CLINICAL ARTICLE

Awareness of HPV infection and attitudes toward HPV vaccination among Latvian adolescents

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Synopsis: Awareness of HPV infection and its consequences among Latvian adolescents was poor, which might explain the low levels of HPV vaccine uptake in this population.

ABSTRACT

Objective: To evaluate awareness of HPV and its vaccine among Latvian adolescents.

Methods: A cross-sectional survey was conducted in a 2-week period in September 2015 among 270 adolescents attending a secondary school in Riga, Latvia. All students present during sexual-health classes (grades 10–12 [aged 16–21 years]) were included. A self-administered paper-based survey assessed sociodemographic factors, sexual behaviours, smear history and knowledge of sexually transmitted infections, HPV and HPV vaccine knowledge, and sources of information.

Results: Overall, 121 surveys were completed (62 by male students and 59 by female students). Latvian adolescents lacked awareness of HPV: only 26 (21.5%) had heard of HPV (21 [35.6%] female students vs 5 [8.1%] male students; $P<0.001$) and 12 (9.9%) of the HPV vaccine. Eighty (66.1%) participants felt inadequately informed about HPV. However, the adolescents partook in high-risk behaviours: 70 (57.9%) students were sexually active, 26 (37.1%) of whom had already had three or more sexual partners.

Conclusion: Despite the high prevalence of HPV in Latvia, poor knowledge about HPV infection among adolescents might explain low uptake of the HPV vaccine by this high-risk population. Therefore, educational strategies that highlight the consequences of HPV could promote acceptance of vaccination.

1 INTRODUCTION

The burden of cervical cancer in Latvia is high. From 1989 to 2011, the incidence increased from 8.9 per 100 000 individuals to 23.4 per 100 000 individuals [1]. Despite a total population of less than 2 million, 284 new diagnoses were made in 2012; cervical cancer is now the second most frequent cancer in Latvia to affect women aged 15–44 years [2].

A state-funded national cervical screening program was implemented in 2009 that was followed, in 2010, by the introduction of primary prevention in the form of HPV vaccination [2]. Persistent infection with high-risk HPV genotypes is responsible for almost all cases of cervical cancer [3], as well malignancies of the head and neck, anus, vulva, and penis [4]. HPV is one of the most common sexually transmitted infections (STIs) that is highly prevalent in the young sexually active population [5]. The prevalence of HPV in Eastern Europe is estimated to be as high as 21.4%, compared with a global prevalence of 11.7% [6]. Data on HPV prevalence in Latvia are scarce; however, estimates published in 2007 showed an overall rate of 26.2% [7].

Primary prevention with HPV vaccination has been successful in other countries with high vaccine uptake, such as Australia [8]. Furthermore, these countries have reported decreases in the prevalence of vaccine-targeted HPV genotypes, the incidence of genital warts, and the incidence of high-grade cervical abnormalities [8]. In Latvia, all girls aged 12 years are eligible for fully state-funded HPV vaccination. Delivery of the vaccine has been through a combination of schools and primary care

health centers [2]. Vaccine coverage data indicate that uptake was approximately 53.4% in 2012 [9]; however, more up-to-date information has not yet been published.

Knowledge of HPV and its vaccine among adolescent girls is one of the key predictors of vaccine uptake in this population [10]. Williams et al. [11] reported that adolescent girls had limited understanding and knowledge; therefore, they did not fully appreciate their risk of acquiring HPV infection and were unable to provide informed consent for HPV vaccination. Knowledge of HPV among European adolescents was previously found to be poor in a systematic review [12]. Nonetheless, that analysis did not include data from Latvia.

The aim of the present study was to determine the level of knowledge regarding HPV and its vaccine among a group of Latvian adolescents 5 years after the introduction of the national vaccination program.

