

A PREVALÊNCIA DO PARASITA *TRICHOMONAS VAGINALIS* ENTRE MULHERES EM ALGUMAS REGIÕES DA PROVÍNCIA DE MAYSANTHE PREVALENCE OF *TRICHOMONAS VAGINALIS* PARASITE AMONG WOMEN IN SOME REGIONS OF MAYSAN PROVINCE

معدل انتشار طفيلي المشعرات المهبليّة بين النساء في بعض مناطق محافظة ميسان

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## RESUMO

*Trichomonas vaginalis* é um protozoário parasita flagelado extracelular. Ele se adapta para viver em condições anaeróbicas da vagina da mulher e causa tricomoníase que é uma doença sexualmente transmissível (DST) não viral. Esse parasita se espalha em todas as regiões do mundo, e a taxa de prevalência global da tricomoníase vaginal em mulheres é maior do que em homens. No Iraque, é considerada uma doença negligenciada, pois há poucos estudos sobre esse parasita, principalmente na província de Maysan, onde os estudos são praticamente ausentes. Neste estudo, duzentos e vinte e seis esfregaços vaginais foram coletados de mulheres que visitaram hospitais, centros de saúde e clínicas médicas em algumas áreas do *governorate* de Maysan (distrito de Amara, distrito de Al-Kahla, distrito de Al-Maymouna, distrito de Al-Majar Al-Distrito de Kabir) durante o período de 10 de novembro de 2019 a 10 de fevereiro de 2020. Os resultados do exame microscópico de esfregaços vaginais mostraram que a taxa de infecção geral foi de 75,22% (170/226). O distrito de AL-Kahla teve a maior taxa de infecção (96,15%), enquanto a mais baixa foi no distrito de Maimouna (60,00%). A faixa etária de 34 a 40 anos apresentou a maior taxa de infecção (86,95%), enquanto a faixa etária <15 anos apresentou a menor taxa de infecção (37,50%). Mulheres casadas apresentaram maior taxa de infecção (80,92%) do que mulheres solteiras (40,62%). A taxa de infecção entre mulheres não grávidas foi alta (81,11%) do que entre mulheres grávidas (78,57%). Este estudo mostrou que o pH vaginal tem um papel significativo na proteção da vagina da mulher contra tricomoníase, sendo que a maior taxa de infecção (96,63%) foi registrada na vagina com pH 6, enquanto nenhuma infecção foi registrada em pH 4. De destes resultados podemos concluir que a tricomoníase é amplamente difundida entre as mulheres das comunidades de Maysan, verificou-se que a infecção foi afetada significativamente por alguns fatores demográficos como idade, ocupação, estado civil, marido polígamo, secreções vaginais e prurido e pH da vagina.

**Palavras-chave:** *Trichomonas vaginalis*, DST, Microscopia, pH, Iraque.

## ABSTRACT

*Trichomonas vaginalis* is an extracellular flagellated parasitic protozoan. It adapts to live in anaerobic conditions of the women's vagina and causes Trichomoniasis, a non-viral, sexually transmitted disease (STD). This parasite spreads in all regions of the world, and the global prevalence rate of vaginal Trichomoniasis in women is higher than in men. It is considered a neglected disease in Iraq, as there are few studies about this parasite, especially in Maysan province, where researches are near absent. In this study, two hundred and twenty-six vaginal swabs were collected from women who visited hospitals, health centers, and medical clinics in some areas of Maysan province (Amara district, Al-Kahla district, Al-Maymouna district, Al-Majar Al-Kabir district) during the period from November 10, 2019 to February 10, 2020. The microscopic examination of vaginal smears showed that the overall infection rate was 75.22% (170/226). AL-Kahla district had the highest rate of infection (96.15%), while the lowest was in the Maimouna district (60.00%). The age group 34-40 years had the highest infection rate (86.95%), while the age group < 15 years had the lowest infection rate (37.50%). Married women had a higher infection (80.92%) than unmarried women (40.62%). The infection rate among nonpregnant women was high (81.11%) than with pregnant women (78.57%). This study showed that vaginal pH has a significant role in protecting the women vagina from Trichomoniasis, once the highest rate of infection (96.63%) was recorded in the vagina with a pH 6, while no infection was recorded at pH 4. It can be concluded that Trichomoniasis is widely spread among women of the Maysan communities, and the condition was affected significantly by some

demographic factors such as age, occupation, marital status, husband polygamous, vaginal secretions, and itching and pH of the vagina.

