

Study on the Awareness and Willingness of HPV Vaccination Among Women Aged 15 to 45 Based on an Online Survey in Xi'an

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Abstract:

Objective: This study investigates the awareness and willingness of human papillomavirus (HPV) vaccination and its determinants among women aged 15 to 45 years in Xi'an, Shaanxi province. **Methods** In August 2023, 112 female residents in Xi'an were selected using a convenient sampling method to research their awareness of HPV, health conditions, and vaccination willingness through self-administered network questionnaires. **Results:** 82.14% of the respondents expressed their willingness to be vaccinated against HPV, 17.86% were reluctant to get HPV vaccination, and 83.1% agreed to include the HPV vaccine in medical insurance. Among those willing to vaccinate, 44 women aged between 15 and 24 account for 39.3%. The age group with the highest awareness score is 25 to 34 years old, with 12.63 as the average awareness score. According to the correlation analysis, awareness of the HPV vaccine was correlated with education ($r=0.312$, $P<0.001$). Besides, the vaccination willingness was intertwined with the awareness of the vaccine ($r=0.218$, $P=0.021$) and the attitude towards vaccine policy ($r=0.392$, $P<0.001$). **Conclusion:** Women in Xi'an have a high willingness to HPV vaccination, which is related to their awareness of the HPV virus and vaccine-related knowledge as well as policy recognition. It is suggested that the publicity and education of the HPV vaccine should be strengthened in the future, and a reasonable cost-sharing mechanism should be established to improve the overall coverage rate of the HPV vaccine.

Keywords: HPV Vaccination; Awareness of HPV Infection; Vaccination Willingness

1. Introduction

Cervical cancer is a malignant tumor that occurs in the cervix (from the vagina to the opening to the uterus). Almost all cases of cervical cancer (99%) are associated with a high risk of infection with HPV, a very common sexually transmitted virus. While most HPV infections heal themselves without any symptoms, persistent infections lead to cervical cancer, which is the fourth most common cancer in women. In 2020, there were 604,000 new cases and 342,000 deaths. Low-and-middle-income countries witness about 90% of new cases and deaths worldwide^[1]. Although cervical cancer is one of the most difficult cancers to cure, most cases can be prevented if detected early or treated with HPV vaccination (Grade I) and precancerous lesion screening and treatment (Grade II). Through a combined approach of prevention, screening, and treatment, cervical cancer can be eliminated in a generation which solves a worldwide public health problem.

2018, WHO first proposed a global initiative to eliminate cervical cancer^[2]. In November 2020, WHO officially issued the Global Strategy to Accelerate the Elimination of Cervical Cancer, which put forward phased goals such as promoting HPV vaccination, cervical cancer screening, and providing standardized treatment management for

patients^[3]. The coverage rate of HPV vaccination in 2021 is 16%. By the end of 2022, 130 Member States had included HPV vaccines in their national immunization services. Because many big countries have not yet been included globally, the coverage rate of the first dose of HPV in girls is estimated to be 21% in 2022. WHO experts found that single-dose vaccination can provide similar immune protection to multi-dose vaccination^[4], so WHO proposed single-dose and two-dose schemes for girls aged 9-14 and 15-20 in its position paper, which means that the economic burden and workload of HPV vaccine publicity in various countries will be greatly reduced^[5]. China actively promotes HPV vaccination and has issued a series of policies to achieve ideal immunization coverage. In Guangdong, Hainan, Fujian, and other provinces and pilot cities, the HPV vaccination policy for school-age girls has been introduced one after another. In January 2023, the Action Plan to Accelerate the Elimination of Cervical Cancer (2023-2030) put forward the importance of school publicity and promotion to improve the vaccination willingness of school-age girls. Based on this realistic background, this study surveyed and analyzed 112 school-age adolescent women in Xi'an, Shaanxi Province, in August 2023, including awareness of the HPV vaccine, health conditions, vaccination willingness, and influencing factors. By discussing and

summarizing the results of this study, references can be provided for further popularization of the HPV vaccine.

2. Objects and Methods

2.1 Research Objects

In September 2023, taking young women in Xi'an, Shaanxi Province, as the research object, a total of 118 questionnaires were obtained in electronic questionnaires, of which 112 were valid, with an effective rate of 94.92%. Among them, 54 were aged 15 to 24 (48.21%), 38 were aged 25 to 34 (33.93%), and 20 were aged 35 to 45 (17.86%).

2.2 Sampling Method

Stratified sampling and cluster sampling are used together to classify the education level, and then cluster sampling is carried out among students from senior high schools, undergraduates, and social people.

2.3 Questionnaire

2.3.1 The Basic Questionnaire

The basic questionnaire is used to collect the basic information of the sample population, including age, gender, grade, average monthly consumption, vaccination willingness, attitude towards vaccines in the national planned immunization, etc.

