

# The prevalence of *Trichomonas Vaginalis* in association with other micro-organisms among women with vaginal discharge in Mosul

Haytham M. Al-Habib\*, Nawfal Y. Al-Dabbagh\*, Ghada A. Al-Daheen\*\*

Departments of \*Microbiology, \*\*Obstetrics & Gynaecology, College of Medicine, University of Mosul

(Ann. Coll. Med. Mosul 2005; 31(1): 37 - 44)

Received: 2<sup>nd</sup> Aug 2004; Accepted: 18<sup>th</sup> May 2005

## ABSTRACT

**Objective:** To screen women with vaginal discharge for *Trichomonas vaginalis* as well as other pathogens and to follow them up.

**Setting:** Outpatient Gynaecologic Clinic, Family Planning Clinic, and Antenatal Clinic at Al-Batool Teaching Hospital for Gynaecology and Obstetrics.

**Participants:** 440 women with vaginal discharge (July 1997 to June 1999).

**Intervention:** Full medical, gynaecological, sexual and social history was recorded. Clinical examination was carried out. Laboratory investigations including vaginal, cervical and urethral swabs for direct examination, gram-stained smear, as well as culture on appropriate media.

**Results:** The total number of *Trichomonas vaginalis* infection was 68 (15.5%). The isolated microorganisms in association with *Trichomonas vaginalis* were *Candida albicans* in 19 women (27.9%), *Staphylococcus epidermidis* in 10 women (14.7%), and *Lactobacilli* in six women constituting (8.8%). Both *Diphtheroids* and *Neisseria gonorrhoeae* showed lower incidences, as only eight women were positive (5.9%) for each. *Escherichia coli* was present in one patient (1.5%). 24 patients were positive for *Trichomonas vaginalis* only (35.3%).

The remaining 372 women who were negative for *Trichomonas vaginalis* showed a high rate of infection with *Candida* species (21.5%), followed by *Staphylococcus epidermidis* (18.3%) and *Lactobacilli* (15.3%). Other isolates included *Streptococcus* species (8.6%), *E.coli* (5.9%), *Klebsiella* (3.8%), *Enterococcus faecalis* (3.0%), *Gardnerella vaginalis* (2.6%), *Neisseria gonorrhoeae* (2.4%), *Proteus* (2.2%), *Diphtheroid* (1.9%), *Staphylococcus aureus* (1.3%) and *Pseudomonas aeruginosa* (0.8%). Moreover, 46 (10.5%) of women showed no growth.

50.0% of infection with *Trichomonas vaginalis* was at age 26-35 years. Considering marital status, the highest rate (76.4%) of infection was among married women followed by divorced (14.7%), widows (5.8%) and singles (2.9%). Pregnant women positive for *Trichomonas vaginalis* represented (45.6%) of cases. 61.7% of infection was among illiterate women.

Metronidazole (flagyl) was given to all in a dose of 250mg orally thrice daily for seven days. Metronidazole was prescribed at the same time to husbands of infected women. Other specific medications (antifungal, antimicrobial agents) were given when indicated either alone or in combination with metronidazole.

Two weeks later only 112 women came for reassessment clinically and by repeating direct smear and culture, that showed fifteen positive cases. Five of them still having *Trichomonas vaginalis*, eight were having *Candida albicans*, and two showed normal smears. Further courses of treatment were given as indicated.

**Conclusion:** Vaginal discharge is common among women in reproductive life.

Culture is indicated for precise diagnosis

**Key words:** *Trichomonas vaginalis*. Vaginal discharge. Metronidazole.

## الخلاصة

الهدف من اجراء البحث: لتعيين نسبة الإصابة بالمشعرات المهبليّة في النساء اللواتي يعانين من افرازات مهبليّة إضافة إلى البحث عن المسببات الاخرى للافرازات المهبليّة و متابعة الحالات سريريا و مختبريا للبحث في كفاءة المعالجة.

مكان إجراء البحث والإطار الزمني: اجري البحث في العيادة الخارجية للأمراض النسائية والتوليد، عيادة رعاية الحوامل و عيادة تنظيم الأسرة في مستشفى البتول التعليمي للولادة والنسائيات في الموصل.

