

## HPV vaccinations in males; Knowledge, attitudes, and practices of physicians on human papilloma virus vaccinations for their sons

Sevtap Seyfettinoglu,<sup>1</sup> Betul Dagoglu Hark<sup>2</sup>

<sup>1</sup> University of Health Sciences, Adana City Training and Research Hospital, Department of Obstetrics and Gynecology, Adana, Turkey

<sup>2</sup> Department of Biostatistics and Medical Informatics, Faculty of Medicine, Firat University Elazığ, Turkey

### ORCID ID of the author(s)

SS: 0000-0001-8607-6628  
BDH: 0000-0002-5189-1929

### Corresponding Author

Sevtap Seyfettinoglu  
Adana City Training and Research Hospital,  
Department of Obstetrics and Gynecology,  
Adana, Turkey  
E-mail: sevtaponcul@gmail.com

### Ethics Committee Approval

The study was approved by the Institutional Review Board of Adana City Training and Research Hospital (No: 76-1320). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

### Conflict of Interest

No conflict of interest was declared by the authors.

### Financial Disclosure

The authors declared that this study has received no financial support.

### Published

2023 August 3

### Copyright © 2023 The Author(s)

### Published by JOSAM

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 (CC BY-NC-ND 4.0) where it is permissible to download, share, remix, transform, and build upon the work provided it is properly cited. The work cannot be used commercially without permission from the journal.



### Abstract

**Background/Aim:** The Human Papilloma Virus (HPV) infection is the most common sexually transmitted disease and has been shown to cause cancer. Both sexes have a lifetime risk of at least 50% of exposure to HPV. Male HPV vaccinations can yield advantages for both the individual and community, including reduced transmission of HPV and protection of male and female health. The approval of vaccinations is mainly influenced by parental perspectives on this matter. It is essential to examine the subject in terms of physicians, who have the highest knowledge about HPV in society. This cross-sectional study aims to investigate physicians' attitudes and knowledge about vaccinating their male children against the human papillomavirus.

**Methods:** A total of 1670 physicians were included in this study. Working as a physician and having a son were determined as inclusion criteria. A digital questionnaire was given to the physicians participating in the study. The answers to the survey questions were rated on a 4-point Likert scale (agree, do not know, disagree, strongly disagree). The responses were compared with the variables, and statistical analysis was performed.

**Results:** Of the physicians participating in the study, 34.4% were male and 65.6% were female. A small percentage of the physicians (6.2%) reported that they would vaccinate their boys against HPV, and 59.9% of them indicated that they would not but they would consider it. The physicians' who were most likely to vaccinate their sons worked in the fields of radiology (97.3%), orthopedics (80%), and gynecology (78.8%). It was determined that the physicians who said they would never have their sons vaccinated against HPV were most frequently specialists in anesthesiology and reanimation, infectious diseases, and clinical microbiology.

**Conclusions:** This study determined that physicians in some specialties hesitated to give the HPV vaccine to their sons. The HPV vaccine is crucial for boys, and it is essential to point out the significance of providing seminars to physicians, particularly in developing nations like Turkey, regarding this issue and its consequences.

**Keywords:** HPV vaccine, immunization, male, physician, cancer

## Introduction

Human papillomavirus (HPV) infection is a sexually transmitted virus that plays an essential role in cancer development. HPV infection is prevalent in both women and men [1]. Lesions caused by HPV considered high risk for cancer development can progress to cervical cancer, the second most common malignancy in young women. HPV causes gynecological cancers and lesions that can lead to cancer in the head and neck region, anus, and penis. Therefore, women and men are at risk of HPV-related cancer [2,3].

Vaccination is the most effective way to prevent HPV. Unfortunately, recent posts, primarily through digital platforms, have increased vaccine hesitancy in society. Anti-vaccination sentiment was listed by the World Health Organization (WHO) as one of the top ten global public health threats in 2019. WHO aims to achieve 90% worldwide HPV vaccine coverage, but misunderstandings, lack of information, and fake news are the main obstacles to achieving this goal [4-6].

