ORIGINAL ARTICLE

Factors Associated with Anogenital Warts and Gonorrhea Infection: A Cross-Sectional Study

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Abstract

Background: Sexually transmitted infections (STIs) are one the most common infections in the world. Among them, anogenital warts and gonorrhea infections are a significant group of STIs. We conducted this research to evaluate the prevalence of anogenital warts and gonorrhea infection and their related aspects in Iran. Still, it has a lot to know about its prevalence, trends, and risk factors.

Methods: In this cross-sectional study, 1064 patients voluntarily referred from a marriage counseling center to the physicians in our center to evaluate STIs were enrolled in this study. All participants completed a data collection form about their sex, age, lifetime number of sexual partners, high-risk behaviors, and history of prior gonorrhea infection. They were also evaluated for anogenital warts by physical examination. The data were analyzed by SPSS 24 with Chi-square test, independent t-test, and logistic regression analysis. P value<0.05 was considered significant.

Results: The number of participants with current anogenital warts was 9.2% (11.9% in men and 3.5% in women). 1.1% of the participants had a documented prior gonorrhea infection, and all of these cases were men. After logistic regression analysis, there was a significant relationship between anogenital warts and gonorrhea infection and male gender (P=0.03). Also, there was a meaningful relationship between these diseases and the higher number of lifetime sexual partners (P=0.001).

Conclusion: Male sex and having more lifetime sexual partners are the risk factors for getting anogenital warts and gonorrhea infection.

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Keywords: Sexually transmitted diseases, Anogenital warts, Gonorrhea, Sexual partners, Sexual behavior, Iran

Introduction

Sexually transmitted infections (STIs), formerly known as sexually transmitted diseases (STDs), are clinical syndromes and infections transmitted through sexual activity.[1] Among the STIs, anogenital human papillomavirus (HPV) infection is the most commonly reported disease worldwide.[2] The prevalence of anogenital warts and gonorrhea infection is well studied worldwide. A recent meta-analysis that included 157,879 women worldwide reported estimates of all HPV infections as 22.1% in Africa, 8.1% in Europe, 20.4% in Central America and Mexico, 11.3% in Northern America, and 8% in Asia.[3] In a systematic review in Iran, the total prevalence of HPV serotypes was 9.4%, using the polymerase chain reaction method in pap smears.[4] Some regions in Iran demonstrated a higher prevalence of HPV infection. For example, the prevalence of any type of HPV infection was as high as 26.34% in Kerman, one of the southeast provinces in

Iran.[5] In another systematic review in 2013, the annual new incidence rate of AGWs varied between 100 and 200 per 100,000 cases worldwide.[6] The WHO estimates that more than 106 million new cases of gonorrhea are diagnosed annually worldwide.[7]

One of the manifestations of HPV infections that can easily be found by physical examination is anogenital warts (AGWs), which are epithelial proliferation caused by a wide range of human papillomavirus (HPV) genotypes, most commonly HPV 6 and 11. These subtypes have a low carcinogenic risk. However, some subtypes have life-threatening complications like cervical cancer, the 3rd most prevalent cancer among women with high morbidity and mortality.[8] The main route of transmission of genital HPV infection, including AGWs, is through sexual intercourse.[9] Physical examination can reveal AGWs, and the gold standard mechanism for investigating HPV infection is by polymerase chain reaction (PCR) method to determine the HPV subtypes.[10] Also, among STIs, gonorrhea infection can also have adverse consequences like infertility. The most common clinical feature of this infection in men is acute anterior urethritis, while this infection does not have any specific presentations in females. The primary route of transmission of this disease is also through sexual contact.[7]

There are behavioral risk factors associated with acquiring HPV, AGWs, and Gonorrhea. Many studies showed a positive correlation between the number of sexual partners and the presence of genital warts or gonorrhea. A case-control study in Turkey on evaluation of genital warts on 200 patients with AGW and 200 healthy individuals showed significantly more sexual partners in the study group compared to the control group.[11] Another study showed that being a heavy smoker and having more than five sexual partners are the risk factors for developing concurrent anal and cervical HPV infections.[12] Other high-risk behaviors, including wet cupping or being a victim of knife crime, have not been well studied yet.[13] The prevalence of AGWs and Gonorrhea infection, especially in men, and associations between acquiring these diseases and high-risk behaviors have not been well studied in Iran.[14] We investigated the prevalence of AGWs and Gonorrhea and their related factors among couples who referred to the marriage counseling center.

Methods

In this cross-sectional study, couples who referred to a marriage counseling center for the premarital visit were enrolled between September-2017 and January-2021. This center offers specific information about sexual contacts, birth control methods, and instructions for straight couples getting married in few months. Individuals who agree to have a genital physical examination are referred to the physician's office in our center. During the study period, 1064 individuals out of 12,568 were referred to the physician's office for physical examination. The inclusion criteria were individuals who attended the center and were referred to the physician's office for evaluation. Participants filled out the data collection forms with consent and underwent the genital examination. The exclusion criteria were the participants who did not complete the data collection form or did not sign the informed consent.

