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Knowledge, attitude and practice in primary and secondary cervical cancer prevention among young adult Italian women

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ABSTRACT

In Italy since 2007 vaccination against human papillomavirus (HPV) is offered to 11-year-old females, whereas vaccination for older age groups is still a matter of debate. To assess Italian young women's knowledge, attitudes and practice regarding primary and secondary cervical cancer prevention a cross-sectional study among young women aged 18–26 years was conducted in 2008. The survey collected information on in-depth awareness and knowledge regarding Pap testing, HPV infection, HPV vaccine and cervical cancer. The response rate was 57.7% with a wide range of variability (34–84%) amongst local health units. Among 667 women who participated in the survey poor awareness and various

Abbreviations: KAP, knowledge attitude and practice; LHU, local health units.

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Pap smear
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HPV vaccine
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misconceptions regarding HPV and cervical cancer prevention were detected. Overall women were found to be more knowledgeable about Pap smears and cervical cancer than about HPV infection and the HPV vaccine. Respondents pointed to their healthcare providers as their most trusted source for medical information. Understanding women's knowledge on cervical cancer prevention, as well as related factors is important in helping to achieve and maintain adherence to cervical cancer preventive strategies. Moreover in order to minimize cervical cancer risk by improving women's adherence to preventive strategies, appropriate and adequate information dissemination, and guidance from health professionals appear to be crucial elements.

1. Introduction

Cervical cancer is the first cancer recognised by WHO to be completely related to an infection, i.e., to human papillomavirus (HPV) oncogenic genotypes infection [1]. It is estimated that over 50% of sexually active women acquire high risk HPV genotypes during their lifetime [2]. HPV infection usually resolves spontaneously, but it may persist and precancerous lesions may follow [3,4]. The progression of HPV infection to cervical cancer occurs over an extended period of time [5]. Therefore, early detection through cervical cytology-based screening programmes targeting women aged 25–64 years is an effective preventive strategy [6]. Cervical cancer remains a cause of morbidity and mortality, causing approximately 3500 new cases and 1000 deaths yearly in Italy [7]. In our country a publicly funded national screening programme actively offering Pap-smear testing every three years to women aged 25–64 years, covers around 40% of the target population with wide geographical variability. Nevertheless the majority of Italian women undergo Pap-smears in the private health sector and national sample surveys report an overall screening coverage of 73% of women aged 25–64 years through both the public and the private health sectors. [8].

In 2007 the European Medicines Agency licensed two vaccines for prevention of lesions due to HPV genotypes 16 and 18 which cause approximately 70% of HPV-related cancers [9,10]. Because the vaccines have maximum efficacy when given before sexual debut, most countries have recommended routine vaccination in girls aged 11–12 years [11]. The acceptance of HPV vaccine by young adult women depends on a range of factors including awareness of HPV infection as a determinant of cervical cancer.

In December 2007 the Italian Ministry of Health introduced HPV vaccination for girls aged 11 years into the national immunisation schedule. However, the rapid introduction of the vaccine in the country did not allow time for developing a comprehensive communication strategy and gathering information regarding Italian young women's knowledge and attitude toward HPV infection and prevention and information on these issues is still lacking [12–14].

In order to evaluate the opportunity to implement a publicly funded catch-up vaccination programme for women aged 18–26 years, the Ministry of Health funded research projects to evaluate HPV prevalence by age and geographical area, assess young women's knowledge, attitudes and practice regarding HPV infection and vaccination, investigate their acceptance of HPV vaccine and perform cost-effective simulation analyses.

The survey presented in this article is part of a national project (PreGio) coordinated by the Italian National Health Institute (Istituto Superiore di Sanità – ISS) and sponsored by the Ministry of Health. The aim of the survey was to evaluate knowledge, attitudes and practices (KAP) regarding cervical cancer, Pap testing, HPV infection and HPV vaccination among women aged 18–26 years. This information will be useful to support the decision-making process regarding the opportunity to extend free HPV vaccination to women aged 18–26 years.

