

Determination of The Level of Knowledge About Hpv Among Adolescents and Improvement of Vaccinationapproval Through Health Education In The Area of Trikala, Central Greece

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Abstract

Background: The aim of this study is to assess the importance of the role of the Health Education among young adolescents, regarding the level of knowledge about the HPV and the acceptance of the HPV vaccination, in order to increase the vaccination coverage, both in young adolescents and young teenagers in the area of Trikala, in Central Greece.

Methods: The methodological tools of the study were questionnaires. The completion of the questionnaires was gained after the informed and written consent of the parents – guardians. Ethical approval was obtained of the Ministry of Education, Research and Religions. Students of the 1st Gymnasium, randomly chosen by drawing among all school groups of the area. In the first phase of the study, the questionnaires were completed by the entire study population. During the second and third phases, the completion of the questionnaires concerned the population under study, immediately after the interactive seminar and three months later, respectively. The IBM SPSS 20.0 statistical program was used for analyzing the data and extracting the results.

Results: A total of 434 female students, who met the criteria for participation in the study, completed the questionnaire (response rate 76.26%). Most participants (66.6%) were girls. From the final analysis of the results we observed a rapid change in the level of awareness about the HPV virus, between the three phases of the study. The percentage of the participants who stated that they "do not know" what HPV is, decreased from 44.4%, before the informative interactive intervention in students (first phase), to 1.6% and 8.1% immediately after the intervention (second phase) and 3 months later (third phase), respectively. Similarly, the willingness of young students to be vaccinated against the HPV was increased from 71% during the first phase of the study, to 89.1% and 83.5% after the second and third phases, respectively.

Conclusion: Young teens are poorly informed about the HPV and HPV vaccination. However, with the use of targeted interactive informational interventions in the school environment, a statistically significant increase in both the level of knowledge about the HPV and the infection caused by it, is recorded, as well as in the willingness of young adolescent students to be vaccinated against the cervical cancer.

Background

The Human Papillomavirus (HPV) is currently the leading cause of cervical cancer. Intraepithelial cervical lesions and cervical carcinomas which are associated with persistent infection from high – risk HPV genotypes, are considered to be responsible for more than 99% of cervical cancers [1]. It is currently estimated that about 529.800 new cases of cervical cancer are diagnosed annually, with a mortality rate of about 50% [2, 3]. Cervical cancer is the fourth most common type of cancer among women worldwide. The greatest incidence concerns the less developed countries, where the lack of resources and infrastructure is estimated to significantly oppose the establishment and implementation of preventive programs [4].

The indisputable finding of a causal link between the HPV and cervical cancer has led the scientific community to the decision to create HPV vaccines, the availability of which has completely changed the scientific data on the primary prevention of cervical cancer. In 2006, the quadrivalent vaccine (Gardasil®) was first released, and a year later the bivalent one (Cervarix®) was approved for circulation. Most recently in 2014, the nine-valent vaccine against HPV (Gardasil 9®) was released. Given the proven effectiveness, cost – effectiveness ratio and safety of the HPV vaccines nowadays, the global vaccination of young adolescents against HPV and cervical cancer should be a public health priority [5, 6].

In Europe, the HPV vaccination program has been adopted by the majority of the Member States of the European Union [7]. In 2010 it was estimated that the vaccination coverage of the population, ranged between 17% and 81%. Specifically, in France, Luxembourg and Norway the vaccination coverage rate was between 17% and 30%, in Denmark and Italy it ranged from 56–58%, while in Portugal and the United Kingdom it was between 80% and 81% [8]. Based on the latest data, it is estimated that in France nowadays, the vaccination coverage of the 16years-old adolescents still remains low (19%). In the United Kingdom and Spain it is estimated to be over 80%, while in the United States and Germany the rates are lower, ranging between 40% and 50% [9]. The vaccination coverage of Greek adolescents during the period 2008–2014 was only 8.9%, increasing from 3.2% in 2008 to 17.1% in 2011. However, it was decreased to 2.1% in 2012, reaching 9.2% and 11.5% in 2013 and 2014 respectively [10].

According to the World Health Organization [11] declaration and the outcomes of numerous research studies, the target population of the HPV vaccination should be the young adolescent students, in Primary and Secondary Education [12, 13, 14].

The aim of this study is to investigate whether the role of the Health Education could possibly enhance the awareness among young adolescents regarding the HPV, as well as in the acceptance of the HPV vaccination. The scope in the end of this study is to increase the vaccination coverage in both young adolescents and young teenagers.

Methods

Study Sample

The study involved first - grade Gymnasium students, who lived in the city, towns and villages in the Prefecture of Trikala, in Central Greece. The basic condition for their participation was that the participants should be students of the 1st Grade. The Ethical approval to conduct this research was obtained after the submission and approval of the protocol from the Institute of Educational Policy of the Ministry of Education, Research and Religions (Ministerial Decision No. 219048/Δ2/19–12 – 2018). As a part of the ethical approval for the participation of the students in the research study, was the written and signed consent of their parents and/or guardians, after being adequately informed. The anonymity and confidentiality of participants data throughout the research process, was ensured from the study

protocol. The study included students from seven school complexes in the Prefecture of Trikala, distributed as follows: four schools selected from the city of Trikala (urban school complexes), two schools from the province of Kalambaka in the Prefecture of Trikala (rural school complexes) and the only private school existing in the prefecture. Out of 573 questionnaires given to students, 136 returned uncompleted (76.26% response rate). The largest response was observed in the Private High School (95%), while the 4th Gymnasium of Trikala and the 1st Gymnasium of Kalampaka were those with the lowest participation rates, 68.1% and 68.1%, respectively (Table 1).

