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Knowledge Level, Vaccination Rates, and Determinants of HPV Vaccination among People Living with HIV in Türkiye: A Cross-sectional Study

Türkiye'de HIV ile Yaşayan Bireylerde HPV Aşısına Ilişkin Bilgi Düzeyi, Aşılama Oranları ve HPV Aşılanmasını Etkileyen Faktörler: Kesitsel Bir Çalışma

Gül et al. HPV Vaccine Uptake Among PLWH in Türkiye

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Abstract
Introduction: Human papillomavirus (HPV) vaccination has not yet been included in national immunization programs in many low- and middle-income countries, including Türkiye. People living with human immunodeficiency virus (HIV; PLWH) are a priority group for vaccination due to their heightened susceptibility to persistent HPV infection and HPV-related cancers. Identifying barriers to vaccination is essential for developing effective prevention strategies.
Materials and Methods: We conducted a cross-sectional study between April and July 2024 among PLWH receiving care at a tertiary training and research hospital. Data were collected using a structured questionnaire covering sociodemographic characteristics, HPV knowledge, vaccination history, and attitudes. Statistical analyses were performed to identify factors associated with HPV knowledge and vaccine uptake.
Results: A total of 120 individuals participated: 92.5% (n = 111) were male, 6.7% (n = 8) female, and 0.8% (n = 1) transgender. The mean age was 34.6 years. Overall, 60.0% (n = 72) reported awareness of HPV, but only 12.5% (n = 15) had received at least one vaccine dose. Among those aware of HPV, uptake was 18.1%. Vaccination was significantly higher among participants with a previous HPV infection (25.0%, $p < 0.05$) and those informed by physicians (45.8%, $p < 0.001$). Among unvaccinated participants, 48.8% (n = 51) indicated they would accept the vaccine only if it were provided free of charge. Higher education level, younger age, and nonheterosexual orientation were significantly associated with greater HPV knowledge.
Conclusion: Despite moderate awareness, HPV vaccination coverage among PLWH in Türkiye remains unacceptably low, primarily due to economic and informational barriers. Expanding cost-free vaccination programs and reinforcing physician recommendations are critical to improving vaccine uptake and reducing the burden of HPV-related diseases in this high-risk population.
Keywords: Barriers, cost, health care, HIV, HPV, knowledge, vaccination

Öz
Giriş: Türkiye dâhil olmak üzere birçok düşük ve orta gelirli ülkede insan papilloma virüsü (HPV) aşısı henüz ulusal bağışıklama programına dâhil edilmemiştir. İnsan bağışıklık yetmezliği virüsü (HIV) ile yaşayan bireyler, HPV enfeksiyonu ve buna bağlı kanserlere karşı artmış duyarlılıkları nedeniyle aşılama açısından öncelikli bir risk grubudur. Aşılama önündeki engellerin belirlenmesi, etkili korunma stratejilerinin geliştirilmesi için önem taşımaktadır.
Gereç ve Yöntem: Çalışma Nisan–Temmuz 2024 tarihleri arasında, üçüncü basamak bir eğitim ve araştırma hastanesinde HIV ile yaşayan kişiler arasında yürütüldü. Yapılandırılmış bir anket aracılığıyla katılımcıların sosyodemografik özellikleri, HPV

