Research Article

A Pilot Study on the Knowledge of HPV Infection and Risk Factors among Mexican Undergraduate Students

Juan Carlos Hernández-Guerrero[1], Salvador Vázquez-Vega[2], Dolores Jiménez-Farfán[3*], Rocío Susana Méndez-Martínez[3], Miriam Guido-Jiménez[3], Emilio Castellanos-Juárez[4], Constantino Ledesma-Montes[3], Avissai Alcántara Vázquez[5]

[1]Laboratory of Immunology, Division of Postgraduate Studies and Research, Faculty of Dentistry, National Autonomous University of Mexico, Mexico

[2]Unit for Epidemiological Research and Health Services SXXI, Mexican Institute of Social Security, Mexico

[3]Laboratory of Viruses and Cancer, National Institute of Cancerology, Mexico

[4]Unit of Medical Research in Oncology Diseases, Oncology Hospital, SXXI Medical Center, Mexican Social Security Institute, Mexico

[5]Department of Surgical Pathology, General Hospital of Mexico Eduardo Liceaga, Mexico

*Corresponding author: Dolores Jiménez-Farfán, Laboratory of Immunology, Division of Postgraduate Studies and Research, Faculty of Dentistry, UNAM, Mexico. Tel: +52 56225558; E-Mail: farfanmd@unam.mx

Abstract

Human Papilloma Virus (HPV) infection is the most prevalent sexually transmitted disease. Most uterine cervix and oropharynx cancer originate from some HPV-type infections. Sexually active young women are at the highest risk. We assessed the knowledge about HPV and its consequences in 217 university students, who responded a questionnaire addressing demographic and sexual life characteristics. Data were analyzed by descriptive statistics, x2and bivariate lineal regression. Students were from biology-oriented and mathematics-oriented schools. The first had a satisfactory level of knowledge; women were better informed. Some sexually active students were well-aware of HPV infection as a risk for cervical and oropharyngeal cancer. Sexual education covering this important aspect of public health is utterly important.

Introduction

Human Papilloma Viruses (HPV) are remarkably diverse DNA viruses, etiologically linked to neoplastic lesions of skin and mucosal epithelium. Currently, 148 different HPV types have been classified, ranging from HPV-1 to HPV-152 (HPV-46, HPV-55, HPV-64 and HPV-79do not meet the criteria for HPV types and are classified as subtypes). All known HPV types have been classified by their genomic composition into five genera (alpha, beta, gamma, mu, and nu) and in 33 species [1].

There is a general deficiency of knowledge about HPV infection, transmission, prevention, and treatment in the Mexican population. HPV infection has been extensively researched as a cause of cervical cancer. There is also a growing body of evidence that HPV infection is related to other cancers of the anal and genital regions (anus, vulva and vagina in women and penis in men) [2,3] as well as with oral cancers [4]. Although some people infected with HPV will not develop symptoms, certain types (6 and 11) will cause oropharynx condylomas, and genital warts. HPV types 16 and 18 are responsible for about 70% of all cases of cervical cancer [3,4].

Mexico has a population of over 51 million women older than 10 years [5]. These women have a potential risk of becoming infected with HPV and suffer cervical cancer in the future. Current estimates indicate that every year more than 10,000 Mexican women are diagnosed with cervical cancer and approximately 5000 will die as a consequence of this neoplasia [6]. Worldwide, cervical cancer is the third-leading cause of cancer deaths in women. HPV

is the causative agent of more than 95% of these cancers [7]. HPV infection is often subclinical and current methods for prevention of sexually transmitted infections, such as the use of condoms, are partially effective [8,9]. There are plenty of risks for HPV infection: multiple sexual partners, early age at first intercourse, early age at first parturition, smoking, alcohol, and drugs [10].

Although HPV infection is clearly related to cervical-uterine cancer, other pathologies HPV associated, affect both men and women. Increasing numbers of studies are demonstrating that HPV infections are also responsible for oral and oropharynx cancer (middle part of the throat, soft palate, tongue and tonsils) [10-13]. In the USA and other countries, more than half of all carcinomas diagnosed in the oropharynx are linked to HPV [14-16].

The incidence of HVP-associated cervical and oral cancer in Mexico stimulated us to conduct this study, directed to assess the level of knowledge that students of the National Autonomous University of Mexico (UNAM) have on HPV infection and its risk factors and practices, as well as about the sex behavior and practices of the cited population.

