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Pediatric Residents' HPV Knowledge and Awareness: A Pre-Post Training Study

Çocuk Asistanlarının HPV Bilgi ve Farkındalık Düzeyleri: Eğitim Öncesi ve Sonrası Bir Çalışma

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Abstract

Aim: The aim of this study is to evaluate pediatric residents' level of knowledge about the Human Papillomavirus (HPV) infection and the HPV vaccine, their attitudes toward the vaccine, and changes in their knowledge and awareness after education.

Material and Method: This study included 90 pediatric residents. A 41-item questionnaire prepared by the researchers was administered to the participants. The participants were given a pre-survey on HPV infection and the vaccine, followed by a comprehensive educational session. After the education, the same survey was administered again, and the knowledge levels before and after the education were compared.

Results: A total of 90 pediatric residents participated in the study. Although most participants knew that HPV causes cervical cancer, they had limited knowledge of other type of cancers. A significant increase in the participants' knowledge levels was observed after education. Knowledge gaps regarding the vaccine were also addressed, and the vast majority of participants supported vaccination. Prior to the education, there were gaps in knowledge regarding the age groups for HPV vaccination and types of vaccines; however, after the education, participants had accurate information. Furthermore, the high cost of the vaccine emerged as a barrier directly influencing the frequency of vaccine administration.

Conclusion: The findings of our study demonstrated the effectiveness of training in improving pediatric residents' knowledge levels regarding HPV and the vaccine. Our study emphasizes the need for continuous training in the fight against HPV and the critical importance of maintaining pediatricians' knowledge up to date for public health.

Keywords: Health knowledge, papillomavirus infections, practice, pediatrics, vaccination

Öz

Amaç: Bu çalışmanın amacı, çocuk asistanlarının Human Papillomavirüs (HPV) enfeksiyonu ve HPV aşısı hakkındaki bilgi düzeylerini, aşıya yönelik tutumlarını ve eğitim sonrası bilgi ve farkındalık düzeylerindeki değişimi değerlendirmektir.

Gereç ve Yöntem: Bu çalışmaya 90 pediatri asistanı dahil edilmiştir. Araştırmacılar tarafından hazırlanan 41 maddelik bir anket katılımcılara uygulanmıştır. Katılımcılara, HPV enfeksiyonu ve aşısı hakkında bir ön anket yapılmış, ardından kapsamlı bir eğitim oturumu verilmiştir. Eğitimin ardından aynı anket tekrar uygulanmış ve eğitim öncesi ve sonrası bilgi düzeyleri karşılaştırılmıştır.

Bulgular: Çalışmaya toplam 90 pediatri asistanı katılmıştır. Katılımcıların çoğu HPV'nin servikal kansere neden olduğunu bilmesine rağmen, diğer kanser türleri hakkında sınırlı bilgiye sahipti. Eğitim sonrası katılımcıların bilgi düzeylerinde anlamlı bir artış gözlenmiştir. Aşı ile ilgili bilgi eksiklikleri giderilmiş ve katılımcıların büyük çoğunluğu aşılamayı desteklemiştir. Eğitim öncesinde HPV aşısının yapılması gereken yaş grupları ve aşı türleri konusunda bilgi eksiklikleri varken, eğitim sonrasında katılımcıların bu konularda doğru bilgiye sahip oldukları görülmüştür. Ayrıca, aşının yüksek maliyeti, aşının uygulanma sıklığını doğrudan etkileyen bir engel olarak ortaya çıkmıştır.

Sonuç: Bu çalışmanın bulguları, eğitimin çocuk asistanlarının HPV ve HPV aşısı konusundaki bilgi düzeylerini artırmada etkili olduğunu göstermiştir. Çalışmamız, HPV ile mücadelede sürekli eğitimin gerekliliğini ve pediatristlerin bilgilerini güncel tutmalarının halk sağlığı açısından kritik önemini vurgulamaktadır.

