

## ORIGINAL ARTICLE

# Cross sectional study investigating the differences in knowledge and behaviors about HPV between vaccinated and non-vaccinated girls

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## Keywords

HPV • Adolescent • Knowledge

## Summary

**Introduction.** The aim of the present study was to compare the level of knowledge about Human Papilloma Virus (HPV) in vaccinated and non-vaccinated girls and to highlight the reasons why non-vaccinated girls refuse vaccination.

**Methods.** A cross-sectional study was conducted from October 2012 to June 2013 in Turin (Piemonte Region, Italy). Questionnaires were administered to girls attending secondary and high schools randomly selected.

**Results.** A total of 576 were compiled. The principle sources of information were parents and health workers. The main reported reasons for non-adherence to vaccination were the disagreement of the parents among the 11-12 years group (45.3%) and the lack

of evidence on efficacy among the 18 years group (26.8%). By comparing the level of knowledge there was a statistically significant difference between groups: vaccinated girls reported higher score than the unvaccinated group in several questions ( $p \leq 0.05$ ).

**Conclusions.** Our findings show a lack of information about HPV infection. Parents, school and health care workers have a central role in girl's education and choices about HPV vaccination. The communication campaign for the prevention of cervical cancer must therefore be characterised by messages able to clarify and consolidate messages that may have been partially received or misunderstood.

## Introduction

Cervical cancer is the first cancer recognised by the World Health Organisation (WHO) as entirely due to the Human papillomavirus (HPV) infection. The availability of two vaccines, along with the screening policies, allows an intervention for the prevention of cervical cancer [1]. In 2006, the WHO decided that, based on the available evidence, girls aged 9-13 years are the primary target of HPV vaccination [2-4], while the females aged 14-26 years are considered a secondary target.

The Italian health-care system is a regionally based national health service and each Region chooses its vaccination strategy following the national recommendation that is to offer free HPV vaccination to 12-year-old females. However, some Regions offer vaccination to other age groups also, according to the WHO [1].

In particular, in Piemonte region (northwest of Italy), the vaccine is delivered by the Local Health Authorities (Azienda Sanitaria Locale, ASL) to 11-12 years old girls, and, in addition, from 2008 to 2011, 16-year-old female subjects represented the secondary target. The vaccination service calls each girl with a personal letter. The aim of the vaccination programme in Italy was to achieve coverage with three doses of vaccine equal to 95% within 5 years after the start of the immunisation programme.

However, both in Italy and other Countries, compliance were less than expected [3, 4]. The Department of Epidemiology of Infectious Diseases of the National Centre of Epidemiology Surveillance and Health Promotion (CNESPS) collects data twice per year regarding vaccination coverage according to Region, birth cohort and number of doses administered. For the birth cohorts in 1997-1998-1999, the document contains data with national coverage, updated on 30/06/2013, which amount to the following average values: 73% were vaccinated with at least 1 dose, 70% with at least 2 doses, and 67% with at least 3 doses [5]. In Piemonte region, the average coverage data for the three cohorts were slightly lower than the national average: 65.5% for the first dose, 66.8% for the second and 53.6% for the third dose. The vaccination rate for the secondary target does not differ greatly, reaching 61.6% in 2011 in the case of the Piedmont region, with different values across the ASL ranging from 46.4% to 75.7% [6]. Many studies have investigated the reasons associated with the low acceptance of HPV vaccination [7-13] such as: the availability of health care professionals to advise patients (the regarding to vaccination) [14], the will and the level of information of the parents [15, 16], the willingness of adolescents and young adults to receive the vaccination [17-19], and the awareness and knowledge of this infection [20, 21]. Some studies show low levels of knowledge about HPV and