Table 1
Response rate of the students of the 1st Grade of the school groups that were included in the study.

School Unit	Study Population	Specimen	Percentage
1° Gymnasium of Trikala	Intervention group	95/119	79.8%
4° Gymnasium of Trikala	Control group	62/91	68.1%
3° Gymnasium of Trikala	Intervention group	80/98	81.6%
9° Gymnasium of Trikala	Control group	47/ 65	72.3%
1° Gymnasium of Kalampaka	Intervention group	45/66	68.1%
2° Gymnasium of Kalampaka	Control group	51/74	68.9%
Private Gymnasium	Intervention and Control group	57/60	95%

The four urban school complexes were categorized into two groups (2 schools in each group): one school was the interventional sample of the studied population and the other, in the same area of the city, was the control one (not the interventional sample of the studied population). Concerning the urban school group, the first – grade students of the 1st and 3rd Gymnasium of Trikala, constituted the studied interventional population. The 4th and the 9th Gymnasium of Trikala were the control sample of the studied population. The selection of the school complexes that constituted the studied interventional population was made randomly by drawing lots. Similarly, in the rural school group of the province of Kalambaka, the 1st Gymnasium of Kalampaka was the sample of intervention and the 2nd Gymnasium of Kalampaka was the sample of control of the studied population. Regarding, the Private Gymnasium, half of the 1st Grade students constituted the interventional sample and the other half were the non-interventional one (control sample) of the studied population (Table 2).

Table 2

Categorization of school complexes that included in the study and actions throughout the research process.

Phases	School Unit	Study Population	Actions
Phase I	1 ^o Gymnasium of Trikala	Intervention group	Completion of a questionnaire
	4 ^o Gymnasium of Trikala	Control group	Completion of a questionnaire
	3 ^o Gymnasium of Trikala	Intervention group	Completion of a questionnaire
	9 ^o Gymnasium of Trikala	Control group	Completion of a questionnaire
	1 ^o Gymnasium of Kalampaka	Intervention group	Completion of a questionnaire
	2 ^o Gymnasium of Kalampaka	Control group	Completion of a questionnaire
	Private Gymnasium	Intervention and Control group	Completion of a questionnaire
Phase II	1 ^o Gymnasium of Trikala	Intervention group	Seminar & completion of the same questionnaire
	3 ^o Gymnasium of Trikala	Intervention group	Seminar & completion of the same questionnaire
	1 ^o Gymnasium of Kalampaka	Intervention group	Seminar & completion of the same questionnaire
	Private Gymnasium	Intervention group	Seminar & completion of the same questionnaire
Phase III	1 ^o Gymnasium of Trikala	Intervention group	Completion of the same questionnaire
	3 ^o Gymnasium of Trikala	Intervention group	Completion of the same questionnaire
	1 ^o Gymnasium of Kalampaka	Intervention group	Completion of the same questionnaire
	Private Gymnasium	Intervention group	Completion of the same questionnaire

Questionnaire of the Study

The methodological tool of the study was a questionnaire. The questionnaire was chosen after a systematic bibliographic review of studies, with a similar research question. The questionnaire has been

previously published and the license to use it was obtained after contacting the editorial team [15]. The editorial team approved the use of the English – language questionnaire. Subsequently, it was translated into Greek by two researchers, with an excellent knowledge of the English language and relevant knowledge of HPV vaccines and health education. Adopting the questionnaire in Greek Health Educational System some questions were removed while others were added. In order to test the clarity of the questions, a preliminary survey was initially conducted, based on the results of which the validity was fully checked and then the questionnaire received its final form.

Criteria for selecting the questionnaire of the study were the limited possible number of questions and the focus on topics related to the HPV, HPV vaccination and cervical cancer. Its final form consisted of 52 closed – ended questions, which were divided into four main sections. In the first and second sections were included school data and student demographics, respectively. The third section included students' knowledge, attitude, and behavior toward HPV infection and the awareness of the relationship between the virus and cervical cancer. The fourth section included students' knowledge, attitude, and behavior toward HPV vaccination and cervical cancer. The data collected from the questionnaire were anonymized. No personal data was collected.

Study Schedule

The survey was conducted during the academic year 2018–2019. The time period for the study was from January 2019 to May of the same year. The completion of the questionnaires and the informational lectures to the students, were taking place during the working days and hours. The duration of the students' briefing did not exceed forty – five minutes – that is of, – one teaching hour. The research was divided into three phases (Table 2). During the first phase, the questionnaire was completed by the entire study population (intervention group and control group). Two weeks later (second phase), the information of the students included in the studied interventional population have been taken place, concerning the HPV and the value of the vaccination against it. The informational lectures that took place in the school amphitheater included the electronic presentation of the knowledge about the HPV, the HPV vaccination and their importance nowadays. The completion of the questionnaire by the students who constituted the studied interventional population, took place at the end of the seminar. Three months after the end of the seminars, the study was accomplished with the completion of the questionnaire, for the third time (third phase), by the students of the interventional group.

