 40 and 41records the scoring on HPV diagnosis for each independent variable. Table 42, 43 and 44 are related to scoring on HPV vaccination for each gender, age group and education level.

Table 1. Demographics of participants.

Gender	**Frequency**	**Percentage**
Male	51	44.3%
Female	64	55.7%
Total	115	100.0%
Age group	**Frequency**	**Percentage**
18 – 24	105	91.3%
25 – 29	10	8.7%
Total	115	100.0%
Race	**Frequency**	**Percentage**
Malay	5	4.3%
Chinese	97	84.3%
Indian	11	9.6%
Other	2	1.7%
Total	115	100.0%
Highest/ Current education level	**Frequency**	**Percentage**
Primary	0	0.0%
Secondary	21	18.3%
Tertiary	94	81.7%
Total	115	100.0%

Total respondent is 115, with the male to female ratio of 0.8 to 1.0. 91.3% (105) of respondent are from the age group 18 to 24 years, with 44.8% (47) being male and 55.2 (58) being female. 40.0% (4) from the age group of 25 to 29 are male, while 60.0% (6) are female. Out of the 115 respondents, 84.3% (97) of them are Chinese, being the highest percentage, followed by Indians with 9.6% (11), Malays with 4.3% (5) and other with 1.7% (2). According to the Department of Statistic Malaysia, 68.6% of Malaysia populations are bumiputera, followed by 23.4% of Chinese, 7.0% of Indians and 1.0% of others [23]. Hence, the data collected by this study does not reflect the true proportion of the Malaysia populations. 81.7% (94) of the respondents

are currently in or graduated with tertiary education level, while 18.3% (21) of them only hold secondary education level certificate.

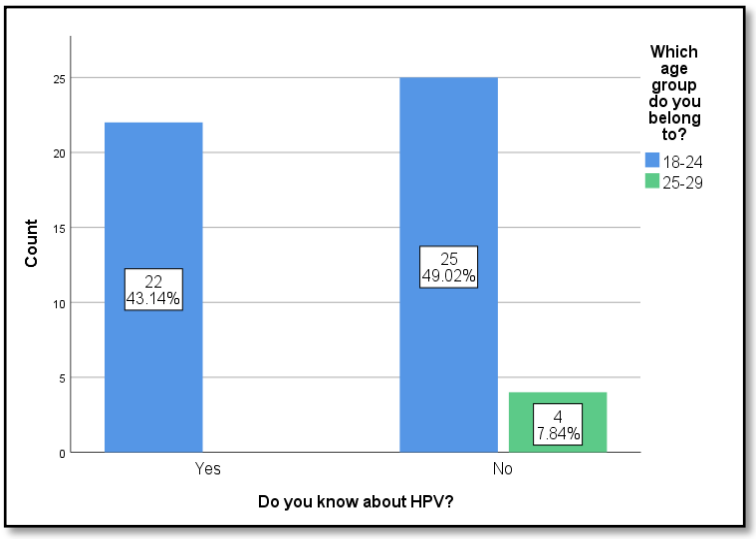

Figure 1. Awareness on the existence of HPV, for male, separated by age group.

Only 43.14% (22) of male knows about or had heard of HPV. None of the male from the age group of 25 to 29 is aware of the existence of HPV.