2. Methods

2.1. PreGio project

Overall the PreGio project involved 2289 women aged 18–26 years stratified in two age groups (18–24 years and 25–26 years). Women were randomly selected from the lists of the resident population of ten participating Local Health Units (LHU) located in six Italian Regions: Abruzzi and Campania in southern Italy, Lazio and Tuscany in central Italy and Emilia–Romagna and Piedmont in northern Italy. Selected LHUs all have active organised cervical cancer screening programmes. Women were invited to participate in the study by letter and were subsequently contacted by trained midwives of the competent LHU. In total three attempts were made to contact each woman by telephone. Midwives were also instructed to perform home visits (a maximum of two attempts) to trace women whom they were unable to contact by telephone. In order to promote women's participation in the project, general practitioners were also informed by letter of the project.

Pregnant women and non Italian-speaking women were excluded from the study.

Enrolled women were randomised 1:1 into four groups according to the different procedures offered:

1. Counselling on cervical cancer prevention, Pap test and HPV test.
2. Counselling on cervical cancer prevention, Pap test, HPV test and KAP survey.
3. Counselling on cervical cancer prevention, Pap test, HPV test and HPV vaccine.
4. Counselling on cervical cancer prevention, Pap test, HPV test, HPV vaccine and KAP survey.

The four groups consisted respectively of 559, 571, 575 and 584 women. All women were offered informative counselling on cervical cancer prevention, a Pap-test and an HPV test (HPV Prevalence arm). In addition, Groups 2 and 4 were offered a face-to-face interview (KAP survey arm) while Groups 3 and 4 were offered HPV vaccination (HPV vaccination arm).

Each participant received a personal identification number that allowed linkages among the three study arms.

The project was approved by the national ethics committee of the Istituto Superiore di Sanità.

2.2. KAP survey

Women randomised to the KAP survey were interviewed by trained midwives at the LHU Cancer Screening Centres. All interviewers attended a two-day training course organised by the ISS and received a written interviewer's manual.

Four regions completed the study between February and June 2008 while two regions did so between October and December 2008.

A structured questionnaire was designed by a multidisciplinary team and tested among 50 women aged 18–26 years. Copies of the questionnaire are available from the authors (in Italian).

The interview lasted about 20 min. Written informed consent was obtained from each participant. Women were informed that the information collected during the interview was confidential and anonymous.

The questionnaire included a brief description of the survey's scope and methodology and was made up of 51 closed and pre-coded questions, organised in five sections: Pap-testing, HPV infection, HPV vaccine, cervical cancer and personal history. The first three sections (25 questions) investigated the type and amount of information received by women about Pap-testing, HPV infection and HPV vaccination, with special regard to sources of information, perceived quality and satisfaction. Women's attitudes toward Pap-testing and HPV vaccination were also explored. Section 4 (2 questions) covered personal and family history of HPV infection and cervical cancer. The last section (Section 5; 23 questions) collected information about sexual and reproductive history, personal habits (smoking habits, use of automobile safety belts and motorbike helmets) and socio-demographic characteristics.

2.3. Statistical analysis

Fourteen questions selected from the first three sections of the questionnaire were used to compute a woman's *knowledge score* (range 0–14); these are listed in Table 3. A low level of knowledge was defined as score < 7 and high level of knowledge as a score ≥ 7.

Three questions attaining to personal life style in the previous 6 months (smoking habits, use of automobile safety belts and motorbike helmets) were used to compute a *prevention index*. The prevention index is a "*yes*/*no*" variable built with the following algorithm: "*yes*" indicating the regular use of automobile safety belts and/or of motorbike helmets and/or never having smoked; "*no*" indicating any other case

Data collection was performed at the local level while data entry and statistical data analysis was performed at ISS, using STATA Package version 11.0 (Stata Corporation, College Station, Texas, USA). Categorical variables were summarised by absolute frequencies and percentages, and continuous variables by means and standard error (SE). The Chi-square test, Fisher's exact test and Chi-square for trend test were used to compare proportions.

