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RESEARCH ARTICLE

HPV Testing and Vaccination Knowledge and Uptake Among Final-Year Medical Students in Central Anatolia: A Cross-Sectional Study

Orta Anadolu'daki Son Sınıf Tıp Öğrencileri Arasında HPV Testi ve Aşısı Hakkında Bilgi Düzeyi ve Uygulanma Durumu: Kesitsel Bir Çalışma

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ABSTRACT

Objective: This study aimed to evaluate knowledge of human papillomavirus (HPV), HPV testing, and HPV vaccination among final-year medical students in Central Anatolia and to determine HPV vaccination uptake.

Materials and Methods: We conducted this cross-sectional descriptive study between March and June 2025. After ethics committee approval, we distributed an online questionnaire to intern doctors from eight medical faculties in Konya, Ankara, Kayseri, Aksaray, and Karaman in the Central Anatolia Region. A total of 384 interns who voluntarily participated and completed the questionnaire were included in the study. Data were collected using an online survey comprising sociodemographic characteristics and the 33-item Turkish-validated Human Papillomavirus Knowledge Scale (HPV-KS). Statistical analyses were performed using SPSS version 31, and group comparisons were conducted using the Mann-Whitney U test. A p value of <0.05 was considered statistically significant.

Results: Among the 384 intern doctors included in the study, only 2.1% had received the HPV vaccine. The mean HPV knowledge score was 24.64±3.92. Among the subdomains, general HPV knowledge was highest, whereas knowledge regarding the protective effects of HPV vaccines was lowest. Notable gaps were identified in knowledge related to HPV testing and vaccination. No significant associations were observed between sociodemographic or behavioural characteristics and HPV knowledge levels (p>0.05).

Conclusion: Final-year medical students demonstrated significant deficiencies in HPV-related knowledge and very low vaccination uptake. These findings suggest that current medical education may be insufficient in terms of preventive medicine. Strengthening HPV-related education may improve future patient counselling and contribute to increasing vaccination rates.

Keywords: Human Papillomavirus (HPV), HPV vaccination, medical students, HPV knowledge

ÖZET

Amaç: Bu çalışmanın amacı, Orta Anadolu'daki son sınıf tıp öğrencilerinde insan papillomavirüsü (HPV), HPV testi ve HPV aşısına ilişkin bilgi düzeyini değerlendirmek ve HPV aşılanma durumunu belirlemektir.

Gereç ve Yöntemler: Bu kesitsel ve tanımlayıcı çalışma, Mart-Haziran 2025 tarihleri arasında Orta Anadolu'daki çeşitli tıp fakültelerinde öğrenim gören intörn doktorlar arasında gerçekleştirildi. Gönüllü olarak katılan ve çevrimiçi anketi eksiksiz dolduran 384 intörn çalışmaya dahil edildi. Veriler, sosyodemografik özellikleri içeren çevrimiçi anket formu ve Türkçe geçerlilik-güvenilirliği yapılmış 33 maddelik HPV Bilgi Ölçeği (HPV-KS) kullanılarak toplandı. İstatistiksel analizler SPSS 31 programı ile yapıldı ve gruplar arası karşılaştırmalarda Mann-Whitney U testi kullanıldı. p<0,05 anlamlı kabul edildi.

Bulgular: Çalışmaya katılan 384 intörn doktorun yalnızca %2,1'inin HPV aşısı olduğu saptandı. Ortalama HPV bilgi puanı 24,64±3,92 idi. Alt boyutlar incelendiğinde, genel HPV bilgi düzeyinin en yüksek, HPV aşısının koruyuculuğuna ilişkin bilginin ise en düşük olduğu görüldü. HPV testi ve aşıya yönelik bilgi alanlarında önemli eksiklikler dikkat çekti. Sosyodemografik ve davranışsal özellikler ile HPV bilgi düzeyi arasında anlamlı bir ilişki saptanmadı (p>0,05).