hakkındaki bilgi düzeyleri, aşı öyküleri ve aşıya ilişkin tutumları değerlendirildi. HPV bilgisi ve aşılama oranlarıyla ilişkili faktörler istatistiksel olarak analiz edildi.
Bulgular: Çalışmaya toplam 120 kişi katıldı; katılımcıların %92,5'i (n = 111) erkek, %6,7'si (n = 8) kadın ve %0,8'i (n = 1) transgender olarak tanımlandı. Katılımcıların ortalama yaşı 34,6 idi. Katılımcıların %60,0'ı HPV hakkında bilgi sahibi olduğunu bildirmiş, ancak yalnızca %12,5'i en az bir doz HPV aşısı yaptırmıştı. HPV konusunda bilgi sahibi olanlar arasında aşılama oranı %18,1 olarak bulundu. Aşılanma oranı, önceden HPV enfeksiyonu geçirenlerde (%25,0; p < 0.05) ve hekimden bilgi alanlarda (%45,8; p < 0,001) anlamlı olarak daha yüksek saptandı. Aşılanmamış bireylerin %48.8'i (n = 51) aşının yalnızca ücretsiz olması durumunda aşı yaptıracağını belirtti. Daha yüksek eğitim düzeyi, genç yaş ve heteroseksüel olmayan yönelim, HPV konusunda daha yüksek bilgi düzeyi ile anlamlı olarak ilişkili bulundu.
Sonuç: Türkiye'de HIV ile yaşayan bireylerde HPV farkındalığı orta düzeyde olmasına rağmen aşılama oranı belirgin biçimde düşüktür. Ekonomik ve bilgiye erişimle ilgili engeller bu durumu belirleyen temel faktörlerdir. Ücretsiz aşılama programlarının yaygınlaştırılması ve hekimlerin aşı önerilerinin güçlendirilmesi, bu yüksek riskli grupta HPV ilişkili hastalık yükünü azaltmak açısından kritik öneme sahiptir.
Anahtar Kelimeler: Engeller, maliyet, sağlık hizmetleri, HIV, HPV, bilgi düzeyi, aşılama

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection (STI) worldwide and is associated with a broad spectrum of diseases, including genital warts and cancers of the cervix, anus, and oropharynx[1,2]. People living with human immunodeficiency virus (HIV; PLWH) are particularly susceptible to persistent HPV infection and HPV-related malignancies due to HIV-induced immunodeficiency, which impairs viral clearance and increases oncogenic potential[3–6]. Among PLWH, men who have sex with men (MSM) are especially vulnerable to anal HPV infection and the subsequent development of anal cancer[7].

HPV vaccination is highly effective in preventing infections caused by high-risk HPV types. Leading health authorities, including the World Health Organization, the European AIDS Clinical Society, and the Centers for Disease Control and Prevention, recommend HPV vaccination for all eligible individuals, including PLWH[8,9]. Nevertheless, in many low- and middle-income countries (LMICs), such as Türkiye, HPV vaccines are not universally incorporated into national immunization programs. This, combined with out-of-pocket payment requirements, significantly restricts access, particularly for economically disadvantaged PLWH[10].

Limited knowledge about HPV and its associated risks further impedes vaccine uptake. Studies in LMICs have shown that PLWH often possess inadequate awareness of HPV-related diseases and the benefits of vaccination, contributing to low vaccination coverage[11,12]. Despite the high prevalence of HIV–HPV coinfection in LMICs, data from Türkiye regarding HPV knowledge, attitudes, and vaccine access among PLWH remain scarce. This study aimed to assess the knowledge and attitudes of PLWH toward HPV and HPV vaccination in Türkiye and to identify sociodemographic and clinical factors influencing vaccination uptake. To the best of our knowledge, this is the first study from Türkiye to report HPV knowledge and vaccination data among PLWH. By situating the findings within the broader LMIC context, the results may inform targeted strategies to enhance HPV prevention among high-risk populations.

Materials and Methods

This cross-sectional observational study was conducted between April 1 and July 1, 2024, among PLWH aged 18 years or older who was receiving care at a training and research hospital. Data were collected using a structured questionnaire administered through face-to-face interviews. The questionnaire included demographic variables (age, gender, education level, disease history, and number of sexual partners in the past year) as well as items assessing knowledge of HPV and attitudes toward HPV vaccination.

Ethical approval was obtained from the Clinical Research Ethics Committee of University of Health Sciences Türkiye, Şişli Hamidiye Etfal Training and Research Hospital (approval number: 4,338, dated: 12.03.2024). Written informed consent was obtained from all participants prior to enrollment. Data collection was performed anonymously to ensure participant confidentiality.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 21.0 (Armonk, NY, USA). Descriptive statistics were used to summarize participants' sociodemographic and behavioral characteristics. Categorical variables were presented as frequencies and percentages, and associations between categorical variables were assessed using the chi-square test or Fisher's exact test, as appropriate. Variables with a p-value <0.10 in bivariate analysis were included in a multivariate logistic regression model to identify independent predictors of HPV vaccination. Statistical significance was set at $p < 0.05$.