Methods

Participants

From August to November 2013, 217 subjects, enrolled in one of the following curricula: Veterinary Medicine, Odontology, Architecture, or Engineering of the National Autonomous University of Mexico (UNAM) were invited to complete an anonymous questionnaire, directed to assess their knowledge about HPV infection, risk factors and HPV-related diseases.

The questionnaire was divided in three sections:

- Demographic and academic characteristics, such as age, gender and school of adscription.
- Habits and behaviors considered relevant for HPV infection (smoking, alcohol and drugs use, sexual behavior and antecedents, personal history of oral and genital lesions, medical care and prophylactic measures).
- Knowledge on the etiology and pathological aspects of HPV infection, ways of transmission and prophylactic measures. The questionnaire applied to the Mexican under graduate students.

Statistical Analyses

Data were analyzed through X2and logistic binary regression using a SPSS 22 program.

Results

Demographic Characteristics

Two hundred seventeen students were included in this study (M_{age}= 21, age range: 17- 25years). (Table 1) shows the main demographic data.

Age of participants (n=217)	Median: 21 y.o. (17, 25y.o)
Age at first menstruation (n= 94)	Median: 12 y.o (11, 13y.o)
Age at first menstruation (by age group) (n=94)	
8 to 13-year-old	72 (76.6%)
14 to 17-year-old	22 (23.4)
Age atinitiation of sexual life (n= 174)	Median: 17 y.o (15 - 19y.o)
Ageat HPV vaccination (n= 26)	Mean: 16.4±2.6 y.o
Number of participants by School (n=217)	
Engineering	53 (24.4%)
Architecture	54 (24.9%)
Odontology	56 (25.8%)
Veterinary	54 (24.9%)
Number of participants by gender(n=217)	
Male	123 (56.6%)
Female	94 (43.4%)
Marital status	
Single	201 (92.6%)
Married	6 (2.8%)
Divorced	1 (0.5%)
Other (not specified)	9 (4.1%)
Father's schooling	
Elementary	9 (4.1%)
Junior High	38 (17.5%)
Senior High	34 (15.7%)
Technical	30 (13.8%)
University	83 (38.2%)
Graduate Studies	23 (10.6%)
Mother's schooling	
Elementary	15 (6.9%)
Junior High	38 (17.5%)
Senior High	34 (15.7%)
Technical	42 (19.4%)
University	75 (34.6%)
Graduate Studies	13 (6.0%)

Table 1: Demographic Data of Participants in the Study.

The number of participants per School (Engineering, Architecture, Odontology, and Veterinary Medicine) was very similar. Concerning the academic education of their parents, most of them studied up to college. In this respect, there were minimal differences in schooling between the fathers and mothers of the participants

in this study (38.2% and 34.6%, respectively).

Smoking, Alcohol and Drugs Use

One hundred and forty-one (65.0%) of the students did not smoke. From 76 that smoked,45 (59.2%) have been doing so for 4 to 15 years,50 of the smokers(65.7%) consumed1-2 cigarettes/day, and 26 (34.2%) smoked more than 3 cigarettes/day. One hundred ninety-eight students drank alcohol (91.2%) and 187 students (86.2%) do not use drugs.From30 drug users, 29 (96.6%) smoked marihuana.

Sexual Behavior

From the total sample, 43 (19.8%) of students had not yet initiated their sexual activity, 174 (80.2%) have sex relations. However, from the 217 students, only 26 (12.0%) had been vaccinated against HPV (21 women and 5 men). Regarding sex habits, some of the students fall into the WHO definition of promiscuous sex that is, when a person has had more than two sexual partners in less than six months [17]. Interviews showed that 48 (27.58%) of the 174 sexually active students do engage in promiscuous relations, whereas 126 (72.4%) have not promiscuous sex. Among sexually active students, the most common answer to the question: With what frequency do you have sexual relations? was Casual encounters(49 students, 28.1%), followed by Once a week(46 students, 26.3%). Regarding protection against sexually transmitted diseases (STDs) and pregnancy, 28 students (16.09%) of the 174 sexually active students did not use any protective method, whereas 143 (82.2%) reported using condoms. For the question: Have you practiced oral sex? The answers were No (21.2%) and Yes(59%). Of the last one, 51.2% did not use protection, whereas only 7.8% used it. Condom was the most common protection used. Because there are no references in the literature to allow us establishing cut-off points on the questions: How many times have you practiced oral sex? How many times have you practiced anal sex?we used percentiles (25th, 50th, and 75th). In this way, from the students who have had oral sex (n=129), 34 (26.35%) were in the 25th percentile (1- 5 times), 27 (20.9%) in the 50th percentile (6-15 times) and 68 (52.7%) in the 75th percentile (20-600 times). Regarding anal sex, of 174 students who have had sex, 39 students (22.4%) have practiced anal sex (30.8% did not use any protection and 69.2% did use condom). As for the number of times, 9 (23.1%), 10 (25.6%), and 20 (51.3%) students were in the 25th (1-2 times), 50th (3-12 times), and 75th (20-100 times) percentile, respectively.

