KNOWLEDGE, ATTITUDES, AND ACCEPTABILITY OF A HUMAN PAPILLOMA VIRUS VACCINE AMONG STUDENTS, PARENTS AND TEACHERS IN THAILAND

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Abstract. The purpose of this study was to assess the knowledge and attitudes about human papilloma virus (HPV) and cervical cancer, and the acceptability of HPV vaccine among students, parents and teachers in secondary schools in Bangkok, Thailand. We conducted a school-based cross-sectional study at four public secondary schools in Bangkok. A total of 644 students aged 12-15 years, 664 parents and 304 teachers were recruited into the study. Data were collected by self-administered questionnaires. The percentages of students, parents and teachers who were willing to be vaccinated were 26, 49 and 43%, respectively. Forty-one percent of parents wanted their children to be vaccinated. Students, parents and teachers had a moderate knowledge of HPV, cervical cancer and the HPV vaccine with mean scores of 6.91 (SD=1.75), 6.82 (SD=1.88), and 6.70 (SD=1.89), respectively. The attitudes of students, parents, and teachers were fair with scores of 3.46 (SD=0.41), 3.52 (SD=0.43), and 3.46 (SD=0.47) out of 5, respectively. Twenty-nine percent of students and 36% of parents were willing to pay USD 14.3-28.5 per dose for the quadrivalent vaccine; 33% of teachers were willing to pay < USD 14.3 per dose for the quadrivalent vaccine. This study is the first study to report the knowledge, and attitudes and acceptability of HPV vaccination in Thailand. The findings suggest the willingness to pay was relatively low and related to the price, while knowledge and attitudes regarding the importance of the HPV vaccine were fair particularly among parents and teachers. Greater effort may be needed to educate people regarding the cost and benefits of HPV vaccination before it would be more acceptable to parents, teachers and students in Thailand.

Keywords: Human Papilloma Virus (HPV), cervical cancer, HPV vaccine

INTRODUCTION

There are more than 100 human papillomavirus (HPV) types, of which 40 can infect the genital tracts of men and women (CDC, 2007). Most genital HPV infections are transient and asymptomatic. Women persistently infected with high-risk types of HPV are at greatest risk for developing cervical cancer precursors and cancer (Moscicki *et al*, 1998).

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In sexually experienced youth, the prevalence rate of HPV infection can be as high as 82% (Brown *et al,* 2005; Paavonen *et al,* 2007). Persistent infection with high risk types of HPV is associated with cervical cancer (Brabin *et al,* 2007; Nielsen *et al,* 2010). In Thailand, approximately 10,000 new cervical cancer cases occur yearly at a rate of 29.2 per 100,000 (WHO, 2010). Cervical cancer screening has been reported to cover approximately 70% of Thai women aged ≥35 years (Ministry of Public Health, 2009); however, the prevalence of cervical cancer in Thailand is unknown.

Recent scientific advances had led to the development of two formulations of vaccines against HPV infection. The first is a quadrivalent vaccine targeting the two most common types of HPV associated with cervical cancer and the two most common types of HPV associated with genital warts. The other is a bivalent vaccine targeting only the types of HPV associated with cervical cancer. These HPV vaccines had been shown to have high efficacy and safety for use in young women aged 9-26 years (Villa *et al,* 2005; Paavonen *et al,* 2007; Songthap *et al,* 2009). The two vaccines reduced CIN 2/3 and adenocarcinoma *in situ* (AIS) associated with HPV 16 and 18 by 100% in a clinical trial. The previous studies found the HPV vaccine was generally acceptable to adolescents and parents (Lazcano-Ponce *et al,* 2001; Davis *et al,* 2004; Olshen *et al,* 2005; Zimet *et al,* 2005; Brabin *et al,* 2007; Brewer and Fazekas, 2007; Constantine and Jerman, 2007; Marlow *et al,* 2007; Woodhall *et al,* 2007). However, these finding cannot be generalized to developing countries with different cultural beliefs and family and social norms. In Thailand, a developing country, the HPV vaccine has been licensed since 2007 and is available mainly in private hospitals. The HPV vaccine has been recommended for young woman aged 9-26 years and the vaccine costs 2,000-3,000 Thai Baht. A current Ministry of Public Health program is piloting a free of charge HPV vaccine among school girls in grade 12 from Nakhon Si Thamarat Province; the number of persons vaccinated in the Thai population is not available. There is little data regarding HPV vaccine acceptability among adolescents, parents and teachers. This study assessed knowledge and attitudes regarding HPV, cervical cancer and acceptability of the HPV vaccine among adolescents, parents and teachers. Findings of this study can help identify areas of concern and willingness to be vaccinated among adolescents, parents and teachers among Thais, a developing country with a per capital GDP of USD 8,100 per year 2009 (CIA, 2010). The results may be used for planning an HPV vaccine program.

