

KNOWLEDGE OF HUMAN PAPILLOMAVIRUS, CERVICAL CANCER, AND ANTI-HPV VACCINE AMONG STUDENTS FROM A UNIVERSITY IN GOIÁS, BRAZIL

CONHECIMENTO DOS ACADÊMICOS DE UMA UNIVERSIDADE DE GOIÁS SOBRE A INFECÇÃO PELO PAPILOMAVÍRUS HUMANO, CÂNCER DO COLO DO ÚTERO E VACINA ANTI-HPV

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ABSTRACT

Introduction: Cervical cancer affects women worldwide. The etiological pathogen is the Human Papillomavirus (HPV). Despite the high incidence, there are some prevention programs that include Pap smear test and the anti-HPV vaccine. **Objective:** The objective of this study was to evaluate the perception and knowledge of HPV infection, cervical cancer, and anti-HPV vaccine among biomedicine students from the *Pontifícia Universidade Católica de Goiás* (PUC Goiás). **Methods:** A questionnaire was administered with objective questions in a multiple-choice format. The mean score for each group of questions was classified as follows: satisfactory, if above 80%; reasonable, between 70 and 80%; and unsatisfactory, when less than 70%. The data was transferred to the R Core Team 2012. In order to develop the statistical analysis, the chi-square test (χ^2) was applied, with a confidence interval of 95% and a significant value below 0.05. **Results:** From 268 participants, the scores concerning the HPV infection varied from 23,2 to 99,6%, with an average of 75,7%; with regard to cervical cancer, scores ranged from 25,9 to 98,1% with an average of 68,9%; and regarding the anti-HPV vaccine, scores ranged from 14,3 to 97,4%, with an average of 69,3%. **Conclusion:** The results showed that the general performance of the academics was insufficient. We highlight the need for new strategies on undergraduate teaching about HPV, its complications and prevention.

Keywords: Human Papillomavirus (HPV); Biological Science; uterine cervical neoplasms; vaccines.

RESUMO

Introdução: O câncer do colo do útero afeta as mulheres em todo o mundo. O agente etiológico é o papilomavírus humano (HPV). Apesar da alta incidência, existem programas de prevenção que incluem o exame Papanicolau e a vacina anti-HPV. **Objetivo:** O objetivo deste estudo foi avaliar a percepção e o conhecimento dos acadêmicos de graduação em Biomedicina da Pontifícia Universidade Católica de Goiás (PUC Goiás) sobre a infecção pelo HPV, o câncer do colo do útero e a vacina anti-HPV. **Métodos:** Um questionário foi aplicado com perguntas de múltipla escolha. A média de acerto para cada grupo de questões foi classificada como satisfatória quando acima de 80%; razoável, entre 70 e 80%; e insatisfatória, quando menor que 70%. Os dados foram transportados para o programa R Core Team 2012 e para a análise estatística foi utilizado o teste qui-quadrado (χ^2), com intervalo de confiança de 95% e valor significativo inferior a 0,05. **Resultados:** Entre os 268 participantes, índices de acerto observados para as questões relacionadas ao conhecimento sobre a infecção pelo HPV variaram de 23,2 a 99,6%, com média de 75,7%; acerca do câncer do colo do útero, os índices de acerto ficaram entre 25,9 e 98,1%, com média de 68,9%; concernente à vacina anti-HPV, os índices de acerto variaram de 14,3 a 97,4%, com média geral de 69,3%. **Conclusão:** Os resultados mostraram que o conhecimento geral dos acadêmicos foi insuficiente. Destaca-se a necessidade de novas estratégias de ensino na graduação sobre o HPV, suas complicações e prevenção.

Palavras-chave: Papiloma Vírus humano (HPV); Ciências Biológicas; câncer de colo do útero; vacina.

INTRODUCTION

Human papillomavirus (HPV) is the most common sexually transmitted infection⁽¹⁾. Therefore, HPV infection is the most studied as it is the main specific cause of 99.7% of cases of cervical cancer worldwide⁽²⁾.

There are several risk factors for cervical cancer. The main risk factor is the HPV infection, followed by age and early onset of sexual activity among women under 25 years of age. High number of sexual partners, continuous use of oral contraceptives, immunosuppression (caused by infection with the human immunodeficiency virus – HIV – or use of immunosuppressants), and smoking may be related to HPV infection⁽³⁾.

