




ORIGINAL ARTICLE

Measuring the Knowledge Level of Laboratory Workers about Human Papillomavirus and Vaccines: A Cross-Sectional Study

Laboratuvar Çalışanlarının Human Papillomavirus ve Aşıları Hakkındaki Bilgi Düzeylerinin Ölçülmesi: Kesitsel Bir Çalışma

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ABSTRACT

Aim: This study aimed to determine the knowledge level of laboratory workers about human papillomavirus (HPV) and vaccines.

Methods: Our study included doctors, technicians, biologists, doctoral and graduate students, and secretaries between the ages of 18-65 actively working in biochemistry, microbiology, and pathology laboratories; 113 people accepted to fill out the survey. The HPV knowledge scale survey consists of a 22-question introductory characteristics form and a 33-question HPV knowledge level form. In our cross-sectional study, the HPV knowledge scale questionnaire consists of 5 main headings: sociodemographic data, general HPV knowledge level, knowledge status about HPV screening tests, knowledge status about two types of HPV vaccines, and knowledge status about current HPV vaccines. The survey was administered via Google Forms after the necessary explanations were made.

Results: While the mean HPV knowledge score was found to be statistically significantly higher in women, those with a master's degree or higher, doctors, and those who stated that they had "enough knowledge" about HPV ($p<0.05$), the mean HPV knowledge score was found to be statistically significantly lower in those working in the biochemistry unit ($p<0.05$).

Conclusions: Healthcare workers, especially laboratory workers, should have sufficient knowledge about HPV, which can cause many pathologies including cervical cancer. Units and employees with deficiencies in their knowledge should be given the necessary training, and awareness about HPV and vaccines should be increased. Increasing health literacy is very important. Increasing the level of HPV knowledge is aimed to increase the level of knowledge not only of women but also of men. Information gaps regarding HPV transmission routes, vaccines, and protection methods should be eliminated.

Keywords: Human papillomavirus, knowledge level, laboratory workers, vaccine

ÖZ

Amaç: Literatürde çeşitli laboratuvarlarda çalışan sağlık profesyonellerinin human papillomavirus (HPV) hakkındaki bilgi düzeylerinin araştırıldığı çalışmaları kapsar. Bu çalışmanın amacı laboratuvar çalışanlarının HPV ve aşıları hakkındaki bilgi düzeylerini tespit etmektir.

Gereç ve Yöntemler: Çalışmamıza biyokimya, mikrobiyoloji ve patoloji laboratuvarlarında aktif olarak çalışan 18-65 yaş aralığındaki doktor, teknisyen, biyolog, doktora ve yüksek lisans öğrencileri, sekreterler dahil edilmiş olup; 113 kişi anket doldurmayı kabul etmiştir. HPV bilgi ölçeği anketi, 22 sorudan oluşan tanıtıcı özellikler formu ve 33 sorudan oluşan HPV bilgi düzeyini içeren formlardan oluşmaktadır. Kesitsel bir araştırma olan çalışmamızda HPV bilgi ölçeği anketi; sosyodemografik özellikler, HPV genel bilgi düzeyi, HPV tarama testi hakkındaki bilgi durumu, iki tip HPV aşısı hakkındaki bilgi düzeyi ve mevcut HPV aşıları hakkındaki bilgi durumu olmak üzere 5 ana başlıktan oluşmaktadır. Anketin uygulanması gerekli açıklamalar yapıldıktan sonra Google Forms üzerinden yapılmıştır.

Bulgular: HPV bilgi puan ortalamaları kadınlarda, yüksek lisans ve üzerinde eğitim alanlarda, doktorlarda ve HPV bilgi düzeyini "yeterince bilgim var" diyen gruplarda istatistiksel olarak anlamlı derecede yüksek bulunmasına karşın ($p<0.05$), biyokimya biriminde çalışanlarda HPV bilgi puan ortalamaları istatistiksel olarak anlamlı derecede düşük bulunmuştur ($p<0.05$).