cervical cancer in women, others indicate that knowledge among young male subjects is even lower [3, 22-24]. A low level of knowledge about HPV is also noticed among paediatricians and General Practitioner's (GPs) [25-28]. Studies show a significant desire for information [4, 18, 23], particularly among parents [20, 29, 30]. It is also demonstrated that where awareness campaigns are conducted the knowledge and attitudes of young people have improved [13, 31-35]. Several studies were carried out in Italy on this topic. Among Italian women, partial information is widespread regarding both HPV and vaccination [36]. The main source of information about HPV is represented by the mass media, while the role of health professionals is much less significant [37, 38]. Assessments about the reasons for this less-than-enthusiastic reception are in progress, in an attempt to identify the communication errors that might have caused it. There are still few studies on the target population [39-44]. It seemed useful, therefore, to focus attention on the information provided and the ability to properly train the adolescent population to highlight the possible need for additional information. The aim of this study is to investigate the knowledge about HPV infection and vaccination among girls aged 11-12 years and aged 18-19 years, highlighting the reasons that led to non-adherence to vaccination.

## Methods

A cross-sectional study was conducted among a convenience sample of girls attending three secondary and two high schools in Turin hinterland.

The main reason for this choice is that schools are the suitable place to catch up both vaccinated and non-vaccinated girls. Questionnaires were realized based on literature information and tested in a small group of students (18 subjects). Subsequently, the questionnaires were administered in the schools by teachers assisted by several public health doctors between October 2012 and June 2013.

Subjects born in the years 1999-2000-2001, who were being convened at the time of the research, were chosen. The questionnaires were therefore distributed, with the same procedure mentioned above, to girls aged 18 who had been called for the vaccination when they were 15 years old as secondary target population.

### THE QUESTIONNAIRE

It was composed by multiple choices 11 questions for younger girls and by 18 questions for the older girls. The first part investigated the vaccination status (vaccinated vs. non-vaccinated), the presence and the nature of the sources of information. In the second part of the questionnaire, the knowledge about the disease and the possibility of its prevention, the acceptance of the immunisation, and the need for further informative opportunities were investigated. Furthermore we added more questions for the older girls regarding modes of trans-

mission and HPV-related diseases. Each question had "yes", "no" and "don't know" as possible answer.

A written consent to fill in the questionnaires was asked for to underage girls' parents. We received the approval from the director and the internal committee of each school. Participation was voluntary, anonymous and without compensation.

### STATISTICAL ANALYSIS

Descriptive statistics were reported as frequencies and percentages for categorical variables. Comparisons of frequencies were performed using two-tailed chi-squared test and Fisher's exact test. Crude odds ratios (ORs) with 95% Confidence Intervals (95%CI) were calculated to assess the association between the level of knowledge in different groups. The data were processed using the StataMP13 statistical software (Stata Corp., College Station, TX, 2013).

## Results

### SAMPLE CHARACTERISTICS

A total of 620 questionnaires were delivered to the girls, and, of these, 574 were returned (92.6%); 307 (53.6%) girls were unvaccinated, and 267 (46.4%) were vaccinated. Among these, 350 questionnaires were distributed in three middle schools, of which 327 were completed (93% of the sample); 128 girls had already been vaccinated (39% of the sample) (Group1), and 199 (60,8%) were not (Group 2); we included in this group, girls who were not already vaccinated, but called for the vaccination and inclined to do it (as indicated in the footstep note of the questionnaire by the girls); this is the reason why the coverage rate in this population appears lower than general population.

The other 270 questionnaires were distributed in two high schools, of which 247 (92% of the sample) were returned. A total of 139 girls were vaccinated (56% of the sample) (Group3), and 108 were not (43.7% of the sample) (Group 4).