Today, 146 countries worldwide have included the HPV vaccine in their vaccination program. In Turkey, the HPV vaccine is not included in the vaccination program, and there is insufficient awareness about this vaccine. According to the 2019 data from UNICEF and WHO, all doses of the HPV vaccine were administered to approximately 4% of males and 15% of females globally [7]. This vaccine, which can be administered to both sexes, is the only way to eradicate HPV-related cancer [8].

When we look at the way HPV infection is transmitted and the disease it causes, it is apparent that this is not only a women's problem but also a significant health problem that threatens men. Therefore, it is necessary to vaccinate boys for both individual and public health reasons [9].

The success of HPV vaccine application depends on physicians' belief in the efficacy and safety of this vaccine. Physicians in different specialties may differ in opinion on the effectiveness of vaccines. This situation creates hindrances to the success of immunization programs [10,11]. For the success of HPV vaccination in Turkey, it is necessary to increase physicians' belief in all specialties in the efficacy and safety of this vaccine [11]. This study aims to evaluate physicians' awareness of HPV vaccination and to show their attitudes toward the immunization of their sons. Their perspectives as parents and physicians will mirror society's consciousness.

## Materials and methods

This national descriptive study was conducted online between May 2022 and December 2022. Ethics committee approval of the study was obtained from Adana City Training and Research Hospital Clinical Research Ethics Committee (No: 76-1320). The questionnaire was designed to determine the knowledge level of the participants about the HPV vaccine and their attitudes regarding vaccinations for their sons. Participants were required to read the fact sheet and declare that they agreed to take part in the survey before participating. The inclusion criteria for the study were that the participant had to be an active physician and have at least one son. A total of 1670 physicians met these criteria and answered all the survey questions.

Physicians who were not actively working and did not have at least one son were excluded from the study.

Using the questionnaire, data were collected about the demographics of the participating physicians, their knowledge of HPV, and their attitudes toward vaccinating their sons against the virus. The answers to the survey questions were yes, no, and I do not know, and these responses were ranked on a 4-point Likert scale (agree, do not know, disagree, strongly disagree). Since the data were generally categorical, statistical significance was considered when evaluating the results according to ratios and percentages.

### Statistical analysis

All analyses were performed using IBM SPSS Statistics Version 22.0 statistical software package (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). Categorical variables were expressed as numbers and percentages, whereas continuous variables were summarized as mean (standard deviation), and median and minimum-maximum where appropriate. The chi-square test was used to compare categorical variables between the groups. For the comparison of more than two groups, one-way ANOVA was used. The statistical level of significance for all tests was 0.05.

## Results

The mean age of the physicians was 41.6 (8.1). While the number of male physicians was 564 (34.4%), the number of female physicians was 1096 (65.6%). When the frequency of the physicians were examined according to their specialties, the highest rate of participants worked in obstetrics and gynecology (27.9%). Following obstetrics and gynecology, other fields included family physicians (21.8%), pediatrics (7.8%), anesthesiology and reanimation (6.7%), orthopedics (4.8%), and radiology (4.4%). The number of physicians working in public hospitals totaled 704 (42.6%); followed by those working in the university hospital, 422 (25.5%); and clinics, 280 (16.9%). Table 1 shows descriptive statistics for the demographic characteristics of the physicians participating in the research.

Table 1: Demographic characteristics of the participants

Variables		n (%)
Age <sup>†</sup>		41.65(8.07)
Gender	Male	574 (34.4)
	Female	1096 (65.6)
Department	Family physician	364 (21.8)
	Obstetrics and gynecology	466 (27.9)
	Orthopedics	80 (4.8)
	Radiology	74 (4.4)
	Pediatrics	130 (7.8)
	Internal medicine	70 (4.2)
	Anesthesiology and reanimation	112 (6.7)
	Infectious disease and clinical microbiology	72 (4.3)
	Others	344 (18.1)
	Hospital	University hospital
Public hospital		704 (42.6)
Private hospital		96 (5.7)
Family health center		152 (9.1)
Own clinic		280 (16.8)
Male child number <sup>††</sup>		1.0 (1-4)
Number of boys aged 0-9	1	720 (78.3)
	2	198 (21.5)
	3	2 (0.2)
Number of boys aged 9-18	1	496 (87.3)
	2	72 (12.7)
Number of boys over the age of 18	1	184 (71.9)
	2	72 (28.1)