Anahtar Kelimeler: Sağlık bilgisi, papillomavirüs enfeksiyonları, uygulama, çocuk sağlığı ve hastalıkları, aşılama

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INTRODUCTION

Human papillomavirus (HPV) is a double-stranded DNA virus with over 200 types, infecting only humans.[1] While most HPV infections resolve spontaneously, in some cases, HPV infections can cause skin lesions, genital warts, and cancers, including cervical cancer.[2]

Human papillomavirus (HPV) is categorized into cutaneous and mucosal types based on tissue tropism. Cutaneous types (HPV 1, 2, 3, and 10) cause warts on the skin, while low-risk mucosal types cause warts in the upper respiratory tract and anogenital regions, as well as papillomas in mucosal tissues. High-risk mucosal types (HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68) have the potential to cause cervical, anogenital, and oropharyngeal cancers.[1]

Cervical cancer is the fourth most common cancer among women world wide.[3] Nearly all cervical cancer cases can be attributed to HPV infection, with HPV-16 and HPV-18 being responsible for the majority of these cancers.[4] Specifically, HPV-16 and HPV-18 are responsible for approximately 70% of cervical cancer cases. HPV-16 plays a larger role in other HPV-related cancers and is associated with more than 90% of HPV-related anal, head, and neck cancers. Low-risk anogenital HPV types such as 6, 11, 40, 42, 43, 44, 54, 61, 72, 73, and 83 typically lead to benign or mild cervical lesions and the development of anogenital warts. The majority of anogenital warts result from infection with HPV-6 and HPV-11, and transmission typically occurs through sexual contact. Additionally, perinatal transmission may occur during childbirth from an infected mother to her newborn. Although clinical disease related to this is rare in infants, HPV-6 and HPV-11 can cause juvenile-onset recurrent respiratory papillomatosis or anogenital warts in infants and young children.[1]

Cell-mediated immunity is crucial for the control of HPV; this is evidenced by the increased risk of HPV-related anogenital cancers in individuals with suppressed cell-mediated immunity.[5] The antibody response to natural HPV infections is relatively low in titre when compared to other systemic viral infections.[6] Evidence suggests that antibodies from natural HPV infection may lack protective efficacy, as their presence is more common in women diagnosed with HPV-related invasive cervical cancer than in those without cancer. HPV vaccines generate antibody levels that exceed those from natural infection by 60 to 100-fold.[7]

Genital HPV infection decreases with monogamy and limiting the number of sexual partners. Condom use reduces the risk of infection. Cesarean delivery is not recommended for preventing perinatal transmission.[8] Vaccination plays a crucial role in the prevention of genital cancers. The bivalent vaccine was first introduced in 2006, followed by the quadrivalent vaccine in 2014, and since 2017, the nine-valent vaccine has been in use.[9,10] It has been observed that the HPV vaccine leads to a significant reduction in HPV prevalence among individuals of the appropriate age.[11]

This study aimed to examine the extent to which an educational intervention influenced pediatric residents' comprehension of HPV infection and vaccination, as well as their subsequent attitudes and clinical approaches.

MATERIAL AND METHOD

The study was carried out with the permission of Çukurova University Clinical Research Ethics Committee (Date: 03.11.2023, Decision No: 138). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This study was conducted as a single-center interventional study at Çukurova University. The study population consisted of all pediatric residents working at the institution during the data collection period. Since the study aimed to include the entire accessible population, no prior sample size calculation was conducted. Participation was entirely voluntary, and all participants provided informed consent. The participants were given a 41-item questionnaire developed by the researchers, which covered demographic information (n=9), knowledge of HPV infection (n=10), HPV vaccination (n=9), and attitudes toward vaccination (n=13). The questionnaire was designed by the researchers, taking into account similar studies in the literature and factors (cost, lack of knowledge, side effects, etc.) that might hinder the widespread implementation of the HPV vaccine. Participants were notified that the survey was conducted solely for scientific research purposes, and that no personally identifiable information was collected. The questionnaire forms were distributed to participants by the researchers and volunteers, ensuring they filled them out without interference. The questionnaire comprised true-false and yes-no items, along with multiple-choice questions that allowed participants to select multiple answers. The questionnaire was administered twice: once before the educational intervention (pre-test) and once immediately after the intervention (post-test). The educational intervention consisted of a single face-to-face session delivered in a classroom setting. The session included a structured presentation prepared by the researchers, covering epidemiology and transmission routes of HPV, related diseases, the importance and safety of HPV vaccination, and national and international vaccination recommendations. All participants who completed the pre-test also completed the post-test.