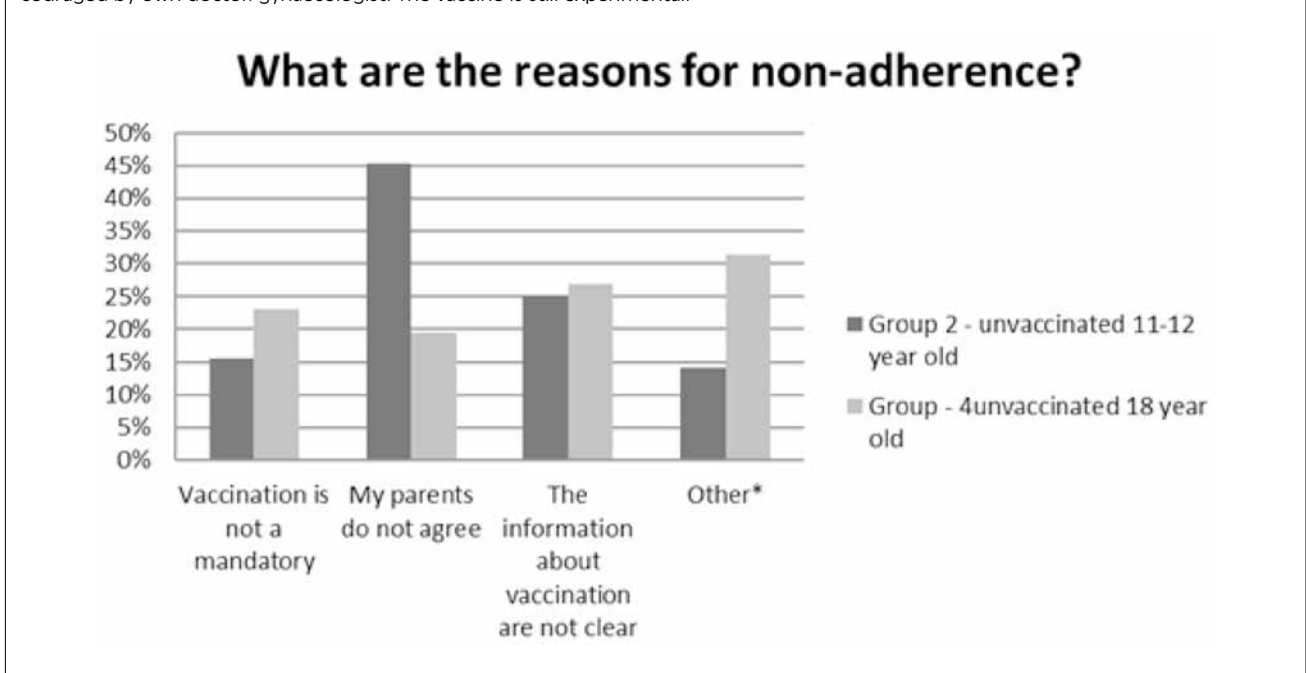
### RESULTS OF FIRST PART OF THE QUESTIONNAIRE

First part of the questionnaire showed that in Group 2, 76.8% of the girls stated that they have heard about HPV infection and know that a vaccine exists. In Group 4, 93.5% of the girls know HPV infection and 87% about HP vaccination.

We also asked to Group 2 and Group 4 what was the reason for non-adherence to vaccination (Fig. 1), in Group2 girls who refused the vaccination, the main reason was disagreement of parents (45.3%) followed by shortage of information (25%), the non-mandatory nature of the vaccine (15.6%) and other reasons (14.1%). In Group 4, the main reason for non-adherence was the lack of information about vaccines (26.8%) followed by the non-mandatory nature (23.1%) and the disagreement of parents (19.4%). Other reasons together represented 31.5% of answers.

**Fig. 1.** Reasons for non-adherence in group 2 and group 4.

\* Other: the lack of confidence in a new vaccine, the vaccine does not protect against every type of HPV, fear of the still unknown side effects of this vaccine. The vaccine does not provide long-lasting coverage. The information received was not convincing. It has been discouraged by own doctor/gynaecologist. The vaccine is still experimental.



The questionnaire of the vaccinated girls (Group 1 and Group 3) investigated if they received explanation about HPV vaccination and from whom. In total, 82% of Group 1 girls claimed to have received an explanation of the vaccine they had received during the visit and the reason why they were vaccinated, but 31% stated that they had yet to satisfy their curiosity about HPV infection and its vaccination. The majority of the girls claimed to have received information from their parents (70.3%); health care professionals of the Vaccination Service and paediatricians followed in a much smaller percentage, while gynaecologists, educators, the Internet, friends, advertising posters and flyers were marginal sources of information (Fig. 2).

