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Some Clinical Features of Trichomoniasis Associated with Pelvic Organs Tenderness in Sample of Iraqi women

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ABSTRACT

Background: Trichomoniasis resulted in negative health issues that may be connected to infertility and pelvic inflammatory disease. **Objectives:**This study aimed to find an evidence of a link between *T. vaginalis* and various pelvic organs, such as adnexal, cervical, and vaginal erythema, friability, and mucopurulent discharge.

Patients and methods: One hundered and sixty married women who visited some private clinics in Baghdad between October 2020 and February 2021 were included in the study. Lower abdominal pain and vaginal discharge were both present in all of these women. The women were split into two groups: those with pelvic inflammatory disease (PID) (n=41) and those without (n=119). All woman had pelvic and vaginal organs examination and vaginal swabs were obtained.

Results: The research showed a strong association between *T. vaginalis* and pelvic inflammatory illness ($P<0.05$). The results showed that vaginal erythema (60%) and other symptoms such as cervical friability (21.7%), cervical motion discomfort (13.3%), and adnexal tenderness (26%), were not significantly associated to *T. vaginalis* positive diagnosis. While the correlation between *T. vaginalis* positivity and mucopurulent discharge was significant ($P< 0.05$).

Conclusions: This research provided information on several clinical traits of trichomoniasis in women with PID. *T. vaginalis* was very predictable among adult female who had PID.

Keywords: Pelvic inflammatory disease, Pelvic organs tenderness, Trichomoniasis, *Trichomonas vaginalis.*

INTRODUCTION

Trichomonas vaginalis is the most widespread sexually transmitted disease (STD) in the world and the primary cause of trichomoniasis. [(1)]. It was residing in the human urogenital track, which adhere to the vaginal epithelial cells in women and in urethra of men [(2)]. In women, the infection was ranging from non-symptomatic to severe vaginitis, whereas the man has asymptomatic infection there for screening for the parasite is very important [(3)]. The symptoms of the infection presented with yellowish-green frothy discharge, itching with bad odour and associated with adverse health problem, and infertility in women while the infection was rarely associated with prostatitis and decrease sperm viability in man [(4)]. The parasite has recently received more attention after WHO estimates in 2016, that the infection rate was increased with 276 million new cases annually [(5)]. The true prevalence of trichomoniasis was not well recognized and affected by the surveyed population, time, and area of the study [(6)]. Trichomoniasis was highly associated with pelvic inflammatory disease and increased acquisition and shedding of HIV infection [(7)]. The correct detection and successful clinical management of STDs is an energetic approach for improving reproductive and sexual health protection [(8)].

Many studies have suggested significant relation between acute endometritis and *T. vaginalis*, *C. trachomatis* as well as *N. gonorrhoea* infection [(9)]. *T. vaginalis* has the ability to change the state of the reproductive tract and is likely associated with adverse health complications and PID when colonized with other STD [(10)]. The parasite may develope erythema in the vaginal and cervical walls as well as strawberry cervix diagnosed in 2% of infected women [(4)]. Mucopurulent cervicitis was detected in 22% of women in which the parasite isolated from the vaginal epithelium of reproductive track [(11)]. Furthermore, there was a relation between *T. vaginalis* and bacterial vaginosis infection with the cervical friability as well as cervical motion tenderness [(12)]. Pelvic examination and laboratory diagnosis showed significant association of *T. vaginalis* infection and other STD with the vaginal bleeding, cervical motion tenderness, and adnexal tenderness [(13)]. Speculum screening with laboratory detection of the *T. vaginalis* and other STD is an effective way to ovoid the infection [(3)]. Limited investigation on the relation between trichomoniasis associated with clinical suspected PID [(14,15)]. So the aim of the cuuren study was to assess the clinical examination sorts of trichomoniasis in adult females who had pelvic inflammatory disease and identify the possible effect of *T. vaginalis* infection on pelvic organs tenderness.