2.3.2 Questionnaires of Cervical Cancer, HPV, Awareness and Willingness of Vaccination

These questionnaires mainly include awareness of cervical cancer, HPV, and HPV vaccines. When analyzing the willingness and reasons for vaccination against HPV,

all questions will be assigned 1 point for correct answers and 0 for wrong ones. The total awareness score of HPV-related knowledge can be obtained after adding all scores.

2.4 Statistical Methods

SPSS 20.0 statistical software was used for data statistics and analysis. T-test or F test was used for quantitative data comparison, χ^2 test for classified data, and binary logistic regression analysis for multivariate analysis, with $\alpha=0.05$ as test standards.

3. Results

3.1 Awareness of Cervical Cancer, HPV and its Vaccine

As for the awareness scores of cervical cancer, HPV, and vaccine (from now on referred to as HPV awareness scores), the scores of people aged 25-34 are significantly higher than those of other age groups, with an average score of 12.63, accounting for 33.9% of the samples aged 15-45. Among the sample population, the employed population accounted for 56.30%, with an average score of 10.81, higher than that of the studying and unemployed population. However, the F test had no statistical significance. Regarding education, the average score of people with higher education, such as those with degrees in college, bachelor's, or above, is higher, with 11.45 as their score, accounting for 61.6%. The average score of people whose monthly consumption is from 2001 to 3000 yuan is higher, with 11.89 as their score, accounting for 24.10%. Meanwhile, there were significant differences in HPV awareness scores from age, education, consumption, and vaccination willingness ($P<0.05$), as seen in Table 1.

Table 1 Basic Characteristics and Awareness Scores of Sample Population

Primary index	Secondary index	Count (N)	Percentage (%)	Awareness score (\bar{x})	Standard deviation σ	F	P
Age	15~24	54	48.20	9.37	4.38	13.019	<0.001***
	25~34	38	33.90	12.63	2.68		
	35~45	20	17.90	8.8	4.75		
Employment status	In studying	43	38.40	10.07	4.03	1.533	0.221
	In-service	63	56.30	10.81	4.42		
	Unemployed	6	5.40	8	3.58		
Education	Junior school	10	8.90	8.1	3.54	4.649	0.012**
	High school	33	29.50	8.82	4.16		
	Degrees of College, bachelor or above	69	61.60	11.45	4.07		

Consumption (Month/Yuan)	0~1000	22	19.60	9.23	4.1	2.065	0.091*
	1000~2000	32	28.60	10.81	4.33		
	2001~3000	27	24.10	11.89	2.91		
	3001~4000	9	8.00	10.11	4.68		
	4001~	22	19.60	9.14	5.09		
Vaccination willingness	Willing	92	82.10	10.8	3.9	4.669	0.042**
	Unwilling	21	17.90	8.4	5.27		
Attitudes to include HPV vaccines in medical insurance policy	Totally unnecessary	4	3.60	4.75	6.29	3.341	0.022**
	Unnecessary	2	1.80	8.56	0		
	Neutral	13	11.60	9.15	4.1		
	Necessary	33	29.50	11.27	3.17		
	Very necessary	60	53.60	10.33	4.37		

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively.

3.2 HPV Vaccination Willingness

82.14% of the sample population are willing to be vaccinated against HPV. Among the people willing to vaccinate, the number of people aged between 25 and 34 is the highest, with 30 people accounting for 26.8%. Fifty people are willing to vaccinate the employment-population, accounting for 44.6% of the total sample, followed by the studying population with 36 people, accounting for 33.20%. The higher the education, the more people are willing to vaccinate, and 57 people with higher education are willing to vaccinate, accounting for

50.9%. Twenty-seven people have monthly consumption levels between 1000 and 2000, accounting for 24.10%. There are also statistical differences in vaccination willingness among groups with different attitudes towards including HPV vaccine in the national planned immunization ($P < 0.0001$). Those who oppose the HPV vaccine being included in the national planned immunization are more likely to be unwilling to vaccinate. According to the women who expressed their reluctance to get vaccinated, the lack of need and insufficient time to vaccinate were the top two reasons.

Table 2 Test on the Difference of People's Vaccination Willingness with Different Characteristics

		Willing to vaccination		Unwilling to vaccination		χ^2	P
		Number (N)	Percentage (%)	Number (N)	Percentage (%)		
Age	15~24	44	39.30	10	8.90	1.122	0.571
	25~34	30	26.80	8	7.10		
	35~45	18	16.10	2	1.80		
Employment status	In studying	36	32.10	7	6.30	1.709	0.426a
	In-service	50	44.60	13	11.60		

Education	Unemployed	6	5.40	0	0.00	0.684	0.711
	Junior school	9	8.00	1	0.90		
	High school	26	23.20	7	6.30		
	Degrees of college, Bachelor or above	57	50.90	12	10.70		
Adjusted consumption	0~1000	19	17.00	3	2.70	1.362	0.851a
	1000~2000	27	24.10	5	4.50		
	2001~3000	21	18.80	6	5.40		
	3001~4000	8	7.10	1	0.90		
	4001~	17	15.20	5	4.50		
Attitudes to include HPV vaccines in medical insurance policy	Totally unnecessary	1	0.90	3	2.70	20.675	<0.0001***a
	Unnecessary	1	0.90	1	0.90		
	Neutral	7	6.30	6	5.40		
	Necessary	29	25.90	4	3.60		
	Very necessary	54	48.20	6	5.40		
Adjusted awareness scores	0~4	8	7.10	5	4.50	6.516	0.089a
	5~9	22	19.60	7	6.30		
	10~14	46	41.10	6	5.40		
	15~17	16	14.30	2	1.80		
	In total	92	100	20	100		

Note: *** Chi-square statistical significance level is 1%.