المشاركون: ٤٤٠ امرأة من النساء اللواتي لديهن افرازات مهبليّة للفترة من تموز ١٩٩٧ إلى حزيران ١٩٩٩.

**طريقة إجراء البحث:** تم أخذ المعلومات السريرية المتعلقة بشكوى المريضة وتاريخ المرض والحالة الاجتماعية والتعليمية، ثم إجراء الفحص السريري والفحوصات المختبرية اللازمة.

**النتائج:** تبين من الدراسة أن نسبة الإصابة بالمشعرات المهبليية هي ٦٨ امرأة ١٥,٥% من مجموع ٤٤٠ امرأة خضعت للدراسة، وان هنالك عدد من الأحياء المجهرية المصاحبة للمشعرات المهبليية في أربعة وستون حالة وهي حسب تدرج نسبة الإصابة كما يلي: فطريات المهبل بنسبة ٢٧,٩%، البكتريا العنقودية بنسبة ١٤,٧%، بكتريا العصيات الحليبية بنسبة ٨,٨%، الجراثيم المسببة للسيلان بنسبة ٥,٩%، ومن نوع الدفتريود ٥,٩%، أما عصيات القولون ١,٥%. بينما كانت أربعة وعشرون حالة (٣٥,٣%) من الإصابات مقتصرة فقط على المشعرات المهبليية بدون بكتريا مصاحبة.

ظهرت أعلى نسبة للإصابة ببدء المشعرات في الأعمار بين ٢٦-٣٥ سنة بنسبة ٥٠% وان ٧٦,٤% من النساء المصابات كنّ متزوجات ٤٥,٦% من النساء المصابات كنّ حوامل، وان ٦١,٧% منهن كنّ غير متعلمات. تمت المعالجة باختيار جرعة مناسبة من دواء فلاجيل في حالة الإصابة ببدء المشعرات لكل من النساء وأزواجهن مع اضافة معالجات اخرى في حالة وجود اكثر من جرثومة.

تمت متابعة مئة و اثني عشر من الحالات بعد اسبوعين او اكثر من ابتداء المعالجة ودراسة مدى فاعلية العلاج باعادة الفحص السريري والمختبري وتبين ان هناك خمسة عشرة امرأة فقط بقيت يعانين من افرازات مهبليية، خمسة منهن مصابات ببدء المشعرات وثمانية اخريات مصابات بفطريات المهبل، واثنتان فحصهما طبيعى وقد تم الشفاء بتكرار المعالجة.

**التوصيات:** تجنب المعالجة العشوائية للنساء اللواتي يعانين من افرازات مهبليية لاحتمال وجود اكثر من جرثومة مسؤولة عن الإصابة حيث ان استعمال نوعين او اكثر من الدواء بدون التعرف على نوعية الجراثيم المسببة قد يؤخر شفاء الحالة.

**T**richomonal infection has been encountered in every continent and climate, with no seasonal variability. It has a cosmopolitan distribution and has been identified in all racial groups and socioeconomic statuses<sup>(1)</sup>. The estimated incidence is more than 170 million cases worldwide<sup>(2,3)</sup>. Infection with *Trichomonas vaginalis* occurs in women and men at any age, and is common during pregnancy<sup>(3)</sup>. The knowledge of other genital pathogens in association with *Trichomonas vaginalis* is useful in planning treatment and understanding the factors predisposing to trichomonal infection and the factors enhancing the pathogenicity of other microorganisms<sup>(4)</sup>. Vaginal trichomoniasis was found to be associated with *Gonococci*, *Streptococci*, *Mycoplasma*, *Diphtheroid*<sup>(5)</sup>, *Micrococci* and *Enterococci*<sup>(16)</sup>. Foutes and Krause<sup>(7)</sup> pointed out the association of trichomoniasis with candidiasis. Similar results were obtained in Sudan by Omer et al<sup>(8)</sup> who studied the bacterial vaginal flora among women presenting with leukorrhoea. *Trichomonas vaginalis* may be a true pathogen, it may act synergistically with bacteria, or it may simply thrive under conditions resulting from other causes<sup>(9,10)</sup>. It has been found that most of the patients with vaginitis are suffering from infection that is caused by *Candida* species, *Gardnerella vaginalis*, *Trichomonas vaginalis*, or *Neisseria gonorrhoeae*<sup>(11,12,13)</sup>.