Results

Sociodemographic and Behavioral Characteristics

A total of 120 participants were enrolled in the study. The majority were male (92.5%, n = 111), followed by female (6.7%, n = 8) and transgender individuals (0.8%, n = 1). Regarding age distribution, 16.7% (n = 20) were younger than 25 years, 37.5% (n = 45) were 25–35 years, 32.5% (n = 39) were 35–45 years, and 13.3% (n = 16) were older than 45 years.

All participants had completed at least primary education. Specifically, 5.0% (n = 6) had primary education, 9.2% (n = 11) middle school, 25.8% (n = 31) high school, 43.3% (n = 52) university, and 16.7% (n = 20) postgraduate education.

Regarding sexual orientation, 42.5% (n = 51) identified as homosexual, 32.5% (n = 39) as heterosexual, and 16.7% (n = 20) as bisexual. In the past year, 12.5% (n = 15) reported no sexual partners, 30.0% (n = 36) had one partner, 33.3% (n = 40) had 2–5 partners, and 19.2% (n = 23) had more than five partners.

Overall, 26.7% (n = 32) reported a history of HPV infection, 32.5% (n = 39) had undergone HPV/Pap smear testing, and 52.5% (n = 63) reported previous STIs other than HIV and HPV.

HPV Knowledge Level

Among participants, 60.0% (n = 72) reported awareness of HPV. To verify self-reported knowledge, participants were asked five specific HPV-related questions. Of these, 55.8% correctly identified that "HPV causes genital warts," and 48.3% correctly recognized that "HPV can cause cancer." The statements "HPV only causes disease in women" and "HPV only causes disease in homosexual men" were correctly rejected by 95.8% and 98.3% of participants, respectively. The statement "Condoms completely prevent HPV transmission" had the lowest correct response rate (28.3%).

HPV knowledge was significantly associated with education, age, and sexual orientation. Knowledge rates were highest among university or postgraduate graduates (69.6%) and lowest among participants with primary or middle school education (5.0%, p = 0.015).

When analyzed by age, 70.0% of participants under 25 years, 70.5% of those aged 25–35 years, and 64.0% of those aged 35–45 years reported awareness of HPV, compared to only 26.9% of participants over 45 years, indicating a significant decline in knowledge with increasing age (p = 0.002).

By sexual orientation, 68.6% of homosexual participants reported awareness of HPV, compared with 60.0% of bisexual and 41.0% of heterosexual participants. Knowledge among homosexual and bisexual participants was significantly higher than among heterosexual participants (p = 0.012).

No significant associations were observed between HPV knowledge and gender or number of sexual partners. However, participants with a history of HPV infection were more likely to report awareness than those without (90.6% vs. 48.9%, p < 0.001). Similarly, individuals with a history of other STIs had higher HPV knowledge than those without (68.3% vs. 50.9%, p = 0.045) (Table 1).

Knowledge and Attitudes Regarding HPV Vaccines

Overall, 40.8% of participants reported awareness of HPV vaccines, while 59.2% were uninformed. Among participants with knowledge of the vaccine, 6.1% believed no effective vaccine existed, 22.4% thought the vaccine protects only against warts, and 65.3% correctly recognized that it protects against both warts and cancer. Additionally, 42.9% believed the vaccine would be ineffective if not administered early, and 36.7% thought it would be ineffective after wart development.

The main sources of information were physicians (33.3%), friends (27.8%), the internet (16.7%), social media (13.9%), and nongovernmental organizations (NGOs) (8.3%).

