

Knowledge, behaviours and attitudes regarding HPV infection and its prevention in female students in West Greece

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Abstract. – OBJECTIVE: Infection with several types of human papilloma viruses (HPV) has been correlated with the development of cervical cancer. Apart from other preventive strategies, two prophylactic vaccines have been added recently to the HPV prevention arsenal. The objectives of this study were to assess HPV vaccination coverage rates and to evaluate the level of knowledge regarding cervical cancer, HPV and Papanicolaou test among female students in a Greek city.

PATIENTS AND METHODS: A cross-sectional study was carried out among five hundred female students of the Technological Educational Institute (TEI) of Patras, Greece. They completed an eighteen-item self-administrated questionnaire regarding their knowledge related to cervical cancer.

RESULTS: Only 31.7% of the students had a high level (> 66%) of total knowledge. The majority (70.4%) had not been vaccinated against HPV. Students who achieved low and moderate total knowledge scores were less likely to be vaccinated against HPV.

CONCLUSIONS: Implementing strategies for improving young females' knowledge on the different aspects of the natural course of HPV infection and increasing HPV vaccination coverage rates seem to be crucial.

Key Words:

Human papilloma virus, HPV, Vaccine-preventable diseases, Vaccines and immunization.

degree of association with human malignancy^{1,2}. Almost 2 million cancer cases each year are caused by infectious diseases and HPV represents one of the four major causes³. Infection with high-risk HPV types (i.e. 16, 18, 31, 33, 35 and others) has been strongly correlated with the development of the following cancers: cervix uteri, vulva, vagina, anus, penis and oropharynx^{1,2}.

Concerning cervical cancer, since 1999, HPV has been established as its necessary cause⁴. Every year more than 270,000 women die from cervical cancer and the majority of these deaths are in low and middle income countries⁵. In 2012, the estimated incidence of cervical cancer in Greece was 2.4%⁶. Estimates of the projected incidence of cervical cancer in 2030 indicate a 2% increase in the global burden of cervical cancer⁷. Moreover the worldwide prevalence of infection with HPV in women without cervical abnormalities is 11-12%⁷. The respective percentage in Greece ranges between 22.7% and 33.1%, while it reduces to 5.9% when screening for high-risk HPV types⁸⁻¹⁰.

Until now, there are two licensed prophylactic vaccines against HPV both exhibiting excellent safety and immunogenicity profiles; one quadrivalent containing virus-like particles of types 6, 11, 16 and 18 and one bivalent containing virus-like particles of types 16 and 18¹¹. Vaccination against HPV in girls 9 to 13 years old combined with regular screening in women over age 30 are key tools to prevent the new cervical cancer cases diagnosed annually⁵. The vaccines have been introduced in most European Union countries, but the vaccine coverage rates remain suboptimal¹². In Greece, since their introduction date in 2008, both vaccines are fully covered financially by the

Introduction

Papillomaviruses are DNA viruses and 150 distinct genotypes of them have been isolated from humans¹. Human papilloma viruses (HPV) infect solely the skin and mucosal surfaces; mucosotropic HPV can be further subdivided into high- and low-risk types depending upon their

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national authorities and are offered for females 11-18 years old with “catch-up” vaccination for females 18-26 years old^{12,13}. However, a number of Greek studies have revealed low vaccination rates among young females¹⁴⁻¹⁶.

The primary aim of this study was to assess HPV vaccination coverage rates among female students from health and non-health sciences in a Greek city. A secondary aim was to evaluate their level of knowledge regarding cervical cancer, HPV and Papanicolaou test (Pap test).

Patients and Methods

This was a cross-sectional study conducted at the Technological Educational Institute (TEI) of Patras, Greece, during March 2013. We used the convenience sampling method to perform our study, and our research tool was a self-completed questionnaire. The inclusion criteria for the study were female sex and age over 18 years old.

A novel questionnaire was developed by the research team after thorough review of the literature. This closed-type questionnaire consisted of 18 items, divided into four groups. The first group (items Q1-Q4) included questions regarding participants' knowledge about cervical cancer. The second group (items Q5-Q10) consisted of questions concerning participants' knowledge about HPV, while the third (items Q11-Q15) about Papanicolaou test (Pap test). The final group (Q16-Q18) included questions regarding some aspects of HPV vaccination and the participants' vaccination status. The majority of the questions required a single answer, while a few questions potentially multiple answers. Demographic data (i.e. age, school, study year, and mother's profession and educational level) were also recorded.

