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CLINICAL ARTICLE

Knowledge of HPV infection and vaccination among vaccinated and unvaccinated teenaged girls

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ABSTRACT

Objective: To assess the knowledge of teenaged girls on human papillomavirus (HPV) infection and vaccination 12 months after the start of a vaccine administration and information campaign. *Methods:* Between May 15 and June 15, 2009, an anonymous questionnaire was given to 629 girls attending a secondary school in a northeastern Italian city (286 were vaccinated against HPV, 343 were unvaccinated) to investigate their knowledge on HPV infection, transmission, prevention, vaccination, and post-vaccination behaviors. The responses were evaluated with respect to the vaccination status of the participants. *Results:* Vaccinated teenaged girls had no more knowledge than unvaccinated ones about the route of HPV transmission, and the relationship between HPV and AIDS. Vaccinated girls had less knowledge than unvaccinated girls about preventing transmission by condom ($P = 0.003$) and about the correlation between HPV and penile cancer ($P = 0.034$) and warts ($P = 0.001$). Furthermore, compared with unvaccinated girls, more vaccinated girls believed that contraceptive pills might prevent HPV-related disease ($P = 0.001$). Vaccinated girls better understood the importance of performing regular Pap smears after vaccination ($P = 0.021$). *Conclusion:* Knowledge on HPV infection and vaccination remains suboptimal, especially among vaccinated teenaged girls, despite a broad information campaign. Misconceptions about the utility of secondary prevention may increase risky sexual behaviors.

1. Introduction

Human papillomavirus (HPV) vaccination, an effective tool with which to provide protection from HPV-related venereal pathologies, has been proposed for young girls by the Italian Public Health Authority. Target objectives were developed in accordance with international vaccination programs. It was planned that at least 80% of 12-year-old girls should be vaccinated within 5 years of the beginning of the campaign in Italy. The vaccination was offered free of charge by public services.

In the meantime, a national information campaign was conducted by means of national TV and radio, advertising, the press, and leaflets handed out at school. The information campaign involved adolescents, teenaged girls, and parents, and focused on the relationship between HPV infection and neoplastic and preneoplastic cervical lesions. Poor knowledge among adolescents and adults has been reported by previous studies both at the beginning of the campaign [1–8] and 12 months after the start of vaccine administration [9]. Other studies have shown that knowledge of HPV improved among young women 1 year after introducing the vaccine [10], among mothers of vaccinated girls [11], and among vaccinated young women attending university [12].

There are very few data on knowledge of HPV and vaccination among vaccinated teenaged girls. Proper education is needed among vaccinated teenaged girls to avoid a false sense of safety, which in turn may lead to more risky sexual behaviors. The aim of the present study was to evaluate knowledge of HPV infection and related lesions, and vaccination efficacy with respect to the vaccination status of girls living in a northeastern Italian town in order to detect knowledge deficiencies and areas of educational intervention.

2. Materials and methods

In a descriptive study, a questionnaire was offered to 1105 students (629 females and 476 males) attending a public secondary

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school in Pordenone, Italy, between May 15 and June 15, 2009. Informed consent was obtained from the school authorities before the study. The project was approved by institutional review board (RE:IRB-02-2011 Oncologic Reference Centre, Aviano, Italy).

The participants were selected on the basis of characteristics of the public vaccination program. The public vaccination program started in September 2008. The bivalent vaccine against HPV-16/18 is offered to all 12-year-old females, and was offered to 16-year-old girls until 2011. Not all girls who completed the questionnaire were vaccinated because not all parents let their daughters have the vaccination and not all girls attending secondary school were the target of vaccination.

The questionnaire was provided to students during school time with no preliminary explanation of the topic. The questionnaires were completed anonymously in 10 minutes.

The questionnaire included multiple-choice tests and 2 open questions. There were no questions about the reason for non-vaccination status. The questionnaire was prepared in accordance with the socio-cultural local background, and had been previously tested for comprehension on 25 teenaged girls attending the Gynaecological Oncology Unit of the Oncologic Reference Centre in Aviano, Italy.

The questionnaire started with questions about demographic data, followed by 6 multiple-choice questions about HPV infection and related diseases, and 6 questions about HPV vaccination, sexual behaviors, and prevention measures after vaccination.

Data on HPV knowledge were compiled as means and descriptive percentages. All answers were taken into consideration to evaluate the level of HPV awareness, whereas only answers from those who responded that they had some knowledge of HPV were considered to evaluate knowledge on the vaccine. The vaccinated group comprised girls who had received at least the first dose of vaccine out of 3.

Statistical analysis was carried out using OpenEpi version 2.3; the Student *t* test was used to make a comparison between means, and Fisher exact test was used to make a comparison between the 2 study groups (vaccinated and unvaccinated girls). A *P* value of less than 0.05 was taken to be statistically significant.