Data collection

The collection of the questionnaires, as well as the informative sessions, have been carried out by the author of the study. Principal of the schools gave permission to offer the seminar without compromising the operation of the school curriculum. The data collection was performed in conjunction with the method of recording information by the participants. Prior to the completion of the questionnaire, the written consent of the parents and guardians was obtained, after explaining the purpose and process of the research study, which allowed the voluntary participation of young students in the research.

Data Statistics

The IBM SPSS (Statistical Package for the Social Sciences) 20.0 statistical program, acquired by IBM, was used to analyze the sample data. Using the descriptive methods, we analyzed the sample by taking measurements of the frequency of responses to all questions. Through this process we received information about demographic characteristics, awareness about the HPV and its vaccination, as well as the willingness or unwillingness of participants to be vaccinated against the HPV.

Pearson X^2 statistical test, evaluated the possible dependence between questionnaire variables and students' knowledge status and behavior towards the HPV. The results between the three phases of the study were compared, both with the analysis of the tables obtained from the extraction of descriptive measures, and with the use of the statistical Paired t - test for dependent samples, in the 95% confidence interval. Through these we received the necessary information to enhance students' awareness and behavior about the HPV and the vaccination against cervical cancer. Statistically significant was considered the sample with p - value = 0.005.

Results

General characteristics

A number of 434 students who met the criteria for participation in the study, filled the questionnaire, 289 (66.6%) of which were girls and 145 (33.4%) were boys. The vast majority of participants (95.6%) were of Greek nationality. 3% were Albanian, while only 1.4% of the participants were of another nationality. Similarly, almost all of the participants (97.2%) were Orthodox Christians, 0.9% were Catholics, while 1.8% were of another religion. Of the 434 students surveyed, regarding their place of residence, 181 (41.7%) were living in a large city, 185 (42.6%) in a small town and the remaining 68 (15.7%) had a permanent residence in a village. Regarding the marital status of the parents of the participants, the vast majority of the sample (94.9%) indicated that their parents were married. 12.2% of the sample had a low monthly family income, while 64.7% of the participants stated that the monthly family income was medium and the remaining 90 (22.8%) responded that the monthly family income was high. Overall, the general demographic characteristics of the study population are summarized in Table 3.

Table 3
 General characteristics of the sample under study (n = 434). All variables are presented as absolute values and percentages

Demographic characteristics	Total Sample (n = 434)	Percentage (%)
Gender	145	33.4%
Male	289	66.6%
Female		
Place of residence	181	41.7%
Big City	185	42.6%
Small Town	68	15.7%
Village		
Nationality	415	95.6%
Greek	13	3%
Albanian	4	1.4%
Other		
Religion	422	97.2%
Christian Orthodox	4	0.9%
Catholic	8	1.8%
Other		
Parental Marital Status	412	94.9%
Married	22	5.1%
Divorced		
Monthly Family Income	90	22.8%
High	292	64.7%
Medium	52	12.2%
Low		
Annual Family Income	99	22.8%
High	282	64.9%
Medium	53	12.2%
Low		

In the main part of our research study we analyzed the data only from the students of the schools in which the informative actions took place - intervention schools (n = 248). In the studied interventional population, a number of two informative seminars have been carried out, which followed the first grant of the questionnaire. In this process, we tried to assess whether Health Education through informative interactive intervention in the school community, influenced the young adolescent students' knowledge about the HPV and their views on whether or not they were willing to accept a vaccination against the cervical cancer.

Knowledge about HPV

The analysis of the data revealed that no statistically significant difference was observed in the level of knowledge about the HPV, based on the sex of the participants ("I Don't Know" - Male 40.7%, Female 46.5%, $p = 0.466$). On the other hand, a statistically significant difference was observed between the levels of students' annual family income ("I Don't Know" - High 18.6%, Medium 40.4%, Low 93%, $p = 0.00$), their nationality ("I Don't Know" - Greek 43.3%, Albanian 0%, Another 100%, $p = 0.00$) and the different residential areas of the participants ("I Don't Know" - Big City 48.5%, Small Town 16.9%, Village 84.6%, $p = 0.00$). Typically, students who stated that they come from high-income families, have higher rates of knowledge about the HPV. Similarly, increased levels of knowledge about the virus were noticed among participants of Greek origin, compared to Albanians or other nationalities, as well as in those living in urban centers compared to those living in villages (Table 4).

Table 4
Level of knowledge about HPV according to the demographic characteristics of the sample (n = 248).