At first a pilot study was conducted. Fifteen female students completed the questionnaire and their comments were used from the research team to correct or rephrase ambiguities and difficult questions. After that step, the questionnaire was distributed by the research team to every eligible student attending the university secretary office for registration to the spring semester. The students were properly informed about the purposes of the study and that their data would remain anonymous and confidential. The study was conducted during the month that was the official registration period for all students. The protocol of the study was approved by the Scientific Committee of the TEI of Patras.

Statistical Analysis

Apart from descriptive statistics for each variable, scores were calculated for three different knowledge categories: cervical cancer, HPV and Pap test. The mean score of these three categories was the total knowledge score. Scores were adjusted to a scale from 0 to 100%. Questions with a single choice answered correctly were scored as 1 (100%). Multiple choice questions were scored from 0 to 100% with false answers receiving negative scoring. The correlation of the total score and the category scores with the independent variables, i.e. age, year of studies, academic department, the occupation of mother and educational level of mother, was assessed with ordinal logistic regression and multinomial logistic regression respectively. All the statistical analyses were performed with SPSS 20.0 (SPSS Inc., Chicago, IL, USA). $p < 0.05$ was considered statistically significant

Results

Five hundred female students completed the questionnaire and their demographic characteristics are shown in Table I. The frequencies of the students' answers regarding their knowledge of cervical cancer, HPV and Pap test are shown in Table II. The proportion of the participants presenting a high level of knowledge (score > 50%) of cervical cancer, HPV and Pap test was 81.2%, 38% and 68.8% respectively. Concerning the total knowledge level, 32.2% of the students scored low (0-52%), 35.4% medium (52.1%-66%) and 31.7% high (> 66%), respectively.

Table I. Profile of the study participants (n = 500).

	Mean ($\pm$ SD)
Age	21.1 $\pm$ 2.06
Year of studies	2.24 $\pm$ 1.06
	n (%)
Academic department	
Related to health sciences	276 (55.2)
Not related to health sciences	224 (44.8)
Occupation of mother	
Working	241 (48.2)
Household	259 (51.8)
Educational level of mother	
Primary education	133 (26.6)
Secondary education	252 (50.4)
University education	115 (23.0)

Table II. Frequencies of answers concerning the knowledge of cervical cancer, HPV and test Papanicolaou (selected questions).

	Yes n (%)	No n (%)	Don't know n (%)
Q1. Do you believe that cervical cancer occurs randomly?	33 (6.6)	400 (80.0)	67 (13.4)
Q2. Do you believe that cervical cancer can be prevented?	447 (89.4)	17 (3.4)	36 (7.1)
Q3. Do you believe that cervical cancer treatment is worse than the disease itself?	56 (11.2)	234 (46.8)	210 (41.6)
Q5. Is HPV related to cervical cancer?	241 (48.2)	68 (13.6)	191 (38.2)
Q15. Is test Pap required after hysterectomy?	187 (37.4)	85 (17.0)	228 (45.6)
Q16. Is test Pap required after HPV vaccination?	402 (80.4)	21 (4.2)	77 (15.4)
n (%)			
Q6. HPV is			
A bacterium		25 (5.0)	
A virus		317 (62.8)	
A kind of cervical cancer		63 (12.5)	
None of the above		6 (1.2)	
Don't know		89 (17.8)	
Q7. HPV is transmitted:			
During the sexual intercourse		351 (70.2)	
By non-sterilized dental tools		25 (5.0)	
By using a non-sterile syringe		43 (8.6)	
By droplets		10 (2.0)	
During natural birth from mother to child		41 (8.2)	
Don't know		122 (24.4)	
Q.9 Women with HPV infection: ¹			
Are always symptomatic		60 (12.0)	
Are not symptomatic		21 (4.2)	
Are sometimes symptomatic		249 (49.8)	
Don't know		169 (33.8)	
Q10. HPV preventive measures are:			
Periodical screening with test Pap		302 (60.4)	
Vaccination		156 (31.2)	
Use of contraceptive pills		13 (2.6)	
Use of condoms from the start			
Of the sexual intercourse		210 (42.0)	
Use of condoms as a contraceptive method		57 (11.4)	
Don't know		65 (13.0)	
Q11. How can HPV infection be diagnosed:			
Vaginal fluid culture		190 (38.0)	
HPV DNA typing		159 (31.8)	
Routine gynecological examination		93 (18.6)	
Only with biopsies		38 (7.6)	
Special blood tests		90 (18.0)	
Don't know		83 (16.6)	
Q12. Test Papanicolaou:			
Detects sexually transmitted diseases		216 (43.2)	
Is used for prevention of cervical cancer		178 (35.6)	
Is a blood test to detect cancer		14 (2.8)	
Is a needle biopsy from the cervix		118 (23.6)	
Don't know		18 (3.6)	
Q13. At what age should a woman start test Pap examinations?			
At the age of 18		61 (12.2)	
At the age of 21		21 (4.2)	
After initiation of sexual intercourses		412 (82.4)	
Don't know		6 (1.2)	
Q14. At what age can test Pap present with abnormal findings?			
18-25		47 (9.4)	
26-35		32 (6.4)	
36-50		31 (6.2)	
50+		11 (2.2)	
At every age		314 (62.8)	
Don't know		65 (13.0)	