2 MATERIALS AND METHODS

A cross-sectional survey was conducted in a 2-week period in September 2015 at a secondary school in Riga, Latvia. School selection was based on the requirement to include students who were eligible for HPV vaccination (age ≥12 years) and was narrowed down by the established associations of the Latvian coauthors (KP and KS). Approval for the present study was obtained from the ethics commission board of the University of Latvia, Riga. Participant consent was implied by completion of the survey.

A paper-based survey was administered to students (grades 10–12 [aged 16–21 years]) during sexual-health teaching sessions. Students attending these classes were selected for the present analysis because they were felt to be of the most culturally and ethically acceptable age to administer a survey related to sexual-health behaviors and STIs. All students who attended the sessions were eligible for inclusion in the present study. The anonymous survey was distributed at the beginning of the session and the students were given 20 minutes to complete it.

The survey was developed following an extensive literature search of published survey studies on HPV and HPV vaccination knowledge among adolescents [12]. Appropriate questions were selected [13] and adapted for the Latvian population. The survey was developed in English and then translated into Latvian.

The final survey comprised six sections that assessed sociodemographics, smoking status, sexual behaviors, smear history and STI knowledge, HPV and HPV vaccine knowledge, and sources of HPV-related information. Most of the 30 questions included in the survey were closed and had a multiple-choice answer format. The knowledge questions had a “true/false/do not know” answer format. The responses were numerically coded for the analysis.

The data were analyzed using SPSS version 22 (IBM, Armonk, NY, USA). Descriptive statistics were generated for the responses. The χ^2 or Fisher exact tests were used as appropriate for the analysis. The *P* values were assessed using two-sided tests, with statistical significance taken as a cutoff of less than or equal to 0.05. Each survey question was analyzed individually to account for missing responses.

3 RESULTS

Three sexual health sessions were held for each grade (30 students per session), resulting in a total sample size of 270. The surveys were completed by 121 students (44.8% response rate); 62 (51.2%) respondents were male and 59 (48.8%) were female.

The sociodemographic characteristics of the participants are outlined in Table 1. Almost all participants were of white Latvian ethnic origin. Table 2 shows smoking status and sexual behaviors. All five students aged 19 years or older and 45 (73.8%) of the 61 students aged 18 years were sexually active, compared with 20 (36.4%) of 55 aged 16–17 years (P<0.001). Two (40.0%) students aged at least 19 years reported having had three or more sexual partners.

Condoms were the most popular form of contraception among both male and female participants (Table 2). Although only 4 (5.7%) of the 70 sexually active participants stated that they did not use any contraception, 26 of 66 students who did use contraception (39.4%) disclosed that they did not use it on every occasion.

Eight (13.6%) female participants stated they had previously received a cervical smear test; 12 (20.3%) were unsure whether or not they had undergone such testing. The median age at first smear test was 17 years (range 14–18).

The participants' knowledge of STIs is presented in Table 3. Some students were unable to name even one STI. The inability to name any STIs decreased with

increasing age: 3 (33.3%) of 9 aged 16 years could not name one, compared with 8 (17.4%) of 46 aged 17 years, and 4 (6.6%) of 61 students aged 18 years (P=0.042). All participants aged older than 19 years could recall at least one STI. There was no difference between the sexes in the ability to name STIs (P=0.240) (Table 3). The most commonly named STI was HIV/AIDs; few students named HPV (Table 3). In all, 26 (21.5%) respondents had heard of HPV, with female students exhibiting greater awareness than male students (P<0.001) (Table 3).

Among the 26 participants who had heard of HPV, more than two-thirds correctly identified sexual intercourse as a mode of transmission and approximately one-quarter correctly identified genital skin-to-skin contact (Table 3). Some participants erroneously stated that HPV transmission occurs through blood transfusion and the use of public toilets. The use of condoms, vaccination, and good personal hygiene were thought to confer protection against HPV. When asked about conditions caused by HPV, 19 (73.1%) students knew of the association with cervical cancer, with female students having a greater level of awareness than male students (P=0.010) (Table 3). Few participants were aware of the association with genital warts and none identified the link with penile cancer; one-fifth thought that HPV was the cause of HIV/AIDs.