Sonuçlar: Sağlık çalışanlarının özellikle de laboratuvar çalışanlarının serviks kanseri dahil olmak üzere birçok patolojiye sebep olabilen HPV hakkındaki bilgi düzeyleri yeterli değildir. Bilgi düzeylerinde eksiklik saptanan birim ve çalışanlara gerekli eğitimler verilmeli, HPV ve aşıları hakkında farkındalık artırılmaya çalışılmalıdır. Sağlık okuryazarlığının artırılması oldukça önemlidir. HPV bilgi düzeyi artırılarak, sadece kadınların değil erkeklerin de bilgi düzeyinin artırılması amaçlanmalı; HPV bulaş yolları, aşıları ve korunma yöntemleriyle ilgili bilgi eksiklikleri giderilmelidir.

Anahtar Kelimeler: Human papillomavirüs, bilgi düzeyi, laboratuvar çalışanları, aşı

Introduction

Human papillomavirus (HPV) is a virus with single-stranded, non-enveloped, circular DNA that is common in both men and women and can cause different clinical pictures. Although there are more than 200 types of HPV, they are generally divided into two groups: low-risk and high-risk. While low-risk HPV types cause benign lesions such as laryngeal papillomas and genital warts, high-risk HPV types cause more serious health problems such as cervical, penile, anal, vaginal, and head and neck cancers. In the literature, low-risk HPV types are 1, 2, 3, 4, 6, 7, and 11; high-risk HPV types are 16, 18,

31, 33, 35, 45, 52, and 58 (1,2). Laboratory workers are an important part of the healthcare system and play a key role in the diagnosis, treatment, and follow-up of infectious diseases. They can use their health-related knowledge to raise awareness in the community as well as in their professional practice. Although HPV is a very common and preventable disease worldwide, there is a lack of information about the routes of HPV transmission, the clinical manifestations it causes, and vaccines. There is a paucity of studies in the literature investigating HPV knowledge among laboratory professionals. This

study aimed to determine and compare the level of knowledge of HPV and vaccines among healthcare professionals working in pathology, microbiology, and biochemistry laboratories. In this way, our study will identify knowledge gaps in different areas of expertise and reveal awareness levels. The results of the comparison will contribute to the identification of HPV-related knowledge deficits of laboratory workers according to their professional field and the dissemination of professional training programs specific to each discipline.

This study hypothesizes that the level of knowledge of HPV among laboratory workers may differ according to their occupational group and educational status. The study aims to contribute to the development of health literacy training programs in the future by identifying knowledge gaps among laboratory workers.

Materials and Methods

A total of 150 health professionals, including doctors, technicians, biologists, doctoral and master's students, and secretaries, aged 18-65, actively working in the biochemistry, microbiology, and pathology laboratories of the hospital. The HPV knowledge scale survey was administered as a cross-sectional descriptive study to 113 laboratory workers who accepted the survey. The inclusion criteria for the study were: to be a laboratory worker, to be aged between 18 and 65 years, and to have volunteered for the study. Exclusion criteria were not having received formal training in HPV vaccination or not meeting the ethical approval requirements to participate in the study. The HPV knowledge scale survey contains 55 questions based on previous studies (3). It consists of 5 main sections: employee sociodemographics, general knowledge of HPV, knowledge of HPV screening tests, knowledge of two types of HPV vaccines, and knowledge of existing HPV vaccines.

The survey was conducted via Google Forms after the necessary explanations were given to 113 laboratory employees who agreed to complete the survey between 10/01/2024 and 10/31/2024. The questions to determine the basic data of the employees were presented to the participants as multiple choice and the participants were asked to answer "yes-no-don't know".

Patients were evaluated after approval was obtained Ethics Committee (Decision No: 5162-06/09/2024). The study was conducted under the principles of the Declaration of Helsinki.

Statistical analysis

The data obtained from the study were loaded into the SPSS program (version, 22.0). To evaluate the data, the significance test of the difference between two means (Student-t) was applied to the data obtained

by measuring in independent groups. As a result of the analysis of variance, the Tukey test was applied to the group or groups that were found to be different. Correlation analysis was used to assess the relationship between mean HPV knowledge scores and some socio-demographic variables. Data are presented in tables as arithmetic mean \pm standard deviation, number of individuals and percentage, and significance was accepted as $p < 0.05$.