There are nearly 200 sequenced HPV genotypes. Of these, approximately 40 types can infect the genital mucosa and evolve to cancer. Genetically identified types are classified as high risk and low risk, according to their oncogenic potential⁽⁴⁾. Twelve HPV types, namely, HPV-16, HPV-18, HPV-31, HPV-33, HPV-35, HPV-39, HPV-45, HPV-51, HPV-52, HPV-56, HPV-58, and HPV-59 are known as high-risk types, and 11 HPV types, namely, HPV-6, HPV-11, HPV-40, HPV-42, HPV-43, HPV-44, HPV-54, HPV-61, HPV-72, HPV-81, and HPV-CP6108 are known as low-risk types. Another group considered as intermediate-risk type is composed of 8 HPV types categorized as probable high-risk (HPV-26, HPV-53, HPV-66, HPV-67, HPV-68, HPV-70, HPV-73 and HPV-82)^(5,6).

According to the World Health Organization (WHO), cervical cancer is the fourth most common cancer worldwide, excluding nonmelanoma skin cancer, with approximately 530,000 new cases per year. Cervical cancer is the main cause of death of 265,000

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women per year⁽⁷⁾. In Brazil, cervical cancer is the third most common among the Brazilian population, excluding nonmelanoma skin cancer. The estimate for 2016 is 16,340 new cases with a risk of 15.85 cases per 100,000 women⁽⁸⁾.

The Pap smear is the most common gynecological exam for cancer prevention. It enables the early detection of precursor lesions in asymptomatic women and may prevent the disease progression with appropriate monitoring and treatment⁽⁹⁾. The gynecological examination is quick, sensitive, and does not cause discomfort to the patient, which characterizes it as a safe screening method. The Pap smear is recommended by the WHO as the main prevention method to be included in programs to combat cervical cancer in several countries. According to the WHO, with a target population coverage of at least 80% and proper diagnosis and treatment of abnormal cases, the incidence of invasive cervical cancer may decline by 60 to 90% in average⁽¹⁰⁾.

Two prophylactic HPV vaccines have been approved with the aim of strengthening cervical cancer prevention: Gardasil[®] (Merck Sharp & Dohme, Whitehouse Station, New Jersey, United States of America) and Cervarix[®] (Glaxo Smith & Kline Biologicals, Rixensart, Belgium). These two vaccines were approved by the Food and Drug Administration (FDA) in June 2006 and October 2009, respectively⁽¹¹⁾.

In 2014, the FDA approved a 9-valent HPV vaccine. Gardasil 9[®] vaccine prevents cervical, vulvar, vaginal, and anal cancers caused by HPV types 16, 18, 31, 33, 45, 52, and 58; and genital warts caused by HPV types 6 or 11. In addition, it provides protection against cervical cancer with up to 90% efficacy. Until the publication of this paper, the tetravalent vaccine had not yet been replaced by the 9-valent vaccine in all health programs worldwide. Only in some developed countries the vaccine was implemented, but not in the health services⁽¹²⁻¹⁴⁾.

In clinical studies, Gardasil[®] vaccine shown to be highly effective against cancer in the anal and genital area, showing 100% efficacy against precancerous lesions and vaginal/vulvar cancers, 95% efficacy against cervical intraepithelial neoplasm, and 99% efficacy against genital lesions caused by HPV types 6, 11, 16, and 18. The duration of immunity of this vaccine is at least five years^(15,16).

OBJECTIVE

To evaluate the perception and knowledge of the main aspects related to HPV infection, its implications in the development of cervical cancer, and the HPV vaccine among undergraduate biomedicine students at the *Pontifícia Universidade Católica de Goiás* (PUC Goiás).

METHODS

This was a descriptive study carried out in the undergraduate biomedicine program at PUC Goiás. This study included the administration of a questionnaire which was elaborated based on a literature review of similar studies carried out in other countries⁽¹⁷⁻²⁰⁾ and on studies that have been developed in medical and nursing programs at the referred university. In these studies, content included HPV infection, cervical cancer, and the HPV vaccine.

The total number of students enrolled in the undergraduate biomedicine program at PUC Goiás was 378 in 2015. Initially, 268 students were studied, with a participation rate of 70.9%. The sample was considered representative; however, only 266 students were included in the study because two participants did not respond to most questions.

