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Parental awareness, knowledge, and hesitancy toward HPV vaccination for adolescents: A cross-sectional study

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ABSTRACT

Background. Human papillomavirus (HPV) is a prevalent sexually transmitted infection and major cause of cervical and anogenital cancers. This study aimed to assess parental knowledge, vaccine hesitancy, and health beliefs concerning HPV infection and vaccination.

Methods. This cross-sectional study was conducted using convenience sampling among parents of adolescents aged 9–18 attending outpatient clinics at a tertiary hospital. The study collected sociodemographic characteristics and used the Health Belief Model Scale for HPV Infection and Vaccination to assess health beliefs, in order to identify factors associated with parental perceptions and vaccination attitudes.

Results. A total of 320 parents participated in the study; 82.8% were mothers. Self-reported HPV infection was low (1.9%), and only 3.4% of parents and 2.8% of their children had been vaccinated.

Awareness about HPV infection was 75%, and that of the HPV vaccine was 67.2%. However, only 30% of parents were willing to vaccinate their children, while 47.5% were uncertain.

The most commonly reported barriers were lack of awareness (33.9%) and concerns about side effects (26.4%). Higher parental education, family income, and prior HPV knowledge were positively associated with both awareness and willingness to vaccinate children, whereas having multiple adolescents was associated with increased vaccine hesitancy.

Conclusion. Parental awareness of HPV infection and vaccination was 75% and 67.2%, respectively, while vaccination rates among adolescents were very low. Higher parental education, income, and prior HPV knowledge were associated with favorable perceptions of vaccination. Addressing knowledge gaps and reducing perceived barriers through educational interventions may help increase HPV vaccination uptake among adolescents.

Keywords: *human papillomavirus viruses, vaccination, awareness, knowledge, adolescent*

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INTRODUCTION

Human papillomavirus (HPV) is a prevalent sexually transmitted infection that affects both genders and is linked to cancers of the cervix, anus, vagina, vulva and penis.[1] Vaccines that protect against HPV 16 and 18 prevent approximately 63% of cancers caused by HPV. Nine-valent vaccines protect against major HPV-related cancers by up to 90%. The HPV vaccine is recommended for all people aged 9 to 26, regardless of gender, around the world and in Turkey.[2] The WHO's plan to eliminate cervical cancer aims for 90% vaccination coverage among girls under 15. But vaccine hesitancy and false information, especially after COVID-19, remain major challenges. The HPV vaccine is not yet part of Turkey's national schedule, even though it is part of many national immunization programs.[3,4]

Health behaviors of individuals are shaped by their ideas, values, and attitudes. Health beliefs and attitudes effectively elucidate and quantify the aspects that either promote or impede health issues and treatment compliance.[4,5] Identifying these detrimental ideas and attitudes enables the use of the most precise and dependable health education or treatment strategies for individuals.[5] Parental endorsement and acceptance of the HPV vaccine are essential for enhancing immunization rates. Comprehending parents' reservations and the issues associated with their perspectives on the HPV vaccine is crucial for the efficacy of vaccination initiatives.[4,5]

The Health Belief Model provides a widely used theoretical framework for understanding preventive health behaviors, including vaccination decisions.[5] The model proposes that individuals' health-related behaviors are influenced by several constructs, including perceived susceptibility to a disease, perceived severity of its consequences, perceived benefits of preventive actions, and perceived barriers to adopting such behaviors. These constructs have been frequently used to evaluate beliefs and attitudes toward HPV vaccination among parents.

This study, the first conducted in Turkey on this topic, assessed parental knowledge, awareness, and attitudes regarding HPV infection and vaccination among parents of adolescents aged 9–18 years, using the Health Belief Model as a conceptual framework to examine how parental perceptions influence HPV vaccination acceptance.

MATERIALS AND METHODS

Participants were recruited from parents visiting the pediatric outpatient clinics at Etlik City Hospital in Ankara, Turkey. The study involved parents of adolescents aged 9 to 18 years, corresponding to the recommended age range for HPV vaccination, who provided informed consent. A convenience sampling method was employed, and all eligible parents accompanying children in the specified age range were approached consecutively. Inclusion criteria required participants to be a parent or legal guardian of an adolescent within this age group.