The purpose of this study was to screen women with vaginal discharge for *Trichomonas vaginalis* as well as other

pathogens; also to follow the patients up after treatment. As far as we know, it is the first study in Mosul area to concentrate on follow up of patients with trichomoniasis after treatment.

## PATIENTS AND METHODS

Four-hundred and forty women attended Al-Batool Teaching Hospital for obstetrics and gynecology with a complaint of vaginal discharge were included in the study from July 1997 to June 1999.

All patients were reviewed clinically, i.e. a standard medical, gynecological, sexual, obstetric and social history was taken. General medical examination was carried out, with local examination. Samples for laboratory investigations were taken from vagina, cervix and urethra. The patients were in the age range of 19-60 years, 244 were married (55.45%), 72 were divorced (16.36%), 16 widowed (3.63%) and 8 singles (1.8%).

Specimens were collected during genital examination in the lithotomy position. A cusco's bivalved speculum was inserted and the discharge from the posterior vaginal fornix and also from endocervix was collected using sterile cotton-tipped swabs. Low vaginal swabs were taken from unmarried women.

### Vaginal Samples:

- Direct wet mount preparation [where a drop of vaginal secretion was mixed with a drop of normal saline and examined under the microscope(40 objective)] for

*Trichomonas vaginalis*, yeast, epithelial cells and bacteria.

- Amine test: [was performed where the vaginal secretion was mixed with 2 drops of (10%) KOH. The result was considered positive if a characteristic fishy smell appeared directly after adding KOH], suggesting infection with *Gardnerella vaginalis* and also *T. vaginalis*.
- Gram's stained smears for the presence of microorganisms, polymorphonuclear leukocytes (PMN), epithelial cells and clue cells. Finding cells was reported semiquantitatively as (+, ++, +++) per field indicating few, moderate, or large.

#### Microbiological methods :

The specimens were inoculated onto duplicate of blood agar plates, *Gardnerella* agar, MacConkey's agar, Thayer Martin agar, Sabourand's agar and *T. vaginalis* medium (CM 1161, Oxoid) <sup>(14,15)</sup>.

One of the blood agar plates was incubated aerobically in 5%-10% CO<sub>2</sub>, while the other was incubated anaerobically using Gas Pak Generating Kit (Oxoid).

*Gardnerella* agar was incubated anaerobically, Thayer Martin medium was incubated 5%-10% CO<sub>2</sub>, while MacConkey's agar, Sabourand's agar and *T. vaginalis* medium were incubated aerobically

All plates were incubated at 37°C for twenty-four hours, with a further twenty-four hours incubation when there was no growth. Cultures for anaerobes were incubated for 48 – 72 hours.

The isolates were identified by their colonial morphology, Gram's stain appearance and standard biochemical tests, in addition to the API identification system (Bio Merieux, France); *T. vaginalis* was identified microscopically by observing their motility on wet mounts and by culture.

Treatment of infected women was directed according to laboratory results. metronidazole (Flagyl) was given to women who were positive for *Trichomonas vaginalis* as an oral dose of 250mg three times per day for seven days. Treatment of the male partner with metronidazole was recommended at the same time, as a seven days oral course of 500mg twice daily or as single dose regime of 2g orally.

Other (antifungal and antimicrobial) drugs were given either alone or in combination with metronidazole depending on the pathogen identified.

For *Candidiasis*, either nystatin 100,000U vaginal tablet once at night for fourteen days, or miconazol cream for seven days, miconazol 200mg vaginal suppository three times /day for three days, or clotrimazol 100mg vaginal tablet once a day for seven days, or twice per day for three days were prescribed; beside advice on local hygiene. The choice between these agents depended on their availability and patient's cooperation.

For bacterial vaginosis (increased prevalence of *Gardnerella vaginalis*, Gram negative rods, *Bacteroids*, *Mycoplasma* and *mobiluncus*), metronidazole was used in the same doses as for *Trichomonas vaginalis*. The alternative for this treatment was either tetracycline, erythromycin or local triple sulfa cream.