MATERIALS AND METHODS

Study design and population

This study was a school-based cross-sectional study assessing knowledge and attitudes regarding HPV, cervical cancer and acceptability of the HPV vaccine among students, parents and teachers in Bangkok, Thailand. Students aged 12-15 years from 4 government secondary schools in Bangkok were chosen for the study. Students were from three class levels (grades 7-9). The sample size was chosen to give a 95% confidence interval with an acceptance rate of 65% (Olshen *et al,* 2005; Zimet *et al,* 2005; Marlow *et al,* 2007). We assumed the incomplete/non-response rate would be 15% and the acceptance level and decision making process might differ between male and female students; therefore, the calculated sample

size was doubled. Eight hundred students with a sex ratio of 1:1 were included in the study. At each of the 4 schools, 34 males and 34 females were randomly selected from each class level. Eight hundred parents guardians were chosen, at one for each child and 400 teachers (100 from each school) were included in the study. After obtaining informed consent, participants filled out questionnaires. Parental/guardian consent was obtained prior to the students filling out their questionnaire.

Data collection

The study was carried out between October and December 2009 using a self-administered closed-ended statement questionnaire (Songthap *et al,* 2009). The questionnaires had assessed basic knowledge of HPV infections and their consequences, knowledge of cervical cancer, including causes, risks, outcomes and screening methodologies, knowledge of the HPV vaccine and its efficacy, safety and benefits. Attitudes towards HPV infection, cervical cancer and HPV vaccine efficacy and its benefit were assessed. The questionnaires asked whether the various characteristics of the vaccine (vaccination procedure, cost, benefits and target groups for vaccination) were acceptable. The questionnaire was first piloted by a research team at a secondary school. The reliability of the questionnaire was evaluated among 30 students, 30 parents, and 30 teachers, and gave Cronbach alpha coefficients regarding attitude of 0.74 0.79, and 0.81, respectively and: KR-20 for knowledge of 0.82, 0.77, and 0.85, respectively (Ebel and Frisbie, 1986). The content validity of the questionnaire was verified by at least three experts. The questionnaire was then adjusted after obtaining the recommendations of the experts.

Statistical analyses

Attitude was assessed using a 5-level Likert scale (Wuensch, 2005) with answers ranging from 1 (strongly disagree) to 5 (strongly agree). Attitude results were calculated from mean scores and grouped into three classes: 1-2.33 = negative, 2.34-3.67 = neutral, 3.68-5 = positive. Descriptive statistics, independent *t*-test and chi-square test were used. Data were analyzed using the statistical software program SPSS®, version 17.0 (SPSS, Chicago, IL). Significance was set at 0.05.

Ethical considerations

The study protocol and questionnaires were approved by the Ethics Committee of the Faculty of Tropical Medicine, Mahidol University.

RESULTS

General characteristics of participants

Students. Six hundred sixty-four students completed the study; their average age was 13.1 years (SD=0.90, range l2-15 years). Ninety-eight percent of students were Buddhists and 53.3% were girls. The distributions of ages, grades and religions was similar between the male and female students, (p>0.05).

Parents. of the 664 parents in the study, 82.2% were females. Sixty-three point seven percent were aged 40 - 49 years with a mean age of 43.2 years. The majority were married (86.2%) and Buddhists (97.3%). Nearly half (48.9%) had a bachelor's degree or higher education level. Twenty-five point three percent were government officers and ≥20 years work experience. Seventy-six percent had a monthly family income >USD 570,with a mean monthly income of USD 1,116.40 (SD=774.90). Fathers were significantly more likely to be

older and have a longer work experience and higher education level than mothers.

Teachers. Of the 304 teachers, 84.2% were females and 54.6% were aged > 50 years with a mean age of 46.1 years (SD=11.40 years). Fifty-five percent were married, 37.8% were single and 6.9% were divorced/separated; 97.0% were Buddhist. The majority of teachers (80.1%) had a bachelor's degree. Forty-two percent had a monthly family income >USD 1,140; the mean monthly income was USD 1,787.50 (SD=951.2). About two-thirds of teachers (65.3%) had worked for more than 20 years.