The questionnaires were administered through face-to-face interviews conducted by trained researchers in the outpatient waiting area following informed consent.

The minimum required sample size was calculated as 286 participants using G*Power software (effect size $f^2 = 0.15$, power = 80%, $\alpha = 0.05$).

Data were collected using the Participant Information Form, which contains 29 items assessing sociodemographic characteristics and HPV awareness, as well as the Health Belief Model Scale for Human Papillomavirus and Vaccination. Parental perceptions about HPV infection and vaccination were assessed using the Health Belief Model Scale. The scale was initially created by Kim in 2012 and subsequently adapted into Turkish by Güvenç et al.[5] In this study, a short form consisting of 14 selected items from the original 20-item scale was used. The scale includes four subscales: perceived severity (4 items), perceived barriers (5 items), perceived benefits (3 items), and perceived susceptibility (2 items). Items are evaluated using a four-point Likert scale, with responses ranging from 'never' (1 point) to 'very much' (4 points). Subscale scores are derived by dividing the total item score by the number of items, resulting in mean values ranging from 1 to 4. Güvenç et al. established construct validity using exploratory factor analysis, resulting in a four-factor structure congruent with the Health Belief Model: perceived susceptibility, severity, benefits, and barriers. A Kaiser-Meyer-Olkin (KMO) value of 0.81 suggested adequate sampling, and Bartlett's test of sphericity revealed significant results ($p < 0.001$). Cronbach's alpha coefficients for subscales ranged from 0.71 to 0.78, showing acceptable internal consistency. Test-retest reliability was confirmed by intraclass correlation coefficients ranging from 0.81 to 0.88, indicating stability over time, with an overall

Cronbach's alpha of 0.85.[5] Internal consistency of the shortened scale was not reassessed in the current sample.

Elevated perceived benefit scores reflect strong beliefs in HPV vaccination efficacy, while increased severity scores indicate the recognition of HPV as a public health issue. High barrier scores denote perceived obstacles to vaccination, while elevated susceptibility scores suggest greater awareness of personal risk. The study's primary outcome was parental willingness to vaccinate children against HPV, serving as a measure of vaccine acceptance/hesitancy. Willingness to vaccinate was assessed as a categorical variable with three response options (yes/no/uncertain) and exploratory correlation analyses were performed to examine its relationship with parental characteristics and health belief scores.

Grounded in the Health Belief Model, key constructs—perceived susceptibility, severity, benefits, and barriers—were analyzed for their influence on vaccination attitudes in relation to sociodemographic variables.

The study was granted approval by the Scientific Research and Publication Ethics Committee of Ankara Etlik City Hospital with an approval number of AEŞH-EKİ-2023-746 dated 06.12.2023. Informed consent was obtained by the participants. All procedures involving human participants were conducted in accordance with the ethical standards of the relevant national and institutional committees on human experimentation and with the current version of the Declaration of Helsinki.

Statistical analysis

Descriptive statistics were used to summarize the data and were presented as mean ± standard deviation for continuous variables and frequency (n) and percentage (%) for categorical variables. The relationships between variables and the subscales of the Health Belief Model were evaluated using Spearman correlation analysis. The primary outcome of the study was parental willingness to vaccinate their children against HPV. Due to the cross-sectional design and the exploratory nature of the study, associations between variables and the primary outcome were evaluated using correlation analyses. Statistical analyses were performed using the Jamovi 2.3.18 statistical software package. A p-value <0.05 was considered statistically significant.

RESULTS

Between January 1 and July 1, 2024, 360 parents were invited to participate. Of these, 320 agreed to participate and completed the questionnaire, corresponding to a response rate of 88.9%. A total of 320 parents participated in the study (mean age: 42.1 ± 5.0 years), with a majority being female (82.8%). The majority were married, and more than fifty percent had university degrees. About two-thirds were employed, and fifty percent of the families had an income over 1200 USD (*Table 1*).

