Vaginal Smear Test Results of Patients Between 2011 and 2020 in the Middle Anatolia Region of Turkey, A Single Centre Experience

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ABSTRACT

Introduction: The objective of this study is to evaluate the cervical cytology results of patients who presented to the pathology laboratory of our hospital for vaginal smears between 2011 and 2020 according to the Bethesda 2014 classification.

Methods: The vaginal smear test reports of 121,537 patients who presented to our pathology laboratory between January 2011 and December 2020 were retrospectively reevaluated. The Bethesda 2014 classification was used for evaluating the results. The data obtained from electronic patient records and the Medical Pathology Department archives were assessed according to the years.

Results: The distribution of 121,537 admissions across the years was as follows: 2011: 7915; 2012: 12,211; 2013: 14,912; 2014: 11,907; 2015: 10,170; 2016: 12,234, 2017: 12,756, 2018: 12,846, 2019: 13,124, and 2020: 13,462. All were aged 17-65 years; the mean age was 46.52±11.85 years. Human papillomavirus (HPV) was detected in 3.3% of cases in 2020. The sample adequacy rate was 99.3%. Intraepithelial lesions and malignancy were not detected in 98.5%, the highest rate of inflammation was observed as 11.8%. Squamous cell anomalies constituted 1.3% of epithelial cell anomalies (1.5%). Among the squamous cell anomalies, prevalence of atypical squamous cells of undetermined significance was 0.86%, low-grade squamous intraepithelial lesions was 0.22%, suspected atypical squamous cell was 0.11%, high-grade squamous intraepithelial lesions was 0.08%, and squamous cell carcinoma was 0.01%. Diagnosis of atypical endocervical cells (0.01%) was the most common class of glandular cell anomalies, and endocervical adenocarcinoma (0.003%) was the least common.

Conclusion: Cervical smear and HPV DNA tests have an important role in defining cervical intraepithelial lesions. Regional and national screening programs should be used to prevent the transformation of precancerous lesions into invasive cancer.

Key words: Cervical cancer; human papillomavirus; screening; vaginal smear

ÖZET

Giriş: Bu çalışma ile 2011-2020 yılları arasında hastanemiz patoloji laboratuvarına vajinal smear için başvuran hastaların servikal sitoloji sonuçlarını Bethesda 2014 sınıflamasına göre değerlendirmek amaçlandı.

Yöntemler: 2 Ocak 2011-Aralık 2020 tarihleri arasında patoloji laboratuvarımıza başvuran 121.537 hastanın vajinal smear testi raporları retrospektif olarak yeniden değerlendirildi. Sonuçların değerlendirilmesinde Bethesda 2014 sınıflaması kullanıldı. Elektronik hasta kayıtları ve Tıbbi Patoloji Anabilim Dalı arşivlerinden elde edilen veriler yıllara göre değerlendirildi.

Bulgular: 121.537 başvurunun yıllara göre dağılımı aşağıdaki gibiydi: 2011: 7915; 2012: 12.211; 2013: 14.912; 2014: 11.907; 2015: 10,170; 2016: 12.234, 2017: 12.756, 2018: 12.846, 2019: 13.124 ve 2020: 13.462. Olguların tamamı 17-65 yaşları arasındaydı; yaş ortalaması 46,52±11,85 yıl idi. 2020 yılında vakaların %3.3'ünde insan papilloma virüsü (HPV) tespit edilmiştir. Örnek yeterlilik oranı %99.3 olup %98.5'inde intraepitelyal lezyon ve malignite saptanmazken, en yüksek %11.8 oran ile inflamasyon gözlendi. Epitel hücre anomalilerinin (%1,5) %1,3'ünü skuamöz hücre anomalileri oluşturmaktaydı. Skuamöz hücre anomalileri arasında önemi belirsiz atipik skuamöz hücreler %0.86, düşük dereceli skuamöz intraepitelyal lezyonlar %0.22, şüpheli atipik skuamöz hücre %0.11, yüksek dereceli skuamöz intraepitelyal lezyonlar %0.08 ve skuamöz hücreli karsinom %0.01 idi. %. Atipik endoservikal hücreler (%0.01) en sık görülen glandüler hücre anomalisiydi ve endoservikal adenokarsinom (%0.003) en az görülen idi.