Statistical Analysis

The statistical analysis of the study was performed using the "Statistical Package for Social Sciences" version 20 (IBM Corp., Armonk, NY, USA). The normality assumption of the numerical data in the study group was tested using the Shapiro-Wilk test. Descriptive statistics for parametric data were expressed as mean±standard deviation, while non-parametric data were presented as median (minimum-maximum), and categorical data were expressed as percentages (%). To evaluate the statistical significance of changes in paired categorical responses before and after the intervention, the McNemar test was used. To assess the magnitude of changes in participants' responses before and after the educational intervention, effect sizes were calculated using Cohen's h for differences in proportions. Cohen's h quantifies the difference between two proportions on an arcsine-transformed scale, with values of 0.2, 0.5, and 0.8 representing small, medium, and large effect sizes, respectively. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Demographic findings of the participants:

A total of 90 pediatric residents participated in the study. Of the participants, 63 were female (70%) and the average age was 30.03±4.29 years (**Table 1**). The median duration of employment as a pediatric resident was 21 months (range: 2-58 months). Of the participants, 49 (54.4%) were married and 24 (26.7%) had children (**Table 1**).

Participants' Knowledge Level Regarding HPV Infection

All participants were aware that HPV is a sexually transmitted disease and can cause cancer (**Table 2**). Regarding the gender affected by HPV, 94.4% responded that it affects both men and women, while 5.6% indicated that it affects only women. Among cancer types, cervical cancer was most frequently mentioned (96.7%). Risk factors highlighted included multiple partners (97.8%), HIV infection (61.1%), smoking (45.6%), and not using condoms (80%) (**Table 2**). As for the causes of warts, HPV (96.7%), HSV (32.2%), CMV (2.2%), and EBV (1.1%) were reported. The main transmission routes for HPV were sexual intercourse (100%), anal sex (78.9%), oral sex (76.7%), and genital examination (25.6%). The most commonly known oncogenic HPV types were HPV 16 and 18. Among prevention methods, vaccination (98.9%), monogamy (88.9%), and condom use (87.8%) were the most frequently mentioned. Additionally, 14.6% of participants believed that having had a previous HPV infection would lead to lasting immunity (**Table 2**).

Table 1. Demographic data of the participants

Category	Number of Participants
Gender, n (%)	
Female	63 (70%)
Male	27 (30%)
Age (years)*	30.03±4.29
Years of work experience as a pediatric resident**	21 (2-58)
Marital status, n (%)	
Married	49 (54.4%)
Single	41 (45.6%)
Children, n (%)	
Yes	24 (26.7%)
No	66 (73.3%)
Child's gender, n (%)	
Female	6 (25%)
Male	11 (45.8%)
Both male and female	7 (29.2%)

*Mean ± standard deviation, **Median (minimum-maximum)

Table 2: Participants' Knowledge Level Regarding Human Papilomavirus Infection.

Category	Number of Participants*	Number of Participants**	P
Gender Affected by Human Papilomavirus, n (%)			
Female	5 (5.6%)	--	0.063
Both female and male	85 (94.4%)	90 (100%)	
Types of Cancer Caused by Human Papilomavirus, n (%)			
Cervical	87 (96.7%)	90 (100%)	0.25
Vaginal	42 (46.7%)	90 (100%)	<0.001
Anal	49 (54.4%)	90 (100%)	<0.001
Penile	47 (52.2%)	90 (100%)	<0.001
Oral	46 (51.1%)	90 (100%)	<0.001
Human Papilomavirus Risk Factors, n (%)			
Multiple partners	88 (97.8%)	90 (100%)	0.5
HIV infection	55 (61.1%)	90 (100%)	<0.001
Smoking	41 (45.6%)	0 (0%)	<0.001
High number of births	14 (15.6%)	0 (0%)	<0.001
Use of birth control pills	10 (11.1%)	0 (0%)	0.002
Not using condom	72 (80%)	90 (100%)	<0.001
Sexual intercourse age < 18	67 (74.4%)	90 (100%)	<0.001
Wart Pathogens, n (%)			
Human papilomavirus	87 (96.7%)	90 (100%)	0.25
Herpes simplex virus	29 (32.2%)	0 (0%)	<0.001
Cytomegalovirus	2 (2.2%)	0 (0%)	0.5
Epstein-Barr virus	1 (1.1%)	0 (0%)	1
Human Papilomavirus Transmission Routes, n (%)			
Sexual intercourse ***	90 (100%)	90 (100%)	-
Sexual intercourse without genital contact	41 (45.6%)	0 (0%)	<0.001
Anal sex	71 (78.9%)	90 (100%)	<0.001
Oral sex	69 (76.7%)	90 (100%)	<0.001
Handshaking	3 (3.3%)	0 (0%)	0.25
Sharing cutlery and utensils	6 (6.7%)	0 (0%)	0.031
Coughing and sneezing	2 (2.2%)	0 (0%)	0.5
Genital examination	23 (25.6%)	90 (100%)	<0.001
Contamination through materials used during genital exams	46 (51.7%)	90 (100%)	<0.001
Contamination during vaginal ultrasound	29 (32.2%)	90 (100%)	<0.001
Contamination during pap smear collection	19 (21.1%)	90 (100%)	<0.001
Mother-to-child transmission during vaginal birth	56 (62.2%)	90 (100%)	<0.001
Mother-to-child transmission during C-section birth	6 (6.7%)	0 (0%)	0.031
Human Papilomavirus Prevention Methods, n (%)			
Condom use	79 (87.8%)	90 (100%)	<0.001
Monogamy	80 (88.9%)	90 (100%)	0.002
Vaccination	89 (98.9%)	90 (100%)	1
Use of spermicides	3 (3.3%)	0 (0%)	0.25
Not sharing underwear	34 (37.8%)	90 (100%)	<.001
Permanent Immunity After Human Papilomavirus Infection, n (%)			
Yes	13 (14.6)	0 (0%)	<.001