Knowledge

Students. More than 60% of students answered 7 out of 11 items correctly (Table 1). Seventy-three point eight percent of male students and 69.6% of female students did not know who should have cervical cancer screening. There were no differences in mean knowledge scores between males (6.62) and females (7.01) (p>0.05); however, knowledge levels did differ by class level (p<0.05). Students in grade 9 had higher knowledge scores of knowledge than those in grades 7 and 8.

Parents. Sixty percent of parents answered 8 out of 11 items correctly (Table 1). Parents had poor knowledge regarding who could be infected with HPV, that condom use can prevent HPV infection, and who should get cervical cancer screening. Knowledge scores among males (mean=6.41, SD=2.03) were significantly lower than those of females (mean=6.91, SD=1.83) (p=0.01). Females had a greater percentage of correct answers for all items except number 10. Parents who had a bachelor's degree or higher were more likely to have higher knowledge scores (mean=7.18) than those with a lower level of education (mean=6.48) (p<0.001).

Teachers. The teacher's mean knowledge' score was 6.7 (SD=1.89) (Table 1). More than 80% knew the most common mode of HPV transmission, the most important cause of cervical cancer, and why women need to receive cervical cancer screening. However, only 25.8% knew who could get HPV infection and only 39.1% knew condom use can prevent HPV infection.

Attitude

Students. The mean attitude score among female students (3.50) was significantly higher than male students (3.42) (p<0.05) (Table 2). Most students agreed that cervical cancer causes death in women, both boys and girls should get the HPV vaccine before they become sexually active and people need reassurance about vaccine efficacy. Significantly more female than male students agreed that communication between children and parents about HPV vaccination might be a problem in Thai culture, that people need reassurance about vaccine efficacy and HPV vaccination cannot lead to increased risky sexual behavior. Interestingly, more male than female students agreed a well informed child should be able to request vaccination without parent consent (p<0.05).

Parents. The mean attitude scores of the fathers (3.52) and mothers (3.53) were not significantly different (p>0.05) (Table 3). More mothers than fathers opined communication between children and parents about HPV vaccination might be a problem in Thai culture and people need reassurance about vaccine efficacy (p<0.05). Most parents agreed cervical cancer causes death in women and people needed reassurance about vaccine efficacy. Most parents disagreed a child should be able to request vaccination without parental consent. Parents who had a good level of knowledge were more likely to have a positive

Table 1
Number (%) of students, parents, and teachers who gave correct answers about HPV.

Questions	Students			Parents			Teachers		
	Male *N*= 301 *n* (%)	Female *N*=343 *n* (%)	Total *N*=644 *n* (%)	Male *N* (118) *n* (%)	Female *N* (546) *n* (%)	Total 664 *n* (%)	Male *N* (48) *n* (%)	Female *N* (256) *n* (%)	Total (304) *n* (%)
1. What is HPV?	237 (79.8)	252 (75.9)	489 (77.7)	75 (67.6)	361 (71.5)	436 (70.8)	37 (80.4)	159 (66.8)*	196 (69.0)
2. What is the most common mode of HPV transmission?	275 (92.9)	328 (97.3)	603 (95.3)*	97 (85.8)	461 (88.7)	558 (88.2)	40 (89.9)	220 (92.1)	260 (91.5)
3. Who can be infected by HPV?	169 (57.1)	205 (60.5)	374 (58.9)	19 (16.7)	114 (21.5)	133 (20.6)	12 (26.1)	63 (25.7)	75 (25.8)
4. Miss A has had first sex with her boyfriend using a condom, does Miss A have a chance to get HPV infection?	111 (37.2)	125 (37.1)	399 (62.8)	42 (37.8)	203 (39.5)	245 (39.2)	15 (33.6)	95 (40.4)	110 (39.1)
5. What is the most important cause of cervical cancer?	202 (67.8)	245 (72.5)	447 (70.3)	93 (83.8)	462 (88.0)	555 (87.3)	39 (86.7)	210 (87.1)	249 (87.1)
6. Who should see a doctor for cervical cancer screening?	78 (26.2)	103 (30.4)	181 (28.4)	41 (36.0)	207 (39.1)	248 (38.6)	10 (21.7)	99 (41.1)*	109 (37.2)
7. Who has a risk of getting cervical cancer?	243 (81.5)	285 (84.3)	528 (83.0)	78 (69.6)	447 (84.0)	525 (81.5)*	34 (75.6)	190 (77.2)	224 (77.0)
8. Can a woman with early stage of cervical cancer be cured?	150 (50.5)	162 (48.1)	312 (49.2)	88 (77.9)	465 (87.1)	553 (85.5)*	35 (76.1)	200 (81.0)	235 (80.2)
9. Miss B is 18 years old and sexually active, can she get a HPV vaccine?	179 (60.3)	221 (65.2)	400 (62.9)	62 (55.9)	330 (63.6)	392 (62.2)	20 (43.5)	130 (54.0)	150 (52.4)
10. What are the diseases protected by the HPV vaccine in Thailand?	226 (76.1)	282 (83.4)	508 (80.0)*	74 (67.3)	341 (65.7)	415 (66.0)	34 (67.3)	166 (65.7)	200 (70.9)
11. Do women who got the HPV vaccine need to get cervical cancer screening?	162 (54.5)	175 (51.8)	337 (53.1)	68 (61.3)	324 (62.5)	392 (62.3)	32 (69.6)	154 (63.6)	182 (64.5)
Mean (SD) of % correct answers.	6.8 (1.8)	7.0 (1.7)	6.9 (1.8)	6.4 (2.0)	6.9 (1.8)	6.8 (1.9)*	6.7 (1.7)	6.7 (1.9)	6.7 (1.9)

