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RESEARCH ARTICLE

Epidemiological Study of Trichomonas vaginalis Infection among Iraqi Women

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Abstract

Trichomoniasis is a common sexually transmitted disease (STD) caused by *Trichomonas vaginalis*. The current study was conducted during the period from February 2013 to April 2014 to investigate the epidemiology of trichomoniasis in Iraqi women. A total of 154 women of different ages were enrolled in this study. Two vaginal swabs (one for direct microscopical examination and the other for culturing) and a blood sample were collected from each woman. A consent form which included age, area of residence, educational level and socioeconomic status, in addition to the symptoms were obtained from the participants.

Wet mount examination and culturing revealed 13.63% and 34.41% infection rate with trichmoniasis respectively. Based on culturing method, age class of 25-34years had the highest rate of infection (49.01%); while infection among urban resident (30.2%) was lower than that of rural (41.37%). Women with primary educational level and low economic status showed higher prevalence of trichomoniasis (44.9% and 44.6% respectively) than other levels and statuses.

About 83% of the studied women had joint pain, while 73.58% of them had profuse vaginal discharge. Other less frequent symptoms; dysuria, malodor, vulvular itching, and cervical abnormalities represented 67.92%, 62.26%, 58.49% and 41.5% respectively. However, 11.32% of infected women were asymptomatic.

These results indicate the high prevalence of trichomoniasis among Iraqi women which should sound the alarm for the official institution to take their efforts against this STD.

Introduction

Trichomonas vaginalis is a human pathogen that causes the most common, non-viral STD in the world, infecting 248 million people yearly according to WHO estimates, with the majority living in developing countries (WHO, 2011). Trichomoniasis (the disease caused by *T. vaginalis*) affects both men and women; however, it causes symptomatic disease almost exclusively in women (Adegbaju and Morenikeji, 2008). Rationally, it is likely that up to 25 million pregnant women globally are infected with trichomoniasis (WHO, 2012).

Trichomoniasis is also considered as a biological marker triggers an evaluation for other STD (Schwebke and Burgess, 2004). Potential sequelae of this STD in females include tubal factor infertility (Wiwanitkit, 2008), and cytological abnormalities of the cervix *(*Donders *et al.*, 2013). The public health importance of the problem is underscored by the fact that the *Trichomonas* infection is prevalent in reproductive age women with serious adverse

reproductive outcomes (McMlelland, 2008). The outcome of infection with *Trichomonas* varies depending on many factors among which genetic variability of the isolates and the host immune response (Imam *et al*., 2007).

Local epidemiological studies on this protozoan reported wide ranges of prevalence. High rates of 21% and 20.11% were reported by Saba (2004) and AL-Zaiadi (2004) respectively. Much less than these rates (9.46% and 6%) were also recorded (Al-Mahdawy, 2006; Edan, 2007), and even some workers reported as low as 3.9% and 2.4% (Al-Rawi, 1993; Al-Saeed, 2011).

Isolation and identification of *T. vaginalis* are still an issue in many laboratories in Iraq. This is usually because of the limited facilities and insufficient experience of workers in these laboratories. This study aimed to determine the prevalence of *T. vaginalis* among Iraqi women and its relation to number of variables as age, residence, socioeconomic status and educational level as well as with the symptoms.

Materials and Methods

Two vaginal swabs and blood samples were collected from symptomatic and asymptomatic women. Vaginal swabs were collected from women who were placed in a lithotomy position and the sterile metal speculum was inserted into vagina without any lubricant or solution. Swabs were taken from the posterior fornix and managed as follows:

1-The first one was obtained from the lateral wall of vagina and placed in tube containing 0.5 ml physiological saline solution (0.9% NaCl) for wet mount examination. The tube was carried to the laboratory, then gently shaken and a slide was prepared for immediate examination under light microscope using 10X and 40X objectives to detect the motile organism. At least 20 fields were examined to recognize the motile trichomonads (Garcia, 2007).

