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The Prevalence and Risk Factors of Human Papillomavirus in Female Sex Workers

Kadın Seks İşçilerinde İnsan Papillomavirus Prevalansı ve Risk Faktörleri

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Abstract

Objective: Human papillomavirus virus (HPV) is the major causative factor for cervical cancer, and sex workers are at high risk for HPV infection. In this study, we aimed to estimate the prevalence and risk factors of HPV infection among female sex workers (FSWs).

Materials and Methods: The study included 239 brothel-based FSWs who work in Izmir, Turkey. A self-administered questionnaire for risk factors was completed, and cervical brush samples were taken for HPV detection and typing. HPV detection and typing were performed by multiplex polymerase chain reaction (PCR) and reverse hybridization methods. The risk factors related to HPV infection were determined by multivariate analysis.

Results: The prevalence of HPV among FSWs was 20.1%. HPV18 was the most common type (40%), followed by HPV16 (17%) and HPV50 (15%). Logistic regression analysis revealed that being less than 30 years of age, having a high frequency of sexual contacts, smoking, and lack of condom use were significantly associated with HPV infection.

Conclusion: FSWs have a high prevalence of HPV infection and are at increased risk for cervical cancer. As they are a priority group for active follow-up, national strategies for reducing HPV among FSWs and regular cervical cancer screening programs should be implemented for this population.

Key Words: Human papillomavirus, Sex workers

Özet

Amaç: İnsan papillomavirus (HPV) infeksiyonu servikal kanserin major nedenlerinden biridir ve seks işçileri HPV infeksiyonu için öncelikli risk grubudur. Bu çalışmada bölgemizde seks işçilerinde HPV infeksiyonu prevalansı ve risk faktörlerinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Genelevde çalışan 239 kadın işçi çalışmaya dahil edilmiştir. Her işçi dağıtılan anket formunu doldurmuş, HPV analizi ve tiplendirme için servikal fırça örnekleri alınmıştır. HPV tespiti ve tiplendirme multiplex polimeraz zincir reaksiyonu (PCR) ve revers hibridizasyon yöntemi ile yapılmıştır. HPV infeksiyonu ile ilgili risk faktörleri multivariyans analizi ile belirlenmiştir.

Bulgular: Genelev kadınlarında HPV prevalansı %20.1 olarak bulundu. En sık saptanan serotip HPV18 (%40) idi ve onu sırasıyla HPV16 (%17) , HPV50 (%15) izledi. Sık cinsel temas, sigara kullanımı, bariyer kullanılmaması ve 30 yaşın altında olmak HPV infeksiyonu ile anlamlı olarak ilişkili bulundu.

Sonuç: Genelev kadınlarında HPV infeksiyonu prevalansı ve servikal kanser riski yüksektir. Aktif izlem gerektiren bu grupta, HPV sıklığının azaltılması için ulusal stratejiler ve düzenli servikal kanser tarama programlarının uygulanması gereklidir.

Anahtar Kelimeler: İnsan papillomavirus, Seks işçileri

Introduction

Human papillomavirus virus (HPV) is the main cause of cervical cancer, which, after breast cancer, is the second most prevalent cancer in the world among women. HPV has more than twenty types; the types that occur in the genital tract are predominantly acquired through sexual intercourse, and up to 50% of sexually active women will be infected at some time [1, 2]. A direct connection has been shown between cervical cancer and HPV infection, whereby 93% of cervical cancer specimens contain HPV DNA [3]. The prevalence of HPV among women in the general population varies by geographical region. Similarly, there is variability in the prevalence of HPV by geographic region within our country, which ranges from 2.14% to 20% [4, 5]. The highest prevalence of HPV has been described in female sex workers (FSWs). Sexual contact with FSWs in some communities is believed to contribute to HPV transmission and the high prevalence

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of cervical cancer in the population [6]. The increased risk of HPV observed in FSWs has been attributed to younger age, low educational status, high frequency of sexual contacts and unsafe sex behavior [7].

Because data for the risk factors associated with HPV infection among FSWs in Turkey are scarce, the present study was conducted to determine the risk factors associated with HPV infection, as well as to identify the prevalence of high- and low-risk types of HPV among this population.