<sup>†</sup> mean (SD), SD: standard deviation, <sup>††</sup> median(min-max)

Participants' HPV knowledge and HPV vaccine awareness are documented in Table 2. The number of physicians reporting that HPV infection is a rare sexually transmitted disease was 1070 (64.1%). Those physicians who correctly reported the cancer types associated with HPV infection totaled 332 (19.9%), while 1278 (76.5) did not answer this question. While 780 (46.8%) of the participants responded "intramuscularly," about the application of the HPV vaccine, 600 (36.0%) did not have an answer to this question. A total of 664 (39.8%) physicians stated that three doses of HPV vaccine should be administered; however 546 (32.7%) reported two doses as the correct answer, and 388 (23.2%) did not respond. Of the participants, 1596 (95.6%) believed that including the vaccine in the routine vaccination program for girls was necessary. The number of physicians indicating that there were two types of vaccines in Turkey was 844 (50.6%). Furthermore, the number of physicians who knew whether the bivalent or quadrivalent vaccine was approved for use in men was high (54.4% and 54.7%, respectively). It was found to be accurate by all participants that the vaccine would significantly reduce HPV infection and reduce high-grade lesions and genital warts in both sexes and that infection in men causes penile cancers. A total of 1218 (72.9%) physicians approved the necessity of a booster dose application. One hundred four (6.2%) of the physicians stated that they had their sons get the HPV vaccine; 1000 (59.9%) did not, but they thought about getting it, and 72 (4.3%) indicated that they would definitely not have their sons vaccinated. The reason why most of these 72 participants would not have their boys vaccinated with HPV is that the long-term results are not precise (55.6%).

We compared the vaccination status of the participants according to their other demographic characteristics (Table 3). The mean age did not show a statistically significant difference according to HPV vaccination status ( $P=0.073$ ). However, the difference according to gender was substantial, and this significant difference was that the percentage of women being undecided about getting vaccinated (33.0%) was higher than men (23.0%). In comparison, the rate of men thinking of getting vaccinated (65.9%) was higher than women (56.8%) ( $p=0.024$ ). When the vaccine preferences of the physicians were examined according to hospital information, it was seen that none of the physicians working in the university hospital had the vaccine. In addition, one finding showed that the physicians working in the private hospitals had the highest vaccination rate (25.0%), and the number of physicians who considered not vaccinating was 0 (0.0%). It was further seen that most of the physicians working in the family physician department were in favor of vaccination, and the number of physicians who did not have the vaccination was 0 (0.0%). Physicians working in the obstetrics and gynecology department and those working in the family physician department mostly opted to have it done. However, 16 (6.9%) of the obstetrics and gynecology department physicians considered not having the vaccine. When the vaccination percentages of physicians working in infectious diseases and clinical microbiology were examined, the number of physicians who vaccinated their sons was 0 (0.0%). Among the physicians working in this field, the number of undecided and planning physicians was the same at 32 (44.4%).

