

**Original Article****ABO blood group and incidence of *Chlamydia trachomatis*, *Trichomonas vaginalis* infections among child bearing women in Kirkuk Province**

Authors

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Women genital health during child conceding is vital to preserve women healthy and to avoid post-delivery neonate complications. This study was aimed to determine the relationship between *Trichomonas vaginalis* (*T. vaginalis*), *Chlamydia trachomatis* (CT) incidences and type of women blood group. Cross-sectional study was carried on 185 women who attend Gynecological and obstetric clinic in Azadi-teaching Hospital in Kirkuk city during 2018. Women ages ranged from 15 to 46 years, their complaint involve urogenital discharges, miscarriage, congenital anomalies, and others. After completing the special questionnaire, two swabs (high vaginal and endo-cervical) were taken and examined microscopically for *T. vaginalis* and serologically for *Chlamydia*. The overall rate for *Chlamydia* was 96.21% versus to 28.10 % for *T. vaginalis*,  $P < 0.05$ . *Chlamydial* infections were higher among women with (O) blood group, whereas *T. vaginalis* infection highly recorded among (A) blood group. Positive rhesus factor (Rh +ve) women samples reveal 88.24 % for both infectious agents compare to 11.76 % in the specimens for women negative Rh-ve. Co-existence infection was detected among 35 specimens and the rates of both types infections were high; 36.21% and 33.55% in samples belong to women with (O) and (B) blood groups respectively,  $P < 0.05$ .

To assess the effectiveness of laboratory samples in demonstrating *Chlamydia* among women, high rates 54.05% and 32.97% were recorded in endocervical and high vaginal swabs respectively, contrary to low rate 13.51 % by using urine samples,  $p < 0.05$ . In general high rates of *Chlamydial* infections were recorded among women with blood group (O), contrary to HVS which showed 11.35 % in the samples of women for both (B and O). Considering *T. vaginalis* infections in regard to blood group of infected women, high rate 13.51% was recorded in HVS for women with blood group (A) compare to other types of blood group, endocervical swabs and urine samples,  $P < 0.05$ . Regarding women husbands urogenital infection and the occurrence of *Chlamydial* infection was significant;  $P < 0.05$ . Correlation between the incidence of both microorganisms and women urogenital discharges, occupation were significant,  $P < 0.05$ . Meanwhile, the relationship between urogenital both pathogens and patients residencies was not significant,  $P > 0.05$ .

**Conclusions:** Relationship between *Chlamydia*, *T. vaginalis* infection and women ABO blood groups, rhesus factor was significant in women during childbearing age in Kirkuk city.

**Keywords:** *Chlamydia*, *T. vaginalis*, HIV, blood group and rhesus factor.

## Introduction

Gonococcal and non-gonococcal infections are classified as sexually transmitted infections (STI), the former is caused by *Neisseria gonorrhoeae*, while the later term involves other bacterial infections such as *Chlamydia trachomatis*, *Mycoplasma hominis*, *Haemophilus ducreyi*. Also viral sexually transmitted such as *Human Immuno-virus HIV*, *Cytomegalovirus (CMV)* and parasitic such as *Schistosoma haematobium* and *Trichomonas vaginalis (T. vaginalis)*. It has been known that, *T. vaginalis* is a cosmopolitan parasite, causing roughly the same number of (STI) as *Chlamydia trachomatis*, the most incident sexually transmitted bacterial pathogen (Weinstock et al;2010). An estimated 180 million new infections acquired annually worldwide (Coleman et al.;2013). Globally *T. vaginalis* rate varies from 2 to above than 50 % , this variation was depended on the type of sexual activities, region, gender, age, contraception (Bebany, 2008), hormonal changes, and demographic parameters of the study populations in addition to the types of laboratory diagnostic that used in most of the studies (Ginocchio et al; 2012).

