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Study on the Cognitive Status and Educational Intervention of College Students for HPV and Its Vaccines

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Abstract: ***Objective:*** ***By means of understanding some college students' cognition and willingness to vaccinate HPV and its vaccine definitely, meanwhile, grasping its influencing factors and sources of acquisition, we strive to design intervention program to achieve the prospect that modify university students' cognition and attitude towards HPV and HPV vaccine, and then intensify the vaccination rate and penetration rate, thereby alleviating the infection rate.*** ***Method:*** ***Use so jump.com to design questionnaires, made posters and distributed online questionnaires in anonymous forms.*** ***Result:*** ***A total of 455 questionnaires were collected, of which 414 were valid. The contents of the survey included the general information of the subjects, the awareness of HPV and its vaccine, the willingness to vaccinate, the influencing factors, etc. Among them, only 23.2% college students had been vaccinated, including 8 males and 88 females. As can be clearly seen from the given datum, 92.1 percent of the unvaccinated are willing to get vaccinated, but the following reasons result in the low rate of vaccination, the total of 38.2 percent, 33.4 percent and 23.6 percent: the fancy price, a lack of current supplies of HPV vaccine and the uncertain reservation process. As technology rapidly increases and the information age expands, 80.4% college students learn about HPV and related information on the Internet. The cruising data indicates that gender and the level of knowledge related HPV have an impact on the willingness to vaccinate ($p<0.05$).*** ***Conclusion:*** ***Most college students have a fundamental cognition of HPV and its vaccine. It is essential to improve college students comprehensive understanding of HPV and its vaccine. It is also badly urged to improve the supply of vaccine, reduce the price of vaccine and publicize the way of vaccination to improve the vaccination rate.***

Keywords: Human papilloma virus, College students, Inoculation intention, Influencing factors, Attitude.

1. Introduction

Cervical cancer is currently the most common disease related to human papilloma virus (HPV) [1,2]. At least 14 types of viruses can cause cervical cancer or other malignancies, and sexual transmission is one of the most common routes of infection. HPV is a spherical DNA virus that can cause the proliferation of squamous epithelium in human skin and mucous membranes [3]. Symptoms include common warts and genital warts (genital warts). Among malignant tumors of the female reproductive system in China, cervical cancer ranks the first in incidence and mortality. Among female malignant tumors, the incidence of cervical cancer is second only to breast cancer. At the same time, the incidence of cervical cancer has gradually become younger [5] and the incidence rate is still on the rise. Reach has shown that the HPV vaccine can prevent and resist HPV infection which can also prevent recurrence after cervical conization. In recent years, the incidence of sexual behavior among college students in China has increased which make the risk of HPV infection among college students has also greatly increased. It is particularly important to clarify the understanding of HPV and its vaccine and their willingness to vaccinate among college students. We investigated the current status and sources of knowledge about HPV and its vaccine among college students. Aiming to formulate targeted education intervention programs to improve college students' knowledge about the pathogenesis and prevention of HPV, also their knowledge and attitudes about HPV vaccines, strengthen vaccination rates and reduce infection rates.

2. Object and Methods

2.1 Object

College students from three universities in western Guangdong. Inclusion criteria: (1) undergraduate students; (2) possess cognitive behavioral abilities; (3) voluntarily participate in survey research.

2.2 Methods

Use So Jump to design questionnaires and make survey posters. Use anonymous forms, conduct online surveys by distributing questionnaires in WeChat groups, QQ groups which formulate targeted publicity and education intervention plans based on the survey results. The intervention plan is to play a popular science video (https://www.bilibili.com/video/BV1Zg411S7MF/?vd_source=a6073f27b8241493c4b12158aac19cef) during class. After playing the video, a questionnaire with the same content will be distributed and compared with the results of the first online survey. Compare whether the intervention program has an impact on improving awareness and willingness to vaccinate.

2.3 Questionnaire Content

(1) Basic information; (2) Knowledge and awareness about the pathogenesis and prevention of HPV and its vaccine. There are 9 questions in total, including single-choice and multiple-choice, with a total score of 45 points, 5 points for

correct answers, no points for wrong answers, 3 points for more choices and less choices, and a cognitive score; (3) HPV vaccine vaccination status and willingness to vaccinate and its influencing factors; (4) Willingness and learning direction to further understand HPV-related knowledge.

2.4 Statistical Analysis

Use SPSSAU software for data analysis and Excel for chart production. Use rates to describe count data. Use composition ratios to describe measurement data. Related factors such as willingness to be vaccinated and HPV awareness were analyzed, and $P<0.05$ was considered a statistically significant difference.