Seventy-five percent of parents were familiar with HPV infection, and 67.2% were aware of the HPV vaccine, with healthcare professionals and social media serving as the primary sources of information. The actual vaccination rates were remarkably low; only 3.4% of parents were vaccinated themselves, and 2.8% had immunized their children. Parental willingness to vaccinate their children was 30%, while 47.5% remained uncertain. The predominant reasons for reluctance were insufficient knowledge (33.9%) and concerns regarding adverse effects (26.4%). Over fifty percent of parents held the belief that both male and female adolescents should receive vaccinations (*Table 2*).

Table 3 presents the descriptive data for the subscales of the Health Belief Model, whereas *Table 4* displays the item responses. The perception subscales (benefit, susceptibility, severity, and barriers) and overall scores correlated with the child's age, female gender, higher education, employment status, increased income, prior awareness of HPV, parental HPV vaccination history, and the willingness to vaccinate their adolescents. A greater number of adolescents and larger household size were correlated with diminished severity perception. Previous HPV infection solely elevated susceptibility scores. No notable correlations were identified with parental age or marital status *(Table 4).*

In univariate analysis, awareness of the HPV vaccine and understanding of its association with cervical cancer considerably enhanced perceived benefits. Female gender, employment, and awareness characteristics elevated susceptibility scores, but more income and HPV awareness enhanced severity perception. The presence of employment and a greater number of adolescents heightened perceived barriers, whereas previous HPV exposure also played a role. Increased income, awareness of HPV, and understanding

Table 1. Sociodemographic characteristics of the participants

Variable	N (320)	%
Age (years), mean ± SD	42.1 ± 5.0	
Sex		
Female	265	82.8
Male	55	17.2
Marital status		
Married	287	89.7
Single	17	5.3
Divorced	16	5.0
Education		
Primary school	18	5.6
Secondary school	30	9.4
High school	92	28.7
University	180	56.3
Employment status		
Employed	210	65.6
Unemployed	110	34.4
Occupation		
Physician	27	8.4
Pharmacist	4	1.3
Nurse	17	5.3
Dietitian	4	1.3
Housewife	117	36.6
Public sector employee	30	9.4
Farmer	2	0.6
Teacher	23	7.2
Other healthcare professionals	8	2.5
Monthly household income		
<600 USD	27	8.4
600–1200 USD	132	41.3
>1200 USD	161	50.3
History of HPV infection		
Yes	6	1.9
No	314	98.1

of cervical cancer risk substantially elevated total perception scores. The child's age showed a positive correlation with overall subscales (*Table 5*).

DISCUSSION

In the present study, although parental awareness of HPV infection and vaccination was relatively high, the actual vaccination rate among adolescents was very low. Similar findings have been reported in previous studies conducted in Turkey and other countries. These findings may suggest that the absence of HPV vaccination from the national immunization program may partially explain the low uptake; however, causal inferences cannot be established within the scope of this cross-sectional study.

Despite global variations, HPV vaccine awareness is predominantly low.[6,7] In developed nations, awareness levels are low to moderate, with a high willingness to vaccinate, yet actual vaccination rates remain disappointing (26–55%).[8-15] Similar findings emerge in developing countries, where knowledge and readiness are also low, resulting in vaccination rates of only 13.3–16.1%.[16-22] Specifically in Turkey, awareness of HPV and its vaccine varies widely—from 3.8% to 57% for HPV awareness and 2.2% to 74.7% for the vaccine. Readiness to vaccinate fluctuates between 6.3% and 69%, but vaccination rates are critically low, recorded at just 0.3% to 0.6%.[4] These findings are consistent with previous research indicating significantly low vaccination rates in Turkey.