*$p<0.05$

Table 2
Student knowledge and attitudes about HPV.

Statements	Male (*N*= 301)						Female (*N*= 343)						Total
	5[a] (%)	4(%)	3(%)	2(%)	1(%)	$\bar{\chi}$ (SD)	5(%)	4(%)	3(%)	2(%)	1(%)	$\bar{\chi}$ (SD)	$\bar{\chi}$ (SD)
1. A person with only one sex partner is protected from HPV infection.	22.1	23.4	33.1	12.0	9.4	3.4 (1.2)	15.7	27.7	29.4	18.2	9.0	3.2 (1.2)	3.3 (1.2)
2. HPV infection in men is as important as in women.	7.7	16.4	40.3	24.5	11.1	2.9 (1.1)	8.2	16.3	46.8	20.7	9.0	2.9 (1.0)	2.9 (1.1)
3. Cervical cancer causes death in women.	34.4	31.1	25.4	4.7	4.3	3.9 (1.1)	41.3	31.5	19.0	5.0	3.2	4.0 (1.1)	4.0 (1.1)
4. Both boys and girls should get the HPV vaccine before he/she becomes sexually active.	34.5	31.1	26.4	5.7	2.3	3.9 (1.0)	32.2	36.4	27.1	2.6	1.7	3.9 (0.9)	3.9 (1.0)
5. It is preferable to vaccinate against HPV to every boy and girl.	27.5	28.5	29.5	7.4	7.4	3.6 (1.2)	27.2	30.1	34.8	5.0	2.9	3.7 (1.0)	3.7 (1.1)
6. A well informed child should be able to request vaccination without parental consent.	14.8	18.5	31.9	19.5	15.4	3.0 (1.3)	7.3	17.3	32.6	26.1	16.7	2.7 (1.2)	2.8 (1.2)[b]
7. Communication between children and parents to get HPV vaccination might be a problem in Thai culture.	12.4	17.1	38.1	17.1	15.3	2.9 (1.2)	12.5	22.7	44.3	14.3	6.2	3.2 (1.0)	3.1 (1.1)[b]
8. People need reassurance about vaccine efficacy.	36.2	30.2	23.2	7.7	2.7	3.9 (1.1)	38.7	36.1	20.8	2.9	1.5	4.1 (0.9)	4.0 (1.0)[b]
9. I am sure the vaccine is safe.	17.7	34.8	37.8	5.7	4.0	3.6 (1.0)	13.6	39.7	42.3	3.5	0.9	3.6 (0.8)	3.6 (0.9)
10. Getting the HPV vaccine does not lead to an increase in risky sexual behavior.	21.4	19.4	31.4	14.4	13.4	3.2 (1.3)	27.4	23.0	27.7	14.0	7.9	3.5 (1.3)	3.4 (1.3)[b]
Mean (SD) score			3.4 (0.4)							3.5 (0.4)			3.5 (0.4)[b]

[a]5, Strongly agree; 4, agree; 3, neutral; 2, disagree; 1, strongly disagree; [b]$p<0.05$, $\bar{\chi}$: 1-2.33, negative; 2.34-3.67, neutral; 3.68-5.00, positive.