Vaccination Status

Among all participants, 12.5% (n = 15) had received at least one dose of the HPV vaccine. Among the unvaccinated, the most common reasons for not receiving the vaccine were lack of knowledge (48.6%), high cost (21.0%), perception that vaccination was unnecessary (18.1%), prior HPV infection leading to perceived ineffectiveness (2.9%), and older age (4.8%). No participants cited fear of side effects or distrust in vaccine efficacy.

Of participants reporting HPV knowledge (n = 72), only 18.1% (n = 13) had been vaccinated. Vaccination rates were significantly higher among individuals with a history of HPV infection compared to those without (25.0% vs. 8.0%, p = 0.02).

Vaccination rates did not differ significantly by number of sexual partners in the past year (range: 9.8%–15.8%) or by sexual orientation, although rates were slightly higher among homosexual participants (14.5%) than among heterosexual (9.5%) or bisexual (13.0%) participants (Table 2).

Receiving information from a physician was strongly associated with vaccination: 45.8% of participants informed by a doctor were vaccinated, compared with 4.2% of others (p < 0.001; odds ratio = 19.46), highlighting the key role of healthcare providers in promoting vaccination (Table 3). Vaccination rates were 25.0% among participants who received information from friends or the internet but 0% among those relying on social media or NGOs.

Of the vaccinated participants, 20.0% received one dose, 33.3% received two doses, and 46.7% completed the three-dose series. Vaccine types included bivalent (20.0%), quadrivalent (33.3%), and nonavalent (40.0%), with 6.7% unable to recall the type.

Access to the HPV Vaccine and Perception of Cost

Among unvaccinated participants, 10.8% believed the HPV vaccine was free, 19.2% knew it was paid and were aware of the price, 25.0% knew it was paid but were unaware of the price, and 45.0% had no opinion regarding the cost.

Nearly half of participants (48.6%) indicated they would only consider vaccination if it were free. Among those willing to pay, 31.4% could allocate less than 3,000 TRY, 15.2% could allocate between 3,000 and 6,000 TRY, and 4.8% between 6,000 and 10,000 TRY. The difference in willingness to pay among these budget groups was statistically significant (chi-square = 46.28; p < 0.001), confirming cost as a major barrier to HPV vaccination.

Discussion

This study demonstrates that although most PLWH in Türkiye were aware of HPV, only a small proportion had received the vaccine, highlighting a notable knowledge–behavior gap. The relatively high knowledge level observed—higher than previously reported in the literature[13,14]—may be attributed to the generally high educational attainment of the sample[15,16] and greater awareness among younger participants, who likely have easier access to information, higher digital health literacy, and are more frequently targeted by vaccination campaigns[17].

The finding that homosexual and bisexual individuals had higher HPV knowledge aligns with prior studies[18,19]. This may reflect their more frequent participation in screening programs and greater engagement with health education services. Additionally, the broader availability of HPV-related counseling for MSM living with HIV may further reinforce this disparity.

Higher awareness among participants who had previously experienced HPV or other STIs may indicate an accelerated learning effect associated with personal illness experience[20].

In our study, most participants reported obtaining information about HPV primarily through social networks and other digital sources. This is consistent with previous research, which identifies digital media, social networks, and the internet as the main sources of HPV-related information, even among PLWH[21,22]. While these platforms can facilitate information dissemination, they also carry a risk of misinformation. This underscores the need for healthcare professionals to provide accurate counseling and direct individuals to reliable sources via formal health services.

Being informed does not always translate into behavioral change. In the case of HPV, knowledge does not necessarily lead to the adoption of preventive behaviors such as vaccination. Indeed, only 12.5% of participants reported having been vaccinated, and

just 46.7% had completed the three-dose series. Similar gaps between awareness and vaccine uptake have been documented among PLWH in other contexts[23,24]. The low vaccination rates despite relatively high knowledge suggest that general education does not directly reflect health literacy, highlighting the importance of targeted public health education and the need for health systems to bridge the gap between knowledge and action.