After reading and signing the informed consent form (ICF), the subjects who agreed to be part of the research received the questionnaire.

Sample group was defined according to the following inclusion criteria: to be properly enrolled in the undergraduate program in Biological Sciences (medical/biomedicine modality) of the institution, age over 18 years, be present when questionnaires were administered, agreed to participate in this research after explanation of the study objectives, and have signed the consent form.

The research project was approved by the Research Ethics Committee of PUC Goiás under the opinion number 1,227,310. Data were collected by means of a questionnaire containing 38 multiple choice questions, which were distributed as follows: 5 aimed at sample characterization, 12 assessed knowledge of HPV, 15 tested knowledge of cervical cancer, and the remaining 6 were about the anti-HPV vaccine. The topics covered in the survey included definitions, routes of transmission and prevention of the virus infection, cancer development risks, administration and use of the vaccine, among others.

The questionnaires were administered at the beginning or end of regular classes of the course. Students had enough time to answer the questions.

Participants' knowledge was evaluated based on the percentage of correct answers for each question on the three themes: knowledge of HPV, cervical cancer, and anti-HPV vaccine.

Score averages obtained for each group of questions were classified into "satisfactory," when scores were greater than 80%; "reasonable," when they were between 70 and 80%; and "insufficient," when they were below 70%.

Information was collected and organized in a database, whose data were inputted in Microsoft Office Excel[®] 2013 spreadsheets (Microsoft Corporation, Redmond, Washington, United States of America). For statistical analysis, data were transferred to the program R Core Team 2012 and were analyzed by descriptive and comparative statistical methods using the chi-square test (χ^2), with 95% confidence interval and significant value below 0.05. Results were shown in graphs and tables using the program R Commander (Rcmdr), 2005.

RESULTS

Biomedicine student's characteristics that were evaluated in this study are shown in **Table 1**. The questionnaires that were administered to the 266 undergraduate biomedicine students were analyzed. Among the students, 81.6% (n = 217) were female and 18.4% (n=49) were male. The ages of the participants ranged from 18 to 42, and the majority (n=237; 89.1%) were aged 18–23 years. Among the participants, 242 (91.0%) were single or divorced, and 166 (62.4%) reported having an active sex life.

With regard to the participants' knowledge of HPV infection, the overall mean score was 75.7%. The highest scores were obtained

on questions pertaining to knowledge of HPV existence (99.6%) and awareness of HPV as a sexually transmitted disease (96.2%). However, when the knowledge of HPV transmission through kissing was evaluated, the percentage of correct answers was 23.3%. This was the lowest score of participants' knowledge of HPV.

A statistically significant difference was observed ($p=0.026$) on the question that investigated the knowledge of a possible transmission of HPV from mother to child. Male participants answered correctly 81.6% of questions, whereas female participants answered correctly 67.7% of questions (**Table 2**).

The overall mean score on participants' knowledge of cervical cancer was 68.9%. The highest scores were obtained on the question that assessed knowledge of HPV infection as main agent of cervical cancer (98.1%) and awareness of sex with multiple partners as a risk factor for such cancer (92.1%). Statistically significant differences were found on the questions on the association of some foods with cervical cancer ($p=0.037$) and early onset of sexual intercourse as a risk factor for the same type of cancer ($p=0.008$); in these two questions female participants stood out in relation to male participants, with scores equivalent to 81.6 % and 74.2%, respectively (**Table 3**).

With regard to the assessment of participants' knowledge of the anti-HPV vaccine, mean score was 69.3%. Male participants achieve a slightly higher score (71.8%) compared to the mean score of female participants (69.5%) (**Table 4**).

Table 1 – Sample characterization of biomedicine students at the Pontifícia Universidade Católica de Goiás (PUC Goiás), in 2015.

VARIABLE	n	f (%)
Sex		
Female	217	81.6
Male	49	18.4
Total	266	100.0
Age range		
18–23 years	237	89.1
24–29 years	19	7.1
≥30 years	6	2.3
NI	4	1.5
Marital Status		
Single/Divorced	242	91.0
Married	10	3.8
Other	14	5.3
Period		
P1	11	4.1
P2	56	21.1
P3	27	10.1
P4	47	17.7
P5	22	8.3
P6	39	14.7
P7	25	9.4
P8	27	10.1
P9	12	4.5
Active Sex Life		
Yes	166	62.4
No	99	37.2
NI	1	0.4

Source: School of Medical, Pharmaceutical, and Biomedical Sciences. NI: not informed.

