

Effect of peer education on knowledge, attitude, and practice of HPV infection prevention among college students



Original article

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Abstract: **Objective:** To explore the effect of peer education on improving the knowledge, attitude, practice level (KAP) to prevent human papilloma virus (HPV) infection among college students.

Methods: The knowledge, attitude/belief, and practice level of 536 grade I college students from a university in Shanghai were surveyed and analyzed using a self-designed questionnaire—the HPV Infection and Prevention KAP Questionnaire.

Results: Many college students heard about HPV vaccine (49.70% before peer education and 100% after peer education); however, few of them were vaccinated (2.82% before peer education and 5.23% after peer education). Knowledge, attitude/belief, and practice of HPV infection prevention were positively related ($P < 0.05$). Peer education was effective in improving college students' KAP level of HPV infection prevention ($P < 0.05$).

Conclusions: Peer education could be used as a strategy in colleges to improve student's KAP level of HPV infection prevention. College students may also be encouraged to spread their influence to society.

Keywords: cervical cancer • college students • Human papillomavirus • KAP • peer education

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1. Introduction

World Health Organization (WHO) announced that 30 years ago, the burden of cancer ranked sixth globally, but has now risen to the second place, just behind cardiovascular diseases in World Cancer Report 2020. WHO believes that the prevention of cancer and the control of cancer incidence are the important tasks in the field of health in the new century.¹ According to the global cancer statistics in 2018, cervical cancer is the fourth major malignant tumor threatening women's

health worldwide.² Fortunately, with the popularization of cervical smear screening and the market launch of human papilloma virus vaccine (HPV vaccine), the incidence and mortality of cervical cancer have been decreasing year by year. However, the declining trend is more obvious in developed countries such as the United States, Canada, Australia, etc.^{1,3} HPV vaccine was first approved in the United States in 2006, and by 2018, it had been approved in 85 countries globally.⁴ However,

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most girls in middle- and low-income countries did not receive the HPV vaccine.⁵ This may be one of the reasons why the incidence and mortality rate of cervical cancer in these countries have not been declining significantly. WHO called on countries to achieve the goal of preventing cervical cancer, reducing the burden of cervical cancer, and guarantee women's health through the effective universalization of HPV vaccine in the next few decades.

In 2016, the Cervarix bivalent vaccine, which developed by the American GlaxoSmithKline company, was approved by the Chinese National Medical Products Administration for marketing.^{6–8} In 2019, China's first domestic HPV vaccine was developed and approved.^{9,10} At present, HPV vaccine is a second-class vaccine in China. It is voluntarily vaccinated and paid for by own expense. The generation of healthy behavior on HPV vaccination requires knowledge as a foundation and belief as a driving force.^{11,12} Knowledge should be given and shared as the basis for establishing attitudes, firm beliefs, and generating behaviors. HPV mainly spreads through sexual behavior, which is a sensitive topic. Traditional teacher–student lectures may not be suitable for such a topic. Young age college students, who are the main HPV vaccine target population, prefer to share, discuss, and spread information and knowledge with their peers. It has been 7 years since HPV vaccine launched in mainland China. There is a lacking in up-to-date evidence regarding HPV vaccination knowledge, attitude, and practice, as well as the effective intervention to improve it among college students.

This study aims to explore the level of knowledge, attitude, and practice among college students in preventing HPV infection before and after peer education. This will provide some help with the scientific and effective promotion of HPV vaccination in China.

2. Method

2.1. Study design and sample selection

A descriptive, quantitative interventional study was conducted among undergraduate students in a comprehensive university in Shanghai. The inclusion criteria for the participants were as follows: (i) undergraduate student and (ii) informed and voluntarily joined the study. In addition, the undergraduate students who were suspended from the university were excluded from this study. The participants were clustered into classes of medical and non-medical majors and were sampled. Medical and non-medical classes were sampled conveniently, as convenience sampling was effective to conduct and was well-suited to this short time-frame study. Consequently, 536 students from 18

classes under medical and non-medical majors in spring semester 2023 were sampled in this study.

