

RESEARCH PAPER

Human papillomavirus infection and vaccination: Knowledge and attitudes among young males in Italy

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ABSTRACT

This study assessed knowledge and attitudes about Human papillomavirus (HPV) and the relative vaccination and their determinants in a sample of young males. The survey was conducted between January and April 2015 among a sample of 1000 males aged between 14–24 y in the geographic area of Naples and Caserta, Italy. The 54.9% of the participants reported of having heard about the HPV infection. Those who were aware about the availability of the vaccine, who reported the first vaginal sexual encounter before the 18 y and at least at 18 y compared to those who had not had a complete sexual intercourse, who had undergone a health checkup in the last year, and who had received information about the HPV vaccine by physicians had a significant higher knowledge about the HPV infection. The 58.2% reported that they would be willing to receive the HPV vaccine. Those younger, who reported the first vaginal sexual encounter at least at 18 y, who agreed that male should receive the vaccine, who knew that both males and females can acquire the infection, and who agreed that the vaccine is an important preventive intervention, expressed more positive attitude toward willingness to receive the vaccine. More information about the HPV vaccine were required by those who agreed that the vaccine is an important preventive intervention, who reported the first vaginal sexual encounter at least at 18 y, who have had only one partner in the last year compared to students who had no partner, and who had received information about the vaccine by physicians. This study highlights a need for improved education of young males of the HPV infection and the associated diseases and about the benefit of the vaccination.

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Introduction

It is well known that genital Human papillomavirus (HPV) infections are mainly sexually transmitted through direct skin or mucosa contact and represent an extraordinary common viral sexually transmitted infection in several countries.¹ The prevalence of the HPV infection in Europe is 12.4% in the general population² and in Italy 72% and 40.5% male partners of HPV-positive women are positive for genital HPV infection.^{3,4} HPV can cause cervical cancer, cancers of the vulva and vagina in women, penile cancer in men, as well other anogenital cancer, oropharyngeal cancer, and genital warts in both sexes.^{5,6}

Vaccination against HPV infection has been recognized as an effective primary intervention to prevent cervical, vaginal, and vulvar precancerous lesions in women and highly efficacious for preventing penile precancers and for reducing the burden of HPV related diseases in men. Thus, many countries had introduced the HPV vaccination in their national immunization program for girls, and in some countries also for boys. It is currently recommended for adolescent girls and boys at 11 or 12 y of age with catch-up vaccination of up to the age of 26 and 21 respectively for girls and women and for boys and men and also for males aged 22 to 26 y who are at risk for HPV.^{7,8} In Italy, the vaccination is currently recommended and provided free for girls aged 11 and 12 y, and only in few geographic

areas also for men. Numerous studies in different countries have evaluated individuals' knowledge, attitudes, and behaviors toward the vaccination mainly among health care providers,^{9–11} adolescents,^{13–16} and women and men for themselves^{17–25} or for their adolescent daughters^{26–28} or sons.^{29–31} Unfortunately all these issues among young males have only been studied to a limited extent.^{32–36} Specifically in Italy, few studies have been conducted among different groups,^{37–39} but to the authors' knowledge little is known to date regarding HPV vaccination in young males. It remains imperative this evaluation in order to identify information needs and to design future strategies for expanding cancer prevention. The present study was designed to assess the level of knowledge and the attitudes about HPV and the relative vaccination and to investigate their determinants in a sample of young males in Italy.

Results

Of the 1000 students randomly selected, a total of 956 completed the questionnaire for a response rate of 95.6%, 359 from the secondary schools and 597 from the University. The average age was 19.6 years, all were single, more than half (62.8%) reported to have current or previous sexual activity and the mean reported age of first vaginal sexual encounter was

16.1 years. Almost all (90.3%) of those who have already experienced a sexual activity, reported a sexual intercourse in the last year with a mean number of partners of 1.9 ranging from 1 to 10. Among those who had sex at least once in the last year, only 37.9% reported that they have always used a condom and one in 5 reported health-care workers as source of information, but the media were the main source for 61.4% of the students (Table 1).