PATIENTS AND METHODS

Study design and patients

Vaginal swabs were obtained from 160 married, non-pregnant women who visited a few gynecology private clinics in Baghdad between October 2020 and February 2021. They either simply experienced vaginal discharge symptoms or experienced both vaginal

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discharge and lower abdominal pain. Their ages ranged from (16-54 years), with a mean age of 31.56 ± 7.7 years. Gynaecologists applied the routine gynaecological examinations. A questionnaire sheet for physical gynaecological examination were filled for reporting if there was any sickness in the pelvic organs for each woman. Pelvic Inflammatory Disease (PID) group (n=41) and non-PID group (n=119) were the two groups made up of all participants.

Vaginal and pelvic organs examination

Vaginal examination was done using sterile metal Cusco-speculum. Gynaecologist reported if there was any erythema in the vaginal and cervical wall. Gynaecologist also identified if there was yellowish green exudate from the endocervix (mucopurulent discharge). This discharge is associated with lower genital tract inflammation ([16,17]). Bimanual examination of the adnexa was done by inserting gloved fingers to the lateral side of the cervix, with pressure applied towards the anterior abdominal wall, this examination indicated the presence of any acute tenderness [18]. In addition, gynaecologists reported if there was any pain during bimanual movement of the cervix and uterus which is associated with cervical motion tenderness [19]. The cervix was also examined if there was any ulceration or bleeding. Women were asked by the examiner if there was any pain upon intercourse or spot of blood between period, which is associated with cervical friability [20]. Physical exam skills are expected to remain essential to determine medical diagnosis, with recommended role of pelvic sonography in the examination of patients [18].

Sample collection

Using sterile cotton swabs, the sample was taken from the lateral and posterior fornices of the vagina. Direct application of the brush into 2 ml of sterile physiological saline followed by thorough mixing [1].

Laboratory examinations

A direct wet mount examination was carried out to identify the *T. vaginalis* motile trophozoites, and this done using Giemsa stained smears [1]. The Amsel method was used to identify bacterial vaginosis from vaginal secretions that had already been stained with Gram stain. The presence of three or more of the following criteria was required. A positive whiff test with a fishy odor, thin homogenous vaginal discharge, a high clue cell count in a Gram stain, and a pH > 4.5 [21]. Whiff test was done by mixing one drop of saline wet vaginal discharge with one drop of KOH 20% on glass slide. If amine odor generates, considered positive whiff test, which is associated with the presence of bacterial vaginosis or co infection. Then the slide should be examined microscopically under10x, 40x for the presence of pseudohyphae or budding yeast, yeast vaginosis was identified by homogeneous white cheese-like discharge with negative whiff test and pH level below 4.5 [22].

Ethical approval: An approval of this study was obtained from the University of Baghdad Academic and Ethical Committee. Women were told about the aim of the study. All the participants signed consent documents for participation in the study. The Declaration of Helsinki, the code of ethics adopted by the World Medical Association for studies involving humans, guided the conduct of this study.

Statistical Analysis

SPSS 16.0 was used for data analysis (SPSS Inc., Chicago, IL, USA). The chi-square test was used to analyze the data. Statistics were considered significant for P values ≤ 0.05. Statistical Analysis

For those data were represented in the result (table 1,2,3,4 and 5) if P values ≤ 0.05 considered significant.

RESULT

Infection rates of T. vaginalis in Women with PID

T. vaginalis had a 14.7% overall infection incidence, according to the findings.Women with PID showed high infection rate (24.39%) compared to non-PID women who showed less infection rate (10.92%) of *T. vaginalis*. There was a significant relation (P<0.05) between pelvic inflammatory disease and the occurrence of *T. vaginalis* infection.