A recent randomized controlled trial from Brazil demonstrated that a personalized, web-based intervention significantly increased both HPV vaccine initiation and completion rates among PLWH compared with standard educational approaches[25]. Similarly, a systematic meta-analysis found that digital reminders and provider-based interventions, including SMS reminders and electronic health record prompts, were more effective in promoting HPV vaccination uptake than client education alone[26]. In Türkiye, where HPV vaccines are not included in the national immunization program and economically disadvantaged groups face additional access barriers, such low-cost and scalable digital interventions could play a critical role in improving vaccination coverage among PLWH.

The unexpectedly low vaccination rates among individuals engaging in high-risk sexual behaviors suggest that these groups are not adequately targeted in vaccination programs, revealing potential strategic gaps. Previous research has similarly documented suboptimal HPV vaccine uptake among individuals with histories of risky sexual behavior, including heterosexually active adults at increased risk for HIV and transgender or gender-diverse populations, who often experience overlapping behavioral and structural risk factors[27,28]. In our study, participants reporting risky sexual behaviors, such as having multiple sexual partners, did not show a statistically significant association with vaccination status. This finding suggests that, even within high-risk groups, awareness may not readily translate into preventive action, and access-related or systemic barriers may be more decisive.

Conversely, some studies have reported that MSM living with HIV are more likely to accept HPV vaccination[29]. A systematic review indicated that HPV vaccine uptake among HIV-negative MSM ranged from 2.7% to 91.5%, whereas among MSM living with HIV, it ranged from 5.6% to 90.0%, highlighting both heterogeneity and generally higher uptake in the latter group[30]. A recent meta-analysis further reported HPV vaccine acceptance among men with same-sex orientation at approximately 62.2%, compared with 47.0% among men in general[31]. In our study, although homosexual participants exhibited higher vaccination rates than heterosexual participants, the difference was not statistically significant, likely due to limited sample size. Greater engagement of MSM with healthcare services, coupled with exposure to comprehensive sexual health education and counseling, may explain the relatively higher vaccine acceptance observed in this group.

Among individuals with a history of HPV infection, the knowledge rate was 90.6%, compared with 48.9% among those without such a history. Although this knowledge increase was positively reflected in vaccination behavior, only 25.0% of individuals with prior HPV infection were vaccinated, compared with 8.0% without such history. Thus, while increased knowledge may enhance vaccination behavior, the uptake remains suboptimal. The low vaccination rates among individuals with HPV-related disease history suggest that opportunities for secondary prevention are underutilized. Failure to provide vaccination counseling to individuals who have undergone HPV testing or have a history of warts may result in missed vaccination opportunities. Similar patterns have been reported in the general population, where women with high-grade cervical lesions remain unvaccinated despite clear eligibility, often due to misconceptions about age limits, prior HPV infection, or lack of provider recommendation[32]. Additionally, catch-up vaccination in older age groups remains underused[33].

Increasing HPV vaccination among (PLWH) requires more than simply providing information. Our analysis revealed that the source of information critically influences the decision to vaccinate. Physician-delivered information has consistently been identified as the strongest predictor of vaccination[34–36]. Healthcare providers who actively recommend the HPV vaccine significantly increase uptake, whereas the absence of such recommendations remains a major barrier[37]. However, even when providers recognize the importance of vaccination, practical, evidentiary, and ethical challenges may hinder recommendations, particularly for older or high-risk populations, including gay, bisexual, and other MSM[38]. These findings highlight the pivotal role of healthcare professionals in initiating vaccination discussions, correcting misconceptions, and facilitating access for eligible individuals.

Conversely, in our study, vaccination rates were significantly lower among participants who relied on social media or internet sources for information. Although the internet can increase awareness of HPV vaccination, it may also disseminate misinformation, contributing to vaccine hesitancy[39].

When participants were asked why they had not been vaccinated, lack of knowledge and cost were the most frequently cited reasons. Notably, 48.6% of unvaccinated participants stated that they would only receive the vaccine if it were free. This aligns with evidence from the Eastern Mediterranean Region, where the high cost of the HPV vaccine—especially in non-Gavi-eligible middle- and high-income countries—was identified as a major barrier to immunization. In contexts without vaccine subsidies, financial burden substantially reduces vaccination rates, even among high-risk populations[40]. Considering the burden of HPV-related infections and cancers in PLWH, providing free vaccination to this group is critically important.