* Before trainig., ** After training., *** The McNemar test could not be performed because there were no discordant pairs between the variables; all responses were identical across both conditions.

Participants' Knowledge Level Regarding the HPV Vaccine

The majority of participants (64.4%) reported that there are 2 types of HPV vaccines (**Table 3**). When asked, "How many types of HPV vaccines are available in our country?", 48.9% of participants answered 2 types, 26.7% answered 1 type. Only 3 participants (3.3%) correctly answered the question "How many valent is the HPV vaccine?" with the correct number (2, 4, and 9 valent). When asked, "How many valent is the HPV vaccine in our country?", 18 participants (20%) correctly answered with the number of valent (4 and 9 valent). Regarding who should receive the HPV vaccine, 7 participants (7.8%) stated that only women should receive it, while 83 participants (92.2%) indicated that both women and men should be vaccinated. When asked, "Is the HPV vaccine only protective if given before the start of sexual activity?", 14 participants (15.6%) answered correctly. In response to the question regarding the recommended age for HPV vaccination, 38.9% of participants correctly identified age 9 as the starting age for girls, while only 18.9% correctly identified the same for boys (**Table 3**). The percentage of participants who believed that a serological test should be done before HPV vaccination was 16.7% (15 participants). When asked, "Would the vaccine provide protection if given to someone who has had an HPV infection?", 12 participants (13.3%) stated that it would not provide protection. When asked, "Is there any benefit in receiving the HPV vaccine after starting sexual activity?", 89 participants (98.9%) stated that it would be beneficial. Lastly, when asked, "Would the HPV vaccine be protective against other strains if given to someone who has been infected through sexual intercourse?", 84 participants (93.3%) stated that it would provide protection (**Table 3**).

Participants' Attitudes Towards the HPV Vaccine

Among the participants, 91.1% stated that they recommend the HPV vaccine to their patients (**Table 4**). The reasons for not recommending the Human Papillomavirus (HPV) vaccine to patients were as follows: insufficient knowledge (7 participants, 7.8%), forgetting to recommend the vaccine because it is not part of the routine vaccination schedule (5 participants, 5.6%), cost concerns (2 participants, 2.2%), belief that the vaccine is ineffective (2 participants, 2.2%), and not knowing where to obtain the vaccine (2 participants, 2.2%). The reasons for the low usage of the Human Papillomavirus (HPV) vaccine were reported as follows: cost (78 participants, 86.7%), the vaccine not being part of the routine vaccination schedule (59 participants, 65.6%), belief that the vaccine is ineffective (6 participants, 6.7%), and concerns about side effects (3 participants, 3.3%). Eighty-three point three percent of the participants indicated that they would consider receiving the HPV vaccine themselves, while 96.7% and 88.9% reported that they would consider the vaccine for their daughters and sons, respectively. Ninety-three point three percent of the participants indicated that the HPV vaccine should be included in the national vaccination schedule. The percentage of participants who thought that lowering the vaccine price would increase vaccination uptake was 98.9%. Additionally, 96.7% of participants stated that they would get the vaccine for themselves and their relatives if a free HPV vaccination campaign were available (**Table 4**).

The Level of Knowledge and Attitudes of Participants Regarding HPV Infection and Vaccination After Education:

After the education, the same questionnaire was repeated for all participants. All participants indicated that HPV affects both men and women and causes cancer in the anogenital system and oropharyngeal regions in both genders. The participants provided correct answers regarding transmission routes, risk factors, the number of oncogenic HPV types, preventive measures, and vaccine-related questions. It was observed that participants' awareness of the importance of vaccination in prevention, vaccine types, who should receive the vaccine, and its effectiveness increased after the education. All participants stated that they would recommend the vaccine to themselves, their close ones, and their patients. All participant supported the inclusion of the HPV vaccine in the standard vaccination program. The most important reason for the exclusion of the HPV vaccine from the routine vaccination schedule in our country was found to be the cost.

