

# Knowledge and Awareness of Genital Warts among Female College Students in Iran and Its Role in Vaccination

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Received: August 12, 2023; Revised: September 02, 2023; Accepted: September 30, 2023

## Abstract

**Background:** Human papillomavirus (HPV) is capable of infecting individuals engaging in sexual activity at some points in their lives. As general vaccination of children and adolescents is not a standard practice in Iran, this study aimed to assess the awareness of Iranian female college students regarding HPV and its associated vaccinations.

**Methods:** This cross-sectional research was conducted in 2020 on a cohort of 350 female college students from Shahed University, Iran. Participants were selected through a convenience sampling technique, with the determined sample size based on the enrollment in each faculty. An electronic questionnaire was prepared and administered virtually to the participating students.

**Results:** The mean age of the participants in this study was  $21.63 \pm 1.93$  years. Remarkably, 90% of the students were familiar with genital warts, while only 41% were knowledgeable about the available vaccine. Additionally, a third of the participants were unaware of the sexual transmission of HPV, and half were uninformed about the association between various cancers and genital warts. The average score for overall knowledge was  $6.19 \pm 3.54$ . Notably, a significant correlation was observed among age, academic years of study, faculty affiliation, and knowledge about HPV and its vaccine ( $P < 0.001$ ). Interestingly, academic education emerged as the primary source of information after public media and the Internet.

**Conclusion:** The level of knowledge concerning HPV and its associated vaccine among the study participants was predominantly moderate. Considering the pivotal link between cervical cancer and HPV, the significance of providing adequate information and education on preventive measures cannot be overstated.

**Keywords:** Human Papilloma virus, Cancer, Knowledge

**How to Cite:** Abak F, Rabiee M, Jouhari Z. Knowledge and Awareness of Genital Warts among Female College Students in Iran and Its Role in Vaccination. Women. Health. Bull. 2024;11(1):1-10. doi: 10.30476/WHB.2024.100187.1249.

## 1. Introduction

One of the most prevalent sexually transmitted infections is Human Papillomavirus (HPV), which nearly all sexually active individuals will encounter at some points in their lives. HPV spreads through skin-to-skin contact or sexual activity and can be transmitted by asymptomatic carriers. Unlike many genitourinary tract infections, HPV infection often lacks acute symptoms such as burning, itching, or vaginal discharge. Nevertheless, the host's immune system typically combats the infection, leading to the absence of clinical signs in most HPV-infected individuals. Only 24.8% of women previously infected with HPV types 6 or 11 had genital warts in a prior studies (1, 2). To date, 228 varieties of HPVs have been identified, with 40 of these types exhibiting a preference for infecting the genital mucosa; HPVs belong to the group of double-stranded DNA viruses. Phylogenetic analyses have categorized HPV genotypes into low-risk, possibly

high-risk, and high-risk categories (3). Low-risk variants like HPV 6 and 11 are responsible for 90% of ano-genital warts and respiratory papillomatosis, both of which can be potentially fatal diseases. In contrast, HPV types 16, 18, 31, 35, 39, 45, 51, 52, and 33, along with other high-risk variants, are major contributors to most cases of cervical cancer, as well as malignancies of the vulva, vagina, anus, penis, mouth, and oro-pharynx. HPV strains 16 and 18, specifically, account for 70% of global cervical cancer cases (3, 4). HPV infection is recognized as a significant risk factor for these malignancies, even though the incidence rate of HPV-related tumors is lower than that of cervical cancer (5). Cervical cancer was the fourth most common malignancy in women worldwide, accounting for 7.5% of all cancer-related deaths in women in 2018 (4-6). Although the majority of HPV infections are asymptomatic, transient, and curable with no specific treatment, preventing HPV infection, particularly the high-risk variants, could