Results

The mean age of the participants was 34.96 ± 8.55 years (mean \pm standard deviation); 60 males (53.1%) and 53 females (46.9%) were included in the study. A total of 54 people (47.8%) from the microbiology laboratory, 34 people (30.1%) from the biochemistry laboratory, and 25 people (22.1%) from the pathology laboratory participated in the study. The socio-demographic characteristics of the subjects included in the study are shown in Table 1.

Table 1. Sociodemographic characteristics of people included in the study (n=113)

Gender	n	%
Female	60	53.1
Male	53	46.9
Educational Status		
High school and below	8	7.1
University	54	47.8
Master's degree and above	51	45.1
Unit of study		
Microbiology	54	47.8
Pathology	25	22.1
Biochemistry	34	30.1
Job		
Doctor	36	31.9
Healthcare Worker	77	68.1
Income status		
Low	9	8.0
Middle	69	61.1
High	35	31.0
Smoking status		
Yes	29	25.7
No	84	74.3
Chronic disease condition		
Yes	36	31.9
No	77	68.1
Cancer status in the family		
Yes	36	31.9
No	77	68.1

The general knowledge of sexually transmitted

diseases (STDs) and HPV among the respondents is shown in Table 2.

Table 2. Scores on the HPV Knowledge Scale survey among study participants (Mean±SD)

Sociodemographic characteristics	Mean±SD	p-value (t-test)
Gender		
Female	21.38±6.90	0.002
Male	16.94±8.18	
Educational Status		
High school and below	12.38±9.10	<0.001
University	15.33±6.43	
Master's degree and above*	24.59±5.32	
Unit of study		
Microbiology	20.46±7.11	0.03
Pathology	20.80±9.26	
Biochemistry*	16.35±7.14	
Job		
Doctor	26.75±3.48	<0.001
Healthcare Worker	15.82±6.78	
Chronic disease condition		
Yes	17.64±8.12	0.123
No	20.08±7.60	
Cancer status in the family		
Yes	19.61±7.07	0.775
No	19.16±8.19	
Are you aware of STDs?		
Yes	19.55±7.73	0.217
No	16.00±8.82	
How much do you know about STDs?		
I have very little knowledge	11.70±6.41	<0.001
I know, but not enough	17.24±7.27	
I have enough knowledge*	22.20±7.12	
Do you need training?		
Yes	18.20±7.95	0.225
No	20.03±7.71	

* Groups that make a difference, **SD: Standard deviation, STDs: Sexually transmitted diseases

The mean HPV knowledge score among all participants was 19.30±7.82. When analyzed by gender, women had significantly higher HPV knowledge scores (21.38±6.90) than men (16.94±8.18) ($p=0.002$, Table 2). Educational level was also significantly associated with knowledge scores, with participants holding a master's degree or higher having the highest scores (24.59±5.32), while those with a high school diploma or below had the lowest (12.38±9.10) ($p<0.001$, Table 2).

When compared across laboratory departments, microbiology laboratory workers had significantly higher HPV knowledge scores (20.46±7.11) than those in the biochemistry laboratory (16.35±7.14) ($p=0.03$,

Table 2). Physicians had the highest HPV knowledge scores (26.75±3.48), significantly higher than other healthcare professionals (15.82±6.78) ($p<0.001$, Table 2). No significant differences were observed based on family history of cancer or chronic disease status ($p>0.05$, Table 2).

The most commonly incorrectly answered questions included "HPV vaccine is approved for women aged 30-45 years" with a 92.9% incorrect response rate, "Both existing HPV vaccines (Gardasil and Cervarix) protect against both genital warts and cervical cancer" with a 91.2% incorrect response rate. "Protect against both genital warts and cervical cancer," with a 91.2% incorrect response rate, and "HPV does not usually require treatment. "There is no." with an 85% incorrect response rate. Among the questions to which participants most often answered 'I don't know', the question 'The HPV vaccine is approved for males aged 11-26 years' was answered by 61.4%, while the question 'The HPV test tells you how long you have had HPV infection' was answered by 51.4%.

When the results of the HPV knowledge scale survey of laboratory physicians were examined, the higher scores of women, those working in pathology laboratories, and those who reported having sufficient knowledge about STDs were found to be statistically significant ($p<0.005$). The results of the HPV knowledge scale survey of laboratory physicians are shown in Table 3.