Demographic characteristics	Level of Knowledge about HPV		
	n (%)	"I do not know" n (%)	χ^2 test
Total	248		
Gender	91 (36.7%)	37 (40.7%)	p = 0.466
Male	157 (63.3%)	73 (46.5%)	
Female			
Annual Income	59 (23.8%)	11 (18.6%)	p = 0.00
High	146 (58.9%)	59 (40.4%)	
Medium	43 (17.3%)	40 (93%)	
Low			
Nationality	240 (96.8%)	104 (43.3%)	p = 0.00
Greek	2 (0.8%)	0 (0.00%)	
Albanian	6 (2.4%)	6 (100%)	
Other			
Place of Residence	132 (53.2%)	64 (48.5%)	p = 0.00
Big City	77 (31.0%)	13 (16.9%)	
Small Town	39 (15.7%)	33 (84.6%)	
Village			

Willingness for HPV vaccination

Analysis of the data of our research (Table 5) showed that there is a statistically significant difference in the rates of vaccination willingness against HPV, based on gender ("Willing" - Male 62.6%, Female 75.8%, p = 0.028), the annual family income ("Willing" - High 78%, Medium 82.2%, Low 23.3%, p = 0.00) and the place of residence ("Willing" - Big City 76.5%, Small Town 80.5%, Village 33.3%, p = 0.00). It is worth noting that a much higher rate of willingness to vaccinate was observed among girls than boys. At the same time, students who stated that they come from high – income families, are more likely to be vaccinated, as well as students living in – urban areas, where the rate is statistically significantly higher compared to the ones coming from rural areas. No statistically significant difference was observed in the willingness rates for vaccination based on the nationality of the participants ("Willing" - Greek 70.4%, Albanian 50%, Another 100%, p = 0.233).

Table 5
Willingness for HPV vaccination according the demographic characteristics of the sample (n = 248).

Demographic characteristics	Willingness for HPV Vaccination		
	n (%)	"Willing"n (%)	χ^2 test
Total	248		
Gender	91 (36.7%)	57 (62.6%)	p = 0.028
Male	157 (63.3%)	119 (75.8%)	
Female			
Annual Income	59 (23.8%)	46 (78.0%)	p = 0.00
High	146 (58.9%)	120 (82.2%)	
Medium	43 (17.3%)	10 (23.3%)	
Low			
Nationality	240 (96.8%)	169 (70.4%)	p = 0.233
Greek	2 (0.8%)	1 (50.0%)	
Albanian	6 (2.4%)	6 (100%)	
Other			
Place of Residence	132 (53.2%)	101 (76.5%)	p = 0.00
Big City	77 (31.0%)	62 (80.5%)	
Small Town	39 (15.7%)	13 (33.3%)	
Village			
GRAPHS			

Differentiation of the level of awareness about HPV and the attitude towards vaccination (willingness or unwillingness)

According the final analysis of the results it is observed a rapid change regarding the level of knowledge about the HPV between the three phases of the study:

Phase 1: The percentage of participants who stated that "I don't know" what HPV is, was 44.4% (n = 110), while 52.4% of young adolescent students (n = 130) replied that it was a virus. In addition, 38.3% (n = 95) answered that sexual intercourse is the most common mode of transmission.

Phase 2: After the intervention, participants who stated "I don't know" what HPV is, decreased to 1.6% (n = 4), while 95.6% (n = 237) of those responded it was a virus. At the same time, 95.6% (n = 237) of the

participants answered that sexual intercourse is the most common mode of transmission.

Phase 3: Three months after the intervention, participants who replied "I don't know" what HPV is, had a percentage of 8.1% (n = 20), while 88.3% (n = 219) stated that it is a virus. Furthermore, 86.3% (n = 214) of the participants indicated that the most common way of viral transmission, is the sexual intercourse (Graph 1 and Graph 2).

Moreover, a change in the responses of the studied population was noticed, regarding the willingness for HPV vaccination among young adolescent students (Fig. 3), although this rate was quite high during the first phase of the study. Specifically, in phase 1, willing to be vaccinated was the 71% (n = 176) of the sample, in phase 2 (immediately after the informative intervention) this percentage was risen to 89.1% (n = 221) and finally, in phase 3 (three months after the informative intervention) the willingness rate for HPV vaccination was 83.5% (n = 207).

Discussion

In our study, we recorded young adolescents' level of awareness on HPV and its vaccination, was a cornerstone for the organization, modernization and implementation of primary preventive programs, including the vaccination against cervical cancer. The vaccination against the HPV may be proven to be the best strategic option, the above reduces the risk of developing the disease in the long run, and in long term the cost effectiveness to the country's health system. In fact, vaccinating girls at a young age, before the initiation of sexual activity, is preferred nowadays mainly for 2 reasons: First of all, at that time the young body has not yet been exposed to the virus and secondly, the immune response with antibody production is much greater at younger ages [16].

Sex

According the analysis of the data of the present study, it is indicated that the level of knowledge about the HPV and the vaccination against cervical cancer, is not statistically significant between the two genders. The hypothesis that girls are more aware on this issue than boys, is confirmed in most research studies. Durosoy et al attributed the fact that the majority of participants who were informed about the effects of HPV were women, to that the awareness campaigns were aimed mainly to girls and women and less to men and boys [17]. Similarly, Gerend and Magloire noticed that female students reported higher awareness and knowledge level about the HPV and its related diseases, than their classmates [18].

Furthermore, in a recent study, Tung and his colleagues revealed that female students had a higher level of knowledge and a more positive attitude towards the HPV, than male participants [19]. Similarly, Patel and his colleagues indicated that young adolescent women were more aware of the HPV and HPV vaccination than men. This finding probably reflects the fact that HPV is mainly considered a women's health issue and that most countries currently recommend the HPV vaccination only for women [14]. However, studies have shown that homosexual male adolescents have a higher level of knowledge about

the HPV and the effects of HPV infection than the heterosexual ones, mainly attributed to the fact that the virus is also associated with the development of anal cancer [20, 21].

