

The prevalence of *Trichomonas vaginalis* infection among patients that presented to hospitals in the Kermanshah district of Iran in 2006 and 2007*

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Aim: To determine the prevalence of *Trichomonas vaginalis* (Tv) among women that presented to hospitals in the Kermanshah district of Iran in 2006 and 2007.

Materials and methods: This retrospective study included 33,690 women that presented to primary pathology laboratories in Kermanshah. Vaginal and cervical swabs were collected, and then stained with Papanicolaou (Pap) stain. Additionally, seasonal variations in the prevalence rate were compared to identify significant differences in the prevalence of Tv according to season.

Results: Among the 33,690 women, 300 were infected with Tv (a prevalence rate of 0.9%). The 30-39-year-old age group had a significantly higher prevalence of infection (33.0%; $P < 0.05$) than the 20-29-year-old (29.0%) and 40-49-year-old age groups (21.0%; $P > 0.05$). The lowest rates of infection were observed in those <20 years of age (5.6%) and >50 years of age (11.4%; $P > 0.05$). According to the seasonal distribution of Tv, winter (22.0%), autumn (20.6%), and spring (26.0%) were similar. The prevalence rate of Tv in summer was significantly higher than during the other seasons ($P < 0.05$).

Conclusion: The prevalence of Tv positivity was low in the present study. The majority of infected individuals were aged 30-39 years and sexually active.

Key words: Trichomoniasis, Pap smear, season, Iran

Introduction

Trichomonas vaginalis (Tv) is a parasitic protozoan that infects the genitourinary tract and produces the most common curable sexually transmitted disease (STD) in sexually active women in all age groups (1). Globally, trichomoniasis affects approximately 57-180 million people, with the majority living in developing countries (2,3). It is predominantly spread via unprotected intercourse with an infected partner, but might be also spread via the fingers after masturbation (2).

Potential sequelae of this STD in females include pelvic inflammatory disease (4), ectopic pregnancy, premature labor (5), tubal factor infertility (6), adverse pregnancy outcomes (7), reproductive tract infection (8), and the potential for an increase in the risk of both the transmission and acquisition of human immunodeficiency virus (HIV) (9). Additionally, investigators have reported epidemiologic associations between *Trichomonas* infection and subsequent cervical neoplasia and carcinoma (10,11).

Different diagnostic techniques, including wet mount preparation, culture, staining, serological tests (e.g. ELISA, IFA), and molecular-based techniques are used for the diagnosis of trichomoniasis

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(12,13). In this sense, the conventional Pap smear examination, which is widely used for the diagnosis of trichomoniasis, is rapid and economical. Studies show that the Pap smear has a sensitivity of 60%-70% in detecting the protozoan in an adequately prepared smear (14). Treatment of vaginal trichomoniasis is recommended if Tv is detected with a Pap smear (15).

The prevalence rates of Tv in some regions of Iran have been reported to range from 3% to 26% (13,16). The aim of the present study was to determine the prevalence of Tv among women that presented to hospitals in the Kermanshah district of Iran, as well as the age of affected individuals and seasonal distribution of the disease.

Materials and methods

Study population

The study included 33,690 women aged 10-65 years that presented to the Kermanshah University of Medical Education Clinical Pathology Laboratory, Mehr Pathology Laboratory, and Health and Medical Education Vahdat Center Pathology Laboratory in Kermanshah province, southwest Iran (34°18'N, 47°3'E and 1420 m above sea level), due to symptoms and/or signs of genital tract infections, cancer screening, or for contact tracing in 2006 and 2007. The year was divided into the 4 seasons based on the Iranian calendar: winter (21 December-21 March), spring (21 March-21 June), summer (21 June-21 September), and autumn (21 September-21 December). The Medical University of Kermanshah Ethics Committee approved the study protocol.

Parasitological methods

Swab samples were collected from the posterior vaginal fornix in each woman for wet mount preparation (Papanicolaou-stained films). Cervical samples were collected using a wooden spatula during pelvic examinations. Fresh, thin Papanicolaou (Pap) smears were prepared for each sample and examined by a qualified specialist. Motile and dead organisms were observed microscopically. The distribution of Tv among according to age range and season was compared using the t-test and SPSS v.16.0. P values below 0.05 were considered significant.

Results

Among the 33,690 women, 300 (0.9%) were infected with Tv in 2006 and 2007. Distribution of Tv infection according to age is shown in Figure 1. The 30-39-year-old age group of had the highest prevalence of infection (33.0%), which was significantly different, as compared to the other age groups ($P < 0.05$). The 20-29-year-old age group had the second highest rate of infection (29.0%), which was significantly different ($P < 0.05$) than that in all other age groups, except the 40-49-year-old age group (21%). The 40-49-year-old age group had a significantly ($P < 0.05$) higher Tv infection rate than the <20- and >50-year-old age groups. The Tv infection rate was lower in the <20-year-old age group (5.6%) than in >50-year-old age group (11.4%; $P > 0.05$).

The 2006-2007 seasonal distribution of *T. vaginalis* prevalence was not consistent and a clear trend was not observed (Figure 2). Winter (22.0%), autumn (20.6%), and spring (26.0%) had similar prevalences ($P > 0.05$), whereas summer (31.4%) and spring (26.0%) did not. The prevalence rate of Tv in summer was significantly ($P < 0.05$) higher in than the other seasons.