Sonuç: Son sınıf tıp öğrencilerinde HPV ile ilişkili bilgi düzeyinde önemli eksiklikler ve oldukça düşük aşılanma oranı bulunmaktadır. Bu bulgular, mevcut tıp eğitiminin koruyucu hekimlik açısından yetersiz olabileceğini düşündürmektedir. HPV eğitiminin güçlendirilmesi, gelecekte hasta danışmanlığı ve aşılanma oranlarının artırılmasına katkı sağlayabilir.

Anahtar Kelimeler: İnsan Papillomavirüsü (HPV), HPV aşısı, tıp öğrencileri, HPV bilgi düzeyi

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INTRODUCTION

Human papillomavirus (HPV) infection is among the most prevalent sexually transmitted diseases worldwide and plays a major role in the development of multiple malignancies. It is estimated that HPV-related cancers constitute approximately 4–5% of the global cancer burden (1,2). The presence of HPV DNA in nearly all cervical cancer cases highlights its fundamental etiological role in this disease. Beyond cervical cancer, HPV has also been implicated in the pathogenesis of several other malignancies, including anal, oropharyngeal, vulvar, vaginal, and penile cancers (3,4). To date, more than 200 HPV genotypes have been identified, of which approximately 14 are considered high-risk due to their oncogenic potential. Among these, HPV types 16 and 18 account for nearly 70% of cervical cancer cases (2,5). The majority of HPV infections remain asymptomatic, facilitating unintentional transmission among individuals. This underscores the importance of improving public awareness regarding HPV infection, including its modes of transmission as well as available preventive and screening strategies. In this context, strengthening educational initiatives, vaccination programs, and screening efforts is essential for reducing the burden of cervical cancer and other HPV-related malignancies (6,7).

Intern doctors, as senior medical students, play a critical role in improving HPV awareness, as they will soon engage directly with the population in primary healthcare settings after graduation. This study therefore sought to evaluate the adequacy of HPV- and HPV vaccination-related educational content within medical school curricula and to objectively assess intern doctors' knowledge levels on these topics. The findings of this research may help inform curriculum revisions, support the development of targeted educational interventions, and strengthen vaccination and screening strategies during the early stages of medical practice.

MATERIALS AND METHODS

Design and Participants:

This cross-sectional descriptive study was designed between March and June 2025. During the study preparation phase, the study protocol was developed, the questionnaire was prepared, and communication was established with participating medical faculties. Following approval from the KTO Karatay University Faculty of Medicine Non-Drug and Non-Medical Device Research Ethics Committee (Approval No: 2025/019; 12 June 2025), the online questionnaire was distributed, and data collection was conducted thereafter. Participants were recruited from eight medical faculties located in Konya, Ankara, Kayseri, Aksaray, and Karaman, including both public and foundation universities in the Central Anatolia Region. The questionnaire was disseminated through institutional and student communication networks. Participation was voluntary, convenience sampling was used, and only fully completed questionnaires were included in the final analysis.

The Human Papillomavirus Knowledge Scale (HPV-KS) was utilised to assess participants' knowledge levels regarding

human papillomavirus (HPV), HPV testing, and HPV vaccination. The scale was originally developed by Waller et al. in 2013, and its Turkish validity and reliability study was conducted by Demir Bozkurt and Özdemir in 2023. The instrument consists of 33 items, each scored as "1" for correct responses, while incorrect or "I do not know" responses are scored as "0", yielding a total possible score ranging from 0 to 33, with higher scores indicating greater knowledge regarding HPV (Supplementary File S2).

The scale comprises four subdomains:

General knowledge about HPV (AÖ1), knowledge related to HPV testing (AÖ2), knowledge of existing types of HPV vaccines (AÖ3), and awareness of the protective properties of HPV vaccines (AÖ4). The questionnaire was prepared electronically using Google Forms and distributed online. In addition to the HPV Knowledge Scale, the survey included questions on sociodemographic and behavioural characteristics, including age, gender, marital status, type of university attended (public or private), smoking status, sexual activity status, and history of HPV vaccination.

