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# Human papillomavirus vaccine administration among women in the Eastern Mediterranean region of Turkey: prevalence and barriers

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**Abstract. – OBJECTIVE: Human papillomavirus (HPV) vaccines are very effective in preventing HPV infection and related diseases. This study aimed to determine the prevalence of the HPV vaccine administration and barriers to vaccination among women aged 15-49 years.**

**SUBJECTS AND METHODS: This cross-sectional study was conducted on 401 women aged 15-49 years. The prevalence of women who received the HPV vaccine, their knowledge about HPV in general, HPV screening tests, HPV vaccine and the current HPV vaccination program were evaluated. Barriers to getting the HPV vaccine were questioned.**

**RESULTS: The mean age of women who had received the HPV vaccine was 30.87±8.89 and the mean age at the first sexual intercourse was 22 years. 3.2% of women received HPV vaccine. The most important factor impeding the vaccination was unawareness of the HPV vaccine and the high cost of the vaccine. If the vaccine was free, most (81.2%) of the participants stated that they would vaccinate themselves and their children (72.8%). The highest lack of information was observed about the vaccination program and vaccinated women were more informed about HPV, HPV screening tests, HPV vaccine and the vaccination program. The increase in the knowledge about the HPV vaccination program increased the probability of getting vaccinated by an odds ratio (OR) of 4.43 times.**

**CONCLUSIONS: The most important barriers to HPV vaccination were the lack of public funding for vaccines and the lack of information. We recommend increasing educational activities on the HPV vaccination program and public funding of vaccination.**

*Key Words:*
HPV, Vaccine, Routine vaccination, Primary prevention.

## Introduction

Almost all cases of cervical cancer are associated with human papillomavirus (HPV). While most HPV infections clear up on their own and do not cause symptoms, persistent infections may lead to cervical cancer in women. Cervical cancer is the fourth most frequently observed cancer in women. An estimated 570,000 women worldwide were diagnosed with cervical cancer in 2018. The 2017 cancer statistics of the Turkish Republic's Ministry of Health reported an incidence of 4.3 per 100,000 for cervical cancer, constituting 2.3% of all cancers in females and an incidence of 5 per 100,000 for HPV-related cancers.

Effective primary prevention (i.e., HPV vaccine) and secondary prevention (i.e., screening and treatment of precancerous lesions) prevent most cases of cervical cancer. It is estimated that cervical cancer could be removed from being a public health problem within one generation if a comprehensive screening and treatment approach was applied[1]. Besides screening, the production of HPV vaccines has had a major impact on the prevention of cervical cancer[2,3]. HPV vaccines are highly effective in preventing HPV infection and related diseases when administered to boys and girls before puberty[4]. The cost-effectiveness of the HPV vaccines decreases significantly after the age of 26[5,6]. In a study[7], HPV vaccines have been shown to cause a stronger immunogenic response than the infection itself. Vaccines have been reported to protect against reinfection or reactivation in individuals who are seropositive with a previously cleared infection[7].

Considering the infrastructure and sources in the country, the ideal preventive practices related to HPV and its consequences in Turkey appear to be screening with the HPV test or Pap-smear (Papanicolaou) test, which is performed every five years, targeting the female population aged between 30 and 65 years (30 and 65 included). The HPV vaccine is not included in the Turkish national vaccination program and the fee for vaccination is paid by the



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individual who requests to receive the HPV vaccine. The Minister of Health – speaking at the Ministry of Health's Plan and Budget Committee on November 25, 2022, within the scope of the budget negotiations of the Ministry of Health – pointed out a plan that, considering age groups and marital status, intended starting HPV vaccination in a determined age group and then extending it to the other age groups, by adding that limited financial resources were the main reason impeding the inclusion of HPV vaccine in the national vaccination program.

This study aimed to determine the prevalence of HPV vaccination and the barriers to vaccination in 15 to 49 years old women living in the eastern Mediterranean region of Turkey.