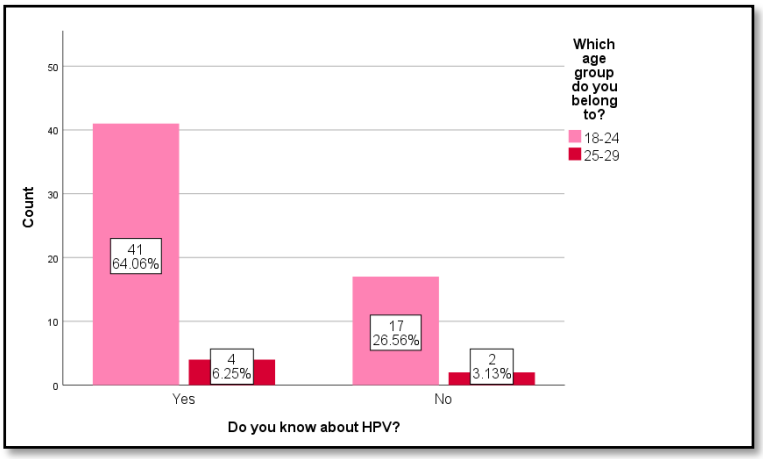

Figure 2. Awareness on the existence of HPV, for female, separated by age group.

70.3% (45) of female are aware of the existence of HPV, with 91.1% (41) of them being 18 to 24 years old and 8.9% (4) of them being 25 to 29 years old.

Table 2. Pearson Correlation between gender and the awareness on the existence of HPV.

		Awareness on the existence of HPV
Gender	Pearson correlation	8.619*
	$Sig. (2-tailed)	0.003
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

The Pearson correlation between the gender of the participant (independent variable) and the awareness on the existence of HPV (independent variable) showed a positive correlation with the p-value <0.05 (0.003), signifying the association. Thus the alternative hypothesis, which is there is an association between the gender of participants and the awareness on the existence of HPV can be accepted.

Table 3. Awareness on the existence of HPV, according to education level.

			Do you know about HPV?		Total
			Yes	No	
What is your highest education level?	Secondary	Count	9	12	21
		Percent	42.9%	57.1%	100.0%
	Tertiary	Count	58	36	94
		Percent	61.7%	38.3%	100.0%

Table 4. Pearson Correlation between education level and the awareness on the existence of HPV.

		Awareness on the existence of HPV
Education level	Pearson correlation	2.507*
	$Sig. (2-tailed)	0.113
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Out of 21 of those who hold secondary education level certificate, 42.9% (9) of them are aware about the existence of HPV. For those with tertiary education level, 61.7% (58) of them are aware of HPV.

The Pearson correlation between education level (independent variable) and the awareness on the existence of HPV (dependent variable) showed a negative correlation as the p-value is more than 0.05 (0.113). Hence, the null hypothesis is accepted, which is there is no association between the education level and the awareness on the existence of HPV.

Table 5. Knowledge of HPV being a STI according to gender.

			Is HPV a sexually transmitted disease?			Total
			Yes	No	I do not know	
What is your gender?	Male	Count	23	4	24	51
		Percent	45.1%	7.8%	47.1%	100.0%
	Female	Count	42	2	20	64
		Percent	65.7%	3.1%	31.3%	100.0%

Table 6. Pearson correlation between gender and the knowledge of HPV being a STI.

		Awareness on the existence of HPV
Gender	Pearson correlation	5.181*
	$Sig. (2-tailed)	0.075
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 7. Knowledge of HPV being a STI according to age group.

			Is HPV a sexually transmitted disease?			Total
			Yes	No	I do not know	
Which age group do you belong to?	18-24	Count	61	6	38	105
		Percent	58.1%	5.7%	36.2%%	100%
	25-29	Count	4	0	6	10
		Percent	40.0%	0.0%	60.0%	100%

Table 8. Pearson correlation between age group and the knowledge of HPV being a STI.

		Awareness on the existence of HPV
Age group	Pearson correlation	2.453*
	$Sig. (2-tailed)	0.293
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 9. Knowledge of HPV being a STI according to education level.

			Is HPV a sexually transmitted disease?			Total
			Yes	No	I do not know	
What is your highest education level?	Primary	Count	0	0	0	0
		Percent	0.0%	0.0%	0.0%	0.0%
	Secondary	Count	10	1	10	21
		Percent	47.6%	4.8%	47.6%	100.0%
	Tertiary	Count	55	5	34	94
		Percent	58.5%	5.3%	36.2%	100.0%

Table 10. Pearson correlation between education level and knowledge of HPV being a STI.