**Keywords:** *Trichomonas vaginalis*, STD, Microscopy, pH, Iraq.

**المخلص:**

المشعرات المهبليّة *Trichomonas vaginalis* هو طفيلي ابتدائي سوطي خارج خلوي. يتأقلم للعيش في الظروف اللاهوائية لمهبل المرأة ويسبب داء المشعرات وهو مرض غير فيروسي ينتقل جنسياً (STD). وينتشر هذا الطفيلي في جميع مناطق العالم، ويكون معدل الانتشار العالمي للمشعر المهبلي في النساء أعلى منه في الرجال. في العراق يعد داء المشعرات من الأمراض المهملة، إذ هناك القليل من الدراسات حول هذا الطفيلي، خاصة في محافظة ميسان حيث تكون الدراسات شبه معدومة. في هذه الدراسة تم جمع مائتين وست وعشرين مسحة مهبليّة من النساء الزائرات للمستشفيات والمراكز الصحية والعيادات الطبية في بعض مناطق محافظة ميسان (قضاء العمارة، قضاء الكحلاء، قضاء الميمونة، قضاء المجر الكبير) خلال الفترة من 10 تشرين الثاني 2019 إلى 10 شباط 2020. وأظهرت نتائج الفحص المجهرى للمسحات المهبليّة أن معدل الإصابة الكلية بلغ 75.22% (226\170). وأن قضاء الكحلاء سجل أعلى معدل للإصابة (96.15%) بينما كان أدناها في قضاء الميمونة (60.00%). وسجلت الفئة العمرية 34-40 سنة أعلى معدل للإصابة (86.95%)، في حين سجلت الفئة العمرية أقل من 15 سنة أدنى معدل للإصابة (37.50%). سجلت النساء المتزوجات أعلى معدل للإصابة (80.92%) من النساء غير المتزوجات (40.62%). بلغ معدل الإصابة بين النساء غير الحوامل 81.11% وفي النساء الحوامل بلغ 78.57%. أظهرت هذه الدراسة أن الرقم الهيدروجيني المهبلي له دور كبير في حماية مهبل المرأة من داء المشعرات، حيث تم تسجيل أعلى نسبة إصابة (96.63%) في المهبل برقم هيدروجيني 6، بينما لم تسجل أي إصابة عند الرقم الهيدروجيني 4. يمكن أن نستنتج أن داء المشعرات ينتشر على نطاق واسع بين نساء مجتمعات ميسان وقد تأثرت العدوى بشكل كبير ببعض العوامل الديموغرافية مثل العمر، المهنة، والحالة الاجتماعية، تعدد الزوجات، الإفرازات المهبليّة والحكة ودرجة الحموضة في المهبل.

**الكلمات المفتاحية:** المشعرات المهبليّة، الأمراض المتقلبة جنسياً، الفحص المجهرى، درجة الحموضة، العراق.

## 1. INTRODUCTION:

The human vagina has a balanced natural environment with an acidic environment, where the pH was ranging from 3.8 to 4.5. This is returning to the presence of bacteria normal flora of *Lactobacillus spp.* which has a positive role in protecting the vagina from pathogens like *Trichomonas vaginalis*, Donne 1836 (Trichomonadidae, Trichomonadida), and Vaginitis bacteria (Adnan and Marjani, 2020). It is an obligated parasite, and human is the only known host (Riestra *et al.*, 2019). This parasite takes an oval or pear shape, but sometimes amoeboid in form when it attached to the epithelial cells of the vagina (Mahmud *et al.*, 2018).

The *T. vaginalis* size is ranging from 7-32 x 5-12 um (long x wide), it has four free anterior flagella and the 5<sup>th</sup> flagellum return back along the edge of the undulating membrane and the ending posterior of 5<sup>th</sup> flagellum to the middle of the organism body (Roberts and Janovy, 2009). It has a simple life cycle, and it appears that *T. vaginalis* does not have a cyst stage and cannot survive well on the outside of the human body, but it can live in the external environment in a humid environment for more than three hours (Burch *et al.*, 1959). It contains only a trophozoite stage in its life cycle, where the trophozoite is the stage of infection and diagnosis (Beri *et al.*, 2020).