Table 2 – University students' knowledge of the Human Papillomavirus (HPV) Infection, Pontifícia Universidade Católica de Goiás (PUC Goiás), 2015.

Questions	Female		Male		Total		p-value
	n	f (%)	n	f (%)	n	f (%)	
Have you heard about HPV?							
Yes	217	100.0	48	98.0	265	99.6	0.184
No	0	0.0	1	2.0	1	0.4	
Is HPV infection a sexually transmitted disease?							
Yes	208	95.9	48	98.0	256	96.2	0.562
No	8	3.7	1	2.0	9	3.4	
NI	1	0.5	0	0.0	1	0.4	
Is kissing a route of HPV transmission?							
Yes	50	23.0	12	24.5	62	23.3	0.854
No	165	76.0	37	75.5	202	75.9	
NI	2	1.0	0	0.0	2	0.8	
Can direct contact with body fluids transmit HPV?							
Yes	163	75.1	38	77.6	201	75.6	0.621
No	52	24.0	10	20.4	62	23.3	
NI	2	0.9	1	2.0	3	1.1	
Can contaminated water transmit HPV?							
Yes	21	9.7	5	10.2	26	9.8	0.907
No	192	88.5	43	87.8	235	88.3	
NI	4	1.8	1	2.0	5	1.9	
Is there mother-child HPV transmission?							
Yes	147	67.7	40	81.6	187	70.3	0.026
No	66	30.4	7	14.3	73	27.4	
NI	4	1.8	2	4.1	6	2.3	
Is HPV infection common?							
Yes	195	89.9	42	85.7	237	89.1	0.253
No	19	8.8	7	14.3	26	9.8	
NI	3	1.4	0	0.0	3	1.1	
Who can get infected with HPV?							
Women	39	18.0	11	22.4	50	18.8	0.682
Men	1	0.5	0	0.0	1	0.4	
Both	170	78.3	37	75.5	207	77.8	
NI	7	3.2	1	2.0	8	3.0	
Is the incidence of HPV infection higher among women aged 20-30 years?							
Yes	168	77.4	42	85.7	210	78.9	0.198
No	49	22.6	7	14.3	56	21.1	
HPV infection is most often:							
Symptomatic	51	23.5	9	18.4	60	22.6	0.4111
Asymptomatic	163	75.1	40	81.6	203	76.3	
NI	3	1.4	0	0.0	3	1.1	
Does HPV infection cause genital warts?							
Yes	178	82.0	41	83.7	219	82.3	0.659
No	37	17.1	7	14.3	44	16.5	
NI	2	0.9	1	2.0	3	1.1	
Is HPV infection curable?							
Yes	140	64.5	34	69.4	174	65.4	0.597
No	74	34.1	15	30.6	89	33.5	
NI	3	1.4	0	0.0	3	1.1	

Source: School of Medical, Pharmaceutical, and Biomedical Sciences. NI: not informed; HPV: Human Papillomavirus.

The highest rate of correct answers was related to the question on knowledge of the existence of anti-HPV vaccine (97.4%), and the lowest score was on the vaccination recommended age range (14.3%). This question showed a statistically significant difference ($p=0.000393$). Another statistically significant difference was identified on the question on the recommended sex for anti-HPV vaccine ($p=0.005$), with male participants obtaining higher scores, equivalent to 65.3% (Table 4).

In the assessment of overall performance concerning HPV infection – including cervical cancer and anti-HPV vaccine – the highest level of knowledge demonstrated by the highest scores was related to HPV (75.7%), and the lowest scores were related to cervical cancer (68.9%) (Table 5).

DISCUSSION

In this study, the majority of participants were single/divorced (91.0%) and had active sexual life (62.4%). Most of them were aged 18 to 23 years (89.1%). These data show that the participants have a high degree of exposure to the main risk factors for HPV infection and cervical cancer⁽³⁾.