Table 2: Participants' HPV knowledge and HPV vaccine awareness

Variables		n (%)
HPV infection is a rare sexually transmitted disease.	True	1070 (64.1)
	False	600 (35.9)
Cancers associated with HPV infection	Vaginal, vulvar, cervical, anal, lung, penile, oropharynx,	332 (19.9)
	Incomplete answer	1278 (76.5)
	All of them	58 (3.5)
HPV vaccine administration route	Intramuscularly	780 (46.8)
	Subcutaneous	112 (6.7)
	Both intramuscular and subcutaneous	176 (10.6)
	I do not know	600 (36.0)
How many doses of the HPV vaccine are administered?	1	48 (2.9)
	2	546 (32.7)
	3	664 (39.8)
	>3	24 (1.4)
	I do not know	388 (23.2)
At what age is the HPV vaccine administered to boys?	0-9	62 (3.7)
	9-13	270 (16.2)
	9-15	314 (18.8)
	9-26	280 (16.8)
	11-12	72 (4.3)
	<15	112 (6.7)
	15-26	104 (6.2)
>26	0 (0.0)	
I do not know	456 (27.3)	
It should be included in the routine vaccination program for girls	Yes	1596 (95.6)
	No	74 (4.4)
How many types of HPV vaccines are available in Turkey?	1	106 (6.4)
	2	844 (50.6)
	3	152 (9.1)
	4+	96 (5.8)
	I do not know	470 (28.2)
The bivalent vaccine is approved for use in men.	Yes	634 (38.0)
	No	128 (7.7)
	I do not know	908 (54.4)
The quadrivalent vaccine is approved for use in men.	Yes	606 (36.3)
	No	150 (9.0)
	I do not know	914 (54.7)
HPV infection can be reduced to 1% with an effective vaccination program.	Yes	1670 (100.0)
	No	0 (0.0)
Rappel dose	Yes	1218 (72.9)
	No	452 (27.1)
Reduction in high-grade lesions	Yes	1670 (100.0)
	No	0 (0.0)
Genital warts can occur in both men and women.	Yes	1670 (100.0)
	No	0 (0.0)
The most common HPV-related penile cancers in men	Yes	1670 (100.0)
	No	0 (0.0)
Situation and opinion about getting the HPV vaccine	I had it done	104 (6.2)
	I haven't done it, but I'm thinking of doing it	1000 (59.9)
	I'm undecided	496 (29.6)
	I don't plan to	72 (4.3)
The reason you don't want to have your son vaccinated against HPV	Not helpful	14 (19.4)
	Adverse effect	8 (11.1)
	Don't think HPV infection will be	10 (13.9)
	Don't know long-term outcome	40 (55.6)

Table 3: Comparison of the vaccination status of the participants according to their demographic characteristics

		HPV Vaccination Status				P-value
		Yes, I did	Yes, I will	Undecided	No	
Age <sup>†</sup>		40.5(7.1)	42.2(7.9)	41.1(8.2)	39.3(9.9)	0.073
Gender	Male	40(7.0)	378(65.9)	132(23.0)	24(4.2)	0.024
	Female	64(5.8)	622(56.8)	362(33.0)	48(4.4)	
Hospital	University hospital	0(0.0)	286(67.8)	104(24.6)	32(7.6)	<0.001
	Public hospital	16(2.3)	448(63.6)	208(29.5)	32(4.5)	
	Private hospital	24(25.0)	48(50.0)	24(25.0)	0(0.0)	
	Family health center	16(10.5)	80(52.6)	56(36.8)	0(0.0)	
	Own clinic	48(17.1)	128(45.7)	96(34.3)	8(2.9)	
Department	Family physician	24(6.6)	200(54.9)	149(38.5)	0(0.0)	NA
	Obstetrics and gynecology	24(5.2)	344(73.8)	66(14.2)	32(6.9)	
	Orthopedic	0(0.0)	64(80.0)	16(20.0)	0(0.0)	
	Radiology	0(0.0)	72(97.3)	2(2.7)	0(0.0)	
	Pediatric	24(16.5)	66(50.8)	40(30.8)	0(0.0)	
	Internal medicine	0(0.0)	22(31.4)	40(57.1)	8(11.4)	
	Anesthesiology and reanimation	16(14.3)	40(35.7)	48(42.9)	8(7.1)	
	Infectious Disease and Clinical Microbiology	0(0.0)	32(44.4)	32(44.4)	8(11.1)	
	Others	16(5.3)	160(53.0)	110(36.4)	16(5.3)	