2.2. Design and implementation of peer education

Three outstanding students with excellent academic performance and good communication and management skills were selected by the counselor in each class at the beginning of the semester. They formed the peer educator team. The team received training from 2 instructors of Project Hope Shanghai representative office cervical cancer/HPV prevention education program. The 2-day HPV prevention peer educator training program contained theoretical and practical aspects. The instructors organized the theoretical part in lectures, including cervical cancer definition, etiology, risk factors, transmission, prevention, HPV vaccine, etc. Practical part was conducted in small groups. Peer educators demonstrated and practiced the methods on delivering knowledge, such as small group discussion, role play, debate, and buzzer game. In the following week, peer educators were required to design a 3-month cervical cancer prevention peer education plan. The plan would be assessed and approved by one instructor. In addition, peer educators' knowledge mastery and competence on delivering knowledge were evaluated by the instructors 1 week after the training. Peer educators would be retained until they passed the evaluation session.

The rest of the students of each class were divided into 3 groups (9–11 students per group). One peer educator and one group of each class were matched. In the following 3 months, they shared, exchanged, discussed, and debated the information and knowledge about cervical cancer and HPV vaccine. The peer educator took the responsibility for organizing the time and location, guiding the process, and ensuring the accuracy of knowledge.

2.3. Variables and measures

This survey used a self-designed "HPV Prevention Knowledge, Attitude, and Practice Questionnaire," with a Cronbach's α of 0.806 and an expert validity of 0.924. The questionnaire includes 2 parts: general information and HPV infection and prevention knowledge, attitude, and practice questionnaire.

- (1) General information: including gender, age, major, whether heard of cervical cancer, whether heard of HPV vaccine, whether received HPV vaccine, etc.
- (2) HPV Prevention Knowledge, Attitude, and Practice Questionnaire: the Knowledge section has 10 questions, with correct answers worth 1 point and

incorrect answers worth 0 point, for a total score of 0–10 points. Higher scores indicate a better grasp of cervical cancer prevention knowledge. The Attitude section has 5 questions, scored on a Likert scale of 5–25 points, with higher scores indicating a more positive attitude towards HPV vaccine. The Behavior section has 5 questions, scored on a Likert scale of 5–25 points, with higher scores indicating a higher likelihood of engaging in HPV vaccine vaccination/recommendation behavior.

2.4. Data collection

The researchers distributed and collected questionnaires in self-study evening class before and after the peer education intervention. The purpose of the questionnaire, as well as voluntary participation and information security, was explained in advance. A total of 536 pre-peer education questionnaires were collected, and 525 post-peer education questionnaires were collected (11 students withdrew from the study due to reasons such as military service, school suspending, and voluntary withdrawal). After excluding incomplete/invalid questionnaires and those that failed to match between pre- and post-tests, 497 valid questionnaires were obtained, with an effective rate of 92.72%.

2.5. Statistical analysis

SPSS 23.0 software (IBM Corporation, Armonk, New York, United States) were utilized for data analysis. The measurement data are presented as mean $\pm$ standard deviation, and the counting data are presented as rate or constituent ratio. The comparison of counting data before and after peer education is performed using the Wilcoxon rank sum test, and the comparison of measurement data is performed using the paired sample *t*-test. The relationship between knowledge, attitude, and behavior is analyzed using Pearson correlation analysis, and the level of significance is $\alpha = 0.05$.

2.6. Ethical consideration

This study has been reviewed and approved by the Academic Ethics and Integrity Committee of Shanghai ShanDa University in accordance with the principles outlined in the relevant national/international ethical standards (approval number. 2023009). The study has been designed to minimize potential risks to participants, and all participants have been fully informed of the purpose, methods, and potential risks and benefits of the study. Participants have been given the opportunity to ask

questions and provide their consent to participate voluntarily. Confidentiality and anonymity have been ensured throughout the study, and measures have been taken to protect the privacy and dignity of all participants. The research team is committed to ensuring that the findings of this study are used responsibly and in a manner that benefits society.

3. Result

3.1. Characteristics of participant

The surveyed participants were aged between 18 years and 21 years, with a mean age of 19.523 ± 0.625 years. The majority were female, and medical major students were slightly higher when compared to non-medical major students. Before the peer education intervention, the proportion of students who had heard of cervical cancer was significantly higher than those who had heard of HPV vaccine. A small percentage of students did not consider peer education as a form of knowledge teaching or training. After the peer education intervention, there was a significant increase in the awareness rate of cervical cancer, HPV vaccine awareness rate, and HPV vaccination rate. The detailed data are provided in Table 1.

3.2. Effectiveness of the intervention

Before and after peer education, the correlation between the knowledge, attitude, and behavior of the study subjects regarding HPV was statistically significant ($P < 0.01$ or $P < 0.05$). The detailed data are presented in Table 2.