Different antimicrobial agents were used alone or in combination with other preparations to treat other types of vaginal infection depending on laboratory results and after excluding contra-indications (drug hypersensitivity, harmful effect on pregnancy); of these are cephalosporines, gentamycin, amoxycillin, etc.

For women with vaginal discharge in whom no pathogen is isolated, non-specific treatment was given after excluding local causes, e.g; cervical erosion. Tetracycline was prescribed for such women for the possibility of having *Chlamydia*, *Mycoplasma* or viral infection which were not tested for in our study.

**Statistical Analysis:** Data were analyzed using the (X<sup>2</sup>) or Two-Tailed probability test to show significant difference between groups. P value of 0.05 or less was considered to be significant.

## RESULTS

*Trichomonas vaginalis* infection was detected in 68 cases out of 440 women examined (15.5%).

The prevalence of *Trichomonas vaginalis* infection among different age groups is shown in Table I. The highest rate of infection (50%) was seen at age group 26-35 year.

**Table (1):** The prevalence of *Trichomonas vaginalis* infection among different age groups.

Age group (years)	Total number examined	Number of positive cases	Percent of Positive cases
19 – 25	116	14	20.6
26 – 35	208	34	50.0
36 – 45	94	18	26.5
46 – over	22	2	2.9
Total	440	68	100

DF = 3, X<sup>2</sup> = 2.808, P = 0.422

**Table (2):** The relation of marital status with *Trichomonas vaginalis* infection.

Marital status	Number of patients examined	Number of Positive cases	Percent of Positive cases
Married	244	52	76.47
Divorced	72	10	14.75
Widow	16	4	5.83
Single	8	2	2.95
total	440	68	100

DF = 3,  $X^2 = 1.839$ , P = 0.607**Table(3) :** The relation of menstrual history with *Trichomonas vaginalis* infection.

Menstrual history	Number examined	Number of positive cases	Percent of positive cases
Menstruating	102	28	41.3
Pregnant	263	31	45.6
lactating	64	7	10.2
Menopausal	11	2	2.9
Total	440	68	100

DF =3,  $X^2 = 15.004$ , P = 0.002**Table (4):** The distribution of *Trichomonas vaginalis* according to educational levels.

Educational level	Number examined	Number of positive cases	Percent of positive cases
Illiterate	316	42	61.8
Primary	82	14	20.5
Secondary & above	38	12	17.7
Others*	4	0	0.0
Total	440	68	

\* college education and higher

**Table (5):** Microorganisms isolated from vaginal discharge in association with *Trichomonas vaginalis* in order of frequency.

Isolated microorganisms	Number of positive cases	Percent (%) of positive cases
No growth (except T.V*)	24	35.3
<i>Candida albicans</i>	19	27.9
<i>Staphylococcus epidermidis</i>	10	14.7
<i>Lactobacilli</i>	6	8.8
<i>Diphtheroids</i>	4	5.9
<i>Neisseria gonorrhoeae</i>	4	5.9
<i>Eschereshia coli</i>	1	1.5
Total (T.V)	68	100

\* T.V = *Trichomonas vaginalis*

Table 2 shows the prevalence of *Trichomonas vaginalis* infection in relation to marital status. The highest rate (76.5%) was among married women.

The relationship between *Trichomonas vaginalis* infection and menstrual history is presented in Table 3. Highest prevalence

was noted among pregnant women (45.6%).

Table 4 shows infection with *Trichomonas vaginalis* in relation to educational level. Illiterate women had the highest rate (61.7%).