reduce the incidence of HPV-related malignancies (7). It is crucial for parents and teenagers, who are the most vulnerable population, to understand how HPV spreads, how ano-genital warts develop, and how these malignancies are associated (8). In response to the high mortality associated with cervical cancer in both developed and developing countries and its strong link to HPV infection, the World Health Organization (WHO) has developed a global strategy for the elimination of cervical cancer known as the Cervical Cancer Elimination Modeling Consortium. This program includes three key interventions: 70% biannual cervical screening, 90% HPV vaccination, and 90% treatment of pre-invasive lesions and invasive malignancies by 2030 (5). The development of a vaccine represents a significant step towards reducing the incidence of cervical cancer and related malignancies (9). According to the World Health Organization, girls between the ages of 9 and 13, who have not yet engaged in any sexual activity, constitute the primary target demographic for HPV vaccination campaigns. Parental knowledge and attitudes significantly influence the effectiveness of vaccination programs (10). Epidemiological data indicated that vaccination rates remain low despite the availability of a vaccine against the agent responsible for cervical cancer (11). Adequate information, appropriate risk perceptions, healthy sexual attitudes, and protective sexual practices have all been shown to be related factors. Conversely, family members, peers, and education play pivotal roles in providing health information to teenagers (12). Furthermore, some parents refrain from discussing the virus, how to prevent it, and vaccination with their children due to embarrassment about the sexually transmitted nature of the illness and their lack of knowledge (13). A study conducted in Iran found that women had a 2.4% prevalence rate of HPV infection (14). In Iran, a developing country, it is estimated that 947 women receive cervical cancer diagnoses annually, with 370 of them succumbing to the disease. In two investigations involving Iranian women diagnosed with cervical cancer, HPV was detected in 87% and 85% of the patients, respectively (15). Moreover, it has been demonstrated that over 70% of Iranian women who develop cervical cancer may be infected with HPV-16 that followed by genotypes 11 and 66 (14). Considering that the prevalence of HPV infection in women peaks at age of 20, with the highest prevalence occurring between the

ages of 18 and 28 (16), this study was conducted to assess the knowledge of university students regarding HPV, its transmission, its association with cancer, and their willingness to receive vaccination. The findings of this research hold significant importance since students are at risk of contracting the virus, and their understanding of transmission mechanisms and infection prevention can contribute to a reduction in the prevalence of genital warts, cervical cancer, and other associated cancers. Notably, the involvement of one spouse in the virus can lead to family disruption in Iran due to religious and moral structures that uphold family privacy. This underscores the importance of comprehending the virus, its prevention, and vaccination. In light of these considerations, it becomes essential to examine the level of awareness about this virus and the acceptance of the vaccine among young people, as this information can inform health planning and policies. This study was designed and implemented to investigate the knowledge of genital warts among female students and their willingness to accept vaccination against it.

## 2. Methods

This study was a descriptive investigation conducted to assess the knowledge level of female students at Shahed University of Tehran, Iran, regarding HPV infection and its vaccine in 2020 (from April 1 to March 31, 2020). With a confidence level of 95%, an alpha value of 0.05, and an estimated awareness rate of 30% (16-21), this study's sample size was 322 individuals. Accounting for a 5% potential loss of participants, the total sample size was determined to be 350 individuals, employing the following formula:

$$n = \frac{(z_{1-\alpha/2})^2 Pq}{(d)^2}$$

where N represents the sample size, P denotes the initial estimation for the desired attribute ratio, d represents the maximum acceptable error in estimating the ratio,  $\alpha$  is the probability of error of the first type, and  $Z_{1-\alpha/2}$  equals 1.96 for  $\alpha=0.05$ .

The selection of participants was based on the number of students within each faculty, ensuring that the faculty with the highest student enrollment had a more significant representation through

convenience sampling techniques. The necessary data were collected using a researcher-designed questionnaire. This questionnaire was developed by reviewing similar instruments used in previous studies (8, 9, 13) and subsequently subjected to review and validation by 5 obstetricians and 2 social medicine specialists. The content validity ratio (CVR) was determined to be 0.99, and the content validity index (CVI) exceeded 0.9. To calculate CVI, experts were asked to categorize each question into one of the following categories: unrelated, relevant but in need of fundamental revision, relevant but in need of revision, and relevant. The number of specialists who selected options 3 and 4 was divided by the total number of specialists.

The questionnaire was administered to 15 female students from Shahed University to establish its reliability. After one week, the same group completed the questionnaire again, and the reliability coefficient was determined using the Pearson correlation test, yielding a coefficient of 0.78.

Due to the COVID-19 pandemic and the closure of universities, an electronic questionnaire was prepared and distributed virtually to the enrolled students. Notably, the questionnaire was anonymous, and students unwilling to participate were excluded from the study at this stage. The questionnaire consisted of 22 questions, categorized into three parts:

1. Eight demographic and personal information (questions 1 to 6, 21, and 22)
2. Eight questions related to knowledge about HPV and genital warts (questions 7 and 9 to 15)
3. Five questions related to knowledge about the HPV vaccine (questions 16 to 20)

Questions 1 to 6 and 8, 21, and 22 had no point values. Questions 7, 9, and 20 were assigned a positive score for correct answers, while no points were awarded for incorrect answers or responses of "I do not know." Consequently, the minimum and maximum total scores for the questionnaire were zero and 13. In contrast, the score for knowledge regarding genital warts ranged from zero to 8, and the score for knowledge about the HPV vaccine ranged from zero to 5.