2-The second swab was pressed between the In-Pouch TV System media (Biomed Diagnostics, USA) walls. Then the swab discarded and the top edge of In-Pouch media chamber was folded down and rolled three times. A wire tape was folded at the end tabs behind the pouch, and the In-Pouch medium was incubated at 37 °C for three days. The culture was examined every day for three successive days before being considered negative (Kreiger, 1995). Blood samples were dispensed in a plain tube for erythrocyte sedimentation rate (ESR) test.

A questionnaire was used to collect data about socio-demographic status including age, area of residence, educational level and socioeconomic status of women, in addition to the symptoms. The study was approved by the ethical committee of the College of Medicine/ Al-Nahrain University.

Statistical analysis

Prevalence of infection was compared between different variables by Chi-squared test. Significance was attributed to probability values $P \leq 0.05$. Computer SPSS and Microsoft excel programs were used for determination of probability values.

Results and Discussion

Of the 154 women examined 53 (34.41%) were found to be infected with *T. vaginalis* by In-Pouch TV culture with sensitivity and specificity 100%, and 21(13.63%) by wet mount. Symptoms alone are not sufficient to make reliable diagnosis of *T. vaginalis* infection.

Although wet mounts are routinely performed for this purpose, this technique has a sensitivity of 50 to 80% (Pattullo *et al*., 2009). Diagnosis is further complicated by the fact that as many as 50% of *T. vaginalis* infected women are asymptomatic (Sutton *et al*., 2007). The culture method was used in this study because it is the "gold standard" against which the performance of other diagnostic methods is compared (Borchadt and Smith., 1991).

Noticeable disparity in the prevalence of *T. vaginalis* could be observed in different areas of residence in Iraq; Saba (2004) found an infection rate of 21% in Baghdad by In-pouch method and 7% by wet mount, while in Dohok, a prevalence of 5.4% by Diamond culture media and 2.4% by wet mount were recorded (Al-Saeed, 2011). In Babylon, Al- Quraishi found 27.48% by staining method (Al-Quraishi, 2014), and Al-Hadraawy (2013) found 11.77% by culture and 10.88% by wet mount in Al-Najaf. A prevalence rate of 34.41% was found in this study which is higher than all that recorded in previous studies in Iraq. Furthermore, this prevalence rate is higher than other findings in neighboring countries. In Palestine prevalence of *T. vaginalis* among women using culture technique was 13.6% (Houso *et al.*, 2011). Using the same technique, Matini *et al.* (2012) reported only 2.1% prevalence among Iranian women, while in Turkey it was 8.69% by wet mount (Tamer *et al*., 2009). These differences in prevalence could be explained on the basis of differences of environment, social, and cultural factors.

Regarding the age, women aged 25-34 years had significantly higher prevalence (49.01%) than others age classes (table 1). This result agreed with Mitchell *et al*. (2014) that *T. vaginalis* infection was significantly associated with older age compared to those aged 20-24 years. Beside monarch women, there were 6 (11.32%) menopausal women with trichomoniasis. Many authors reported such incidence in menopause women although less than current study. In Vietnam it was 8.7% (Anh, 2010), while in Turkey, 10% menopausal trichomoniasis patients

was recorded (Akarsu, 2006). Older age seems to be a risk factor for *T. vaginalis* infection (Crosby *et al.,* 2002; Leon *et al.,* 2009). The increased prevalence of infection in older women may indicates a long standing infection that does not naturally resolve and that is likely missed by screening programs attentive on younger women (Sutton *et al*., 2007).

The study revealed that women with primary education have the highest percentage (44.9%) although the differences from illiterate women was insignificant. In contrary, previous studies in Baghdad and Al-Najaf showed that the uneducated women (illiterates) were more associated with the disease than other age classes (Saba, 2004; Al-Hadraawy, 2013). However, there is at least an agreement between the current and previous studies about the low infection rate in women who have higher educational level (Saba, 2004, Annang *et al.,* 2009).

Based on family income, we have observed that low socioeconomic status had the highest rate (44.6%) followed by high status (37.5%), and finally the moderate status (24.6%). These results disagreed with Kaur *et al*. (2008) that 90% infected women belonged to middle and lower socio economic status, while only 10% were from upper socio-economic status. This disparity can be partly explained by the number of samples used for study as this study used much less patients than that enrolled by the last study.