¹Missing: 1 (0.2%).

Only 33.2% of the participated students reported being very worried about cervical cancer. The majority (59.8%) has never had a Pap test, while only 13.4% mentioned an annual Pap test. Interestingly even though 59.8% believed that the vaccination against HPV should be mandatory, the vast majority (70.4%) has not been vaccinated against HPV.

The results of the analysis of the factors influencing the level of the students' knowledge are shown in Table III, while which factors influence their attitudes and preventive strategies are shown in Table IV. In general, senior students (OR, 1.30; 95% CI, 1.08-1.55), students of the health sciences (OR, 2.08; 95% CI, 1.48-2.93), and students with a working mother (OR, 1.76; 95% CI, 1.23-2.51), had more often a higher total level of knowledge (Table III). Additionally, senior students (OR, 0.71; 95% CI, 0.56-0.90) and students of the health sciences (OR, 0.64; 95% CI, 0.41-0.99) stated less often being not at all, slightly or somewhat worried about cervical cancer (Table IV). Students that achieved low (OR, 0.35; 95% CI, 0.2-0.63) and moderate (OR, 0.49; 95% CI, 0.30-0.82) total knowledge scores were less likely to be vaccinated against HPV (Table IV).

Discussion

This study revealed a worryingly low vaccination coverage rate against HPV and low total levels of knowledge about cervical cancer, HPV and

Pap test among female students of the TEI of Patras. Even though the majority of the participants suggested that the vaccine against HPV should be mandatory, yet only three out of ten had been vaccinated. Previous studies concerning Greek university students have reported relatively wide fluctuating vaccination coverage rates from 10.47% to 44.3%, while concerning the general public a respective rate of 11% has been reported¹⁴⁻¹⁷. Across European countries the coverage rates range between 30% and 80%¹². Specifically among college students, vaccination coverage rates range between 12% in the UK to 67% in Germany^{18,19}.

Furthermore, it is disturbing the fact that only a small proportion of the participants stated being worried about cervical cancer. In the present study senior students as well as students of the health sciences were more worried about cervical cancer. It seems plausible that the stimuli acquired with age as well as by pursuing a degree in health sciences play an important role in the observed difference. The majority of the participants had never had a Pap test. Only one out of ten students had a Pap test annually, which represents a lower proportion than the 36.2% reported in a relevant study which enrolled Greek university students²⁰. Nevertheless, the female students' adherence to cervical cancer screening remains suboptimal, while lacking of appreciation of the importance of the screening, embarrassment, fear and high cost have been reported as reasons for the noncompliance²⁰.

Table III. Analysis of factors influencing knowledge scores.

	Knowledge on			Total knowledge score OR (95% CI) ²
	Cervical cancer OR (95% CI) ¹	HPV OR (95% CI) ¹	Pap test OR (95% CI) ¹	
Age	1.04 (0.92-1.17)	1.04 (0.93-1.16)	1.00 (0.90-1.11)	1.00 (0.91-1.09)
Year of studies	0.73 (0.57-0.95)	0.89 (0.72-1.09)	0.77 (0.62-0.95)	1.30 (1.08-1.55)
Academic department				
Related to health sciences	0.53 (0.33-0.84)	0.52 (0.35-0.76)	0.58 (0.39-0.87)	2.08 (1.48-2.93)
Not related to health sciences	1.0 (...)	1.0 (...)	1.0 (...)	1.0 (...)
Occupation of mother				
Working	0.62 (0.37-1.02)	0.73 (0.49-1.09)	0.77 (0.51-1.18)	1.76 (1.23-2.51)
Household	1.0 (...)	1.0 (...)	1.0 (...)	1.0 (...)
Educational level of mother				
Primary education	1.32 (0.64-2.71)	2.16 (1.23-3.80)	0.95 (0.52-1.72)	0.76 (0.46-1.25)
Secondary education	1.08 (0.56-2.06)	1.72 (1.06-2.79)	1.08 (0.65-1.83)	0.87 (0.56-1.35)
University education	1.0 (...)	1.0 (...)	1.0 (...)	1.0 (...)