Sonuç: Servikal smear ve HPV DNA testleri servikal intraepitelyal lezyonların tanımlanmasında önemli bir role sahip olduğundan prekanseröz lezyonların invaziv kansere dönüşmesini önlemek için bölgesel ve ulusal tarama programları yaygın olarak kullanılmalıdır.

Anahtar Kelimeler: Rahim ağzı kanseri; insan papilloma virüsü; tarama; vajinal yayma

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INTRODUCTION

Cervical cancer is the ninth most common gynecologic malignancy in women in our country. Its mortality has decreased with the introduction of screening tests after the twentieth century; 85% of the mortality related to cervical cancer is seen in underdeveloped and undeveloped countries (1).

There are more than 40 sexually transmitted types of human papillomavirus (HPV) that infect the skin and mucous membranes. In infected individuals, HPV is normally eliminated by the immune system within two years. However, in some individuals, it may persist with some unknown mechanisms. It has been observed that HPV causes lesions more frequently in immunocompromised and/or suppressed and smokers (2,3). It has been reported that HPV genotypes, especially 16, 18, 31, 33, 35, 45, 52, and 58 play a role in the development of cervical cancer, and HPV 16 is responsible for 60% of cervical cancers and 15% of HPV 18 (2,4,5). At least one of these HPV types has been identified in 99.7% of cervical cancers in the United States (6). It takes a long time, from 10 to 20 years, for HPV infection transmitted by direct contact to turn into a precancerous lesion, and the diagnosis and treatment of premalignant lesions that may develop in this period are important. Therefore, the World Health Organization (WHO) recommends cervical cancer screening tests such as HPV-DNA and vaginal smears every 5 years between the ages of 30 and 65 years (7).

The purpose of the vaginal smear (VS) test, which is a screening test, is to reduce the morbidity and mortality that may arise from cervical cancer (1,6). Currently, there is no test with 100% sensitivity for cervical cancer screening. VS test is aimed to identify precancerous lesions that can turn into invasive cancer (6). The VS test was first introduced in 1941 by a zoologist, George N Papanicolaou, with the examination of cells taken from the cervix first in pigs and then in humans, and it was later observed that this method successfully reduced the incidence of cervical cancer and also mortality (1). Today, there are two types of VS methods, conventional and liquid-based, and the detection rate of precancerous lesions in each is similar. In liquid-based HPV tests artifacts that may occur in the conventional method due to air drying are not observed (7).

The aim of this study was to evaluate the results of cervical cytology of patients who presented to the pathology laboratory of our hospital for vaginal smears between 2011 and 2020 according to the Bethesda 2014 classification.

METHODS

The cervical cytology results of 121,537 patients who presented to the pathology laboratory of Konya Training and Research Hospital between January 2010 and December 2020 were retrospectively investigated. This study was approved by the institutional review board of Necmettin Erbakan University Medical Faculty (2021-3429). The data were obtained from electronic patient records and the Medical Pathology Department archives. The vaginal smear samples were evaluated by certified and experienced pathologists. Patients with vaginal bleeding, those who had sexual activity in the last 48 hours, those who had a vaginal douche in the last 72 hours, and those who received intravaginal treatment were excluded from the study.

VS tests are recommended for patients aged over 21 years and/or patients with a sexually active life history of at least 3 years who present to the gynecology outpatient clinics of our hospital, and HPV-DNA testing started in the pathology department in 2020. For the VS test, the patient was in the lithotomy position on the examination table, and after the speculum was placed, the smear brush was placed in the external ostium, 360° rotation clockwise, and the materials were transferred to a slide or closed box and were sent to the pathology laboratory for evaluation. A smear was

Table 1. The Distribution of the Admissions According to Years.