Table 3
Knowledge and attitudes of parents about HPV.

Statements	Male (*N*= 118)						Female (*N*= 546)						Total
	5[a] (%)	4(%)	3(%)	2(%)	1(%)	$\bar{\chi}$ (SD)	5(%)	4(%)	3(%)	2(%)	1(%)	$\bar{\chi}$ (SD)	$\bar{\chi}$ (SD)
1. A person who has only one sexual partner is protected from HPV infection.	31.9	29.3	14.7	13.8	10.3	3.6 (1.3)	20.7	34.0	13.7	21.7	10.0	3.3 (1.3)	3.4 (1.3)
2. HPV infection in men is as important as in women.	18.1	19.8	18.1	29.3	14.7	3.0 (1.4)	8.3	19.2	25.4	33.7	13.4	2.8 (1.2)	2.8 (1.2)
3. Cervical cancer causes death in women.	55.5	26.5	10.3	4.3	3.4	4.3 (1.0)	70.2	17.6	4.7	2.1	5.4	4.5 (1.1)	4.4 (1.1)
4. Both boys and girls should get the HPV vaccine before he/she becomes sexually active.	30.7	38.6	18.5	6.1	6.1	3.8 (1.1)	36.4	29.4	21.7	8.5	4.0	3.9 (1.1)	3.9 (1.1)
5. It is preferable to vaccinate against HPV to every boy and girl.	17.0	28.6	36.6	6.2	11.6	3.3 (1.2)	20.0	30.5	28.2	15.5	5.9	3.4 (1.1)	3.4 (1.2)
6. A well informed child should be able to request vaccination without parental consent.	10.5	22.8	14.0	27.2	25.5	2.7 (1.4)	9.4	18.1	11.0	30.5	31.0	2.4 (1.3)	2.5 (1.3)
7. Communication between children and parents to get HPV vaccination might be a problem in Thai culture.	27.6	19.7	23.3	14.7	14.7	3.3 (1.4)	29.9	28.4	20.6	13.1	8.0	3.6 (1.3)	3.5 (1.3)[b]
8. People need reassurance about vaccine efficacy.	47.0	32.5	15.4	3.4	1.7	4.2 (0.9)	55.3	33.1	7.9	2.2	1.5	4.4 (0.8)	4.6 (0.9)[b]
9. I am sure the vaccine is safe.	15.5	33.6	40.5	6.9	3.5	3.5 (1.0)	13.4	41.2	34.0	8.6	2.8	3.5 (0.9)	3.5 (0.9)
10. Getting the HPV vaccine does not lead to an increase in risky sexual behavior.	29.9	23.1	20.5	17.1	9.4	3.5 (1.3)	24.7	29.5	22.9	14.9	8.0	3.5 (1.2)	3.5 (1.3)
Mean (SD) score				3.5 (0.5)						3.53 (0.43)			3.5 (0.4)

[a]5, Strongly agree; 4, agree; 3, neutral; 2, disagree; 1, strongly disagree; [b]$p<0.05$, $\bar{\chi}$: 1-2.33, negative; 2.34-3.67, neutral; 3.68-5, positive.

Table 4
Attitude of students (by sex, grade), parents and teachers (by sex, age, and education).

Participants	Attitude			*p*-value
	Negative *n* (%)	Neutral *n* (%)	Positive *n* (%)	
Students	6 (0.6)	356 (59.3)	282 (40.1)	
Sex				0.003
Male	1 (0.3)	187 (62.5)	111 (37.2)	
Female	5 (1.5)	169 (48.9)	171 (49.6)	
Grade				0.730
7	1 (0.4)	132 (53.2)	115 (46.4)	
8	5 (2.5)	117 (57.4)	82 (41.1)	
9	6 (3.1)	103 (54.1)	83 (42.8)	
Parents	8 (1.2)	279 (42.4)	371 (56.4)	
Sex				0.014
Male	2 (1.7)	61 (52.1)	54 (46.2)	
Female	6 (1.1)	218 (40.3)	317 (58.6)	
Age (years)				0.002
<40	0 (0.0)	62 (39.7)	94 (60.3)	
40-49	5 (1.4)	180 (42.4)	239 (56.2)	
≥50	6 (8.3)	38 (45.2)	39 (46.5)	
Education				0.916
<Bachelor's degree	2 (0.6)	138 (41.7)	191 (57.7)	
≥Bachelor's degree	6 (1.8)	139 (42.8)	180 (55.4)	
Teachers	-	148 (49.0)	152 (51.0)	
Sex				0.197
Male	-	20 (42.6)	27 (57.4)	
Female	-	128 (50.6)	125 (49.4)	
Age (years)				0.109
<40	-	30 (42.3)	41 (57.7)	
≥40		118 (51.5)	111 (48.5)	
Education				0.170
<Bachelor's degree	-	123 (51.0)	118 (49.0)	
≥Bachelor's degree	-	24 (42.9)	32 (57.1)	

attitude (72%) than those who had moderate (59.5%) or low knowledge levels (46.7%) ($p<0.001$). Parents younger than 40 years were more likely to have a positive attitude than those who were older (Table 5).

