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A study on the cognition of HPV and HPV vaccine among female college students in Guilin City and the influencing factors of vaccination

Lin Wan[1], Miao Hu[1], Tao Jiang[1], Shangyuhui Huang[1,*]

[1]*School of Humanities and Management, Guilin Medical University, Guilin, 541199, China*
[*]*Corresponding author: 18907739051@163.com*

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Abstract: The objective of this dissertation was to explore the awareness of human papillomavirus (HPV) and HPV vaccine, medical beliefs about HPV infection, and vaccination willingness of female college students in Guangxi, to analyze the factors influencing female students' willingness to receive HPV vaccination, and to propose countermeasures and recommendations on various aspects to promote scientific HPV vaccination of female college students, while adding new evidence and data to the knowledge base in this area, which will provide a solid theoretical foundation for subsequent research on intervention strategies. The questionnaire was distributed via WeChat and QQ, using the Health Belief Model as the theoretical framework and the questionnaire developed in previous work as the research instrument. The content of the questionnaire included general demographic characteristics of the study population, basic knowledge of HPV and HPV vaccine, and basic ways to obtain HPV and HPV vaccine. By using the statistical software package SPSS 26.0 for data description and statistical analysis, the HPV vaccination situation could be analyzed and appropriate recommendations made. A total of 210 questionnaires were distributed and 205 valid questionnaires were received, with a response rate of 97.61%, which is high and meets the theoretical requirements. The study results show that the knowledge level of female students about human papillomavirus (HPV) and HPV vaccine in this study is 82.14%, and the knowledge of HPV is high, as well as the number of female students who have been vaccinated with HPV vaccine. The percentage of female students who were vaccinated with HPV vaccine was 42.34%.

1. Introduction

Human papillomavirus (HPV) is a small, double-stranded, circular DNA virus that infects epithelial cells, discovered and confirmed in 1984 by German scientist Harald zur Hausen in cervical cancer patients. Human papillomavirus (HPV) has strong epithelial, high tissue, and host specificity, which can cause squamous hyperplasia of human skin and mucous membranes, such as genital warts and common condyloma acuminata [1]. Cervical cancer seriously endangers women's lives and health and is one of the most common malignant tumors in gynecology [2]. Cervical cancer is the second most common malignancy in women after breast cancer, with approximately 530,000 new cervical

cancer patients and 270,000 deaths due to the disease each year worldwide [3]. Persistent infection with high-risk HPV, the most prevalent sexually transmitted disease, is a necessary and important factor in cervical cancer [4], and most people who are sexually active will be infected with HPV for the rest of their lives.

1.1. Cervical cancer

In China, cervical cancer is the most common gynaecological cancer, the fourth most common cancer affecting women globally, and the fourth most common cause of cancer death among women worldwide. According to WHO, there are currently about 530,000 patients worldwide each year, and the mortality rate among women due to uterine cancer is as high as 250,000, while in the developing world, the proportion of women with uterine cancer is as high as 80%. The average HPV infection rate among women worldwide is about 10% [5]. In developed regions such as Europe and the United States, the incidence of HPV is gradually decreasing due to the promotion of measures such as HPV vaccination and cervical cancer screening. Human papillomavirus (HPV) is mainly carried by sick people and infected people, mainly in the reproductive organs or mucous membranes of sick people, and can be transmitted sexually to their partner or sexual partner, as well as to each other.

1.2. Getting vaccinated against HPV

According to relevant survey data, at the end of 2021, China's total population was 1412.6 million, and the population aged 0-14 accounted for about 21% of the total population[6]. At present, more than 135 countries and regions around the world have approved the introduction of HPV vaccines, of which 71 countries have included them in national immunization programs, and target groups of certain ages are only required to bear part or free HPV vaccination[7]. In the context of the unbalanced development of economic development and medical and health conditions in different regions, it is necessary to increase the health intervention of cervical cancer, HPV and HPV vaccine in a diversified way, so as to arouse the understanding and attention of the population, especially the female group, and effectively improve the relevant cognitive level and strengthen the awareness of cervical cancer prevention[8]. Since 2016, China has successively approved the marketing of imported bivalent vaccines, quadrivalent vaccines and nine-valent vaccines, and the first domestic bivalent vaccine was also approved for marketing in 2019, but people's awareness of preventive HPV vaccines is generally low.

This paper investigated the awareness of female college students about human papillomavirus (HPV) and HPV vaccine, health belief in HPV infection and vaccination willingness of female college students in Guilin, analyzed the influencing factors of female college students' HPV vaccination intention, and put forward countermeasures and suggestions from various aspects, so as to promote the scientific HPV vaccination of female college students, and at the same time add new understanding and data to the knowledge base in this field, so as to provide a solid theoretical foundation for subsequent intervention strategy research.

2. Methods

We followed a four-step process to extract and analyze data from the accreditation reports: (1) data sourcing, (2) data extraction, (3) data labelling, and (4) data analysis.