Years		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
The number of the vaginal smear (n, %)		7915 (6.51)	12211 (10.04)	14912 (12.27)	11907 (9.8)	10170 (8.36)	12234 (10.07)	12756 (10.5)	12846 (10.57)	13124 (10.80)	13462 (11.08)	121537 (100)
Age (years)		51.44±12.09	49.90±12.03	50.95±11.15	49.64±11.10	45.49±12.82	45.25±12.78	43.56±12.14	43.24±11.86	43.16±11.42	42.56±11.18	46.52±11.85
Age Groups (n, %)	<30	199 (2.5)	457 (3.7)	371 (2.5)	472 (4.0)	1186 (11.7)	1630 (13.3)	1422 (11.1)	1387 (10.8)	1391 (10.6)	1401 (10.4)	9916 (8.16)
	30-50	3526 (44.6)	5996 (49.1)	6989 (46.9)	5932 (49.8)	5668 (55.7)	6588 (53.9)	7115 (55.8)	7425 (57.8)	7638 (58.2)	7875 (58.5)	64752 (53.27)
	>50	4190 (52.9)	5758 (47.2)	7552 (50.6)	5503 (46.2)	3316 (32.6)	4016 (32.8)	4219 (33.1)	4034 (31.4)	4095 (31.2)	4186 (31.1)	46869 (38.57)
Specimen qualification (n, %)		7837 (99.01)	12093 (99.03)	14770 (99.04)	11795 (99.06)	10075 (99.06)	12118 (99.05)	12634 (99.04)	12725 (99.06)	12999 (99.05)	13622 (99.85)	120668 (99.3)
The number of negative for intraepithelial lesion or malignancy (n, %)		7819 (98.8)	12048 (98.7)	14709 (98.6)	11740 (98.6)	10019 (98.5)	12052 (98.5)	12563 (98.5)	12635 (98.4)	12909 (98.4)	13727 (98.3)	119721 (98.5)
The number of the epithelial cell anomalia (n,%)		96 (1.2)	163 (1.3)	203 (1.4)	167 (1.4)	151 (1.5)	182 (1.5)	193 (1.5)	211 (1.6)	215 (1.6)	235 (1.7)	1816 (1.5)
HPV DNA Genotyping (n,%)											445 (3.3)	
HPV 16 (n,%)											151 (1.1)	
HPV 18 (n,%)											45 (0.4)	
HPV 45 (n,%)											37 (0.3)	
HPV 11 (n,%)											24 (0.2)	
HPV 31 (n,%)											18 (0.1)	
HPV 33 (n,%)											11 (0.08)	
HPV 35 (n,%)											5 (0.07)	
Multiple (n,%)											80 (0.6)	
Other (n,%)											74 (0.6)	

Abb.human papilloma virus, DNA: deoxyribo nucleic acid

performed on a glass slide for conventional evaluation and fixed (108,075 samples). The cytobrush was then dropped in a vial containing the preservative fluid for liquid-based cytology and HPV DNA testing (13,462 samples). The preparations stained with Papanicolau (PAP) dye in the pathology laboratory were evaluated using the light microscope by pathology specialists using the Bethesda 2014 classification.

HPV DNA sampling was studied in the samples taken in 2020 because this was when liquid-based cytology examinations started in the pathology department. The liquid-based cytology samples used for HPV DNA testing were diluted in STM (Digene/Qiagen, Courtaboeuf, France) as a reference medium and in Novaprep® HQ+ Orange medium (Novacyt, VélizyVillacoublay, France), which is primarily an alcohol-based fixative, following the manufacturer's recommendations.

Two hundred fifty microliters of the samples were taken into Eppendorf tubes, 450 µL of Buffer ATL was added, 30 µL of protein solution was added, 5 seconds of spin centrifugation was performed by vortexing for 5 seconds, and the samples were incubated at 56°C for 1

Table 2. The Distribution of Negative Results in terms of Intraepithelial Lesions or Malignancy.