In this subtable, cells above 20 expect a cell count of less than 5. Chi-square results may be invalid.

3.3 Correlation Analysis

The relationship between various factors and vaccination willingness is obtained

through correlation analysis. According to the correlation analysis results, the sample population's awareness scores were positively correlated with education ($r=0.312$, $P=0.001$) and vaccination willingness ($r=0.218$, $P=0.021$). In contrast, vaccination willingness was closely related to attitude towards vaccine policy ($r=0.392$, $P<0.001$).

Table 3 Correlation Between Awareness Score, Policy Attitude, and Vaccination Willingness

		Awareness score	Age	Consumption	Education	Employment status	Policy attitude	Vaccination willingness
Awareness score	Correlation coefficient	1	0.07	-0.001	0.312**	-0.004	0.125	0.218*
	P		0.466	0.991	<0.001	0.965	0.189	0.021

Age	Correlation coefficient	0.07	1	0.388**	0.655**	0.712**	0.18	0.089
	P	0.466		0	0	0	0.058	0.348
Consumption	Correlation coefficient	-0.001	0.388**	1	.407**	0.308**	0.032	-0.107
	P	0.991	<0.001		0	0.001	0.746	0.281
Education	Correlation coefficient	.312**	0.655**	0.407**	1	0.583**	0.148	-0.017
	P	0.001	0	0		0	0.119	0.863
Employment status	Correlation coefficient	-0.004	0.712**	0.308**	.583**	1	0.067	0.016
	P	0.965	0	0.001	0		0.482	0.867
Policy attitude	Correlation coefficient	0.125	0.18	0.032	0.148	0.067	1	0.392**
	P	0.189	0.058	0.746	0.119	0.482		<0.001
Vaccination willingness	Correlation coefficient	.218*	0.089	-0.107	-0.017	0.016	0.392**	1
	P	0.021	0.348	0.281	0.863	0.867	0	

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively.

4. Discussion

This study investigated the awareness of the HPV vaccine and the willingness to vaccinate among adolescent women in Xi'an. According to the results, although there are great differences in the awareness of HPV-related knowledge among different groups, most respondents expressed their willingness to vaccinate. In April 2023, Dou Qianru et al. studied the awareness and willingness of women to vaccinate against the HPV vaccine in Hainan Province, which found that the willingness of people to vaccinate against the HPV vaccine was 75% [6], lower than 82.14% in this study. It's indicated that women's willingness to vaccinate HPV vaccine was rising. Regarding the factors influencing vaccination willingness, the survey of women in Guangzhou by Ran Rui et al. demonstrated that factors such as age, education, income, and HPV awareness significantly influence [7]. It also found that awareness level and policy attitude are directly related to vaccination willingness. According to the awareness analysis, awareness differences exist among people of different age groups, education, and consumption. This result shows that influence paths may exist among influencing factors. Thus, further mediating effect tests or path analyses are needed to clarify the influence mechanism.

To improve the vaccination rate, it's advised to strengthen the publicity and health education of the HPV vaccine to cultivate young women's awareness of obtaining medical

information. In future research, we can further explore the factors and mechanisms influencing HPV vaccine awareness and vaccination willingness to formulate more targeted health education policies and preventive measures. In the future, the main body of this study should use more comprehensive survey data and more suitable analysis methods for further exploration.

5. Conclusions

Since cervical cancer is one of the common gynecological malignant tumors in women, it is significant for people to know how to prevent HPV infection. This paper investigates the current situation of people's awareness of HPV infection, which finds that healthy people of different ages, genders, and consumption have different awareness of HPV infection.

According to survey results, young women in Xi'an are highly aware of the HPV vaccine, and their health care awareness is improving. Many women are aware of the importance of cervical cancer screening and prevention. In addition, most of the respondents expressed their willingness to get vaccinated. Besides, the awareness of groups with different education is quite varied, and the awareness of HPV-related knowledge directly affects vaccination willingness. Hence, differentiated publicity strategies should be adopted to strengthen the popularization of related knowledge for lower-grade students with low awareness levels. In a word,

Xi'an needs to take appropriate measures to intensify the positive publicity of the HPV vaccine and health education related to HPV through relevant media channels to improve young women's awareness of the vaccine and their vaccination willingness.

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