Trichomoniasis is a widespread non-viral, sexually transmitted disease (STD) (Trein *et al.*, 2019). It infected both males and females of all ages, adults, or children in all regions of the world, whether rich or poor (Morris *et al.*, 2019). *T. vaginalis* was the first species of the Genus

*Trichomonas* to be identified as causing Trichomoniasis in 1916 (Stephen and Richard, 2001). *T. vaginalis* lives in close association with the vagina, urethra, endocervix of the females and prostate tissues, seminal vesicles, and urethra of males. It is an important source of reproductive morbidity (Roberts and Janovy, 2009; Kissinger, 2015). It is transmitted between males and females via vaginal sexual intercourse by using contaminated fomites (Ferré *et al.*, 2019) and via water (Crucitti *et al.*, 2011). Several studies reported that the infection rate (IR) of *T. vaginalis* increased with the increase of IR of bacterial vaginitis. This may cause genital inflammation that may increase the risk of HIV or HSV-2 infection, thereby increasing the risk of transmission to the sexual partner (Deivam *et al.*, 2014; Rostami *et al.*, 2017; Shipitsyna *et al.*, 2020). Also, Trichomoniasis is related to a 1.9-times risk of cervical neoplasia (Zhang and Begg, 1994).

There were about 122 million new trichomoniasis cases in 2015 (Vos *et al.*, 2016). About 2 million women are affected by Trichomoniasis in the USA, and it occurs more often in women than in men (Adams and Fosnight, 2018). The global IR of *T. vaginalis* was estimated to be about 1.0 % and 8.1 % for males and females, respectively (WHO, 2001). According to the records of WHO in some countries, the IR among pregnant women is: in Brazil, 2.11%, Chile, 5-2.7%, Central Africa, 9.9%, and South Africa, 41.4% (Bolumburu *et al.*, 2020). In Iraq, Trichomoniasis was one of the neglected diseases. In Basra, in Southern Iraq, Al-Assadi *et al.* (2020) showed the IR was 5.7-8.5%.

The direct microscopic examination of the

vaginal wet amount is the most common method used to diagnose vaginal Trichomoniasis, which gives high specificity of fresh vaginal specimens (Al-Mamoori *et al.*, 2020). The testing with a swab, culture media of vaginal secretions, or vaginal swabs has a sensitivity that reaches 63.0–98.2%, and high specificity that reaches 99.4–100% (Smith *et al.*, 2005).

Metronidazole (Flagyl) is a choice treatment and an effective antibiotic for Trichomoniasis in all world regions, especially in the USA (Workowski and Berman, 2010). It was taken as a single dosage of 2gm/day or 500mg twice daily, for seven days (Workowski and Bolan, 2015). The Metronidazole cure rate was reached 97% (Sherrard, 2020). It estimated that 2.5–5% of all Trichomoniasis treated cases with metronidazole exhibit resistance to metronidazole (Tien *et al.*, 2020).

This study aimed to determine the infection rate of *T. vaginalis* parasite among Maysan province women by using direct microscopic of the wet amount of vaginal discharge and endocervical specimen and investigates infection relation with some sociodemographic factors.

## 2. MATERIALS AND METHODS:

### 2.1. The regions of the study

Maysan province is located in South-Eastern Iraq besides the border with Iran. It is located astronomically between two latitudes (31°15'-32° 56') and two longitudes ( 47° 50' - 46°15'). The province of Maysan extends over 16,072 km<sup>2</sup>, and the population was about (1150000) Peoples. It consists of six districts (Ali-Algarbi, Al-Amara, Al-Maymouna, Al-Kahla, Qulat Saleh, and Al-Majar Al-Kabir). Maysan province has a dry climate and a high temperature. The annual average was 25° C with a range between 6.2 to 45.7° C, and the rainfall is concentrated in the winter months. The annual average of rainfall was 177.3 mm. A total of four districts Al-Amara center, Al-Kahla, Al-Maymouna, Al-Majar Al-Kabir (Figure 1) were randomly chosen for this study. Al-Amara City is the center of Maysan province, with an area of 6,287.07 Km<sup>2</sup> which consisted of 39.1% of the Maysan area and the population was about 420,000 people, and the area and population of Al-Maymouna, 2,081.49 Km<sup>2</sup> and 150,678 people; Al-Kahla, 1289.80 Km<sup>2</sup>, and 85000 people and Al-Majar Al-Kabir 1434.92 Km<sup>2</sup> and 96338 people (Malinowski, 2002; Atiaa *et al.*, 2013; Jaber, 2014; Al-Abadi *et al.*, 2017).

### 2.2. The study population criteria

The region (Al-Amara, Al-Kahla, Al-Maymouna, and Al-Majar Al-Kabir); age (<15, 15-19, 20-26, 27-33, 34-40, 41-47, 48-54 and ≥55 years old); social status (married and unmarried); education level (illiteracy, primary, secondary and a graduate); occupation (housewife, employee, student, baby girl); marital status of the husband (monogamous, polygamous and not a husband); the number of birth (0, 1-3, 4-6, 7-9); residence (urban and rural); status of women (pregnant, not pregnant and single); pH values (4, 5.5, 6 and 6.5); secretions (yes or no) and itching (yes or no) were used as the parameters of the sample of this study.