Personal History of Oral and Genital Lesions, Medical Care, and Prophylactic Measures

With regard to seeking specialized medical care, of 94 female students, 41 (43.6%) have never visited a gynecologist, whereas 53 (56.4%) have done so. Thirty-three students (62.3%) only visited when something abnormal occurred, and 16 students (30.2%) do it annually, whereas the rest do it occasionally. Of these 94 women, 30 (31.9%) have had a pelvic examination. Of these

students, in 18 (19.14%) a Pap test had been performed, 9(9.5%) have had a colposcopy. In 77.8% of cases, the result was "Without Alterations"and the rest were reported as "Inflammatory" and "Non-Neoplastic Conditions". Of 123 men, 88 (71.5%) have never visited a urologist. Meanwhile, the other 28.5% have had at least one visit (26 of them did so when something abnormal occurred, only 5 men visited the urologist regularly). In reference to the question: Do you or did you present an abnormal change in the morphology or structure of the oral mucosa? Of the 217 students, 183 (84.3%) have not noted any changes, whereas 34 (15.7%) said to have/had noted some changes, mainly ulcers. Linked to the last question, we asked: Since when? In this case, 18students (8.3%) reported for more than 6 months, and, 7 students (3.2%) reported from 1 to 3 months. Likewise, to the question: Have you noticed an abnormal change in the morphology of your genitals?215 students (99.1%) reported no change and the other 2 students (0.9%) responded ulcers. Regarding the time since they had first observed these changes, they reported more than 6 months. Of 94 female students, 7 (7.4%) have been pregnant (4 had spontaneous abortions).

Level of Knowledge About HPV

The level of knowledge about HPV was evaluated through a questionnaire with eleven questions. To establish cut-off points of the results obtained with the 217 questionnaires, we established percentiles (25th, 50th and 75th) obtaining three levels of knowledge: under the mean (lower level: 0-6 right answers), mean (medium level: 7-8 right answers), and over the mean (upper level: 9-11 right answers). According to this, 55 (25.3%), 65 (30%), and 97 (44.7%) students were in the lower, medium, and upper level of knowledge, respectively (Table 2).

Level	Number of Right Answers	Students (N)	(%)
lower	(0-6)	55	25.3
medium	(7-8)	65	30
upper	(9-11)	97	44.7

Table 2: Level of Knowledge about HPV Infection by Percentiles* of Right Answers.* 25th, 50th, and 75th, corresponding to lower, medium, and upper level of knowledge, respectively.

To know whether a statistically significant association exists between the independent variables (demographic characteristics, habits and behaviors, sexual habits and antecedents, history of oral and genital lesions, medical care and prophylactic measures) and the dependent variable (level of knowledge)as determined by X2 (p < 0.05). We grouped together the lower and medium levels of knowledge to establish a clear-cut difference with the upper level. The odds ratio (OR) and confidence interval [CI95%] were also calculated. We divided the Schools in two groups by area of knowledge: Biological (Veterinary and Odontology) and Non-biological (Engineering and Architecture). (Table 3) shows

results of the comparison of Level of knowledge versus Schools, we found significant differences (p<0.05). The Schools with the highest percentage of students with an upper level of knowledge were Veterinary and Odontology (69.1%). In contrast, Engineering and Architecture had the lowest percentage of students in the upper level (19.6%). The OR for having a low level of knowledge of HPV in the Schools of Engineering and Architecture was 9.2 times (CI95%4.9-17.1) that of Veterinary and Odontology. For the comparison of Level of knowledge about HPV versus Gender, the results revealed a higher percentage of women (58.5%) with an upper level of knowledge than men (34.1%) (p< 0.05). The OR of having a low level of knowledge about HPV was 2.7 times (CI95%1.5-4.7) higher for men than for women.