The inclusion criteria were being an actively practising intern doctor and providing complete responses to all questionnaire items. Questionnaires that were partially completed or contained inconsistent responses were excluded from the analysis. Participation was entirely voluntary. To minimise potential social desirability and reporting bias, the survey was administered anonymously and without collecting any personally identifiable information. The target sample size was determined based on the estimated number of accessible intern doctors in the participating universities during the data collection period, and all eligible students who could be reached were invited to take part in the study.

Ethical Approval:

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the KTO Karatay University Faculty of Medicine Non-Drug and Non-Medical Device Research Ethics Committee (Approval No: 2025/019; 12 June 2025) before participant recruitment and data collection commenced. Electronic informed consent was obtained from all participants before they completed the questionnaire. Data were collected anonymously without requesting any personally identifiable information, and the confidentiality of all participants was strictly maintained.

Statistical analysis:

Statistical analyses were performed using IBM SPSS Statistics version 31 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean, standard deviation, median, quartiles, and minimum–maximum values for quantitative variables, and as frequencies and percentages for categorical variables. The distribution of quantitative variables was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. As the majority of scale and subscale scores did not show a normal distribution, comparisons between two independent groups were conducted using the Mann–Whitney U test. All HPV Knowledge Scale total and subscale scores were analysed as continuous variables and were not categorised into predefined

groups. Because only fully completed questionnaires were included in the analysis, no missing data were present for the variables used in the statistical analyses.

Box-and-whisker plots were used to visually present the distribution of total and subscale scores of the HPV Knowledge Scale across categories of selected categorical variables. No subgroup, interaction, or sensitivity analyses were performed. A two-sided *p* value of <0.05 was considered statistically significant, and all statistical tests were interpreted with a 95% confidence interval. The internal consistency of the HPV Knowledge Scale in the current study sample was assessed using Cronbach's alpha coefficient. Correct responses were scored as 1, whereas incorrect and "I do not know" responses were scored as 0, in accordance with the scoring procedure of the scale.

RESULTS

The sociodemographic characteristics of the 384 intern doctors included in the study are presented in Table 1. Of the participants, 56.3% were female and 43.8% were male. The majority of the participants were single (97.4%), while only 2.6% were married. Regarding the type of university attended, 88.5% were studying at public universities and 11.5% at private (foundation) universities. When HPV vaccination status was evaluated, it was determined that only 2.1% of the intern doctors had received at least one dose of the HPV vaccine, whereas 97.9% reported not having been vaccinated. Regarding smoking habits, 16.1% of the participants reported current smoking, while 83.9% stated that they were non-smokers. Evaluation of sexual activity revealed that 5.7% of the participants reported being sexually active, while 94.3% reported not having an active sexual life (Table 1).

The HPV Knowledge Scale (HPV-KS) total score reflects the overall level of knowledge regarding HPV. The first subdimension of the scale (AO1) evaluates general knowledge about HPV, the second subdimension (AO2) assesses knowledge related to HPV testing, the third subdimension (AO3) measures awareness of currently available HPV vaccines, and the fourth subdimension (AO4) evaluates knowledge regarding the protective properties of HPV vaccines. The scale comprises 16 items in AO1, 6 items in AO2, 5 items in AO3, and 6 items in AO4. The mean total HPV knowledge score was 24.640 ± 3.922 (range: 6–32). The mean AO1 score was 12.599 ± 1.572 (range: 6–15), while the mean AO2 score was 4.333 ± 1.339 (range: 0–6). The mean AO3 score was 4.338 ± 0.957 (range: 0–5), and the mean AO4 score was 3.369 ± 1.319 (range:

Table 1. Sociodemographic Characteristics of the Study Participants

Variable	Category	n (%)
Gender	Male	168 (43.8)
	Female	216 (56.3)
Marital Status	Single	374 (97.4)
	Married	10 (2.6)
Type of University	Public	340 (88.5)
	Private	44 (11.5)
HPV Vaccination Status	Yes	8 (2.1)
	No	376 (97.9)
Smoking Status	Yes	62 (16.1)
	No	322 (83.9)
Sexual Activity	Yes	22 (5.7)
	No	362 (94.3)
Total		84 (100.0)