## Subject and Methods

This cross-sectional study was conducted between February and April 2022 by researchers from the Department of Public Health at the Faculty of Medicine of Çukurova University in Adana, Turkey. The population of the study consisted of women aged between 15 and 49 years residing in the Research and Practice Area (RPA) of the Department. In the sample size analysis performed by accepting type 1 error level=0.05, power=80%, effect size=0.281[8], the minimum sample size was calculated as 398 and 401 women were reached. The RPA included primary health care institutions (Family Health Centre, Community Health Centre, Healthy Life Centre) in two central districts and one rural district. A face-to-face questionnaire was applied to the participants reached by convenience sampling, and consent to participate was obtained after the necessary explanations. The first part of the questionnaire form included questions about sociodemographic information and those related to reproductive health, and the second scale part consisted of HPV Knowledge Scale.

### Human Papillomavirus Knowledge Scale (HPV-KS)

This scale was developed by Waller et al[9] in 2013 to measure the knowledge level of individuals about HPV, HPV vaccine and screening tests. The validity and reliability study of the scale was conducted in the Turkish language by Demir et al[10] in 2019. The Turkish adaptation of the HPV-KS consists of 33 questions and 4 sub-factors: Factor 1: general HPV knowledge; Factor 2: HPV screening test knowledge; Factor 3: general HPV vaccination knowledge; Factor 4: knowledge of the current HPV vaccination program. Participants mark each item of the HPV-KS as "Yes", "No" and "Don't know". In the evaluation phase, each correct answer is scored with 1, while incorrect answers and "don't know" statements are scored with 0. The total score to be obtained from the HPV-KS varies between 0 and 33. A higher score indicates a higher level of knowledge about HPV, HPV screening tests and the HPV vaccine.

### Statistical Analysis

SPSS v. 22 (IBM Corp., Armonk, NY, USA) statistical analyses package software was used for data. Normality was tested with the Kolmogorov-Smirnov test. Mann-Whitney U test and binary logistic regression were used to analyse the data. A $p<0.05$ was considered statistically significant.

## Results

The mean age of 401 women who participated in the study was 30.87±8.89 years (min=15 - max=49), with 49.8% of the women being married and 62.3% university graduates. The HPV vaccine prevalence is 3.2%. 21.4% of the participants had undergone a Pap smear screening test. The most prominent factors impeding the vaccination were the lack of information about the vaccine and the high cost of the vaccine. Most participants stated that if the vaccine was free of charge, they would buy the vaccine for themselves (81.2%) and for their children (72.8%) (Table I).

The knowledge levels of the participants about HPV infection, vaccines, vaccination programs and screening were given in Table II. The proportion of participants who said they did not know about these factors varied between 19.2% and 66.8%. The least known subjects were vaccine licenses and the vaccination program itself.

General knowledge, screening test knowledge, vaccine knowledge, knowledge about vaccination program sub-dimensions and the HPV knowledge scale score sums were found to be statistically significantly higher in participants who had received HPV vaccination compared to those who had not received it (Table III).

The binary logistic regression established to predict the probability of HPV vaccination was found to be significant (omnibus test $p<0.001$). The independent variables of the model were HPV knowledge scale sub-dimensions, and the dependent variable was HPV vaccination status.