Regarding the vaccination against the HPV, it is noticed that girls demonstrate a higher willingness on this matter than males. The above result is confirmed by many studies from the international literature. In 2015, Khurana and his colleagues indicated that the acceptance of cervical cancer vaccination among unvaccinated adolescent men, was much lower than in girls, emphasizing the importance of education in increasing the vaccination coverage among the male population [22]. Moreover, in a recently published systematic review, the increased acceptance of the HPV vaccines was mainly attributed to the greater willingness for vaccination against cervical cancer, by young adolescent women [23].

Place of residence

The present study revealed that the residence area of young adolescent students is strongly related to the level of knowledge about the HPV and their willingness to be vaccinated against cervical cancer. It is concluded that students living in urban centers, are more aware of the HPV and HPV vaccination than students living in rural areas. Students residing in a village tend to be unwilling to be vaccinated against cervical cancer.

The majority of scientific studies that have investigated the HPV coincide with the above expected result, reinforcing the hypothesis that the level of knowledge about the virus and its vaccination, varies not only in different countries, but also among regions of the same country. Durusoy and his colleagues concluded that there is a wide range of behavioral approaches to the intention to vaccinate against the HPV among countries, with the Western ones demonstrating higher rates of acceptance of HPV vaccines, than the Easterns. The same study also indicated that participants from Turkey's western region, were more willing to be accepted and to be included in a preventive vaccination program, than the residents of the mainland [17].

Moreover, quite significant seems to be the variation in the level of knowledge about the HPV and HPV vaccination in European countries. A higher level of awareness is observed among Italian adolescence, approximately two years after the introduction of HPV vaccines [24], while the lowest level of knowledge is noticed in Sweden, three years before the implementation of the national vaccination program [25]. Studies from Hungary and the Netherlands have also been demonstrating a higher level of awareness about the HPV, compared to Germany, suggesting that the knowledge about the virus and HPV vaccination is a multifactorial issue, the solution of which seems not to be only the introduction of a national vaccination program, against cervical cancer [26, 27, 28, 29, 30].

Family income

According the results of our study, it is concluded that the annual family income is statistically significantly related to the level of knowledge about the HPV and the willingness to undergo vaccination. It is noticed that the higher the family income, the higher the level of awareness about the HPV. Typically,

students who state that their annual family income is low, are less likely to be vaccinated against the HPV virus.

The outcome of a study conducted by Durosoy and his colleagues is similar. The authors indicated that participants with a higher socioeconomic status were more likely to be vaccinated against the HPV, than the economically weaker counterparts [17]. Similarly, Mortensen in 2010 revealed that vaccination acceptance among adolescents, was associated with a higher level of education and higher socioeconomic status of their parents, without being able to pinpoint which of the two factors was the most important [31]. In 2016, Schülein and his colleagues found that the educational level of parents, was slightly most important factor than the socioeconomic level, in terms of acceptance of HPV vaccination [32].

In contrast, a recent study from Slovenia, aiming to determine the relationship between socioeconomic factors and cervical cancer vaccination, indicated that the lowest vaccination rates were not statistically significantly correlated with the lower average family income, nor was there any relationship between higher education ratios and the immunization rate of the participants in the study [33].

Family status

The marital status of the parents of the participants in this study was not statistically significantly related to the level of knowledge about the HPV and the willingness to be vaccinated against cervical cancer. However, regardless of the marital status and the lack of correlation between the examined factors, a strong tendency to be vaccinated against the HPV among the participants was found.

Similarly, in a previous study aiming to determine whether parents would allow their children to be vaccinated against the HPV and which variables could influence their decision, the authors concluded that marital status was not related statistically significantly with the acceptance of HPV vaccination [26]. In contrast, a recent study indicated that participants' family status, along with other socio-demographic factors, such as race, nationality, maternal education, health care provider composition, family income, and the age of the unvaccinated daughter, appear to be statistically significantly related to one or more factors identified as barriers to the decision to vaccinate against cervical cancer [34].

Nationality

The analysis of the data of our study revealed that nationality is statistically significantly related to the level of knowledge about the HPV and the willingness to vaccinate. Greeks appear to be much more informed about the virus, than students of Albanian or other nationalities. However, it is necessary to point out the observed disproportion of nationalities among the participants, as 95.6% are of Greek nationality, which does not allow us to assess the result excellently and with great accuracy.

Similarly, a study from Italy indicated lower vaccination coverage rates against the HPV in foreigners, compared to Italian citizens [35]. Furthermore, other studies involving female adolescents of national minorities from degraded areas, found that the rates of HPV vaccination were lower compared to those of

privileged ones [36, 37]. In contrast, a recent Canadian population study found that school vaccination programs can lead to higher vaccination coverage rates, even in areas inhabited by a larger percentage of national minorities [38].

Health Education as a means of improving the knowledge level about the HPV and the vaccination willingness.

In an effort to approach and interpret the main outcomes of this research study, it appears that through Health Education, using targeted informative intervention, a statistically significant increase in both the level of knowledge about the HPV and the infection caused by it, is recorded, as well as to the adolescents' willingness to be vaccinated against HPV and cervical cancer.