The questionnaire specifically asked several questions for measuring the knowledge regarding HPV and the results are presented in Table 2. The 54.9% of the participants reported of having heard about the HPV infection prior to the study, and more than 2 thirds (78.9%) of them knew that both males and females can acquire the infection, the vast majority (91.6%) were aware that the infection can be transmitted during a sexual intercourse, but only 9.5% correctly indicated that needle sharing was not a mode of transmission. The responses regarding the diseases associated with the HPV infection showed that 70.1% were correct in identifying the penile cancer, but only 15.2%, 6.7%, and 5.4% were aware that HPV can cause cervical, anal, and oral cancers, respectively. The knowledge regarding the ways to prevent HPV transmission showed that the 88.4%

Table 2. Knowledge about HPV infection of the study population.

	N	%
Have heard about the HPV infection ^a	525	54.9
Knowledge that both males and females can acquire the HPV infection ^b	414	78.9
	Correct response	
Cancers caused by the HPV infection ^b	N	%
Penile	368	70.1
Cervical	80	15.2
Anal	35	6.7
Oral	28	5.4
Modes of transmission of HPV ^b		
Complete sexual intercourse (true)	481	91.6
Incomplete sexual intercourse (true)	222	42.3
Pregnancy (false)	192	36.6
Vaginal delivery (true)	57	10.9
Needle sharing (false)	50	9.5
Preventive measures for HPV infection ^b		
Condom use (true)	464	88.4
Vaccination (true)	284	54.1
Late start of complete sexual intercourse (true)	58	11.1
Late start of incomplete sexual intercourse (true)	27	5.2
Knowledge that vaccine should be given to both males and females ^c	65	39.7

^aAll sample ($n = 956$).

^bOnly for those who reported that they have heard about HPV infection.

^cOnly for those who were aware about the availability of the HPV vaccine in Italy.

Table 1. Main characteristics and sexual behaviors of the sample.

	Total ($n = 956$)	
	N	%
Age (years)	19.6 ± 3.1 (14–24)*	
Number of cohabiting	3.2 ± 0.9 (0–6)*	
At least one parent who is a health care professional		
Yes	79	8.3
No	877	91.7
Personal, familiar, or friendly history of cancer related to HPV infection		
Yes	43	4.5
No	913	95.5
Sexual activity		
No complete sexual intercourse	356	37.2
Complete sexual intercourse	600	62.8
No complete sexual intercourse in the last year ^a	58	9.7
At least one complete sexual intercourse in the last year ^a	538	90.3
Age at first complete sexual intercourse	16.1 ± 1.6 (14–24)*	
Number of sexual partners in the last year	1.9 ± 1.4 (1–10)*	
0	422	44.1
1	311	32.5
≥ 2	223	23.4
Condom use during the sexual intercourse in the last year ^b		
Never	55	10.4
Rarely	76	14.4
Sometimes	80	15.2
Often	116	22.1
Always	200	37.9
Have undergone a health checkup in the last year		
Yes	528	55.2
No	428	44.8
Source of information about HPV vaccine ^c		
Physicians	95	18.6
Others	509	81.4
Need of additional information about HPV vaccine		
Yes	793	82.9
No	163	17.1

Number for each item may not add up to the total number of the study population due to missing values.

*Mean \pm standard deviation (range).

^aOnly for those who had at least one complete sexual intercourse ($n = 600$).

^bOnly for those who had at least one complete sexual intercourse in the last year ($n = 538$).

^cOnly for those who acquire information about HPV vaccine ($n = 604$).

indicated the use of condom and more than half were aware about a vaccine (54.1%), but only 17.1% of all respondents were aware about the availability of the vaccine in Italy. Among those who have this knowledge, 12.3%, 32.7%, and 39.7% respectively indicated that the vaccine should be given to male, to female, and to both male and female. Also, the majority did not know the age at which the HPV vaccine can be administered (84.1%). Those who were aware about the availability of the HPV vaccine in Italy (OR = 2.23; 95% CI 1.52–3.27), those who reported the first vaginal sexual encounter before the 18 y (OR = 1.5; 95% CI 1.07–2.11) and at least at 18 y (OR = 1.8; 95% CI 1.09–2.96) compared to those who had not had a complete sexual intercourse, those who had undergone a health checkup in the last year (OR = 1.33; 95% CI 1.01–1.78), and those who had received information about the vaccine by physicians (OR = 2.14; 95% CI 1.42–3.21) had having heard about the HPV infection and know that the infection can be transmitted during sexual intercourse (Model 1 in Table 3).