Years		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
The number of the vaginal smear (n, %)		7915 (6.51)	12211 (10.04)	14912 (12.27)	11907 (9.8)	10170 (8.36)	12234 (10.07)	12756 (10.5)	12846 (10.57)	13124 (10.80)	13462 (11.08)	121537 (100)
The number of negative for intraepithelial lesion or malignancy (n, %)		7819 (98.8)	12048 (98.7)	14709 (98.6)	11740 (98.6)	10019 (98.5)	12052 (98.5)	12563 (98.5)	12635 (98.4)	12909 (98.4)	13727 (98.3)	119721 (98.5)
Reactive cellular changes (n, %)	Inflammation	880 (11.1)	1512 (12.3)	1769 (11.8)	1408 (11.7)	1198 (11.8)	1145 (11.9)	1606 (12.4)	1548 (12.1)	1636 (12.3)	1682 (12.5)	14384 (11.8)
	Radiation effect	24 (0.3)	26 (0.2)	46 (0.3)	25 (0.2)	21 (0.2)	38 (0.3)	41 (0.3)	53 (0.4)	65 (0.5)	68 (0.5)	407 (0.3)
	İntrauterin device effect	36 (0.45)	37 (0.3)	61 (0.4)	38 (0.3)	21 (0.2)	49 (0.4)	64 (0.5)	52 (0.4)	39 (0.3)	66 (0.5)	463 (0.4)
Inflammation (n, %)	Trichomonas	17 (0.21)	33 (0.27)	36 (0.24)	35 (0.29)	23 (0.22)	32 (0.26)	33 (0.25)	29 (0.23)	36 (0.27)	39 (0.29)	312 (0.25)
	Candidiasis	294 (3.7)	476 (3.9)	566 (3.8)	405 (3.4)	366 (3.6)	429 (3.5)	497 (3.9)	475 (3.7)	511 (3.9)	512 (3.8)	4531 (3.7)
	Bacterial vaginosis	443 (5.6)	708 (5.8)	821 (5.5)	679 (5.7)	601 (5.9)	673 (5.5)	741 (5.8)	719 (5.6)	774 (5.9)	781 (5.8)	6940 (5.7)
	Actinomyces	95 (1.2)	171 (1.4)	164 (1.1)	178 (1.5)	132 (1.3)	151 (1.2)	166 (1.3)	181 (1.4)	158 (1.2)	175 (1.3)	1571 (1.3)
	Herpes Simplex	31 (0.4)	61 (0.6)	75 (0.5)	48 (0.4)	31 (0.3)	73 (0.6)	64 (0.5)	39 (0.3)	53 (0.4)	41 (0.3)	516 (0.4)
Glandular cells after hysterectomy (n,%)		39 (0.5)	85 (0.7)	91 (0.6)	59 (0.5)	41 (0.4)	61 (0.5)	77 (06)	64 (0.5)	66 (0.5)	54 (0.4)	637 (0.5)
Atrophy (n, %)		398 (5.02)	633 (5.18)	864 (5.79)	626 (5.26)	557 (5.48)	688 (5.62)	751 (5.88)	738 (5.74)	778 (5.92)	821 (6.09)	6854 (5.6)
Endometrial cells (n, %)		102 (1.3)	195 (1.6)	224 (1.5)	214 (1.8)	142 (1.4)	208 (1.7)	242 (1.9)	218 (1.7)	276 (2.1)	309 (2.3)	2130 (1.7)

hour. Then, 200 µL of absolute ethanol was added and the mixture was washed twice on spin columns using wash buffers I and II. Then, it the samples was centrifuged for 3 minutes, washed with 150 µL of washing solution, and centrifuged for 1 minute at 8000 rpm.

Following the isolation of viral DNA in the Q1-Acube Cannet device as per the manufacturer's instructions, the presence of HPV viral DNA was determined using the Q1A screen PPV PCR test using an AuRA PCR platform. HPV types were determined in HPV positive samples using the HPV Sign® Q24 Complete Real-Time polymerase chain reaction (PCR) kit and pyrosequencing method.

Statistical analyses were performed using the SPSS 15.0 for Windows software package (SPSS, Chicago, IL, USA). Continuous variables are expressed as mean±standard deviation. Nominal data are expressed as the number of cases and percentages.

RESULTS

The number of the vaginal smear according to the years are presented in Table 1. The distribution of 121,537 admissions across the years was as follows: 2011: 7915; 2012: 12,211; 2013: 14,912; 2014: 11,907; 2015: 10,170; 2016: 12,234, 2017: 12,756, 2018: 12,846, 2019: 13,124, and 2020: 13,462. All patients were aged 17-65 years; the mean age was 46.52±11.85 years. HPV was detected in 3.3% of 2020 year. The sample adequacy rate was 99.3% and the epithelial cell anomaly rate was detected as 1.5%.

