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Infertility Rate And Relationship Between Infertility Status And Microbial Infections Among Women in Baquba City

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Abstract---Backgrounds: Infertility is defined as the inability to conceive after twelve months of normal and unprotected sexual intercourse, It is estimated that between 8% -12% of couples of childbearing age in the world are impacted and a variety of factors have a role, including microbial infections. Objectives: To determine the infertility rate and relation with microbial agents among women in Baquba city. Methods: A cross-sectional study was conducted on 308 women who were admitted to outpatient in Al-Batool Teaching Hospital for Maternity and Children in Baqubah City, Diyala. Iraq during the period from January till December 2018. Urine and vaginal swabs were taken from 70 infertile women aged between 18-48 years, clinical diagnosis was done as well as laboratory through examining different microbial agents. Results: The infertility rate among women in Baquba city was 22.7%, primary infertility constitute 69.60% while secondary infertility was 30.40%. A high percentage of 65.7% were with microbial infections while 34.3% were without infection. *Trichomonas vaginalis* showed a high frequency of 22 cases than others, followed by *Candida albicans* was 17 cases, and *Chlamydia trachomatis* was 7 cases, the main age infection was 18-28 years old found 47.8% followed by the age 29-38 years old about 30.4% and the age 39-48 years old was less common about 21.7%. The patients were infected with *Trichomonas vaginalis* 63.6% have a single infection, while 27.3% have co-infection with *Candida albicans* and 9.1% with *Chlamydia trichomats*. On the other hand, the patients who were infected with *Candida albicans* 64.7% have a single infection while

35.3% have co-infection with *Trichomonas vaginalis*, while the patients who have an infection with *Chlamydia trichromats* 42.9% have a single infection while the other 57.1% have co-infection 2 of them have *Trichomonas vaginalis* and 2 others have other bacteria Conclusion: The infertility rate is moderate in women in Baquba city, the primary type was common, and the main infectious cause of infertility is *Trichomonas vaginalis*.

Keywords--candida albicans, chlamydia, infertility, trichomonas vaginalis, women.

Introduction

The World Health Organization defines infertility as a reproductive system illness characterized by the failure to obtain the pregnancy following twelve months of normal unprotected sexual intercourse. (1). Around 186 million people worldwide suffer from infertility, the majority of whom live in developing countries. (2). Infertility is prevalent in 3.5%-16.7% of industrialized countries and 6.9%-9.3% of underdeveloped countries (3). The most effective negative indicator of fertility is a woman's age before conception. (4). Woman factors account for at least 35% of all fertility problems and include a broad variety of factors influencing ovarian development, oocyte maturation, fertilization competence, and the potential of a fertilized egg for preimplantation growth, implantation, and fetal growth, and also the possibility of a fertilized egg for preimplantation development, implantation, and fetal growth. (5). There are two types of infertility, Primary infertility is defined as "inability to conceive within two years of exposure to pregnancy," whereas secondary infertility is defined as "inability to conceive within two years of exposure to pregnancy after a previous pregnancy". The majority of infertile couples throughout the world suffer from primary infertility. (6). The causes of infertility vary based on the age of the partner and the age of the marriage. And although polycystic ovarian syndrome (PCOS) is still the most prevalent cause of tubal factor infertility, infections remain a major factor. The most common infections that induced infertility were gonorrhoea and sexually transmissible illnesses. (7). Infections commonly affect cervical areas, tubal blockage, and peritoneal damage in females, interfering with human infertility. Coinfections, in addition to direct infections, are now thought to be the cause of sperm quality, motility, and movement problems. (8).