## 2.1. Statistical Analysis

The necessary data was collected and subsequently entered into SPSS version 16. Following this, frequency and percentage were employed to represent qualitative data, along with mean and standard deviation, to convey quantitative descriptive data. Given the non-normal nature of the quantitative data in this research, Mann-Whitney, Kruskal-Wallis, and Fisher tests were employed to analyze the aberrant data.

## 3. Results

### 3.1. Demographic Characteristics

The mean age of the study participants was  $21.63 \pm 1.93$  years, with a maximum age of 33 years and a minimum age of 19 years. The average duration of students' education was 3 years for middle education and 4 years for high school education, with a maximum of 8 years and a minimum of 1 year. Moreover, 68% (238 individuals) were undergraduate students, while 32% (112) were pursuing a professional PhD. Additionally, 252 participants (72.2%) were unmarried, and 97 (27.8%) were married. The prevalence rate of genital warts among the study participants was estimated at 4.3%, involving 15 cases. Furthermore, 8 (2.3%) students had received prior vaccination. Additional demographic information about the study participants is presented in Table 1.

### 3.2. Awareness and Knowledge of HPV and the Vaccine

It was discovered that 315 (90%) of the students possessed information about genital warts. Additionally, 234 (67%) students were aware of the sexual transmission of genital warts, and 178 (50.9%) understood the link between genital warts and the development of various cancers. Responses to other questions can be found in Table 2. The mean score from the questionnaire sections related to knowledge about HPV and genital warts was  $3.75 \pm 2.29$ .

Significantly, 144 (41%) subjects had awareness of the vaccine. In response to whether the vaccine is administered exclusively to girls and women, 194 (63%) students lacked information on this matter, and 59 (16.8%) individuals believed that

**Table 1:** Demographic characteristics and their correlation with students' awareness of HPV and its vaccine

	Prevalence (%)	Virus awareness score	P value	Vaccine awareness score	P value	Total awareness score	P value
School of study							
Science	58 (16.6)	1.1±78/2.94	<0.001	27/1±46/1	<0.001	7/2±29/580	<0.001
Humanities	76 (21.7)	2.00±1.89		1.13±.75		3.42±3.11	
Engineering	47 (13.4)	2.74±1.85		1.24±1.06		4.61±3.03	
Medical	67 (19.1)	5.94±1.32		2.85±1.82		9.77±2.80	
Nursing	57 (16.3)	4.05±2.71		1.40±.97		6.40±2.49	
Dentistry	45 (12.9)	5.44±1.28		1.66±1.12		8.08±1.89	
Grade							
Masters	238 (68)	2.81±2.04	<0.001	1.18±1.14	<0.001	4.83±1.08	<0.001
PhD	112 (32)	5.74±1.32		2.37±1.68		9.09±2.60	
Location							
Home	254 (72.2)	3.85±2.29	<0.265	1.70±1.51	<0.01	6.48±3.58	<0.038
Dorm	95 (27.2)	3.53±2.25		1.27±1.09		5.50±3.33	
Marital status							
Single	252 (72.2)	3.63±2.30	<0.100	1.46±1.44	<0.126	5.99±3.53	<0.59
Married	97 (27.8)	4.09±2.22		1.74±1.56		6.79±3.49	
Vaccination							
Yes	8 (2.3)	4.77±1.88	0.204	2.87±.99	0.006	8.75±2.86	0.066
No	342 (97.7)	3.72±2.29		1.50±1.47		6.13±3.54	
History of genital warts							
Yes	15 (4.3)	4.33±2.19	0.353	1.86±1.45	0.289	7.20±3.42	0.264
No	335 (95.7)	3.72±2.29		1.52±1.48		6.15±3.55	