**Table I.** Sociodemographic and human papillomavirus (HPV) vaccine/screening-related characteristics.

| | n | % |
|---|---|---|
| **Marital status** | | |
| Married | 199 | 49.8 |
| Single | 190 | 47.5 |
| Other | 11 | 2.7 |
| **Education** | | |
| Graduate of less than university | 151 | 37.7 |
| University graduate and more | 250 | 62.3 |
| **Income** | | |
| Minimum wage or less | 92 | 22.9 |
| More than the minimum wage but less than the poverty threshold | 142 | 35.5 |
| More than the poverty threshold | 166 | 41.5 |
| **Sexual intercourse experience** | | |
| Yes | 232 | 57.9 |
| No | 154 | 38.4 |
| No Answer | 15 | 3.7 |
| **Age at first sexual intercourse** (mean±standard deviation) [min-max] | 22.21±3.76 (14-31) | |
| **Knowledge about sexually transmitted diseases** | | |
| I know enough | 171 | 42.6 |
| I have little knowledge | 179 | 44.6 |
| I have no idea | 51 | 12.7 |
| **Heard about the HPV vaccine** | | |
| Yes | 297 | 74.1 |
| No | 72 | 18.0 |
| No idea | 31 | 7.7 |
| **Got vaccinated with the HPV vaccine** | | |
| Yes | 13 | 3.2 |
| No | 388 | 96.8 |
| **Reason for not being vaccinated** | | |
| I had no knowledge | 186 | 46.4 |
| I find it expensive | 126 | 31.4 |
| I don't trust in the vaccine | 8 | 2.0 |
| I don't think it will be helpful | 6 | 1.5 |
| Because of the side effects | 6 | 1.5 |
| I'm undecided | 31 | 7.7 |
| Other | 22 | 5.5 |
| **Would you get vaccinated if it was free?** | | |
| Yes | 328 | 81.8 |
| No | 70 | 17.5 |
| **Did you get your child vaccinated with the HPV vaccine?** | | |
| Yes | 11 | 2.7 |
| No | 390 | 97.3 |
| **Reason for not getting your child vaccinated** | | |
| I had no knowledge | 99 | 24.7 |
| I find it expensive | 24 | 6.0 |
| I don't trust in the vaccine | 4 | 1.0 |
| I don't think it will be helpful | 6 | 1.5 |
| Because of the side effects | - | - |
| I'm undecided | 14 | 3.5 |
| Other | 29 | 7.2 |
| **Would you get your child vaccinated if it was free?** | | |
| Yes | 292 | 72.8 |
| No | 109 | 27.2 |
| **Ever tested with Pap-smear** | | |
| Yes | 86 | 21.4 |
| No | 314 | 78.3 |
| **Pap smear results*** | | |
| Negative | 68 | 79.1 |
| ASC-US | 1 | 1.1 |
| CIN-1 | 5 | 5.8 |
| I don't know | 12 | 13.9 |
| **Total number of participants** | 401 | 100.0 |

ASC-US=Atypical squamous cells of undetermined significance observed. CIN=Cervical intraepithelial neoplasia observed (CIN-1=Level in CIN). Pap=Papanicolaou. *Only those who have undergone a Pap smear have been included in the calculation.