**Table (6):** Microorganisms isolated from vaginal discharge of 372 women without *Trichomonas vaginalis* infection.

Microorganisms isolated	Number of positive cases	Percent (%) of positive cases
No growth of pathogen	46	12.4
<i>Candida albicans</i>	80	21.5
<i>Staphylococcus epidermidis</i>	68	18.3
<i>Lactobacilli</i>	57	15.3
<i>B. haemolytic Streptococcus</i>	18	4.8
<i>Anaerobic Streptococcus</i>	14	3.8
<i>Enterococcus faecalis</i>	11	3.0
<i>Eschereshia. coli</i>	22	5.9
<i>Klebseilla</i>	14	3.8
<i>Proteus</i>	8	2.2
<i>Gardnerella. vaginalis</i>	10	2.6
<i>Neisseria gonorrhoeae</i>	9	2.4
<i>Diphtheroids</i>	7	1.9
<i>Staphylococcus aureus</i>	5	1.3
<i>Pseudomonas aeruginosa</i>	4	0.8
Total negative trichomoniasis	373	100

**Table (7): Microscopical findings of wet mount preparation.**

Gram stain	Infected with <i>Trichomonas. Vaginalis</i>		Infected with other micro organisms	
	No	%	No	%
PMN (pus cells)				
-	28	41.2	176	47.3
+	19	27.9	111	29.8
++	12	17.6	49	13.2
+++	9	13.3	36	9.7
	68	100.0	372	100.0
Epithelial cells				
-	30	44.1	126	43.5
+	22	32.4	141	37.9
++	9	13.2	42	11.3
+++	7	10.3	27	7.3
	68	100.0	372	100.0
Clue cells				
-	66	97.1	351	94.4
+	2	2.9	21	5.6
	68	100.0	372	100.0

- = no cells , += few , ++ = moderate , +++ heavy  
PMN= polymorphonuclear leukocytes

**Table (8): The distribution of *Trichomonas vaginalis* according to clinical symptoms (apart from vaginal discharge)**

Symptom	Positive symptoms	
	Number	Percent (%)
Irritation and pruritus	36	53.0
Dyspareunia	21	30.9
dysuria	11	16.1
Total	68	100

**Table (9): Results of follow up after treatment.**

Period of observation	Number of patients	Results of treatment			
		Success	%	Failure	%
None	340	-	-	-	-
2 weeks	112	97	86.6%	15	13.4
4 weeks	15	11	73.3%	4	26.7

**Table (10): Bacteriological results in patients with residual symptoms after treatment.**

Microorganism	Residual symptom		Total percent (%)	
	Discharge	Pruritus		
<i>Trichomonas vaginalis</i>	4	1	5	33.3
yeast	3	5	8	53.3
No pathogen	2		2	13

The isolated microorganisms from vaginal discharges in association with *Trichomonas vaginalis* infection are presented in Table 5. This table shows that *Candida albicans* was the dominant pathogen which represented (27.9%). *Trichomonas vaginalis* was the only pathogen isolated from 24 cases out of the 68 women positive with *Trichomonas vaginalis*, representing (35.3%). Table 6 shows the frequency of other microorganisms isolated in the remaining 372 women with vaginal discharge who were negative for *Trichomonas vaginalis*. Table 7 shows the microscopical findings of wet preparation. Clinical symptoms due to *Trichomonas vaginalis* (apart from vaginal discharge) are presented in Table 8. The data showed that irritation and pruritus were evident among 36 women (53.0%), and dyspareunia was a complaint among 21

women (30.9%), while dysuria was found in 11 women only (18.2%).

After prescribing the therapy that we adopted, patients were instructed to return two weeks later for follow up where only one hundred and twelve of them attended; Table 9. The reassessment included clinical evaluation and repeating laboratory procedures including culture. Fifteen of them (13.4%) were still suffering from vaginal discharge and associated local problems. *Trichomonas vaginalis* was detected in 5(33.3%) women. *Candida albicans* in 8(53.3%). Negative smear and culture results were seen in 2(13%) women. Metronidazole was given again in the same courses. A longer course of local antimycotic agents was advised to eradicate fungal infection. Broad-spectrum antibiotics were prescribed for those in

whom no pathogen was isolated; an antibiotic course like tetracycline or erythromycin was prescribed for the possibility of Chlamydial infection. Of the fifteen women, eleven were seen three weeks later, where only direct wet mount smear examination was carried-out which was negative.