2.1. Data sourcing

By reviewing the literature and combing the data, we will have an in-depth understanding of the

meaning of health belief model, HPV, HPV vaccine and other contents, which will provide a theoretical basis for this study. After that, the demographic situation of female college students in a medical college in Guangxi Province was investigated, and the correlation between demographic factors and HPV vaccination attitudes and health beliefs was analyzed. Finally, the influencing factors of HPV vaccination in female college students were discussed, and relevant countermeasures and suggestions were put forward based on the collected data.

2.2. Data extraction

Based on the health belief model, this study designed a questionnaire with reference to relevant domestic existing literature, including:

1) Literature analysis

Through the induction and analysis of relevant research data, we have a basic understanding of HPV and HPV vaccines, and after combing the literature, we can find suitable theoretical studies to provide a good theoretical basis for the research process.

2) Questionnaire method

Through reading a large number of literatures, based on the "health belief model", female college students were tested for HPV and HPV, and the health belief level of HPV infection and vaccine was verified through the understanding of HPV infection and vaccine-related knowledge, as well as the understanding of the health belief level of vaccine.

3) Mathematical statistics

SPSS26.0 statistical software was used for data processing, and the results were summarized.

2.3. Data analysis and Data labelling

The reliability test is a credibility test of a questionnaire, The reliability of SPSS statistical analysis was 0.969, indicating that the reliability of the research data was high and could be used for further analysis.

In terms of construction validity, factor analysis was used to test the construction validity of the questionnaire. The value of the KMO test is between 0 and 1, and an important criterion for the suitability of factor analysis is: above 0.9 is appropriate, 0.7-0.9 is appropriate, and 0.7-0.6 is appropriate. 0.5 to 0.6 is not appropriate, and less than 0.5 is abstention and cannot be studied as a factor. The Bartlett spherical test values test the correlation between the items investigated, if significant (i.e., an index of 0.05), which is suitable for factor analysis.

3. Results

3.1. Demographic characteristics of the study subjects

A total of 210 questionnaires were distributed in this survey, and 205 were found to be valid, yielding an effective rate of 97.61%. The number of valid questionnaires not only met but exceeded the expected 180, which was more than the actual need of 25, aligning with our expectations. Taking female students in Guilin as the research subjects, the awareness rate and vaccination attitude of HPV and its vaccine were discussed, and the sample was analyzed in detail by demographic methods. To identify more internal associations between variables, the main objectives of this study include analyzing the age distribution of female college students in Guilin, which is predominantly 19-24 years old, with the majority, 125 cases or 60.98%, falling within the 22-24 age range; Among students aged 19-21, there were 63 students, accounting for 30.73%. Among the 19-year-olds and 24-year-olds, there are 3 and 14 students, respectively, accounting for one-sixth of the total. The overall age

range of the female college students surveyed is similar to the target age range for 9-valent HPV vaccination, indicating that the survey's conclusions are representative. There were 73 female college students majoring in medicine, accounting for 35.61%; and 173 majoring in non-medical fields, accounting for 64.39%. These results allow us to analyze the relationship between the medical profession of female college students and their knowledge of the HPV vaccine and their attitudes towards vaccination. There were 36 college students, accounting for 17.56% of the total. There were 164 undergraduates, accounting for 80% of the total. There were 5 graduate students or higher, accounting for 2.44%. The distribution of each stage of study avoids the singleness of the respondents. A total of 122 respondents reported having had sexual intercourse in this survey, accounting for 59.51% of the total. 83 respondents, accounting for 40.49%, reported no sexual intercourse. HPV is transmitted through sexual contact, and the most effective prerequisite for the 9-valent HPV vaccine is the absence of sexual activity. Therefore, it is very meaningful to investigate whether the female students have had sexual relations. Regarding female college students' awareness of HPV and HPV vaccines, three main aspects were investigated: the awareness rate of HPV vaccines among female college students, their self-perceived understanding of HPV and HPV vaccines, and their actual cognitive level as measured by their responses to relevant knowledge questions.

196 respondents were aware of HPV and HPV vaccines, with an awareness rate of 95.61%; There were 9 respondents were not aware of HPV and HPV vaccine, accounting for 4.39%. In general, female college students demonstrate a higher level of awareness regarding HPV and the HPV vaccine. Since respondents who were not aware of HPV and the HPV vaccine did not participate in subsequent responses, only 196 cases were included in the awareness analysis. 8 respondents (4.08%) indicated that they did not understand this topic. 27 respondents had a poor understanding, accounting for 13.78%. 96 respondents had some knowledge, accounting for 48.98%. 61 respondents had a comparatively good understanding, accounting for 31.12%. There were 4 respondents had an excellent understanding, accounting for 2.04%. Overall, respondents felt that their knowledge of HPV and the HPV vaccine was mostly moderate; few had either a very limited or an excellent understanding. Although the awareness level of HPV among female college students is high, there are still questions with low accuracy rates, indicating deficiencies in their understanding. For instance, more than 10% of students incorrectly believe that "only women can be infected with HPV," which is a misconception. Furthermore, the question "Can the use of contraceptive pills protect against the HPV ?" has the lowest correct response rate among several questions. This misconception could influence the actual behavior of female college students; the excessive use of contraceptives can be harmful to their health. 127 respondents reported using social media, accounting for the highest proportion at 61.95%; Secondly, after consulting with family and friends, 108 respondents reported this method, accounting for 52.68%; Then, 106, 104, 100, 93, and 78 respondents reported using other sources, accounting for 51.71%, 50.73%, 48.78%, 45.37%, and 38.05% respectively. In general, women primarily acquire knowledge about HPV and HPV vaccines through social media and interpersonal interactions, that is, through interpersonal and group means.