Table 2 shows the distribution of negative results in terms of intraepithelial lesions or malignancy. Intraepithelial lesions and malignancy were not detected in 98.5% of the cases, and the highest rate of inflammation was observed as 11.8%. Bacterial vaginosis (5.7%) was the most common inflammation, and candidal infection was the second (0.4%). In addition, atrophic findings were observed in 5.6%, endometrial cells in 1.7%, and glandular cells after hysterectomy in 0.5% of the samples.

The distribution of epithelial cell anomaly results is given in Table 3. Squamous cell anomalies constituted 1.3% of epithelial cell anomalies (1.5%). Among the squamous cell anomalies, atypical squamous cells of undetermined significance (ASCUS) was 0.86%, low-grade squamous intraepithelial lesions were 0.22%,

Table 3. The Distribution of Epithelial Cell Anomaly Results

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
The number of the vaginal smear (n,%)	7915 (6.51)	12211 (10.04)	14912 (12.27)	1190 (9.8%)	10170 (8.36)	12234 (10.07)	12756 (10.5)	12846 (10.57)	13124 (10.80)	13462 (11.08)	121537 (100)
The number of the epithelial cell anomalia (n,%)	96 (1.2)	163 (1.3)	203 (1.4)	167 (1.4)	151 (1.5)	182 (1.5)	193 (1.5)	211 (1.6)	215 (1.6)	235 (1.7)	1816 (1.5)
Squamous Cell (n,%)	83 (1.04)	144 (1.1)	184 (1.2)	147 (1.2)	133 (1.3)	161 (1.3)	177 (1.3)	188 (1.4)	193 (1.5)	210 (1.6)	1620 (1.3)
Atypical squamous cell of undetermined significance (ASCUS) (n,%)	67 (0.84)	105 (0.85)	122 (0.80)	95 (0.80)	82 (0.81)	105 (0.86)	107 (0.83)	111 (0.89)	121 (0.92)	126 (0.93)	1041 (0.86)
H-SIL suspected atypical squamous cell (ASC-H) (n,%)	3 (0.03)	8 (0.06)	14 (0.09)	13 (0.10)	11 (0.10)	14 (0.11)	17 (0.13)	19 (0.14)	16 (0.12)	19 (0.14)	134 (0.11)
Low-grade squamous intraepithelial lesion (L-SIL) (HPV/ Mild dysplasia /CIN I) (n,%)	7 (0.13)	18 (0.15)	27 (0.18)	24 (0.20)	25 (0.24)	27 (0.22)	33 (0.26)	36 (0.28)	33 (0.25)	37 (0.27)	267 (0.22)
High grade squamous intraepithelial lesion (H-SIL) (Moderate dysplasia /CIN II/CIN III/CIS) (n,%)	3 (0.03)	7 (0.05)	12 (0.08)	8 (0.07)	9 (0.09)	7 (0.06)	10 (0.08)	12 (0.09)	15 (0.11)	18 (0.13)	101 (0.08)
With signs of suspected invasion (n,%)	2 (0.02)	4 (0.03)	6 (0.04)	5 (0.04)	4 (0.03)	6 (0.04)	7 (0.05)	7 (0.05)	6 (0.04)	7 (0.05)	54 (0.04)
Squamous cell carcinoma (n,%)	1 (0.01)	2 (0.01)	3 (0.02)	2 (0.01)	2 (0.01)	2 (0.01)	3 (0.02)	3 (0.02)	2 (0.01)	3 (0.02)	23 (0.01)
Glandular cell (n,%)	13 (0.16)	19 (0.15)	19 (0.12)	20 (0.16)	18 (0.17)	21 (0.17)	16 (0.12)	23 (0.18)	22 (0.16)	25 (0.18)	196 (0.16)
Atypical endocervical cells (n,%)	1 (0.01)	3 (0.02)	2 (0.01)	2 (0.01)	1 (0.009)	2 (0.01)	1 (0.007)	3 (0.02)	2 (0.01)	3 (0.02)	20 (0.01)
Atypical endometrial cells (n,%)	3 (0.03)	3 (0.02)	4 (0.02)	3 (0.02)	5 (0.04)	4 (0.03)	4 (0.03)	5 (0.04)	4 (0.03)	5 (0.03)	40 (0.03)
Atypical glandular cells (n,%)	6 (0.07)	8 (0.06)	8 (0.05)	9 (0.07)	8 (0.07)	8 (0.06)	7 (0.05)	9 (0.07)	10 (0.07)	10 (0.07)	83 (0.06)
Endocervical adenocarcinoma in situ (n,%)	-	-	-	-	-	-	-	-	-	-	-
Endocervical adenocarcinoma (n,%)	-	-	1 (0.006)	-	1 (0.009)	1 (0.008)	-	-	-	1 (0.007)	4 (0.003)
Endometrial adenocarcinoma (n,%)	2 (0.02)	4 (0.03)	3 (0.02)	4 (0.03)	3 (0.02)	5 (0.04)	3 (0.02)	5 (0.04)	4 (0.03)	5 (0.03)	38 (0.03)
Extrauterine adenocarcinoma (n,%)	-	-	-	-	-	-	-	-	-	-	-
Unspecified (n,%)	1 (0.01)	1 (0.008)	1 (0.006)	2 (0.01)	-	1 (0.008)	1 (0.007)	1 (0.007)	2 (0.01)	1 (0.007)	11 (0.009)
Other malignant neoplasms (n,%)	-	-	-	-	-	-	-	-	-	-	-

