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Assessment of Knowledge about the Human Papillomavirus and Factors Influencing the Attitude Towards Recommended Protective Vaccinations against HPV among the Inhabitants of the Lodz Voivodeship

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Karolina Tchórzewska[1]
https://orcid.org/0000-0002-6298-5250

Jakub Tchórzewski[2]
https://orcid.org/0000-0001-8616-5006

Aleksandra Ksel[3]
https://orcid.org/0009-0009-7226-0198

Adam Rzeźnicki[4]
https://orcid.org/0000-0002-9926-721X

Dominika Cichońska-Rzeźnicka[4]
https://orcid.org/0000-0001-8623-4307

Jan Krakowiak[4]
https://orcid.org/0000-0002-3435-9658

1 University Clinical Hospital of the Military Medical Academy in Lodz, Poland
2 Medical Simulation Center, Medical University of Lodz, Poland
3 Independent Public Health Care Institution of the Ministry of Internal Affairs and Administration in Kielce, Poland
4 Department of Social Medicine, Medical University of Lodz, Poland

Address for correspondence

Karolina Tchórzewska
University Clinical Hospital of the Military Medical Academy in Lodz
113 Żeromskiego St.
90-549 Lodz, Poland
tchorzewska.karolina1@gmail.com

Abstract

Background: *HPV (human papilloma virus) is one of the most common viral infections and almost every sexually active person will be infected with it during their lifetime. Infection may be asymptomatic or clinically manifest causing multiple disease units. There is primary prevention available in the form of recommended protective vaccinations.*

Objective: *To assess knowledge about the human papillomavirus and factors influencing the attitude towards recommended HPV vaccinations among the inhabitants of the Lodz Voivodeship.*

Material and methods: *Original online survey questionnaire consisting of 20 questions. The study involved 134 participants.*

Results: *80.6% of the respondents knew what the abbreviation HPV means. 75.0% of them correctly identified the route of sexual contact as the route of the virus transmission. The majority, i.e., 85.1%, of those surveyed indicated cervical cancer as a disease that may be the result of HPV infection. 92.5% of respondents were aware of the existence of the HPV vaccine, while 72.9% of them were aware that it was recommended for both girls and boys. 92.3% of those who had been vaccinated in the past supported the recommended protective vaccinations, as well as 52.4% of those who had not been vaccinated, and 46.2% of those with unknown vaccination history*

Conclusions: *Medical workers were more knowledgeable about the human papillomavirus than non-medical workers, so physicians should constantly educate their patients. People who were vaccinated in the past have a more positive attitude towards vaccination than people were not vaccinated. Information campaigns should be organized for the inhabitants of the Lodz Voivodeship to promote knowledge about pathogenicity, risk factors, and HPV prevention and its methods.*

Key words: *HPV, vaccination, human papillomavirus, prophylaxis*

Background

HPV (human papilloma virus) is one of the most common viral infections and it causes a number of symptoms in both women and men [1]. Almost every sexually active person will become infected during their lifetime [2]. HPV is a non-enveloped DNA virus [3]. There are several hundred types of the virus, and HPV infection may be asymptomatic, mildly symptomatic, or clinically overt. In most cases, self-healing occurs. Virus types with low and high oncogenic potential can be distinguished. Highly oncogenic types, which include types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58 and 59, increase the risk of developing, among other things, cervical, anal, or vulvar cancer. HPV infection is the major risk factor for cervical cancer. HPV DNA has been shown to be present in 99.7% of cervical cancer samples, confirming a causal relationship between HPV infection and cervical cancer. On the other hand, the consequence of low oncogenic types (types 6, 11, 13, 30, 40, 42, 43, 44) may be genital warts [2]. Human papillomavirus may cause many disease units, including precancerous conditions and cervical cancer, precancerous conditions and vaginal cancer, anal cancers, cancers of the mouth, throat, tongue and palate tonsils, terminal warts, laryngeal papillomavirus, penile warts, and foot warts. The reservoir is an infected human. HPV is an epidermotropic virus – it has affinity for the epithelium. It is most often transmitted through sexual contact and skin-to-skin genital contact. It can also be transmitted vertically during childbirth from mother to child. Unlike HIV, HPV is not transmitted by blood [4]. The methods of infection prevention include, among other things, renouncing sexual contacts, limiting the number of partners, and using condoms. It should be remembered that although a condom is a mechanical barrier against microbes, it does not provide 100% protection against the transmission of the virus, but it only reduces the risk of infection [2]. There is a possibility of primary prevention – namely vaccination against HPV. Prophylactic vaccination is the only effective method of primary prevention of diseases associated with HPV infection. The greatest health and social benefits come from the parallel activities of primary prophylaxis, which involves the spread of HPV vaccination, and secondary prophylaxis,