The study results showed that through peer education, the scores of knowledge, attitude, and behavior regarding the prevention of HPV infection among college students increased, with statistical significance ($P < 0.05$). College students with a medical background had higher scores in knowledge, attitude, and behavior regarding the prevention of HPV infection compared to those with non-medical backgrounds, but only the knowledge section showed statistical significance after peer education ($P < 0.05$). The detailed data are presented in Table 3.

4. Discussion

4.1. High awareness rate but low vaccination rate for HPV vaccination among college students

Yang et al.¹³ conducted a study in 2016 on 2131 non-medical female students in Xi'an, China, which showed that only 9.7% were aware of HPV vaccine. Lu et al.¹⁴

Variables	Pre peer education		Post peer education		Z	P
	n	Percentage (%)	n	Percentage (%)		
<i>Gender</i>						
Male	126	25.35	/			
Female	371	74.65				
<i>Major</i>						
Medical	262	52.72	/			
Non-medical	235	47.28				
<i>Whether heard of cervical cancer</i>						
Yes	454	91.35	497	100	6.557	0.000
No	43	8.65	0	0		
<i>Whether concern your own or female relatives' risk of developing cervical cancer</i>						
Yes	207	58.35	297	59.76	5.738	0.000
No	290	41.65	200	40.24		
<i>Whether heard of HPV vaccine</i>					15.716	0.000
Yes	250	49.70	497	100		
No	247	50.30	0	0		
<i>Whether received cervical cancer/HPV prevention training</i>					20	0.000
Yes	59	11.87	461	92.76		
No	438	88.13	36	7.24		
<i>Whether received voluntarily vaccine</i>					4.459	0.000
Yes	95	19.11	121	24.35		
No	402	80.89	376	75.65		
<i>Whether relatives or friends received HPV vaccine</i>					3.78	0.000
Yes	121	24.35	141	28.37		
No	376	75.65	356	71.36		
<i>Whether yourself received HPV vaccine</i>					2.828	0.005
Yes	14	2.82	26	5.23		
No	483	97.18	471	94.77		

Note: HPV, human papilloma virus.

Table 1. Characteristics of the study participants (N = 497).

conducted a questionnaire survey in 2015 on 810 college students in Shanghai, which showed that only 6.42% were aware of HPV vaccine. The results of this study showed that the awareness rate of HPV vaccine among college students before peer education intervention was 49.70% (Table 1), which was slightly higher but still lower than the awareness rates of 92% and 81% among American and British women, respectively.¹⁵ With the approval of imported and domestic HPV vaccines in China, college students' access to relevant reports and information gradually increased, which was closely related to the rise in their awareness rate. After peer education, the awareness rate of HPV vaccine among college students significantly increased, with significant

statistical significance (Table 1), indicating that peer education is efficient to a certain extent. However, the vaccination rate of HPV vaccine among college students was relatively low (2.82% before peer education and 5.23% after peer education), and the change was not statistically significant (Table 1). The peer education intervention lasted for 3 months, and it takes time for cognition to turn into action. HPV vaccine has been on the market for a short time, and its efficacy and side effects are not yet clear. The vaccine is not included in the national first-class vaccine, and the cost needs to be self-paid. The vaccine/vaccination point coverage is limited, and these factors require college students to make a cautious vaccination decision.

Variables	1	2	3	4	5	6
1. Knowledge score before peer education	1					
2. Attitude score before peer education	0.163**	1				
3. Practice score before peer education	0.153**	0.088*	1			
4. Knowledge score after peer education	-0.051	-0.051	0.137**	1		
5. Attitude score after peer education	-0.043	-0.042	-0.01	0.204**	1	
6. Practice score after peer education	-0.127**	-0.007	-0.094*	0.184**	0.223**	1

Note: *Represents significance at the 0.05 level (2-tailed); **Represents significance at the 0.01 level (2-tailed).

Table 2. Correlation analysis of knowledge, attitudes, and practices related to prevention of HPV infection among college students (N = 497).