Furthermore, towards the same research axis and direction is the publication of a systematic bibliographic review by our research team. The conclusion we have drawn, is that adolescents are not sufficiently informed about the HPV and the HPV preventive vaccination. In order to improve the level of knowledge about the virus and the consequences of HPV infection, is mandatory to provide information through the framework of compulsory education, primary health care and the development of informative interactive interventions. The knowledge and receptive susceptibility to HPV infection and to HPV-related health issues, demonstrate the urgent need for a well-designed training program nowadays, in order to bridge the gap between HPV awareness and vaccine acceptance [39].

Previous studies have also indicated that informing young women, is an important factor in shaping positive thinking and perception towards the vaccination against HPV [17, 20, 40]. In 2014, Lee and his colleagues highlighted the role of school environment, which should provide young teens with more information about the prevention of cervical cancer, while enhancing the health education. The purpose of the above is the proper information of the students, concerning the severity of the disease, in order to be achieved higher rates of participation in a vaccination program against cervical cancer [40].

On the other hand, it has been indicated by other studies, that the participation and completion of a preventive HPV vaccination program is not directly correlated to the level of awareness of vaccinated women. Based on the results of other studies, it was concluded that women who were vaccinated against cervical cancer did not have a higher level of knowledge about the HPV, than the non-vaccinated ones, although it would be expected that vaccinated women would have received at least basic information on the virus and its implications [41, 42]. Similarly, Fishman and his colleagues noticed that neither parental nor adolescent HPV knowledge was related to future adolescent vaccination, as some participants with a low level of awareness about the HPV and its preventive vaccination, eventually completed the prophylactic vaccination program, whereas, in contrast, individuals who initially demonstrated high levels of knowledge, were eventually not vaccinated against HPV and cervical cancer [43].

Conclusions

Young adolescent students are poorly informed about the HPV and HPV vaccination, which can be a significant obstacle to the necessary increase in the vaccination coverage of the population. The use of interactive lecturing interventions to young adolescent students in the school environment, could contribute statistically significantly to the increase in both the level of knowledge about the HPV and the infection caused by it, as well as in the willingness of participants to be vaccinated against the HPV and cervical cancer.

At the same time, the implementation of Health Education programs in schools, under the responsibility of the State, can be an important measure in an effort to reduce the incidence of cervical cancer. Sex education of young girls and boys in order to gain a good amount of knowledge concerning issues such as sex life, family planning, proper use and effectiveness of contraceptive methods and good hygiene, reduces the exposure of the population to predisposing risk factors for developing HPV.

Abbreviations

ECDC

European Centre for Disease Prevention and Control

IBM SPSS

Statistical Package for the Social Sciences

HPV

Human Papillomavirus

WHO

World Health Organization

Declarations

Ethics approval and consent to participate

The study was approved by the Institute of Educational Policy of the Ministry of Education, Research and Religions (219048/Δ2/19 – 12 – 2018) and after the information and the consent of the Directorate of Secondary Education of the Prefecture of Trikala and the Directorate of each school complex. The aim of the study was explained to the parents - guardians of the minor students, who were asked for the signed consent, in order for the students to participate in the study. The study participants were informed that they are free to participate. The collected data were kept confidential in compliance to established Human Subject Protection guidelines.

Consent for publication

Not applicable.

Availability of data and material

All data generated during this study are included in this manuscript.

Competing interests

The authors declare that they have no competing interests.

Funding

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Authors' contributions

IT conceptualized the problem, conducted statistical analyses, reviewed the literature, and drafted the manuscript. PG participated in problem refinement, design and statistical analyses of the manuscripts. GL and DP critically reviewed the manuscript for intellectual content and advised on the structure. All authors read and approved the final draft of the manuscript.