Vaginal erythema

Total rate of vaginal erythema among all participants was (43.1%). The results revealed that vaginal erythema was higher in *T. vaginalis* posative group (60%) versus the *T. vaginalis* negative group (40.1%). Statistical analysis indiated no significant relationship (P>0.05) between vaginal erythema and the incidence of *T. vaginalis*. While, the prevalence of vaginal erythema was recorded to be higher among PID women. The majority 70% and 74.1% of PID-*T. vaginalis* posative and PID-*T. vaginalis* negative women respectively suffered from vaginal erythema. While only 53.8% and 30.1% of non PID-*T. vaginalis* posative and non PID-*T. vaginalis* negativewomen had vaginal erythema. Significant relation (P<0.05) was recorded between PID and vaginal erythema regardless *T. vaginalis* positive status (Table 1). On other hand, both PID and vaginosis affected the occurrence of vaginal erythema. The majority (85.7%), (75%) and (72.7%) of PID- *T. vaginalis* posative with vaginosis, PID- *T. vaginalis* negative with vaginosis and PID- *T. vaginalis* negative without vaginosis successively had vaginal erythema. While the minority of other groups suffered from vaginal erythema (Table 1). Significant differences were noticed between groups regarding vaginal erythema.

Table (1): The total infection rate of *T. vaginalis* infection and percentage of vaginal erythema in different groups

No.	Group	N	n (%) *T.vaginalis*	X^2 (P-value)
1.	PID women	41	10 (24.39%)	4.49 (<
	Non-PID women	119	13 (10.92%)	0.05)*
	Groups	**N**	**n (%) Vaginal erythema**	**X^2 (P-value)**
2.	All	160	69 (43.1%)	3.4(> 0.05)
	T.vaginalis positive women	23	14 (60%)	
	T.vaginalis negative women	137	55 (40.1%)	
3.	PID *T.vaginalis* positive women	10	7 (70%)	22.9 (< 0.05)*
	PID *T.vaginalis* negative women	31	23 (74.1%)	
	Non-PID *T.vaginalis* positive women	13	7 (53.8%)	
	Non-PID *T.vaginalis* negative women	106	32 (30.1 %)	
4.	PID *T.vaginalis* positive with vaginosis	7	6 (85.7 %)	36.9 (< 0.05)*
	PID *T.vaginalis* negative with vaginosis	20	15 (75 %)	
	PID *T.vaginalis* positive without vaginosis	3	1 (33.3%)	
	PID *T.vaginalis* negative without vaginosis	11	8 (72.7 %)	
	Non-PID *T.vaginalis* positive with vaginosis	10	6 (60 %)	
	Non-PID *T.vaginalis* negative with vaginosis	83	32 (38.5 %)	
	Non-PID *T. vaginalis* positive without Vaginosis	3	1 (33.3 %)	
	Non-PID *T. vaginalis* negative without Vaginosis	23	0 (0 %)	

* vaginosis groups (bacterial vaginosis, yeast vaginosis and co- infection).

Cervical friability

Cervical friability was detected in 12.5% of the total. Results revealed that *T. vaginalis* positive results were not related significantly (P>0.05) with the cervical friability, although the *T. vaginalis* positive group reported high prevalent rate of cervical friability (21.7%) versus (10.9 %) among *T. vaginalis* negativegroup. The occurrence of cervical friability was relatively higher in both PID-*T. vaginalis* positive and PID-*T. vaginalis* negative women, the occurrence rate was 30% and 38.7% respectively. While, only 15.3% and 2.8% of non-PID-*T. vaginalis* positive and non-PID-*T. vaginalis* negative women had cervical friability. Significant relation (P<0.05) was recorded between PID and cervical friability regardless *T. vaginalis* positive status (Table 2). PID and vaginosis were noticed to be associated with cervical friability among *T. vaginalis* positive and *T. vaginalis* negative women. No cervical friability was reported among non-PID *T. vaginalis* negative women who had no vaginosis. While, high occurrence rate of cervical friability was noticed among PID *T. vaginalis* negative with vaginosis (35%), PID *T. vaginalis* positive without vaginosis (33.3%) and PID *T. vaginalis* negative without vaginosis (45.4%). Statistical analysis indicated significant differences (P<0.05) between groups regarding the occurrence of cervical friability (Table 2).