Teachers. The mean attitude score among teachers was 3.46. The majority of teachers (>80%) agreed cervical cancer causes death among women and people need reassurance about vaccine efficacy. Approximately 60% opined both boys and girls should get the HPV vaccine before becoming sexually active. Forty-three percent suggested the HPV vaccine would not lead to an increase in risky sexual behavior, but 27% were not sure. Forty-one percent disagreed that HPV infection in men is as important as in

Table 5
Acceptance of HPV vaccine by students, parents, and teachers.

Variables	Students				Parents				Teachers
	Male	Female	Total	*p*-value	Male	Female	Total	*p*-value	*n* (%)
Willingness to get vaccination				<0.001				0.005	
No	66 (22.3)	25 (7.4)	91 (14.4)		11 (9.6)	47 (8.8)	58 (9.0)		38 (13.0)
Yes	75 (25.3)	90 (26.8)	165 (26.1)		36 (31.3)	254 (47.7)	290 (44.8)		126 (43.0)
Not sure	155 (52.4)	221 (65.8)	376 (59.5)		68 (59.1)	232 (43.5)	300 (46.2)		123 (42.0)
Vaccine delivery				0.03				0.122	6 (2.0)
Appropriate	156 (53.1)	163 (48.9)	319 (50.9)		58 (52.7)	303 (58.0)	361 (57.1)		
Not appropriate	122 (42.5)	129 (38.8)	251 (40.1)		37 (33.7)	151 (28.9)	188 (29.7)		177 (62.1)
Need information	6 (2.0)	15 (4.6)	21 (3.3)		13 (11.8)	39 (7.5)	52 (8.3)		81 (28.4)
Not sure	10 (3.4)	26 (5.7)	36 (5.7)		2 (1.8)	29 (5.6)	31 (4.9)		27 (9.5)
Initiating age for vaccination				0.891				0.386	
≤ 18 years old	275 (96.2)	318 (96.4)	593 (96.3)		105 (98.1)	497 (96.5)	602 (96.8)		266 (94.0)
> 18 years old	11 (3.8)	12 (3.6)	23 (3.7)		2 (1.9)	18 (3.5)	20 (3.2)		17 (6.0)
Who should receive vaccine				0.168				0.342	
Females	124 (42.6)	132 (39.8)	256 (41.1)		59 (53.6)	245 (46.9)	304 (48.1)		123 (42.9)
Males	9 (3.1)	4 (1.2)	13 (2.1)		0	3 (0.6)	3 (0.5)		5 (1.7)
Both	158 (54.3)	196 (59.0)	354 (56.8)		51 (46.4)	274 (52.5)	325 (51.4)		159 (55.4)
Willingness to pay for vaccination by cost (USD)				<0.001				0.061	
< 14.2	54 (19.0)	25 (7.6)	79 (12.9)		26 (24.5)	79 (15.3)	105 (16.9)		76 (27.3)
14.3-57.1	139 (49.3)	203 (61.9)	342 (56.1)		67 (63.2)	376 (72.7)	443 (71.1)		165 (59.1)
57.2-114.3	89 (31.7)	100 (30.5)	189 (31.0)		13 (12.3)	62 (12.0)	75 (12.0)		38 (13.6)
Levels of interest in HPV vaccine				0.070				0.018	
Very much	29 (9.9)	26 (7.8)	55 (8.8)		13 (12.0)	101 (19.1)	114 (17.9)		75 (26.0)
Much	80 (27.3)	103 (30.9)	31 (29.2)		40 (37.0)	250 (47.3)	290 (45.5)		121 (41.9)
Neutral	150 (51.2)	185 (55.6)	335 (53.5)		42 (38.9)	135 (25.5)	177 (27.8)		63 (21.7)
Little	19 (6.5)	12 (3.6)	183 (5.0)		11 (10.2)	35 (6.6)	46 (7.2)		20 (6.9)
Very little	15 (5.1)	7 (2.1)	55 (3.5)		2 (1.9)	8 (1.5)	10 (1.6)		10 (3.5)