### 2.3. Samples

This study was done under the agreement of the Maysan Health statement. All samples were taken under the direct supervision of the gynecologist physician in all hospitals, health care centers and medical clinics. The nature of the study was explained, and the participants consents were obtained before work began. Using the vaginal speculum, two specimens of the vaginal wet amount had been collected (the first for microscopic examination and the second for cultivation) from every 226 females of different ages of 5-60 years old, who visited hospitals, health care centers, and medical clinics from some regions of Maysan province distributed as Al-Amara city 161, Al-Kahla 26, Al-Maymouna 25 and Al-Majar Al-Kabir 14 women from the period November 10, 2019, to February 10, 2020.

### 2.4. pH measuring

The pH of the vagina of each participant had been measured by using peat moss paper strips (Merck, Darmstadt, Germany) by taking a drop of vaginal secretions (Sgibnev and Kremleva, 2020).

### 2.5. Microscopic examination of vaginal secretions samples

For microscopic examination, one drop of phosphate buffer saline pH 7.2 (PBS) was mixed with the vaginal wet amount specimen, and then six slides were prepared: three slides without stain and three for stained with Giemsa stain (mixed of eosin and azure B) (Solarbio, China) and then examined under a compound microscope with 40X magnification.

## 2.6. Cultivation of vaginal specimens

For cultivation, the 2<sup>nd</sup> vaginal secretion specimen that loaded in the cotton swap was mixed with three milliliters of PBS. The mixture was cultured with sterile Amies Transport Media (Biozek Medical, Netherlands) (Figure 2) and then incubated at 37°C for seven days. The cultivation specimens were examined periodically every two days to confirm the results.



**Figure 2.** Amies transport medium.

## 2.7. Statistical analysis

The data were statistically analysed with the Statistical Package for Social Science software (SPSS version 24) using the Chi-square ( $\chi^2$ ) test to determine the relations between the infection rate and some clinical and sociodemographic factors of the current study. The probability value ( $p \leq 0.05$ ) was used as a criterion statistically significant.

## 2.8. Ethical clearance

Permission was issued to conduct this study by all health institutions in Maysan province and in the institute where this study was conducted.

## 3. RESULTS AND DISCUSSION:

The microscopic examination results depend on watching the *T. vaginalis* parasite (Figure 3) in the microscopic field. The results of the present study (Table 1) are shown a high overall IR of *T. vaginalis* among women of 75.22%, and the highest IR (96.15%) is recorded in Al-Kahla district, and the lowest (60.00%) is in Al-Maymouna district. There are significant differences between the IRs of Trichomoniasis among women in this study ( $\chi^2=12.118$ ,  $p=0.007$ ). These results in line with the finding of a previous study in Iraq, Bagdad, 85.50% (Saheb *et al.*, 2016). And higher than of earlier studies in

different regions of Iraq such as Al-Mosul, 25.86% (Al-Mallah, 1981), Baghdad, 22.60% (Al-Kaisi, 1994) Basra, 57.85% (Jarallah, 2013), Diyala, 24.60% (Al-Hussuny, 2015), Baghdad, 19.10% (Al-Muqdad *et al.*, 2017), Al-Najaf, 27.9% (Al-Abbas and Radhi, 2019), Al-Muthana, 26.00% (Al-Abodi *et al.*, 2019), and higher than that reported from other countries such as the USA, 38.0% (Schwebke and Burgess, 2004), Turkey, 3.2% (Kassem and Majoud, 2006), Saudi Arabia, 28.% (Madani, 2006), Iran, 1.7% (Matini *et al.*, 2012),

The high IR in this study may be returned to the lack of personal hygiene, low level of education, social status (Eshete *et al.*, 2013) or due to asymptomatic infection which may extend to six months, or to lack of female doctors in the primary health care center specialized in gynecology, or as a result of incorrect treatment.

Regarding age, it can be said (34-40) years age group had the highest IR (86.95%), and the lowest was (37.50%) at (<15) years age group, ( $\chi^2 = 13.334$ ,  $p=0.064$ ). These results agree with Fattah and Kadir (2010) and do not agree with Sutton *et al.* (2007), where the group (14-19) years was the most affected because the IR was increasing at ages with more significant sexual activity. This may be due to the high level of estrogen that makes the vaginal environment suitable for the growth of the *T. vaginalis* parasite (Nwokah *et al.*, 2019),

On the other hand, this study (Table 1) showed that the IR of Trichomoniasis among married women (80.92%) is higher than that of unmarried women (40.62%), ( $\chi^2=23.938$ ,  $p<0.001$ ). This result is similar to what Al-Kahfaji(2020) found that IR among married women was (81.90%). The higher IR among married women is attributed to sexual intercourse or contraceptive use, leading to increased trichomoniasis IR in married women (Paniker and Ghosh, 2017).