3. Result

3.1 Basic Situation

Received 455 questionnaires, valid questionnaires are total 414. The age of the survey respondents was 15-28 years old, with an average age of (20.11±1.95) years. Among them, 118 people were male (28.5%) and 296 people were female (71.5%); 259 people (62.6%) were in medical majors and 155 people (37.4%) were in non-medical majors (Table 1).

Table 1: Basic information about the survey objects

Projects		Number
Age	15—19	141
	20—22	257
	23—25	15
	>25	1
Gender	male	118
	female	296
Grade	Freshman year	119
	Sophomore year	148
	Junior year	123
	Senior year	18
	Fifth year	6
Major	Medical profession	259
	Non-medical profession	155

3.2 Cognitive Situation

The questionnaire showed that among the 414 research subjects, 373 people (90.1%) said they had heard of HPV, and 41 people (9.9%) had not heard of HPV. Regarding the view on the preventive effect of HPV vaccine, 55 people (13.3%) believe that it can prevent all high-risk subtypes, and 341 people (82.4%) believe that it can prevent some high-risk subtypes. The median cognitive score of the survey respondents was 26 points. A score of ≤26 was defined as insufficient cognition, a score of 26 <score ≤35 was defined as a certain level of cognition, and a score of >35 was defined as comprehensive cognition. The number of people with insufficient cognition was 223 people (53.9%), the number of people with certain cognition was 150 people (36.2%), and the number of people with full cognition was 41 people (9.9%) (Table 2).

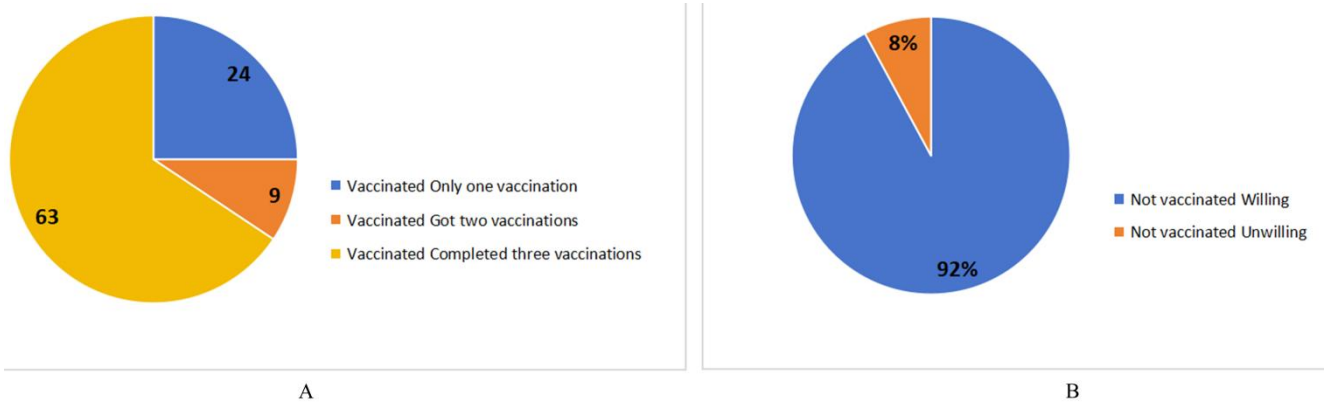
Table 2: Awareness of HPV and HPV vaccine

