

Analysis of the incidence of anogenital warts and serological test results for other sexually transmitted infections

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Abstract

Introduction: Anogenital warts (AGWs) are proliferative lesions mainly presenting in the anal, genital, and perianal regions. They are one of the most prevalent sexually transmitted infections globally.

Methods: The study included patients that presented at the Dermatology Clinic of Health Sciences, University Elaziğ, Fethi Sekin City Hospital between January 2019 and December 2022 and were diagnosed with AGWs. Patients that presented with this diagnosis and were screened for other sexually transmitted infections (HBsAg, anti-HBs, anti-HCV, anti-HIV, VDRL, and TPHA) were identified. Epidemiological and demographic patient data and the results of serological tests for other sexually transmitted infections in the last 4 years were analyzed. The patient data and examination results were collected retrospectively based on the hospital automated patient records.

Results: AGW incidence was significantly higher in males. The mean patient age was 32, and the mean female patient age was lower than that of males. It was observed that the number of patients that were followed up with an AGW diagnosis increased significantly during the last 4 years ($p < 0.05$). The study detected 2.2% HBsAg, 0.6% TPHA, 0.3% VDRL, 0.5% anti-HCV, and 56.5% anti-HBs positivity. No anti-HIV-positive patients were identified. None of the patients had more than one sexually transmitted infection on serology testing.

Conclusions: Although the serological findings were higher when compared to certain studies and quite low when compared to others, it would be beneficial to evaluate all patients with AGWs for other sexually transmitted infections.

Keywords: anogenital warts, hepatitis, HIV, syphilis, sexually transmitted infections

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Introduction

Anogenital warts (AGWs) are benign proliferative lesions mainly presenting in the epithelium of the anal, genital, perianal, inguinal, or suprapubic region. Human papillomavirus (HPV) genotypes 6 and 11 cause more than 95% of AGW cases (1, 2). AGWs are among the most common sexually transmitted infections (STIs) in young adults (3).

AGWs are an important public health problem due to global incidence estimates of 160 to 289 cases per 100,000 persons/year (1, 4). Previous studies have reported that 9 to 13% of the world population is infected (1, 4).

Although AGWs are benign lesions, certain studies reported an increased risk of cervical intraepithelial neoplasia, penile intraepithelial neoplasia, and especially HPV-related anogenital cancer in AGW patients. Furthermore, AGWs lead to significant health expenditures and psychological burdens for patients (3). Most AGWs could be prevented with vaccination, and a significant decrease was observed in AGW incidence in countries with high vaccination rates (3). Because early diagnosis with screening tests and prevention of precancerous lesions and cervical cancer with prophylactic HPV vaccines are crucial, individuals should be encouraged to take part in preventive measures to reduce the incidence of the disease (5).

AGWs, one of the most prevalent sexually transmitted diseases, develops in about 65% of individuals that have sex with an infected partner (6). Furthermore, individuals with STIs are considered at increased risk of another STI (7). Thus, AGW patients

should be considered a risk group and followed up regularly. These patients also pose serious HPV and other STI transmission risks (8, 9). The main purpose of STI screening is to identify and treat infected individuals before they develop complications and to detect, test, and treat their sex partners to prevent transmissions and re-infections (10).

This study investigates AGW incidence, epidemiological and demographic patient data, and serological test results for other STIs that could accompany AGWs.

Methods

This study was approved by the Firat University ethics committee (2023/05-12). Patients that applied to the Dermatology Clinic at Health Sciences, University Elaziğ, Fethi Sekin City Hospital between January 2019 and December 2022 and were diagnosed with AGWs after clinical examination were included in the study. The patients were screened for other STIs. In patients with AGWs, hepatitis B surface antigen (HBsAg), anti-HBs antibody, anti-hepatitis C virus antibody (anti-HCV), anti-HIV antibody, and Venereal Disease Research Laboratory (VDRL), and *Treponema pallidum* hemagglutination (TPHA) tests were performed and the results were examined. The epidemiological and demographic data of AGW patients in the last 4 years and serological test results for other STIs were collected retrospectively from the hospital automated patient records. Data such as age, sex, admission date, and ICD-10 (International Classification of Diseases—10th Revision) codes were obtained from hospital records, and the electronic records

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database was anonymized to protect patient confidentiality. No exclusion criteria were defined because all AGW patients were included in the dermatology database. However, the annual first examination of the patients was recorded, and follow-up examination records were excluded. Written patient consent was not obtained due to the retrospective nature of the study. The study was conducted per Declaration of Helsinki standards.

Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics for Windows, version 25.0 (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, USA) software. Descriptive categorical variable statistics are presented as frequencies and percentages, and continuous variables as mean ± standard deviation (SD) and median (interquartile range; IQR). A chi-square test was employed to compare categorical variables. The level of statistical significance was set at $p < 0.05$.

Results

Table 1 shows the total number of patients that presented with AGWs at our clinic between 2019 and 2022. The AGW incidence statistically significantly increased during the 4 years ($p < 0.001$). The number of male AGW patients was significantly higher than the number of female patients. The mean age and sex of the patients are presented in Table 2. The age distribution of the patients based on predetermined age groups (< 18 , $18-44$, and ≥ 45 years) is presented in Figure 1.

The number of AGW patient follow-ups increased significantly between 2019 and 2022 (Table 1). The analysis of patient serological tests between 2019 and 2022 showed that 581 patients were tested for HBsAg, and 13 patients were positive (2.2%). Anti-HBs was tested in 313 patients, and 177 were positive (56.5%). VDRL

Table 1 | Ratio of patients with anogenital warts to all patients.

Year	Total number of patients	Number of patients with anogenital warts	%	<i>p</i>
2019	80,514	222	0.27	< 0.001
2020	39,974	163	0.40	
2021	71,437	269	0.37	
2022	90,327	456	0.50	

Table 2 | Anogenital wart patients' demographics between 2019 and 2022 (n = 1,110).

Year and sex	n	%	Age, mean ± SD	Age, median (IQR)
2019				
Male	166	74.8	33.00 ± 11.10	31.00 (13.25)
Female	56	25.2	29.37 ± 9.95	28.50 (9.75)
Total	222	100.0	32.08 ± 10.91	30.00 (13.00)
2020				
Male	116	71.2	33.07 ± 10.12	32.00 (13.00)
Female	47	28.8	31.89 ± 15.01	29.00 (14.00)
Total	163	100.0	32.73 ± 11.70	31.00 (14.00)
2021				
Male	189	70.3	33.32 ± 9.37	31.00 (13.00)
Female	80	29.7	31.88 ± 10.45	30.00 (15.50)
Total	269	100.0	32.89 ± 9.71	31.00 (13.50)
2022				
Male	336	73.7	34.62 ± 11.19	32.00 (15.00)
Female	120	26.3	33.35 ± 13.69	31.00 (17.75)
Total	456	100.0	34.29 ± 11.90	32.00 (16.00)
2019-2022				
Male	807	72.7	33.76 ± 10.63	32.00 (14.00)
Female	303	27.3	32.00 ± 12.52	30.00 (15.00)
Total	1,100	100.0	33.28 ± 11.20	31.00 (14.00)

SD = standard deviation, IQR = interquartile range.

was tested in 594 patients, and two were positive (0.3%). TPHA was tested in 163 patients, and one was positive (0.6%). Anti-HCV was tested in 589 patients, and three were positive (0.5%). No anti-HIV positive patients were identified (Fig. 2). None of the patients had more than one positive serological test for HBV, HCV, and syphilis.

Discussion

The incidence of AGWs is high globally; however, the number of studies on sexually transmitted coinfections is limited in AGW patients. Study findings have varied by region and country. Studies conducted in two regions in Turkey, in Germany, and in China reported different AGW incidences and STI serological test positivity results (7, 11-13).

In a study by Aktaş et al. (11), 74 of 109 patients were male and 35 were female. The mean patient age was 33. HIV and VDRL tests were not positive in any patient, whereas HBsAg was detected in one patient, and anti-HCV test was positive in another. Anti-HBs was detected in 28 patients.

In a retrospective study conducted in Ankara by Erduran and Yalçınkaya İyidal (7), 858 of 1,111 patients were male, and 213 were female. The average age was 32. HBsAg was detected in 2.4% of cases, anti-HIV in 2.9%, anti-HCV in 1.1%, and VDRL in 0.6%. Three of the 32 HIV-positive cases were new diagnoses, and 29 were under treatment. Other tests that were routinely conducted in patients with AGWs led to the diagnosis of three HIV cases and treatment of seven asymptomatic syphilis cases.

In a retrospective study by Mueller et al. (12) conducted between 2008 and 2016, 196 patients were screened for HIV, HBV, HCV, *T. pallidum*, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Mycoplasma genitalium*, and herpes simplex (HSV) infections. The mean age was 36, and the coinfection rate was 24.6% in all patients. The coinfection rate did not differ significantly among women, heterosexual men, and homosexual men. Due to the high rate of sexually transmitted co-infections in the study, it was concluded that AGW patients should be screened for other STIs. The mean age of 36 and the predominance of male patients were consistent with this study.