Materials and Methods

Study population

Ethical approval was obtained from the local Ethical Committee of our center. A total of 239 FSWs working in Izmir, Turkey were included in the study. After obtaining informed consent, each participant completed a self-administered questionnaire designed to collect information through an interview conducted by a physician. The questionnaire included information on demographics, educational status, sexual activities, use of contraceptive methods, and smoking. The number of sexual contacts per year was calculated by multiplying the self-reported working days in the last year by the number of self-reported clients per day. It was classified into two groups as an expression of the median. During physical examination, cervical specimens were collected and transported to our center for laboratory evaluation, according to transportation guidelines.

HPV Testing

HPV detection and typing were performed by multiplex PCR and reverse hybridization methods. The HPV test kit detects high-risk types (types 16, 18, 31, 33, 35, 39, 45, 51, 56, 58, 59, and 68) and low-risk types (types 6, 11, 42, 43, and 44). The specimens were treated with sodium hydroxide to hydrolyze the RNA and to denature the DNA, according to the kit protocol. The liberated single-stranded DNA was hybridized in solution with an RNA probe mixture consisting of the high- or the low-risk HPV types. Each reaction mixture containing RNA-DNA hybrids was transferred to a capture tube coated with antibodies against the hybrids, thus immobilizing them. The bound RNA-DNA hybrids were then exposed to an alkaline phosphatase-conjugated antibody directed against the hybrids. The unreacted material was removed by washing, and a dioxetane-based chemiluminescent compound, Lumi-Phos 530 (Lumigen, Inc. Michigan, USA) was added as a substrate for the alkaline phosphatase. The light produced by the ensuing reaction was measured with a luminometer. The light measurements were expressed as relative light units (RLUs). Sonicated herring sperm DNA, in Digene transporting medium (100 mg/mL), was used as a negative control. Triplicate specimens of HPV16 and HPV11 DNA at 1.0 pg/mL served as the positive controls (PC) for high- and low-risk probes, respectively. All the RLU measurements were divided by the mean RLU of the three corresponding PCs to give a ratio of specimen RLU/PC. A ratio of 1.0 or greater was regarded as positive for HPV DNA, and a ratio of less than 1.0 was regarded as negative.

Statistical methods

SPSS 15.0 software for Windows (Chicago, IL, USA) was used to perform the data analysis. The Pearson's x^2 test was used for comparisons of groups. The relationship between risk factors and HPV infection was studied by logistic regression analysis. The odds ratios (ORs) and 95% confidence intervals (95% CI) were calculated. A p value of <0.05 was considered significant.

Results

Among 239 FSWs, 48 (20.08%) were positive for HPV DNA of different types, as observed in Table 1. HPV-type 18 was seen most frequently (n=19, 40%), followed by type 16 (n=8,17%) and type 50 (n=7,15%).

A comparison of the demographics and sexual characteristics of the FSWs is given in Table 2.

The variables, including age, smoking, condom use, and total number of sexual contacts per year, were significantly different between the groups (p<0.001). There were significantly higher FSWs aged less than 30 years in the HPV positive group compared to the HPV negative group. The rate of smokers was higher among HPV positive FSWs (p<0.001).

Table 1. Distribution of the HPV-types in FSWs

HPV Type	FSWs	
	n	%
11*	3	6
16	8	17
18	19	40
30	6	12
45	1	2
50	7	15
30+11	1	2
30+50	1	2
11+50	1	2
50+6*	1	2
Total	48	100

*low risk types

Table 2. Comparison of the demographic and sexual characteristics of sex workers

Parameters	number (%) of HPV negatives	number (%) of HPV positives	p value
Age (years)			
≤30	57 (29.8)	30 (62.5)	<0.001*
>30	134 (70.2)	18 (37.5)	
Education Level			
Primary school	166 (86.9)	44 (91.7)	0.464
Secondary and/or high	25 (13.1)	4 (8.3)	
Smoking			
Yes	105 (55)	43 (89.6)	<0.001*
No	86 (45)	5 (10.4)	
Contraception method			
Condom use	111 (58.1)	11 (22.9)	<0.001*
Oral contraceptive use	35 (18.3)	4 (8.3)	0.125
Intrauterine device (IUD) use	21 (11)	6 (12.5)	0.799
Total number of sexual contacts per year (median)			
≤768	148 (77.5)	18 (37.5)	<0.001*
>768	43 (22.5)	30 (62.5)	

*statistically significant

The education level and the use of oral contraceptives or intrauterine devices as contraception methods revealed no differences between groups (p values of 0.464, 0.125, and 0.799, respectively).