In Group 3 72.2% of these girls received an explanation of what they received; 58% expressed some remaining curiosity. The majority of the girls claimed to have received information from their parents, their paediatrician/family doctor, and health care professionals of the Vaccination Service; a lower percentage (12-15%) received information from their friends, gynaecologist, the mass media, posters/flyers or the Internet or at school. Other sources were considered marginal (Fig. 2).

#### RESULTS OF THE SECOND PART OF THE QUESTIONNAIRE

In the second part of the questionnaire, we investigated the level of knowledge about HPV infection and vaccination and then we compared the correct answers from vaccinated and non-vaccinated groups. This questionnaire part was constructed differently based on age, with more questions about transmission for the 18 years old

group, for this reason we compared the groups divided for age.

Group 1: Already vaccinated 11 - 12 year olds, 31% answered "yes" when we asked if HPV

Infection is frequent and 23% stated that men could not be infected by HPV; only 38% knew that a person could be infected and aware of it. Data are presented in Table I.

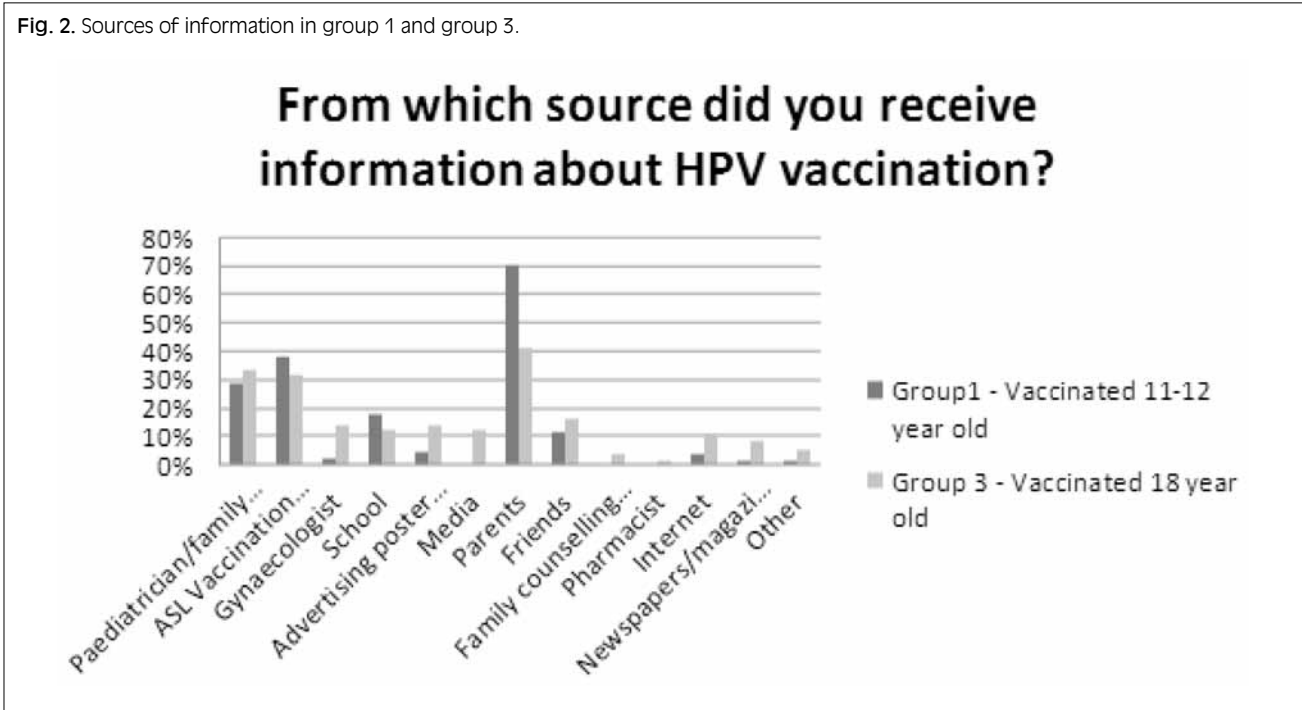
Furthermore, 7% of the girls considered themselves to be at risk of contracting the infection in the future, and 38.2% did not answer the question; 77.3% stated that it would be useful to discuss these subjects at school. Group 2: 11-12 year olds unvaccinated due to rejection or waiting for the call, 65% of the girls stated they do not know whether HPV infection is frequent, 26% stated that men can be infected by HPV, and 42.2% knew that a person could be infected and be unaware of it. 12.5% of the girls believed they are at risk of becoming infected in the future, while 61.8% did not know the answer to the question; 71.8% stated that it would be useful to discuss these subjects at school.