In a study of 200 patients in China by Wang et al. (13) to determine the prevalence of genital herpes (HSV-2), *C. trachomatis*, *N. gonorrhoeae*, *M. genitalium*, HIV, and syphilis, 49 (24.5%) coinfections were identified. Fewer STIs and fewer coinfections were identified in women. The patients with the highest prevalence were 18 to 25 years old (35.4%).

Ünal et al. (14) screened for other STIs in 94 AGW patients: 83 males and 11 females. The study found three (3.1%) cases without previous clinical symptoms of syphilis, identified by serology for VDRL and TPHA. HBsAg positivity was observed in three cases, and no anti-HIV or anti-HCV positivity was reported.

In studies conducted in Turkey, HBsAg positivity varied between 0.8% and 5.7% (7, 15). In a recent study conducted by Erduran and Yalçınkaya İyidal (7), HBsAg positivity was reported as 2.4%. In addition, in the study conducted by Mueller et al. (12), HBsAg prevalence was reported as 2.6%. In this study, HBsAg positivity was 2.2%, consistent with the aforementioned studies. None of the patients younger than 18 were HBsAg-positive in our study. This may have been due to the inclusion of HBV vaccine in vaccination programs in 2001 in Turkey (7, 15). In our study, the anti-HBs prevalence was 56.5%. Erduran and Yalçınkaya İyidal (7) reported a slightly lower anti-HBs positivity rate of 50.9% in 2020.

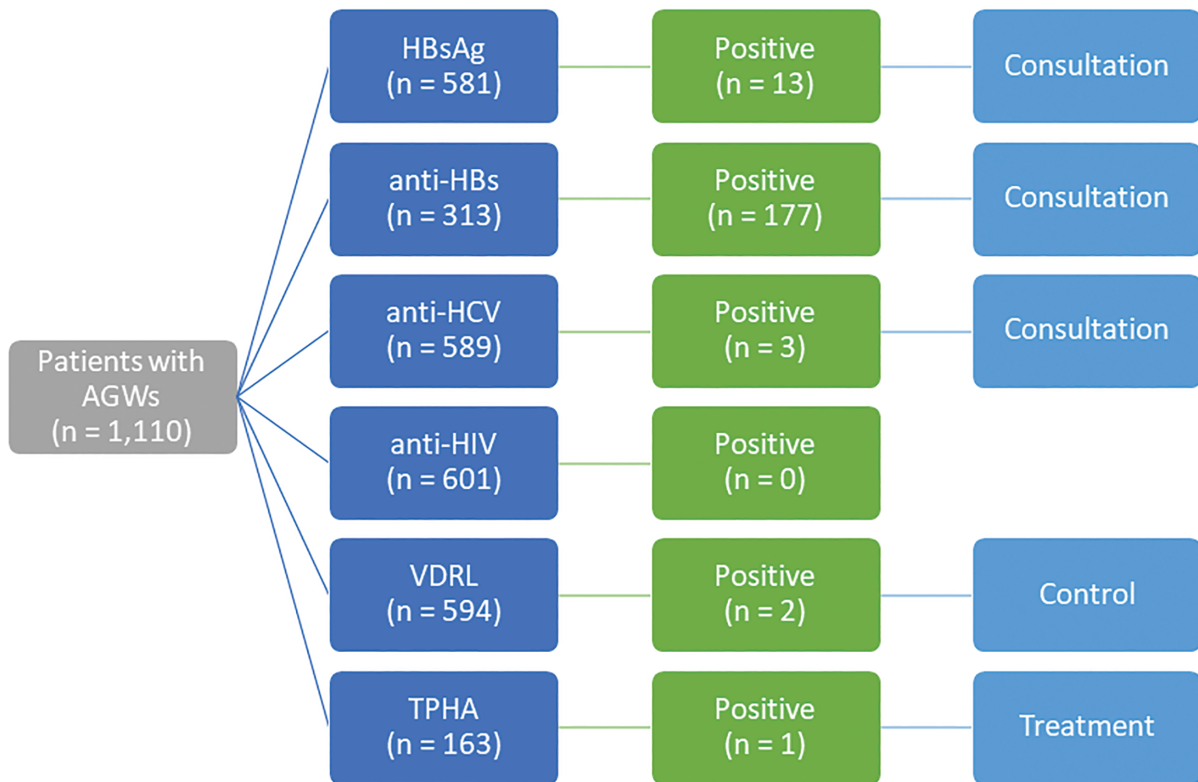


Figure 1 | Anogenital warts incidence based on age group. The counts are presented in percentages.

