

# Knowledge about human papillomavirus and the human papillomavirus vaccine in Belgian students

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**Introduction** The aim of this study was to examine the knowledge of Belgian university students about the human papillomavirus (HPV) and HPV–vaccination.

**Material and methods** During a period of two months we administered an online questionnaire, which contained 29 questions, to 3332 students of the Free University of Brussels. Of the 433 completed questionnaires, 346 were included by age (18–30 years) and completeness of responded questionnaires. These formed the study group.

**Results** Of the 346 included questionnaires (76% female), 48% were completed by medical students. The majority (65%) knew that both genders could be infected with HPV. Ninety–five percent of all medical students were aware of the existence of HPV, while 92% knew of the possibility to be vaccinated against the virus. Ninety percent of them were aware of the causal relationship between HPV infection and cervical cancer. 46% of the medical students were aware that HPV can cause anogenital cancers, and only 28% knew that HPV–vaccination could protect them against genital warts. Sixty percent of all female students were fully vaccinated against HPV, without any difference between medical and non–medical students. A very small part of all students (3%) believed that vaccination against HPV could enhance a promiscuous lifestyle.

**Conclusions** Almost 80% of respondents were aware of the existence of the human papillomavirus, its morbid potential and the HPV–vaccination.

**Key Words:** human papillomavirus ↔ HPV–vaccination ↔ cervical cancer ↔ online surveys

## INTRODUCTION

Today, more than 200 types of the human papillomavirus (HPV) are known [1]. HPV type 6 and 11 are low risk types, mainly responsible for genital warts. HPV type 16 and 18 are high risk types, which are responsible for 70% of all cervical cancer cases [2, 3]. Eighty percent of all sexually active women will get infected with HPV during their lifetime, but the women will clear most of the infections within the year [4, 5]. Nevertheless, cervical cancer is the third most frequent female cancer worldwide, with the majority of cases in developing countries [6]. In Belgium,

as in Europe, the incidence is 12/100,000 per year, mostly between 30 and 50 years [7, 8].

The Belgian government promotes an opportunistic screening campaign for cervical cancer. Women between 25 and 64 years of age are invited to have a PAP–smear every 3 years. Since 2007 the government of the Northern part of Belgium has started a, free of charge, campaign to vaccinate girls between 12 and 16 years with the anti–HPV vaccine [9]. We suppose that young students, who are included in this campaign, are more aware of the human papillomavirus, since they have been vaccinated and informed.

The aim of this study is to describe the knowledge about HPV and HPV-vaccination in the free University of Brussels (VUB).

## MATERIAL AND METHODS

### Study population

Students of the Free University of Brussels (Dutch-speaking) between the ages 18–30 received an online questionnaire between 01.03.2012 and 30.04.2012. The ethical committee of the University Hospital of Brussels approved the study protocol.

3332 students were invited to complete an electronic questionnaire. First, the participants could read an informed consent. If they agreed, the questionnaire was started. The respondents had the free choice to fill in the questionnaire or not.

The privacy of the participants was guaranteed. No personal information of the participants was asked or stored. Furthermore, the software prevented participants from completing the questionnaire more than four times on the same computer. Analysis was only done on fully completed questionnaires.

### Questionnaire

The questionnaire is derived from existing models [10, 11].

We opted for an online questionnaire. Processing was done using the digital platform of the Faculty of Medicine and Pharmacy (MINF) of the Dutch-speaking University of Brussels. The data was gathered by means of a Personal Home Page Hypertext Preprocessor (PHP) program and immediately stored in a Structured Query Language (SQL) database.

The questionnaire covered 5 different areas: demographic information about the participants, their knowledge about HPV and the HPV-vaccine, the vaccination status of the responders and, at last, the satisfaction of the personal knowledge about HPV and HPV-vaccination.

We questioned student's sexual activity (vaginal, oral or anal) in the past month.

We defined unsafe sex as sex with more than one partner and without a preservative (a condom).