In regards to perceptions regarding the HPV infection and vaccine, despite the frequency of unprotected sex and concurrent partners, most participants perceived themselves as having low or no risk of acquiring the infection with an overall mean value of 4.5, out of a maximum score of 10, and penile, anal, and oral cancers with mean values of 5.6, 4.5, and 4.4, respectively. Students agreed with the importance of the HPV vaccine toward the protection against oral, penile, and anal cancers with a mean score of 7 and that the male should receive the vaccine (49.9%). Only four respondents received the HPV vaccine. More than half (58.2%) of the non vaccinated respondents reported that they would be willing to receive the vaccine and when they were asked to select from a provided list the attributes that would be important to them for the vaccination, the most common reasons for their willingness were that the vaccine may reduce the risk of acquiring a HPV infection (74.3%) and that the vaccine is able to prevent the cancer (37.2%), whereas among those who indicated that they do not were

Table 3. Multivariate logistic regression analyses indicating associations between independent variables and the different outcomes.

Variable	OR	SE	95% CI	p value
Model 1. Having heard about HPV infection and having the knowledge that infection can be transmitted through sexual intercourse Log likelihood = -534.32, $\chi^2 = 49.95$ (7 df), $p < 0.0001$				
Aware about the availability of the HPV vaccine in Italy	2.23	0.43	1.52–3.27	<0.001
Physicians as sources of information about the HPV vaccine	2.14	0.44	1.42–3.21	<0.001
Age at first complete sexual intercourse				
No complete sexual intercourse	1*			
<18 years	1.5	0.26	1.07–2.11	0.019
≥18 years	1.8	0.45	1.09–2.96	0.02
Health checkup in the last year	1.33	0.2	1.01–1.78	0.05
Number of partners in the last year				
0	1*			
≥2	1.26	0.24	0.86–1.84	0.227
Socio-economic status				
Low	1*			
High	0.84	0.14	0.61–1.16	0.301
Model 2. Positive attitude toward willingness to receive the HPV vaccine Log likelihood = -429.47, $\chi^2 = 222.76$ (10 df), $p < 0.0001$				
Agree that the HPV vaccine is important for the protection against oral, penile, and anal cancers	1.31	0.04	1.22–1.4	<0.001
Agree that males should receive the HPV vaccine	3.28	0.55	2.35–4.58	<0.001
Age				
Age at first complete sexual intercourse				
No complete sexual intercourse	1*			
≥18 years	3.89	1.83	1.54–9.8	0.004
<18 years	1.73	0.67	0.8–3.7	0.156
Knowledge that both males and females can acquire the HPV infection	1.49	0.28	1.03–2.15	0.032
Preoccupation to acquire the HPV infection	1.06	0.04	0.99–1.15	0.097
Socio-economic status				
Low	1*			
High	1.29	0.25	0.88–1.87	0.183
Number of partners in the last year				
0	1*			
1	0.67	0.25	0.32–1.38	0.282
≥2	0.65	0.25	0.31–1.39	0.273
Model 3. Perceived need of more information about the HPV vaccine Log likelihood = -311.26, $\chi^2 = 52.57$ (10 df), $p < 0.0001$				
Agree that the HPV vaccine is important for the protection against oral, penile, and anal cancers	1.14	0.37	1.05–1.23	0.001
Age at first complete sexual intercourse				
No complete sexual intercourse	1*			
≥18 years	3.19	1.55	1.23–8.29	0.017
Physicians as sources of information about the HPV vaccine	2.25	0.79	1.13–4.49	0.21
Number of partners in the last year				
0	1*			
1	1.74	0.44	1.06–2.87	0.028
≥2	1.51	0.4	0.89–2.55	0.125
Agree that males should receive the HPV vaccine	1.49	0.32	0.97–2.28	0.067
Preoccupation to acquire the HPV infection	1.09	0.05	0.99–1.19	0.073
Socio-economic status				
Low	1*			
Intermediate	0.79	0.16	0.53–1.19	0.265
Aware about the availability of the HPV vaccine in Italy	1.31	0.37	0.75–2.31	0.342