Table (2): Percentage of cervical friability in in different groups

	Group	N	n (%)Cervical friability	X^2 (P-value)
	All	160	20 (12.5%)	
1.	*T.vaginalis* positive women	23	5 (21.7%)	2.09 (> 0.05)
	T.vaginalis negative women	137	15 (10.9 %)	
2.	PID *T.vaginalis* positive women	10	3 (30%)	31.4 (< 0.05)*
	PID *T.vaginalis* negative women	31	12 (38.7 %)	
	Non-PID *T.vaginalis* positive women	13	2 (15.3 %)	
	Non PID *T.vaginalis* negative women	106	3 (2.8 %)	
3.	PID *T.vaginalis* positive with vaginosis	7	2 (28.5 %)	33.5 (< 0.05)*
	PID *T.vaginalis* negative with vaginosis	20	7 (35 %)	
	PID *T.vaginalis* positive without vaginosis	3	1 (33.3 %)	
	PID *T.vaginalis* negative without vaginosis	11	5 (45.4 %)	
	Non-PID *T.vaginalis* positive with vaginosis	10	1 (10 %)	
	Non-PID *T.vaginalis* negative with vaginosis	83	3 (3.6 %)	
	Non-PID *T.vaginalis* positive without vaginosis	3	1 (33.3 %)	
	Non-PID *T.vaginalis* negative without vaginosis	23	0 (0 %)	

* vaginosis groups (bacterial vaginosis, yeast vaginosis and co- infection)

Mucopurulent discharge

Results showed that mucopurulent discharge was reported only in 47 (29.3%) out of 160 women. The mucopurulent discharge was noticed to be linked significantly (P<0.05) to *T. vaginalis* infection. Regardless PID grade, women with *T. vaginalis* infections were more likely to experience mucopurulent discharge, which occurred 47.8% of the time compared to only 26.2% of *T. vaginalis* negative women. Significant differences (P<0.05) were noticed between PID and non-PID women regarding the occurrence of mucopurulent discharge infection. All (100%) of *T. vaginalis* positive women and PID of *T. vaginalis* negative women with symptoms of mucopurulent discharge, while only 6% of non-PID *T. vaginalis* negative women had this symptom. As well as no women among non-PID *T. vaginalis* positive group was noticed to have mucopurulent discharge. PID was also correlated significantly (P<0.05) with mucopurulent discharge among PID regardless vaginosis and positive status of *T. vaginalis*. All (100%) PID *T. vaginalis* positive with vaginosis, PID *T. vaginalis* negative with vaginosis, PID *T. vaginalis* positive withou vaginosis and PID *T. vaginalis* negative without vaginosis had the symptoms of mucopurulent discharge. While the occurrence of mucopurulent discharge was recorded only in 10% and 6% of non-PID *T. vaginalis* positive with vaginosis and non-PID *T. vaginalis* negative with vaginosis respectively. As well as no cases were recorded to have mucopurulent discharge among non-PID *T. vaginalis* positive without vaginosis and non-PID *T. vaginalis* negative without vaginosis (Table 3).

Table (3): Percentage of mucopurulent discharge in in different groups

No.	Group	N	n (%) Mucopurulent discharge	X^2 (P-value)
	All	160	47 (29.3 %)	
1.	*T.vaginalis* positive women	23	11 (47.8 %)	4.4 (< 0.05)*
	T.vaginalis negative women	137	36 (26.2 %)	
	PID *T.vaginalis* positive women	10	10 (100 %)	
	PID *T.vaginalis* negative women	31	31 (100 %)	
2.	Non-PID *T.vaginalis* positive women	13	0 (0%)	136.7 (< 0.05)*
	Non-PID *T.vaginalis* negative women	106	6 (5.6%)	
	PID *T.vaginalis* positive with vaginosis	7	7 (100 %)	
	PID *T.vaginalis* negative with vaginosis	20	20 (100 %)	
	PID *T.vaginalis* positive without vaginosis	3	3 (100 %)	
	PID *T.vaginalis* negative without vaginosis	11	11 (100 %)	
3.	Non-PID *T.vaginalis* positive with vaginosis	10	1 (10 %)	132.7 (< 0.05)*
	Non-PID *T.vaginalis* negative with vaginosis	83	5 (6 %)	
	Non-PID *T.vaginalis* positive without vaginosis	3	0 (0 %)	
	Non-PID *T.vaginalis* negative without vaginosis	23	0 (0 %)	

