Knowledge, Awareness and Attitude about Human Papilloma Virus (HPV) Infection and HPV Vaccination among Adolescents in Chiang Rai, Thailand

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Abstract:

Background: Human Papilloma Virus (HPV) is a significant cause of cervical cancer and other HPV-related diseases. The HPV vaccine is an effective method for preventing these conditions, particularly when administered during adolescence.

Objectives: To evaluate the knowledge, awareness, and attitudes of adolescents in Chiang Rai, Thailand, with the aim of identifying key factors that influence the need for HPV vaccination.

Materials and Method: A total of 426 participants were recruited from the secondary schools in Chiang Rai, Thailand. Data were collected through online questionnaires, which included sections on baseline characteristics, knowledge, awareness, attitudes toward HPV infection and vaccination, and the perceived need for HPV vaccination.

Results: The proportions of participants with high levels of knowledge, awareness, and attitudes about HPV were 72.30%, 14.31%, and 62.68%, respectively. Additionally, 64.08% expressed the need for HPV vaccination. Being female (OR=2.20, $p < 0.001$), having a high level of awareness (OR=2.96, p=0.007) and attitude toward HPV infection and vaccination (OR=3.35, $p = 0.038$) were significantly associated with the perceived need for HPV vaccination.

Conclusion: Health promotion about HPV is vital for adolescents, with an emphasis on both females and males. Initiatives to improve awareness and attitude of HPV infection should be implemented to increase vaccination rates and reduce the prevalence of HPV.

Keywords: HPV, Vaccine, Knowledge, Awareness, Attitude, Adolescents

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Introduction

Cervical cancer is the fourth most common cancer among women globally, with approximately 660,000 new cases and 350,000 deaths reported in 2022.[1] In Thailand, it ranks as the third most frequent cancer among women and the second most common among those aged 15-44.[2] Most cases of cervical cancer are caused by human papillomavirus (HPV), particularly types 16 and 18.[3]

The World Health Organization (WHO) recommends HPV vaccination as a key preventive measure against cervical cancer and other HPV-related diseases. Six prophylactic vaccines provide protection against HPV types 16 and 18, which are responsible for over 70% of cervical cancers. Research has shown these vaccines to be safe and highly effective. Vaccination is recommended for both males and females, ideally between the ages of 9 and 14, before the onset of sexual activity.[4] In Thailand, the quadrivalent (HPV types 6, 11, 16 and 18) and 9-valent (HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58) vaccines are available in public and private sectors. Since 2023, the National Health Security Office (NHSO) has implemented a school-based HPV vaccination program for Grade 5 girls, aiming for full nationwide coverage by 2025. Early data show high effectiveness in preventing HPV infection and precancerous cervical lesions.

Previous studies have identified multiple factors influencing HPV vaccine acceptance among adolescents and young adults. These include gender, level of knowledge and awareness about HPV, perceived susceptibility and severity of infection, perceived benefits of vaccination, social norms, and recommendations from healthcare providers. Cultural beliefs, parental influence, and accessibility of vaccination services have also been shown to affect vaccine uptake. For instance, perceived benefits and social influences were significant predictors of HPV vaccination intentions among young women[6], while higher knowledge and positive attitudes were associated with increased willingness to receive the vaccine in studies conducted among adolescents in Ethiopia and Italy.[7,11] Collectively, these findings highlight the need to understand these multidimensional factors within specific cultural contexts, such as northern Thailand, to design effective public health strategies.

Despite the availability of effective vaccines, gaps in knowledge, awareness, and attitudes toward HPV vaccination remain, particularly among adolescents, the primary target group for vaccination programs. This study aims to assess the levels of knowledge, awareness, and attitudes about HPV and its vaccine among adolescents, with the goal of identifying key factors influencing vaccine uptake and informing targeted public health strategies.

Method

This cross-sectional study was conducted from November 1, 2023, to January 31, 2024, at a large public secondary school in Chiang Rai Province.

Study population and samples

Adolescents aged 12-20 years enrolled at a large public secondary school in Chiang Rai Province in the 2023 academic year were included in the study. Participants who were unable to complete the questionnaire due to absence, underlying pathology, or physical abnormalities were excluded from the study. This included individuals with significant physical or mental disabilities, serious underlying medical conditions, or a history of HPV-related pathology.