which involves regular cytological testing [5]. Since 2023, Poland has started a universal program of free HPV vaccinations targeting both girls and boys aged 12 and 13. In Poland, two vaccines are available free of charge: Cervarix and Gardasil 9. They are administered in two doses, with an interval of 6 to 12 months [6]. Cervarix is a bivalent vaccine against types 16 and 18 [7], while Gardasil 9 is a 9-valent vaccine against types 16, 18, and less common but still highly oncogenic types 31, 33, 45, 52, and 58 [8].

Material and methods

The study method comprised an original online survey questionnaire consisting of 20 questions. The study included 134 participants, 55.2% of whom were women and 44.8% of whom were men. Complete characteristics of the study group are presented in tabular form (Table 1). Inclusion criteria for the study were as follows: age between 18 and 40, residence in the Lodz Voivodeship, and informed and voluntary consent to participate in the study. Exclusion criteria included: age <18 years and >40 years, residence in other voivodeships, lack of consent to participate in the study. After entering the data collected in the surveys into an MS Excel spreadsheet, all the empirical material was analyzed. Descriptive methods and statistical inference were used to develop it. The chi^2 test of independence was used to compare the frequencies of each trait variety and to determine correlations between qualitative traits. Differences between frequencies and correlations between traits were considered statistically significant if the calculated value of the chi^2 test was greater than or equal to the critical value, which was derived from the tables for the corresponding number of degrees of freedom assuming a probability of error of $p<0.05$.

Table 1. Characteristics of the participants

Gender	**No.**	**%**
Female	74	55.2
Male	60	44.8
Age	**No.**	**%**
18–24	30	22.4
25–32	65	48.5
33–40	39	29.1
Education level	**No.**	**%**
Higher	77	57.5
Secondary	31	23.1
Vocational	17	12.7
Primary	9	6.7
Place of residence	**No.**	**%**
City over 100,000 inhabitants	31	29.1
City from 20,000 to 100,000 inhabitants	25	18.7
City up to 20,000 inhabitants	29	21.6
Countryside	41	30.6
Medical occupation	**No.**	**%**
Yes	36	26.9
No	98	73.1

Results

80.6% of the respondents knew what the HPV abbreviation means. 75.0% of them correctly identified the route of sexual contact as the route of transmission of the virus. In the survey, respondents were asked to identify individual diseases that they thought might be caused by HPV infection. Detailed data are shown in the graphic form (Figure 1). Most of the respondents, i.e. 85.1%, indicated cervical cancer as an individual disease that may be the result of HPV infection, while only 47.8% of the respondents were aware of the possibility of developing infection in the form of vaginal cancer, while for anal cancer the corresponding number was 41.0%, for cancer of the mouth, throat and palate tonsils – 35.1%, for terminal warts – 30.6%, for laryngeal papilloma – 29.9%, and for warts and feet cancer – 27.6%. Some respondents

wrongly identified pearly lumps of the penis (18.7%) and hard ulcer (10.4%) as complications of HPV infection.