*Trichomonas vaginalis* is a single, spherical, motile, flagellated parasite with a barbed tail (called an axostyle) that habitat in the urogenital tract of humans. *Trichomonads* are anaerobic, reproduce via binary fission, and require carbohydrates (i.e., vaginal glycogen) as an energy source (Nielsen et al; 2012). Attachment of *T. vaginalis* to the vaginal epithelial cells through axostyle is responsible for producing the symptoms and signs of trichomoniasis (Carlton et al; 2007). Secretion of cysteine proteinases and a cell-detaching factor and expression of a highly immunogenic surface protein (P270). These events lead to an intense host inflammatory response, genital tract symptoms, tissue damage, and various reproductive squeals (Draper et al;1998). It has been estimated that, 50% of all women with *T. vaginalis* are asymptomatic. But the signs of infection in symptomatic women involve malodorous vaginal discharge, edema or erythema

and Strawberry cervix (punctate hemorrhagic lesions), inflammation and vulval irritation. Other complaints include dyspareunia, lower abdominal pain, dysuria and pruritis, (Johnston and Maybe 2008; Giordani et al. 2012). Therefore, the following serious complications may be raised such as preterm labor, premature rupture membranes and low birth weight in pregnant women enhances HIV acquisition and transmission (Donbraye et al. 2010). In the last ten years ago, some studies suggested that, trichomoniasis predispose to certain malignant disease like prostate and cervical cancer (Schwebke and Burgess 2004; Stark et al. 2009).

*Chlamydia trachomatis* is the most commonly diagnosed sexually transmitted bacterial infection (STI) worldwide (Malek, et al.; 2006). According to regional distribution of CT, the Netherlands and the United Kingdom have witnessed an increase in *C. trachomatis* case reports over the last decade. Recently the overall burden has decreased in other countries including the United States (2016).

The genus, *Chlamydia* is an obligate intracellular parasites and they have not been survive out of the host cells. DNA analysis reveals four main species causing different types of diseases (Rayan et al ;2010). But regarding CT, three serovar were found to affect human being; they are serovars A-C cause trachoma, D-K cause non-gonococcal urethritis, mucopurulent cervicitis and inclusion conjunctivitis. In addition to L 1-3 cause *lymphogranuloma venereum (LGV)*, (Salman et al;2018). Infections with *Chlamydia (Chlamydia trachomatis; CT)* and gonorrhoea (*Neisseria gonorrhoeae; NG*) represent a transmissible global public health burden, with an estimated 256 million incidence in adults aged 15–49 years in 2012. (Neoman, et al.;2015) Without treatment, their complications include pelvic inflammatory disease (PID), infertility and ectopic pregnancy in addition to adverse pregnancy outcomes, (Holmes , et al.; 2007), they contribute to a range of psychosocial consequences, and are associated with abortion (Causer , et al.;2018).

The distribution of the four ABO blood types distribution, A, B, AB, and O, varies in populations throughout the world. The frequency of the three alleles of the ABO gene in different populations has been determined. Blood type O is the dominant worldwide one, followed by group A. Group B is less common, and group AB is the least common (Dhruva, et al.;2015). The Rh blood group is one of the most complex blood groups known in humans. It has a vital role in blood transfusion medicine. The antigens of the Rh blood group nature are proteins. The information for producing the protein antigens was holds in the DNA of person's. The D-antigen is a larger protein on the red blood cell membrane which encoded by Rh-D gene. In Rh-negative people, Rh-D gene does not produce D antigen, and therefore the RhD protein is absent from their red blood cells. To date, 49 Rh antigens are known (Mitra, et al.; 2014).

In the recent, most of the studies were carried on for highlighting the association of patients ABO blood groups and the incidence of some diseases such as gastroenteritis due to *Helicobacter pylori* (*H. pylori*) (Petrovic, et al.;2011),( Jaff,2010 and 2011) and (AbdulRazq,2017)., *Plasmodium vivax*, for both infectious agents patients with blood group (O) were prone to *H. pylori* and *P. vivax* malaria (Salman,1996). In the current study two infectious agents *Chlamydia trachomatis* (Intra-cellular bacteria) and *Trichomonas vaginalis* (extra-cellular protozoa) were taken in-consider. Regarding the later; as an extracellular parasite, the surface antigens of *T. vaginalis* are critical in interaction with host cells, evasion of the immune response, competition with and consumption of other organisms inhabiting the human urogenital tract. The output of most studies on *T. vaginalis* surface molecules has revolved around proteins and their possible roles in host-parasite interaction (de Miguel, et al.; 2010). The most extensively studied putative adhesion proteins are a controversial set of metabolic enzymes suspected of having dual localization inside the cells and on the surface (Hirt, et al.;2007). More recently,

molecular trials of sequencing of the *T. vaginalis* genome has allowed for the identification of over 1000 predicted surface proteins, many containing domains that have homology to proteins (crosses proteins) implicated in pathogenesis in other organisms (Alderety, et al.;2001, Christopher, et al.;2011).