*Reference category

willing to get the vaccine, the most frequently mentioned concerns that would lead for this attitude were that they believed of being not at risk for HPV infection (49.5%) and potential side effects of the vaccine (44.1%). Respondents of younger age (OR = 0.9; 95% CI 0.85–0.96), those who reported the first

vaginal sexual encounter at least at 18 y (OR = 3.89; 95% CI 1.54–9.8) compared to those who had not had a sexual intercourse, those who agreed that male should receive the vaccine (OR = 3.28; 95% CI 2.35–4.58), those who knew that both males and females can acquire the infection (OR = 1.49; 95% CI 1.03–2.115), those who agreed that the vaccine is important for the protection against oral, penile, and anal cancers (OR = 1.31; 95% CI 1.22–1.4), were found to express more positive attitude toward willingness to receive the vaccine (Model 2 in Table 3).

Only 53.3% of the respondents declared that they had received information about the HPV vaccine and the most commonly used resource was mass media (47.3%), followed by the school (26.7%) and physicians (18.6%). The vast majority (82.9%) responded that they would like more education on the vaccine (Table 1). Those who agreed that the HPV vaccine is important for the protection against oral, penile, and anal cancers (OR = 1.14; 95% CI 1.05–1.23), those who reported the first vaginal sexual encounter at least at 18 y (OR = 3.19; 95% CI 1.23–8.29) compared to those who had not had a sexual intercourse, those who have had only one partner in the last year compared to students with no partner (OR = 1.74; 95% CI 1.06–2.87), and those who had received information about the vaccine by physicians (OR = 2.25; 95% CI 1.13–4.49), were more likely to need more information about the HPV vaccine (Model 3 in Table 3).

Discussion

This is the first known study of its kind to be conducted in Italy aimed at determining the knowledge, acceptability, and behavior toward HPV vaccination and to investigate their determinants among a randomly selected sample of young males. This target population was chosen because it is potentially the most interested to vaccination and others preventive measures. Notable in this study is the gaps in knowledge about the HPV infection and vaccination among the surveyed students, since only 54.9% and 17.1% reported of having heard about the HPV infection prior to the study and that a vaccine is available in Italy. Although the knowledge is not a direct predictor of the acceptability of the vaccine, the fact that participants were not well informed is of great concern since proper knowledge is an important factor in order to understand the preventive measures and to have appropriate behavior.^{21,24,40} Future opportunities are necessary to address these deficiencies by establishing easy access to accurate information. Direct comparison of the results of this survey with data of similar published results is complicated by the fact that the methodology vary between studies in terms of characteristics of each population, data collection, and ways of reporting. The level of knowledge is higher than those obtained in 18 to 25-year-old students in Germany which only 13.9% knew that HPV infection is sexually transmitted and <15% knew that HPV infects women and men,³³ in a group aged 18–24 in Singapore only 15.2% had ever heard of HPV,³¹ in males aged 12–22 y in India respectively 31.5% and 28% were aware that HPV infection causes genital cancer and of availability of vaccine,³⁵ in the United Arab Emirates 31% of university students had not heard of HPV infection before,³⁴ in Hungary among adolescents 12 and 19 y only 35% have heard

of the HPV and 46.6% knew that HPV infection may be transmitted by vaginal intercourse,³² and in the US respectively 38.3% and 33.1% of respondents had heard of HPV and of the vaccine.¹⁶