Types	Male (n=118)		Female (n=296)		Total (n=414)	Awareness rate(%)
	Number of people	Awareness rate(%)	Number of people	Awareness rate(%)		
Have you ever heard of HPV?						
Yes	96	81.4	277	93.6	373	90.1
No	22	18.6	19	6.4	41	9.9
Perspectives on HPV Vaccine Preventive Effectiveness						
Prevention of all high-risk subtypes	25	21.2	30	10.1	55	13.3
Prevents some high-risk subtypes	83	70.3	258	87.2	341	82.4
No preventive effect	3	2.5	2	0.7	5	1.2
Skeptical about the effectiveness of prevention	7	5.9	6	2	13	3.1
Is HPV an infectious disease?						
Yes	65	55.1	177	59.8	242	58.4
No	32	27.1	88	29.7	120	28.9
Not sure	21	17.8	31	10.5	52	12.5
Are women the only ones infected?						
Yes	8	6.8	28	9.5	36	8.7
No	93	78.8	236	79.7	329	79.5
Not sure	17	14.4	32	10.8	49	11.8
Are women the only ones who need to be vaccinated?						
Yes	21	17.8	48	16.2	69	16.7
No	75	63.6	210	70.9	285	68.8
Not sure	22	18.6	38	12.8	60	14.5
Does the vaccine protect against all HPV subtypes?						
Yes	29	24.6	38	12.8	67	16.2
No	66	55.9	223	75.3	289	69.8
Not sure	23	19.5	35	11.8	58	14
Is the vaccine available for 16-25 year olds?						
Yes	68	57.6	161	54.4	229	55.3
No	24	20.3	97	32.8	121	29.2
Not sure	26	22	38	12.8	64	15.5
Preventive measures for HPV infection (Multiple choice)						
HPV vaccination	110	93.2	288	97.3	398	96.1
Sterilize after contact with infected person	74	62.7	153	51.7	227	54.8
Fixed sexual partners and use condoms	97	82.2	256	86.5	353	85.3
Enhance autoimmunity	97	82.2	268	90.5	365	88.2
Symptoms of HPV infection (Multiple choice)						
Warts	96	81.4	249	84.1	336	81.2
Pimples	72	61	164	55.4	236	57
Fever	61	51.7	169	57.1	221	53.4
Tumors such as cervical and penile cancer	96	81.4	265	89.5	361	87.2

Contact bleeding	58	49.2	169	57.1	227	54.8
People susceptible to HPV (multiple choice)						
Disorders of sex hormone levels	94	79.7	247	83.4	341	82.4
Immunocompromised	106	89.8	275	92.9	381	92
Alcoholism	55	46.6	136	45.9	191	46.1
Multiple sexual partners	92	78	259	87.5	351	84.8
Smoking	45	38.1	113	38.2	158	38.2
Routes of HPV transmission (multiple choice)						
Direct contact	66	55.9	140	47.3	206	63.3
Mother-to-child transmission	73	61.9	197	66.6	270	80.2
Sexual transmission	102	86.4	277	93.6	379	112.4
Droplet transmission	30	25.4	66	22.3	96	29.3
Contact with contaminated materials	60	50.8	158	53.4	218	64.9

3.3 Vaccination Status and Willingness to Vaccinate

Among the 414 college students who participated in the survey, 96 people (23.1%) have received the HPV vaccine, including 8 boys (8.3%) and 88 girls (91.7%); 24 (25%) have only received one shot. 9 people (9.4%) have received 2 doses, and 63 people (65.6%) have completed 3 doses. Among unvaccinated college students, 293 people (92.1%) were willing to be vaccinated, and 25 people (7.9%) were unwilling to be vaccinated (Figure 1).



A. Vaccination status; B. Willingness to be vaccinated.

Figure 1: Vaccinated and willingness to vaccinate

3.4 Factors Influencing Willingness to Vaccinate

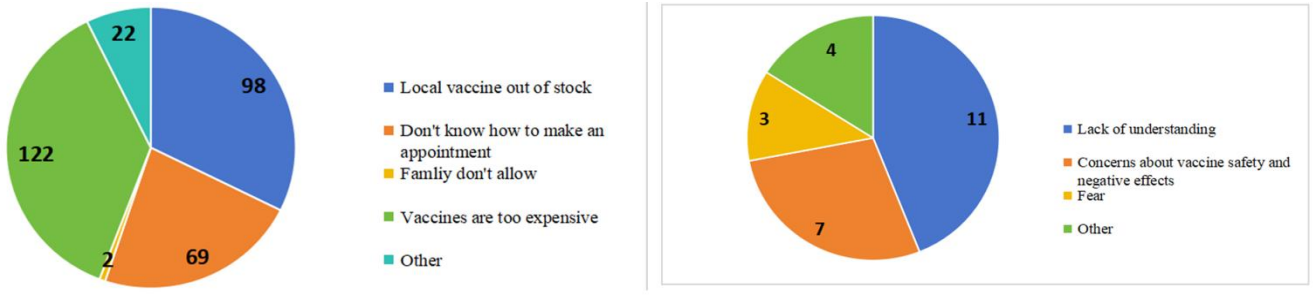
Analyzed Pearson's chi-squared test shows that gender has a statistically significant difference in willingness to receive HPV vaccine (P<0.05), which means that gender is an influencing factor in willingness to receive HPV vaccine (Table 3).