Regarding the education level, it showed that illiteracy women have the highest IR (77.67%) and the lowest (50.00%) is at women with the secondary level ( $\chi^2=6.342$ ,  $p=0.096$ ). This finding agrees with Jarallah (2013) and does not agree with Salman and Kareem (2013), who found the women with primary education levels had the highest IR. This result may be due to poor health care and a lack of women's awareness programs, in which women are at risk of infection (Yeh *et al.*, 2013).

Concerning the occupation, it was found the housewife has the highest IR (78.00%) than others ( $\chi^2=10.598$ ,  $p=0.014$ ). This finding agrees

with Nas *et al.* (2020), who found the highest IR was among unemployed women, which is not in agreement with Mahdi *et al.* (2001). The increasing of IR among non-working women (housewife) may be to some extent resulted from a poor economic level that will be caused malnutrition and thus decline in the body's immunity, which makes it is weak for facing invading of pathogens, including the *T. vaginalis* parasite, or due to lack of the awareness, and neglect of taking proper treatment (Wiesenfeld *et al.*, 2001),

The present study showed a significant relationship between Trichomoniasis and the marital status of the husband (polygamy or monogamy), ( $\chi^2=5.734$ ,  $p<0.017$ ). Women with polygamous husbands had a higher IR of 87.44% than women with monogamous husbands (85.33%). This result agrees with that reported by Adjei *et al.* (2019) and does not agree with Helms *et al.* (2008). This finding is in line with an early report that the IR of Trichomoniasis increases much with the increase in the chances of having vaginal sex (Thurman and Doncel, 2011), especially in populations with high-risk behaviors such as unhealthy sexual activity and having multiple sexual partners (Arbabi *et al.*, 2014).

Table 1 showed that women who had (4-6) births record presented the highest trichomoniasis IR (88.33%) in comparison to unique or other multiple births (but there is no significant,  $\chi^2=4.867$ ,  $p=0.182$ ). This result agrees with Al-Hussuny (2015) and disagrees with Nouraddin and Alsakee (2015). The high IR in women with multiple births may be due to the overwork of the immune system with multiple, repeated pregnancies for long periods (Poole and McClelland, 2013).

The outcomes also showed that women from the rural area had high IR (81.54%) compare with urban's women (72.67%). This finding is in line with the previous studies of Eshete *et al.* (2013) and Taher and shaker (2018), and disagrees with Ali *et al.* (2017). The reasons for the high infection rate in rural women may be due to poor awareness, lack of literacy level, low socioeconomic level, lack of personal hygiene, and most importantly, lack of treatment (Ray *et al.*, 2008)

Regarding pregnancy, it was found (Table 1) that nonpregnant women have a higher IR (81.11%) compared with pregnant women (78.57%). This IR is lower than the IR (89.0%) recorded in nonpregnant women from India

(Masand *et al.*, 2015) but higher than the IR (15.4%) obtained from women in Ethiopia (Mulu *et al.*, 2015). This finding agrees with Abdul-Aziz *et al.* (2019) and does not agree with Kadhum (2012). Vaginal Trichomoniasis is highly affected human fertility, such as sperm activity, and hinders their access to eggs, and thus results in failure to fertilize them (Al Saeed, 2011), which leads to the failure of the embryo implantation, and pregnancy did not occur (Lucena *et al.*, 2015)

This study showed that the pH of a woman's vagina has a very significant effect on the IR of vaginal Trichomoniasis ( $\chi^2=185.276$ ,  $p<0.001$ ). The current results show that the highest infection rate of 96.63% is recorded in the vagina of women with a pH 6. This result is in line with Hawel and Alasadiy (2017) findings, where they found that all infected women with Trichomoniasis were at pH 6. And also in agreement with Glehn *et al.* (2016). This is due to the ability of this parasite to change the pH of the vagina (Korosh *et al.*, 2017) towards alkalinity at a pH of 5 to 6 (Roberts and Janovy, 2009) in order to maintain its survival. And current results showed that no infection was recorded among women with a vagina have a pH 4.

Another clinical sign characteristic of the infection with this parasite is vaginal secretions. The present study (Table 2) shows the IR of 89.40% among women with vaginal secretions is high compared with IR of 46.66% among women without vaginal secretions. There is a highly significant association between *T. vaginalis* IR and the clinical sign of vaginal secretions ( $\chi^2=49.105$ ,  $p<0.001$ ). This finding is in agreement with Asiegbu *et al.* (2018) and does not agree with Ranjit *et al.* (2018), who found the highest IR was with light secretion.