Few students had heard of the HPV vaccine, with awareness more common among female participants than male participants (P=0.007) (Table 3). Four (3.3%) participants (all female) reported having received the vaccine. The students' responses revealed that they believed the age at which HPV vaccination is recommended in Latvia ranged from 11 to 18 years. Assessment of the detailed HPV

knowledge section of the survey revealed that six of the 11 female students who had heard of the vaccine had left the questions unanswered. By contrast, the one male student had selected the “not sure” option for all the questions. Among the five female students who had attempted to answer these questions, four were aware of the three-dose vaccine schedule and appreciated the level of protection offered by vaccination; three correctly identified the need for cervical screening and the reduced, but not eliminated, risk of cervical cancer following vaccination. Four of the female students understood that the HPV vaccine does not provide protection against all STIs.

Overall, 5 (4.1%) students felt adequately informed about HPV, whereas 80 (66.1%) disagreed that they were adequately informed. The most popular sources of information about HPV were the internet, school, and doctors (Table 3).

No association was found between HPV awareness and other sociodemographic factors (Table 4).

4 DISCUSSION

The present study demonstrated that awareness of HPV and its vaccine among Latvian adolescents was poor. Detailed knowledge was also lacking; however, it was difficult to draw any firm conclusions given that so few of the participants had even heard of HPV or the vaccine.

Although most of the respondents correctly identified sexual intercourse as the mode of viral transmission, recognition of the role of genital skin-to-skin contact was

undervalued. Other researchers have noted similar misconceptions among adolescents, including the belief that transmission occurs through the use of public toilets and poor intimate hygiene [14]. Most of the students enrolled in the present study were knowledgeable about the causative relationship between HPV and cervical cancer, but not of that between HPV and genital warts or penile cancer. One possible explanation for this is that, when the HPV vaccine was introduced, the emphasis might have been on its role in the prevention of cervical cancer rather than any other association. Alternatively, it could stem from the belief that, by minimizing the connection of HPV with genital warts, the stigma associated with this condition as an STI might be reduced and so vaccine acceptance would be increased [15].

Female sex was the only factor that correlated with increased awareness of HPV and the HPV vaccine in the present study. This finding was in agreement with previous studies in both adolescent [12] and adult populations [16]. Thus far, female individuals have been the main focus for prevention of HPV infection and/or its resultant conditions. However, there is now increased appreciation of the equal burden of HPV infection among male individuals and the possible serious long-term consequences with regards to the risk of malignancies of the anus, penis, oral cavity, and oropharynx [4]. To address this situation, and increase herd immunity, the HPV vaccine is being offered to male adolescents in the USA, Canada, Australia, and Austria [17]. However, the vaccine is not currently recommended for male adolescents in Latvia.

The present study found that general awareness of STIs was deficient, with some participants unable to recall even one STI. This result was surprising given that the

survey had been administered during a sexual health class. HIV/AIDS were by far the most commonly mentioned STIs, which is probably reflective of the extensive global awareness campaigns for HIV/AIDS that have taken place since the 1980s [18]. Education about HIV/AIDS appears to have eclipsed that of other STIs, even though the prevalence of HPV among adolescents is higher than that of HIV/AIDS [19]. By contrast with HPV awareness, no sex-related difference was found with regard to awareness of STIs in general among participants in the present study.

The high rates of sexual activity (including the total number of partners) reported by the present study participants indicated that Latvian adolescents engage in high-risk behaviors. Multiple sexual partners increases the chance of both acquisition and persistence of infection with high-risk HPV genotypes [20]. Most respondents stated that they used contraception; however, approximately two-fifths admitted that this practice was not always the case. Condoms were the most frequently used form of contraception. Using condoms might not necessarily prevent infection with HPV, as infection can occur and/or be transmitted from an epithelial surface that is not covered; nevertheless, this method could still provide protection against the development of HPV-related conditions [21].