Odds ratios and their 95% confidence intervals were calculated to assess the associations between selected variables. Variables showing potentially interesting associations with $p < 0.10$ were included into two logistic regression models and retained in the final model according to a log-likelihood-ratio test for goodness-of-fit in order to controlling for possible confounding factors. Two outcomes were considered: women's level of knowledge expressed through the *knowledge score* (*high level* ≥ 7 vs. *low level* < 7), and women's willingness to undergo HPV vaccination (*yes* vs. *don't know*). Only 40 interviewed women stated they would not undergo HPV vaccination. This dependent variable was therefore not used in the logistic model. The following independent variables were used in the multivariate analysis: age at interview, geographical residence, education, prevention index, parity, willingness to undergo HPV vaccination, age at first intercourse, lifetime number of partners, sexual history, contraceptive methods used at last intercourse, frequency of condom use, previous Pap-smear, anxiety about acquiring an HPV infection, self perception of personal HPV infection risk and nationality. The personal identification number attributed to each participant allowed linkages among the KAP survey arm and the HPV prevalence and HPV vaccination arm of the whole PreGio project.

3. Results

A total of 1155 women were selected for the KAP survey, 120 (10.4%) of whom did not meet the study's inclusion criteria and were replaced. One-hundred forty eight women (12.8%) could not be traced and 335 (29.0%) refused to participate. Of the remaining 672 women 5 opted for participation in other parts of the PreGio project but not in the KAP survey. Overall, 667 women participated in the survey. The response rate was 57.7% with a wide range of variability (34–84%) amongst LHUs. No significant differences were found in terms of age distribution ($p = 0.147$) and educational level ($p = 0.113$) between responders and non-responders.

Table 1
Sample socio-demographic characteristics ($n = 667$).

Socio-demographic characteristics		*n*	%
Age	18–20 years	130	19
	21–24 years	251	38
	25–26 years	286	43
Education	Primary or middle school degree	145	22
	High school degree	390	59
	College degree or more	129	19
Profession	Students	288	44
	Employed	279	42
	Unemployed	63	9
	Housewives	34	5
Marital status	Single	591	89
	Married	72	11
	Divorced	1	0.1
Cohabitation	Lives with her parents	499	75
	Lives with her partner	104	16
	Lives alone	31	5
	Lives with friends/colleagues	26	4

3.1. Study population

Table 1 shows the main socio-demographic characteristics of the interviewed women. The mean age of the women was 23.6 ± 0.1 years (mean ± SE). Eighty-nine percent of the interviewed women were single, 78% had a high level of education (≥13 years) and 75% lived with their parents.

With regard to women's sexual and reproductive health history, 89% were nulliparous and 86% were sexually active. The reported mean and median ages at first intercourse were respectively 18 and 17 years with no significant differences among the two age groups and geographical areas. Eighty nine percent of the sexually active women had a single sexual partner in the previous 6 months. Fourteen percent used no contraception at the last sexual intercourse, 13% used low efficacy methods (natural methods, withdrawal), 48% used a condom and 29% the pill or vaginal ring. The answers regarding contraceptive use are not mutually exclusive: the total is therefore greater than 100%. Among interviewed women 30% used condoms regularly at every sexual intercourse, 16% used them frequently, while 54% rarely or never used them. Twenty four percent had a history of sexually transmitted infections but only five women reported an identified previous HPV infection.

With regard to life-style habits, the vast majority of interviewed women reported always using safety belts (79%) and motorbike helmets (81%). Approximately 50% of the sample had never smoked cigarettes and 66% of smokers smoked less than 10 cigarettes per day.

3.2. Knowledge about cervical cancer prevention

Ninety-two percent of the sample had heard about Pap-smears prior to the interview, 83% had heard about cervical cancer, 59% about HPV infection and 52% about the HPV vaccine. Reported sources for information regarding Pap-smears, HPV infection and HPV vaccine are listed in Table 2. The vast majority of women

Table 2
Information sources about Pap-smear, HPV and vaccine.

	Pap-smear		HPV		Vaccine (reported)		Vaccine (expected)	
	n	%	*n*	%	*n*	%	*n*	%
Friends/family members	403	60	181	27	134	20	28	4
Media	76	11	151	23	185	28	–	–
Gynaecologist	204	31	89	13	56	8	366	55
General Practitioner	83	12	50	8	52	8	324	49
Maternal & Child Health Centers	20	3	20	3	17	3	108	16
Vaccination Centers	–	–	–	–	–	–	81	12
Pharmacist	–	–	–	–	–	–	5	1
Internet	10	2	32	5	24	4	31	5
Do not know, do not remember	8	1	14	2	13	2	–	–

obtained information through friends and media but would have preferred being informed by a healthcare professional. In Table 2, information sources about HPV vaccine are divided into "reported", meaning the sources from whom or which interviewed women actually obtained information about the vaccine and "expected", indicating the information sources they would prefer. In some columns of the same table the sum of percentages exceed 100 because several answers were possible for each question.