When questioned about the HPV infection, most participants were aware of the virus and identified the infection as a sexually transmitted disease. This is an important finding which indicates the students' concern about avoiding exposure to risk factors in the sexual intercourse. An overall mean score equivalent to 75.7% showed that the participants have reasonable level of knowledge of the pathogenesis of HPV. However, when assessing the HPV transmission through kissing, only 23.3% of participants responded correctly. This is worrying, as similar oral and genital lesions caused by the HPV have been discovered, which suggested their inclusion in the development of oral cancer. In such cases, association of open-mouth ("French") kissing with oral HPV infection and also the transmission of genital HPV positive to the oral tract through oral sex were revealed^(21,22).

A statistically significant difference in relation to female participants (74.2%) compared to male participants (55.1%) was observed ($p=0.008$). This allowed us to infer that women in this study have concerns about the HPV transmission and probably adhere to other preventive measures, as women under 25 years of age are a risk group with less chance of developing cervical cancer⁽³⁾.

The male population is primarily responsible for the transmission of HPV to women, because they act as reservoirs, transmitting oncogenic types more easily to women than the opposite – from women to men⁽²³⁾. Most of these infections are asymptomatic and transient, and usually undetectable within one or two years; however, persistent infection favors the development of future neoplasms⁽²⁴⁾.

When the students were asked about the existence of vertical transmission of HPV, 70.3% of them were aware of this type of transmission, with significant frequency ($p=0.026$) and greater knowledge score among male participants (81.6%); women presented 67.7% of correct responses. However, 27.4% of students did not consider this possibility. In fact, during the passage of the fetus through the birth canal, the HPV infected mucosa of the mother can infect and stimulate the proliferation of the virus in the upper airways, which can evolve to recurrent respiratory papillomatosis with lung involvement^(25,26).

With regard to the assessment of the HPV cure, an unsatisfactory level of knowledge was observed (65.4%). This is an important

Table 3 – University students' knowledge of the cervical cancer, Pontifícia Universidade Católica de Goiás (PUC Goiás), 2015.

Questions	Female		Male		Total		p-value
	n	f (%)	n	f (%)	n	f (%)	
Can HPV infection cause cervical cancer?							
Yes	214	98.6	47	96.0	261	98.1	0.719
No	3	1.4	1	2.0	4	1.5	
NI	0	0.0	1	2.0	1	0.4	
Is cervical cancer related to genetic predisposition?							
Yes	139	64.1	31	63.3	170	63.9	0.865
No	76	35.0	16	32.7	92	34.6	
NI	2	0.9	2	4.1	4	1.5	
Can some foods cause cervical cancer?							
Yes	40	18.4	14	28.6	54	20.3	0.037
No	177	81.6	35	71.4	212	79.7	
Can bacterial infection cause cervical cancer?							
Yes	138	63.6	36	73.5	174	65.4	0.231
No	76	35.0	13	26.5	89	33.5	
NI	3	1.4	0	0.0	3	1.1	
Having multiple sexual partners is a risk factor for the development of cervical cancer?							
Yes	201	92.6	44	89.8	245	92.1	0.507
No	16	7.4	5	10.2	21	7.9	
Is early sexual intercourse characterized as a risk factor for cervical cancer?							
Yes	161	74.2	27	55.1	188	70.7	0.008*
No	56	25.8	22	44.9	78	29.3	
Is IUD use a risk factor for cervical cancer?							
Yes	98	45.2	20	40.8	118	44.4	0.641
No	118	54.4	28	57.1	146	54.9	
NI	1	0.5	1	2.0	2	0.8	
Is smoking a risk factor for the development of cervical cancer?							
Yes	108	49.8	27	55.1	135	50.8	0.500
No	109	50.2	22	44.9	131	49.2	
Is alcohol consumption a risk factor for the cervical cancer?							
Yes	94	43.3	27	55.1	121	45.5	0.142
No	122	56.2	22	44.9	144	54.1	
NI	1	0.5	0	0.0	1	0.4	
Is lack of hygiene a risk factor for the cervical cancer?							
Yes	158	72.8	39	79.6	197	74.1	0.328
No	59	27.2	10	20.4	69	25.9	
Is pain after sexual intercourse one of the symptoms of cervical cancer?							
Yes	164	75.6	29	58.2	193	72.6	0.02*
No	53	24.4	20	40.8	73	27.4	
Are bleedings between menstrual periods symptoms of cervical cancer?							
Yes	156	71.9	32	65.3	188	70.7	0.336
No	60	27.6	17	34.7	77	28.9	
NI	1	0.5	0	0.0	1	0.4	
Is the occurrence of bloody vaginal discharge a symptom of cervical cancer?							
Yes	187	86.2	40	81.6	227	85.3	0.291
No	27	12.4	9	18.4	36	13.5	
NI	3	1.4	0	0.0	3	1.1	
Are fever and headache symptoms of cervical cancer?							
Yes	45	20.7	12	24.5	57	21.4	0.574
No	171	78.8	37	75.5	208	78.2	
NI	1	0.5	0	0.0	1	0.4	
Is pelvic pain a characteristic symptom of cervical cancer?							
Yes	170	78.3	40	81.6	210	78.9	0.610
No	47	21.7	9	18.4	56	21.1	