Evidence from multiple settings indicates that HPV vaccination can be cost-effective for PLWH by preventing HPV-related diseases and reducing healthcare expenditures. In China, a Markov model analysis demonstrated that vaccinating women living with HIV aged 18–45 years, particularly with the quadrivalent vaccine, was cost effective and substantially reduced genital warts, cervical cancer incidence, and related mortality compared with no vaccination[41]. In Germany, dynamic transmission modeling suggested that extending HPV vaccination to MSM up to ages 26 or 45 could avert thousands of anogenital cancers and warts, with incremental cost-effectiveness ratios within acceptable thresholds[42]. Similarly, in the United States, modeling studies in HIV-positive MSM indicated that treating high-grade squamous intraepithelial lesions combined with adjuvant HPV vaccination in individuals aged 38 years or older was cost effective compared with no intervention[43]. Collectively, these findings suggest that HPV vaccination offers favorable economic value for both women and men living with HIV. Ensuring insurance coverage, implementing health policies to reduce out-of-pocket costs, expanding reimbursement mechanisms, and integrating HPV vaccination into publicly funded programs may substantially improve access for PLWH, particularly in countries such as Türkiye, where financial barriers remain significant.

Given that lack of knowledge and high vaccine cost remain major barriers to HPV vaccination among PLWH, interventions should also address social and psychological factors influencing uptake. In particular, stigma associated with HIV and other STIs

may discourage individuals from seeking vaccination or discussing it with partners. Culturally sensitive education, community engagement, and the creation of a supportive, nonjudgmental healthcare environment may facilitate vaccine access, empower informed decision-making, and encourage open communication about HPV prevention[11].

Although this study identifies important trends, several methodological limitations must be acknowledged. First, the sample size was limited in certain subgroups, such as women and heterosexual individuals, which may have reduced the ability to detect statistically significant differences. For variables showing no significant differences, this may reflect insufficient statistical power rather than a true absence of effect. The cross-sectional design precludes causal inferences; therefore, relationships should be interpreted as associations rather than causation. Additionally, reliance on self-reported data may introduce response bias. Multicenter studies with larger samples are needed to confirm these findings and enable broader generalization.

This research did not receive specific funding, and the authors declare no conflicts of interest.

Conclusion

In this study, 60.0% of participants reported awareness of HPV, yet only 12.5% had received at least one dose of the HPV vaccine. Among participants aware of HPV, the vaccination rate was 18.1%. Higher vaccination rates were observed among individuals with a history of HPV infection and those who received information from a physician. Greater HPV knowledge scores were associated with higher education, younger age, and nonheterosexual orientation. Notably, 48.8% of unvaccinated participants indicated they would accept the vaccine only if it were free. These findings suggest that, in this study population, vaccination coverage among PLWH remains substantially lower than awareness levels. Cost-related barriers and limited physician-delivered information were identified as key factors influencing uptake. Incorporating HPV vaccination into publicly funded programs and providing structured counseling within HIV care settings may enhance vaccine access and uptake among PLWH in Türkiye.

Ethics

Ethics Committee Approval: Ethical approval was obtained from the Clinical Research Ethics Committee of University of Health Sciences Türkiye, Şişli Hamidiye Etfal Training and Research Hospital (approval number: 4,338, dated: 12.03.2024).

Informed Consent: Written informed consent was obtained from all participants prior to enrollment.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Ö.G., Concept: Ö.G., N.D.D., D.Y.S., Design: Ö.G., D.Y.S., Data Collection or Processing: Ö.G., N.D.D., C.A.T., O.D., A.Ö., D.Y.S., Analysis or Interpretation: Ö.G., O.D., Literature Search: Ö.G., N.D.D., C.A.T., A.Ö., Writing: Ö.G., N.D.D., D.Y.S.