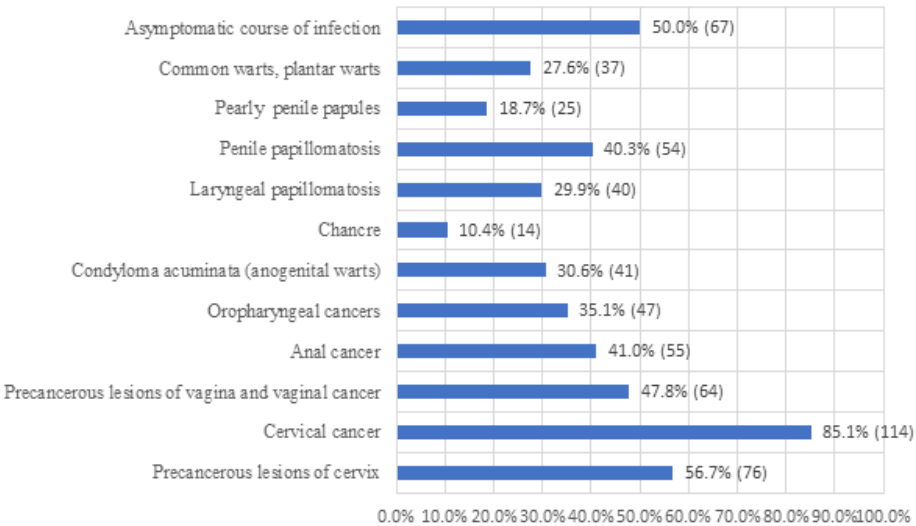

Figure 1. Disease entities which, according to the respondents, may be caused by HPV infection

Sexual contact as a route of virus transmission was indicated by 94.1% of medical workers and 68.4% of non-medical workers (Table 2). HPV-6, HPV-11, HPV-40 types as causing low-risk cancers and HPV-16, HPV-18, HPV-31, HPV-33, HPV-35 as high-oncogenic types were identified by 77.8% and 83.3% of medical professionals and 33.7% and 70.1% of those working in fields other than health care, respectively. The observed differences turned out to be statistically significant – $p<0.05$; $chi^2=8.978$. 97.2% of medics correctly indicated that HPV does not only affect people with multiple sexual partners, and 94.3% stated that condoms do not completely protect against infection. Among non-medical workers, 56.1% and 59.2% of the respondents were aware of this information, respectively. 100% of medics and 89.9% of non-medics knew about the existence of primary prevention in the form of recommended immunizations. Information concerning the fact that the vaccination is recommended for both girls and boys was known to 91.4% of physicians and 66.3% of non-physicians. The recommended vaccination

administration period being the age between 12 and 14 before the onset of sexual intercourse was correctly indicated by 100% of medics and 67.3% of non-medics. The observed differences turned out to be statistically significant – $p<0.001$; $chi^2=15.443$.

Table 2. Knowledge about HPV among medical and non-medical workers

	Medical workers		Non-medical workers		Total		p
Routes of transmission	No.	%	No.	%	No.	%	p<0.05; chi²=8.978
Airborne	1	2.9%	11	11.2%	12	9.1%	
Bloodborne	1	2.9%	20	20.4%	21	15.9%	
Sexual transmission	32	94.1%	67	68.4%	99	75.0%	
Majority of infections are asymptomatic	No.	%	No.	%	No.	%	p<0.001; chi²=27.248
True	31	88.6%	36	37.1%	67	50.8%	
False	4	11.4%	61	62.9%	65	49.2%	
HPV-6, HPV-11, HPV-40 are high-risk oncogenic types	No.	%	No.	%	No.	%	p<0.001; chi²=20.651
True	8	22.2%	65	66.3%	73	54.5%	
False	28	77.8%	33	33.7%	61	45.5%	
HPV-16, HPV-18, HPV-31, HPV-33, HPV-35 are high-risk oncogenic types	No.	%	No.	%	No.	%	p>0.05
True	30	83.3%	68	70.1%	98	73.7%	
False	6	16.7%	29	29.9%	35	26.3%	
The risk of contracting HPV applies only to people with multiple sexual partners	No.	%	No.	%	No.	%	p<0.001; chi²=20.166
True	1	2.8%	43	43.9%	44	32.8%	
False	35	97.2%	55	56.1%	90	67.2%	
Condom use provides 100% protection against HPV infection	No.	%	No.	%	No.	%	p<0.001; chi²=14.707
True	2	5.7%	40	40.8%	42	31.6%	
False	33	94.3%	58	59.2%	91	68.4%	
There is a vaccine against HPV available	No.	%	No.	%	No.	%	p>0.05
True	36	100.0%	88	89.8%	124	92.5%	
False	0	0.0%	10	10.2%	10	7.5%	