**Table II.** Distribution of responses given to human papillomavirus (HPV) Knowledge Scale items.

| | Correct answer | True (%) | False (%) | Don't Know (%) |
|---|---|---|---|---|
| HPV can cause cervical cancer | T | 299 (74.6) | 7 (1.7) | 95 (23.7) |
| A person could have HPV for many years without knowing it | T | 252 (62.8) | 32 (8.0) | 117 (29.2) |
| Having many sexual partners increases the risk of getting HPV | T | 305 (76.1) | 19 (4.7) | 77 (19.2) |
| HPV is very rare | F | 38 (9.5) | 224 (55.9) | 139 (34.7) |
| HPV can be passed on during sexual intercourse | T | 280 (69.8) | 29 (7.2) | 92 (22.9) |
| HPV has always visible signs and symptoms | F | 48 (12.0) | 200 (49.9) | 153 (38.2) |
| Using condoms reduces the risk of getting HPV | T | 255 (63.6) | 36 (9.0) | 110 (27.4) |
| HPV can cause HIV (Human immunodeficiency virus)/AIDS (Acquired Immuno deficiency virus) | F | 101 (25.2) | 118 (29.4) | 182 (45.4) |
| HPV can be passed on by genital skin-to-skin contact | T | 237 (59.1) | 35 (8.7) | 129 (32.2) |
| HPV does not contaminate men | F | 31 (7.7) | 231 (57.6) | 139 (34.7) |
| Having sex at an early age increases the risk of getting HPV | T | 191 (47.6) | 55 (13.7) | 155 (38.7) |
| There are many types of HPV | T | 206 (51.4) | 21 (5.2) | 174 (43.4) |
| HPV can cause genital warts | T | 240 (59.9) | 26 (6.5) | 135 (33.7) |
| HPV can be cured with antibiotics | F | 44 (11.0) | 164 (40.9) | 193 (48.1) |
| Most sexually active people will be infected with HPV at some point in their lives | T | 116 (28.9) | 106 (26.4) | 179 (44.6) |
| HPV usually doesn't need any treatment | T | 58 (14.5) | 188 (46.9) | 155 (38.7) |
| If a woman tests positive for HPV, she will definitely get cervical cancer | F | 37 (9.2) | 201 (50.1) | 163 (40.6) |
| An HPV test can be done at the same time as a Pap-test | T | 169 (42.1) | 30 (7.5) | 202 (50.4) |
| An HPV test can tell you how long you have had an HPV infection | F | 45 (11.2) | 143 (35.7) | 213 (53.1) |
| HPV testing is used to indicate if the HPV vaccine is needed | F | 72 (18.0) | 148 (36.9) | 181 (45.1) |
| When you have an HPV test, you get the results the same day | F | 53 (13.2) | 121 (30.2) | 227 (56.6) |
| If an HPV test shows that a woman does not have HPV, her risk of cervical cancer is low | T | 142 (35.4) | 84 (20.9) | 175 (43.6) |
| Girls who have had an HPV vaccine do not need a Pap-test (smear test) when they are older | F | 27 (6.7) | 200 (49.9) | 174 (43.4) |
| One type of HPV vaccine offers protection against genital warts | T | 167 (41.6) | 39 (9.7) | 195 (48.6) |
| The HPV vaccines offer protection against all sexually transmitted infections | F | 50 (12.5) | 179 (44.6) | 172 (42.9) |
| Someone who is vaccinated with HPV vaccine does not develop cervical cancer | F | 45 (11.2) | 177 (44.1) | 179 (44.6) |
| HPV vaccines offer protection against most cervical cancers | T | 213 (53.1) | 25 (6.2) | 163 (40.6) |
| The HPV vaccine requires three doses | T | 151 (37.7) | 23 (5.7) | 227 (56.6) |
| The HPV vaccines are most effective if given to people who have never had sex | T | 127 (31.7) | 61 (15.2) | 213 (53.1) |
| The HPV vaccine is offered to girls aged 9-13 years | T | 180 (44.9) | 34 (8.5) | 187 (46.6) |
| The HPV vaccine is offered to women aged 30-45 years | F | 100 (24.9) | 49 (12.2) | 252 (62.8) |
| Both HPV vaccines that are available protect against both genital warts and cervical cancer | F | 136 (33.9) | 24 (6.0) | 241 (60.1) |
| HPV vaccine is permitted for males aged 11-26 years | T | 101 (25.2) | 32 (8.0) | 268 (66.8) |

Among the variables included in the model, the level of knowledge about the HPV vaccination program was found to be important, and each 1.49 unit increase in the score in this subscale increased the probability of vaccination by 4.43 times (Table IV).

## Discussion

There are two existing vaccines against HPV infection in Turkey: Cervarix® (GlaxoSmithKline Biologicals S.A., Belgium) and Gardasil® (Merck & Co., Inc., USA). Both vaccines prevent HPV

**Table III.** Comparison of human papillomavirus (HPV) Knowledge Scale dimensions according to vaccination status.

| Scale sub-dimension | HPV vaccination - Median (IQR) | | p |
|---|---|---|---|
| | No | Yes | |
| HPV general information | 8 (8) | 12 (3.5) | **0.004** |
| HPV screening test information | 2 (4) | 4 (3.5) | **0.037** |
| HPV vaccine information | 2 (4) | 5 (2.5) | **0.004** |
| Knowledge of the HPV vaccination program | 1 (3) | 5 (2) | **<0.001** |
| Total | 13.5 (17) | 26 (8) | **<0.001** |

IQR=interquartile range.