		Awareness on the existence of HPV
Education level	Pearson correlation	0.959*
	$Sig. (2-tailed)	0.619
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

More female (65.7%) are aware that HPV is a STI comparing to male (45.1%). 58.1% (61) of those aged 18 to 24 are aware that HPV is a STI, which is higher than those aged 25 to 29 with only 40.0% (4). 58.5% (55) of those who have tertiary education answered correctly and is 10.9% more than those with secondary education level (47.6%).

The Pearson correlation between gender, age group and education level with knowledge of HPV being a STI have the p-value of 0.075, 0.293 and 0.619, respectively. These p-values are larger than 0.05. Hence, there is no association between gender, age group and education level with knowledge of HPV being a STI.

Table 11. Knowledge on HPV being a factor of cervical cancer according to gender.

			Can HPV cause cervical cancer in female?			Total
			Yes	No	I do not know	
What is your gender?	Male	Count	20	2	29	51
		Percent	39.2%	3.9%	56.9%	100.0%
	Female	Count	33	4	27	64
		Percent	51.6%	6.2%	42.2%	100.0%

Table 12. Pearson correlation between gender and knowledge on HPV being a factor of cervical cancer.

		Awareness on HPV being a factor of cervical cancer
Gender	Pearson correlation	2.489*
	$Sig. (2-tailed)	0.288
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 13. Knowledge on HPV is a factor of cervical cancer according to age group.

			Can HPV cause cervical cancer in female?			Total
			Yes	No	I do not know	
Which age group do you belong to?	18-24	Count	52	6	47	105
		Percent	49.5%	5.7%	44.8%	100.0%
	25-29	Count	1	0	9	10
		Percent	10.0%	0.0%	90.0%	100.0%

Table 14. Pearson correlation between age group and knowledge on HPV being a factor of cervical cancer.

		Awareness on HPV being a factor of cervical cancer
Age group	Pearson correlation	7.503*
	$Sig. (2-tailed)	0.023
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 15. Knowledge on HPV is a factor of cervical cancer according to education level.

			Can HPV cause cervical cancer in female?			Total
			Yes	No	I do not know	
What is your highest education level?	Primary	Count	0	0	0	0
		Percent	0.0%	0.0%	0.0%	0.0%
	Secondary	Count	12	0	9	21
		Percent	57.1%	0.0%	42.9%	100.0%
	Tertiary	Count	41	6	47	94
		Percent	43.6%	6.4%	50.0%	100.0%

Table 16. Pearson correlation between education level and knowledge on HPV being a factor of cervical cancer.

		Awareness on HPV being a factor of cervical cancer
Education level	Pearson correlation	2.202*
	$Sig. (2-tailed)	0.333
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

51.6% (33) of female answered correctly for HPV being able to cause cervical cancer, comparing to only 39.2% (20) of male answered correctly. Almost half (49.5%) of those aged 18 to 24 knows that HPV can cause cervical cancer. For those with secondary education level, more than half of them (57.1%) are aware that cervical cancer can be caused by HPV, while only 43.6% from tertiary education level are aware of this.

The p-value for Pearson correlation between gender, age group and education level with knowledge on HPV being a factor for cervical cancer are 0.288, 0.023 and 0.333 respectively. For the independent variable of

gender and education level, the p-value is greater than 0.05, hence there is no association between the independent variable and the dependent variable. For age group, the p-value is lesser than 0.05 (0.023), hence the null hypothesis have to be rejected. Therefore, there is an association between age group and the knowledge on HPV being a factor for cervical cancer.

Table 17. Knowledge on Pap smear being used to diagnose HPV infection according to gender.

			Can Pap smear be used to diagnose HPV infection?			Total
			Yes	No	I do not know	
What is your gender?	Male	Count	10	5	36	51
		Percent	19.6%	9.8%	70.6%	100.0%
	Female	Count	20	7	37	64
		Percent	31.3%	10.9%	57.8%	100.0%

Table 18. Pearson correlation between gender and knowledge on Pap smear being used to diagnose HPV infection.