Discussion

The total *T. vaginalis* prevalence rate of 0.9% observed in the present study is below the broad range

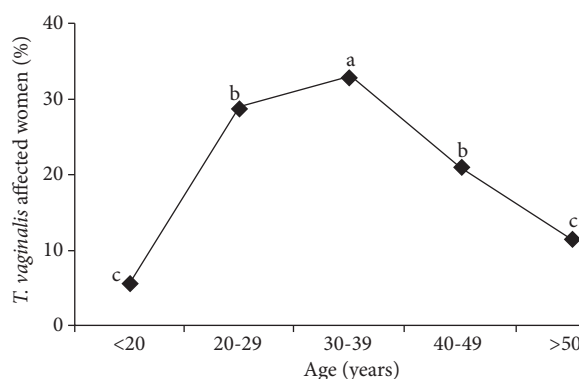


Figure 1. The percentage of *T. vaginalis* affected women in segregated age groups for Kermanshah in 2006 and 2007. Values with different superscripts are significantly different ($P < 0.05$).

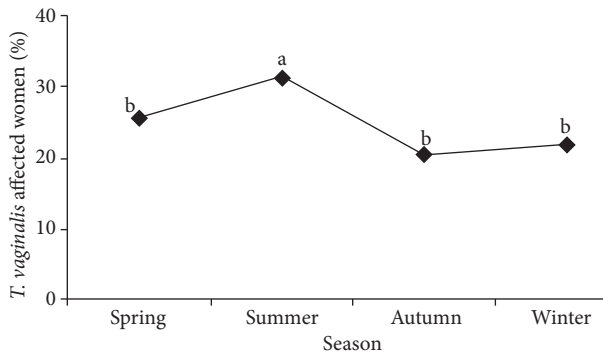


Figure 2. Seasonally distribution of *T. vaginalis* in 2006 and 2007. Values with different superscripts are significantly different ($P < 0.05$).

previously reported for developing countries. In Nigeria an overall trichomoniasis prevalence of 2.6% in women aged 15-64 years was reported between January 2006 and October 2007 (12), while prevalences in Asian studies were as follows: 2.9% in Chinese women aged 36.3 ± 6.84 years (17), 18.2% in Palestinian women aged 16-50 years (2000-2006) (18), 25% in state-regulated prostitutes in Turkey (19), and 28.1% for all sexual transmitted diseases between January 1995 and December 1999 in Saudi Arabia (20). Possible explanations for the very low prevalence of Tv in the present study may be related to male circumcision.

In a prospective study of American male partners of women infected with Tv, Sena et al. reported that uncircumcised men were almost twice as likely to be infected with Tv (21). There is also evidence that male circumcision reduces Tv transmission to female partners. A recent randomized study on HIV-discordant heterosexual couples conducted in Rakai, Uganda, reported that the rate of Tv infection among the partners of participants in the intervention arm of the study was reduced by almost half (22).

Muslims are the largest religious group that practices male circumcision. In Iran the general practice is to circumcise boys born in hospital a few days before discharge, whereas those born outside hospitals are circumcised between 3 and 7 years of age. Hence, the lower infection rate of trichomoniasis among the women in the present study, as compared to previously reported rates, may have been related to universal male circumcision in Iran.

Trichomoniasis is commonly associated with patients under 25 years of age that are more sexually active than older women (23,24). In the present study the highest prevalence of Tv (62.0%) was observed in the 20-39-year-old age group, versus the lowest rate of 5.3% in the <20-year-old age group, which might have been due to marriage. The age of marriage in Iran is usually >20 years; therefore, sexual activity may have contributed to the high prevalence rate via legal marriage. Among the sexually active women in the present study, more women in the 30-39-year-old age group were infected than in the 20-29- and 40-49-year-old age groups.

Sexually transmitted disease awareness programs that mass media targeted at the younger generation might have contributed to the lower prevalence observed in the 20-29-year old group. Overall, half of all the women affected were in the 30-49-year-old age group. These older women might have lacked knowledge about health issues, might have lacked the confidence to correctly identify problems, and might have used traditional medicine rather than modern treatment; women in Iran are especially prone to adhere to traditional customs.

Neilson (25) reported an increase in the frequency with which Tv was cultured during autumn (September, October, and November) in Copenhagen. Between 1972 and 1976 the maximum and minimum seasonal incidence of trichomoniasis in Scottish women was reported in winter and summer, respectively (26), whereas Shrader et al. (27) reported that there was no seasonal difference in the detection of Tv using routine Papanicolaou smears.

The dissimilarity between the patterns of seasonal variation in the present study (the significantly highest Tv infection rate was in summer and the non-significantly lowest Tv infection rate was in autumn) may have been related to seasonal differences in presentation to the pathology laboratories, greater use of public swimming pools and baths during the warm seasons, and differences in the methodologies used to detect the organism. Additionally, differences in socioeconomic status and the level of knowledge about STDs among the participants, and abiding to traditional moral guidelines by avoiding sexual intercourse with anyone other than a spouse may have contributed to the observed seasonal differences in

the prevalence of Tv. However, there are other proven and possible methods of spread. *Trichomonas* can thrive in moist environments; thus, it can survive for up to 45 min on wet (soiled) clothing, in bath water, and on toilet seats (28). Thus, although *trichomonas* is recognized as a venereal urogenital infection, non-venereal transmission can occur.

In conclusion, the results of the present study suggest that gynecological disease prevention programs are needed. Clinicians, therefore, should inform the general population about STD prevention. The present findings suggest that clinic-, community-,

and school-based STD prevention programs may benefit Kermanshahi females by addressing the risk factors for *T. vaginalis* infection.

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