Source: School of Medical, Pharmaceutical, and Biomedical Sciences. NI: not informed; HPV: Human Papillomavirus; IUD: intrauterine device.

fact that suggests strengthening the knowledge of this peculiarity of HPV infection is necessary, as the natural history of the problem is the spontaneous healing. However, the presence of oncogenic types associated with multiple risk factors can lead to persistent infection, which in turn can lead to neoplastic lesions and evolve to cervical cancer^(24,27). Nevertheless, when cervical cancer is early detected, it is possible to delay the development of invasive cancer or even cure it by means of clinical interventions such as colposcopy and biopsy, local excision, conization, and hysterectomy⁽²⁸⁾.

Participants' knowledge of cervical cancer was considered unsatisfactory and corresponded to the worst score found in the study. However, most of the students in this study were aware of the main risk factors for cervical cancer, such as genetic predisposition, bacterial infection, early onset of sexual intercourse, and multiple sexual partners.

A significant number of students were unaware of smoking as a risk factor for the development of cervical cancer (49.2%). Tobacco

is capable of exposing the DNA in cervical epithelial cells to nicotine, cotinine, and its metabolites, and of promoting mutagenesis, genomic damage, and proliferation of these cells. In addition, it can induce immunosuppression, facilitating the occurrence of lesions and HPV persistence. Brazilian studies have shown greater probability of cancer in women who smoke; it was estimated that smoking at least 100 cigarettes during their lifetime would be a potential risk factor for the development of cervical cancer^(29,30).

In general context, students know the signs and symptoms of cervical cancer. This type of cancer grows slowly and it is usually asymptomatic in the early stage; however, the evolution of the disease may lead to intermittent vaginal bleeding, pain after intercourse, abnormal vaginal discharge, and abdominal pain⁽³¹⁾.

Cervical cancer is a preventable and curable disease; however, early detection of precursor lesions by means of the Pap test, which is the main strategy to control this cancer, is necessary. Primary prevention, which is obtained through HPV vaccines that provide protection for the main HPV types is also essential^(6,11,16,18).

Table 4 – University students' knowledge of anti-HPV vaccine, Pontifícia Universidade Católica de Goiás (PUC Goiás), 2015.

Questions	Female		Male		Total		p-value
	n	f (%)	n	f (%)	n	f (%)	
Have you heard about the anti-HPV vaccine?							
Yes	212	97.7	47	95.9	259	97.4	0.343
No	4	1.8	2	4.1	6	2.3	
NI	1	0.5	0	0.0	1	0.4	
Is the vaccine included in the annual vaccination calendar of the Ministry of Health?							
Yes	182	83.9	37	75.5	219	82.3	0.166
No	35	16.1	12	24.5	47	17.7	
Is the vaccine approved for those individuals who have not had contact with the HPV virus?							
Yes	195	89.9	42	85.7	237	89.1	0.502
No	20	9.2	6	12.2	26	9.8	
NI	2	0.9	1	2.0	3	1.1	
Who can use the HPV vaccine?							
Women	124	57.1	15	30.6	139	52.3	0.005
Men	1	0.5	0	0.0	1	0.4	
Both	90	41.5	32	65.3	122	45.9	
NI	2	0.9	2	4.1	4	1.5	
For what age range is the anti-HPV vaccine recommended?							
9 to 13 years	176	81.1	30	61.2	206	77.4	0.000393
10 to 20 years	30	13.8	8	16.3	38	14.3	
20 to 30 years	9	4.1	7	14.2	16	6.0	
30 to 40 years	0	0.0	2	4.1	2	0.8	
Above 40 years	0	0.0	0	0.0	0	0.0	
NI	2	0.9	2	4.1	4	1.5	
Do vaccinated women need to undergo the preventive exam annually?							
Yes	195	89.9	45	91.8	240	90.2	0.736
No	21	9.7	4	8.2	25	9.4	
NI	1	0.5	0	0.0	1	0.4	

Source: School of Medical, Pharmaceutical, and Biomedical Sciences. NI: not informed; HPV: Human Papillomavirus.