suspected atypical squamous cells were 0.22%, high-grade squamous intraepithelial lesions were 0.08%, and squamous cell carcinoma was 0.01%. Atypical endocervical cells (0.01%) were the most common glandular cell anomalies, and endocervical adenocarcinoma (0.003%) was the least common.

DISCUSSION

In our study, in which we aimed to evaluate the cervical cytology results of the last 10 years, 99.3% of the data were sufficient for diagnosis. ASCUS accounted for 0.86%, and the prevalence of atypical squamous cells, cannot rule out high-grade squamous intraepithelial lesion (ASC-H) was 0.11%, low-grade squamous intraepithelial lesions (L-SIL) was 0.22%, high-grade squamous intraepithelial lesions (H-SIL) was 0.08%, cervical cancer was 0.01%, atypical endocervical cells was 0.01%, and endocervical adenocarcinoma was 0.003%.

In the VS method, which is quite simple, it is very important not to have sexual intercourse, or perform vaginal douching or any intravaginal treatment 48 hours before the procedure and it should be done before the bimanual examination. No lubricant should be used, and samples should be fixed without waiting after sample collection. Also, in case of infection, a VS should be performed after treatment. The detection rates of precancerous lesions by conventional and liquid-based cytology are similar, however the diagnosis insufficiency due to the presence of infection and blood is less common in liquid-based tests. Bleeding does not negatively affect evaluations because blood cells are separated in liquid-based cytology. In addition, HPV DNA testing can be performed in liquid-based cytology, and artifacts due to fixation and drying are less common (8).

The use of liquid-based cytology in our Pathology department is quite new, starting in 2020, and cervical

cytology results were found close to the conventional method performed in previous years. In a study evaluating 9079 vaginal smear results in Şanlıurfa, Turkey, the rate of ASCUS was found as 1.6%, ASC-H was 0.06%, atypical glandular cells (AGC) were 0.05%, L-SIL was 0.07%, H-SIL was 0.02%, and invasive cancer was 0.01% (9). When 19639 VS were evaluated in Denizli province in 2004-2005, ASCUS was found as 0.3%, ASC-H was 0.2%, L-SIL was 0.15%, and H-SIL was 0.07% (10). In Van province, ASCUS was reported as 0.8%, ASC-H was 0.2%, L-SIL was 0.2%, and H-SIL was 0.05% (11). When the VS samples of 4322 patients in Hacettepe University Faculty of Medicine were evaluated retrospectively, ASCUS was found as 0.6% and epithelial cell anomalies were found as 1.1% (12). Ersoz et al. also found ASCUS as 1.9%, L-SIL as 0.4%, H-SIL as 0.1%, and invasive cancer as 0.07% in their study (13). Similar rates of ASCUS and epithelial cell anomalies were found in the examination of 3013 VS results covering the years 1999-2020 at EtlikZübeydeHanım Hospital (14). The results of the same hospital for 2008-2010 were reported as ASCUS 1.1%, ASC-H 0.14%, AGC 0.09%, L-SIL 0.1%, and H-SIL 0.04% (15).