The answers of these two groups are also compared in Table I, which shows that there were statistically significant differences between the frequencies of two of the statement: HPV infection is frequent (OR 1.75; CI(95%): 1.05-2.92) and HPV infection can cause cervical cancer (OR 2.65 CI(95%): 1.62-4.45), with higher correct response in the vaccinated group (Group 1).

Group 3: 18 years old, vaccinated

In total, 56% of the girls knew whether HPV infection is frequent, 93% did not know whether HPV caused genital warts, 27.8% did not know whether the male gender

Fig. 2. Sources of information in group 1 and group 3.



can be infected, and 47% thought that wearing a condom is sufficient to avoid contracting the infection. A percentage of 69% knew the mode of transmission of HPV, and 15% were not aware that HPV infection could cause cervical cancer. Table II summarises these data.

Group 4: 18 years old, non-vaccinated

In the non-vaccinated group, 24% of the sample knew the HPV infection is frequent, 7% knew that genital warts are caused by HPV, 21% did not know whether the male gender could be infected, and 26% said that wearing a condom is sufficient to avoid contracting the infection. A percentage of 47% knew that sexual intercourse are a possible way of HPV transmission, and 53% were aware that HPV infection could cause cervical cancer.

Comparing the answers from the two groups, as shown in table 2, a statistically significant difference

was observed for the questions about the prevalence (OR 1.38 CI(95%): 1.04-2.92) and the consequences of the HPV infection (OR 1.10; CI(95%): 1.01-3.92); indicated that be vaccinated and receiving explanation about vaccination is related with higher knowledge about HPV.

Finally, the last question asked to the girls if they thought it would be useful to discuss these subjects at school, the majority of the girls (96%) answered yes to this question.

## Discussion

The present study aimed to investigate the knowledge about HPV infection and vaccine among young girls in Italy (Piemonte Region). Interestingly, the answers to

Tab. I. Knowledge in Group 1 (11-12 years old vaccinated girls) and Group 2(11-12 years old unvaccinated girls) (the reference group OR = 1 is the one of unvaccinated girls).

	Correct answer			OR CI(95%)
	Group 1 N = 128)	Group 2 (N = 199)		
HPV infection is frequent	31%	21%	p = 0.03	OR =1.75 (1.05-2.92)
HPV infection can cause cervical cancer	76%	54%	p < 0.001	OR =2.69 (1.62-4.45)
Men cannot be infected by HPV	23%	26%	p = 0.654	OR =1.78 (0.52-1.49)
A person may be infected by HPV and not be aware of it	38%	42%	p = 0.5726	OR =0.87 (0.55-1.38)

**Tab. II.** Knowledge in Group 3 (18 years old vaccinated girls) and Group 4 (18 years old unvaccinated girls) (the reference group OR = 1 is the one of unvaccinated girls).