The data collection form contained demographic factors including sex, age, level of education, high-risk behaviors (history of addiction, having a tattoo, wet cupping therapy, having sex with sex-workers, having unprotected sex), number of their lifetime sexual partners before this marriage, and history of prior gonorrhea infection.

The history of gonorrhea infection was documented by asking the patients to bring their previous positive lab results. They performed the tests at non-governmental clinical laboratories in the city of Isfahan, Iran. The methods for detecting the gonorrhea infection were the PCR or cellular culture. The number of lifetime sexual partners was divided as 0, 1, 2, 3, and 4 or more according to a pooled analysis in 2006.[15] Furthermore, the genital physical examination was performed on all of the participants by an expert physician. In adults, AGWs are clinically represented by vegetative papules of an irregular surface and normochromic appearance.[9]

The collected data were analyzed using Chi-Square and Independent t-test through SPSS version 25. Also, logistic regression analysis was adjusted for the significant variables in the first analysis based on mean, standard deviation, and frequency. P-value<0.05 was considered significant.

The Isfahan University of Medical Sciences Ethics Committee approved the study protocol with grant number 396921.

Results

In this study, 722 (67.9%) male and 342 (32.1%) female participants were enrolled. The mean age of the healthy subjects (33.4) and patients (28.5) was different. These participants were divided into healthy (87% of males and 96.5% of females) and diseased cases (13% of males and 3.5% of females). The percentage of patients suffering from anogenital warts was 9.2%, with a rate of 11.9% in men and 3.5% in women. The rate of history of gonorrhea infection was 1.1% which was exclusively in the male group (1.7% of males). There was no significant difference between the two groups based on the level of education (P=0.10), as shown in Table 1. There was a considerable difference between the two groups based on gender before and after the logistic regression analysis (P=0.03).

Tables 1: Comparison of demographic data of the study between patients and healthy subjects

Variables		Healthy people with no history of gonorrhea and anogenital warts at present (n=958) N (%)	Cases with anogenital warts at present or history of gonorrhea infection at past (n=106) N (%)	Total	P
Age (year) (Mean±SD)		28.23±4.67	29.56±5.10	28.36±4.73	0.006
Gender	Male	628 (65.6)	94 (88.7)	722 (67.9)	0.001
	Female	330 (34.4)	12 (11.3)	342 (32.1)	
Education	Diploma or less	257 (26.8)	30 (28.3)	287 (27)	0.10
	University student	115 (12)	18 (17)	133 (12.5)	
	Bachelor's degree	402 (42)	47 (44.3)	449 (42.2)	
	Master's degree or higher	184 (19.2)	11 (10.4)	195 (18.3)	
Number of Sexual Partners	0	630 (65.8)	33 (31.1)	663 (62.3)	0.002
	1	104 (10.9)	13 (12.3)	117 (11)	
	2	39 (4)	3 (2.8)	42 (4)	
	3	27 (2.8%)	4 (3.8)	31 (2.9)	
	≥4	158 (16.5)	53 (50)	211 (19.8)	
High risk behaviors	Victim of knife crime	23 (2.4)	7 (6.6)	30 (2.8)	0.02
	Addiction	5 (0.5)	0 (0)	5 (0.5)	1.0
	Tattoo	11 (1.1)	4 (3.8)	15 (1.4)	0.054
	Wet Cupping therapy	21 (2.2)	8 (7.5)	29 (2.7)	0.005
	Sex without protection	79 (8.2)	10 (9.4)	89 (8.4)	0.71
	Sex with sex workers	37 (3.9)	4 (3.8)	41 (3.9)	1.0

*n: Number; **SD: Standard deviation

Table 2: Logistic regression between variables and the ratio of getting the disease

Variables	Odds Ratio (OR)	P value	95% CI least-most
Age	1.02	0.34	0.971-1.089
Gender	3.62	0.03	1.072-12.280
Number of sexual partners	1.46	0.001	1.175-1.836
Victim of knife crime	2.53	0.07	0.415-3.337
Cupping therapy	1.17	0.75	0.904-7.091
Constant	0.009	<0.001	

*OR: Odds ratio; **CI: Confidence interval

Although there was a significant difference between the healthy and patient groups based on age before the logistic regression analysis (P=0.006), there was no difference between them after logistic regression analysis (P=0.34).

There was a significant difference between the two groups in the number of partners before and after the logistic regression analysis with a P=0.001 (Table 1). Also, there was no significant difference between the groups in addiction (P=1), having a tattoo (P=0.054), unprotected sexual activity (P=0.71), or having sex with sex workers (P=1). There were significant differences between cases based on being a victim of knife crime (P=0.02) and wet cupping therapy (P=0.005) (Table 1). However, logistic regression analysis did not find any relationships between the healthy and patient groups (Table 2).

Discussion

Sexually transmitted infections (STIs) are among the most common infections globally, with anogenital warts and gonorrhea having the highest incidence overal. This study aimed to evaluate the prevalence of anogenital warts and gonorrhea infection and their related factors in an Iranian population.