In rural residence, the infection rate (41.3%) was insignificantly higher than infection rate in urban (30.2%). This did not agree with Al-Quraishi (2013) in Babylon, probably because of the difference between the city and countryside in lifestyle and the *T. vaginalis* mainly affecting people living in poor or disadvantaged communities.

Table 1: Prevalence of *T. vaginalis* in women with different ages, educational levels, socioeconomic classes and residence.

Variable	No. of cases	Positive cases	X^2	P- value	OR(95% CI)
Age groups (years)					
15-24	25	6 (24%)			1.0
25-34	51	25 (49%)	4.348	0.037	3.045 (1.045-8.873)
35-44	55	14 (25.45%)	0.019	0.889	1.081 (0.360-3.249)
45-54	23	8 (34.78%)	0.674	0.412	1.689 (0.481-5.933)
Educational levels					
Illiterate	25	9 (36%)			1.0
Primary	72	32 (44.9%)	0.542	0.461	1.422 (0.556-3.64)
Secondary	36	7 (19.4%)	2.090	0.148	0.429 (0.134-1.370)
Higher education	21	5 (23.8%)	0.801	0.376	0.556 (0.152-2.0290
Socioeconomic classes					
Low	65	29 (44.6%)			1.0
Moderate	73	18 (24.65%)	6.098	0.014	0.406 (0.197-0.837)
High	16	6 (37.5%)	0.265	0.607	0.745 (0.242-2.292)
Residence					
Urban	96	29 (30.2%)			1.0
Rural	58	24 (41.37%)	1.999	0.157	1.631 (0.826-3.220)

OR: Odds Ratio; CI: confidence interval; p: probability

Note: married women have a stable sexual partner. Socioeconomic classes are determined based on the family income, the level of education, and profession.

Presence of clinical symptoms helps, but not sufficient, in the diagnosis of trichomoniasis. The symptoms experienced by women participating in this study are summarized in Chart 1.Women with joint pain showed significantly higher percentage (83.01%) than other symptoms: vulvular itching, malodor, profuse discharge, cervical abnormalities and dysuria, which represented 58.49%, 62.26%, 73.58%, 41.5%, 67.92% respectively. Women with no clinical signs represent the lower percentage of cases (11.32%).

Reactive arthritis associated with protozoal infection is considered rare cases. The microorganisms most frequently implicated are enteric or genitourinary infectious agents as *T. vaginalis*, This infection usually precedes arthritis by a month (Tejera *et al.,* 2012). The pathogenesis of *T. vaginalis* leading to the most aforementioned symptoms is somehow obvious; however, the relationship between this infection and arthritis is not so clear. It is believed that the adhesion of *T. vaginalis* to vaginal epithelial cells (VECs) plays an important role in the

pathogenesis of this parasite (Arroyo *et al*., 1992). Han *et al*. (2012) showed that the inflammatory mediators made by VECs in response to *T. vaginalis* activate and attract masts cells and neutrophils. Thus, the involvement of joints in trichomoniasis could be attributed to the role of activated mast cells in autoimmune inflammatory arthritis via their tryptase/heparin complex (Shin *et al*., 2009).

Beside the joint pain, we evaluate the ESR values for patients as a confirmatory parameter for the involvement of joints. Average ESR value was 60.03± 18.14 mm/h (range 16-104 mm/h) and it is higher than normal value according to the formula devised in 1983 (Miller and green, 1983). Thus, joint pain, especially knee joint and lower back, can be used as additional indicator for trichomoniasis.

T.vaginalis infection is also associated with the cervical cytological abnormalities (Donders *et al.*, 2013), which renders this protozoan as a risk factor for cervical dysplasia and cancer (Gram *et al*., 1992; sayed el-ahl *et al*., 2002). However, this hypothesis is still a debate issue. Cervical abnormalities in our study appeared in 41.5% of examined women. These women should be followed up to confirm the claim of the association of *T. vaginalis* infection and the occurrence of cervical cancers.