Table 3 shows the percentage of correct answers to the questions investigating women's knowledge about HPV, Pap-smears and the HPV vaccine. Approximately two thirds of the sample knew that HPV can cause cervical cancer and that HPV infection may be prevented but only 21% was aware that the majority of infections regress spontaneously. Sixty-five percent knew that Pap-smears prevent cervical cancer but only 27% was aware that the recommended interval for performing smears is three years. Fifty-seven percent believed Pap testing should be performed annually, 4% believed it should be performed every five years and 12% did not know. Thirty-nine percent was aware that the HPV vaccine prevents 70% of cervical cancers, 15% believed it prevents around 50% of cervical cancers, 7% around 30%, 8% believed it prevents all cervical cancers and 32% did not know how to answer.

Table 4 shows results of a logistic regression model to measure the likelihood of obtaining a high knowledge score on primary and secondary cervical cancer prevention. The knowledge score was used as a dependent variable (high level ≥ 7 vs. low level < 7). Having a high educational level (OR = 1.54; 95%CI: 0.98–2.41), and having undergone a Pap-smear (OR = 1.40; 95%CI: 0.97–2.02), were both found to be statistically associated with a higher level of knowledge. Being sexually active and being of foreign nationality were also associated with a high knowledge score, but associations were not significant. On the contrary, having one or more children and being unsure about HPV vaccination were both found to be associated with lower knowledge scores.

3.3. Attitudes toward and practice about HPV infection and HPV vaccine

Fifty-nine percent (394) of women reported being worried about acquiring an HPV infection, 33% (220) were not worried or only minimally worried and 8% (49) did not know. Matching the respondents' answers to the results of the HPV prevalence study arm, 14%, 20% and 23% respectively of each of the three groups tested positive for high risk HPV (hrHPV).

Twenty percent (132) of the respondents perceived themselves to be at very high or fairly high risk of acquiring an HPV infection, 57% (377) at low risk or no risk and 23% (155) did not know. Respectively 21%, 19% and 28% of the three groups tested positive for high risk HPV.

Seventy-two percent of the respondents indicated that they would accept being vaccinated against HPV infection, 22% would require more information before a deciding while 6% would refuse the vaccine.

Eighty-seven percent (237) of women who stated that were in favour of being vaccinated ultimately received the vaccine, as well as 58% (36) of those who requested more information and 25% (6) of those who had stated that they would refuse the vaccine.

The most important reasons given for deciding to accept or refuse HPV vaccination were the opportunity to prevent an important disease, physician advice and cost of the vaccine. Ninety-one percent of women reported that they would continue to undergo regular Pap-testing following vaccination and 70% would continue to use condoms.

Table 5 describes a logistic regression model about the intention to undergo HPV vaccination. Women with a high knowledge score (OR = 2.46; 95%CI: 1.52–3.99), those with more than one sexual partner (2–4 partners: OR = 1.87; 95%CI: 1.16–3.00; ≥ 5 partners: OR = 2.27; 95%CI: 1.09–4.75), and those who were fairly and very worried about getting an HPV infection (OR = 4.20; 95%CI:

Table 3
Women's kowledge about HPV, Pap-smear and HPV vaccine.

	Correct answer		Wrong answer		Do not know	
	n	%	*n*	%	*n*	%
HPV may cause cervical cancer	494	74.1	173	25.9	–	–
HPV infections are preventable	505	75.7	33	5.0	129	19.3
HPV is a sexualy transmitted disease	433	64.9	88	13.2	146	21.9
HPV infections are frequent	423	63.4	72	10.8	172	25.8
Sometimes an HPV infection can last years	389	58.4	30	4.5	247	37.1
HPV may infect both, men and woman	276	41.4	197	29.6	193	29.0
Most HPV infections resolve spontaneously	140	21.0	302	45.4	224	33.6
HPV may infect you without symptoms	497	74.6	37	5.6	132	19.8
HPV may cause genital warts	59	8.8	608	91.2	–	–
HPV may cause other anogenital cancers (penis, anus)	57	8.5	610	91.5	–	–
Pap-smear prevents cervical cancer	418	62.9	204	30.3	45	6.8
Pap-smear is very or relatively effective in preventing cervical cancer	590	88.6	12	1.8	64	9.6
Pap-smear every 3 years	182	27.5	401	60.7	78	11.8
HPV vaccine prevents around 70 of cervical cancers	142	38.7	109	29.7	116	31.6

Table 4
Likelihood of having a high knowledge score about primary and secondary cervical cancer prevention.