* vaginosis groups (bacterial vaginosis, yeast vaginosis and co- infection)

Cervical motion tenderness

The occurrence rates of cervical motion tenderness are illustrated in table (4). Cervical motion tenderness was found only in 18 (11.2%) of the total participants. The results demonstrated relatively high occurrence 13% of cervical motion tenderness among *T.vaginalis* positive group compared to *T.vaginalis* negative who showed only 10.9 % occurrence rate of this symptom. Although, cervical motion tenderness was not related significantly (P>0.05) to trichomoniasis.

The results showed significant (P<0.05) differences between PID and non-PID women regarding cervical motion tenderness, which was recorded among 30% and 38.7% of PID *T. vaginalis* positive and PID *T. vaginalis* negative respectively. While, no cervical motion tenderness was recorded among non-PID *T. vaginalis* positive group. On the other hand, only 2.8% of non-PID *T. vaginalis* negative group had this symptom. A significant (P<0.05) differences were also noticed between PID and non-PID women regardless *T.vaginalis* infection and vaginosis.

The occurrence of cervical motion tenderness was as following: 28.5%, 45%, 33.3% and 27.2% among PID *T. vaginalis* positive with vaginosis, PID *T. vaginalis* negative with vaginosis, PID *T. vaginalis* positive without vaginosis and PID *T. vaginalis* negative without vaginosis respectively.

While, no cases of cervical motion tenderness were recorded among the non-PID groups except those who were non-PID *T. vaginalis* negative with vaginosis. Only 3.6% of them had cervical motion tenderness.

Table (4): Percentage of cervical motion tenderness in different groups

	Group	N	n (%) Cervical Motion tenderness	X^2 (P-value)
	All	160	18 (11.2%)	
1.	*T.vaginalis* positive women	23	3 (13 %)	0.08 (> 0.05)
	T.vaginalis negative women	137	15 (10.9 %)	
	PID *T.vaginalis* positive women	10	3 (30 %)	
2.	PID *T.vaginalis* negative women	31	12 (38.7 %)	36.1 (< 0.05)*
	Non-PID *T.vaginalis* positive women	13	0 (0 %)	
	Non-PID *T.vaginalis* negative women	106	3 (2.8 %)	
	PID *T.vaginalis* positive with vaginosis	7	2 (28.5 %)	
	PID *T.vaginalis* negative with vaginosis	20	9 (45 %)	
	PID *T.vaginalis* positive without vaginosis	3	1 (33.3%)	
	PID *T.vaginalis* negative without vaginosis	11	3 (27.2%)	
3.	Non-PID *T.vaginalis* positive with vaginosis	10	0 (0 %)	38.6 (< 0.05)*
	Non-PID *T. vaginalis* negative with vaginosis	83	3 (3.6%)	
	Non PID *T.vaginalis* positive without vaginosis	3	0 (0%)	
	Non PID *T.vaginalis* negative without vaginosis	23	0 (0 %)	

* vaginosis groups (bacterial vaginosis, yeast vaginosis and co- infection)

Adnexal tenderness

Adnexal tenderness occurred in 17.5% of the overall population. Six out of 23 (26 %) *T.vaginalis* infected women showed high occurrence rate of adnexal tenderness compared to 16 % in *T.vaginalis* negative group. Although, no significant (P>0.05) relation were found between *T.vagonalis* infection and the occurrence of adnexal tenderness.