**Table IV.** Logistic regression analysis of prediction of human papillomavirus (HPV) vaccination.

| | B | p | O.R. | 95% C.I. for OR | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| HPV general information | -0.048 | 0.736 | 0.953 | 0.722 | 1.259 |
| HPV screening test information | -0.396 | 0.100 | 0.673 | 0.419 | 1.080 |
| HPV vaccine information | 0.125 | 0.671 | 1.133 | 0.638 | 2.013 |
| Knowledge of the HPV vaccination program | 1.490 | **<0.001** | 4.437 | 2.219 | 8.873 |
| Constant | -6.525 | <0.001 | 0.001 | | |

O.R.=Odds Ratio. C.I.=Confidence Interval. B=Beta Coefficient.

types 16 and 18. Gardasil also prevents HPV types 6 and 11. The HPV vaccine is recommended for women aged 9 to 26 years and for men aged 13 to 21 years. Many countries[11] have introduced publicly funded HPV immunization programs since 2006. However, the immunization coverage rate remains low in some countries and the coverage rate is higher in more developed regions compared to less developed regions[11]. An HPV vaccination coverage of 70% in women has been accepted as the threshold for optimum cost-effectiveness[12]. A meta-analysis[13] showed that a vaccine coverage of at least 50% provided a reduction of 68% in HPV types 16 and 18 prevalence and a reduction of 61% in anogenital warts prevalence. In our country, HPV vaccines are not included in the free routine national vaccination program. In our study, it was found that the rate of women who received HPV vaccination was 3.2%, and the most prominent barriers to vaccination were the cost of the vaccine (not financed by the public resource) and the lack of information about both HPV infection and vaccine/vaccination programs. In a study[14] conducted in Thailand, the rate of HPV vaccination was found to be 1.9% and 30.3% of the participants expressed their intention to be vaccinated.

The barriers to HPV vaccination were reported as cost (52.2%) and the perception that it was not needed due to low-risk behaviour (45.1%)[14]. In a study conducted in Lebanon[15], 36.5% of the participants stated that they had never heard of the vaccine before and 16.5% had received the HPV vaccine. The level of knowledge about HPV was found to be low-medium. In a study conducted in Jordan[16], 62.7% of the participants had heard of HPV and 48.7% of them knew about the availability of HPV vaccines; 3.6% had received the HPV vaccine and the overall willingness to receive the HPV vaccine was 75.0% if provided free of charge. The most common reason for HPV vaccine refusal is the perceived low risk of HPV infection. In a study conducted in China[17], the vaccination rate of women was found to be 3.5%; 65.7% of the participants were willing to be vaccinated against HPV. High vaccine cost (50.8%), concern about side effects (46.3%) and lack of sexual life (43.4%) were found to be the main reasons for reluctance. It was reported that the level of knowledge about HPV was effective in the willingness to be vaccinated. In a study[18] of 7,335 university students, female students generally had better knowledge and attitudes towards HPV, while male students

reported a higher probability of contracting HPV compared to female students. Knowledge and sexual education were found to be indicators of willingness to receive HPV vaccination for both sexes. The factors affecting willingness for HPV vaccination were payment for optional vaccination for male students, while for female students it was high income, having cancer in relatives or friends, having had sexual experience before and having received information about HPV vaccination[18]. It was reported that providing more active education – to improve the knowledge and attitudes of university students about HPV and HPV vaccine and inclusion of HPV vaccine in the National Immunisation Programme at the recommended ages for both men and women – would be the most cost-effective way to prevent HPV infection.