	Correct answer			OR CI(95%)
	Group 3 (N = 139)	Group 4 (N = 108)		
HPV infection is frequent	56%	24%	p = 0.001	OR = 1.38 (1.04-2.92)
HPV can be transmitted through sexual intercourse	69%	47%	P = 0.22	OR = 0.39 (0.81-2.37)
HPV infection can cause cervical cancer	85%	53%	p = 0.03	OR = 1.10 (1.02-3.92)
Genital warts are caused by HPV	7%	7%	p = 0.68	OR = 0.27 (0.4-4.0)
Men cannot be infected by HPV	28%	21%	P = 0.75	OR = 0.48 (0.52-1.60)
It's sufficient to wear a condom to avoid contracting the infection	47%	26%	P = 0.28	OR = 0.93 (0.78-2.22)
A person may be infected by HPV and not be aware of it	75%	51%	P = 0.37	OR = 0.29 (0.73-2.26)

the questionnaires showed some elements that can improve the efficacy of a vaccination campaign. The main source of information is represented by the parents, who, in most cases, are also those that bring girls to the vaccination centre; even in this case, the family is one of the most important source of information, in agreement with previous studies [8, 9, 30, 45]. Since the majority of the respondents recognizes the informational role of parents, it could be important to support and improve the knowledge of this source of information; conversely, health care workers appeared to have a slightly lower frequency as information providers and it could be of interest to understand why.

The majority of the girls stated that it would be useful to discuss HPV vaccination at school, that could play an important preventive role, by providing information about the different risky behaviours: in this sense, specific interventions may also be useful to clarify the contradictory messages that have spread, which have a negative impact on adherence to vaccination campaigns [23]. Interestingly, it should be stressed that in Countries such as the UK, an effective, comprehensive and organised school communication campaign has allowed us to reach coverage greater than 90% [23].

The majority of respondents claimed to have received explanations about the vaccination and its justifications; however, when knowledge about HPV infection and its mode of transmission were investigated, there was a statistically significant difference between the levels of knowledge of the two groups, which was higher in the group of vaccinated girls. The knowledge in the group of 18 year olds, questioned even on the "most sensitive" themes, showed a lack of information about the infection, its consequences, and modes of transmission and prevention; being vaccinated improve significantly the

level of knowledge for few topics. It may therefore be important for health professionals and parents to be supported and to develop communication skills about sexuality [4, 17].

In the group of unvaccinated girls, both minors and adults, the lack of parental consent and of clarity of the information about the safety and efficacy of vaccination emerged as the main reasons behind this choice. One item worth noting is represented by the considerations of the involved teachers, who reported that the questionnaire was a first opportunity to address important issues to which little time and attention are usually devoted; at the same time the majority of the scholar said that could be interesting to discuss these topics at school; these findings are important to emphasize the role that school could have in sexual and health education.

Limitations of the study are the use of a convenience sampling, the peer influence of opinions between classmates and the issue of the reliability of the answers. Furthermore, the survey was conducted in the Torino area only, rather than opening up to different contexts, which could produce different results.

## Conclusions

In conclusion, the proposed prevention model is based on a twofold assertion: first, the centrality of the adolescent and his/her action in his/her own health choices and, second, the strong educational role of the adult, the school and health care professional. The communication campaign for the prevention of cervical cancer must therefore be characterised by messages able to reach new cohorts every year in order to clarify and consolidate messages that may have been partially received or

misunderstood; particularly the information about long term efficacy, the appropriate age of administration and safety of both vaccines.

## Acknowledgments

No funding sources participated to this research. Authors deny any existing or potential conflicts of interest of a financial, personal or any other nature that could affect or bias their research.

## Authors' contributions

CMZ conceived, designed and coordinated the research. MS and MVM collected data. MS, MVM and MRG performed the data quality control. MS and MVM optimized the informatics database. MS, MRG and MVM performed the statistical analyses and evaluated the results. MS wrote the manuscript. All Authors revised the manuscript and gave their contribution to improve the paper. All authors read and approved the final manuscript.

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■ Received on December 1, 2015. Accepted on June 14, 2016.

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