Variables		*n* (%)	Univariate analysis		Logistic regression	
			OR_{crude}	95%CI	OR_{adj}	95%CI
Age groups	18–24 years	181(47.5)	1	–		
	25–26 years	137(47.9)	1.02	0.75–1.38		
Educational level	Low (≤8 years)	52(35.9)	1	–	1	–
	High (>8 years)	266(51.2)	1.88	1.28–2.75	1.54	0.98–2.41
Sexual intercourse	Yes	266(46.4)	1	–		
	No	52(55.9)	1.46	0.94–2.27		
Number of partners	1	98(47.8)	1	–		
	2–4	126(44.4)	0.87	0.61–1.25		
	≥5	42(50.0)	1.09	0.66–1.81		
Geografical area of residence	Centre	70(51.8)	1	–		
	North	112(43.1)	0.70	0.46–1.07		
	South	136(50.0)	0.93	0.61–1.40		
Condom use	Never/rarely	150(48.5)	1	–		
	Always/often	116(44.1)	0.84	0.60–1.16		
Smoking habits	Never	154(47.4)	1	–		
	Smoker	132(48.0)	1.02	0.74–1.41		
	Ex-smoker	26(44.8)	0.90	0.51–1.58		
Pap-test	She never underwent	199(44.7)	1	–	1	–
	She underwent in the past	113(52.6)	1.37	0.99–1.90	1.40	0.97–2.02
HPV vaccine	Would accept	253(52.2)	1	–	1	–
	Would not accept	24(60.0)	1.37	0.71–2.65	1.16	0.55–2.45
	Does not know, requires more information	40(28.6)	0.37	0.24–0.55	0.38	0.24–0.59
Age at first sexual intercourse	>17 years	135(50.4)	1	–		
	≤17 years	131(42.9)	0.74	0.53–1.03		
Use of high efficacy contraceptive methods	No	67(46.5)	1	–		
	Yes (condom, IUD, pill, vaginal ring)	199(46.4)	0.99	0.68–1.45		
Parity	Nulliparous	248(48.8)	1	–	1	–
	≥1 child	18(27.7)	0.40	0.23–0.71	0.40	0.22–0.74
Prevention index	No	30(49.2)	1	–		
	Yes	288(47.5)	0.93	0.55–1.58		
Nationality	Foreign	17(34.0)	1	–		
	Italian	290(48.7)	1.84	1.00–3.37		

2.08–8.49) were found to have a higher probability of accepting the vaccine. Older women (aged 25–26 years OR = 0.48; 95%CI: 0.31–0.75) and those who reported using condoms regularly (OR = 0.64; 95%CI: 0.41–0.99) had a higher probability of refusing vaccination.

4. Discussion

In accordance with the international literature [15–18] our study reports poor awareness and various misconceptions regarding HPV and cervical cancer prevention among young women and an association between level of knowledge and socio-economic factors such as women's educational level and nationality.

Caution should be exercised when comparing our results to other studies exploring knowledge of HPV because of different methodologies and target populations. The systematic review of Klug et al. published in 2008, analysed 39 studies conducted in 11 countries and reported an overall poor knowledge about HPV infection with wide variability (10–85%) within groups due to different sex and age classes of study participants. Awareness of HPV and cervical cancer were associated with ethnicity, demographics, socio-cultural and economical background of the samples investigated [15]. Moreover a recent systematic review [16] examined measures of HPV and HPV-vaccine knowledge, attitudes, beliefs and acceptability in published studies and concluded that more rigorous methodology and validation of measures are needed.