Infections of the genital tract, such as bacterial vaginosis, pelvic inflammatory disease, and endometritis, can cause infertility. Increased risk of sexually transmitted infections is all likely factors in infertility. (9)(10). In addition, obesity has been related to an increased risk of female infertility, as have lipid metabolic disorders and a history of abortion. (10). Infection with *Chlamydia trachomatis* in the genital tract can cause serious reproductive problems like acute urethritis, cervicitis, and salpingitis, as well as pelvic inflammatory illness, which can lead to tubal factor infertility. (11). It's an obligate intracellular gram-negative bacterium that, is the second most common cause of bacterial sexually transmitted infection after Neisseria infection worldwide. (12). A high frequency of asymptomatic cases is up to 70% in females (13).

Trichomoniasis is a parasitic infection that causes one of the most frequent non-viral sexually transmitted disorders. *Trichomonas vaginalis* is a flagellate human parasite that causes the world's most prevalent non-viral sexually transmitted infection and is linked to fertility and cervical abnormalities. (14)(15). *Candida* infection has sperm-immobilizing capabilities, and since no clinical or histological alterations were found in the reproductive organs, colonization of the vaginal canal with sperm-impairing microbes could be the cause of female infertility. (16). *Candida albicans* is a common commensal organism of the female genital tract that can cause diseases ranging from minor vaginitis and cervicitis to life-threatening infections (17).

Objectives

The current study aimed to determine the infertility rate and related microbial agents among women with infertility status in Baquba city.

Methods

Study design and samples collection

A cross-sectional study was done on 308 f who were outpatients in Al-Batool Teaching Hospital for Maternity and Children in Baqubah City, Diyala. Iraq in the period from January until December 2018. Following a complete history and clinical examination, a high vaginal swab taken from the posterior fornix of the vagina, and a comprehensive urine examination, all samples were examined for the presence of *Trichomonas vaginalis* using a wet mount preparation under the microscope. (18), as well as used *Trichomonas vaginalis* rapid tests were performed according to manufacturer's (Biotech™ Corp., China), saline and 10% KOH smears were used for the presence of *Candida albicans* (19), and Chlamydia rapid diagnostic test (Biopanda reagents, RAPG-CLM-001) was used to determine the presence of *Chlamydia trachomatis* in female cervical swab samples then all results were recorded.

Statistical analysis

The statistical analysis was done by using Program (SAS) - 2012, version 22, number, percentage, and proportion, and chi-square were used to test the effect of different factors in the study. For a significant comparison, we used the (0.05 probability).

Results

The infertility rate was 22.7% (70 out of 308), 65.7% (46 out of 70) were with microbial infections while 34.3% (24 out of 70) were without infection (Figure 1). The primary type of infertility was constituted 69.6% (32 out of 46) while the secondary type of infertility was 30.4% (14 out of 46).

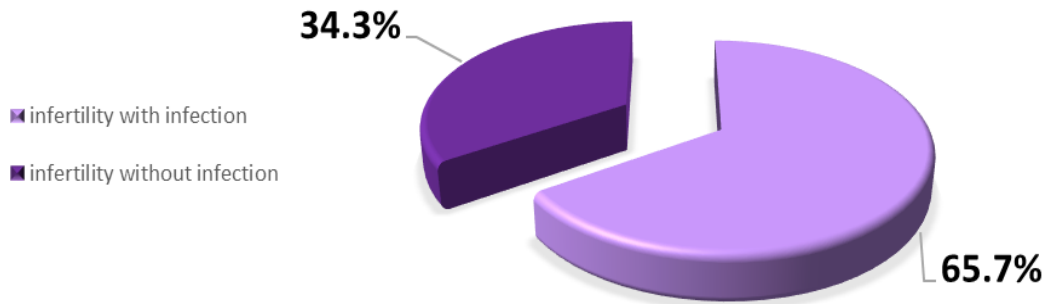


Figure 1. The relation between infertility and type of infection

According to microbial infections, the infection with *Trichomonas vaginalis* showed high frequency than others 47.8% (22 out of 46) followed by *Candida albicans* was 37% (17 out of 46), and *Chlamydia trachomatis* was 15.2% (7 out of 46) as shown in Figure 2.