### Statistical analysis

IBM SPSS Statistics for MAC 19® (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Fisher exact test and Mid P exact test were used to compare the groups. We compared medical and non-medical students, men and women, students younger than

22 years and older than 21 years, and finally Catholic students *versus* non-believers.

A p-value <0.05 was considered statistically significant.

## RESULTS

The online survey was sent in an email to 3332 students of whom 433 answered (13%). Eighty-seven of them were incomplete or did not meet the inclusion criteria as stated in the abstract, and were thus excluded. As a result, 346 questionnaires were included for analysis.

### Demographics

The majority of the respondents were female (76%). The mean age was 21.4 years (range 18–30; SD 2.41) (Table 1). Table 1 shows that 48% of the participants studied medicine. We noted 39% Catholic, 54% atheist, 5% Muslim students and 1% Jehovah's Witnesses.

### Knowledge about the human papillomavirus

Eighty-eight percent of female and 85% of male students had heard about HPV. The link between HPV and cervical cancer was known by 82%. The majority knew that both genders could be infected with HPV. Not surprisingly, medical students had a better knowledge of HPV and HPV-related problems. Differences in knowledge between medical and other students were the fact that HPV causes infections in men and women and the role of HPV in genital warts and anogenital cancers.

We found statistically significant differences in knowledge about HPV between medical and non-medical students (Table 2). No differences in knowledge between male and female, nor between believing and nonbelieving students were observed.

**Table 1.** Participants' characteristics (n = 346)

	N (%)
Gender	
Male	84 (24)
Female	262 (76)
Faculty of the students	
Medicine	166 (48)
Law	95 (28)
Engineering	45 (13)
Political and social sciences	26 (7.5)
Physiotherapy	14 (4.1)

**Table 2.** Knowledge about the human papillomavirus (HPV) in medical and in non-medical students (n = 346) – Correct answers

Question	Correct answer	Medical students (n=166)	Non-medical students (n=180)	P-value
HPV is sexually transmitted	Yes	145 (87%)	141 (78%)	0.027
HPV infections are rare	No	161 (97%)	173 (96%)	0.884
HPV causes cervical cancer	Yes	150 (90%)	134 (74%)	<0.001
HPV may infect both, men and women	Yes	134 (81%)	92 (51%)	<0.001
The incidence of HPV is highest among women in their 20's and 30's	Yes	83 (50%)	67 (37%)	0.017
Most genital HPV infections are symptomatic	No	145 (87%)	166 (92%)	0.133
HPV causes genital warts	Yes	105 (63%)	54 (30%)	<0.001
HPV may cause other anogenital cancers (penis, anus)	Yes	77 (46%)	47 (26%)	<0.001

**Table 3.** Knowledge about the HPV-vaccine compared between medical and non-medical students (n = 346) – Correct answers

Question	Correct answer	Medical students (n=166)	Non-medical students (n=180)	P-value
The HPV vaccine should be given before the first sexual intercourse	Yes	149 (90%)	138 (77%)	0.001
There is a vaccine that protects against genital warts	Yes	47 (28%)	20 (11%)	<0.001
Once vaccinated, women no longer have to be screened for cervical cancer	No	164 (99%)	178 (99%)	0.999
The HPV vaccine prevents around 70 percent of cervical cancers	Yes	89 (54%)	74 (41%)	0.020

### Knowledge about the HPV-vaccine

294 students (85%) were in some way informed that an HPV-vaccine was available (92% medical and 78% non-medical students). However, there was much less knowledge about the role of the vaccine in the prevention of cervical cancer. Reported information channels were the media (34%), parents (30%), healthcare professionals (18%), school (18%) and one student claimed to have been informed by a brochure of the Flemish government. 83% of students knew that the vaccine should be given before their first sexual intercourse and nearly every student (98%) knew that with vaccination cervical screening did not cease to be performed. 19% were aware of the additional protection against genital warts.

Differences between medical and non-medical students are reported in Table 3.

### Risk profile

Fifty-five percent of the students were sexually active. The number of sexual partners varied between one (16%), two to four (17%) and five or more (9%). Thirteen percent of sexually active students did not respond to this question.