Moreover, *Chlamydia* as Gram negative bacteria its cell wall is rich in lipopolysaccharides. So, the mechanism of interaction by which the blood groups of women infected by both organisms is unclear and this study is a preliminary to detect the relationship between the incidence of *T. vaginalis* and *Chlamydia trachomatis* in child bearing age women.

## Materials and Methods

### Study design and population

From 1st of January 2018 to 31th of December 2018, A total of 185 women in Kirkuk city were enrolled cross-sectional study, whom they attend the obstetric and gynecological department in Azadi Teaching Hospital in Kirkuk city. Women who attend into two private clinics in the Kirkuk medical street. Their ages were ranged from 15 years to 46 years. Their complaints involve; cervicitis, vaginitis, urethritis, bad odor, itching, back pain, dyspareunia and other signs and symptoms. For each woman, a special questionnaire which contains all information's was completed by trained health professionals who attended the services. Study population classified into 141 non-pregnant women, 20 pregnant women, and 25 women without any signs and symptoms (control group). Exclusion criteria included administration of systemic or topical antibiotics within one month prior to sampling.

### Ethical approval

This study was approved by the Medical Ethics Committee in the College of Medicine, Kirkuk University. Informed consent was taken from the participants subsequently they presented for clinical examination and urogenital discharge sample collections.

### Samples Collection

From each woman, three different samples were collected as follows; endocervical and vaginal discharges were collected by insertion of a Cuscos bivalve speculum and the discharge from endocervix and also from the posterior vaginal fornix using sterile cotton-tipped swabs. These samples were transferred into another tube containing transport medium. Samples after collection were transported at once to the lab for processing (Centers for Disease Control and Prevention, 2014). In case the delay of sample arrival to the lab the samples were transported on ice packs and stored at -20°C until processed. For urine collection, a clean catch sample was advised, which was collected in sterile fitted tight screw lid to avoid sample contamination and leakage. This specimen was transported in a cool box and transferred to a lab for sample processing (Knox *et al.*, 2002). For blood grouping and Rh factor, five ml of venous blood was collected from each woman, then transferred into two tubes, the first tube was ethylene diamine tetra-acetic acid (EDTA) to help blood coagulation. The second tube contains activated jell, that helps in blood coagulation for separating clear serum after centrifuging.

### Sample processing and laboratory tests

**Urine samples:** Each sample was divided in to clean sterile plan tube, the first portion was directly seeded for culture and antibiotic sensitivity test for detecting other infectious agents causes Urinary tract infection. Whereas the second tube was examined macroscopically for color, odor and pH. Then centrifuged for 15 minutes using 3000 rpm. The supernatant was discarded, while the deposit was divided into two parts: the first part homogenized and all content was examined microscopically for pus cells, red blood corpuscles, crystals, *Trichomonas vaginalis* trophozoites, (Laposata, 2010), bacteria and yeasts. The second portion of the deposited was tested for *Chlamydia trachomatis* antibodies using rapid lateral immune-chromatography assay (RLICA), (Salman, et al.;2018).