Table 3. Scores on the HPV knowledge scale for laboratory medical doctors (n=36)

Sociodemographic characteristics	Mean±SD	p-value (t-test)
Gender		
Female	27.83±2.61	0.03
Male	24.85±4.10	
Unit of study		
Microbiology	26.56±3.72	0.042
Pathology*	28.42±3.20	
Biochemistry*	24.63±2.20	
Are you aware of STDs?		
Yes	27.18±2.94	0.011
No	22.00±6.08	
How much do you know about STDs?		
I know, but not enough	24.00±4.00	0.131
I have enough knowledge*	27.91±2.46	
Do you need training?		
Yes	25.58±4.42	0.158
No	27.33±2.84	

* Groups that make a difference, ** SD: Standard deviation, STDs: Sexually transmitted diseases

When the HPV knowledge scale survey scores of non-physician healthcare professionals working in the laboratory are examined, the higher mean scores of women, those with a master's degree or higher education, and those working in the microbiology laboratory were found to be statistically significant ($p<0.005$). The mean scores of the HPV knowledge scale survey for health professionals working in laboratories other than physicians are shown in Table 4.

Table 4. HPV knowledge scale survey scores of non-physician healthcare workers in the laboratory (n=77)

Sociodemographic characteristics	Mean \pm SD	p-value (t-test)
Gender		
Female	17.38 \pm 5.56	0.049
Sociodemographic characteristics	14.38 \pm 7.52	
Educational Status		
High school and below	12.38 \pm 9.10	0.036
University	15.33 \pm 6.43	
Master's degree and above*	19.40 \pm 5.48	
Unit of study		
Microbiology*	17.89 \pm 6.63	0.043
Pathology	13.77 \pm 7.11	
Biochemistry	13.80 \pm 6.11	
Are you aware of STDs?		
Yes	16.05 \pm 6.64	0.246
No	12.40 \pm 8.62	
How much do you know about STDs?		
I have very little knowledge	11.70 \pm 6.41	0.030
I know, but not enough	15.06 \pm 6.75	
I have enough knowledge*	17.85 \pm 6.36	
Do you need training?		
Yes	15.52 \pm 7.23	0.737
No	16.05 \pm 6.50	

When the correlation between the HPV knowledge score of the study group and some socio-demographic characteristics was examined, a statistically significant positive correlation was found between educational status and HPV knowledge score ($r=0.601$; $p<0.05$).

Discussion

There is a paucity of studies in the literature measuring the knowledge of laboratory workers about HPV and vaccines. According to a meta-analysis of the literature, lack of HPV knowledge is an important public health problem not only in low-income countries but also in developing and developed countries (4). In our study, consistent with the literature, the mean HPV knowledge score of laboratory personnel was found

to be 19.30 ± 7.82 , indicating that the knowledge of laboratory personnel about HPV was inadequate. In a study of global HPV awareness, similar to our study, HPV knowledge was found to be statistically significantly higher in women and those with higher education (5). A study conducted in Latin America, similar to our study, found that the level of HPV knowledge depends on the education and socio-cultural level of healthcare professionals (6).

According to a report published by the Cervical Screening Wales in 2018, there is a direct relationship between the type of laboratory surveyed and HPV awareness. Our study supports this finding, revealing that pathology and microbiology laboratory staff had significantly higher HPV knowledge scores compared to biochemistry laboratory staff ($p=0.03$, Table 2). This difference may be attributed to the fact that microbiology and pathology professionals are more frequently exposed to HPV-related diagnostic processes, leading to greater familiarity with the virus, its transmission routes, and its prevention strategies. In contrast, biochemistry laboratory staff primarily focus on biochemical analyses rather than infectious disease diagnostics, which may contribute to their lower HPV knowledge scores. Previous studies have also suggested that healthcare professionals working in microbiology-related fields tend to have a deeper understanding of viral infections due to their specialized training (7). These findings highlight the need for targeted educational programs to bridge the knowledge gap among biochemistry laboratory workers, ensuring that all laboratory professionals have a sufficient understanding of HPV and its implications for public health.