Twelve percent reported that they had unsafe sex one month before having answered the questionnaire.

### Vaccination status

Twelve students (5%) had a positive PAP-smear. Sixty percent of the female students had received all three doses of the vaccine, while 2% had received only one or two vaccines. No difference in vaccination status was observed between medical and non-medical students. However, there was a statistically significant difference in vaccination status between the younger and older ones: 82% of the students aged 21 or younger received the anti-HPV vaccine, while only 38% of the students older than 21 got the complete vaccine schedule (p-value <0.001).

### Vaccination campaign

Half of the students agreed that sexual behavior should be discussed before HPV vaccination. Only few students (3%) thought that this vaccination could enhance a promiscuous life style.

Finally, the majority of students thought that confirmation of the efficacy and safety of the vaccine is still needed. There was a general agreement among

students that follow-up concerning the safety and efficacy of the vaccine is warranted.

## DISCUSSION

In our study, only 47% of all students were aware of the Belgian governmental screening campaign for cervical cancer. Most of the students, however, were below 25 years of age and did not belong to the target population.

In 2007 the government started a free of charge campaign to vaccinate girls between 12 and 16 years old to prevent them against HPV infection. Actually the vaccination is free for all girls in the first year of high school, and the vaccine is reimbursed for all girls between 12 and 18 years.

HPV vaccination is an excellent instrument to prevent HPV-related malignancies, especially if the vaccination is performed before the first sexual contact. However, its efficacy is less when given after the first sexual intercourse [12].

Several studies elucidated the knowledge of people on HPV-screening and HPV-vaccination [13–18]. However, most of these studies focus on racial or ethnic groups. Black participants, for instance, were less knowledgeable about HPV compared with the white population [10]. A few studies examined the knowledge of this topic in the general population [10, 11]. Our study examined the knowledge of male and female university students. Therefore, some form of education-bias is evident. Furthermore, our results are even more biased by the fact that nearly half of the respondent were students in medicine.

Our university students were aware that HPV is known as a sexually transmitted virus. Nevertheless, 12% still acknowledged having “unsafe” sex with one or more partners. Only a small minority of the participants feared that preventive HPV-vaccination should give rise to an unprotected and promiscuous sex life. The link between HPV and cervical cancer was well-known, but the knowledge about the

possible relationship between HPV and genital warts and other anogenital cancers was limited (Table 2). All this information leads us to the conclusion that although there is a high vaccination rate in our country, a limited knowledge exists about HPV itself.

Eighty-two percent of the students aged 21 or younger were vaccinated against HPV, while only 38% of the students older than 21 were vaccinated. This is probably due to the reimbursement criteria of the Belgian government, which states that as of 2007 only girls between the ages 12 and 16 are vaccinated free of charge. Furthermore, the vaccination rate in medical *versus* non-medical students was identical (Table 3). Religion did not seem to influence the results. This may lead us to the conclusion that medical knowledge about HPV and religion is not very important in convincing the students to get vaccinated against HPV.

Compared to our results the American population is more aware of HPV ( $p$ -value = 0.002) and the HPV-vaccine ( $p$ -value = 0.017) [10]. Further differences in knowledge between the Belgian and American population were very heterogeneous. One important issue for the American population is that sexuality must be discussed before giving the HPV-vaccine. They strongly believe that HPV-vaccination campaigns will enhance the sexual risk behavior. In our study, half the number of students agreed that sexual behavior should be discussed before HPV vaccination, but only 3 percent of all students thought that this vaccination should give rise to an unprotected and promiscuous sex life.

Compared to an Italian study population, our study group had significantly higher knowledge about HPV [11]. This can be explained by the high number of medical students in our study population, compared to the Italian participants who presented with different backgrounds and education levels. They studied an older population (mean age 23.6 *vs.* 21.4). Furthermore, only 19% of the Italian students had a college degree, while in our study all participants were college students. This is shown in Table 4.