### Chlamydia trachomatis IgM antibody detection (ELISA)

ELISA kit was purchased from Cortez Diagnostics, Inc USA. This lab test was done according to manufacture company described procedure applied as follows: the sera were diluted 1:40 by adding 5 µl of the test samples was added to 200µl of sample diluent, 100 µl of diluted sera, calibrator, and controls were transferred by automatic micropipette into the appropriate wells. For the reagent blank, 100 µl of the sample diluent solution was transferred into 1A well position. The micro-plate was knocked gently to remove air bubbles from the liquid and mix well, then after the microplate was incubated for 30 minutes at room temperature. The contents of each well was discarded and about 350 µl of wash solution were added into each well, except A1 (the blank). Washing process was repeated for three times, dried and 100 µl of conjugate enzyme was added to each well, mixed thoroughly for 30 seconds incubated for 30 minutes at room temperature. The wells of the microplate were discarded, three times of washing were applied using a wash buffer. The wells were dried, then 100 µl of chromogenic substrate (TMB) was added to each well, and incubated for 15 minutes at room temperature in a dark place. The reaction was stopped by adding 100 µl of Stop solution to each well. Air bubbles were removed from each well before reading the optical density (O.D.) at 450 nm with ELISA micro-well reader. Results interpretations: negative: IgM index of 10 IU/ml or less are seronegative for IgM antibody. Positive: IgM index of 11.00 IU/ml or greater. Equivocal: IgM index of 10.1 – 11 IU/ml are equivocal (Salman, 2014).

### Blood grouping and Rh factors

On a clean slide three blood spots (25µl) was transferred, then after equal volume of Anti-A, anti-B and Anti-D was added, mixed thoroughly, and watched for any clumping or agglutination microscopically. Each specimen was confirmed by using the tube method (Ching, 2012).

**Statistical analysis**

All obtained data have been organized in tables and the statistical analysis was done by using statistical analysis system (SPSS); version 16. (SPSS Inc. Chicago IL. The USA). Frequency and percentage were used with qualitative data. Z-test and Chi-square were used to compare frequencies.

**Results**

The overall rates of both *Chlamydia* and *Trichomonas vaginalis* infection were 96.21% and 28.10 % respectively, P<0.05. High rates of *Chlamydia* infections were recorded in the specimen of women with blood group (O) 34.94, followed by 32.43 % among women with blood group (B), versus to 18.38 % 10.81% in samples of women with blood group (A) and (AB) respectively, p<0.05.

Regarding *Trichomonas* infection 28.10 % ,this rate was involved high rate of 13.51 % among women with blood group (A) compare to 3.24 % for women with (AB) blood group , P<0.05. Table-1

**Table 1** Infectious agent's positive number and percentages in urogenital tract of women in regard of women ABO blood groups.

Infectious agents	Chlamydia trachomatis		Trichomonas vaginalis		Total	
	No +ve	% +ve	No +ve	% +ve	No. +ve	% +ve
Blood groups						
A	34	18.38	25	13.51 b	59	25.65
B	60	32.43	11	5.94	71	30.86
AB	20	10.81	6	3.24	26	11.30
O	64	34.94 a	10	5.40	74	32.17 c
<b>Total</b>	<b>178</b>	<b>96.21</b>	<b>52</b>	<b>28.10</b>	<b>230 *</b>	<b>100</b>

Total number examined : 185 \* co-infection=35. a ,b and c P<0.05

The result of blood grouping in relation to rhesus factors was obvious in the table-2 and 3 , which showed low rates of infections for both pathogens among Rh-negative women were 9.72% and 4.86% compare to high rate infections 86.48% and 23.24 % among Rh positive women respectively, P<0.05. In general, the rate of *Chlamydia trachomatis* was high among women with positive- Rhesus factor than Rhesus factor negative. The same finding considering *Trichomonas vaginalis* infection, in spite of the

later pathogen showed low rate compared to *Chlamydia* infections.

To assess the efficacy of laboratory samples in demonstrating *Chlamydia* among women, table-4 was showing that, high rates 54.05% and 32.97% were recorded in endo cervical and high vaginal swabs respectively, contrary to low rate 13.51 % by using urine samples, p<0.05. In general high rates of *Chlamydia* infections were recorded among women with blood group (O), contrary to trichomoniasis which showed 11.35 % in the specimen of women for both (B and O).

**Table-2** Correlation between infectious agents and Rhesus factor positive and negative among women with urogenital discharges

Infectious agents	Chlamydia trachomatis		Trichomonas vaginalis		Total	
	No. +ve	% +ve	No. +ve	% +ve	No. +ve	% +ve
Reshus factors						
Rh +ve	160	86.48	43	23.24	203	88.26 c
Rh -ve	18	9.72 b	9	4.86	27	11.74
<b>Total</b>	<b>178</b>	<b>96.21 a</b>	<b>52</b>	<b>28.10</b>	<b>230</b>	<b>100</b>

Total number examined : 185 \* co-infection=35. a ,b and c P<0.05

**Table-3** Distribution of *Chlamydia trachomatis* and *Trichomonas vaginalis* in urogenital tract according to blood groups and rhesus factor.