In the present study, the number of people suffering from anogenital warts was higher in men. This prevalence rate was approximately similar to that of human papillomavirus (HPV) infection in a systematic review performed in Iran, indicating that the overall prevalence of HPV infection was 9.4%.[4] Another systematic review showed that the overall prevalence of anogenital warts (AGWs) ranged between 0.2% and 5.1% worldwide.[6] In this study, the prevalence of the history of gonorrhea infection was also rated as 1.1%, which is higher than the global prevalence in 2012 which was reported as 0.8% and 0.6% in women and men, respectively.[16]

A recent study in China showed a concomitant gonorrhea infection in 2% of patients with AGWs, and the prevalence of gonorrhea infection was insignificantly higher in men.[17] This study also showed a significant correlation between being a male

and acquiring both anogenital warts and gonorrhea infection. The results for gonorrhea infection were inconsistent with prior research among five different countries that showed a female gender was associated with gonorrhea infection.[18] This inconsistency may be related to the fact that women, due to social shame or stigma, may not report their previous sexual disorders accurately, especially before getting married. Furthermore, gonorrhea infection may not show any symptoms in women.[7] In a systematic review, the overall prevalence of anogenital warts has been higher in males gender;[6] their results were similar to our findings that showed a significantly higher prevalence in male groups.

Some studies have been conducted regarding the most vulnerable age group for anogenital warts or gonorrhea infection . A study has indicated a higher prevalence of gonorrhea infection between 14-25 years among all the age groups.[19] These results are also consistent with AGWs. A prior study in Iran showed most of the patients with anogenital warts were between 15-25 years old.[14] Although the patients' mean age was higher than healthy people in our study, we could not find any significant relationships between age and development of the diseases.

Many studies have considered several sexual partners as a significant risk factor in developing sexually transmitted infections. For instance, in a survey that included nine different countries, there has been a strong association between lifetime sexual partners and developing any type of HPV infection. However, this relationship was not linear. They also showed that even extramarital relationships of the patients' spouses could positively affect their partners in developing HPV.[15] We showed that the number of sexual partners before marriage was the most potent risk factor for developing anogenital warts or gonorrhea infection compared to other factors after adjusting.

Regarding education and developing sexually transmitted diseases, some studies found a positive correlation between higher education and developing anogenital warts.[11, 20] In our study, we could not find any relationships between the level of education and acquiring anogenital warts or gonorrhea infection. Although we did not find any relationship between the level of education in the two groups, the specific training programs in the educational system can affect the people in their sexual behaviors. A study shows that self-care training programs about sexually transmitted diseases can change sexual attitude, knowledge, practice, and behavior in vulnerable cases.[21] Regarding the high-risk sexual behaviors, in our results, being the victim of knife crime did not have any significant relationship with acquiring anogenital warts or gonorrhea infection after regression. We could find just one study by Buffardi et al.[13] on the relationship between STIs and crime victims. However, they demonstrated that being a crime victim is related to a higher prevalence of specific STIs such as HPV and Gonorrhea. Although many studies have investigated a positive relationship between inconsistent condom use and catching STIs,[13, 22] we did not find any differences in unprotected sex between the healthy and diseased groups after regression. These differences in our results could have been related to not remembering to report every high-risk sexual contact without a condom in our participants.

This study showed that wet cupping therapy on the back, a traditional remedy in some cultures, was not related to getting the diseases after logistic regression analysis. At this time, we did not find any similar study for such a relationship, and the gap in this part should be filled with further reflections on any possible relationship between this traditional remedy and getting sexually transmitted infections.

In this study, there was no significant correlation between anogenital warts and gonorrhea infection with addiction, tattooing, and history of sex with commercial sex workers. Buffardi et al.[13] also did not find any relationship between STIs and history of drug abuses. In another study published in 2012 by Heywood et al.[23] who worked on demographic and behavioral patterns of tattooing, there was no higher prevalence of STIs in the tattooed population after adjustment for other confounders. In another study on HPV infection prevalence before and after the intercourse among the male clients of commercial female sex workers, similar to our research, there was not any significant relationship between this sexual behavior and the prevalence of HPV infection.[24]

Conclusion

Due to the high burden of sexually transmitted infections and their severe effects on an individual's life, their risk factors and appropriate ways of managing them should be thoroughly investigated in each geographical area. Also, specific age-related training programs should be available for young and adults in the educational system to enhance the insight into STIs and their risk factors.

Limitations

The limitation of our study was that the participants might not have given the exact information about their previous sexual behaviors, possibly due to a social stigma about the number of sexual partners before marriage and a history of sexual infections in Iran. The data of HPV serotypes were also not enough to be evaluated and analyzed. Another limitation of this study was that the patients were voluntarily coming to the office of our physician and might have had high-risk behaviors or

symptoms of genital infections that prompted them to visit the office.

On the other hand, the selected group were all those who wanted to get married soon, which can affect the results due to possible social and habitual differences compared to the single ones. Nevertheless, none of our samples was from the LGBTQ+ community, which possibly has a great effect on the final results. We highly recommend using a more randomized sampling method covering all types of patients with variable sexual desires in future studies.

Informed Consent: Informed consent was obtained from the subject(s) and/or guardian(s).

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Conflicts of interest*:* None declared.

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