In the study conducted by Hsu et al[19], it was found that more than 50% of female university students were aware of HPV and HPV vaccines, and 63% of the students intended to receive the HPV vaccine. Age, family history of gynaecologic cancer, personal history of gynaecologic visits, sexual experience, and awareness of HPV and HPV vaccines were demographic factors predicting HPV vaccination. Personal susceptibility to the disease, perception of disease severity, characteristics of HPV, and cost and availability of the vaccine were found to be "health belief factors" predicting HPV vaccination. In a study[20] conducted in South India, 59.7% of the students had heard of the HPV vaccine, and 65.2% were planning to receive the vaccine. Participants older than 22 years were found to be less likely to accept the vaccine compared to younger participants. Medical students, students who reported alcohol use and those with moderate knowledge scores were found to have a higher intention to receive the vaccine[20]. In a study[21] conducted on Indonesian urban residents, the factors predicting better practices in HPV vaccination were female sex, being employed, high knowledge scores and having a positive attitude. Having received one vaccine dose and intention to be vaccinated are significantly affected by good knowledge, attitude, and behaviour. In our study, HPV vaccination rates were found to be quite low and the lack of information about vaccination and public financing of vaccines were found to be the biggest barriers to not getting vaccinated[21]. In a study[22] conducted in Nigeria, only 17.7% of students had heard about HPV infection and 14.4% had heard about the HPV vaccine. In general, only 11.1% knew that genital HPV infection can cause cervical cancer. Of the students who had heard of the HPV vaccine, 46.2% knew that it aimed to protect against cervical cancer and 57.7% stated that they wanted to be vaccinated[22]. In a study[23] conducted in South Korea, the HPV vaccination rate was found to be 26% and vaccination rates were found to be higher in young, single, highly educated women. Xenaki et al[24] conducted a study on educators and health professionals and found that 74.8% of them did not receive the HPV vaccine, despite 94.1% of participants having a positive attitude towards the vaccine.

Our study revealed that an increase in knowledge about the vaccination program was associated with an increase in vaccination behaviour. Moreover, women who received the HPV vaccine tended to have greater knowledge about prevention concepts such as HPV, HPV screening, and vaccination. We believe that increasing the level of knowledge of women on this subject and providing the vaccine free of charge by public bodies will provide a significant increase in vaccination rates.

Globally, by the end of 2008, a quarter of high-income and upper-middle-income countries had implemented national HPV vaccination programs, but no such initiatives were observed in low- and lower-middle-income countries. By 2014, only 1.1% of 10 to 20-year-old girls in all 84 low- and lower-middle-income countries had been vaccinated with one or more doses of HPV vaccine and approximately 70% of cervical cancers occurred in countries without national HPV vaccination programmes[11]. HPV vaccination coverage appears as a problem in low-income countries and lack of information and cost are the biggest barriers to the vaccination. In recent years, more than 80 countries have implemented national HPV vaccination programs. The majority of these countries are high or upper-middle-income countries. Barriers to HPV vaccination remain heaviest in countries with the highest burden of cervical cancer and the greatest need for the vaccine. Innovation and global leadership are needed to increase and sustain introductions in low-income and lower-middle-income countries[25]. The limitation of this study is that it was conducted in a single centre.

## Conclusions

According to the results of this study, the rate of HPV vaccination among women aged 15 to 49

years was very low, and the lack of information on vaccines and vaccination programs and the cost of vaccination were the biggest barriers to vaccination. We recommend that more emphasis should be placed on educational activities to increase knowledge and awareness about HPV vaccination programs and that the HPV vaccine be included in the free national vaccination program.

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None.

### Ethics Approval
The study was approved by the Ethical Committee for Non-Interventional Studies of the Faculty of Medicine, Çukurova University, Adana, Türkiye (February 4th, 2022, and Decree No. 119).

### Informed Consent
All participants signed informed consent for inclusion.

### Availability of Data and Materials
The data of the study are available from the first and corresponding author.

### Conflict of Interest
There is no conflict of interest in this study.

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None.

### Authors' Contributions
Burak Mete; conception and design of the study, acquisition of data, analysis and interpretation of data; drafting the article, making critical revisions. Fatma Atun Utuk; conception and design of the study, acquisition of data, analysis, making critical revisions. Ayşe Inaltekin; conception and design of the study, acquisition of data, analysis, making critical revisions. Hakan Demirhindi; design of the study, acquisition of data, analysis, making critical revisions. Ferdi Tanir; conception and design of the study, acquisition of data, analysis, making critical revisions. Ertan Kara; conception and design of the study, acquisition of data, analysis, making critical revisions. Ersin Nazlican; conception and design of the study, acquisition of data, analysis, making critical revisions.

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