0–6). The presence of minimum scores of zero in AO2, AO3, and AO4 indicates that some participants reported no correct responses in the domains of HPV testing and HPV vaccination. The mean scores of the HPV testing- and vaccine-related subdimensions (AO2, AO3, and AO4) were similar, suggesting comparable levels of awareness across these domains. Among all subdimensions, general HPV knowledge (AO1) showed the highest mean score, whereas knowledge related to the protective properties of HPV vaccines (AO4) showed the lowest mean score. Overall, these findings indicate that while general awareness of HPV was relatively adequate, important gaps remain in knowledge related to screening and vaccination (Table 2).

Because only fully completed questionnaires were included in the analyses, no missing data were present for the main outcome variables. Comparisons of total and subscale HPV Knowledge Scale scores according to sociodemographic and behavioural characteristics are summarised in Table 3. There were no statistically significant differences between male and female participants in either the total score or any of the subscale scores (all *p* > 0.05). Similarly, marital status was not associated with HPV knowledge levels, and no significant differences were observed between single and married participants across the total or subscale scores (all *p* > 0.05). The comparison between students attending public and private universities likewise revealed no significant differences in the total or subscale scores of the HPV Knowledge Scale

Table 2. Distribution of Responses According to Subdomains of the HPV Knowledge Scale

Subdomains of HPV-KS (n:384)	Min-Max	Mean±SD
What do you know about HPV?	6-15	12.59±1.57
What do you know about HPV testing?	0-6	4.33±1.34
What do you know about the types of available HPV vaccines?	0-5	4.34±0.96
What do you know about the protective properties of HPV vaccines?	0-6	3.37±1.32
Total Score	6-32	24.64±3.92

Min: Minimum, Max: Maximum, SD: Standard Deviation

Table 3. Comparison of HPV Knowledge Scale Total and Subscale Scores According to Sociodemographic Variables

Variables	Categories	First Subdimension Median (Q1-Q3) Mean±SD	Second Subdimension Median (Q1-Q3) Mean±SD	Third Subdimension Median (Q1-Q3) Mean±SD	Fourth Subdimension Median (Q1-Q3) Mean±SD	Total Score Median (Q1-Q3) Mean±SD
Gender	Male	13(12-14) 12.66±1.55	4(4-5) 4.40±1.28	5(4-5) 4.44±0.76	3(2-4) 3.17±1.35	25(23-27) 24.69±3.62
	Female	13(12-14) 12.55±1.59	5(3-5) 4.27±1.38	5(4-5) 4.26±1.07	4(3-4) 3.52±1.28	25(23-27) 24.60±4.16
	p-value	0.413	0.626	0.492	0.112	0.883
Marital Status	Single	13(12-14) 12.62±1.57	4(4-5) 4.31±1.34	5(4-5) 4.34±0.96	4(3-4) 3.36±1.31	25(23-27) 24.63±3.94
	Married	13(10.50-13) 12.00±1.41	5(4.50-6) 5.20±0.84	4(4-5) 4.40±0.55	4(2-5) 3.60±1.82	26(22-28) 25.20±3.35
	p-value	0.337	0.125	0.738	0.724	0.746
University Type	Public	13(12-14) 12.59±1.57	4(4-5) 4.28±1.33	5(4-5) 4.35±0.98	3(3-4) 3.36±1.30	25(23-27) 24.58±3.88
	Private	13(12-14) 12.64±1.62	5(4-6) 4.68±1.39	4(4-5) 4.27±0.77	4(2-4.25) 3.45±1.47	25.50(23.75-28.25) 25.04±4.31
	p-value	0.669	0.090	0.336	0.629	0.395
HPV Vaccination Status	Vaccinated	12.50 (11.25-14.50) 12.75±1.71	4(3.25-5.50) 4.25±1.26	5(5-5) 5.00±0.00	2.50(2-3.75) 2.75±0.96	23(23-28.25) 24.75±3.50
	Not Vaccinated	13(12-14) 12.59±1.57	4(4-5) 4.34±1.34	5(4-5) 4.32±0.96	4(3-4) 3.38±1.32	25(23-27) 24.64±3.94
	p-value	0.955	0.712	0.094	0.230	0.677
Smoking Status	Yes	13(12-14) 12.52±1.98	4(3-5) 4.03±1.52	5(4-5) 4.09±1.39	3(2-4) 3.06±1.44	25(22-27) 23.71±4.98
	No	13(12-14) 12.61±1.48	5(4-5) 4.39±1.29	5(4-5) 4.38±0.84	4(3-4) 3.43±1.29	25(23-27) 24.82±3.67
	p-value	0.803	0.250	0.489	0.268	0.442
Sexual Activity	Yes	13(11-13) 12.18±1.33	5(3-6) 4.45±1.37	4(4-5) 4.18±0.75	4(2-4) 3.36±1.36	25(21-28) 24.18±3.28
	No	13(12-14) 12.62±1.59	4(4-5) 4.33±1.34	5(4-5) 4.34±0.97	4(3-4) 3.37±1.32	25(23-27) 24.66±3.96
	p-value	0.282	0.780	0.244	0.881	0.479