Table 5 – Average of correct responses according to variables of the biomedicine students from the Pontifícia Universidade Católica de Goiás (PUC Goiás), 2015.

Variables	HPV (%)	Cancer (%)	Vaccine (%)
All (n=266)	75.7	68.9	69.3
Gender			
Female (n=217)	76.5	70.2	69.5
Male (n=49)	79.1	65.9	71.8
Age range (years)			
18 – 23 (n=237)	77.0	69.5	69.8
24 – 29 (n=19)	72.4	69.1	71.9
≥32 (n=6)	70.8	68.9	72.2
NI (n=4)	70.8	66.7	58.3
Marital status			
Single or divorce (n=242)	77.5	69.2	69.8
Married (n=10)	74.2	66.7	68.3
Other (n= 14)	68.5	71.9	71.4
Period			
First (n=11)	70.4	70.3	71.2
Second (n=56)	71.3	67.7	72.9
Third (n=27)	68.8	68.4	71.0
Fourth (n=47)	79.1	71.0	71.3
Fifth (n=22)	84.5	72.1	68.9
Sixth (n=39)	81.2	70.6	68.8
Seventh (n=25)	81.0	68.5	64.0
Eight (n=27)	80.6	69.9	68.5
Ninth (n=12)	75.0	68.9	66.7
Period (Virology and Cytopathology)			
1 st to 3 rd (n=94)	70.5	68.2	72.2
4 th to 6 th (n=108)	80.9	70.6	69.9
7 th to 9 th (n=64)	79.7	69.2	66.4
Active sex life			
Yes (n=166)	77.7	70.6	70.9
No (n=99)	75.7	67.5	68.2
NI (n=1)	75.0	66.7	66.7

Source: School of Medical, Pharmaceutical, and Biomedical Sciences. NI: not informed; HPV: Human Papillomavirus.

Regarding the anti-HPV vaccine as a new prevention method for HPV infection and cervical cancer, students' knowledge score showed a low average. In this study, most participants heard about the vaccine (97.4%) and know that it is already included in the National Immunization Program (82.3%), which may be explained by the media coverage of the vaccination campaign promoted by the Ministry of Health in 2014⁽³¹⁾. Results of a research carried out in hospitals located in Bangkok, Thailand⁽²⁰⁾, revealed that nurses (63%) and physicians (73%) respondents believed that the vaccine is introduced for both boys and girls before the onset of sexual activity.

The period that the participant was attending had no significant influence on the knowledge of the cervical cancer and anti-HPV vaccine; however, in this study, increased knowledge of HPV infection was found among participants who were enrolled at "Immunology" and "Virology" (4th period), and mainly at "Cytopathology" (6th period), which had a strong impact. However, the level of knowledge of the subject was relatively stable until the last period of the biomedicine program.

The biomedical scientist contributes to the promotion of health of the population, especially in the prevention of diseases, since he or she is a professional who can work in several areas⁽³²⁾. This study results suggested that there is lack of adequate knowledge of the key themes peculiarities. A greater coverage of the subject is relevant for these students, so they may promote adequate health care to the population, as future biomedical scientists.

CONCLUSION

In view of the results obtained in this study, the overall performance of students was considered reasonable, suggesting that the knowledge acquired by students during the biomedicine program was not sufficient. These data corroborate other studies carried out in different locations and health fields⁽¹⁷⁻²⁰⁾ which have addressed similarly HPV infection, cervical cancer, and anti-HPV vaccine.

The need for a broader coverage of this particular theme in the classroom should be highlighted, in addition to the development of new continuing education strategies, such as courses, symposiums, and workshops, conducted by people responsible to inform the students about HPV, its complications and prevention, as well as the encouragement of academic leagues and advertising campaigns.

Conflict of interests

The authors declare there was no conflict of interests.

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