Although approximately 50.0% of the respondents in the present study knew that the HPV vaccine could reduce the risk of infection, only four female students had undergone vaccination. This low level of uptake was reported despite the fact that the vaccine has been offered free of charge to all Latvian girls aged 12 years since 2010 [2]; therefore, most of the female students in the present cohort would have been eligible for free vaccination. Increased vaccine-related knowledge positively

correlates with vaccine uptake [10]. Additionally, attitudes and perceptions of the parents to HPV vaccination are believed to play a part [22]. Latvian parents' attitudes toward the HPV vaccine have not been explored; however, uptake of cervical cancer screening is suboptimal [23], with maternal screening behaviors linked to HPV-vaccine initiation [24].

The recommended age for commencement of cervical cancer screening in Latvia is 25 years [1]. Nonetheless, eight of the females enrolled in the present study had already undergone a cervical smear test (none of these students had received the HPV vaccine). This observation suggests that this particular subgroup either themselves or through the beliefs of their parents appreciated the need to prevent cervical cancer but believed that secondary prevention is superior to primary prevention.

Most of the students in the present study felt inadequately informed about HPV. The main sources of knowledge were the internet, school, and doctors. Communicating HPV-related knowledge to adolescents is a challenge and the optimum method to achieve this aim has yet to be identified [25]. Physicians find it difficult to talk about the HPV vaccine and are less likely to endorse it than other childhood vaccines [26], resulting in a lowered intention to be vaccinated among patients.

The present study had some limitations. The sample size is fairly small and therefore the representativeness of these data could be questioned. However, the data have provided some insight for this previously unstudied group. An element of bias might have been introduced by administering the survey during a sexual-health class.

Nonetheless, the students did not perform very well, despite this potential advantage. The low rate of survey completion could indicate disengagement of the students with the topic of sexual health, because despite been given an allocated time during the class to complete the survey, more than half opted not to do so. Interpretation of the detailed HPV knowledge questions was limited; few students had heard of HPV or its vaccine, and many left the knowledge questions unanswered (although this finding in itself might be perceived as lack of knowledge).

In summary, uptake of the HPV vaccine must be greatly increased among Latvian adolescents to achieve a substantial impact on the high prevalence of HPV infection in this country. Vaccine acceptance might be enhanced, and participation in high-risk behaviors decreased, through increased awareness and education on HPV and STIs.

Author contributions

HP, SMS, and ELM designed the initial study concept and devised the protocol. KP, KS, IV, and DR assisted with the translation of surveys and with the conduct and set up of the study in Latvia. HP performed the data analysis. DGT and CWR provided guidance on refinement of the protocol and data analysis. All authors equally contributed to manuscript preparation and review.

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Conflict of interest

The authors have no conflicts of interests.

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Table 1 Sociodemographic characteristics.[a]

Characteristic	Total (n=121)	Male students (n=62)	Female students (n=59)
Age, y [b]	18 (16–21)	ND	ND
Ethnic origin [b]			
White Latvian	119 (99.2)	61 (100.0)	58 (98.3)
Asian	1 (0.8)	0	1 (1.7)
Religion [c]			
Roman Catholic	22 (18.6)	14 (23.7)	8 (13.6)
Lutheran	37 (31.4)	15 (25.4)	22 (37.3)
Christian (other)	5 (4.2)	4 (6.8)	1 (1.7)
Jewish	2 (1.7)	0	2 (3.4)
Hindu	2 (1.7)	1 (1.7)	1 (1.7)
Buddhist	3 (2.5)	0	3 (5.1)
Prefer not to say	10 (8.5)	5 (8.5)	5 (8.5)
Atheist	17 (14.4)	11 (18.6)	6 (10.2)
Other (not specified)	20 (16.9)	9 (15.3)	11 (18.6)

Abbreviation: ND, not determined.

[a] Values are given as median (range) or number (percentage).