Q1: 1st quartile, Median: 2nd quartile, Q3: 3rd quartile, SD: Standard Deviation

(all $p > 0.05$). HPV vaccination status was not associated with knowledge levels, as vaccinated and unvaccinated participants demonstrated comparable scores in the overall scale and in each subdimension (all $p > 0.05$). In addition, no statistically significant differences in HPV knowledge were observed between smokers and non-smokers, or between participants who reported being sexually active and those who were not (all $p > 0.05$). When the distribution of HPV knowledge scale total and subscale scores according to sociodemographic variables was examined, it was observed that there were

generally similar distribution structures among the groups, the median values were close to each other, and the observed differences were at a limited level (Figure 1.).

All HPV Knowledge Scale total and subscale scores were analysed as continuous variables and were not categorised into predefined groups. No additional subgroup or sensitivity analyses were performed. The HPV Knowledge Scale demonstrated acceptable internal consistency in the current sample, with a Cronbach's alpha coefficient of 0.768.

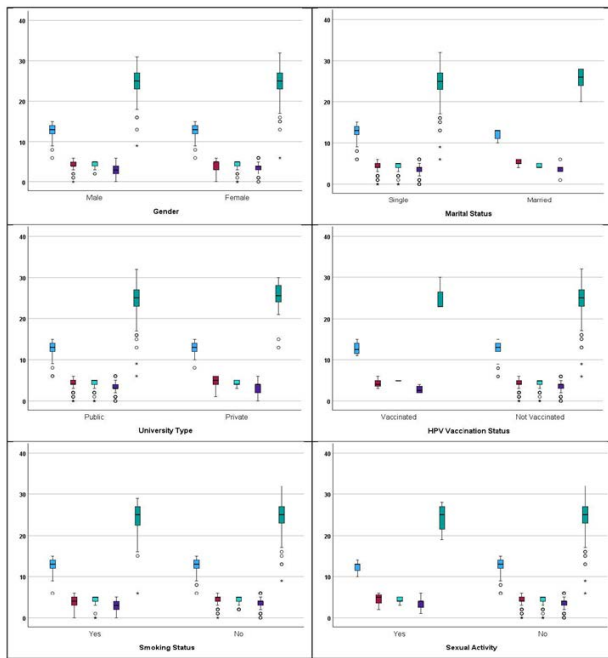


Figure 1. Boxplots of HPV Knowledge Scale Total and Subscale Scores According to Sociodemographic Variables