Table 2 shows vaginal trichomoniasis infection is significantly related to the presence of vaginal itching ( $\chi^2 = 4.428$ ,  $p= 0.035$ ). The highest IR is recorded among women with vaginal itching (77.72%) than women without vaginal itching (60.60%). These results align with the finding of Ajayi *et al.* (2016) and disagree with Nzomo *et al.* (2013). Sometimes, the itching may be caused by other pathogenic microorganisms such as bacteria, fungi, and yeasts, which enhanced the infection of this parasite. It is attributed to the cause of the abundance of vaginal secretions and skin itching and accompanied by other clinical manifestations such as unpleasant odors that smell like fish (Al-Marsomy, 2020).

#### 4. CONCLUSIONS:

Trichomoniasis is a prevalent and widespread disease in Maysan province, South of Iraq. The infection rate of women with *T. vaginalis* is affected by sociodemographic factors such as age, marital status, polygamy, and others. The IR is affected by the pH of the vagina. It was also found that clinical signs such as vaginal secretions and itching are often associated with *T. vaginalis* infection. Significantly, a relationship was observed between IR and Region, social status, occupation, marital status of the husband, number of birth and pregnancy, and we did not notice a relationship between IR and education level, residence, and birth number. The clinical signs such as vaginal pH, secretions, and vulva itching are considered to be evidence of infection of the vagina with Trichomoniasis. Moreover, we show the direct microscopic examination of a wet amount of vaginal secretion specimens has a high sensitivity for detecting the *T. vaginalis* parasite.

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**Table 1.** The *T. vaginalis* infection rate of women in Maysan province and their relation with some of the social characteristics of the study population.

Variable	Sections	No. Exam	No. Infection (%)	% of total	$\chi^2$	p-value
Region	Al-Amara	161	117(72.67%)	51.80%	12.118	0.007**
	Al-Kahla	26	25(96.15%)	11.10%		
	Al-Maymouna	25	15(60.00%)	6.60%		
	Al-Majar Al-Kabir	14	13(92.85%)	5.80%		
	Total	226	170(75.22%)	100%		
Age	<15	8	3(37.5%)	1.30%	13.334	NS
	15-19	22	13(59.09%)	5.80%		
	20-26	49	38(77.55%)	16.80%		
	27-33	42	32(76.19%)	14.20%		
	34-40	46	40(86.95%)	17.70%		
	41-47	27	19(70.37%)	8.40%		
	48-54	26	20(76.92%)	8.80%		
	$\geq 55$	6	5(83.33%)	2.20%		
	Total	226	170(75.22%)	100%		
Social Status	Married	194	157(80.92%)	69.50%	23.938	<0.001***
	Unmarried	32	13(40.62%)	5.80%		
	Total	226	170(75.22%)	100%		
Education level	illiteracy	112	87(77.67%)	38.50%	6.342	NS
	Primary	85	66(77.64%)	29.20%		
	Secondary	16	8(50.00%)	3.50%		
	A graduate	13	9(69.23%)	4.00%		
	Total	226	170(75.22%)	100%		
Occupation	Housewife	200	156(78.00%)	69.00%	10.598	0.014*
	Employee	14	8(57.14%)	3.50%		
	Student	10	6(60.00%)	2.70%		
	Baby girl	2	0(0.00%)	0.00%		
	Total	226	170(75.22%)	100%		
Marital status of the husband	Monogamous	75	64(85.33%)	28.30%	24.431	<0.001***
	Polygamous	116	91(87.44%)	40.30%		