Conflict of Interest: No conflict of interest was declared by the authors.

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Table 1. Association between HPV knowledge level and sociodemographic and clinical variables.

Variable	Reported HPV knowledge: Yes, n (%)	Reported HPV knowledge: No, n (%)	p-value
Education level			**0.015**
Primary/middle school	1 (5.0)	16 (95.0)	
High school	12 (37.5)	20 (62.5)	
University/postgraduat	59 (69.6)	26 (30.4)	
Age group			**0.002**
<25	14 (70.0)	6 (30.0)	
25–35	31 (70.5)	13 (29.5)	
35–45	25 (64.0)	14 (36.0)	
>45	4 (26.9)	12 (73.1)	
Sexual orientation			**0.012**
Homosexual	35 (68.6)	16 (31.4)	
Bisexual	12 (60.0)	8 (40.0)	
Heterosexual	16 (41.0)	23 (59.0)	
History of HPV infection			**<0.001**
Yes	29 (90.6)	3 (9.4)	
No	41 (48.9)	43 (51.1)	
History of STIs			**0.045**
Yes	43 (68.3)	20 (31.7)	
No	29 (50.9)	28 (49.1)	
Gender			**0.538**
Male	67 (60.4)	44 (39.6)	
Female/transgender	5 (55.6)	4 (44.4)	
Number of sexual partners (last 1 year)			**0.619**
0	8 (53.3)	7 (46.7)	
1	22 (61.1)	14 (38.9)	
2–5	24 (60.0)	16 (40.0)	
>5	18 (64.3)	10 (35.7)	

Statistical analysis was performed using the chi-square test and Fisher's exact test where appropriate.

Table 2. Association between HPV vaccination status and sociodemographic and clinical variables.

Variable	Vaccinated, n (%)	Not vaccinated, n (%)	p-value
Age group			0.237
<25	4 (20.0)	16 (80.0)	
25–34	4 (8.9)	41 (91.1)	
≥35	7 (12.7)	48 (87.3)	
Education level			0.974
High school or below	6 (13.0)	40 (87.0)	
University	7 (11.9)	52 (88.1)	
Postgraduate	2 (13.3)	13 (86.7)	

Gender			0.471
Female	0 (0.0)	8 (100.0)	
Male	15 (13.5)	96 (86.5)	
Other	0 (0.0)	1 (100.0)	
Sexual orientation			0.791
Heterosexual	4 (9.5)	38 (90.5)	
Homosexual	8 (14.5)	47 (85.5)	
Bisexual	3 (13.0)	20 (87.0)	
Number of sexual partners (last year)			0.847
0–1	8 (14.5)	47 (85.5)	
2–4	4 (9.8)	37 (90.2)	
≥5	3 (12.5)	21 (87.5)	
HPV/pap smear test			**0.030**
Yes	9 (23.1)	30 (76.9)	
No	6 (7.4)	75 (92.6)	
History of HPV infection			**0.020**
Yes	8 (25.0)	24 (75.0)	
No	7 (8.0)	81 (92.0)	
History of STIs			0.951
Yes	8 (12.7)	55 (87.3)	
No	7 (12.3)	50 (87.7)	
Knowledge about HPV			**<0.001**
Yes	13 (18.1)	59 (81.9)	
No	2 (4.3)	45 (95.7)	
Chi-square and Fisher's exact test were used to evaluate associations between categorical variables.			

Table 3. Association between HPV vaccination status and source of information.

Source of information	Vaccinated, n (%)	Not vaccinated, n (%)	Total, n	Vaccination rate (%)
Doctor	11	13	24	45.8
Friends	5	15	20	25.0
Internet	3	9	12	25.0
NGOs	0	6	6	0.0
Social media	0	10	10	0.0

Vaccination rates according to the source of information were compared using Fisher's exact test. The rate of vaccination was significantly higher among participants who received information from a physician ($p < 0.001$, Fisher's exact test; OR = 19.46).