In a study by the Turkish Cervical Cancer and Cervical Cytology Group in which 140,334 VS samples were evaluated including 33 centers, ASCUS was 1.07%, ASC-H was 0.07%, AGC was 0.07%, L-SIL was 0.3%, H-SIL was 0.17%, and invasive cancer was found as 0.06% (16). In a study by Seven et al. (17), Candidal infection was 0.75%, Trichomonas infection was 0.08%, and bacterial vaginosis was 1.9% in VS samples, and ASCUS was 0.77% and L-SIL was 0.02%. Malkavi et al. found Candidal infection as 1.2%, Trichomonasvaginalis as 0.9%, and Actinomyces infection as 0.08% in 1176 VS samples (18). In our study, in which 121,537 VS samples from 10 years including 2011-2020 were evaluated, we found ASCUS as 0.86%, ASC-H as 0.11%, L-SIL as 0.22%, H-SIL as 0.08%, and cervical cancer as 0.01%. In addition, Candidal infection was reported as 3.7%, Trichomonas infection as 0.25%, Actinomyces as 1.3%, and bacterial vaginosis as 5%.

With the demonstration of the relationship between HPV infection and cervical cancer, routine HPV DNA testing has come to the fore. Sexual intercourse, vaginal douching, and intravaginal treatment do not adversely affect HPV tests. The aim of HPV DNA testing should be to detect high-risk types associated with cervical cancer. An HPV DNA test can be performed as a co-test with VS or if the VS result is negative (reflex HPV test). Cervical intraepithelial neoplasia (CIN)-I and CIN-II cases are temporary and do not progress to CIN-III and cervix cancer because the majority of HPV infections heal spontaneously under the age of 30 years. For this reason, HPV DNA tests are recommended for women aged over 30 years; if it is performed under the age of 30 years it may cause unnecessary colposcopy and invasive procedures such as conization, thus causing some negative obstetric problems including preterm labor (19).

A long period is required for the development of CIN and cervical cancer after HPV infection, thus the appropriate diagnosis and treatment method during this period is very important (20). Therefore, it is aimed to reduce cervical cancer mortality rates through HPV DNA and VS test screening methods (21). Cervical cancer is a preventable disease; the prevention of HPV infection with protective vaccines is primary prevention and detection and treatment of precancerous lesions with screening tests is secondary prevention. In Turkey, VS tests began for cervical cancer screening in 1992 by the Ministry of Health and they are still widely used today (22).

The prevalence of HPV in cervical cancers has been reported as 95%. The prevalence of HPV has been reported as 22% in Africa, 21% in Europe, 16% in America, and 11.7% in the world average in results with

normal cytology results (23). In a study in which 94,848 VS samples were evaluated between 2014 and 2017 in Turkey, the prevalence of HPV was found as 3.16% (1). In studies conducted in our country, the average rate is around 3% and varies between 1% and 15% (24,25). The fact that the ratio is in such a wide range may be due to the person's social lifestyle, traditional religious beliefs, place of residence, and cultural characteristics. When the distribution of HPV in Turkey is evaluated in terms of subtypes, HPV type 16 takes first place (1,24). In our study, the prevalence of HPV was found as 3.3% in accordance with the literature and HPV type 16 was detected most frequently with 33.9%. From this, we can conclude that HPV type 16 causes the highest rate of cervical abnormalities.

The possible limitation of the study is that the study was conducted in a tertiary care institution and it was a single-center study. Also, the pathology specimens were not evaluated by a single pathologist. On the other hand, a strength of our study is that it included both individuals with gynecologic symptoms and those who came for a normal gynecologic examination.

CONCLUSION

In conclusion, regional and national screening programs should be widely used to prevent the transformation of precancerous lesions into invasive cancer because cervical smear and HPV DNA tests have an important role in defining cervical intraepithelial lesions. In this way, mortality due to cervical cancer and the rate of unnecessary medical interventions will decrease along with the reduction in colposcopy referral.

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