<sup>†</sup>mean (SD), SD: standard deviation

Vaccination status is shown in Table 4, based on the questions asked to measure vaccination knowledge of the participants. Accordingly, most physicians who knew correctly that HPV infection is a rare disease stated that they were undecided (34.7%) or would not vaccinate (5.3%) ( $P=0.033$ ). While 10.3% of the physicians who answered the application method of HPV vaccine correctly stated that they had been vaccinated, 5.6% and 1.3% of the physicians who responded to the question incorrectly or did not answer the question had the vaccine, respectively. A total of 72% of the incorrectly responding participants said they planned to get vaccinated eventually, while 38.7% of those not answering participants said they could not decide what to do. Only 8.6% of doctors who gave the correct answer about HPV vaccination doses reported being vaccinated themselves. In contrast, 44.4% of the physicians who answered this question incorrectly and 44.8% who stated that they did not know the number of doses administered indicated that they were undecided about vaccination. Eleven percent of the physicians who correctly reported the vaccine age for males stated that they had been vaccinated, and 66.7% said they would vaccinate. Those who did not answer this question were mainly undecided about getting vaccinated ( $P<0.001$ ). Physicians who did not consider it necessary to include it in the routine vaccination program for girls were undecided, with a rate of 56.8%. In comparison, 10.8% said they would not be vaccinated ( $P<0.001$ ).

Table 4: Comparison of the vaccination status of the participants according to their vaccination information

		HPV Vaccination Status				P-value
		Yes, I did	Yes, I will	Undecided	No	
HPV infection is rare	Yes (wrong)	64(6.0)	680(63.6)	286(26.7)	40(3.1)	0.033
	No (right)	40(6.7)	320(53.3)	208(34.7)	32(5.3)	
HPV related cancers	Vaginal, Vulvar, Cervical, Anal, Lung, Penile, Oropharynx	10(3.0)	232(69.9)	76(22.9)	14(4.2)	0.032
	Incomplete answer	88(6.9)	726(56.8)	406(31.8)	58(4.5)	
	All of them	6(10.3)	40(69.0)	12(20.7)	0(0.0)	
HPV vaccine administration route	Right	80(10.3)	456(58.5)	204(26.2)	40(5.1)	<0.001
	False	16(5.6)	208(72.2)	56(19.4)	8(2.8)	
	Don't know	4(1.3)	168(56.0)	116(38.7)	12(4.0)	
HPV vaccine dose number	Right	52(8.6)	381(63.0)	144(23.8)	28(4.6)	<0.001
	False	0(0.0)	20(55.6)	16(44.4)	0(0.0)	
	Don't know	0(0.0)	99(51.0)	87(44.8)	8(4.1)	
Administration of HPV vaccine in boys	Right	4(11.1)	24(66.7)	8(22.2)	0(0.0)	<0.001
	False	58(8.4)	380(66.5)	123(21.5)	20(3.5)	
	Don't know	0(0.0)	96(42.1)	116(50.9)	16(7.0)	
HPV vaccine should be a routine for girls	Yes	44(5.5)	496(62.2)	226(28.3)	32(4.0)	<0.001
	No	8(21.6)	4(10.8)	21(56.8)	4(10.8)	
Types of HPV Vaccines in Turkey	Right	24(5.7)	269(63.7)	113(26.8)	16(3.8)	<0.001
	False	24(13.6)	116(65.5)	33(18.6)	4(2.3)	
	Don't know	4(1.7)	114(48.5)	101(43.0)	16(6.8)	
Bivalent vaccine approved in male	Yes	32(10.1)	224(70.7)	45(14.2)	16(5.0)	<0.001
	No	4(6.2)	58(90.6)	2(3.1)	0(0.0)	
	Don't know	16(3.5)	218(48.0)	200(44.1)	20(4.4)	
Quadrivalent vaccine approved in male	Yes	31(10.2)	220(72.6)	41(13.5)	11(3.6)	<0.001
	No	1(1.3)	54(72.0)	20(26.7)	0(0.0)	
	Don't know	20(4.4)	226(49.5)	186(40.7)	25(5.5)	
A booster dose is necessarily	Yes	36(5.9)	349(57.3)	203(33.3)	21(3.4)	<0.001
	No	16(7.1)	151(66.8)	44(19.5)	15(6.6)	