Table 3: Participants' Knowledge Level Regarding the Human Papilomavirus Vaccine

Category	Number of Participants*	Number of Participants**	P
Who Should Receive the Human Papilomavirus Vaccine?, n (%) Women Both women and men	 7 (7.8%) 83 (92.2%)	 90 (100%)	0.016
The Human Papilomavirus Vaccine is Protective Only if Given Before the Start of Sexual Activity, n (%) Yes No	 14 (15.6%) 76 (84.4%)	 - 90 (100%)	<0.001
At What Age Should the Human Papilomavirus Vaccine Be Recommended for Women? Correct answer (age 9)	 35 (38.9%)	 90 (100%)	<0.001
At What Age Should the Human Papilomavirus Vaccine Be Recommended for Men? Correct answer (age 9)	 17 (18.9%)	 90 (100%)	<0.001
Should Serology Be Done Before Human Papilomavirus Vaccination?, n (%) Yes No	 15 (16.7%) 75 (83.3%)	 - 90 (100%)	<0.001
Is the Human Papilomavirus Vaccine Protective After Someone Has Had Any Type of HPV Infection?, n (%) Yes	 78 (86.7%)	 90 (100%)	<0.001
Does the Human Papilomavirus Vaccine Protect Against Other Strains When Given to Someone Infected via Sexual Activity?, n (%) Yes	 78 (86.7%)	 90 (100%)	<0.001

* Before trainig., ** After training.

Table 4: Participants' Attitudes Towards the Human Papilomavirus Vaccine

Category	Number of Participants*	Number of Participants**	P
Do you recommend the Human Papilomavirus vaccine to your patients?, n (%) Yes	82 (91.1%)	90 (100%)	0.008
Would you consider getting the Human Papilomavirus vaccine for yourself? , n (%) Yes	75 (83.3%)	90 (100%)	<0.001
Would you consider getting the Human Papilomavirus vaccine for your daughter?, n (%) Yes	87 (96.7%)	90 (100%)	0.25
Would you consider getting the Human Papilomavirus vaccine for your son?, n (%) Yes	80 (88.9%)	90 (100%)	0.002
Should the Human Papilomavirus vaccine be included in the national vaccination schedule?, n (%) Yes	84 (93.3%)	90 (100%)	0.031
Do you recommend the Human Papilomavirus vaccine to your close ones?, n (%) Yes	89 (98.9%)	90 (100%)	0.063
Do you recommend the Human Papilomavirus vaccine to your patients?, n (%) Yes	85 (94.4%)	90 (100%)	0.004
If there were a free Human Papilomavirus vaccination campaign, would you get vaccinated for yourself and your close ones?, n (%) Yes	87 (96.7%)	90 (100%)	0.25

*Before trainig., ** After training.

Effect Sizes Demonstrating the Impact of Education on HPV Vaccination Perceptions

Following the educational intervention, a significant increase was observed in the proportions of participants endorsing HPV vaccination-related attitudes. Cohen's h effect sizes indicated medium to large effects across key items. For instance, the proportion of participants recommending the HPV vaccine to their patients increased from 91.1% to 100% (h = 0.62), reflecting a medium to large effect. Similarly, willingness to consider HPV vaccination for themselves increased from 83.3% to 100% (h = 0.83), indicating a large effect. Other items, such as willingness to vaccinate their daughters and sons, and support for including the HPV vaccine in the national immunization schedule, showed medium effect sizes (h ranging from 0.36 to 0.66). These findings demonstrate the substantial positive impact of the training on participants' knowledge and attitudes toward HPV vaccination.

DISCUSSION

Worldwide, cervical cancer is the fourth most common cancer in women. Approximately 604,000 cases of invasive cervical carcinoma diagnosed and 342,000 deaths due to cervical cancer occurring annually.[3] Nearly all cases of cervical cancer can be attributed to HPV infection.[4] In our country, the frequency of HPV infection and cervical cancers secondary to HPV is increasing. Timely and effective vaccination can prevent HPV infection and the cancers it causes.[12]

The period between the pre-cancerous and cancerous transformation of HPV infections and their cytological detection is on average about 10 years after the onset of sexual activity.[13] Since HPV is a latent infection. It may later transforms into cancer. This latency can cause confusion when there is limited information regarding the disease. In our study, we assessed pediatric residents' knowledge levels and approaches towards HPV infection and vaccination. All physicians participating in the survey agreed that HPV is a sexually transmitted infection agent that causes cancer. However, there were knowledge gaps regarding the modes of transmission of HPV, the types of cancers it may cause, preventive measures, and the HPV vaccine. Although some knowledge gaps existed, 78% of the physicians supported the vaccine.