On the other hand, significant differences(P<0.05) in the occurrence rate of adnexal tenderness between PID and non-PID women. The occurrence rates of adnexal tenderness were higher in PID *T. vaginalis* positive 50% and PID *T. vaginalis* negative 51% compared to low occurrence 7.6% and 5.6% among non-PID *T. vaginalis* posative and non-PID *T. vaginalis* negativegroup respectively. Both PID and vaginosis were associated with this symptom.

Significant (P<0.05) differences were noticed between groups regarding the occurrence of adnexal tenderness. High occurrence rates of this symptoms 71.4%, 55% and 45.4% were found in PID *T.vaginalis* positive with vaginosis, PID *T.vaginalis* negative with vaginosis and PID *T.vaginalis* negative without vaginosis respectively. While less or no cases were noticed in the other groups (Table 5).

Table (5): Percentage of adnexal in different groups

	Group	N	n (%)Adnexal tenderness	X^2 (P-value)
	All	160	28 (17.5%)	
1.	*T.vaginalis* positive women	23	6 (26 %)	1.3 (> 0.05)
	T.vaginalis negative women	137	22 (16 %)	
2.	PID *T.vaginalis* positive women	10	5 (50 %)	43 (< 0.05)*
	PID *T.vaginalis* negative women	31	16 (51.6 %)	
	Non-PID *T.vaginalis* positive women	13	1 (7.6 %)	
	Non-PID *T.vaginalis* negative women	106	6 (5.6 %)	
3.	PID *T.vaginalis* positive with vaginosis	7	5 (71.4 %)	52.1(< 0.05)*
	PID *T.vaginalis* negative with vaginosis	20	11 (55 %)	
	PID *T.vaginalis* positive without vaginosis	3	0 (0 %)	
	PID *T.vaginalis* negative without vaginosis	11	5 (45.4 %)	
	Non-PID *T.vaginalis* positive with vaginosis	10	1 (10 %)	
	Non-PID *T.vaginalis* negative with vaginosis	83	6 (7.2 %)	
	Non-PID *T.vaginalis* positive without vaginosis	3	0 (0 %)	
	Non-PID *T.vaginalis* negative without vaginosis	23	0 (0%)	

* vaginosis groups (bacterial vaginosis, yeast vaginosis and co- infection).

DISCUSSION

Trichomonas vaginalis was considered harmless microorganism until studying its role and pathogenesis as a sexually transmitted disease (STD) began to demonstrate [3]. Accurate diagnostic and successful treatment was the important strategies to control and manage the infection since the parasite related to pelvic inflammatory disease, infertility, and HIV infection [5]. The incidence of *T. vaginalis* infection was further common than *C. trachomatis* or *N. gonorrhoeae*. Therefore, routine screening is very important for sexual health protection [15].

In the existing study, the prevalence of trichomoniasis among PID women was higher (24.39%) compared to non-PID women (10.92%). These results agree with the finding **Wiringa *et al.*** [14] who reported the association of trichomoniasis with infertility and recurrent PID infection. These results also agree with **Reighard *et al.*** [16] who found significant relation between *T. vaginalis* infection with pelvic inflammatory disease in the upper genital track of infected women.

The results of the current investigation showed a substantial relationship between PID and vaginosis groups and vaginal erythema and T. vaginalis. The interaction of the parasite with the vaginal epithelial cell that caused damage and apoptosis to the vaginal tissue or due to the cytopathic effect of the parasitic proteases enzyme and other factors that may degrade the extracellular matrix and kill the host cell or the parasite adhesion associated with the inflammation and recruitment of the immune cell to the site could all be contributing factors to the high infection rate of vaginal erythema among women who have T. vaginal [4, 23, 24]. Several studies regarding the link of *T. vaginalis* infection with vaginal erythema in which the infection is associated with green frothy discharge and vaginal erythematous character (vulvar erythema, edema, and pruritus) usually are seen in speculum examination [25]. Furthermore, *T. vaginalis* infection caused vaginitis and vulvitis and may be associated with vaginal and cervical erythematous walls in symptomatic women [4]. Vaginal erythema was reported in 20% out of 296 women screened for routine pelvic examination to detect cervical infection [26]. The association of bacterial vaginosis with PID showed that 20% of women had edema, erythema, and purulent exudate in laparoscopic triad examination [27].