Physicians who stated they were unaware of the HPV vaccine types available in Turkey were divided into three groups: 48.5% said they would receive the vaccine, 43.0% were undecided, and 6.8% said they would not ( $P<0.001$ ). Stating that the bivalent vaccine is approved for use in men, 90.6% of those who answered incorrectly stated that they would be vaccinated, while 10.1% of those who responded correctly said that they already had the vaccine. On the other hand, 44.1% of those who

did not know were undecided about getting vaccinated. Ten percent of the physicians who answered correctly that the quadrivalent vaccine was approved for use in men had been vaccinated. In addition, 40.7% of those who did not know about the approval for use stated that they were undecided about getting the vaccine, while 25.5% stated that they would not. While 33.3% of those who said yes to rappel dosing were uncertain about getting vaccinated, 19.5% of those who said no to rappel dosing were undecided ( $P<0.001$ ).

## Discussion

In the literature, there are no studies evaluating physicians' attitudes toward giving the HPV vaccine to their sons; the current study closes this research gap. More than 90% of anal cancers in men are caused by HPV 16 and HPV 18. In addition, most oropharyngeal and penile cancers are caused by HPV infection. Compared to the incidence of cervical cancer, the incidence of penile cancer is very low. Nevertheless, protecting men with the HPV vaccine is very important in terms of immunization.

The contribution of male immunization to female and community vaccination should be considered, as it is necessary to vaccinate both sexes for a fully immunized population [12]. As previously indicated, a significant barrier to immunization in many developing countries is the lack of public funding [13]. In our study, 95.6% of the participants believed that it is necessary to include the vaccine in the routine vaccination program for girls, while 59.9% reported that they did not vaccinate their boys but planned to do so. In a recent study involving nurses and midwives, it was found that 98% of the respondents did not get vaccinated, and only 34% had recommended the vaccine to someone [14]. This showed that the level of positive awareness among physicians about the vaccination of girls was quite good, but the same was not valid for boys. We believe that with the increase in physicians' knowledge level about the threats posed by HPV infections for boys, similar results will be obtained for both genders.

HPV infections, which causes cancer to develop in women and men, can be prevented by vaccination. However, since the HPV vaccine is not included in the immunization program in Turkey, it is applied in line with the physicians' recommendations. A previous study reported that the most influential factor for families to get the HPV vaccine was the recommendation of the physician [15,16]. Studies have indicated that physicians' attitudes in recommending the HPV vaccine are related to a lack of knowledge [17–19]. In our study, when the answers were given to information questions such as the incidence of HPV infections and which types cause cancer, the number of those who gave correct answers was low. Tasar et al. [20] reported that most of the participants in their study considered themselves to have sufficient knowledge about the HPV vaccine, and only 14.3% of them felt inadequate. According to our study results, the rate of correct answers to the questions about HPV by the participating physicians was low. However, it was confirmed by all participants that the vaccine would drastically reduce HPV infection, and reduce high-grade lesions and genital warts.

There are differences between female and male physicians regarding knowledge and attitudes about the HPV vaccine. In our study, 65.9% of male and 56.8% of female physicians considered vaccinating their sons. In previous studies of physician attitudes toward the HPV vaccine, it was observed that female physicians exhibited more positive attitudes [21,22]. Kartal et al. [23] reported similar results in their study. They attributed this to female physicians' increased sensitivity to HPV infections, primarily because of women's high cancer incidence. We attribute the reason why male physicians show more positive attitudes toward HPV vaccine administration to boys to the same reason.