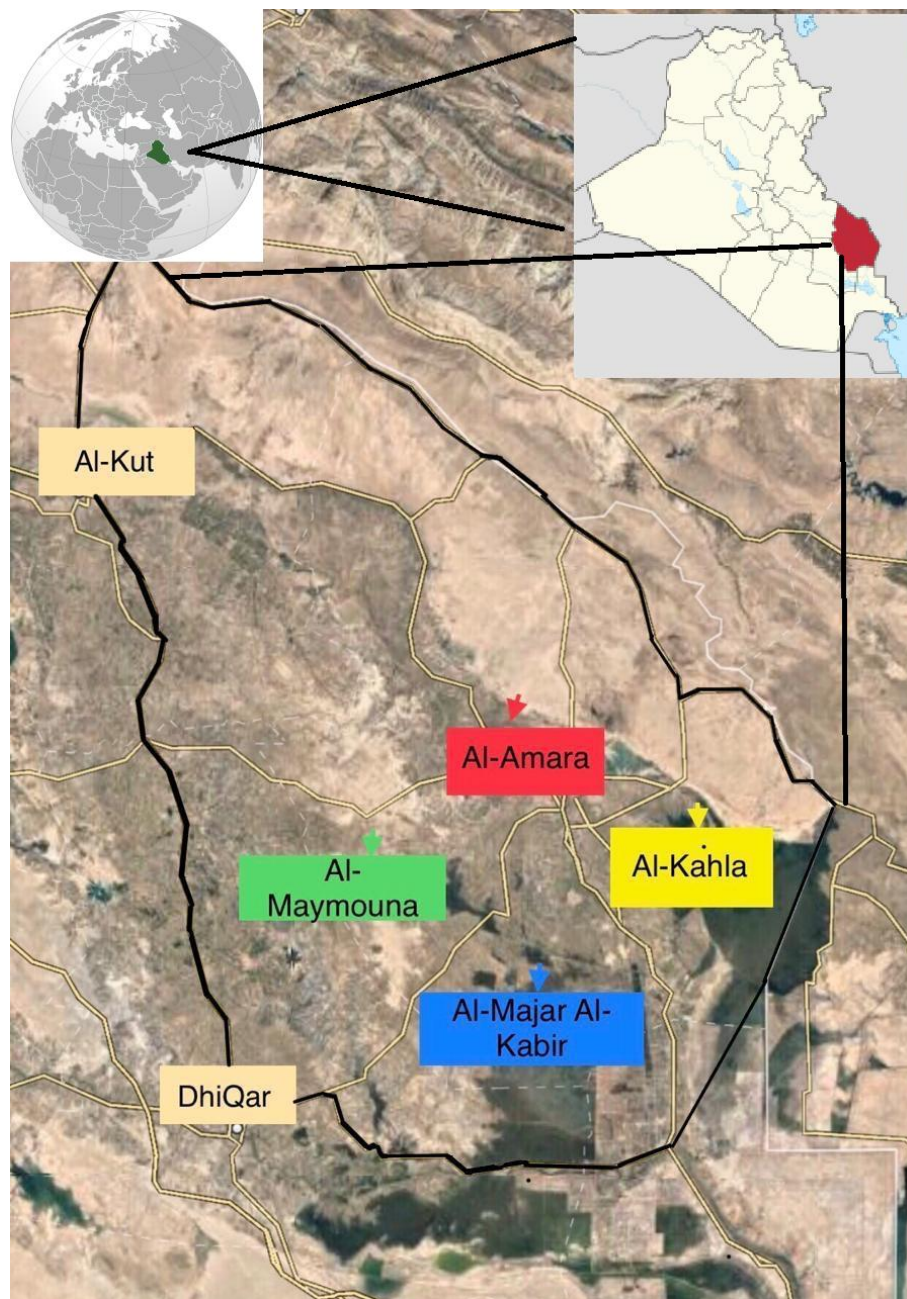
	Not a husband	35	15(42.85%)	6.60%		
	Total	226	170(75.22%)	100%		
<b>No. Birth</b>	0	23	20(86.95%)	8.80%	27.812	<0.001***
	1 – 3	77	58(75.32%)	25.70%		
	4 – 6	60	53(88.33%)	23.50%		
	7 – 9	34	26(76.47%)	11.50%		
	Single	32	13(40.62%)	5.80%		
	Total	226	170(75.22%)	100%		
<b>Residence</b>	Urban	161	117(72.67%)	51.80%	1.954	NS
	Rural	65	53(81.54%)	23.50%		
	Total	226	170(75.22%)	100%		
<b>Status of women</b>	Pregnant	14	11(78.57%)	4.90%	23.983	<0.001***
	Not pregnant	180	146(81.11%)	64.60%		
	Single	32	13(40.62%)	5.80%		
	Total	226	170(75.22%)	100%		