	Medical workers		Non-medical workers		Total		p
HPV vaccine is recommended only for girls because of reduced cervical cancer risk	No.	%	No.	%	No.	%	p<0.05; chi^2=9.645
True	2	5.6%	31	31.6%	33	24.6%	
False	34	94.4%	67	68.4%	101	75.4%	
HPV vaccine is recommended for both girls and boys	No.	%	No.	%	No.	%	p<0.05; chi^2=8.232
True	32	91.4%	65	66.3%	97	72.9%	
False	3	8.6%	33	33.7%	36	27.1%	
HPV vaccine is recommended for children at the age of 12–14 years before sexual initiation	No.	%	No.	%	No.	%	p<0.001; chi^2=15.443
True	36		66	67.3%	102	76.1%	
False	0	0.0%	32	32.7%	32	23.9%	

As many as 49.2% of the respondents indicated as false the information that most HPV infections are asymptomatic and self-medicate. This is erroneous and increases the risk of virus transmission between people unaware of a possible infection. Almost one in three respondents thought that the risk of HPV infection only occurred in people who had multiple sexual partners (32.8%), and the use of condoms protected against infection in 100% (31.6% of the respondents). Among them, there were 31.5% and 17.6% women and 45.0% and 48.3% men, respectively. Statistically significant differences between women's and men's knowledge in the field concerned the awareness that HPV does not affect only those with multiple sexual partners ($p<0.05$; $ch^2=7.29$), the use of condoms does not fully protect against infection ($p<0.05$; $chi^2=14.202$), and the fact that both girls and boys should be vaccinated ($p<0.05$; $chi^2=6.733$) (Table 3).

Table 3. Knowledge about HPV among women and men

	Women		Men		Total		p
Routes of transmission	No.	%	No.	%	No.	%	p>0.05
Airborne	8	9.25%	4	6.67%	12	9.10%	
Bloodborne	10	13.51%	11	18.33%	21	15.90%	
Sexual transmission	54	72.97%	45	75.00%	99	75.00%	
Majority of infections are asymptomatic.	No.	%	No.	%	No.	%	p>0.05
True	34	45.95%	33	55.00%	67	50.80%	
False	38	51.35%	27	45.00%	65	49.20%	
HPV-6, HPV-11, HPV-40 are high-risk oncogenic types.	No.	%	No.	%	No.	%	p>0.05
True	38	51.35%	35	58.33%	73	54.50%	
False	36	48.65%	25	41.67%	61	45.50%	
HPV-16, HPV-18, HPV-31, HPV-33, HPV-35 are high-risk oncogenic types.	No.	%	No.	%	No.	%	p>0.05
True	58	78.38%	40	66.67%	98	73.70%	
False	15	20.27%	20	33.33%	35	26.30%	
The risk of contracting HPV applies only to people with multiple sexual partners.	No.	%	No.	%	No.	%	p<0.05; chi^2=7.29
True	17	31.48%	27	45.00%	44	32.80%	
False	57	77.03%	33	55.00%	90	67.20%	
Condom use provides 100% protection against HPV infection.	No.	%	No.	%	No.	%	p<0.05; chi^2=14.202
True	13	17.57%	29	48.33%	42	31.60%	
False	60	81.08%	31	51.67%	91	68.40%	
There is a vaccine against HPV available.	No.	%	No.	%	No.	%	p>0.05
True	70	94.59%	54	90.00%	124	92.50%	
False	4	5.41%	6	10.00%	10	7.50%	

	Women		Men		Total		p
HPV vaccine is recommended only for girls because of reduced cervical cancer risk.	No.	%	No.	%	No.	%	p<0.05; chi^2=6.733
True	12	16.22%	21	35.00%	33	24.60%	
False	64	86.49%	39	65.00%	101	75.40%	
HPV vaccine is recommended for both girls and boys.	No.	%	No.	%	No.	%	p>0.05
True	58	78.38%	39	65.00%	97	72.90%	
False	16	21.62%	20	33.33%	36	27.10%	
HPV vaccine is recommended for children at the age of 12–14 years before sexual initiation.	No.	%	No.	%	No.	%	p>0.05
True	60	81.08%	42	70.00%	102	76.10%	
False	14	18.92%	18	30.00%	32	23.90%	