		Awareness on Pap smear being used to diagnose HPV infection
Gender	Pearson correlation	2.239*
	$Sig. (2-tailed)	0.326
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 19. Knowledge on Pap smear being used to diagnose HPV infection according to age group.

			Can Pap smear be used to diagnose HPV infection?			Total
			Yes	No	I do not know	
Which age group do you belong to?	18-24	Count	27	11	67	105
		Percent	25.7%	10.5%	63.8%	100.0%
	25-29	Count	3	1	6	10
		Percent	30.0%	10.0%	60.0%	100.0%

Table 20. Pearson correlation between age group and knowledge on Pap smear being used to diagnose HPV infection.

		Awareness on Pap smear being used to diagnose HPV infection
Age group	Pearson correlation	0.087*
	$Sig. (2-tailed)	0.975
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 21. Knowledge on Pap smear being used to diagnose HPV infection according to education level.

			Can Pap smear be used to diagnose HPV infection?			Total
			Yes	No	I do not know	
What is your highest education level?	Primary	Count	0	0	0	0
		Percent	0.0%	0.0%	0.0%	0.0%
	Secondary	Count	7	0	14	21
		Percent	33.3%	0.0%	66.7%	100.0%
	Tertiary	Count	30	12	73	115
		Percent	26.1%	10.4%	63.5%	100.0%

Table 22. Pearson correlation between education level and knowledge on Pap smear being used to diagnose HPV infection.

		Awareness on Pap smear being used to diagnose HPV infection
Education level	Pearson correlation	3.239*
	$Sig. (2-tailed)	0.198
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

More female than male knows that Pap smear is a diagnostic tool for HPV infection, with 31.3% (20) comparing to 19.6% (10). For age group, there are a similar percentage of respondents that answered correctly. For 18 to 24, it is 25.7% (27), while for 25 to 29; it is 30.0% (3). For respondent with secondary education level, there is a higher percentage of answered correctly (33.3%) comparing to tertiary education level (26.1%).

The Pearson correlation between gender, age group and education level with knowledge on Pap smear being a diagnostic tool for HPV infection showed a negative correlation with p-value lesser than 0.05. Hence, there is no association between the independent variables with knowledge on Pap smear being used to diagnose HPV infection.

Table 23. Awareness of HPV vaccination program in Malaysia according to gender.

			Do you know about the HPV vaccination program in Malaysia?		Total
			Yes	No	
What is your gender?	Male	Count	16	35	51
		Percent	31.4%	68.6%	100.0%
	Female	Count	35	29	64
		Percent	54.7%	45.3%	100.0%

Table 24. Pearson correlation between gender and awareness of HPV vaccination program in Malaysia.

		Awareness of HPV vaccination program
Gender	Pearson correlation	6.215*
	$Sig. (2-tailed)	0.012
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 25. Knowledge on HPV vaccination program in Malaysia according to age group.

			Do you know about the HPV vaccination program in Malaysia?		Total
			Yes	No	
Which age group do you belong to?	18-24	Count	49	56	105
		Percent	46.7%	53.3%	100.0%
	25-29	Count	2	8	10
		Percent	20.0%	80.0%	100.0%

Table 26. Pearson correlation between age group and awareness of HPV vaccination program in Malaysia.

		Awareness of HPV vaccination program
Age group	Pearson correlation	2.631*
	$Sig. (2-tailed)	0.105
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 27. Awareness on HPV vaccination program in Malaysia according to education level.

			Do you know about the HPV vaccination program in Malaysia?		Total
			Yes	No	
What is your highest education level?	Primary	Count	0	0	0
		Percent	0.0%	0.0%	0.0%
	Secondary	Count	5	16	21
		Percent	23.8%	76.2%	100.0%
	Tertiary	Count	46	48	94
		Percent	48.9%	51.1%	100.0%

Table 28. Pearson correlation between education level and awareness on HPV vaccination program in Malaysia.