The questions most frequently answered incorrectly by laboratory staff in our study were about the applicable age ranges of HPV vaccines, the diseases protected by HPV vaccines, and treatment requirements. A systematic review from 2019 found that misunderstandings about the HPV vaccine are quite common and that the lack of information, especially for age groups, causes serious harm to preventive health services, which are the basis of health policy (8). Similarly, the most incorrectly answered question in our study was "HPV vaccine is licensed for women aged 30-45" with a rate of 92.9%, revealing a lack of knowledge among laboratory staff about vaccination of women. In our study, the topics that most frequently answered "I don't know" were the vaccination of men against HPV and the HPV screening test providing

information about the course of the infection. Garland et al. A study showed that the reason for the delay in including men in the HPV vaccination program was a lack of knowledge about HPV vaccines in men (9). Another study of healthcare professionals in the United States assessed their knowledge of the HPV vaccine and found that lack of knowledge was particularly prevalent among men (10). In our study, 61.4% of respondents answered 'I don't know' when asked about male vaccination, which shows a similar lack of knowledge. This highlights the lack of knowledge about the role of HPV in men and HPV vaccines among healthcare professionals working in the laboratory. However, HPV can also cause genitourinary lesions and various cancers in men, and vaccination significantly reduces the risk of these diseases. In our study, the lack of knowledge on the question where the second most common answer was 'I don't know' (51.3%) is due to a lack of knowledge about the transmission and clinical course of HPV. In his study, Stanley et al. argued that education about the routes of HPV transmission and its clinical course should be provided not only to the public but also to healthcare professionals (11). In a study of HPV vaccination policies, it was found that both direct and indirect protection is provided by popularising HPV vaccination throughout society. However, it was emphasized that for this effect to be optimal, health professionals should have accurate information about vaccination programs (12). Our study found a lack of information about whether HPV vaccines cover men as well as women, which is an issue that may limit the effectiveness of vaccination campaigns. A study conducted in the USA found that health professionals' awareness of HPV and its vaccine directly affects the vaccination rate in the community. This study found that the level of knowledge of pediatric and gynecological healthcare professionals was critical to increasing vaccination rates (13). For laboratory staff to play an active role in increasing social awareness, various professional training programs should be organized for laboratory staff to fill knowledge gaps. A study conducted in Denmark found an association between access to vaccination and HPV knowledge (14). In a study conducted among women in Europe, the lack of knowledge about HPV vaccines was also found to be quite high among women; in our study, similar to the literature, the question with the most incorrect answers (92.9%) was the question about the HPV vaccination age range of women (15). Studies in the literature have shown that regular participation of healthcare professionals in HPV-related training has a

positive effect on their level of knowledge and their behavior in recommending the vaccine (16-19). To address the lack of HPV knowledge, it is necessary to develop training programs for laboratory staff. In their study, Bosch et al. emphasized the need for a multidisciplinary approach to control HPV infections in society (20).

Therefore, the training needs of laboratory staff should be determined according to the type of laboratory to increase the awareness of biochemistry laboratory staff in particular. In addition, knowledge and awareness of the clinical significance of HPV vaccines administered to males should be increased among healthcare professionals.

One of the strengths of this study is that it can identify specific training needs for professional groups by comparing the knowledge levels of health professionals working in different laboratory departments. However, the most important limitation of our study is that it was conducted in a single center. The generalizability of the results can be increased with larger and multicenter studies.

Thus, increasing the level of HPV knowledge among laboratory personnel will have a positive impact not only on individual awareness but also on public health. Using multidisciplinary approaches, training programs should be developed that are specific to the type of laboratory and can be repeated periodically, including gender awareness.

Conclusion

This study has shown that the level of HPV knowledge among laboratory staff is generally inadequate. The level of knowledge was found to be directly related to the level of education, the type of laboratory, and individual awareness. The higher levels of knowledge among physicians, those with a master's degree or higher, and women indicate that these individuals can play a leadership role in targeted educational campaigns. However, the lack of knowledge among males and biochemistry laboratory workers highlights the need to develop specific training strategies for these groups. To effectively control HPV in society, the primary goal should be to address the lack of knowledge among healthcare professionals.

This study shows that laboratory workers have insufficient knowledge of HPV and that the knowledge level of biochemistry laboratory workers is particularly low. The results suggest that targeted training programs

should be developed to increase HPV awareness. The results of this study may guide the development of HPV-specific training programs for laboratory workers.

Conflict of interest

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