Infectious agents	Chlamydia trachomatis		Trichomonas vaginalis		Total	
	No +ve	% +ve	No +ve	% +ve	No. +ve	% +ve
Blood groups						
A +ve	30	16.21	22	12.08 b	52	28.10
A -ve	4	2.16	3	1.62	7	3.78
B +ve	54	29.18	8	4.32	62	33.51
B -ve	6	3.24	3	1.62	9	4.86
AB +ve	17	9.18	5	2.70	22	11.89
AB -ve	3	1.62	1	0.54	4	2.16
O +ve	59	31.89 a	8	4.32	67	36.21
O -ve	5	2.70	2	1.08	7	3.78
<b>Total</b>	<b>178</b>	<b>96.21</b>	<b>52</b>	<b>28.10</b>	<b>230 *</b>	<b>100</b>

Total number examined : 185 \* co-infection=35. a ,b and c P<0.05

**Table 4** Frequencies of *Chlamydia trachomatis* in relation to urogenital samples and ABO blood groups of women.

Laboratory Samples	Urine		Vaginal swabs		Endocervical swabs	
	No +ve	% +ve	No +ve	% +ve	No. +ve	% +ve
Blood groups						
A	3	1.61	12	6.44	19	10.27
B	9	4.86	21	11.35 b	30	16.21
AB	3	1.61	7	3.78	10	5.40
O	12	6.44 a	21	11.35 b	41	22.16 c
<b>Total</b>	<b>25</b>	<b>13.51</b>	<b>61</b>	<b>32.97</b>	<b>100</b>	<b>54.05 d</b>

Total number examined : 185 \* co-infection=35. a ,b,c and d =P<0.05

Considering *Trichomonas vaginalis* infections in relation to blood group of infected women, table -5-was exerting that, high rate 13.51% was recorded in women with blood group (A) compare to other types of blood group, P<0.05. This rate involves: 6.48% , 4.32% and 2.70 % in vaginal swabs, endocervical swabs and urine samples respectively, p<0.05. According to laboratory samples, high rate of trichomoniasis 15.67 % was recorded in HVS, followed by 7.56% and 4.86 % in endocervical swabs and urine samples respectively , p<0.05.

**Table-5** Frequencies of *Trichomonas vaginalis* in relation to urogenital samples and ABO blood groups of women.

Laboratory Samples	Urine		Vaginal swabs		Endocervical swabs		Total	
	No +ve	% +ve	No +ve	% +ve	No +ve	% +ve	No +ve	% +ve
A	5	2.70 a	12	6.48 b	8	4.32 c	25	13.51 d
B	3	1.62	6	3.24	2	1.08	11	5.94
AB	1	0.54	4	2.16	1	0.54	6	3.24
O	2	1.08	6	3.24	2	1.08	10	5.40
Total	9	4.86	29	15.67 e	14	7.56	52	28.10

Total number examined : 185 \* co-infection=35.  
a ,b,c ,d and e =P<0.05 .

Regarding women husbands urogenital infection and the frequency of women *Chlamydia trachomatis* infection was significant; P<0.05. The rate of *Chlamydia trachomatis* was 80 % in the specimens related to women their husbands have had UTI compare 50 % of *Chlamydia trachomatis* infection in the specimen for women their husbands have no urogenital problems. Table-6.

**Table 6** Women partner uro-genital infection in relation to *Chlamydia trachomatis* infection distribution

Husbands health conditions	No. exam	percent age	No. positive	Percentage +ve
Husbands without infections	141	84.94	71	50.35
Husbands with urinary tract infection	25	15.06	20	80.00
Total	166	100	91	54.81

According to the existence of urogenital discharge in women and *Chlamydia* antibodies in women without discharges was shown in table-7; via

which the all rate of *Chlamydia* antibodies was 95.57 % compared to 5.43 % in the specimen belongs to control women, P<0.05. The positive rate was divided into the following rates: the highest rate 69.28 % was recorded among house makers followed by 13.86% , 7.23 % and 4.21% in samples from women with bachelor , diploma and students respectively ,p<0.05.