¹Multinomial logistic regression, reference category: high score (> 50%); ²Ordinal logistic regressions, reference category: The closer lower score category. Odds ratios reaching statistical significance are in bold.

Table IV. Analysis of factors influencing attitudes and preventive strategies.

	How worrying is cervical cancer ¹		Are you examined with test Pap ²		HPV vaccination should be		Have you been vaccinated against HPV?	
	Low worry High worry OR (95% CI) ³	Reference category: High worry OR (95% CI) ³	Never Yes OR (95% CI) ³	Reference category: Never Yes OR (95% CI) ³	Mandatory Optional OR (95% CI) ³	Reference category: Mandatory Optional OR (95% CI) ³	I don't know Optional OR (95% CI) ³	Reference category: I don't know Optional OR (95% CI) ³
Age	1.11 (0.99-1.23)	0.95 (0.86-1.05)	0.95 (0.86-1.05)	Reference category: Never Yes OR (95% CI) ³	1.02 (0.90-1.16)	1.18 (1.02-1.37)	1.12 (0.94-1.32)	Reference category: Never Yes OR (95% CI) ³
Year of studies	0.71 (0.56-0.90)	1.00 (0.82-1.22)	1.00 (0.82-1.22)	Reference category: Never Yes OR (95% CI) ³	1.06 (0.84-1.34)	1.23 (0.90-1.68)	0.45 (0.28-0.73)	Reference category: Never Yes OR (95% CI) ³
Academic department	0.64 (0.41-0.99)	1.05 (0.72-1.53)	1.05 (0.72-1.53)	Reference category: Never Yes OR (95% CI) ³	1.10 (0.71-1.69)	1.09 (0.59-2.02)	0.45 (0.20-1.00)	Reference category: Never Yes OR (95% CI) ³
Related to health sciences	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³
Not related to health sciences	1.09 (0.68-1.73)	0.78 (0.52-1.16)	0.78 (0.52-1.16)	Reference category: Never Yes OR (95% CI) ³	0.82 (0.52-1.30)	1.15 (0.60-2.21)	1.01 (0.45-2.26)	Reference category: Never Yes OR (95% CI) ³
Occupation of mother	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³
Working	1.02 (0.54-1.91)	1.13 (0.66-1.96)	1.13 (0.66-1.96)	Reference category: Never Yes OR (95% CI) ³	1.18 (0.64-2.18)	1.13 (0.46-2.78)	0.72 (0.20-2.60)	Reference category: Never Yes OR (95% CI) ³
Household	0.71 (0.40-1.24)	1.27 (0.79-2.04)	1.27 (0.79-2.04)	Reference category: Never Yes OR (95% CI) ³	1.48 (0.86-2.55)	1.60 (0.73-3.50)	1.77 (0.63-4.98)	Reference category: Never Yes OR (95% CI) ³
Educational level of mother	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³
Primary education	2.17 (1.28-3.70)	0.73 (0.46-1.17)	0.73 (0.46-1.17)	Reference category: Never Yes OR (95% CI) ³	0.81 (0.48-1.38)	1.40 (0.63-3.08)	0.35 (0.2-0.63)	Reference category: Never Yes OR (95% CI) ³
Secondary education	0.89 (0.51-1.55)	0.99 (0.63-1.54)	0.99 (0.63-1.54)	Reference category: Never Yes OR (95% CI) ³	1.19 (0.71-1.98)	1.72 (0.81-3.66)	0.49 (0.30-0.82)	Reference category: Never Yes OR (95% CI) ³
University education	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³	1.0 (...)	1.0 (...)	1.0 (...)	Reference category: Never Yes OR (95% CI) ³
Knowledge score				Reference category: Never Yes OR (95% CI) ³				Reference category: Never Yes OR (95% CI) ³
Low (0-52%)				Reference category: Never Yes OR (95% CI) ³				Reference category: Never Yes OR (95% CI) ³
Moderate (52.1-66%)				Reference category: Never Yes OR (95% CI) ³				Reference category: Never Yes OR (95% CI) ³
High (> 66%)				Reference category: Never Yes OR (95% CI) ³				Reference category: Never Yes OR (95% CI) ³