Table 3: Factor influencing willingness to vaccinate

		Willing	Unwilling	χ^2	P
Gender	Male	98	20	34.63	< 0.0001
	Female	291	5		
Major	Medical profession	243	16	0.023	0.878
	Non-medical profession	146	9		
Ever heard of HPV	Yes	353	20	3.04	0.081
	No	36	5		

3.5 Factors Affecting Vaccination Status

Among 293 college students who were willing to be vaccinated but were not vaccinated, 112 people (38.2%) were not vaccinated because the vaccine was too expensive, 98 people (33.4%) were because the vaccine was out of stock in their place, and 69 people were not sure how to make an appointment (23.5%), and 40% of other reasons are lack of understanding of the HPV vaccine. Among the reasons why college students are unwilling to vaccinate, the largest number of people (11 people (44%)) are due to lack of understanding of HPV or HPV vaccines, and 7 people (28%) are considering the safety and negative effects of HPV vaccines (Figure 2).



A. Willing to be vaccinated but for some reason not yet vaccinated; B. Reasons for not being vaccinated and not wanting to be vaccinated

Figure 2: Factor influencing vaccination status

3.6 Cognitive Source Pathway

Among the 414 college students who participated in the survey, 207 people (50%) said that the school has carried out knowledge about HPV and its vaccine, and 207 people (50%) said that the school has not carried out knowledge about HPV and its vaccine. Among them, 333 cases (24.9%) learned relevant knowledge through the Internet, 253 cases (24.9%) learned about it through news reports, 226 people (22.2%) learned about it through friends and family, and 226 people (22.2%) learned about it through newspapers, magazines, etc. There were 191 cases (18.8%), and 11 cases (1.1%) said they had never understood it (Figure 3).

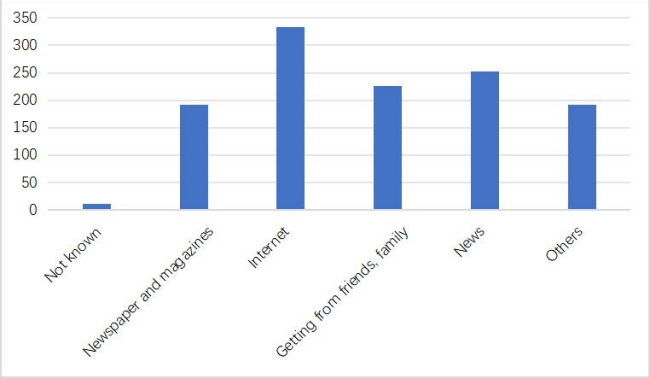


Figure 3: Ways for college students to learn about the HPV vaccine

3.7 Return Visits after Popularization of Science

Totally collect 167 questionnaires and 165 were valid questionnaires. The age of the survey subjects was 17-24 years old, with an average age of (19.71±1.4) years. Among them, 55 were male (33.7%) and 108 were female (66.3%). Awareness during the return visit was improved compared with the first visit ($p<0.05$) (Table 4).

Table 4: Comparison of first-time and return visit perceptions

	Cognitive deficit	Some cognition	χ^2	P
First Survey	222	192	13.65	0.0002
Return visit	60	104		

P.s.: Insufficient cognition is defined as a score of 0-26 and some cognition is defined as a score of 27-45

4. Discussions

4.1 College Students have Some Awareness of HPV Vaccine Distribution but not a Comprehensive Understanding

The questionnaire survey showed that college students have a certain awareness of HPV and HPV vaccine but it is not comprehensive. The overall awareness rate has statistically significant gender differences ($P<0.05$). More than 80% of college students have heard about HPV and its vaccine-related knowledge, and their understanding of HPV-related knowledge is better than the 2020 study by Chen Lin and others on college students at a medical college in Guangdong Province [6], 2022 Luo Qing's study on some college students in Guangdong Province [7]. The overall cognitive status of girls is better, but their cognitive age for nine-valent vaccine has been revised and their knowledge of the transmission routes of the HPV virus is still weak. In this study, 17.6% of students still had weak knowledge of the HPV vaccine. It shows that there are misunderstandings about the preventive effect or doubts about its preventive effect. Although the awareness rate of college students has increased, we must pay attention to the preventive effect of the HPV vaccine. In this survey, the awareness rate of college students reached 46.1%., which higher than Li Jing's study of college students in Luzhou in 2022 [8], Zhang Xiaoxiao's study of Chinese college students [9] in 2019 and Zhang Xuhao's study of the bacterial rate in Hong Kong in 2018 [10]. This may be related to the increased attention and popularization of science in colleges and the increased emphasis on the HPV vaccine among college students.