**Table-7** *Chlamydia trachomatis* distribution in relation to women occupation

Study groups	Women with discharges		Women without discharges		Total	
	No. positive	% positive	No. positive	% positive	No.	%
House makers	115	69.28 *	5	3.01	120	72.29
Bachelor	23	13.86	2	1.20	25	15.06
Diploma	12	7.23	2	1.20	14	8.43
Students	7	4.21	0	0.00	7	4.21
Total	157	94.57	9	5.43	166	34.15

Total examined samples =498.

Considering patients residency and the frequency of *Chlamydia trachomatis* antibodies, the relationship was significant, P<0.05. Table-8. Via which the rate of the infection in the specimen of the patients from a rural area was 45.58 % versus to 40.83%. Variation was clear in regard to urine samples which exert 21.37 % in specimens from rural area compare to 15.83 % in urban area, p<0.05.

**Table 8** Frequency of *Chlamydia trachomatis* according patients residency

Type of Samples	Urine deposits		High vaginal swabs		Endo-cervical swabs		Total	
	No. Exam	No +ve %*	No. Exam	No +ve %	No. Exam	No +ve %	No. Exam	No +ve %
Rural area	46	10 21.37	46	25 54.34	46	27 58.69	136	62 45.58*
Urban area	120	19 15.83	120	60 50.00	120	68 56.66	360	147 40.83
Total	166	29 17.46	166	85 51.20	166	95 57.22	496	209 41.96

\*P<0.05.

**Discussion**

In Iraq , particularly in Kirkuk city, although data on *C. trachomatis* population prevalence is scarce, a study conducted in Kirkuk city in 2014 estimated that 14.46 % of women in the general population were infected (Salman, 2016). In 2018,

the total rate of women urogenital infection was 55.22 %, CT was contributing 41.96% using RLICA and ELISA techniques (Salman, et al.;2018). In the current study the rate of *Chlamydia* was 96.21 % the using only RLICA technique. This high rate is highlighting the rate of contamination among women in this Province. Factorial causes might be, poverty, continuous water interruption particularly after 2003, abuse of antibiotics and contraception. This rate was higher than those 0.0%,

39.99%, 68 % , 78% and 55-88% recorded in Kirkuk (Kadir, et al .;2014), Barzil (Neves, et al.;2016), In Kirkuk and Tikrit (Bebany, 2008) and Colombian women (Molano, 2005). The variants might be due to the size of samples, laboratory methods, Social habits, mode of sexually activity.

Correlation *Chlamydia* incidence with ABO blood group, 34.94% of the infection was recorded among women with (O) blood group, this rate was higher than in other blood groups, this can be interpreted by the fact that the surface of this type of blood group was free from any antigens, that will not exert any antibody crosses compare to blood group (A). Furthermore, the (O) blood group in its nature was higher in the distribution among peoples in the world (Dhruva, et al.; 2015). On the other hand 32.43% records among women with blood group (B), this most often due to the high distribution of this blood group among Kirkuk peoples.(Salman, 1996).

High records of both pathogens in the current study among patients with a positive- Rh factor than in patients negative Rh factor, this most like to be related to the normal distribution of high incidence of Rh positive in the communities among population in the world according to the first time discovery in 1925,(Liu , et.al.;2014). The finding of high rate 9,72% of *Chlamydia* among patients with Rh-negative versus to low rate during trichomoniasis 4.86%, can be also related to the high occurrence of *Chlamydia* among people in Kirkuk city, or due to misdiagnosis of *Trichomonas* parasite using only

direct wet preparation technique. Moreover *Chlamydia* is an intracellular parasite while *Trichomonas* is a superficial genital lining parasite, so the former pathogen is highly related than the later one On the other, high occurrence Ain women with (O –ve) might be due to the sialic acid on the surface of (O-ve) red blood cells, which not contains any antigens on their surfaces (Rowley and Milkins, 2006). This result of the present study contraindicated with a study conducted in Erbil-Iraq by (Jaff 2011).