\* P<0.05, \*\* P<0.01, \*\*\* P<0.005, NS= No Significance, P≤0.05

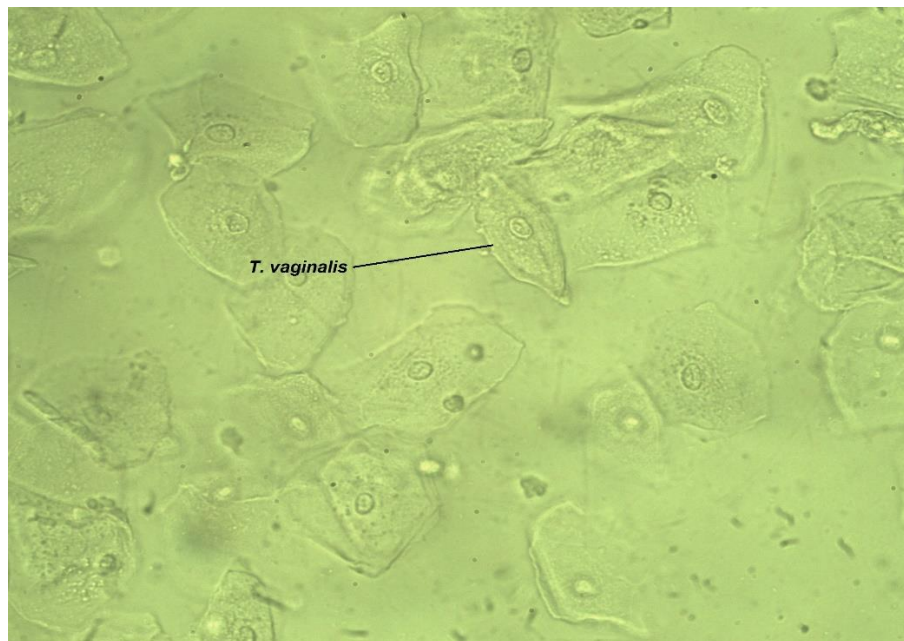
**Table 2.** The relation of Trichomoniasis IR among women in Maysan province with some of the clinical characteristics of the study population

Variable	Sections	No. exam	No. Infection (%)	% Of total	χ <sup>2</sup>	P-value
<b>pH values</b>	4	48	0(0.00%)	0.00%	185.276	<0.001***
	5.5	26	24(92.30%)	10.60%		
	6	119	115(96.63%)	50.90%		
	6.5	33	31(93.93%)	13.70%		
	Total	226	170(75.22%)	100%		
<b>Secretions</b>	Yes	151	135(89.40%)	59.70%	49.105	<0.001***
	No	75	35(46.66%)	15.50%		
	Total	226	170(75.22%)	100%		
<b>Itching</b>	Yes	193	150(77.72%)	66.40%	4.428	0.035*
	No	33	20(60.60%)	8.80%		
	Total	226	170(75.22%)	100%		

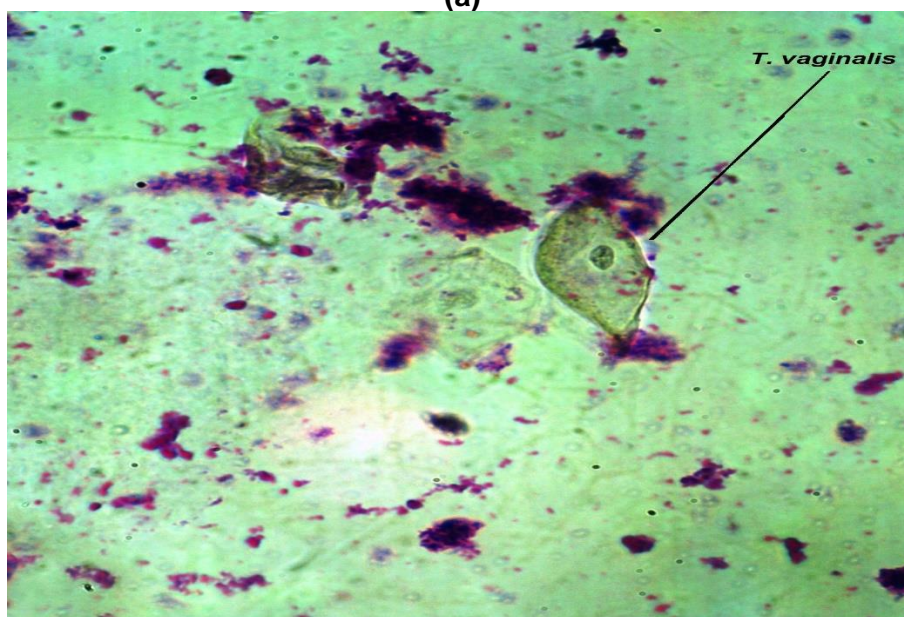
\* P<0.05, \*\* P<0.01, \*\*\* P<0.005, NS= No Significance, P≤0.05



**Figure 1.** A map of the Maysan province showing the regions of the study.  
 ▼ Al-Amara ▼ Al- Kahla ▼ Al- Majar Al-Kabir ▼ Al- Maymouna, Source: Al-Abadi et al., 2017  
 (authors carried out some additions).



(a)



(b)

**Figure 3.** The *Trichomonas vaginalis* parasite under 40X magnification. **(a)** in a fresh smear of wet mount vaginal secretions; **(b)** after staining with Giemsa stain.