4.2 College Students are Highly Willing to be Vaccinated but There are Still Objective Difficulties and Concerns About Vaccination

The American Advisory Committee on Immunization Practices (ACIP) recommends that both men and women aged 9-26 should receive the HPV vaccine so college students are also among the target groups for HPV vaccination [11]. In this study, the vaccination rate of some college students reached 23.1%, which is higher than the survey results of Hangzhou City (3.6%) [12]and Tongzhou District Survey results (2.91%) [13] but lower than the HPV vaccine for college students in Hong Kong whose vaccination rate is 47.20% [10]. This may be related to the fact that the HPV vaccine in mainland China was launched relatively late, with relatively low attention and low scientific popularity.

In this study, 92.1% of college students are willing to receive the HPV vaccine, indicating that college students are more willing to receive the HPV vaccine. The willingness to receive the vaccine is better than the study by Shi Jing et al. on college students in Tongzhou District in 2023 (44.75%) [13] and meta analysis by Hao Yanhui et al. in 2018(71.84%) [14]. In this study, 38.2% of students who are willing to be vaccinated but have not yet been vaccinated said that the vaccine is too expensive. What's more many students said that they are not clear about how to make an appointment of it, that the vaccine supply is insufficient. Also they are not clear about the way to make an appointment for vaccination. Studies have shown that countries that carry out HPV vaccination programs and provide low-priced vaccines have higher HPV vaccine coverage [1] and HPV infection rates also significantly higher in countries and regions with high vaccination coverage. More than 100 countries and regions have now included HPV vaccine in their national free vaccination plans.

However, the HPV vaccine has not been included in the scope of basic health services in China, and it is still a voluntary vaccine until now [1]. Therefore, we should actively strive to include the HPV vaccine in the scope of national medical insurance and reduce the price of the vaccine to increase the vaccination rate. The main reason why vaccines are in short supply is that the current mainstream HPV vaccines are still imported from abroad MSD and GSK. The two companies have almost monopolized the HPV vaccine market, which make China still has problems with large-scale imports of vaccines. China has developed and launched a domestically produced bivalent HPV vaccine in 2020, which has alleviated some of the pressure on HPV vaccine supply. However, there are still problems with the supply of other types of vaccines,

which still requires accelerating the development of other types of domestically produced HPV vaccines to alleviate this problem.

The World Health Organization points out that increasing HPV vaccine coverage is of critical significance in reducing the prevalence of cervical cancer and HPV infection-related diseases [1]. However, in this study, 7.9% of college students were still unwilling to be vaccinated. Most of the college students who were unwilling to be vaccinated believed that they lacked understanding of the HPV vaccine or were worried about its safety and whether it would cause side effects. In recent years, research and analysis have confirmed the safety of the vaccine, but there are still a small number of students who are worried. This prompts streets, schools, and governments to increase efforts to publicize and popularize the safety and effectiveness of HPV, and reduce public awareness of the HPV vaccine's worry.

4.3 Designing Programs to Improve the Effectiveness of educational intervention for College Students' Understanding of Ways

In this survey, 80.4% of college students learned about HPV-related knowledge online, which is consistent with the study by Shi Jing et al. on college students in Tongzhou District, Beijing in 2023 [13]. Otherwise 50% of college students say that their school has carried out activities to understand HPV-related knowledge. For college students who like to learn relevant knowledge through the Internet, relevant popular science videos, popular science cartoons, popular science articles, etc. can be produced and posted on the Internet. Moreover relevant popular science animations can be played during school's break and broadcast on the school radio station or public accounts to promote the effectiveness of the HPV vaccine and ways to make vaccine appointments.

4.4 After the Implementation of Intervention Measures, Awareness and Willingness to Vaccinate Increased

In this study, the intervention measure of playing popular science animations during class breaks was implemented. The return interviews showed that college students' awareness and willingness to vaccinate have improved, indicating that increasing science popularization can improve college students' awareness and vaccination rate. However, there are certain flaws in the educational measures of this study, such as too small a sample size, the inability to play complete popular science videos during class breaks, and outdated science popularization content. This requires follow-up research to expand the sample size, including self-media, mainstream media, and education personnel. Able to innovate and pay attention to policy changes and trends. The increase in awareness also suggests that the intervention measure of playing popular science videos between classes has a certain effect and can be implemented in colleges and universities in the future.

4.5 Conclusion

At present, many college students have some knowledge and understanding of HPV and its vaccine, but it is relatively superficial. It is urgent to take effective publicity and education measures to improve college students' comprehensive understanding of HPV and its vaccine, improve the supply of vaccines, reduce vaccine prices, and publicize vaccination routes to increase vaccination rates. In view of the fact that college students tend to learn about HPV-related knowledge through the Internet, flexible education methods such as popular science videos and popular science cartoons can be produced to improve the effect of publicity and education intervention.

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