Not surprising only 4 students in this study have been vaccinated against HPV, but one important observation was that almost 2-thirds were likely to be vaccinated against HPV. This finding was similar to the results observed in the US with values of 67.6% in a group aged 18 to 29,⁴¹ and of 70% in 18–26 y old,¹⁹ higher than the 41% of 16–18 y old college students in England⁴² and the 46% in the already mentioned survey in the United Arab Emirates,³⁴ and lower than the 90.9% among non-health sciences students in Portugal.⁴³ One of the most common reasons for this positive attitude toward the vaccination was that it may reduce the risk of acquiring a HPV infection and this is in accordance with previous surveys^{34,42,43} whereas among those who indicated that they do not willingness to get the vaccine, the most frequently mentioned concern was that they were not at risk for the HPV infection.⁴²

Several factors were found to be significantly associated with the different outcomes of interest in the multivariate regression analysis. Consistent with previous research, it has been observed that those with sexual activity were more likely to have a higher level of knowledge about the HPV infection,^{33,34} and to express more positive attitude toward willingness to receive the vaccine.¹⁶ The important role of the history of sexual intercourse has been also reported among female with those who reported ever having had vaginal sex were more likely to be vaccinated⁴⁴ or among university students it was a significant factor increasing vaccine awareness.⁴⁵ Moreover, those who were aware about the HPV vaccine were more likely to have a higher level of knowledge about the HPV infection.^{33,34} In the current study, it was seen that those who agree that the HPV vaccine is important for males as a preventive intervention for cancers HPV-related were, as expected, more willingness to receive the vaccine. This is in agreement with previous findings in similar surveys^{17,20,40,46} and among adolescent girls or their parents the intention to vaccinate was significantly associated with the belief that vaccination was a good way to protect against cancer.^{27,47}

The main source of information was mass media rather than physicians and parents and because both are an important source of knowledge, the results that only a minority of the respondents obtained the information through these 2 sources is disappointing. However, a large majority of participants have responded that they would like more education on the HPV vaccine, and those who were willing to be vaccinated were more likely to need more information. This observation indicates the need for more dissemination of information to be given via primary care physicians and emphasizes the fact that parents are not actively involved in open discussions with their adolescents about sexual health related issues and, therefore, they fail to be a guidance about preventive health care issues of their children. The finding regarding the main source of information is in accordance with similar previous studies.^{7,18,33,45,48}

Interpretation of this study should take into account certain potential limitations that might impact upon its conclusions. First, since this was a cross-sectional study, it is difficult to draw conclusions regarding the direct causal inferences and the

direction of causality. Second, due to the nature of this topic which involved some sensitivity matter, the data may suffer from an information bias caused by investigator expectations in terms of sexual behavior and condom use and it is possible that respondents may over-report socially desirable attitudes or behaviors or under-report socially undesirable attitudes or behaviors, which may have affected reliability of the results. However, several features are likely to have increased the validity of such reporting and that the respondents may have provided reliable results with the opportunity for the students to respond more accurately to sensitive questions, including the fact that the questionnaire was anonymous and voluntary with the assurance of confidentiality of responses. Third, the sample from the university may be not representative of the population of that age. Fourth, recall bias may be occurred and in order to reduce such bias, the sexual behaviors and the number of visits by physicians were asked regarding the previous year. Besides these limitations, this survey has important strengths and these results provide an important contribution about this topic. Indeed, this survey had a very high response rate and this reflects strong interest in this topic, assure more accurate and valid survey results, and the survey utilized a tested instrument making it possible to compare findings across populations.

The findings support the clear need for implementing public health educational interventions among young males regarding the HPV infection and the associated diseases with the aim of increasing their level of knowledge and about the vaccine recommendations.

Methods

Setting and sample

A cross-sectional survey was conducted between January and April 2015 among a sample of male students aged between 14 and 24 y old selected from a random sample of 4 public secondary schools in the geographic area of Naples and Caserta and 5 Faculty in the study areas of Economics, Education, Engineering, and Sport Sciences of a University in Naples (Italy). The sample was selected with a 2 stage cluster method. In the first stage, secondary schools and Faculty have been selected from the list of public secondary schools and universities of the geographic area. In the second stage, from each School and Faculty the students have been selected through a simple random sampling.