92.5% of the respondents were aware of the existence of the HPV vaccine, while 72.9% of them were aware that it was recommended for both girls and boys. 76.1% of the respondents correctly indicated the age at which vaccination of children is recommended. Among the respondents, 59.0% were in favor of the recommended HPV vaccine, 26.9% had no opinion on the topic, and 14.2% were against the vaccine. The group of vaccine's supporters included 71.6% of all women surveyed and 43.3% of men. 16.2% of the respondents with no opinion on the topic were women and 40.0% of them were men. The vaccine's opponents included 12.2% women and 16.7% men. The observed differences turned out to be statistically significant – $p<0.05$; $chi^2=11.948$ (Table 4).

Among the people with higher education, those in favor of immunization accounted for 76.6% of the respondents, while those with education other than higher accounted for 35.1%. The observed differences turned out to be statistically significant – $p<0.001$; $chi^2=23.368$.

In terms of the respondents' place of living, 55.9% urban residents supported the vaccination, as well as 65.9% of residents of rural areas. The observed differences turned out to be statistically insignificant.

Among health professionals 94.4% of them supported the vaccination, while among non-health professionals the number was only 45.9%. The observed differences turned out to be statistically significant – $p<0.001$; $chi^2=25.816$. To sum up, socio-demographic factors that statistically influence the attitude towards protective vaccinations include: gender, age, education (Table 4).

Table 4. Socio-demographic characteristics affecting the attitude towards recommended HPV vaccination.

	For		Against		No opinion		p
Gender	No.	%	No.	%	No.	%	p<0.05; chi²=11.948
Female	53	71.6%	9	12.2%	12	16.2%	
Male	26	43.3%	10	16.7%	24	40.0%	
Age	No.	%	No.	%	No.	%	p<0.05; chi²=10.598
18–24	14	46.7%	8	26.7%	8	26.7%	
25–32	46	70.8%	4	6.2%	15	23.1%	
33–40	19	48.7%	7	17.9%	13	33.3%	
Education level	No.	%	No.	%	No.	%	p<0.001; chi²=23.368
Higher	59	76.6%	6	7.8%	12	15.6%	
Other than higher	20	35.1%	13	22.8%	24	42.1%	
Place of residence	No.	%	No.	%	No.	%	p>0.05
City	52	55.9%	11	11.8%	30	32.3%	
Countryside	27	65.9%	8	19.5%	6	14.6%	
Medical occupation	No.	%	No.	%	No.	%	p<0.001; chi²=25.816
Yes	34	94.4%	0	0.0%	2	5.6%	
No	45	45.9%	19	19.4%	34	34.7%	
Total	No.	%	No.	%	No.	%	
	79	59%	19	14.2%	36	26.9%	

Among those who had been vaccinated in the past, 92.3% supported the recommended protective vaccinations, while among those who had not been vaccinated the number was only 47.8%, and among those who did not

know if they had been vaccinated or not – 46.2%. The observed differences turned out to be statistically significant – $p<0.001$; $chi^2=24.557$. Therefore, it can be concluded that being vaccinated in the past is a factor that influences later attitudes toward vaccination (Figure 2).

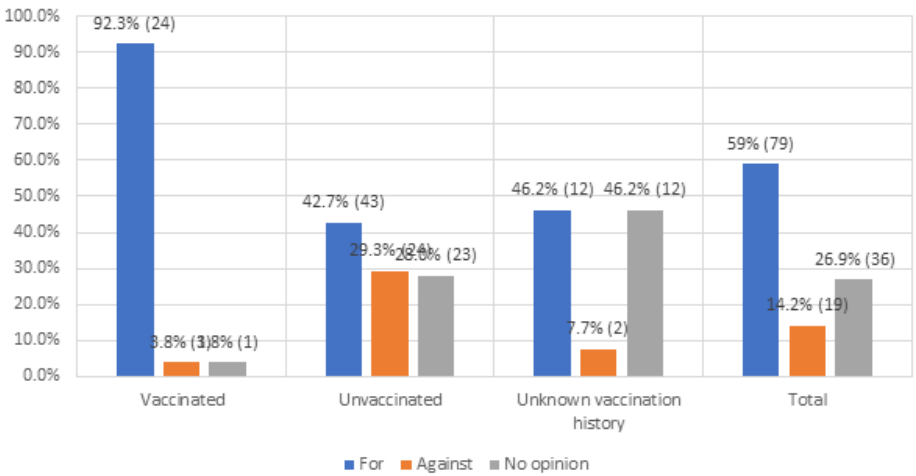

Figure 2. Attitude towards recommended HPV vaccination based on past vaccination history.