DISCUSSION

The findings of this cross-sectional study conducted among final-year medical students in Central Anatolia revealed notable deficiencies in HPV-related knowledge, particularly in the domains of testing and vaccination, together with a remarkably low rate of vaccine uptake. Collectively, these results indicate that current medical training may not adequately convert HPV-related theoretical information into practical knowledge and preventive behaviours at the early stages of clinical practice. In the present study, HPV knowledge scores were comparable across all examined variables, including gender, marital status, university type, vaccination status, smoking, and sexual activity, suggesting a consistently low baseline level of knowledge that cannot be attributed to sociodemographic or behavioural differences. Similar findings have been reported in studies conducted in Saudi Arabia, where medical students demonstrated limited HPV-related knowledge and low vaccination uptake, as well as in China, where higher knowledge levels were associated with a greater likelihood of recommending HPV vaccination (9,10). Likewise, studies from Türkiye have highlighted insufficient HPV awareness and notable vaccine hesitancy among medical trainees (1). Although research from the United States indicates a relatively better understanding of HPV's oncogenic role, important gaps persist in knowledge related to vaccination schedules and screening practices. In line with these observations, our results showed that the lowest mean scores were observed in the

subdomains of HPV testing, vaccine types, and the protective effects of vaccination, pointing to deficiencies in prevention-oriented competencies that are critical for effective patient counselling and public health promotion (12,13).

The exceptionally low vaccination rate in our cohort (2.1%) is particularly noteworthy. Given the World Health Organization's recognition of HPV vaccination as an important component of cervical cancer prevention and the prevention of other HPV-associated malignancies, this low uptake among future physicians warrants attention (1). The lower level of knowledge regarding HPV vaccination and its protective effects compared with general HPV knowledge may be related to both educational and healthcare system factors. Although medical students receive information about HPV and its association with cervical cancer during undergraduate training, opportunities for practical exposure to HPV vaccination, including vaccine indications, schedules, and counselling, may be more limited. In addition, HPV vaccination was not routinely included in the national immunization program in Türkiye during the study period, which may have further limited students' exposure to vaccination practices in routine clinical settings (14). Greater emphasis on the practical aspects of HPV vaccination in undergraduate medical education may therefore help address these specific knowledge gaps. The absence of gender-based differences in knowledge in our sample contrasts with some previous studies reporting higher knowledge levels among women; differences in curricular exposure, clinical training environments, and public health engagement may partly explain these discrepancies (15).

Policy implications: National medical curricula should incorporate competency-based HPV education modules that explicitly address screening algorithms, vaccine indications and schedules, and structured approaches to counselling vaccine-hesitant individuals. In parallel, collaboration between the Ministries of Health and Education to facilitate on-campus access to HPV vaccination for medical students such as free vaccination programmes and reminder systems may help position future physicians as early adopters and credible advocates for HPV prevention.

Study Limitations

Several limitations of this study should be acknowledged. First, participation was voluntary and data were collected through an online survey, which may have introduced selection bias and limited the representativeness of the study population. Second, HPV-related knowledge, vaccination status and personal behaviours were self-reported and may therefore be affected by recall bias and social desirability bias, despite the anonymous design of the questionnaire. In addition, the cross-sectional nature of the study precludes any causal interpretation of the observed associations between individual characteristics and knowledge levels. Finally, although the sample size was relatively large, the study was confined to intern doctors in the Central Anatolia Region, and unmeasured institutional or curricular differences between medical schools may have influenced the findings.

CONCLUSION

Final-year medical students demonstrated substantial deficiencies in HPV testing and vaccination knowledge and an extremely low level of vaccine uptake. These findings indicate that current curricula are not adequately equipping future physicians with prevention-focused competencies. Enhancing the content, scope, and practical application of HPV education—particularly screening pathways, vaccine indications and schedules, and communication strategies to address hesitancy—may strengthen students' personal preventive behaviours, improve counselling efficacy, and ultimately contribute to reducing the national burden of HPV-related disease.