In this survey, a total of 83 respondents (42.34%) had been vaccinated with an HPV vaccine, of whom 6.02% had received the bivalent HPV vaccine, 3.61% had received the quadrivalent HPV vaccine, and 90.36% had received the nine-valent HPV vaccine. The top three reasons for not being vaccinated were other factors, lack of time, and lack of knowledge about the HPV vaccine, accounting for 38.78%, 37.76%, and 31.63% respectively, followed by concerns that the vaccine might not work, not knowing where to get vaccinated, and not meeting the vaccination conditions, accounting for 30.61%, 30.1%, and 28.06% respectively.

3.2. Correlation analysis

Among the 205 respondents, the average scores were as follows: susceptibility cognition, 4.233±1.02; severity cognition, 4.396±0.86; perceived health behavior benefit, 4.310±0.89; and perceived health behavior disorder, 3.995±1.21. The average score for health belief was 4.233±0.91, indicating an overall health belief above average (see **Table 1**). The results show that the current awareness of HPV virus protection knowledge among college girls in China is moderately high, yet there is room for improvement. The results suggest that a higher cognitive level of "health behavior disorder" among girls may be attributed to their young age and physical preferences. Women may not have a deep understanding of HPV infection, and it is possible that some have misconceptions about HPV.

Table 1: Health belief scores in each dimension

Name	Average
Susceptibility perception	4.233±1.02
Severity perception	4.396±0.86
Perceived health behavior benefits	4.310±0.89
Perceived Health Behavior Disorder	3.995±1.21
Health Belief	4.233±0.91

In the measurement table of HPV cognition, each question is assigned a score of 1 point for the "correct" option, 0 points for the "incorrect" or "don't know" option, and a reverse score for the question "Can only women be infected with HPV virus", that is, 0 points are assigned to the "correct" and "don't know" options, and 1 point is assigned to the "incorrect" option. Subsequently, a Spearman's analysis was performed based on the general demographic characteristics of female college students and the degree of HPV awareness.

There was a significant positive correlation between age, school attendance, monthly living expenses and HPV awareness, and a significant negative correlation between professional and sexual experiences and HPV awareness. In SPSS, medical students are assigned a value of 1 and non-medical students are assigned a value of 2, and non-medical students encounter more obstacles to HPV vaccination than medical students. Pearson correlation analysis was performed to analyze the scores of each dimension of HPV vaccination and health belief among female college students. There is a significant correlation between susceptibility cognition, severity cognition, perceived health behavior benefit, perceived health behavior disorder and whether or not HPV vaccine has been vaccinated.

4. Discussion

A questionnaire survey of 205 female students at a medical college revealed that 196 (95.61%) were aware of HPV and its vaccines. This awareness rate exceeds that reported in existing literature, likely due to the successive launches of domestic bivalent, quadrivalent, and nine-valent vaccines in China, including the domestic bivalent vaccine in January 2020, and the popularization and promotion of HPV vaccine in recent years.

The increasing number of channels for obtaining relevant information also contributes to the gradual increase in awareness of HPV and HPV vaccines among female college students. In this study, the awareness of HPV and HPV vaccine related knowledge among female college students was at a high level, but some students also had misconceptions, among which 21 students (10.71%) did not know that HPV can be sexually transmitted.

Information provided by traditional media, such as television, radio and newspapers may be more credible and convincing than information on the Internet, as confirmed by a study in Thailand[9].

Health education activities can be carried out through radio and television, mainly medical staff, and the popularization of HPV infection can be increased on social media and Internet platforms, and corresponding popular science courses can be set up on campuses to raise students' awareness of HPV infection. Compared with previous studies, people's awareness of HPV and its vaccines has increased, and a study before the vaccine was not available in China showed that only 12% of female students were aware of HPV, and only 7.2% of students knew that HPV was related to cervical cancer[10].

5. Conclusion

Based on reliable scales, this study reasonably evaluates the awareness of HPV and HPV vaccines among female college students and the influencing factors of vaccination. The research found that the awareness of HPV and HPV vaccines among female college students is high. Studies have shown that with increasing age, the likelihood of being vaccinated against HPV also increases. The willingness to be vaccinated is related to the field of study, with a higher proportion of female medical students being vaccinated compared to their non-medical counterparts. Female college students who have had sexual intercourse are more likely to be vaccinated than those who have not. Willingness to receive the HPV vaccine is also related to the level of awareness about the vaccine, with students who are more informed being more likely to receive it than those with lower awareness.

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Author contributions

M.H. conceived the idea of the study. T.J. performed the experiments. L.W., SYH. H., and T.J. analyzed the data and wrote the paper.

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