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Figures

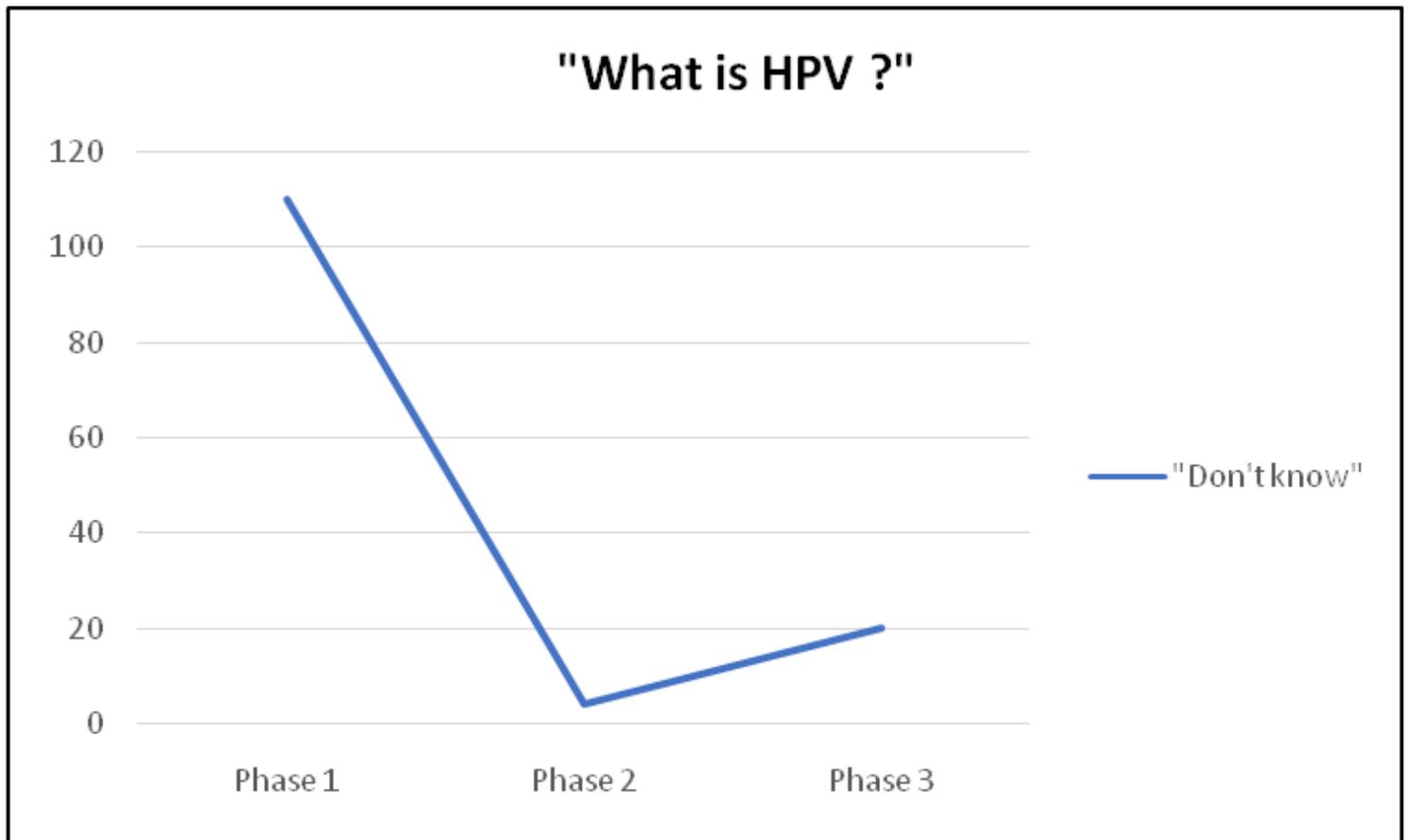


Figure 1

Graphic illustration of the level of knowledge about HPV, based on the question «What is HPV» throughout the research study.