Physicians' attitudes toward the HPV vaccine vary according to their specializations. In our study, the practice fields of the physicians who were most apt to vaccinate their sons were radiology (97.3%), orthopedics (80%), and gynecology (78.8%). In a study conducted in Turkey, it was reported that the idea of starting the HPV immunization program for the pediatric and adolescent population by family medicine, pediatrics, gynecology, and obstetrics doctors was significantly higher than in other fields [24]. Previous studies reported that 60% of family physicians, more than 90% of pediatricians, and 79% of obstetricians and gynecologists recommend the HPV vaccine to their patients [25,26]. Topcu et al. [27] reported that 85% of obstetricians and 78% of pediatric and family physicians recommended vaccinations. The reason our study obtained different results from previous studies is the questioning of attitudes about administering the HPV vaccine to boys. In previous studies, recommendation status was questioned without gender determination. We think that the fact that the number of male physicians is generally higher in radiology and orthopedics is reflected in this result.

The most important contribution of this study is that many physicians participated. It is also the first study to examine physicians' approach to their sons regarding vaccinations. Our study determined that the physicians who stated they would not give HPV vaccine to their sons were most frequently specialists in anesthesia and animation, infectious diseases, and clinical microbiology. We attribute the most important reason for this situation to the high number of female physicians, especially in these specialties. We believe that gender-related empathy influences the attitude toward vaccinating boys.

### Limitations

A limitation of this study is that the attitudes of male and female physicians for each specialty were not evaluated separately. For this, it would be necessary to design multicenter studies over an extended period.

### Conclusion and recommendations

This study determined that physicians in some specialties had hesitations about giving the HPV vaccine to boys. We believe these results are significant, because they may indicate the situation in developing nations. Furthermore, societies and medical specialists should make recommendations for the HPV vaccine. This would positively contribute to increasing vaccine awareness among physicians. Considering the results of this study and looking at the accuracy rates of the answers, studies addressing education on HPV vaccines are also needed.

### Acknowledgements

We would like to thank all of the doctors who participated in this study.