The sample size was calculated assuming an expected prevalence of participants willing to accept the HPV vaccine as high as 40%, keeping 95% confidence interval, with an error rate of 5% and a design effect of two. To account for an expected response rate of 75%, the sample size was increased to 1000 persons.

Data collection

After the Ethical approval obtained by the Ethics Committee of the Second University of Naples, each of the participants institution was contacted and received a letter to inform about the survey and explaining the purpose and methodology. Informed consent was obtained from each institution. The questionnaires were distributed to male students in the classroom before or after classes by a researcher, who have before explained verbally

all the pertinent information of the study, ensured that all information gathered would be anonymous without names or unique identifiers attached to the data and handled confidentially. Participation was voluntary and the students were informed that they could withdraw from the study at any stage of the questionnaire, if they so desired, without any penalty or explanation; completion of the questionnaire implied consent for study participation. For the students younger than 18 y of age, informed consent has been obtained from the parents. Participants filled out the questionnaire individually under the supervision of one of the researchers.

Instrument

Where possible, items of the questionnaire were used from similar previous surveys conducted by our group.^{37,38} The final 30-item of the self-administered questionnaire included questions that were a combination of multiple choice, 5-point Likert scale, 10-point Likert scale, and open-ended items. Questions were grouped broadly into 5 sections assessing socio-demographic characteristics of the parent(s) and of the student (age, personal, familiar, or friendly history of cancer related to HPV infection, employment status), knowledge regarding the HPV infection (having heard about the infection, both males and females can acquire the infection, modes of transmission, cancers related the infection, preventive measures), and HPV vaccination (availability of vaccine in Italy, number of doses, age at which the vaccine can be administered), attitudes about the HPV vaccine and perceived acceptance of it (preoccupation to acquire the infection, agree that males should receive the vaccine, agree that the vaccine is important for the protection against cancers related the HPV infection, willingness to receive the vaccine), sexual behavior (age at first complete sexual intercourse, number of sexual partners and condom use in the last year), and source and need of additional information about HPV vaccine. Response options included “true” “false”, or “do not know”. Reasons for having received and for not having received the HPV vaccination were gathered with a list of pre-defined options and students were given the option to provide additional free-text responses. The same reasons were asked to those who have not received the vaccine whether they agreed or disagreed with receiving the vaccine. The questionnaire was pretested on 25 students for clarity and validity.

Statistical analysis

At first, chi-square and Student's t-test were conducted for univariate analysis to examine the association between the outcomes of interest and influencing factors. The variables with a *p*-value less or equal than 0.25 in the bivariate analysis were included in the multivariate logistic regression models, in order to establish whether the independent variables were associated with the outcome of interest after controlling other variables. Then, multivariate stepwise logistic regression investigated the independent contribution of potential predictors to the following 3 primary outcomes of interest: having heard about HPV infection and having the knowledge that the infection can be transmitted through sexual intercourse (no = 0; yes = 1) (Model 1), positive attitude toward willingness to receive the HPV vaccine (no = 0; yes = 1) (Model 2), and perceived need

of more information about the HPV vaccine (no = 0; yes = 1) (Model 3). Independent variables included in all models were the following: age, have at least one parent who is a health care professional, socio-economic status, knowledge that both males and females can acquire the HPV infection, aware about the availability of the HPV vaccine in Italy, have undergone a health checkup in the last year, age at first complete sexual intercourse, number of sexual partners in the last year, and sources of information about the vaccine. Moreover, perceived need of more information about the HPV vaccine was included in Model 1 and participants' preoccupation to acquire the infection, agree that males should receive the vaccine, and agree that the vaccine is important for the protection against oral, penile, and anal cancers were included in Models 2 and 3.

The significance level for variables entering in the logistic regression models was set at 0.2 and for removing at 0.4. Odds ratios (OR) and their 95% confidence interval (CI) were estimated from the logistic regression model. All analyses used 2-tailed tests of significance and a *p* value of 0.05 or less was considered to be statistically significant, and were done with Stata statistical software.⁴⁹

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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