Level of knowledge about HPV versus Schools						
	Lower-Medium	**Upper**	**p***	**OR**	**CI$_{95\%}$**	
					Lowest	Highest
Engineering-Architecture	80.40%	19.60%	0.001	9.2	4.9	17.1
Veterinary-Odontology	30.90%	69.10%				
Level of knowledge about HPV versus Gender						
Men	65.90%	34.10%	0.001	2.7	1.5	4.7
Women	41.50%	58.50%				
Level of knowledge about HPV versus Have had sex?						
No	48.80%	51.20%	0.341	0.72	0.4	1.4
Yes	56.90%	43.10%				
Level of knowledge about HPV versusIs HPV a risk factor for cervical cancer?						
No	85.00%	15.00%	0.001	6	2.4	15
Yes	48.60%	51.40%				
Level of knowledge about HPV versus Is HPV a risk factor for oral cancer?						
No	70.60%	29.40%	0.001	10.4	5.07	21.3
Yes	18.80%	81.20%				
*Calculated by X2 (p< 0.05)						

Table 3: Bivariate Analyses of Relevant Information versus Level of Knowledge About HPV.

The comparison of Level of knowledge about HPV versus age, marital status of the participants and schooling level of father and mother revealed no significant differences, meaning that any student, independently of age, marital status and schooling of the father and mother could be in anyone of the levels of knowledge. A similar lack of statistical significance was obtained when we compared smoking, alcohol and drugs consumption with the level of knowledge about HPV.

When comparing answers to the question: Do you have or have had sex relations versus Level of knowledge about HPV. We found a lower percentage of students with an upper level of knowledge (43.1%) in the group of the students that have had sexual relations when compared with those that had not had sex (51.2%), but this difference was not statistically significant (p= 0.341, OR= 0.72, CI$_{95\%}$ 4.9-17.1) (Table 3). The Level of knowledge about HPV related to answers to the questions Is HPV a risk factor for cervical/oral cancer? Did yield significant differences (p< 0.05). The results show that there is a high OR of being in the group with low-medium level of knowledge about HPV for those

who answered NO to both questions (OR=6.0, CI$_{95\%}$ 2.4-15 and, OR=10.4, CI$_{95\%}$ 5.07-21.3, respectively) (Table 3).

The comparison of Promiscuity (WHO definition) versus Did you use protection? showed non-significant results (p>0.05). Students with 1-2 sexual partners as well as those that reported 3 or more partners used protection in quite similar percentages (83.8% and 85%, respectively). Regarding the answers to questions of promiscuity, sexual relations with more than one partner at the time, with how many persons, frequency of sex activity, age at the start of sexual activity, use and type of protection versus level of knowledge on HPV infection did not yield statistically significant results. Similarly, non-significant differences were observed when comparing the answers to questions regarding frequency of oral and/or anal sex versus level of knowledge about HPV as well as with the comparison of the level of knowledge of HPV in patients who had visited a gynecologist or urologist. The comparison of the answer to Have you had a pelvic exam? versus Level of knowledge about HPV showed that 38.2% of women that have undergone a pelvic exam possessed a high level of knowledge in contrast to women

not having had a pelvic exam (61.8%) (p<0.05). The OR of having a low level of knowledge about HPV for women that have not undergone a pelvic exam was 2.05 times as compared to those that have undergone this examination, but the confidence interval was ambiguous ($CI_{95\%}$ 0.82-5.17).

Regarding the questions: Do you present any abnormal change in the oral mucosa? and Since when have you noticed the change? Versus Level of knowledge, the results showed no statistical significance and association. The question Do you have an abnormal change in the morphology or structure of the genitals? and type and time of lesions were neither statistically significant. With the question: Have you been vaccinated against HPV? versus Level of Knowledge there were no statistically significant differences in the level of knowledge of vaccinated and non-vaccinated students. Similarly, differences in the age at HPV vaccination did not have statistical significance.

(Table 4) shows the logistic binary regression analysis of relevant variables. Variable School is significantly related to Level of knowledge, that is, most students in the upper level of knowledge were from the Schools of Veterinary and Odontology, corresponding both to the biological area of knowledge. In the variable Gender, we found that the greatest proportion of students with an upper level of knowledge about HPV were women. Regarding the questions Is HPV a risk factor for cervical/oral cancer? In both cases the students who answered correctly had an Exp (B) value far from the unit (19.4 and 7.89, respectively). Thus, there is a higher probability that they recognize the association of HPV with cervical cancer rather than its association with oral cancer.