¹Categorization into two categories: low worry (not at all, slightly, somewhat) and high worry (fairly, very); reference category: High worry; ²Categorization into two categories: yes (every year, less than every year) and never; reference category: Yes; ³Multinomial logistic regression.

Another disturbing finding was the fact that less than half of the participants stated that HPV is related to cervical cancer. This in accordance with previous studies concerning not only Greek students, but also women of all ages approached in public areas^{16,21}. On the contrary, in a study conducted among midwives and midwifery students, the respective proportion was high for the midwives (78.5%), yet relatively low for the students (48.3%)²².

However, in general, our findings suggest that the majority of the participants were above the cut-off point concerning the levels of knowledge of cervical cancer and Pap test, but not of HPV. Students of health sciences had higher knowledge scores in all three aforementioned categories, while senior students had higher knowledge scores of cervical cancer and Pap test. Positive predictors of achieving high total knowledge scores were: a) being senior student, b) studying health sciences and c) having a working mother. To the best of our knowledge, there are not other studies in Greece examining simultaneously students' knowledge of cervical cancer, HPV and Pap test. Nevertheless, studies^{18,23} examining the levels of USA or Turkish students' knowledge of HPV have also revealed low knowledge scores.

One of the main reasons reported for not being vaccinated against HPV is the fear of side-effects¹⁴. In a study²⁴ among ethnically different students, intention to receive an HPV vaccine was associated with knowledge of HPV and genital warts and knowledge of cervical screening and cervical cancer risk factors. As positive predictors of vaccine uptake, among others, have been reported the younger age, the higher educational level (own and parents), the previous visit(s) to the gynaecologist, the easy access to Health Care Services, as well as the higher levels of knowledge of HPV vaccine^{15,21}. Interestingly in the present study the vaccine uptake was not associated with age, academic department or other examined predictors, but only with the total level of students' knowledge of cervical cancer, HPV and Pap test. It has been suggested that the individuals who are vaccinated engage in more preventive behaviours, receive more information from health providers, and as a result, have higher levels of knowledge about health²¹. Therefore, it seems of vital importance to target our efforts in increasing the females' knowledge on every aspect of the HPV infection.

A recent study¹⁴ showed that students who had received information about HPV vaccine

safety from the mass media had lower vaccination coverage, while those who had received information from the Hellenic Centre for Diseases Control and Prevention had increased vaccination coverage rates against HPV. Furthermore, it has been reported²⁵ that non-vaccinated women were less likely to have heard of the vaccine through a healthcare provider. Low vaccination coverage rates represent an important public health issue which lies beyond the borders of a single country. Coordinated actions are needed and educational programs should be implemented in order to increase the vaccine acceptance. It is undoubtable that the healthcare providers along with official web sites are the most trusted information sources on health issues. Moreover, the development of policies, services, and programs that address the needs of young people are essential, particularly the youth-friendly approach to service delivery²⁶. The success of HPV vaccination programs seems to be dependent on physicians' knowledge, willingness and ability to communicate the critical need of vaccination and recommend HPV vaccines to their patients²⁷.

There are several limitations of this study. First of all, we did not include questions in the study's questionnaire concerning the sexual activity of the students. Secondly, we used a convenience sample of female Greek students in Patras, Greece; hence the conclusions are not generalizable. Finally, all the data are self-reported, thus there is no way of determining their credibility.

Conclusions

The present study showed low vaccination coverage rates among female Greek students and a gap in their total knowledge of cervical cancer, HPV and Pap test which was associated with the low vaccination uptake. It seems plausible that the educational programs and the information provided to the public, in general, must cover the entire spectrum of HPV infection; namely HPV virus, natural history of HPV infection, cervical cancer and primary and secondary prevention of cervical cancer. It is of great importance to engage healthcare providers and national authorities towards implementing effectively educational programs by rendering them into strategic plans with continuous evaluation of their progress and success.

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Conflict of Interest

The Authors declare that there are no conflicts of interest.

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