**Table 4.** Knowledge, attitude and practice in primary and secondary cervical cancer prevention among young adult Italian women

	Correct answer	Belgian study (n=346)	Italian study (n=667)	P-value
HPV is sexually transmitted	Yes	17%	35%	0.000
HPV infections are rare	No	97%	63%	0.000
HPV causes cervical cancer	Yes	82%	74%	0.004
HPV may infect both, men and women	Yes	65%	41%	0.000
Most genital HPV infections are symptomatic	No	90%	75%	0.000
HPV causes genital warts	Yes	46%	9%	0.000
HPV may cause other anogenital cancers (penis, anus)	Yes	36%	9%	0.000

Cervical cancer is an important health problem. Thanks to regular screening by PAP-smears, morbidity and mortality has been strongly reduced in our Western population [19]. Vaccination and early detection seem to be the most adequate instrument to prevent cervical cancer in the future. However, the HPV vaccine has not been on the market for a sufficient period to evaluate its long-term efficacy. To obtain a strong reduction in global morbidity and mortality, it is also important to reduce the morbidity in developing countries. Due to logistic constraints, the set-up of an efficient screening program is mostly impossible in these areas. A preventive HPV-vaccination campaign could change HPV incidence in these areas. A significant price reduction is certainly necessary for the developing countries.

## CONCLUSIONS

HPV vaccination is an excellent instrument to prevent against HPV infection and HPV-related malignancies. In general, the knowledge about HPV and HPV-vaccination is very good. Nevertheless, the knowledge and HPV awareness were significantly higher when participants followed a form of medical education.

83% of the participants knew that HPV is a sexually transmittable disease and 82% knew that HPV infection and cervical cancer could be prevented by the HPV-vaccine. Only 19% knew about the protective role of the HPV-vaccine against genital warts.

Future promotion campaigns should focus on the protective role of HPV-vaccination against genital warts and other anogenital cancers.

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## APPENDIX

Survey “Knowledge about Human Papillomavirus and the HPV vaccine in Belgian students”

### PART 1

#### Demographic classification

1. What is your age?
2. What is your gender?
  - Female
  - Male
3. What is your postal code?
4. What is your nationality?
  - Belgian
  - Other:
5. Which faculty did you study at?
  - Faculty of Medicine and Pharmacy
  - Faculty of Economics, Social and Political Sciences and Solvay Business School
  - Faculty Psychology and Educational Sciences
  - Faculty of Sciences and Bio-Engineering
  - Faculty of Law and Criminology
  - Faculty of Literature and Philosophy
  - Faculty of Engineering Sciences
  - Faculty of Physiotherapy and Physical Education
  - Other:
6. What is the highest degree obtained by your mother
  - Primary School
  - Lower High School
  - Higher High School
  - College
  - University
  - Other:
7. What is the highest degree obtained by your father?
  - Primary School
  - Lower High School
  - Higher High School
  - College
  - University
  - Other:
8. What is your religion
  - Catholic
  - Atheist
  - Muslim
  - Other:

### PART 2

#### Knowledge

1. Have you ever heard of the human papilloma virus (HPV)?
  - Yes
  - No
2. The next questions consists of 10 statements, which you have to judge with absolutely disagree, disagree, neutral, agree or completely agree

	Absolutely disagree	Disagree	Neutral	Agree	Completely agree
Have you ever heard of the human papilloma virus?					
HPV is a non-sexually transmittable disease.					
HPV infection does not occur often.					
HPV causes cervical cancer.					
Both men and women can be infected by HPV.					
HPV appears more in females from the age 20-30 years.					
Most people with HPV-infection have symptoms.					
HPV causes genital warts					
Genital warts are caused by the same types of HPV as cervical cancer.					
There is a treatment for HPV-infection.					
HPV causes other forms of anogenital cancer (p.e. penis cancer and anal cancer).					

3. Have you ever heard of a vaccine against HPV?
  - Yes
  - No
4. You will be given 4 statements on the vaccine against HPV. As stated above, you will have to answer these statements with absolutely disagree, disagree, neutral, agree or completely agree

	Absolutely disagree	Disagree	Neutral	Agree	Totally agree
Have you ever heard of a vaccine against HPV?					
The HPV-vaccine should be administered before the first sexual contact.					
An HPV-vaccine that protects against genital warts also exists.					
Once vaccinated, women do not need to be screened for cervical cancer anymore.					
The HPV-vaccine prevents about 70% of all cervical cancer cases.					