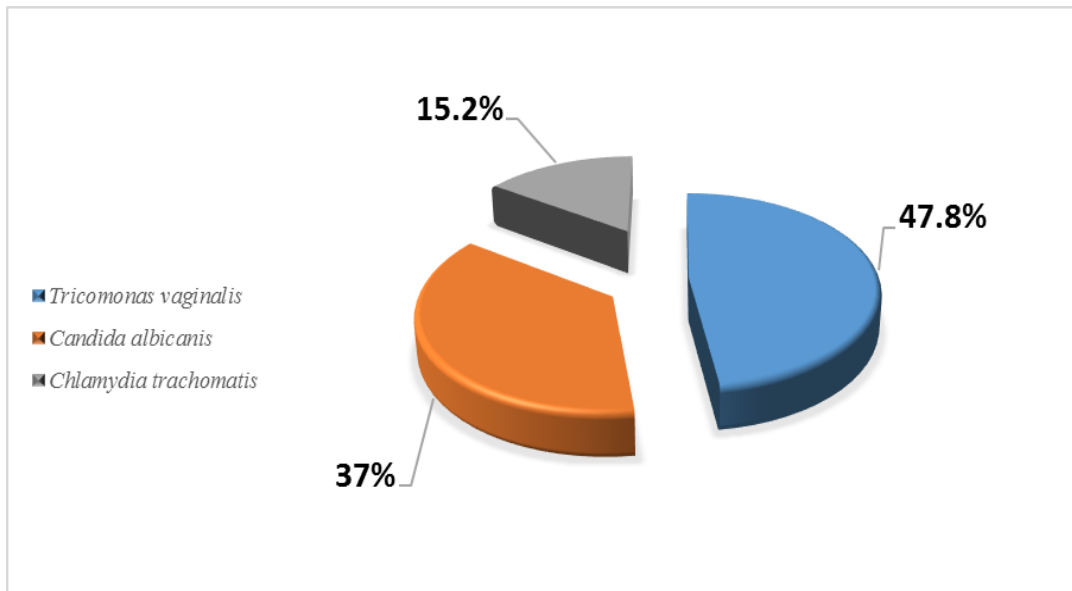


Figure 2. Distribution of microbial infections with infertility status

Regarding the results of Table (1). The minimum age was 18 years and the maximum was 48 years with a mean of 30.4 ± 8.2 , the most frequent infection was diagnosed in the age group 18-28 years old (22 cases), followed by the age 29-38 years old was 30.4% and the age 39-48 years old was less common about 21.7%.

Table 1
Distribution of infertile women with infections according to age

Age groups	Infertile No. (%)	Fertile No. (%)	p-value
18-28	22 (47.8%)	160 (61.1%)	0.7NS
29-38	14 (30.4%)	70(26..7%)	
39-48	10 (21.7%)	32 (12.2%)	
Total	46 (100%)	262(100%)	

NS = Non Significant

The percentage of patients who were infected with *Trichomonas vaginalis* 63.6% have a single infection, while 27.3% have co-infection with *Candida albicans* and 9.1% with *Chlamydia trichromats*. On the other hand, the patients who were infected with *Candida albicans* 64.7% have a single infection while 35.3% have co-infection with *Trichomonas vaginalis*. The rate of patients who have an infection with *Chlamydia trichromats* 42.9% have a single infection while the other 57.1% have co-infection 2 of them have *Trichomonas vaginalis* and 2 others have other bacteria as shown in Table 2.