Research reveals that parental opposition to HPV vaccination mainly arises from a lack of understanding about HPV infection and the vaccine itself.[23,24] In developed nations,

Table 2. Responses to the questions regarding parents' general knowledge about HPV infection and HPV vaccination

	N (%)
Does HPV cause cervical cancer?	
Yes	179 (55.9)
No	5 (1.6)
Don't know	136 (42.5)
Do you know anybody diagnosed with cervix carcinoma?	
Yes	43 (13.4)
No	277 (86.6)
Ever heard of the HPV vaccine?	
Yes	215 (67.2)
No	105 (32.8)
If you have heard about HPV vaccines, where did you hear it from? *	
Healthcare professionals	70 (32.6)
Friends	13 (6.0)
Social media	64 (29.7)
Family	1 (0.5)
School	9 (4.2)
All	58 (27.0)
Have you had HPV vaccination?	
Yes	11 (3.4)
No	309 (96.6)
Do you follow routine vaccine schedule (designated by Heath ministry) in our country?	
Yes	311 (97.2)
No	9 (2.8 %)
Would you perform HPV vaccination to your children?	
Yes	96 (30.0)
No	72 (22.5)
Do not know	152 (47.5)
Have you vaccinated your children with HPV vaccine?	
Yes	9 (2.8)
No	311 (97.2)
If you do not prefer to vaccinate your children with HPV vaccines, what is the main reason for this? **	
I do not know about the vaccine	77 (33.9)
Expensive	2 (0.9)
Adverse effects	60 (26.4)
Unnecessary	10 (4.4)
The child is too young	41 (18.1)
Because it is a new vaccine	11 (4.8)
All	26 (11.5)
Have you ever heard the name of these vaccines before?	
Cervarix	15 (4.7)
Gardasil	31 (9.7)
Both of them	49 (15.3)
None of them	225 (70.3)
Which HPV vaccine type was administered?	
Gardasil	9 (2.8)
Cervarix	0 (0.)
None	311 (97.2)
Should HPV vaccination be performed to girls or boys?	
Girls	73 (22.8)
Boys	1 (0.3)
Both	176 (55.0)
Do not know	70 (21.9s)

** Percentages were calculated among participants who reported having heard of the HPV vaccine (n = 215).*
*** Percentages were calculated among participants who reported that they did not prefer HPV vaccination for their children (n = 227).*

Table 3. Descriptive statistics of the HPV Infection and Vaccination Perception Scale and its subscales

	Median (min-max)
Perceived Benefit	2.7 (2.0-3.0)
Perceived Susceptibility	2.5 (2.0-3.0)
Perceived Severity	2.8 (2.3-3.3)
Perceived Barriers	2.2 (1.8-2.6)

key barriers include concerns over vaccine safety and efficacy, fear of side effects, and insufficient information, while cost can also be a factor.[10,13,15] In developing countries, similar issues are present, often complicated by limited understanding, skepticism about vaccine effectiveness, societal stigma towards sexually transmitted infections, and the misconception that HPV poses no personal risk.[16,18,22] Data from Turkey shows that major barriers include inadequate knowledge about HPV and the vaccine (40.9–76.6%), fears of adverse effects (0.9–64.5%), and financial constraints (0.2–49.5%).[4] This study suggested that lack of understanding is the foremost challenge, emphasizing the need for clear and accessible parental education on the HPV vaccine.

Our research revealed that healthcare professionals (32.6%) and social media (29.8%) are the main sources of information about the HPV vaccine. In developed nations, healthcare professionals are viewed as the most reliable information source, while media may play a lesser role.[8] Conversely, in lower-income countries, media often serves as the principal source of health information, with less engagement with medical professionals.[17,19] Similar findings were noted in Turkey, where both media and healthcare professionals are key information sources.[4,5] Counseling by healthcare providers has been shown to improve awareness and attitudes toward vaccination.[19] Healthcare providers, particularly pediatricians and primary care physicians, play a key role in improving HPV vaccination uptake, as provider recommendation is one of the strongest factors associated with parental decision-making. Integrating HPV information into clinical practice and training may boost public awareness and vaccine uptake. However, misinformation spread through media may hinder access to credible information.[25] Therefore, training healthcare personnel in effective communication and ensuring the dissemination of accurate information via popular channels like social media is crucial for improving vaccine acceptability.