HPV: Human Papillomavirus

**Table 2:** Students' answers to questions about HPV and its vaccine

	Yes (%)	No (%)	Don't know
Have you heard of genital warts (Human Papilloma virus)?	317 (90.6)	33 (9.4)	-
Is the prevalence of genital warts increasing?	231 (67.2)	7 (2)	106 (30.8)
How does a person get genital warts?			
Skin-to-skin contact	52 (14.9)		
Types of sexual contact	235 (67.1)		
Body fluids (urine, saliva, feces .....	8 (2.3)		
Transfer from mother to fetus	1 (.3)		
Don't know	54 (15.4)		
Is it possible for a person to be infected with human Papilloma virus and have no symptoms?	192 (54.9)	34 (9.7)	124 (35.4)
Can asymptomatic people transmit the virus?	166 (47.4)	34 (9.7)	150 (42.9)
Are there different types of genital warts?	131 (37.4)	30 (8.6)	189 (54)
Can different types of genital wart virus be Detected by testing?	130 (37.1)	45 (12.9)	175 (50)
Is genital wart associated with cancers (cervix, mouth and throat, etc.)?	178 (50.9)	34 (9.7)	138 (39.4)
Is there a vaccine to prevent genital warts?	144 (41.1)	27 (7.7)	179 (51)
Does the vaccine completely and definitively protect a person from getting genital warts?	44 (12.3)	79 (22.6)	227 (64.1)
Does the vaccine prevent cancer (cervix, mouth and throat, etc.)?	193 (55.3)	112 (32.1)	44 (12.3)
Is the vaccine recommended only for girls and women?	59 (16.9)	96 (27.5)	194 (55.6)
Is there an age limit for vaccination?	107 (30.6)	32 (9.1)	211 (60.3)

HPV: Human Papillomavirus

only girls should be vaccinated. The mean level of knowledge about the HPV vaccine was  $1.53 \pm 1.48$ . The percentage and frequency of answers to each questionnaire question are separately presented in Table 2. The average score for total knowledge obtained from the questionnaire (representing

overall awareness of papillomavirus and its vaccine) was  $6.19 \pm 3.54$ , ranging from zero to 13.

### 3.3. Correlation between Participants' Knowledge and Demographics

A positive and statistically significant

correlation was identified between participants' ages and the mean scores of general knowledge obtained from the questionnaire ( $r=0.426$ ), as well as scores related to knowledge about HPV ( $r=0.408$ ) and scores about knowledge regarding the HPV vaccine ( $r=0.342$ ) ( $P<0.001$ ). Additionally, a positive and statistically significant correlation was observed between students' academic years, the mean of general knowledge scores obtained from the questionnaire ( $r=0.452$ ), scores related to knowledge about HPV ( $r=0.449$ ), and scores about knowledge regarding the HPV vaccine ( $r=0.341$ ) ( $P<0.001$ ). When comparing the mean scores of general knowledge obtained from the questionnaire, scores related to knowledge about HPV, and scores about knowledge regarding the HPV vaccine based on the students' faculties, a statistically significant difference was evident ( $P<0.001$ ). Most scores were associated with medical and dental students (Table 1). Notably, the highest vaccination rate (4.48%) was observed in the medical school, which also exhibited the highest level of knowledge about HPV and its vaccine. However, no statistically significant difference was found between other

demographic characteristics and knowledge about HPV and vaccination (Table 1).

### 3.4. The Correlation between Participants' Knowledge and Information Sources

The primary source of information was university courses, comprising 151 respondents (47.3%), while public media and the Internet accounted for 162 respondents (50.8%). Therefore, it has been determined that university courses are the predominant source of information for medical, dental, and nursing students. In contrast, public media and the Internet are the primary sources for engineering, humanities, and basic science students (Figure 1).

A statistically significant difference was observed when comparing the mean general knowledge scores obtained from the questionnaire based on the students' information sources. Specifically, the highest knowledge scores were associated with students who acquired their information from university courses ( $P<0.0001$ ) (Table 3).