In studies conducted in our country, one in 2013 with pediatricians and another in 2014 with both pediatricians and obstetricians, it was observed that the participants' knowledge level about HPV infection was insufficient.[14,15] Our findings showed that 96.7% of participants knew HPV could cause cervical cancer; however, fewer were informed about its potential to cause other types of cancer, including vaginal, anal, penile, and oral cancers. Similar to our study, the majority of previous studies found that participants were highly aware that HPV most commonly causes cervical cancer.[15,16] 26.8% of the participants did not know how many oncogenic types of HPV exist before the training. The most well-known types were HPV-16 and HPV-18. In our study, all participants were aware that the HPV vaccine is available in Türkiye, but only 20% of them correctly knew the number of valencies of the vaccine. There was a lack of information regarding the appropriate age and gender for vaccination before the training. Before the training, some participants hesitated to vaccinate themselves or their children. After the training, these concerns disappeared.

One of the pediatric resident who participated in our study stated that he/she did not recommend the vaccine because he/she believed it could lead to early initiation of sexual activity. In Muslim countries such as Türkiye, sexuality and sexually transmitted diseases are often taboo topics. Thus, HPV vaccination is less openly discussed than in Western countries. However, religious beliefs alone are not the only determining factor in the application of the HPV vaccine, and this can vary

across countries. In a study conducted in Malaysia in 2009, it was observed that doctors widely recommended the HPV vaccine to their patients, while in a 2011 study in Indonesia, parents widely accepted the HPV vaccine. On the other hand, studies from the The United Arab Emirates and Syria showed the opposite results.[17-20] In our study, prior to the training, 93.3% of participants, and following the training, all participants endorsed incorporating the vaccine into the standard vaccination schedule. It is important to note that questions related to religious beliefs were intentionally excluded from the sociodemographic form due to the sensitivity of the topic and the predominantly Muslim population in Türkiye. Therefore, it is not possible to directly assess the influence of religious beliefs on participants' attitudes toward HPV vaccination. Consequently, any association between vaccine hesitancy and religious or cultural factors should be interpreted cautiously and acknowledged as a limitation of the study.

Cost is one of the biggest barriers to widespread vaccine use. In fact, 98.8% of participants believed that lowering the price would increase vaccination rates. The biggest barrier to its inclusion in the routine vaccination schedule is also seen as cost. Several studies have also suggested that a reduction in the cost of the HPV vaccine would increase vaccination rates.[21-24]

It was observed that the situations where participants were uncertain about HPV infection and its vaccine before the education were resolved after the training. Our study clearly shows that regular education improves vaccine support among physicians. In the future, to reduce and even prevent cancer development related to HPV, it is important for all physicians to be willing to participate in vaccination efforts in our country, where the child and young population is high.

One of the strengths of our study is the repeated survey design, where participants completed an initial survey, received targeted training, and then completed a follow-up survey immediately afterward. This approach clearly demonstrates the positive impact of education on physicians' knowledge and attitudes toward HPV vaccination, which is an advantage compared to similar studies that only used a single survey.

However, there are some limitations. Although the sample size (n=90) is reasonably adequate, the single-center design restricts the generalizability of our findings to broader populations. This limits the external validity of the results. Future multi-center studies with larger and more diverse participant groups are needed to confirm and expand upon our findings.

CONCLUSION

By November 2022, 125 countries have included the HPV vaccine for girls, while 47 countries have included it for both boys and girls in their national immunization programs.[25] In Türkiye, cervical cancer screening has been conducted through a national primary HPV testing program initiated by the Ministry of Health since 2014. Women aged 30–65 are screened every five years using HPV-DNA testing, and those positive for high-risk HPV types 16/18 are referred for colposcopy, while others undergo cytology testing for further evaluation.[6] Enhancing healthcare providers' knowledge through regular educational programs is crucial to increase vaccine acceptance and ultimately lower HPV-related cancer rates

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Çukurova University Clinical Research Ethics Committee (Date: 03.11.2023, Decision No: 138).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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