Research from Turkey reveals HPV vaccination rates among females are very low, ranging from 0.3% to 6.0%.[4] In contrast, developed nations have achieved higher vaccination outcomes, with Scotland reporting around 80% coverage in 2022, Norway 73.6% in 2021, and Switzerland 72.6% in 2021.[23] The U.S. had roughly 65% one-dose coverage in 2021, while Argentina's national program boosted coverage to 87.9% in 2013.[23] These findings emphasize the need for a comprehensive nationwide HPV vaccination program targeting school-aged adolescents to reach levels seen in high-performing countries. Variations in vaccination rates among European nations highlight the importance of considering their differing national policies and healthcare systems.

Public financing for the HPV vaccine, along with vaccine awareness, greatly influences vaccination rates.[26] Many countries have seen notable increases in HPV vaccination following its inclusion in national immunization programs.[4-6] Despite an impressive adherence rate to the standard immunization schedule (97.2%), the HPV vaccination rate in adolescents remains low at 2.8% in our study, suggesting a lack of parental resistance to vaccination overall. This finding suggests that hesitancy toward HPV vaccination may be vaccine-specific rather than reflecting general vaccine refusal. In this context, structural barriers such as cost and limited access, particularly since HPV vaccination is not included in the national immunization program in Turkey, may significantly influence parental decisions. Parental willingness may also vary according to the age of the adolescent, as HPV vaccination is recommended prior to sexual debut. This underscores the importance of targeting parents of younger adolescents for timely vaccination.

Prior research indicates that positive parental attitudes are crucial for HPV vaccination among adolescents.[23,27,28] This study identified several factors associated with favorable attitudes, such as older child age, female gender, higher

Table 4. Distribution of responses to individual items of the health belief model scale for HPV infection and vaccination

		N	%
Benefit Subscales	**1. What is the extent of the effectiveness of HPV vaccines in preventing genital lesions and cancers?**		
	None	69	21.6
	Little	72	22.5
	Quite	119	37.2
	Very much	60	18.8
	2. Do HPV vaccines prevent cervical cancer?		
	None	76	23.8
	Little	66	20.6
	Quite	113	35.3
	Very much	65	20.3
	3. Do you consider HPV vaccines to be both efficacious and safe?		
	None	75	23.4
	Little	99	30.9
	Quite	107	33.4
	Very much	39	12.2
Susceptibility Subscales	**4. Is there a significant risk of developing genital warts among individuals who have not received the HPV vaccination?**		
	None	70	21.9
	Little	112	35.0
	Quite	103	32.2
	Very much	35	10.9
	5. Are males who have not received the HPV vaccine more susceptible to developing anal and penile cancers, or are females more prone to developing cervical cancer?		
	None	74	23.1
	Little	103	32.2
	Quite	102	31.9
	Very much	41	12.8
Severity Subscales	**6. Is HPV infection a severe condition and can it interfere with academic or professional life?**		
	None	69	21.6
	Little	48	15.0
	Quite	130	40.6
	Very much	73	22.8
	7. Can HPV infection result in death?		
	None	85	26.6
	Little	95	29.7
	Quite	102	31.9
	Very much	38	11.9
	8. Can HPV infection lead to troubles in a relationship with a partner or spouse?		
	None	62	19.4
	Little	38	11.9
	Quite	125	39.1
	Very much	95	29.7
	9. Are you afraid of becoming infected with HPV?		
	None	38	11.9
	Little	54	16.9
	Quite	114	35.6
	Very much	114	35.6
Barriers Subscale	**10. Do you have concerns about the effectiveness and safety of HPV vaccines?**		
	None	93	29.1
	Little	142	44.4
	Quite	56	17.5
	Very much	29	9.1

Barriers Subscale *(cont.)*	**11. Do you have concerns about vaccinating your child against HPV at a young age?**		
	None	89	27.8
	Little	140	43.8
	Quite	58	18.1
	Very much	33	10.3
	12. Does the HPV vaccine elevate the probability of early sexual intercourse?		
	None	202	63.1
	Little	74	23.1
	Quite	31	9.7
	Very much	13	4.1
	13. Is the HPV vaccine expensive?		
	None	72	22.5
	Little	97	30.3
	Quite	88	27.5
	Very much	63	19.7
	14. Are you concerned about possible side effects of the HPV vaccine?		
	None	46	14.4
	Little	113	35.3
	Quite	81	25.3
	Very much	80	25.0