[b] One response from male student missing.

[c] Three responses from male students missing.

Table 2 Smoking status and sexual behaviors.[a]

Variable	Total (n=121)	Male students (n=62)	Female students (n=59)	*P* value [b]
Do you smoke?				0.909
Yes	18 (14.9)	9 (14.5)	9 (15.3)	
No	103 (85.1)	53 (85.5)	50 (84.7)	
Have you been sexually active?				0.249
Yes	70 (57.9)	39 (62.9)	31 (52.5)	
No	51 (42.1)	23 (37.1)	28 (47.5)	
No. of sexual partners [c]				0.435
1	27 (38.6)	14 (35.9)	13 (41.9)	
2	17 (24.3)	8 (20.5)	9 (29.0)	
≥3	26 (37.1)	17 (43.6)	9 (29.0)	
Type of contraception used [c]				
Condoms	60 (85.7)	38 (97.4)	22 (71.0)	0.004
Oral contraceptive pill	5 (7.1)	0	5 (16.1)	NA
No contraception	4 (5.7)	1 (2.6)	3 (9.7)	0.315 [d]
Other	1 (1.4)	0	1 (3.2)	NA
Always uses contraception [e]				0.599
Yes	40 (60.6)	22 (57.9)	18 (64.3)	
No	26 (39.4)	16 (42.1)	10 (35.7)	

Abbreviation: NA, not applicable.

[a] Values are given as number (percentage), unless indicated otherwise.

[b] Calculated using the χ^2 test; $P \leq 0.05$ was considered statistically significant.

[c] Assessed among the male students (n=39) and female students (n=31) who were sexually active.

[d] Calculated using the Fisher exact test owing to small sample size.

[e] Assessed among the male students (n=38) and female students (n=28) who used contraception.

Table 3 Knowledge of STIs, HPV, and the HPV vaccine.[a]

Variable	Total (n=121)	Male students (n=62)	Female students (n=59)	*P* value [b]
No. of STIs named				0.240
0	15 (12.4)	4 (6.5)	11 (18.6)	
1	42 (34.7)	20 (32.3)	22 (37.3)	
2	39 (32.2)	27 (43.5)	12 (20.3)	
3	25 (20.7)	11 (17.7)	14 (23.8)	
Most commonly named STIs [c]				
HIV/AIDs	96 (90.5)	51 (87.9)	45 (93.8)	0.308
Syphilis	33 (31.1)	24 (41.4)	9 (18.8)	0.012
Gonorrhea	24 (22.6)	15 (25.9)	9 (18.8)	0.384
Herpes	22 (20.8)	13 (22.4)	9 (18.8)	0.643
HPV	8 (7.5)	2 (3.4)	6 (12.5)	0.137
Hepatitis	7 (6.6)	3 (5.2)	4 (8.3)	0.699
Chlamydia	7 (6.6)	3 (5.2)	4 (8.3)	0.699
Have you heard of HPV?				<0.001
Yes	26 (21.5)	5 (8.1)	21 (35.6)	
No	81 (66.9)	51 (82.3)	30 (50.8)	
Not sure	14 (11.6)	6 (9.7)	8 (13.6)	
How is HPV transmitted?[d,e]				
Sexual intercourse	18 (69.2)	3 (60.0)	15 (71.4)	0.628
Blood transfusion	3 (11.5)	1 (20.0)	2 (9.5)	0.488
Genital skin-to-skin contact	7 (26.9)	2 (40.0)	5 (23.8)	0.588
Using public toilets	1 (3.8)	1 (20.0)	0	0.192
Not sure	6 (23.1)	1 (20.0)	5 (23.8)	>0.99
How can you reduce your risk of getting HPV?[d,e]				
Condoms	21 (80.8)	3 (60.0)	18 (85.7)	0.236
Oral contraceptive pill	0	0	0	NA
HPV vaccine	13 (50.0)	2 (40.0)	11 (52.4)	>0.99
Good personal hygiene	9 (34.6)	2 (40.0)	7 (33.3)	>0.99
Antibiotics	0	0	0	NA
Do not know	3 (11.5)	1 (20.0)	2 (9.5)	0.488
Which conditions are caused by HPV?[d,e]				
Cervical cancer	19 (73.1)	1 (20.0)	18 (85.7)	0.010
Genital warts	7 (26.9)	3 (60.0)	4 (19.0)	0.101
HIV/AIDs	5 (19.2)	1 (20.0)	4 (19.0)	>0.99
Hepatitis	2 (7.7)	1 (20.0)	1 (4.8)	0.354
Infertility	4 (15.4)	0	4 (19.0)	0.555
Penile cancer	0	0	0	NA
None of the above	0	0	0	NA
Have you heard of the HPV vaccine?				0.007
Yes	12 (9.9)	1 (1.6)	11 (18.6)	
No	84 (69.4)	47 (75.8)	37 (62.7)	
Not sure	25 (20.7)	14 (22.6)	11 (18.6)	
Have you had received the HPV vaccine?				0.081
Yes	4 (3.3)	0	4 (6.8)	
No	72 (59.5)	36 (58.1)	36 (61.0)	
Not sure	45 (37.2)	26 (41.9)	19 (32.2)	
Can boys have the HPV vaccine?				0.562
Yes	6 (5.0)	3 (4.8)	3 (5.1)	
No	4 (3.3)	1 (1.6)	3 (5.1)	
Not sure	111 (91.7)	58 (93.5)	53 (89.8)	
Sources of HPV-related				