School	B exponent	CI 95%	
Engineering*		Lower	Upper
Architecture	1.1	0.42	2.85
Odontology	7.16	2.98	17.19
Veterinary	13.56	13.56	34.33
Schools according toarea of knowledge			
Non-biological (Engineering &Architecture) *			
Biological (Odontology & Veterinary)	9.154	4.8	17.1
Gender			
Men*			
Women	3.53	1.53	8.15
Is VPH a risk factor for cervical cancer?			
No*			
Yes	19.04	7.27	49.84
Is HPV a risk factor for oral cancer?			
No*			
Yes	7.89	1.98	32.65
*Reference (This refers to the category of comparison)			

Table 4: Logistic Binary Regression Analysis to Identify the Relevant Variables Associated with Level of Knowledge About HPV.

Discussion

Currently, HPV infection and its sequelae represent a worldwide public health problem; around 265,653 new deaths caused by cervical cancer occur annually in the world (estimations for 2012) [18]. Despite all the campaigns for early diagnosis and prevention launched by governments around the world, this has not been sufficient if we consider that more than 600,000 women and men worldwide develop some type of cancer related to HPV infection [19]. Considering that the level of college education should reflect better knowledge on the HPV topic, in the present study we included 217 Mexican undergraduate students from four different curricula (Architecture, Engineering, Veterinary Medicine, and Odontology, UNAM) aiming at analyzing their level of knowledge on the infection by this virus.

In this study, the highest percentage corresponded to men; however, this is not a significant variable, because at the UNAM, men mainly take the Engineering and Architecture curricula. It is only recently that men have been made aware of their role in HPV transmission. In Mexico, a 30% incidence and a 15% mortality caused by cervical-uterine cancer has been estimated annually or are HPV infected [19]. We found that women are better informed than men on the studied subject, independently from the coursed curriculum. This agrees with previous findings [20-23]. Together with their level of knowledge, it was found that students not yet engaged in sexual relations have a high level of knowledge as compared to those engaging in them. The aforementioned indicates the need posed by the male gender to know more about HPV infections, as it seems that the relation with other types of carcinomas is largely unknown. Likewise, students from Veterinary Medicine and Odontology had in average a higher level of knowledge than those from Engineering and Architecture. It is important to mention that the research included all years of study, which could enhance the differences regarding the level of knowledge, aside from the type of curricular adscription.

To ascertain the level of knowledge about HPV of our students, we used percentiles of right answers (upper, intermediate, and low level). In this case, 44.7% were at the upper level and 25.3% in the lower level (9-11 and 0-6 right questions, respectively). Of those of the lower level, 33% lack complete knowledge about HPV (23% women and 10% men). These are alarming figures, as it has estimated that 16% of the world population carries

the HPV and there are around 900 thousand new cases per year [24]. It is noteworthy that in our study, 80% of the participants that knew about HPV were women, which could be related to the fact that women are the most affected by this infection, generating a greater concern and interest for their personal health. Our results differ from those of Jackan [20], who reported that 88% of his study subjects did not know that HPV was a sexually transmitted disease and only 3.4% knew that HPV infection was causally related with cervical cancer. Also, 47% did not know that HPV caused chronic diseases and 58% did not know about the existence of a vaccine. Surprisingly, 79% of the interviewers were women [25].

In Mexico, according to the National Survey on Health and Nutrition [26], the average age of first sexual relation is 16.6 years-old, and 61.5% of adolescents do not use any type of anti-conceptive method in their first sexual encounter [22]. In our study, 80.2% of the participants had already started their sex life between 13 and 22 years of age, with a median of 17 years, similarly to the report by [20]. In a study performed with 17-year-old students, it was found that 58% had already started sexual activity, 88% did not know that HPV was a STD, 19.6% of them recognized having had more than one sex partner, and 71.9% did not use a prophylactic method during their sexual encounters [27]. In our study, 17% of the students that have had sexual relations did not use any type of anti-conceptive. It has been reported that the use of hormonal contraception is a risk factor for HPV [15]. In our study, 16.5% of the interviewed population has used hormonal anti-conceptive pills, whereas the condom was the most used protective measure (65.9%). This is relevant, as approximately 35% of the students engaging in sexual relations were not protected against STDs during their encounters. Sánchez, et al. [24] reported that the use of anti-conceptive pills or the IUD was not accompanied by the use of a condom, which indicates a greater concern about preventing pregnancy than the risk of a STD. The aforementioned implies that having had sexual relations was not related to the knowledge on HPV, that is, the knowledge about STD is not a factor taken into account at the time of deciding to engage in a sexual relation. This is relevant, because starting sex life at increasingly earlier life stages could foster risky sexual practices. Of the population that had sexual activity, 80% used some sort of anti-conceptive method, of these, 94% reported the use of condoms as first choice, 2% used anti-conceptive pills, 2% had IUDs, and the remainder 2% used a non-specified method. It is then possible to infer that 20% of the sexually active population is engaging in risky sexual practices, exposing themselves and their partners to a great probability of getting a HPV infection or any other form of STD [25-28].