### References

- Einstein MH, Goldberg GL. Human papillomavirus and cervical neoplasia. *Cancer Invest.* 2002;20(7-8):1080-5.
- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2018;68(6):394-424.
- Du J, Nordfors C, Ahrlund-Richter A, Sobkowiak M, Romanitan M, Näsman A, et al. Prevalence of oral human papillomavirus infection among youth, Sweden. *Emerg Infect Dis.* 2012;18(9):1468-71.
- Hanley SJ, Yoshioka E, Ito Y, Kishi R. HPV vaccination crisis in Japan. *Lancet.* 2015;385(9987):61152-7.
- Schuler CL, Hanley CJ, Coyne-Beasley T. Misconception: Human papillomavirus vaccine and infertility. *Clin Pediatr (Phila).* 2014;53(2):158-65.
- Suppli CH, Hansen ND, Rasmussen M, Valentiner-Branth P, Krause TG, Mølbak K. Decline in HPV-vaccination uptake in Denmark - The association between HPV-related media coverage and HPV-vaccination. *BMC Public Health.* 2018;18(1):1360-8.
- Bruni L, Saura-Lázaro A, Montoliu A, Brotons M, Alemany L, Diallo MS, et al. HPV vaccination introduction worldwide and WHO and UNICEF estimates of national HPV immunization coverage 2010-2019. *Prev Med (Baltim).* 2021;144:1-12.
- Näsman A, Du J, Dalianis T. A global epidemic increase of an HPV-induced tonsil and tongue base cancer - potential benefit from a pan-gender use of HPV vaccine. *J Intern Med.* 2020;287(2):129-35.
- Drolet M, Bénéard É, Pérez N, Brisson M. HPV Vaccination Impact Study Group. Population-level impact and herd effects following the introduction of human papillomavirus vaccination programmes: updated systematic review and meta-analysis. *Lancet.* 2019;394(10197):497-509.
- Gilca V, Boulianne N, Dubé E, Sauvageau C, Ouakki M. Attitudes of nurses toward current and proposed vaccines for public programs: a questionnaire survey. *Int J Nurs Stud.* 2009;46(9):1219-35.
- Zimet GD, Mays RM, Fortenberry JD. Vaccines against sexually transmitted infections: promise and problems of the magic bullets for prevention and control. *Sex Transm Dis.* 2000;27(1):49-52.
- Shabbir M, Barod R, Hegarty PK, Minhas S. Primary prevention and vaccination for penile cancer. *Ther Adv Urol.* 2013;5(3):161-9.
- Meteb B, Utuk FA, Demirhindi H, Inaltekin A, Tanır F, Kara E, Nazlıcan E. Human papillomavirus vaccine administration among women in the Eastern Mediterranean region of Turkey: prevalence and barriers. *Eur Rev Med Pharmacol Sci.* 2023;27(8):3526-33.
- Beyazgül B, Cindoğlu Ç, Koruk İ. The relationship of stress, self-efficacy and sociodemographic factors among physicians during the COVID-19 pandemic. *J Surg Med.* 2023;7(6):369-74.
- Davis K, Dickman ED, Ferris D, Dias JK. Human papillomavirus vaccine acceptability among parents of 10- to 15-year-old adolescents. *J Low Genit Tract Dis.* 2004;8(3):188-94.
- Stokley S, Curtis CR, Jeyarajah J, Harrington T, Gee J, Markowitz L. Human Papillomavirus Vaccination Coverage Among Adolescent Girls, 2007-2012, and Postlicensure Vaccine Safety Monitoring, 2006-2013 - United States. *Morb Mortal Wkly Rep.* 2013;62(29):591-5.
- Kahn JA, Zimet GD, Bernstein DI, Riedesel JM, Lan D, Huang B, et al. Pediatricians' intention to administer human papillomavirus vaccine: the role of practice characteristics, knowledge, and attitudes. *J Adolesc Health.* 2005;37(6):502-10.
- Daley MF, Liddon N, Crane LA, Beaty BL, Barrow J, Babbal C, et al. A national survey of pediatrician knowledge and attitudes regarding human papillomavirus vaccination. *Pediatrics.* 2006;118(6):2280-9.
- Esposito S, Bosis S, Pelucchi C, Begliatti E, Rognoni A, Bellasio M, et al. Pediatrician knowledge and attitudes regarding human papillomavirus disease and its prevention. *Vaccine.* 2007;25(35):6437-46.
- Taşar S, Bal Yüksel E, Sağan C, Karadağ Öncel E, Kara Aksay A, Yılmaz Çifidoğan D. Knowledge and Attitudes of Pediatricians to The Human Papilloma Virus Vaccines. *Forbes J Med.* 2021;2(1):19-24.
- Duval B, Gilca V, McNeil S, Dobson S, Money D, Gemmill IM, et al. Vaccination against human papillomavirus: a baseline survey of Canadian clinicians' knowledge, attitudes and beliefs. *Vaccine.* 2007;25(45):7841-7.
- Riedesel JM, Rosenthal SL, Zimet GD, Bernstein DI, Huang B, Lan D, et al. Attitudes about human papillomavirus vaccine among family physicians. *J Pediatr Adolesc Gynecol.* 2005;18(6):391-8.
- Kartal JA. What do primary care physicians know about cervical cancer and HPV vaccine? *Türkiye Aile Hekim Derg.* 2011;15(1):1-6.
- Güner PD, Gözükarar KH. Factors influencing decision - Making for HPV vaccination of female doctors for their children. *Ankara Med J.* 2019;18(3):539-49.
- Revanlı RA, Yüceer C, Şenol E, Azap A, Erbay A, Alp-Çavuş S, et al. Aile hekimlerinin İnsan papilloma virüsü ve zona aşılıları hakkındaki bilgi düzeyleri ve tutumlarının araştırılması. *Klinik Derg.* 2016;29(1):15-20.
- Tan J, Farrell L, Allen DG. The attitudes of Australian gynaecologists to HPV vaccination: an ASCCP survey. *Aust N Z J Obstet Gynaecol.* 2010;50(5):472-7.
- Topcu S, Ulukol B, Emuler DS, Topcu HO, Peker GC, Dokmeci F, et al. Physicians' awareness and approaches to human papillomavirus infection and vaccination. *Cukurova Med J.* 2018;43(2):326-31.