Our results presented significant relation among *T. vaginalis* infection, PID and vaginosis groups with the cervical friability. Women with cervical friability are likely to have the signs of cervicitis infection with endocervical purulent discharge, high leukocytes count (PMNs) in the cervix, and the presence of bleeding (friability in the cervix). Usually, cervicitis is a predictor sign of PID and related with chronic *T. vaginalis* or bacterial vaginosis infection [28]. The association of purulent discharge with cervical friability is considered the clinical sign of cervicitis detection. approximately 50% of the cervicitis cases are associated with sexually transmitted infections (STIs), while the remaining cases has unknown causes [29]. Several studies reported the association of cervical discharge, cervical friability, erythema, among women with *T. vaginalis* infection in 79 out of 104 [30]. Another study reported that women with *T. vaginalis* infection associated with bacterial vaginosis were most likely to have cervical exudate, cervical friability, pus on the cervical swab, spot of blood after sampling [12]. Cervicitis was recorded in (19.1%) of Kenyan women infected with *T. vaginalis* and bacterial vaginosis co-infection [28]. The majority of PID studies and the association of *C. trachomatis* and *N. gonorrhoeae* reported cervical friability among the surveyed population [31, 32].

Rendering to the Centre for Disease Control and Prevention (CDC), the clinical finding of the pelvic organ tenderness associated with the endocervical purulent (mucopurulent) discharge was considered the diagnostic sign of the cervicitis and PID detection. It is also associated with *T. vaginalis* and bacterial vaginosis infection [17, 33]. Previous studies detected the association of mucopurulent discharge with *T. vaginalis* in 82 and 21 out of 261 women for mucopurulent vaginal discharge and mucopurulent cervical discharge respectively [30]. Mucopurulent discharge was also reported in 35.7% among women who had *T. vaginalis* infection associated with bacterial vaginosis [34]. As well as, mucopurulent cervicitis was detected in 22% of women in which the parasite was isolated from the vaginal epithelium of reproductive track [11].

In the current study, there was significant relation between mucopurulent discharge and the presence *T. vaginalis* among PID and vaginosis groups. These results agree with the finding of [35, 36] who showed the association between PID and bacterial vaginosis with the occurrence of mucopurulent discharge.

No significant differences were noticed in the cervical motion tenderness, adnexal tenderness and the occurrence of *T. vaginalis* infection in the surveyed population. Usually, *T. vaginalis* infection is characterized by reduction of the significant count of *lactobacilli* and enhance the overgrowth of anaerobic microbiome. While, bacterial vaginosis impaired the cervical barrier by local secretion of enzymes which degrade cervical mucus. This impairment is associated with spread out the pathogen to the upper genital tract [17]. Moreover, the effect of several factors interaction was most likely to make risk groups. These interactions include association of *T. vaginalis* with

PID and vaginosis infection. Statistical analysis indicated significant correlation between PID *T. vaginalis* infection and vaginosis groups. Several studies looked the link of cervicitis and cervical motion tenderness among women with co-infection of *T. vaginalis* with bacterial vaginosis infection [(12)].

In this study, *T. vaginalis* was high predictable among women with PID. We needed more consideration with more investigation since none has detected the relation between trichomoniasis and clinical features of pelvic examination in Iraq.

CONCLUSION

In women with pelvic inflammatory illness, trichomoniasis was strongly correlated and predicted. Regarding this problem in Iraq, more research is necessary. The sample size of participants and the sample collection from the gynecology private clinics were limitations of the current study.

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