The required sample size was estimated based on a previous study, which reported

53.39% awareness of HPV infection among women.[5] A minimum sample size of 426 participants was calculated to achieve a 0.05 margin of error and acceptable differences in apparent and adjusted R-squared values. Stratified proportional (based on number of students in each grade) random sampling was applied according to educational level, with 213 participants recruited from middle school (grades 6-8) and 213 participants from high school (grades 9-12), a total of 426 participants.

Assessment of knowledge, awareness, attitude about HPV infection and vaccination and interested in receiving the HPV vaccine

Data were collected using an online questionnaire via Google Forms. The questionnaire consisted of four sections to assess participants' interest in receiving the HPV vaccine, specifically the quadrivalent (HPV types 6, 11, 16 and 18) and the 9-valent (HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58) vaccines, as well as their knowledge[6], awareness[7], and attitude[5] about HPV infection and vaccination. Items were adapted from a previous study and translated into Thai. The content validity of the questionnaire after translation was 0.85 which was evaluated by 2 community and family medicine physicians and 1 gynecologist.

Levels of knowledge, awareness, and attitude about HPV infection and vaccination were categorized into three groups based on total score, low or negative (< 60%), moderate or neutral (60-79%), and high or positive (80-100%), following on Bloom's cutoff criteria.[8]

Statistical analysis

Data analysis was conducted using Stata 17 (StataCorp, College Station, TX, USA). A p-value of < 0.05 was considered statistically significant. Categorical variables were described using frequencies and percentages, while numerical variables were summarized as mean and standard deviation (SD) or median and interquartile range (IQR), depending on their distribution. Fisher's exact test was used to compare categorical variables. Student's t-test or the Mann-Whitney U test was applied for numerical variables. Univariable and multivariable logistic regression were employed to assess associations between baseline characteristics, knowledge, awareness, attitude levels, and interest in receiving the HPV vaccine. There was no missing data in this study.

Results

Participant's Characteristics

This study recruited 426 participants, with females comprising 55.63%. The average age was 15 years. High levels of knowledge, positive awareness, and positive attitudes about HPV were reported by 72.30%, 14.31%, and 62.68% of participants, respectively. Furthermore, 64.08% expressed a need for HPV vaccination. Ninety-seven participants (22.77%) reported having received the HPV vaccination before being recruited into this study.

Baseline Characteristics Between Groups Interested and Not Interested in Receiving the HPV Vaccine

The results showed a significant difference in gender, age, level of education, awareness, and attitude about HPV infection ($p < 0.05$) between the groups interested and not interested in receiving the HPV vaccine (table 1). Female participants showed greater willingness to receive the HPV vaccine. In contrast, Male participants showed reduced willingness vaccine acceptance.

Table 1 Comparison of Baseline Characteristics Between Groups Interested and Not Interested in Receiving the HPV Vaccine

	Interested in receiving the HPV vaccine (n = 273) n (%)	**Not interested in receiving the HPV vaccine** (n = 153) n (%)	**p-value**
Gender			
• Male	97 (35.53%)	92 (60.13%)	< 0.001
• Female	176 (64.47%)	61 (39.87%)	
Age (years)*	15 (14-16)	15 (14-16)	0.036 †
Level of education			
• Middle school (grades 6 to 8)	124 (45.42%)	89 (58.17%)	0.015
• High school (grades 9 to 12)	149 (54.58%)	64 (41.83%)	
Level of knowledge			
• Low (0-4 points)	18 (6.59%)	19 (12.42%)	0.120
• Moderate (5-6 points)	52 (19.05%)	29 (18.95%)	
• High (7-8 points)	203 (74.36%)	105 (68.63%)	
Level of awareness			
• Negative (0-2 points)	145 (53.11%)	106 (69.28%)	< 0.001
• Neutral (3 points)	76 (27.84%)	38 (24.84%)	
• Positive (4 points)	52 (19.05%)	9 (5.88%)	
Level of attitude			
• Negative (0-4 points)	6 (2.20%)	10 (6.54%)	0.001
• Neutral (5-6 points)	80 (29.30%)	63 (41.18%)	
• Positive (7-8 points)	187 (68.50%)	80 (52.29%)	

*Median (IQR), † Mann-Whitney U test

Knowledge about HPV infection and HPV vaccination

The total score of knowledge was 10 points. The mean knowledge score about HPV infection and HPV vaccination for the groups interested and not interested in receiving the HPV vaccine were 9 (2-10) and 8 (2-10) points, respectively. Questions 10, 7, and 5 had the highest correct answer rates (89.67%, 88.73%, and 87.32%, respectively), while questions 1, 3, and 6 had the lowest correct answer rates (71.36%, 73.47%, and 76.29%, respectively) (table 2).