		Awareness of HPV vaccination program
Education level	Pearson correlation	4.391*
	$Sig. (2-tailed)	0.036
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

More female than male are aware of the HPV vaccination program in Malaysia, with the percentage of 54.7% comparing to 31.4%. For both of the age groups, there are more respondents that are unaware of the vaccination program comparing to those that are aware of it. It is the same for education level as well, more are unaware than those that are.

The p-value for Pearson correlation between age group and awareness of HPV vaccination program is lesser than 0.05 (0.012), and for education level it is lesser than 0.05 as well (0.036). Therefore there is a positive correlation and alternative hypothesis can be accepted, which is there is an association between age group and education level with awareness of HPV vaccination program in Malaysia. The p-value for Pearson correlation between age group and awareness of HPV vaccination is more than 0.05 (0.105), hence there is no association.

Table 29. Willingness to receive HPV vaccine according to gender.

			Are you willing to be vaccinated against HPV?		Total
			Yes	No	
What is your gender?	Male	Count	41	10	51
		Percent	80.39%	19.61%	100.0%
	Female	Count	60	4	64
		Percent	93.75%	6.25%	100.0%

Table 30. Pearson correlation between gender and willingness to receive HPV vaccine.

		Willingness to be vaccinated
Gender	Pearson correlation	4.737*
	$Sig. (2-tailed)	0.030
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 31. Willingness to receive HPV vaccine according to age group.

			Are you willing to be vaccinated against HPV?		Total
			Yes	No	
Which age group do you belong to?	18 – 24	Count	93	12	105
		Percent	88.6%	11.4%	100.0%
	25 - 29	Count	8	2	10
		Percent	80.0%	20.0%	100.0%

Table 32. Pearson correlation between age group and willingness to receive HPV vaccine.

		Willingness to be vaccinated
Age group	Pearson correlation	0.627*
	$Sig. (2-tailed)	0.428
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

Table 33. Willingness to receive HPV vaccine according to education level.

			Are you willing to be vaccinated against HPV?		Total
			Yes	No	
What is your highest education level?	Primary	Count	0	0	0
		Percent	0.0%	0.0%	0.0%
	Secondary	Count	18	3	21
		Percent	85.7%	14.3%	100.0%
	Tertiary	Count	83	11	94
		Percent	88.3%	11.7%	100.0%

Table 34. Pearson correlation between education level and willingness to receive HPV vaccine.

		Willingness to be vaccinated
Education level	Pearson correlation	0.107*
	Sig. (2-tailed)	0.743
	N	115
*Correlation is significant at the 0.05 level (2-tailed), $Significance.		

93.75% (60) of female are willing to be vaccinated against HPV, which is higher than male with the percentage of 80.39% (41). For both age groups, there are more respondents that are willing to be vaccinated compare to those unwilling respondents. It is the same applied to education level.

The p-value for Pearson correlation between age group and education level with willingness to receive HPV vaccine is higher than 0.05, hence there is no association between the independent and dependent variable. For gender, the p-value is 0.030, which is lesser than 0.05. Therefore, the null hypothesis has to be rejected and it is said that there is an association between gender and the willingness to be vaccinated against HPV.

Table 35. Reason for not willing to be vaccinated against HPV.

	Frequency	Percent
It is not a big issue	4	22.2
It is none of my concern	7	38.9
Financial issue	1	5.6
Religion/ Cultural issue	0	0.0
Due to possible side effects	4	22.2
No knowledge of HPV	2	11.1
Total	18	100.0

Table 36. Scoring on HPV (type of disease, mode of transmission and its sequelae), according to gender.