Table 2
Type of infections in the study population

Microorganism	No. (%)	single infection	Co-infection	P-value
Trichomonas vaginalis	22 (47.8%)	14 (63.6%)	8 (36.4%)	0.8NS
Candida albicans	17(37%)	11(64.7%)	6 (75%) <i>Candida albicans</i> 2 (25%) <i>Chlamydia trichromats</i>	
Chlamydia trichromats	7 (15.2%)	3 (42.9%)	4 (67.1%) 2 (50%) <i>Trichomonas vaginalis</i> 2 (50%) Other bacteria	

NS = Non-Significant

Discussion

The current study showed that the infertility rate among women in Baquba city was 22.7%, the primary type of infertility constituted 69.6%, while the secondary type of infertility was 30.4%. These results were near to the results of studies from other governorates such as a study done in the Al-Anbar governorate and report 62% with primary infertility and 38% had secondary infertility (17). Another study done in Erbil city found 63% had primary, and 37% had secondary infertility (18). Outside Iraq, the prevalence of primary and secondary infertility was 67.37% and 32.63% respectively in Morocco (19). The results of this study were relatively low compared with the result of the study conducted in the general population of Iraq that found the primary type of infertility in women was about 79.1% and secondary type was about 78% (20). Also, the results of this study

were higher than the results of the studies that were reported from neighboring countries such as Turkey so the infertility rate in the general Turkish population was 5.94% (21). In Iran, primary infertility among couples was 17.3% (22). The differences may be due to the difference in the environment and surrounding conditions and the time of sample collection or the method used in the diagnosis, or it may be due to the different societies in which the study was conducted or the time during the year in which the samples were collected.

The results of this study showed that 65.7% of infertility was caused by microbial infection, which was distributed as *Trichomonas vaginalis* was 47.8%, *Candida albicans* was 37%, and *Chlamydia trachomatis* was 15.2%, while the others 34.3% without infections. Concerning *Trichomonas vaginalis* infection, the current study showed that the infection was 47.8% the highest of other Iraqi studies such as 27.9% among couples in Al-Hamza city Al-Qādisiyyah governorate-Iraq (23), 34.41% among infertile women in Baghdad province (14). While the results were lower than the study of infection of *Trichomonas vaginalis* among infertile couples in the study of the role of this infection in the center for infertility and In vitro fertilization In Erbil that was 70% (24). The result of the current study was higher when compared with studies from neighboring countries such as in Turkey was found 18% in infertile patients (25). while in Tehran was 8.3% and was symptomatic in 13.3% of infected women and about 3.3% in women with pregnancy (26). On the other hand, the infection associated with infertility in other countries was 10% was detected in 88.9% with primary infertility, and 11.1% with secondary infertility in Beni-Sueif-Egypt (27), while globally was 12.8% among infertile women in the USA (28). This may be due to the trichomoniasis infection caused pelvic inflammatory disease involving inflammation of ovaries, fallopian tubes, endometrium, and pelvic peritoneum ending in tissue damage(29), and the sperm cells and their by-products were phagocytosed by *T. vaginalis*, resulting in sterility in the infected husband and wife (30).

The current study showed that the infection with *Candida albicans* among infertile women was 37%. The results were low when compared with the results of the study in Babylon province reported 61.53% with primary infertility while 38.46% with secondary infertility (31). Outside Iraq was 67.7% of Iranian infertile women were infected with *Candida albicans* (32), 35% of the patients suffered from vaginal candidiasis in India (33).

This study showed that the infection with *Chlamydia trachomatis* among infertile women was less common than other infections that were 15.2% and when the results compared with the other studies from other governorates such as Al-Nasiriyah was 9.5% (34). Infertility rate was in Iraqi women attending several facilities in Baghdad, including the gynecology sections of the women's health center at Al-Elwiyia obstetrics hospital, Ibn Al-balady Maternity, and Children's Hospital were infected at a rate of 13.75%. (35), and 43.2% of infertile women in Basra (36).