Table 2 Knowledge of students about HPV infection and HPV vaccination

Question	Correct N (%)	Wrong N (%)
Q.1 There is only one type of HPV infection.	304 (71.36%)	122 (28.64%)
Q.2 HPV causes genital herpes.	343 (80.52%)	83 (19.48%)
Q.3 HPV causes genital warts.	313 (73.47%)	113 (26.53%)
Q.4 HPV infection can cause cancer in both men and women.	331 (77.70%)	95 (22.30%)
Q.5 Both men and women can get the HPV vaccine.	372 (87.32%)	54 (12.68%)
Q.6 Age 11-12 years is the most suitable age to receive the HPV vaccine.	325 (76.29%)	101 (23.71%)
Q.7 Adults can get the HPV vaccine.	378 (88.73%)	48 (11.27%)
Q.8 If you have received the HPV vaccine, you can have unprotected sex.	330 (77.46%)	96 (22.54%)
Q.9 Prevention of HPV infection can be done by using condoms during sex.	362 (84.98%)	64 (15.02%)
Q.10 Most HPV infections are transmitted through sexual contact or through body fluids.	382 (89.67%)	44 (10.33%)

Awareness about HPV infection and HPV vaccination

The total score of awareness was 4 points. Question no. 3, "Have you ever heard of cervical cancer?" had the highest "Yes" answer rate (92.72%), while question no. 1, "Have you received the HPV vaccine?" had the lowest "Yes" answer rate (22.77%) (table 3).

Table 3 Awareness of students about HPV infection and HPV vaccination

Question	Yes N (%)	No N (%)
Q.1 Have you received the HPV vaccine?	97 (22.77%)	329 (77.23%)
Q.2 Have you ever heard of the HPV vaccine?	182 (42.72%)	244 (57.28%)
Q.3 Have you ever heard of cervical cancer?	395 (92.72%)	31 (7.28%)
Q.4 Have you ever heard of cervical cancer screening (Pap smear)?	320 (75.12%)	106 (24.88%)

Attitude about HPV infection and HPV vaccination

The total score of attitudes was 8 points. Quote no.4, 5 and 8 had the highest median attitude score, while quote no.2, "I think I may have been exposed to or contracted HPV", had the lowest median attitude score (table 4).

Table 4 Attitude of students about HPV infection and HPV vaccination

Quote	Attitude Score N (%)					Median (IQR)
	1	2	3	4	5	
Q.1 HPV can cause a number of serious diseases.	6 (1.41%)	5 (1.17%)	72 (16.90%)	151 (35.45%)	192 (45.07%)	4 (4-5)
Q.2 I think I may have been exposed to or contracted HPV.	126 (29.58%)	85 (19.95%)	100 (23.47%)	51 (11.97%)	64 (15.02%)	3 (1-4)
Q.3 It is helpful to talk about HPV infection or STDs in the home.	11 (2.58%)	12 (2.82%)	83 (19.48%)	112 (26.29%)	208 (48.83%)	4 (4-5)
Q.4 Talking about HPV infection and sexually transmitted diseases in schools can be helpful.	10 (2.35%)	5 (1.17%)	67 (15.73%)	124 (29.11%)	220 (51.64%)	5 (4-5)
Q.5 It is helpful to talk to your doctor or healthcare professional about HPV infection or sexually transmitted diseases.	10 (2.35%)	1 (0.23%)	52 (12.21)	101 (23.71)	262 (61.50%)	5 (4-5)
Q.6 The HPV vaccine can prevent cervical cancer and genital warts.	11 (2.58%)	7 (1.64%)	67 (15.73%)	134 (31.46%)	207 (48.59%)	4 (4-5)
Q.7 The HPV vaccine is not harmful.	9 (2.11%)	20 (4.69%)	104 (24.41%)	145 (34.04%)	148 (34.74%)	4 (3-5)
Q.8 Both teenage girls and boys need to get the HPV vaccine.	10 (2.35%)	7 (1.64%)	70 (16.43%)	108 (25.35%)	231 (54.23%)	5 (4-5)

Factors Affecting Participants' Interest in Receiving the HPV Vaccine

From the multivariable logistic regression analysis, being female, having a high awareness and attitude level toward HPV infection and vaccination were significant factors affecting participants' interest in receiving the HPV vaccine (mOR = 2.20, 2.96 and 3.35, respectively) (table 5).