	Gender	N	Mean	*Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV	Male	51	5.35	5.473	0.766		
	Female	64	7.05	5.236	0.654		
	*Std.: Standard					-1.689	0.094

Table 37. Scoring on HPV (type of disease, mode of transmission and its sequelae), according to age group.

	Age group	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV	18 – 24	105	6.50	5.416	0.529		
	25 – 29	10	4.20	4.803	1.519		
	*Std.: Standard					1.292	0.199

Table 38. Scoring on HPV (type of disease, mode of transmission and its sequelae), according to education level.

	Education level	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV	Secondary	21	6.57	5.344	1.166		
	Tertiary	94	6.23	5.421	0.559		
	*Std.: Standard					0.259	0.796

The significant level between gender, age group and education level with scoring on HPV (type of disease, mode of transmission and its sequelae) are all more than 0.05. Therefore there is no significant difference in the mean of the scoring between different groups in each independent variable.

Table 39. Scoring on HPV diagnosis, according to gender.

	Gender	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV diagnosis	Male	51	0.41	0.698	0.098		
	Female	64	0.42	0.662	0.083		
	*Std.: Standard					-0.79	0.937

Table 40. Scoring on HPV diagnosis, according to age group.

	Age group	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV diagnosis	18 – 24	105	0.42	0.676	0.066		
	25 – 29	10	0.40	0.699	0.221		
	*Std.: Standard					0.085	0.933

Table 41. Scoring on HPV diagnosis, according to education level.

	Education level	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV diagnosis	Secondary	21	0.52	0.750	0.164		
	Tertiary	94	0.39	0.659	0.068		
	*Std.: Standard					0.264	0.798

The significant level for gender, age group and education level with scoring on HPV diagnosis are 0.937, 0.933 and 0.798 respectively. All are more than 0.05, therefore there is no significant difference in the mean of scoring on HPV diagnosis between each groups in each independent variable.

Table 42. Scoring on HPV vaccination, according to gender.

	Gender	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV vaccination	Male	51	2.90	3.401	0.476		
	Female	64	4.61	3.327	0.416		
	*Std.: Standard					-2.707	0.008

Table 43. Scoring on HPV vaccination, according to age group.

	Age group	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV vaccination	18 – 24	105	4.00	3.456	0.337		
	25 – 29	10	2.30	3.164	1.001		
	*Std.: Standard					1.496	0.137

Table 44. Scoring on HPV vaccination, according to education level.

	Education level	N	Mean	Std. deviation	Std. error mean	t	Sig. (2-tailed)
Score on HPV vaccination	Secondary	21	3.19	3.763	0.821		
	Tertiary	94	4.00	3.382	0.349		
	*Std.: Standard					-0.971	0.333

The significant level between age group and education level with scoring on HPV vaccination is more than 0.05. Therefore, there is no significant difference between the dependent and independent variable.The significant level for gender with scoring on HPV vaccination is 0.008, which is lesser than 0.05. Therefore, we can say that female's mean score on HPV vaccination is significantly higher than that of male, with 4.61 compare to 2.90.

4.1. Limitations

As this study is conducted by non-probability, convenient sampling, hence the race proportion does not reflect the true proportion. This issue can be solve by obtaining more sample from the Malays and Indians, and try to achieve the true race proportion given by the Malaysian government. Besides that, the numbers of sample obtained for different age group have a huge gap. Equal or close to equal numbers of sample for each age group should be obtained for a more accurate result.

5. Conclusion

Knowledge and awareness on HPV is crucial as it helps individual to identify the route of transmission, signs and symptoms and prevention of HPV. Besides that, by preventing HPV, we are able to prevent its complications such as cervical cancer. Government should put more effort in educating the public about HPV so that we are able to tackle this issue. This study shows a highly positive correlation between gender and awareness on the existence of HPV and significant difference in gender and means score on HPV vaccination.

6. Conflicts of Interest

The author(s) report(s) no conflict(s) of interest(s). The author along are responsible for content and writing of the paper.

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NA

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