Variables	Before peer education	After peer education	t	P
<i>Knowledge score</i>	7.181 ± 1.595	8.875 ± 1.444	17.122	0.000
Medical major (n = 262)	7.317 ± 1.374	9.198 ± 1.339		
Non-medical major (n = 235)	7.030 ± 1.801	8.515 ± 1.471		
t	2.009	5.417		
P	0.045	0.000		
<i>Attitude score</i>	15.256 ± 2.655	15.815 ± 3.239	2.918	0.004
Medical major (n = 262)	15.302 ± 2.618	16.015 ± 3.149		
Non-medical major (n = 235)	15.204 ± 2.700	15.591 ± 3.329		
t	0.407	1.458		
P	0.684	0.145		
<i>Practice score</i>	19.161 ± 3.130	20.157 ± 3.148	5.254	0.000
Medical major (n = 262)	19.282 ± 3.019	20.225 ± 3.027		
Non-medical major (n = 235)	19.026 ± 3.250	20.081 ± 3.281		
t	0.913	0.510		
P	0.361	0.610		
<i>Total score of knowledge, attitudes, and practice</i>	41.598 ± 875	44.847 ± 5.532	9.796	0.000
Medical major (n = 262)	41.901 ± 4.779	45.439 ± 5.434		
Non-medical major (n = 235)	41.260 ± 4.969	44.187 ± 5.578		
t	1.466	2.532		
P	0.143	0.012		

Note: HPV, human papilloma virus; SD, Standard Deviation.

Table 3. Analysis of the correlation between knowledge, attitudes, and practices related to prevention of HPV infection among college students before and after peer education (N = 497) ($\bar{x} \pm SD$).

4.2. Positive correlation between knowledge, attitudes, and practice related to prevention of HPV infection among college students

Table 2 shows that there is a positive correlation between knowledge, attitudes, and behaviors related to the prevention of HPV infection among college students before and after peer education intervention, with statistical significance. This is consistent with the KAP theoretical model (Knowledge, Attitude/Belief,

Practice) proposed by the British scholar Koster in the 1960s.^{16–18} Acquiring knowledge of preventing HPV infection is the foundation; establishing positive attitudes and beliefs for preventing HPV infection is the driving force; producing behaviors for preventing HPV infection and receiving vaccinations is the result. These three are a continuous process, and there is a close relationship between them. Peer education is an important external condition that helps and promotes college students to acquire knowledge, form attitudes, and develop behaviors.

4.3. Peer education is effective in improving knowledge, attitudes, and behaviors related to the prevention of HPV infection among college students

Table 3 shows that the scores of knowledge, attitudes, behaviors and total score related to the prevention of HPV infection among college students after peer education intervention were significantly higher than those before peer education, with statistical significance. This indicates that peer education is an effective intervention method for improving knowledge acquisition, establishing positive attitudes, and promoting positive behavior trends. Peer education has been rarely used in the prevention of HPV infection and cervical cancer, but has been widely used in the prevention of AIDS and other diseases, with positive results consistent with the findings of this study.^{19–22} Before peer education, the influence of major on the knowledge, attitudes, and behaviors of college students in preventing HPV infection was not statistically significant. After peer education, medical major college students had higher scores in knowledge than non-medical major college students, with statistical significance. However, there was no statistically significant difference between the 2 groups in attitude and behavior scores, indicating that medical background is helpful for college students to absorb and master relevant professional knowledge, but the influence factors of attitude and behavior are diverse and complex, and knowledge is only one of them.

5. Conclusions

The discovery of the etiology of cervical cancer and the creation of HPV vaccine have made cervical cancer the

first preventable cancer in human history. The WHO calls for the popularization of the HPV vaccine, prevention of cervical cancer, and reduction of the burden of cervical cancer. College students are the targeted age group for HPV vaccination. Therefore, understanding and improving college students' knowledge, attitudes, and behaviors related to preventing HPV infection are key to reducing the burden of cervical cancer. Peer education captures the characteristics of adolescents, trains influential peers to master knowledge/skills, and then disseminates knowledge to their peers and even a wider audience to achieve effective educational objectives. The results of this study showed that through peer education, the behavior trend of college students was quite positive. However, this study only recruited the undergraduate students from one university, the generalizability could be the limitation. In the future, students from diverse institutes could be researched to enrich the finding in this research field. In addition, other strategies to improve college students' knowledge, attitudes, and behaviors related to preventing HPV were also recommended to research.

Ethical approval

This study has been reviewed and approved by the Academic Ethics and Integrity Committee of Shanghai Shanda University in accordance with the principles outlined in the relevant national/international ethical standards (approval number: 2023009).

Conflicts of interest

All contributing authors declare no conflicts of interest.

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