The analyses of the risk factors associated with HPV infection are presented in Table 3.

Being less than 30 years of age was significantly associated with a risk of infection (OR 3.91, 95% CI 2.02-7.55). The OR (4.15, 95% CI 2.00-8.60) of the youngest group was significantly higher than the oldest group regarding the frequency of sexual contacts (p<0.001).

Lack of condom use, smoking and higher frequency of sexual contacts were other significant factors associated with HPV infection.

No significant associations were found between HPV infection and the level of education.

Discussion

The prevalence rate of HPV in women in the general population varies extensively by geographical region. Approximately 29% of women in the general population in Eastern Europe are estimated to be HPV-positive [6]. Studies from Turkey have also reported that the prevalence in the general population varies from 2.1% (Izmir, Turkey) to 20% (Ankara, Turkey), according to different districts [5, 8-10].

Because there is currently limited information on HPV infections of FSWs in Turkey, we determined the prevalence rate of HPV and its related risk factors among FSWs in our country. The estimated prevalence rate of HPV was found to be 20.1%, which was nearly 10 times higher than that of women in the general population. Additionally, types 18 and 16, which are high-risk HPV types for cervical cancer, constituted approximately 55% of the identified HPV types in this study. This result is in accordance with other studies [6, 7]. In another study from Turkey, the HPV prevalence rate was reported to be 13% in FSWs, and the most frequently observed type was type 16 [11]. However, the sample size was considerably lower in that study, and it is difficult to infer a conclusion.

The rate in our study was lower than that of FSWs in Bulgaria (43.4%), Belgium, and Australia (31.6%) [2, 6, 12]. The lower rate could reflect the smaller proportion of FSWs of younger ages and relatively fewer sexual contacts in our group. The differences also might be explained by the use of different HPV assays [13].

Table 3. Multivariate analysis of significant factors related to HPV infection

Age (years)	OR (95% CI)	p value
≤30	3.91(2.02-7.55)	<0.001
>30	1	
Smoking		
Yes	7.04(2.67-18.5)	<0.001
No	1	
Condom use		
Yes	1	<0.001
No	4.66(2.24-9.70)	
Total number of sexual contacts per year (median)		
≤768	1	<0.001
>768	5.79(2.91-11.27)	

The increased risk of HPV observed in FSWs has been attributed to younger age, low educational status, high number of sexual contacts, unsafe sex behavior, and smoking [2, 6, 7, 14, 15]. The risk relation between age and HPV prevalence has been well described, whereby the rate of HR-HPV decreases with age [2, 6, 16]. This finding has been largely attributed to increased HPV exposure, which induces acquired immunity, and to the immaturity of the cellular response of the cervix [17]. Furthermore, higher frequencies of sexual contact in younger FSWs might also contribute to the higher prevalence rates in these groups. In our study, we extrapolated that the age group younger than 30 years was associated with a significant increase in HPV infection.

Currently, the effect of the educational status of FSWs on HPV infection has not been well defined. Some investigations revealed that higher educational status was protective against HPV infection, while others argued this notion [7, 18]. We found no significant correlation between the level of education of FSWs and the prevalence rate of HPV in this study. This result might be attributed to sexual behavior patterns.

Although there are conflicting data regarding the association between smoking and the risk of HPV infection [14], in the present study, we confirm that smoking is strongly associated with a high rate of HPV.

The use of condoms was shown to be protective against HPV infection in our study group, which is an issue that has not been well clarified. A meta-analysis of the effect of condom use on the prevention of HPV infection revealed that there was no consistent evidence that condom use reduces the risk of HPV infection [19]. Conversely, the study by Tideman et al. [2] showed that a failure to use condoms was significantly associated with HPV infection.

In summary, this study, the first in Turkey, showed that FSWs had a high HPV infection rate, especially of high risk genotypes, and multiple risk factors were associated with this high prevalence. These findings make FSWs a priority group for active screening, and national cervical cancer prevention programs should be preferentially implemented for these women. Increasing the educational level of FSWs, teaching effective uses of barrier methods and vaccination, and providing health insurance that enables them easy access to healthcare may effectively decrease the prevalence of HPV and cervical cancer.

Conflict of interest statement: The authors declare that they have no conflict of interest to the publication of this article.

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