The results of the current study sound alarm for the high prevalence of STDs, and this requires the cooperation of different efforts in either in health sector or other public sectors to increase the awareness about the risk of these STDs and how to control their transmission.

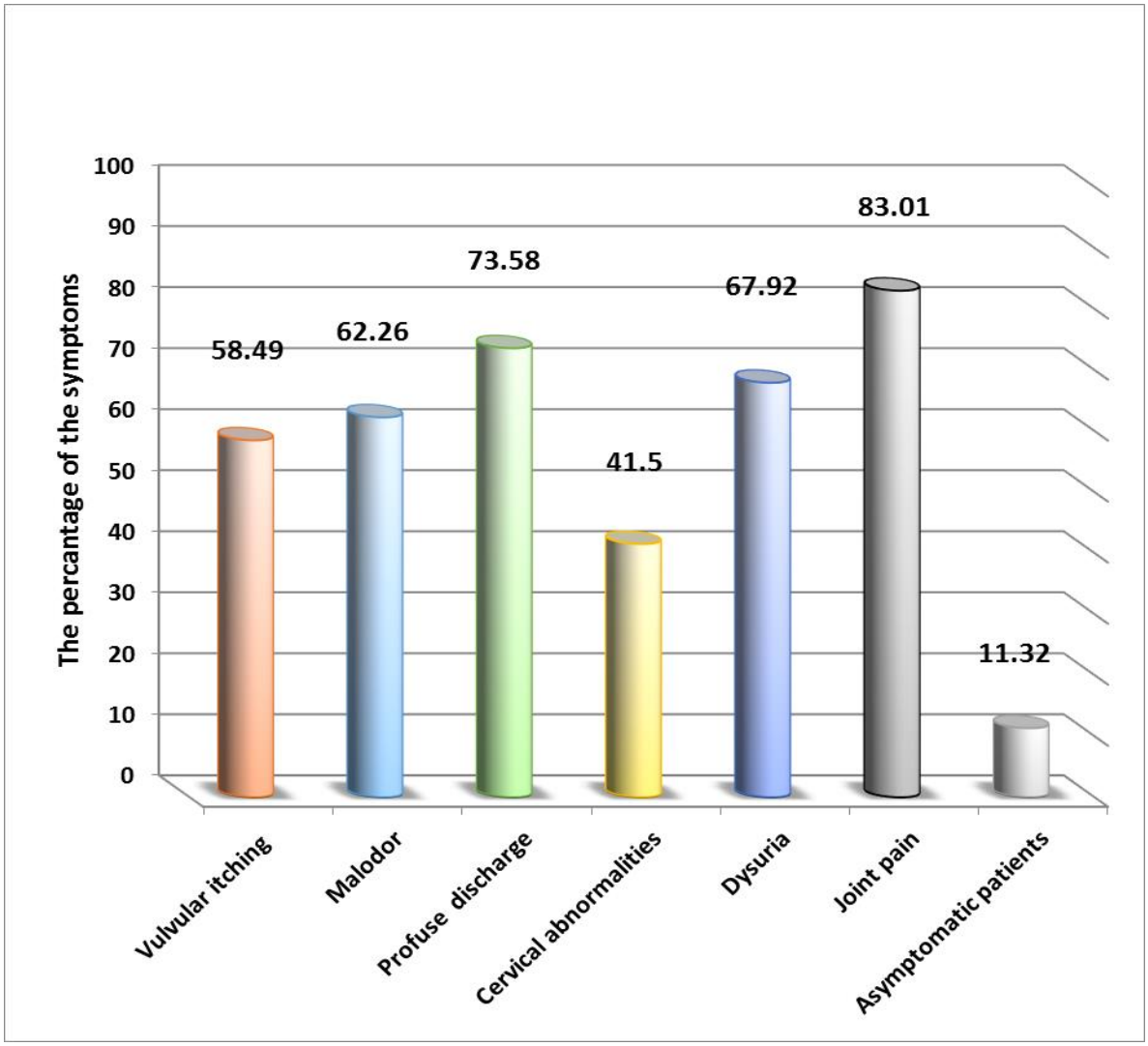

Chart-1 Frequency of symptoms in trichomoniasis patients

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