3. Results

All 1105 students filled out the questionnaire. There were 629 females who made up the objective of the present analysis. The average age of the girls was 15.8 years (range 13–20 years, median 16 years); unvaccinated girls were older than vaccinated girls (16.28 years vs 15.14 years; $P < 0.001$). Levels of knowledge on HPV are summarized in Table 1. Among the 629 participants, 584 (92.8%) knew about HPV: 97.9% of vaccinated (280/286) and 88.6% of unvaccinated (304/343) girls ($P < 0.001$). In total, 438/584 (75.0%) of the girls responded that sexual contacts were the only route of HPV transmission, whereas 113/584 (19.3%) girls believed that transmission of HPV infection may be through blood; there was no difference between vaccinated and unvaccinated girls.

Overall, 93.7% of the interviewed girls knew that cervical cancer is related to HPV infection (96.1% of vaccinated and 91.8% of unvaccinated girls; $P = 0.045$). Only 101 girls (17.3%) associated HPV with genital warts (11.8% of vaccinated and 22.4% of unvaccinated girls; $P = 0.001$). In addition, 61 girls (10.4%) associated HPV infection with penile tumor (7.5% of vaccinated and 13.2% of unvaccinated girls; $P = 0.034$). Among all participants, 110 (18.8%) associated HPV with AIDS, whereas 57 (9.7%) associated it with hepatitis, with no significant difference between vaccinated and unvaccinated girls (20.4% vs 17.4%, and 7.5 % vs 8.5% respectively).

In addition, 526 girls (90.1%) responded that the number of sexual partners is directly related to the risk of HPV-related lesions (92.1% of vaccinated and 88.2% of unvaccinated). More than half of the girls (326/584, 55.8%: 58.6% of vaccinated and 53.3% of unvaccinated) wrongly identified scarce personal hygiene among the risk factors for HPV-related lesions. Only 28 girls (4.8%) identified smoking among the risk factors (7.0% of vaccinated and 2.6% of unvaccinated girls; $P = 0.017$). Most girls (94.2%) knew that the condom is important for HPV prevention. There were no differences between vaccinated and unvaccinated girls about knowledge on diagnostic tests for HPV-related lesions.

Table 1
Knowledge on HPV infection in relation to vaccination status.

Knowledge	Vaccinated (n = 280)		Not vaccinated (n = 304)		*P* value[a]
	No.	% (95% CI)	No.	% (95% CI)	
Route of transmission					
Only sexual	211	75.4 (69.9–80.3)	227	74.7 (69.4–79.4)	0.924
Blood	55	19.6 (15.1–24.8)	58	19.1 (14.8–24.0)	0.945
HPV-related disease					
Cervical cancer	269	96.1 (93.1–98.0)	279	91.8 (88.1–94.6)	0.045
Warts	33	11.8 (8.3–16.1)	68	22.4 (17.8–27.5)	0.001
Penile cancer	21	7.5 (4.7–11.2)	40	13.2 (9.6–17.5)	0.034
AIDS	57	20.4 (15.8–25.6)	53	17.4 (13.3–22.2)	0.425
Hepatitis	21	7.5 (4.7–11.2)	26	8.5 (5.7–12.3)	0.754
Risk factors					
Number of partners	258	92.1 (88.4–95.0)	268	88.2 (84.0–91.6)	0.140
Scarce intimate hygiene	164	58.6 (52.6–64.4)	162	53.3 (47.5–59.0)	0.229
Smoke	20	7.0 (4.4–10.8)	8	2.6 (1.1–5.1)	0.017
Only number of partners	112	40.0 (34.2–46.0)	132	43.4 (37.8–49.2)	0.451
Prevention					
Condom and incorrect answers	263	93.2 (90.5–96.4)	287	94.4 (91.2–96.7)	0.942
Condom without incorrect answers	189	67.5 (61.7–73.0)	239	78.6 (73.6–83.1)	0.003
Do not mention condoms	17	6.1 (3.6–9.5)	17	5.6 (3.3–8.8)	0.942
Oral contraceptive	69	24.6 (19.7–30.1)	38	12.5 (9.0–16.8)	0.001
Intimate soaps	20	7.0 (4.4–10.8)	15	4.9 (2.8–8.0)	0.093
Diagnostic tests for HPV related lesions					
Smear test	206	73.6 (68.0–78.6)	244	80.3 (74.3–84.6)	0.068
Blood examination	71	25.4 (20.4–30.9)	67	22.0 (17.5–27.1)	0.397
Ultrasound scan	30	10.7 (7.4–14.9)	35	11.5 (8.2–15.7)	0.862
Physical examination	42	15.0 (11.0–19.7)	59	19.4 (15.1–24.3)	0.194
Pap smear ± physical examination	173	61.8 (55.8–67.5)	202	66.4 (60.8–71.7)	0.276

Abbreviation: CI, confidence interval.
[a] By Fisher exact test.