HPV: Human Papillomavirus.

parental education, work status, and family income. Conversely, more adolescents and larger household sizes negatively impacted parental sentiments. Experience with HPV infection increased the sense of vulnerability but did not affect other perceptions. Factors like parental age, marital status, and adherence to immunization schedules showed no significant correlation with vaccination views. Although the correlations found were statistically significant, they were generally weak, implying that numerous elements may shape parental attitudes toward HPV vaccination. Additionally, parental attitudes toward HPV vaccination for boys versus girls should be considered, as awareness regarding male vaccination remains limited despite

Table 5. Correlation of participant characteristics with perception subscales (Spearman's r)

	Perception				
	Benefit	**Susceptibility**	**Severity**	**Barriers**	**Total**
Age of participant	0.086	0.019	-0.052	-0.035	0.003
Number of adolescents	-0.023	-0.033	-0.143*	-0.028	-0.057
Household size	-0.068	-0.075	-0.179**	-0.02	-0.103
Age of the pediatric patient admitted to the hospital	0.153**	0.125*	0.096	0.107	0.165**
Gender of participant	0.198***	0.172**	0.123*	0.09	0.185***
Marital status of the participant	-0.008	-0.015	-0.096	-0.023	-0.062
Educational status of the participant	0.334***	0.277***	0.326***	-0.009	0.305***
Employment status of the participant	0.242***	0.22***	0.127*	0.191***	0.116*
Family income	0.209***	0.136*	0.208***	-0.003	0.197***
Previously experienced HPV infection	0.028	0.114*	0.08	0.027	0.067
Previously heard HPV	0.443***	0.393***	0.477***	0.19***	0.481***
Aware that HPV infection causes cervical cancer	0.549***	0.472***	0.398***	0.025	0.452***
Knowing someone diagnosed with cervical cancer	0.155**	0.153**	0.186***	0.026	0.156**
HPV vaccine awareness	0.465***	0.362**	0.430***	0.101	0.433***
HPV vaccination status	0.118*	0.148**	0.133*	0.011	0.159**
Routine vaccination schedule compliance	0.029	0.035	0.011	0.048	0.059

**: p < 0.05; **: p <0.01; ***: p <0.001. Spearman test.*

recommendations for gender-neutral vaccination.

Evidence from various countries indicates that maternal views on vaccinations are associated with several factors. In Kazakhstan, ethnic background, location, higher child counts, economic status, and anti-vaccination sentiments were detrimental to attitudes towards vaccination.[29] In Serbia, having a daughter and increased awareness of HPV positively impacted these views,[23] while in Poland, knowledge and educational attainment were significant predictors.[30] Turkish research highlighted that higher education, employment, and better economic status among mothers improved awareness and favorable attitudes towards HPV and childhood vaccinations.[4,31] Consistent with the current literature, our findings suggest that educational, socioeconomic, and policy factors may play a crucial role in parental acceptance of HPV vaccination, indicating a need for further research.

This study has several limitations. It was conducted in a single center, limiting generalizability, although most participants were parents of generally healthy children attending routine visits. Its cross-sectional design precludes causal inferences between parental beliefs and attitudes toward HPV vaccination. Internal consistency of the scale was not assessed in the current sample, which should be considered when interpreting the findings. No multivariable analytical model was used to evaluate independent predictors of willingness to vaccinate; therefore, the findings are based on unadjusted correlation analyses and should be interpreted as exploratory associations rather than independent effects. In addition, hospital-based recruitment may have introduced selection bias, face-to-face interviews may have led to social desirability bias, and the use of a shortened scale may limit the full representation of the original construct.

CONCLUSION

In conclusion, despite a considerable level of parental awareness regarding HPV infection and vaccination, the uptake of HPV vaccination among adolescents remained significantly low. Multiple sociodemographic and knowledge-based factors associated with parental perceptions of HPV vaccination. These findings highlight the importance of improving awareness and understanding of HPV vaccination among parents. Further large-scale and longitudinal studies are needed to better understand the determinants of HPV vaccine acceptance. ■

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