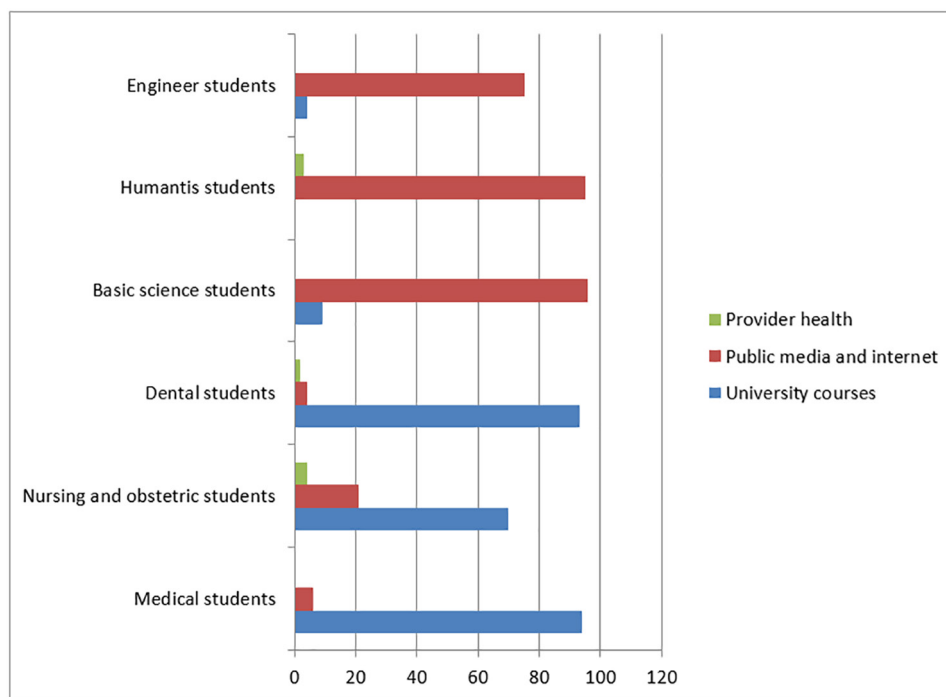


Figure 1: The figure shows the correlation between college students and source of information.

Table 3: The correlation between participants' knowledge and source of information

Source of information	Total knowledge score	P value
University courses	8.67±2.45	<0.0001
Public media and internet	5.06±2.6	
Provider health	6.25±0.5	
Friends and family	7±2.28	

#### 4. Discussion

This study revealed that 90% of the students possessed information regarding genital warts. Additionally, 67% of the students demonstrated awareness of sexual transmission, while 50.9% were cognizant of the link between genital warts and the development of various cancers. The average knowledge score, derived from the questionnaire encompassing papillomavirus and its vaccine awareness, stood at  $6.19 \pm 3.54$ .

Earlier studies conducted in Iran documented high incidence rates of HPV-6 (75%) and HPV-11 (16.7%), along with co-infections involving both HPV-6 and 11. Furthermore, in addition to its association with cervical cancer, HPV has been linked to head and neck cancers. The prevalence of HPV among women with normal cervical cytology ranged between 6.6% and 32.5%, while specific HPV genotypes, such as 16 and 18, were implicated (5-7, 16). Comprehensive insights into HPV infection and attitudes within general and educated populations are essential for enhanced illness management and treatment. Numerous studies consistently demonstrated that despite the high incidence of HPV, a dearth of information or misconceptions regarding the virus persists, even among informed individuals (17-21). Fortunately, 90% of the participants reported prior knowledge of HPV, an unexpectedly favorable outcome.

In contrast, a mere 10.3% of Chinese students had prior knowledge of HPV, and a mere 5.4% were aware of vaccination, as reported by Zou and colleagues (22). In a meta-analysis, awareness of HPV and its vaccination ranged widely from 5.2% to 94% of individuals surveyed (23). However, it is essential to note that hearing the term "HPV" does not necessarily equate to a comprehensive understanding of the virus and its potential implications (24). This research underscored a deficiency in comprehension regarding HPV and its vaccine.

This analysis identified key sociodemographic factors associated with HPV knowledge. These included the type of faculty, level of education, age, and study duration. Despite the generally low level of knowledge regarding HPV and its vaccine among all students, considerable disparities were observed among students from various colleges. Medical and dental students exhibited the highest level of HPV knowledge. Consistent with our findings, several

studies reported statistically significant differences in knowledge between different colleges, with health sciences students displaying higher awareness levels (25-27), a logical outcome. Interestingly, this study revealed low awareness levels among nursing and midwifery students, a trend also observed in studies conducted in Indonesia (28, 29).

However, in this study, knowledge of the HPV vaccine among medical and dental students was notably deficient. In study by Pelullo and colleagues, out of 556 nursing students surveyed, nearly all reported awareness of HPV infection. However, only 36.5% were knowledgeable about HPV infection risk factors and the preventative role of the HPV vaccine (28). Our statistical analyses demonstrated a positive correlation between increasing age, years of education, and knowledge about HPV and its vaccine. This association likely stems from increased exposure to information about HPV and its vaccine as the students progress through their academic years.