The prevalence of chlamydial infection in neighboring countries such as In Jordan, the rate was reported to be 3.9%(37), Saudi Arabia in women with infertility is 8% (38). In Tehran was (10.8%) among women with pregnancy-

related complications and infertility was 10.6% and 11.1% among women in the symptomatic group (26). Another study reported prevalence of *Chlamydia trachomatis* in infertile women infection based on PCR was (12.4%) in Iran (39). *Chlamydia trachomatis* is linked to infertility, especially when it causes tubal inflammation, and it can cause irreversible damage to the fallopian tubes, including proximal and distal tubal occlusions, which can lead to infertility (40). On the other hand, *Chlamydia trachomatis* produces more heat shock protein which causes a proinflammatory immunological response in the human fallopian tube epithelia, resulting in scarring and tubal blockage(41).

The differences in the infection rate can be linked to a variety of factors, including the sample size and type, the study period, the method used for diagnosis, and the nature of social traditions existing in society, the lower the rate of infection and the use of serological tests can produce unmeasurable findings, especially when immunological responses against the parasite can last for years.

Regarding the age, the results of this study showed the infection was common in age group (18-28 years old) was 47.8% followed by the age 29-38 years old was 30.4% and the age (39-48 years old) was less common about 21.7%. These results are similar to the results of the study that conducted infertility in age ≤ 30 years that was reported 42% from infertile women (42), and a study conducted in the urban population of central India reported the age more than 25 years was common (43). While another study it was found that 26% of infertile women were aged 31-35 years were positive for chlamydia infection (44) and the study was reported infertility associated with infection was at age ≤ 40 years (45).

Other studies also showed similarities with the current study such as a study in Al-Hamza city-Iraq that showed that the infection rate of *Trichomonas vaginalis* among infertile women was highest in the group 28-32 years old followed by the group 23-27 years old while the age group 38-43years old was the lowest incidence rate (23), other study done in Al-Muthanna province that showed the higher percentage of *T. vaginalis* infection in the age group 20-25 years old while the lower percentage in the age group 41-45 years old (46). While the infection was more in those aged 26-35 years old in Al-Diwaniya, Iraq (47).

The results of this study are different from other studies such as a study conducted among women visiting obstetrics and gynecology clinics in Malaysia that reported there was no significant correlation between chlamydial infection and age (48) and differ from the results of the study conducted in the Department of Obstetrics and Gynecology, Faculty of Medicine Cairo University- Egypt that found not significantly correlate between *Trichomonas vaginalis* infections and age (27).

Differences in proportions between age groups can be caused by a variety of causes, including vaginal PH, estrogen and progesterone concentrations, repeated pregnancy and miscarriage, and weakened bodily defenses following the menstrual cycle (49). The decrease in infection in elderly women may be due to an increase in vaginal PH, which will reach 6-8, as well as a fall in estrogen and progesterone levels, which do not promote infection (50).

In this study, the co-infection was 27.3% of patients with *Trichomonas vaginalis* have *Candida albicans* and 9.1% have *Chlamydia trichromats*. Of the patients who were infected with *Candida albicans*, 35.3% have co-infection with *Trichomonas vaginalis*. The patients who have an infection with *Chlamydia trichromats*, 57.1% have co-infection 2 of them have *Trichomonas vaginalis* and 2 others have other bacteria. Another study showed that the co-infection rate of *Trichomonas vaginalis* was 2.6% occurred mostly with *Chlamydia trichromats* about 12.5% followed by *Neisseria gonorrhoeae* about 6.3% (51).

Trichomonas vaginalis, *Chlamydia trichromats* and/or *Candida albicans* infection together may raise the risk of upper genital tract infection more than *Chlamydia trichromats* infection alone that may be due to increasing the effectiveness of these infectious agents and affect the immunity of patients than other single infection and consequently increasing the chance of infertility by invasive of genital tract by other microorganisms that lead to inflammation and damage to the genital mucosa. In conclusion, the infertility rate is moderate in women at Baquba city, the primary type was common, and the main infectious cause of infertility is *Trichomonas vaginalis* followed by *Candida albicans* while the *Chlamydia trichromats* were a less common cause of infertility in Baquba city, Diyala- Iraq

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