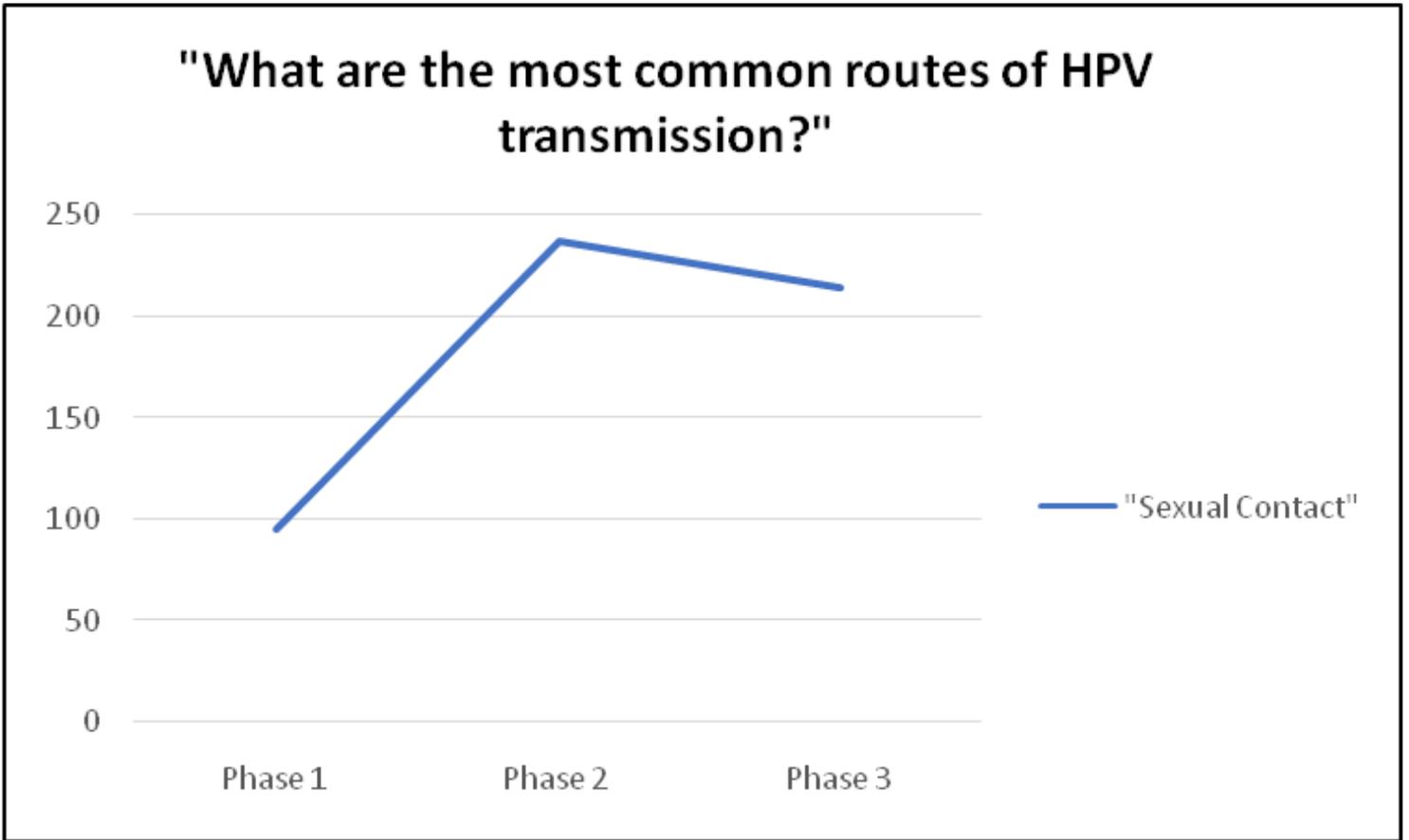


Figure 2

Graphic illustration of the level of knowledge about HPV, based on the question «What are the most common routes of HPV transmission», throughout the research study.

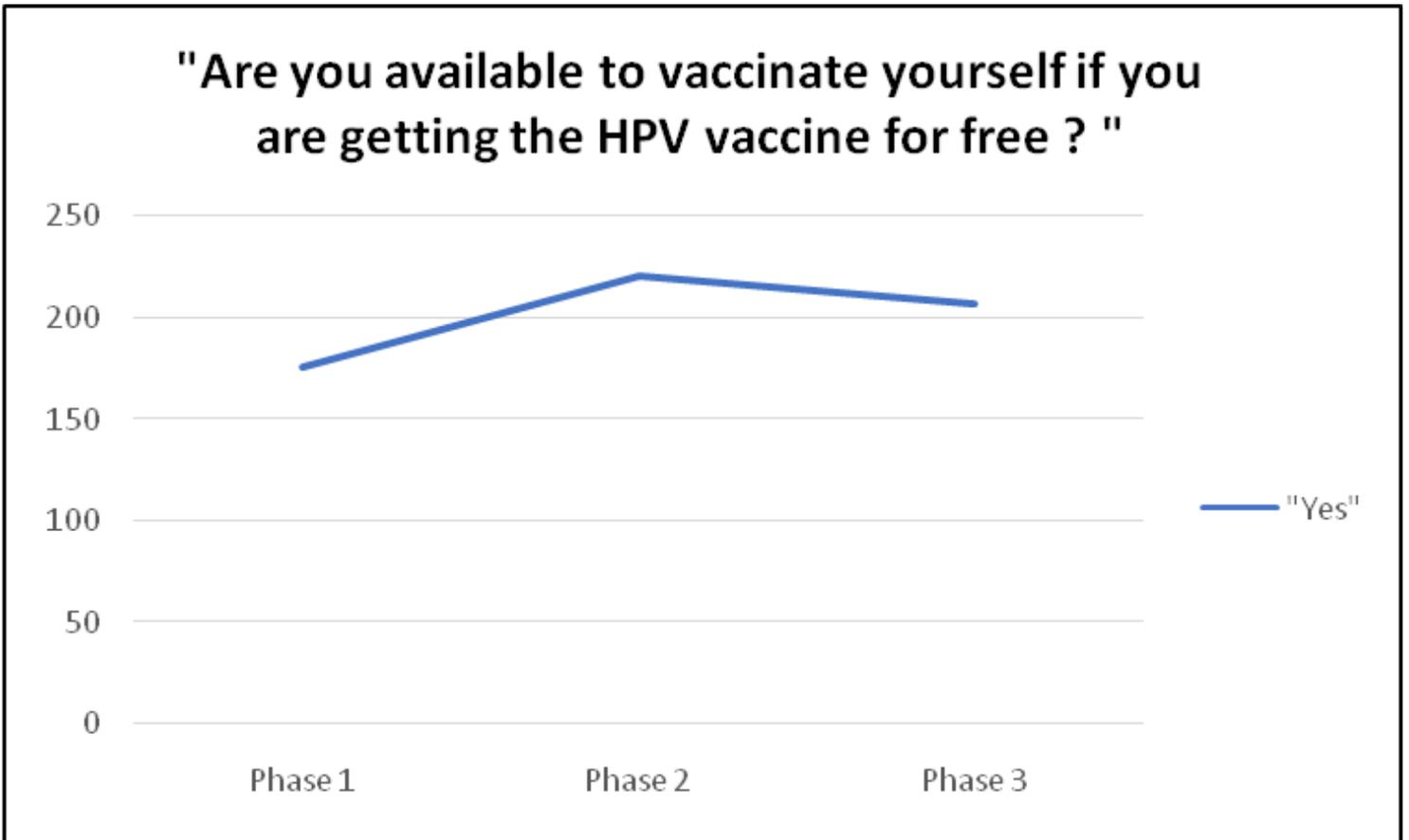


Figure 3

Graphic illustration of the young students' willingness for vaccination against HPV, based on the question «Are you willing to undergo vaccination» throughout the research study