Want their children to get vaccination							0.651	
No	-	-	-	-	6 (5.5)	42 (8.2)	48 (7.7)	-
Yes	-	-	-	-	42 (38.5)	213 (41.4)	255 (40.9)	-
Not sure	-	-	-	-	58 (53.2)	244 (47.5)	302 (48.5)	-
Need information	-	-	-	-	3 (2.8)	15 (2.9)	18 (2.9)	-
Ready to pay for vaccine by cost (USD)				0.096			0.607	
<14.2	41 (14.0)	31 (9.3)	72 (11.5)		26 (23.6)	94 (18.0)	120 (19.0)	95 (33.0)
14.3-28.5	82 (28.0)	98 (29.3)	180 (28.7)		38 (34.5)	190 (36.3)	228 (36.0)	79 (27.4)
28.6-57.1	69 (23.5)	93 (27.7)	162 (25.8)		25 (22.7)	143 (27.3)	168 (26.5)	68 (23.6)
57.2-85.7	57 (19.5)	78 (23.3)	135 (21.5)		14 (12.8)	70 (13.4)	84 (13.3)	24 (8.3)
85.7-114.3	44 (15.0)	35 (10.4)	79 (12.5)		7 (6.4)	26 (5.0)	33 (5.2)	22 (7.7)

women and 37% disagreed their children should be able to get the HPV vaccine without parental consent. Teachers with a higher knowledge level were not significantly more likely to have a positive attitude than those who had a moderate or low level of knowledge (p=0.17) (Table 4).

Acceptability

Students. The majority of students (59.5%) were not sure whether to get the vaccine or not. Only 25.3% of male and 26.8% of female students were willing to get the vaccine (Table 5). More than half of male students (53.1%) and nearly half of female students (48.9%) agreed the method of HPV vaccine delivery was appropriate. Students of both sexes agreed adolescents, aged ≤18 years, should be given the HPV vaccine. Fifty-four percent of male and 59% of female students stated both sexes should receive the HPV vaccine. Only 31% of students were willing to pay ≥USD 57.20 per dose for the vaccine (Table 5).

Eighty point five percent of the students were not interested in the vaccine. There were no significant differences between male (37.2%) and female (38.7%) students in their interest in the HPV vaccine.

Parents. Forty-six percent of parents were not sure whether or not to get the vaccine for themselves; there was a significant difference between fathers (47.7%) and mothers (31.3%) (Table 5). The vaccination procedure was acceptable to 57.1% of parents. Most parents (96.8%) believed age ≤18 years should be the age to start vaccination. About half of parents (51.4%) felt both sexes should get the vaccine. Eighty-five percent of parents, were willing to pay for the vaccination at a price <USD 57.20. Sixty-three percent of parents were interested in the HPV vaccine; mothers were more interested in the HPV vaccine than

fathers. Only 7.7% of parents felt there was no need to have their children vaccinated. Seventy-one percent of parents were ready to pay for the quadrivalent vaccine if the price was ≤USD 57.20 per dose.

Teachers. Forty-three percent of teachers were willing to receive the HPV vaccine, 42% were not sure (Table 5). Sixty-two percent of teachers felt the vaccine delivery was appropriate. Approximately 68% of teachers showed an interest in the HPV vaccine. More than half (55.4%) of teachers believed both sexes should equally be vaccinated. Eighty-six percent of teachers were willing to pay for vaccination at a cost ≤USD 57.20 per dose. Ninety-four percent of teachers thought the vaccine should be initiated at age ≤18 years. One-third of teachers were ready to pay for the quadrivalent vaccine at a cost ≤USD 14.30 per dose.

DISCUSSION

Most participants in this study had a medium level of knowledge of HPV, cervical cancer and the HPV vaccine. However, knowledge regarding cervical screening and HPV infection and its consequences was inadequate.

Most students were unaware who should have cervical cancer screening. They may have been too young to be concerned about this subject. Nearly all students knew why women need to have cervical screening and knew about the mode of HPV transmission. More students in this study (<40%) were aware of HPV vaccination than students in Sweden (6%) (Gottvall *et al*, 2009). It is important to introduce HPV vaccination, HPV infection, and its consequence for students before they become sexually active.