Table 5 Factors Affecting Participants' Interest in Receiving the HPV Vaccine

	OR	p-value	aOR	95%CI	p-value
Female	2.74	< 0.001	2.20	1.42-3.42	< 0.001
Age ≥ 15 years	1.51	0.716	0.96	0.50-1.85	0.911
High School level	1.67	0.012	1.38	0.73-2.60	0.326
Level of knowledge					
• Low	Ref.				
• Moderate	1.89	0.113	1.36	0.72-2.43	0.473
• High	2.04	0.042	1.14	0.36-2.43	0.716
Level of awareness					
• Negative	Ref.				
• Neutral	1.46	0.110	1.22	0.74-1.98	0.435
• Positive	4.22	< 0.001	2.96	1.35-6.48	0.007
Level of attitude					
• Negative	Ref.				
• Neutral	2.12	0.168	2.03	0.63-6.53	0.231
• Positive	3.89	0.011	3.35	1.06-10.55	0.038

OR = Crude odds ratio, aOR = Adjusted odds ratio, CI = Confidence interval, Ref.=Reference

Discussion

The findings of this study highlight significant gaps in awareness and attitudes toward HPV vaccination among adolescents in Chiang Rai, Thailand, despite high levels of knowledge. This discrepancy underscores the need for targeted health promotion strategies to bridge the gap between knowledge, awareness and attitude in preventing HPV-related diseases. In this study, only 22.77% of participants reported receiving HPV vaccination, which is consistent with previous findings indicating suboptimal uptake among Thai adolescents.

In December 2024, the inclusion of HPV vaccination as a benefit under Thailand's National Health Security System for Grade 5 girls by 2025 represents a crucial step toward improving vaccination rates.[9] Evidence from countries that have implemented similar national programs shows a substantial reduction in HPV infections and related diseases. For instance, a meta-analysis by Drolet et al. (2019) demonstrated a significant decline in HPV prevalence and cervical pre-cancers following the introduction of national HPV immunization programs globally.[10] The focus on early vaccination aligns with WHO recommendations for vaccinating girls aged 9-14 before sexual activity begins to maximize vaccine efficacy.[4]

In this study, 72.30% of participants demonstrated high knowledge about HPV, only 14.31% reported positive awareness, and 62.68% had a positive attitude toward vaccination. In addition, positive awareness

and positive attitude are significant factors to perceiving the HPV vaccine. These findings suggest that knowledge alone may not be sufficient to drive vaccine uptake. Studies have shown that awareness and positive attitudes are critical predictors of vaccine acceptance. For example, Gerend and Shepherd (2012) found that perceived benefits of vaccination and social influences significantly impact vaccine intentions.[11]

To improve HPV vaccination rates and reduce the prevalence of HPV-related diseases, several strategies are recommended. Nationwide awareness campaigns should be implemented to emphasize the importance of HPV vaccination for both males and females. Culturally sensitive and age-appropriate education programs should be introduced in schools to enhance understanding and acceptance among adolescents. Healthcare providers should be actively engaged as trusted sources of information to address concerns and misconceptions about the vaccine. Additionally, it is essential to monitor vaccine coverage regularly and focus on addressing access disparities, particularly in rural and underserved areas, to ensure equitable immunization efforts.

This study has notable strengths and limitations. One strength is that the participants are adolescents, the primary target group for HPV vaccination. Additionally, the study evaluates three key dimensions (knowledge, awareness, and attitude) which are essential for effective health promotion. However, the study has some limitations. First, as a cross-sectional study, its findings may not account for future changes in vaccine technology or national policies, which could influence participants' knowledge, awareness, attitudes, and interest in HPV vaccination. Second, the study was conducted in northern Thailand, where cultural and societal perspectives may differ from other regions. As a result, the findings may not fully represent the knowledge, awareness, attitudes, or interests of adolescents across the region or country. Furthermore, some factors that may influence vaccine acceptance, such as vaccine cost, family income, religion, and ethnicity, were not included in this study. In addition, this study did not directly assess vaccine hesitancy for example, concerns about safety, side effects, or misunderstanding about the need for vaccination. Future research should explore these social and psychological factors to better understand barriers to HPV vaccine uptake among adolescents.

Conclusion

Health care providers and policy makers must focus on translating knowledge into awareness and positive attitudes to achieve widespread acceptance. Targeted health promotion and community-based strategies are essential to maximize the impact of national vaccination initiatives and reduce the burden of HPV-related diseases.

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Conflict of interests

There was no conflict of interest to declare.

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