Association of HPV infection with oral and oropharyngeal cancer was first reported in 1983 by Syrjänen, et al. [29] particularly with HPV types 16, 18 and 56 [10,28]. Some participants in our study were involved in alternative non-conventional sexual practices (36% had oral sex, whereas 11% have had anal sex) most of them without condom. On the other side, consumption of al-cohol and smoking is widely recognized as a risk factor for the development of head and neck cancer [23,24]. According to our results, 91.2% of undergraduate students drink alcohol and 35% smoke. Both factors associated to a low level of knowledge about HPV infection could increase considerably the risk of developing a malignant neoplasm in the oral cavity or the pharynx at some time in their life. According to our results, there is a correlation between the level of knowledge about HPV and cervical-uterine and oral cancers. Noteworthy is that at the level of knowledge about HPV, approximately half of the interviewed had information about its relationship with cervical cancer; at the highest level of knowledge, more detailed information was available like the relation of HPV to oral cancer.

Promiscuous sexual practices are risk factors for HPV infection. According to the World Health Organization (WHO), promiscuity occurs when a subject hast more than two sexual partners in less than 6 months [17]. In our study, 80.2% of the interviewed population reported having engaged in sexual relations. Of these, 11.49% have had promiscuous relation with more than three sexual partners, whereas 88.5% have had sexual relations with 1 or 2 partners in 6 months. It is interesting that of the total population that has started sexual life, 83.9% uses some form of protection. On the other hand, 4.1% has had sexual relations with more than two persons at the same time. Regarding the frequency of sexual relations, 28.1% reported having casual encounters and 26.3% reported having sex once per week. Due to these risk behaviors, education in this sense should be directed at creating awareness on the importance of periodical medical revisions and evaluations. Our results show that 19% of the women have undergone at least one Pap test in their lifespan, which is a very low percentage, considering the number of women that reported having had sexual relations. This information agrees with a previous study performed in Mexico by Sanchez-Alemán [23], who reported that 12% of their interviewed population had undergone that test. According to the results, despite the low percentage of students reporting risk behaviors like oral sex and promiscuous relations, it can be identified that the lack of periodical medical evaluations, like the Pap test, places this population at a higher risk than other populations. We also observed that the population having undergone the Pap test had a greater knowledge about HPV than those not subjected to that diagnostic test; these results agree with those of Jackan [20]. It is important to point out that 70% of the women that have undergone a pelvic examination possess the highest level of knowledge about HPV.

In Mexico, a vaccination program against HPV was implemented in economically and socially depressed regions since 2008, and since 2012, a modification was performed to the National Vaccination Program to include vaccination against HPV 16 and 18, for all 9-year-old girls. In the present study, the total percentage of students vaccinated against HPV was 12%, mostly women. The mean age of vaccination was of 16 years. If we consider that the

average age of starting sexual activity in our analyzed population was of 17 years, we could say that, in general, the vaccinated population is protected. However, the recommended age for the vaccine is between 9 and 12 years [30].

In summary, our students have a heterogeneous level of information about HPV, in particular about its transmission, as well as of the variety of lesions caused by HPV infection, but much less of its importance in the causation of neoplastic lesions. Because the studied population corresponds to university students, we should expect that their level of knowledge would be sufficient to promote healthy sexual practices. However, it seems that they do not understand or do not care about the risk of HPV infection and its consequences. This is a relevant fact, because the lack of knowledge plus an attitude of apathy on the subject of STDs among sexually active adolescents and young adults raises the probability that, in the future, they might continue with the same behaviors, placing at risk an increasing number of people. The current results invite us to reflect on this subject, given its importance for the maintenance of public health.

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