Interestingly, our study found that students residing in private homes generally exhibited more information about the virus and its vaccine, contrary to the initial expectation that students living in dormitories, with more exposure to medical and paramedical peers, might be better informed.

In contrast to study of Salehifar and co-workers (30), no significant difference in knowledge was observed between married and unmarried individuals in our study. Research of Salehifar and co-workers (30) also suggested that married students were five times more knowledgeable than their unmarried counterparts, possibly due to counseling information provided at healthcare centers and personal experiences.

Among the factors considered to influence students' awareness were a history of genital warts and vaccine injections. Our research indicated a significant relationship between vaccine injection and vaccine knowledge. Nonetheless, compared to international statistics (31-33), our study group exhibited a meager percentage of HPV vaccine coverage. This may be attributed to cultural variations and a lack of community awareness. Knowledge and awareness of the HPV vaccine are reliable indicators of vaccine receipt or intention to vaccinate. Furthermore, comprehension of cervical

cancer and the role of HPV plays a predictive role in vaccination behavior (34).

In our study 50% of the studied people had obtained their information from the Internet and social networks and 47% from university courses. Surprisingly, medical staff and healthcare providers constituted only 1.3% of students' information sources. In alignment with our findings, a study by Ghotbi and Anai on Japanese students reported that source of information for students about HPV and its vaccination, respectively: 90% university courses, 7% on media, and only 0.1% on healthcare providers (35). The lack of knowledge regarding HPV among medical professionals, including physicians, may be why students and others seek information from them. Inadequate awareness of the health system about the HPV virus and the importance of vaccination has caused them to give little advice to clients for vaccination (36, 37). Remarkably, just 27% of paramedics were familiar with the names of commercially available HPV vaccines, compared to 86% of gynecologists. Paramedical staff expressed a substantial lack of understanding about the primary cause, risk factors, and symptoms of cervical cancer, as well as HPV vaccination (37). Research in the UK also indicated the need for further training to medical practitioners in order to address HPV screening and vaccination (38).

Regarding sexual health, our study revealed a significant knowledge deficit concerning HPV. Findings indicated a widespread misconception that males cannot contract HPV, a misconception consistent with previous research. Historically, the emphasis on HPV primarily affecting women's health may have contributed to this misperception. Additionally, respondents generally lacked awareness that the majority of sexually active individuals will contract the virus at some points in their lives, that early sexual debut increases the risk of HPV contraction, or that HPV is the primary cause of genital warts (24). Sexual conduct is widely recognized as the primary risk factor for HPV. Furthermore, it is well-established that increased awareness of HPV and HPV vaccinations can lead to higher vaccine uptake, while a lack of understanding may contribute to poor sexual hygiene and resistance to vaccine adoption (39).

#### 4.1. Limitations

One limitation of this study is its exclusive

focus on female students. Questions about the characteristics of sexual relations, such as the age of starting sexual relations, the type of sexual relations, non-conventional sexual relations, and other relevant materials were not asked.

## 5. Conclusions

The students' comprehension of both HPV and HPV vaccinations was notably deficient. Regrettably, only approximately half of the students exhibited awareness regarding the vaccination and the correlation between HPV and malignancies. According to the Health Belief Model, possessing adequate information ranks as one of the paramount variables for altering health beliefs and potentially influencing shifts in individuals' health behaviors. These unsatisfactory levels of knowledge pose a significant challenge within this research context. Consequently, it may prove highly advantageous to fortify government policies on preventing this infection while simultaneously recognizing the media's pivotal role in disseminating information and education on prevention. Nonetheless, due to the evolution of 1) young people's attitudes towards sexuality, 2) the need for the Ministry of Health program to endorse HPV vaccination and reassess the merits of HPV vaccination, and 3) the necessity for high-risk age groups to incorporate comprehensive instruction on sexually transmitted diseases, notably HPV, into their curricula, it becomes evident that HPV could potentially emerge as a dynamic threat to individuals.

## Ethical Approval

The researchers conducted this study following the ethical principles outlined in the Helsinki Accords. It was ensured that information of the Student Questionnaire would remain confidential. This study received approval from the ethics committee of Shahed University, Tehran, Iran, with the code IR.SHAHED.REC.1399.035. Also, written informed consent was obtained from the participants.

**Conflict of Interest:** None declared.

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