DECLARATIONS

Conflict of Interest: The authors declare no competing interests.

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REFERENCES

1. Akinnibosun O, Abakpa OG, Ujoh AJ, et al. Knowledge, attitudes and practices among women of reproductive age on human papillomavirus infection, cervical cancer and vaccination in Otukpo, Nigeria. *Ethiop J Health Sci.* 2024;34(1):15-26. doi: 10.4314/ejhs.v34i1.3.
2. de Martel C, Georges D, Bray F, et al. Global burden of cancer attributable to infections in 2018: A worldwide incidence analysis. *Lancet Glob Health.* 2020;8(2):e180-90. doi: 10.1016/S2214-109X(19)30488-7.
3. de Martel C, Plummer M, Vignat J, et al. Worldwide burden of cancer attributable to HPV by site, country and HPV type. *Int J Cancer.* 2017;141(4):664-70. doi: 10.1002/ijc.30716.
4. Alemany L, Saunier M, Alvarado-Cabrero I, et al. Human papillomavirus DNA prevalence and type distribution in anal carcinomas worldwide. *Int J Cancer.* 2015;136(1):98-07. doi: 10.1002/ijc.28963.
5. Arbyn M, Weiderpass E, Bruni L, et al. Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. *Lancet Glob Health.* 2020;8(2):e191-03. doi: 10.1016/S2214-109X(19)30482-6.
6. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (U.S.). Division of STD Prevention. Genital HPV infection - CDC fact sheet. 2017. Available from: <https://stacks.cdc.gov/view/cdc/130186>.
7. Doorbar J, Quint W, Banks L, et al. The biology and life-cycle of human papillomaviruses. *Vaccine.* 2012;30(Suppl 5):F55-70. doi: 10.1016/j.vaccine.2012.06.083.
8. Demir Bozkurt F, Özdemir S. Validity and reliability of a Turkish version of the human papillomavirus knowledge scale: A methodological study. *J Turk Ger Gynecol Assoc.* 2023;24(3):177-86. doi: 10.4274/jtgga.galenos.2023.2022-10-9.
9. Mekonnen BA, Anagaw YK, Kassahun BA, et al. Evaluation of female university students' knowledge, attitudes, and practices toward human papillomavirus infection and vaccination: A multicenter cross-sectional study. *BMC Womens Health.* 2024;24(1):437. doi: 10.1186/s12905-024-03279-6.
10. Wang H, Liu F, Zhang H, et al. Influential factors and willingness to advocate for HPV vaccination among male nursing interns in China. *BMC Nurs.* 2024;23(1):628. doi: 10.1186/s12912-024-02324-x.
11. Afacan Yıldırım E, Kızık TN. Human papillomavirus (HPV) awareness and vaccine hesitancy among medical students: A cross-sectional study on knowledge, stigma, and preventive behavior. *Turk J Dermatol.* 2025;19(3):118-25. doi: 10.4274/tjd.galenos.2025.05706.
12. Du EY, Adjei Boakye E, Taylor DB, et al. Medical students' knowledge of HPV, HPV vaccine, and HPV-associated head and neck cancer. *Hum Vaccin Immunother.* 2022;18(6):2109892. doi: 10.1080/21645515.2022.2109892.
13. López N, Garcés-Sánchez M, Panizo MB, et al. HPV knowledge and vaccine acceptance among European adolescents and their parents: A systematic literature review. *Public Health Rev.* 2020;41:10. doi: 10.1186/s40985-020-00126-5.
14. Ozdemir CY, Marangoz B, Cicekli N, et al. HPV vaccine awareness and vaccination status among women of reproductive age in Türkiye: A cross-sectional study. *Hum Vaccin Immunother.* 2025;21(1):2586826. doi: 10.1080/21645515.2025.2586826.
15. Forster AS, Marlow LAV, Wardle J, et al. Interest in having HPV vaccination among adolescent boys in England. *Vaccine.* 2012;30(30):4505-10. doi: 10.1016/j.vaccine.2012.04.066.