5. Where did you first hear about the vaccine against cervical cancer?

- Parents and family
- Friends
- GP
- Gynaecologist
- School
- Internet
- Radio, TV
- Newspaper, magazine
- Other:

**PART 3**  
**Risk profile**

1. Have you had sex with a man in the past month (vaginal, oral or anal)?

- Yes
- No

2. Have you had sex with a woman in the past month (vaginal, oral or anal)?

- Yes
- No

3. With how many different men have you had sexual contact in the past (vaginal, oral or anal)?

- 0
- 1
- 2
- 3
- 4
- 5
- >5
- No answer

4. With how many different women have you had sexual contact in the past (vaginal, oral or anal)?

- 0
- 1
- 2
- 3
- 4
- 5
- >5
- No answer

5. How many times have you had vaginal, oral or anal sex in the past month outside of a relationship and without a condom?

- 0
- 1
- 2
- >2
- No answer

**PART 4**  
**Vaccination status**

1. How many times a year do you visit your GP?

- Several times a year
- Once a year
- Less than once a year
- Never

2. How often do you have a PAP-smear?

- Once a year
- Once every 2 years
- Once every 3 years
- Once every 5 years
- Never
- Other:

3. Have you ever had to return for a positive PAP-smear?

CONDITION: Having answered "Female" for question 2.

- Yes
- No

4. Are you vaccinated against cervical cancer?

CONDITION: Having answered "Female" for question 2.

- Yes
- No
- I don't know

5. Have you had all 3 injections?

CONDITION: Having answered "Female" for question 2 and "Yes" for question 22.

- Yes (3 injections)
- No (1 or 2 injections)
- I don't know

## 6. Why not?

CONDITION: Having answered "Female" for question 2 and "No" for question 22.

- I have never thought about it.
- I have never heard of this vaccination until now.
- I find it too expensive.
- I am against vaccination.
- I am older than 18 and do not get refund for the vaccination.
- I think it would be inefficient as I have had (several) sexual partners in the past.
- I don't believe in its purpose because there is no long term proved yet.
- I find it too experimental.
- I am afraid of the side effects.
- I am afraid of the long term side effects.
- I think I can't be infected with the HPV.
- Other:

## 7. Would you like to be vaccinated against HPV?

- Yes
- No
- I don't know

8. Why would you like to be vaccinated against HPV?  
CONDITION: Having answered "Yes" for question 25.

- Prevention against sexually transmitted diseases (STD).
- Prevention against cancer.
- Prevention against genital warts.
- Other:

## 9. Why not?

CONDITION: Having answered "No" for question 25

- I find it pointless because I am not sexually active.
- I am afraid of injections.
- I am afraid of the side effects of injections.
- I am not afraid to get genital warts.
- I am not afraid to get cancer.
- I am against vaccination.
- My GP or gynaecologist discouraged it.
- For religious reasons.
- Other:

## PART 5: Vaccination campaign

## 1. If you want to talk to someone about sexually related subjects, who do you go to?

- A friend
- A parent
- A brother or a sister
- A teacher
- A GP
- A gynaecologist
- Nobody
- Other:

## 2. Here are 8 statements. Please fill in as noted above with totally disagree, disagree, neutral, agree or fully agree.

	Totally disagree	Disagree	Neutral	Agree	Fully agree
I find I know enough about HPV-vaccination.					
I think it is necessary to discuss sexuality before mentioning the HPV-vaccine to teenagers.					
I find that vaccination against HPV promotes sexual risk behaviour.					
More clarity should be given around the efficacy of the HPV-vaccine.					
I think men and women should have the HPV-vaccine.					
I find vaccination against HPV useless for men.					
I find vaccination against HPV useful for homosexual men because they have a higher risk for genital infections.					
I am aware of the vaccination campaign of the Flemish governments against HPV-infection and cervical cancer.					