Overall in the present survey, women were found to be more knowledgeable about Pap smears and cervical cancer than about HPV infection and the HPV vaccine, probably due to the cervical cancer screening programmes available in the involved LHUs since many years. Over 60% of participating women knew that Pap-smears prevent cervical cancer, as confirmed by a recent Italian survey involving young women aged 14–24 years [12], but less than 30% was aware of the recommended interval between Pap-smears. Having undergone a Pap-smear was associated with better knowledge scores. Few respondents reported discussing HPV or HPV vaccine with their practitioner or others health professionals but this may be partly due to the fact that data were collected only shortly after the vaccine had became available in Italy. In this survey, women pointed to their healthcare providers as their most trusted source for medical information. However a need for improving communication between women and health providers is evident. Education level was also positively associated with awareness about cervical cancer prevention.

Most of the interviewed women seem to be aware of the causal relationship between HPV infection and cervical cancer. However, awareness does not necessarily imply correct knowledge and our data suggest that many respondents do not understand the transient nature of most HPV infections, the asymptomatic quality of HPV infection and the connection between HPV and genital warts.

Table 5
Intention of undergoing HPV vaccination.

Variables		*n* (%)	Univariate analysis		Logistic regression	
			OR_{crude}	95%CI	OR_{adj}	95%CI
Knowledge score	Low	232 (69.9)	1	–	1	–
	High	253 (86.3)	2.73	1.81–4.10	2.46	1.52–3.99
Worried about getting HPV infection	Does not know	24 (48.0)	1	–	1	–
	Less/no	146 (73.7)	3.04	1.61–5.76	2.02	0.98–4.16
	Very/fairly	314 (83.5)	5.49	2.96–10.18	4.20	2.08–8.49
Age group	18–24 years	293 (81.6)	1	–	1	–
	25–26 years	192 (72.2)	0.58	0.40–0.85	0.48	0.31–0.75
Educational level	Low (≤8 years)	101 (75.4)	1	–		
	High (>8 years)	382 (78.3)	1.18	0.75–1.84		
Sexual intercourse	Yes	417 (77.5)	1	–		
	No	68 (79.1)	1.09	0.63–1.91		
Number of partners	1	136 (70.5)	1	–	1	–
	2–4	216 (80.9)	1.77	1.15–2.74	1.87	1.16–3.00
	≥5	65 (83.3)	2.09	1.07–4.10	2.27	1.09–4.75
Geografical area of residence	Centre	108 (83.7)	1	–		
	North	190 (78.2)	0.70	0.40–1.22		
	South	187 (73.9)	0.55	0.32–0.95		
Condom use	Never/rarely	234 (81.2)	1	–	1	–
	Always/often	183 (73.2)	0.63	0.42–0.95	0.64	0.41–0.99
Smoking habit	Never	233 (75.9)	1	–		
	Smoker	206 (80.2)	1.28	0.86–1.92		
	Ex-smoker	38 (71.7)	0.80	0.42–1.54		
Pap-test	She never underwent	321 (76.1)	1	–		
	She underwent in the past	159 (80.7)	1.32	0.87–2.00		
Self perception of personal HPV infection risk	Does not know	96 (63.6)	1	–		
	Less/no	285 (80.5)	2.37	1.55–3.61		
	Very/fairly	104 (86.7)	3.72	2.00–6.94		
Age at first sexual intercourse	>17 years	194 (77.0)	1	–		
	≤17 years	223 (78.0)	1.06	0.70–1.59		
Use of high efficacy contraceptive methods	No	101 (77.7)	1	–		
	Yes (condom, IUD, pill, vaginal ring)	316 (77.4)	0.99	0.61–1.58		
Parity	Nulliparous	369 (76.9)	1	–		
	≥1 child	48 (82.8)	1.44	0.71–2.95		
Prevention index	No	41 (77.4)	1	–		
	Yes	444 (77.6)	1.01	0.52–1.99		
Nationality	Foreign	39 (81.2)	1	–		
	Italian	430 (77.3)	0.79	0.37–1.67		

These results highlight the difficulties in conceptualizing HPV as an infectious agent with different potential severity and consequences.

Predictors of perceived risk for HPV infection were consistent with previous studies [15–18] and participants who were sexually active and those with multiple sex partners felt more at risk.