information [f]				
Parents	4 (5.8)	0	4 (10.0)	0.133
School	24 (34.8)	10 (34.5)	14 (35.0)	0.964
Doctors	17 (24.6)	6 (20.7)	11 (27.5)	0.517
TV	8 (11.6)	5 (17.2)	3 (7.5)	0.266
Radio	1 (1.4)	1 (3.4)	0	0.420
Magazines and/or newspapers	3 (4.3)	1 (3.4)	2 (5.0)	>0.99
Internet	26 (37.7)	9 (31.0)	17 (42.5)	0.332

Abbreviations: STI, sexually transmitted infection; NA, not applicable.
[a] Values are given as number (percentage), unless indicated otherwise.
[b] Calculated using the χ^2 or Fisher exact test; a *P* value ≤0.05 was considered statistically significant.
[c] Among the 106 participants who named ≥1 STI (58 male, 48 female).
[d] Among the 26 participants who had heard of HPV (5 male, 21 female).
[e] Participants were asked to select all of the true options.
[f] Among 69 participants (29 male, 40 female).

Table 4 Associations between sociodemographic factors and awareness of HPV.[a]

Variable	Have you heard of HPV?		*P* value [b]
	Yes	No	
Age, y			0.419
≤17	10 (18.2)	45 (81.8)	
≥18	16 (24.2)	50 (75.8)	
Religion			0.479
Roman Catholic	2 (9.1)	20 (90.1)	
Lutheran	10 (27.0)	27 (73.0)	
Other [c]	6 (18.8)	26 (81.3)	
Prefer not to say	2 (20.0)	8 (80.0)	
Atheist	5 (29.4)	12 (70.6)	
Smoking status			>0.99 [d]
Non-smoker	22 (21.4)	81 (78.6)	
Smoker	4 (22.2)	14 (77.8)	
No. of sexual partners			0.088
0	9 (17.6)	42 (82.4)	
1	3 (11.5)	23 (88.5)	
2	7 (41.2)	10 (58.8)	
≥3	7 (26.9)	19 (73.1)	

[a] Values are given as number (percentage), unless indicated otherwise.
[b] Calculated using the χ^2 test; $P \leq 0.05$ was considered statistically significant.
[c] Outcomes for variables were aggregated to form large groups to account for outliers.
[d] Calculated using the Fisher exact test owing to small sample size.