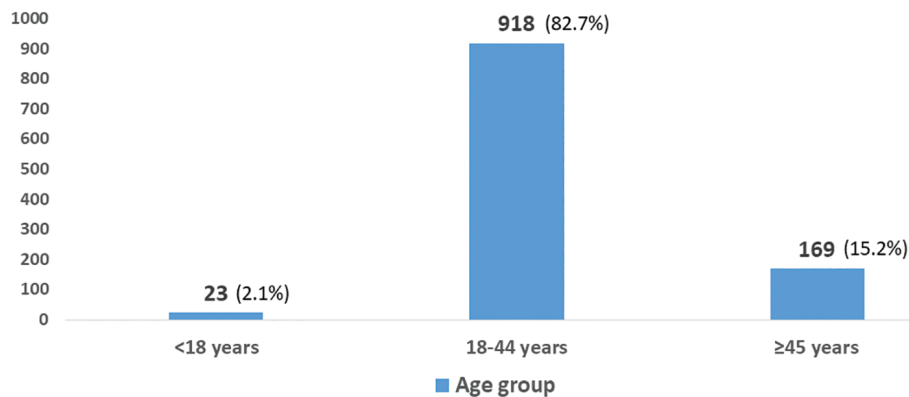


Figure 2 | Serological test results flow chart and management of patients presenting with anogenital warts between 2019 and 2022. AGWs = anogenital warts.

In Turkey, anti-HCV positivity was reported as 0.54% by donor screening reports and 1.15% in the general population (16). The positivity rate was reported as 0.7% in a city close to the region of the current study (16). Anti-HCV positivity rate of 0.5% found in this study is similar to several study findings reported for Turkey, but it is relatively high when compared to certain studies and quite low when compared to others.

Although it was determined that HIV infections had increased gradually in Turkey and the world in recent years (17), in this study—similar to the findings reported by Aktaş et al. (11) and Ünal et al. (14)—none of the AGW patients were HIV-positive.

The lowest VDRL seropositivity reported in Turkey in recent years was 0.004% and the highest was 2.33% (18, 19). In this study, VDRL seropositivity was between these two figures, at 0.3%. The TPHA test was negative in one of the two patients with VDRL positive result. The TPHA result of the other patient, who did not have any symptoms other than AGWs, was positive, and treatment was initiated. Three patients were anti-HCV-positive (0.5%). Gastroenterology consultation was requested for these patients. Although

the positivity rates for syphilis were similar to some of aforementioned study findings, they were significantly lower when compared to other studies. This may be associated with the social structure of the province where the study was conducted.

Furthermore, not all AGW patients were screened for all coinfections, and this could have led to different findings in all serological tests. Nevertheless, the number of patients followed up with an AGW diagnosis has increased significantly during the last 4 years. A screened patient without symptoms was diagnosed and treated for syphilis. Patients that were positive for HBsAg and anti-HCV (a few of them were diagnosed earlier, but some were diagnosed during the screening conducted in this study) were referred to the relevant departments and were treated and followed up.

Similar to the aforementioned studies, male patients significantly predominated in the current study. The mean patient age was 32, and the mean female patient age was lower than that of male patients.

This study had several limitations. Due to the retrospective design of the study and the lack of data in hospital records on

condom use, discharge, marital status, and presence of more than one sexual partner, these data were not analyzed. Patients were not analyzed for other STIs such as HSV, *M. genitalium*, *N. gonorrhoeae*, and *C. trachomatis* infections. Another limitation of the study was the screening of only patients that presented to the dermatology clinic and the exclusion of those that presented to the gynecology and urology outpatient clinics. The inclusion of these patients would have changed the total number of patients, and possibly age and sex data.

Conclusions

This study of AGW incidence, epidemiological and demographic

patient data, and the results of serological tests for other STIs in these patients showed that the number of patients followed up with a diagnosis of AGWs has increased significantly in the last 4 years. Due to STI screening, patients with positive serological test results had the opportunity to be treated for these conditions.

Although interest in the HPV vaccine has increased in Turkey, it is not included in the Turkish national vaccination program (20). The data in this study can guide future studies in comparing AGW incidence before and after vaccination in our region.

Although the serological screening results were high when compared to certain previous study findings and quite low when compared to others, it is suggested that all AGW patients be screened for other STIs.

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