The availability of results from the prevalence arm of the PreGio study allowed the detection of high-risk HPV genotypes among survey respondents. Women who stated that they would refuse the vaccination had the highest percentage of high-risk HPV virus positivity (30%). It is not evident whether these participants stated that they would refuse vaccination because they were already aware of being at high risk for HPV infection or for other reasons. Results show a discrepancy between perceived risk of infection and HPV positivity. In fact, 19% of women who perceived themselves not to be at risk for HPV infection tested positive for high-risk HPV virus. High-risk HPV virus was also frequently detected in women who did not know whether they were at risk (28%) or whether they were worried about HPV infection (23%). Finally, after controlling for vaccine acceptance among women randomised to both the vaccine and KAP survey study arms, we found that 58% of women who were initially unsure about vaccination ultimately accepted to be vaccinated. The above results highlight the need for better comprehension of the decision-making processes related to perceived risk and acceptance of preventive measures among young women. A meta-analytic review of theory of planned behaviour [19] has reported, for example, that intention to get vaccinated may not reflect future behaviour and that differences between intention and action can be considerable. A recent Danish study [20] has also found significant discrepancies between intention to get vaccinated and HPV vaccination uptake among young women. In the present survey, as in a previous Italian survey who reported similar acceptance rates of the HPV vaccine, recommendation of the vaccine by a health professional is a strong predictor of vaccine receipt [12]. In accordance with other surveys [21,22], multivariate analysis showed that intention to undergo HPV vaccination was associated with a high knowledge score, having multiple sexual partners and a high self-perceived risk of HPV infection. Similarly to studies conducted in other countries [20,23–25], acceptance of HPV vaccine appears to be influenced by beliefs about disease severity, recommendation by a health professional and vaccine characteristics such as cost. In our study, having had five or more sexual partners was associated with an increased propensity to undergo vaccination, possibly because these women consider themselves

to be at high risk for HPV infection although HPV vaccine provides the greatest benefit prior to HPV exposure. Despite low levels of awareness about HPV infection, few young women have the false beliefs that the HPV vaccine will protect them against other sexually transmitted infections other than HPV, or that it will obviate their need for cervical cancer screening. Also, most women reported that they would continue to use condoms after vaccination. It is worthy to note that both of the above messages have been strongly advertised during the HPV communication campaigns in Italy. Analogous results have been reported by a recent Swedish population-based study [26].

The major strengths of this study are: the 18–26 years target group which has not been investigated extensively by past studies, the large sample size, the use of population-based sampling and the opportunity to link the information gathered from the three arms of the PreGio study.

Study limitations include the cross-sectional design of the study and the fact that our sample is not representative of the general female Italian population aged 18–26 years because recruitment was limited to only six of 21 Italian Regions. Nevertheless local probabilistic samples are population-based and participating regions were distributed in northern, central and southern Italy. Also, both urban and rural LHUs were involved.

The proportion of respondents was low (58%) with substantial variability between participating LHUs (range 35–84%). We therefore cannot exclude a selection bias. However results were in agreement with those of other similar studies which suggests that if a bias exists, its impact should be limited.

Previous research indicates that few women name HPV as the cause of cervical cancer in case of open-ended questions. The adoption of a closed-ended questionnaire, like ours, on the contrary, facilitates *recall memory* and may have contributed to overestimate the real level of knowledge of participating women.

A further limitation is that awareness and knowledge of HPV and cervical cancer among young women may have changed in the three years elapsed since data collection.

5. Conclusions

In order to minimize cervical cancer risk by improving women's adherence to preventive strategies, appropriate and adequate information dissemination and guidance from health professionals appear to be crucial elements. Although knowledge is not a direct predictor of health behaviour we believe it represents a key first step to the success of any health intervention. As health professionals play a major role in women's decision-making process, their knowledge and counselling abilities should also be evaluated and improved if necessary. In a recent publication of the results of the Pregio project regarding HPV vaccination among young adult women in Italy [27], the study group concluded that it is still premature to offer this vaccination to older women (18–26 years) and this may divert resources from vaccinating the primary target. Nevertheless, in view of the persistence of inequalities of access to cervical cancer screening programmes across Italy [28] and the probability that HPV testing and the HPV vaccine will play important roles in future prevention strategies, improving knowledge of HPV in high-risk women represents a priority.

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