Mothers in this study had better knowledge on the causal relationship between HPV and cervical cancer than mothers in the Netherlands (Lenselink *et al*, 2008) and in Hong Kong (Chan *et al*, 2007). Factors influencing maternal awareness about the risk of cervical cancer and the knowledge of the HPV vaccine included age, education, cervical cancer campaigns and HPV vaccine advertisements.

The high percentage of students with a neutral attitude indicates HPV and the HPV vaccine may be new for them. More students in our study had a positive attitude about the HPV vaccine than students in Sweden (Gottvall *et al*, 2009) and more students in our study felt the HPV vaccine would not affect sexual behavior than students in Finland (Constantine and Jerman, 2007). This may be because of differences in cultures and beliefs by country. In Thai culture, communication about sexuality in the family and at school is not as open as in European countries. This could affect Thai students' understanding of HPV vaccination and its consequence.

Most parents in this study worried about the efficacy and safety of the vaccine, similar to a UK study (Marlow *et al*, 2007). This may affect the reason why most parents believed their children must have parental consent before vaccination.

In this study, more than half of women believed the vaccine would not affect sexual behavior. This is different from other studies from Finland (Constantine and Jerman, 2007), Vietnam (Dinh *et al*, 2007) and parents in the UK (Brabin *et al*, 2007). The Vietnamese study collected data from women visiting an obstetric/gynecologic clinic and an emergency outpatient department at a general hospital.

Parents of students aged 11-12 years old in the UK (Brabin *et al*, 2007) were

more likely to agree that both boys and girls should be vaccinated before they become sexually active and a well informed child should be able to request vaccination without parental consent than parents in this study. Parental attitude might have been different in our study if parents had a greater knowledge about the vaccine, since 20% of parents had not yet decided what to do in our study.

Teachers had neutral attitudes regarding HPV infection, the HPV vaccine, and cervical cancer. This finding is disappointing since teachers are supposed to be leaders and be good examples to the community. Teachers need correct information about the HPV vaccine to communicate more effectively with their students and people in the community.

Proportion of students in this study who were willing to get the vaccine was relatively low compared to students in Finland and Sweden (Wuensch, 2005; Constantine and Jerman, 2007). It could be some students in Finland had a greater knowledge of the HPV vaccine than students in our study.

Sixty percent of students in our study were not sure whether to get the vaccine beacuse of concerns about vaccine safety and efficacy, concerns about parental permission and the price of the vaccine. Since more than half of the students believe both sexes should be vaccinated, this indicates most students understood the benefits of the vaccine.

Forty-four point eight percent of parents were willing to receive the vaccine; the willingness was more common among females (47.7%) than males (31.3%). Compared with other studies, the acceptance rates by parents in this study was average (Constantine and Jerman, 2007; Marlow *et al*, 2007; Jones and Cook, 2008). Higher acceptance rates were found in the US and in some countries of Europe. The acceptance rates depend on sex, age, knowledge, cost, beliefs and perhaps other factors.

Nearly all the parents in our study believed the best age to vaccinate is ≤18 years, similar to a study by Brabin *et al* (2007). Constantine and Jerman (2007) reported parents in the US were willing to have their daughters vaccinated before 13 years old (Marlow *et al*, 2007). Perceptions by parents of how the vaccine works might influence the willingness to have their children get the vaccine at an early age. Forty point nine percent of parents in this study wanted their children to have the vaccine, while 48.5% did not. This may reflect the different parental concerns about vaccine efficacy and safety.

Two-thirds of teachers in this study had an interest in the HPV vaccine. This finding supports the possibility of HPV vaccination in schools in the future. Most agreed both sexes should be vaccinated.

There are several problems to applying the findings of this study to other situations. The subject in our study attended governmental schools in Bangkok. The study did not include private school students, parents or teachers who might be more well to do and could afford the high price of the vaccine. This study was implemented in Bangkok only. The results may not represent other populations in Thailand. The target population in this study was students, parents and educators. Other populations were not selected for the study, such as people in the community.

We hypothesize reducing the price could enhance acceptability, but more importantly better education regarding the vaccine and HPV is needed. The HPV vac-

cine is approved for use in women only by the Thai Food and Drug Administration (FDA). Further studies of cost-benefit analysis need to be carried out among women and men in Thailand to determine what the cost-benefit of the vaccine is to the Thai population.

In conclusion, knowledge of HPV and cervical cancer and acceptance of the HPV vaccine were low to intermediate. The acceptance rate might increase if participants were better educated regarding safety and efficacy of the vaccine.

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