High relationship between the types of laboratory samples, *Chlamydia* infection and women ABO blood group in table -4 which exerting high frequency of *Chlamydia* pathogen 22.16 % from endocervical swabs higher than HVS 32.97% and urine deposits 13.51% refers to the fact that the endocervical region is the habitat for CT as the pH scale was slightly higher than HVS (Smith and Angarone, 2015). On the other hand HVS infection in the second grade after endocervical swabs most often due to descending the discharges from endocervix and the cases were more sever because it has been found that the acid pH of the vagina is not proper for the propagation of CT (Nourollahpour Shiadeh et al., 2016). High rates of Chlamydia among patients with (O) and (B) blood groups, might be related to sample size, and for the chance during patient selection in the current study.

Vaginitis due to trichomoniasis among women with (A) in high rate compared to women with other (ABO), this finding could be attributed to parasite interaction with the blood supporting lining tissue of the genitalia, in addition to the chemical composition of blood group (A) subgroups that facilitate parasite attachment and habitants in the host.

The high occurrence of *T.vaginalis* 15.67 % in vaginal swabs in comparison to other laboratory samples 7.56% and 4.86% in endocervical swabs and deposits respectively. This finding might be interpreted to normal parasite habitant in the specific host, particularly the slightly acid vagina (4.5 to 5.5) which favor the propagation of

*T.vaginalis*. On the other hand, the pH of normal urine is 6.8 to 7.6, this range was not proper for the development of this protozoan parasite, so the low rate records in urine samples in the current study.

The high rate of 80% of *Chlamydia trachomatis* in the specimens belonging to women, their husband have had UTI compare to women without UTI 50%. According to available data in this regard, we didn't find any explanation, so the following explanation is helpful in understanding the variance between the two groups. This high rate refers to a high degree of contamination with bacterial co-existence infection, this may be a prone to alarm the light on exposure to other infections such as HIV, syphilis in addition to *Neisseria gonorrhoeae*. As fact continuous infection in general in any system and particularly in urogenital system, definitively may lead to immune system diminishing that give rises to opportunistic infectious agent occurrence. On the other hand the rate 50.35% of CT among women their husbands have no UTI also high, this highlighting silent women's infection by CT.

According to the women occupation, high rate record of both types of infection in the current study among house 72.29 compared to occupations, this variance might be attributed to high number of house maker 120 in the current study compared to other women occupation. While low records among students also related to their light number in the study. This finding was in agreement with that recorded in the same Province and in Tikrit-Iraq by (Bebany, 2008). In the same table (7), high frequency of both types on infections among women with urogenital discharge high than without discharges, particularly among house makers, this refers to several factors: in Iraq most of the house maker have low level of education (illiterate), they didn't have more information about STD, way of transmitting and prevention, so they are more susceptible for acquiring the infections. The second factor might be hormonal changes, contraception in addition to missing periodical

visit to gynecologist for monthly check of their condition particularly Intra-utrine device (IUD). Furthermore according to our observation, most of the women in Iraq in general and in Kirkuk, use contraception in bad manner without interruption, so most of the have hormonal changes and genital discharge. The existence of discharges have had impacts on the fetus post-delivery and the chance of getting pulmonary and ocular infections among them be high.

According to the residency of participant women, high occurrence of both infections among women in arural area 45.83 % compared to women in urban area. This finding is referring to low level of women education in rural area in Iraq, low level of sanitation in addition to displacing due to the continuous instability in Iraq after 2003 and the last events after 2014. Moreover, bad quality of drugs availability due the absence of governmental inspection may had role in increasing the rate of infectious agents among Iraqi communities in general and in particular urogenital agents. This finding was agree that recorded in the same province by (Hussein, 2010 and Bebany, 2008).

### Conclusions

The rates of *Chlamydia trachomatis* and *T. vaginalis* among women in Kirkuk Province were high. Relationship between both types of urogenital infections with women ABO blood group was significant .Both partner should be treated at the time and emphasize should be towered on women in a rural area, house makers and their husband have UTI.

### Limitation

This study was limited to detection of *Chlamydia trachomatis* and *T. vaginalis* infections on examination of, endo-cervical, vaginal swab and urine specimens from women. Study of other STIs especially viruses such as human immunodeficiency virus and human papilloma virus and other specimens such as urine samples among the same population is recommended.



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### Conflict of interest

Authors declare they have no conflict of interests.

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