Discussion

The human papillomavirus is a proven causative agent of many disease conditions, including serious cancers. Raising public awareness of this correlation and of how to prevent HPV infection is an important element of prevention. The results of this study show that the healthcare-related respondents from the Lodz Voivodeship had a higher level of knowledge about HPV and HPV vaccinations. A Polish study from 2021, which included students from different universities, confirmed that among medical students the level of knowledge about HPV and infection prevention was significantly higher than among non-medical students [9]. Similar conclusions were drawn in the 2017 study conducted in Hong Kong [10] and Turkey. In the Turkish study it was observed that the level of knowledge in both groups was insufficient and further education is necessary [11]. The study being the subject of this

article showed that women from Lodz had better knowledge about the human papillomavirus than men. This correlation is confirmed by a study carried out in Brazil in 2019, in which data from young adults of both sexes were collected [12]. Greater knowledge in women may be due to the fact that HPV is mainly associated with cervical cancer, although infection with this virus is a risk factor for many other cancers, including anal, oral and throat cancers [13]. Moreover, an American study of 2008 showed that there is an increase in the number of diagnosed cases of non-cervical HPV-related cancers in the US. In addition, cancers of the mouth, throat and anus occur with a comparable frequency in women and men [14]. Cervical cancer was the most common result of HPV infection according to the respondents, while only 35% of them associated it with oral and throat cancers. Similar results were obtained in a Dutch study of 2021, in which the need to increase the emphasis on this aspect in public education was stressed [15]. Similar conclusions were reached by researchers from Brazil in a study conducted in 2022 on a group of students of the State University of Parana [16].

HPV vaccines are currently one of the most effective vaccines available. All are directed against oncogenic HPV-16 and HPV-18 types, which are the cause of most HPV-dependent cancers [17]. Their effectiveness was confirmed in a 2020 meta-analysis of 14 high-income countries [18]. 50% of the respondents in the study reported a positive attitude towards the recommended HPV vaccination in children. The demographic factors influencing the approach to vaccination were gender, age, and educational level of the respondents. In the study conducted in Poland in 2022 it was found that HPV education and knowledge were factors influencing parents' attitudes to vaccination. There was no significant correlation between gender, age, or place of residence [19]. In a 2021 Chinese study, place of residence and level of knowledge about HPV were important determinants of attitude towards vaccination [20].

Conclusions:

1. Medical workers have been more knowledgeable about the human papillomavirus than non-medical workers, so physicians should constantly educate their patients, as well as other persons from non-healthcare backgrounds, and encourage them to take the recommended protective vaccinations.
2. Women were more likely to be in favor of HPV vaccine protection than men, and they were more likely to be aware of the age at which the vaccination is recommended. They were also more likely to be aware that both girls and boys should be vaccinated.
3. Differences between women and men in terms of their knowledge on HPV concerned the awareness that HPV does not only affect people with multiple sexual partners, and that condoms do not fully protect against the infection. Women are better educated than men as far as knowledge on HPV is concerned; therefore, it is important to educate men in this area in order to minimize unconscious infection of partners.
4. Socio-demographic factors influencing attitudes towards vaccination include gender, age, and education. The place of residence had no effect on attitudes towards the vaccination.
5. People who were vaccinated in the past have a better attitude towards vaccination than people who were not vaccinated.
6. People who did not know their vaccination history most often had no opinion about the recommended protective vaccinations. This may be due to the fact that there is less interest in the health situation in such people compared to people who are knowledgeable about their previous vaccinations.
7. Information campaigns should be organized for the inhabitants of the Lodz Voivodeship to promote knowledge about pathogenicity, risk factors, as well as HPV prevention and its methods.

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