## DISCUSSION

The prevalence of *Trichomonas vaginalis* infection in our study was (15.5%), however other studies from Iraq recorded different results. In Baghdad the prevalence rate varies between 3.9% to 19.5%<sup>(16-20)</sup>, in Mosul 12.5% and 14%<sup>(21,14)</sup> respectively, in Basrah 11.3%<sup>(22)</sup>, in Erbil 10.0%<sup>(23)</sup> and 7.5% in Kirkuk<sup>(24)</sup>. Higher incidences were reported in London and Georgia<sup>(25,7)</sup> respectively. The incidence of trichomoniasis is as high as 56% in patients attending STD clinics<sup>(26)</sup>. This rate depends on many factors including age, sexual activity, number of sexual partners, other STD, sexual customs, phase of menstrual cycle, technique of examination, specimen collection and laboratory technique. The higher incidence of *Trichomonas vaginalis* in the Western countries than those obtained in Iraq could be attributed to the local habits; also the promiscuous sexual practice which is common in the western countries and unusual in our community. Hence there is much less chance of spreading the parasite in our community.

The highest incidence (50.0%) of infection by *Trichomonas vaginalis* was reported among females at age group 26-35 year. This finding is in accordance with those reported by other workers<sup>(27,23,18)</sup> who emphasized that infection occurs mostly at ages of greatest sexual activity. However lower rate (2.9%) of infection was noted among age group 46 years and over, which is in agreement with Al-Najar<sup>(20)</sup>.

In the present study the highest rate of infection was recorded among married patients (76.5%) which is in agreement with those reported by Mohammed and Al-Mallah<sup>(21,23)</sup>.

The study also showed that the highest incidence (45.6%) of infection was seen among pregnant women. A prevalence of (29.0 %) was reported in Kirkuk<sup>(23)</sup>, and (18.6%) in Basrah. High prevalence was also reported by Poria<sup>(29)</sup>. It seems that pregnancy encourages the growth of the parasite through: high estrogen, high pH, large amount of glycogen in the vaginal epithelium and the generally reduced body immunity during pregnancy<sup>(30,31)</sup>. In addition doctors are usually reluctant to prescribe

metronidazole empirically (without proved indication) during pregnancy because of possible teratogenicity.

The highest rate (61.47%) of infection was seen among illiterate women which was in accordance with those reported by others<sup>(16,19,23)</sup>.

Many reports have been published on the association of *Trichomonas vaginalis* infection and other microorganisms in patients with vaginal discharge. In the present study *Candida* species was the commonest microorganism isolated (27.9%). This is similar to the results obtained by others<sup>(23, 27)</sup> who reported an incidence of (30.0%) and (20.3%) respectively. However Morton<sup>(32)</sup> found that the association rate between trichomoniasis and candidiasis was only (7.4%).

In the current study an association was found between isolation of *Trichomonas vaginalis* and *Neisseria gonorrhoeae* (5.9%). This result was higher than that obtained by Omer *et al*<sup>(27)</sup> of 2.5%. It was different from that reported by Morton<sup>(32)</sup> of 42-46%.

Metronidazole (Flagyl) continued to be the drug of first choice to treat trichomoniasis and bacterial vaginosis since its introduction in 1960<sup>(33,34)</sup>. Considering treatment of our 68 *Trichomonas vaginalis* infected women, the cure rate obtained was (92.6%). The result is comparable to those collected by Dunlop & Wisdom<sup>(35)</sup>, and Gsonka,<sup>(36)</sup> who reported (90.0%), and (92.1%), respectively.

We have chosen the longer course of Flagyl (250 mg tds for seven days) as we believed that the majority of women infested with *Trichomonas vaginalis* are also harboring anaerobic bacteria which respond adequately only with prolonged courses<sup>(33, 34)</sup>. For the male partner, the single dose regimen was chosen as it looked more convenient and practical.

A second course of metronidazole (same initial dose) was repeated for those women who continued to suffer from the infection. This treatment was quite successful in eradicating the parasite. Treatment failure is explained by re-infection by the parasite or due to presence of resistant strains of *Trichomonas vaginalis*. Similar failure rate (11 of 101 women) was registered by Gsonka<sup>(36)</sup>.

Metronidazole was completely successful in treating bacterial vaginosis, given in the same dose used for *Trichomonas vaginalis*.

Considering *Candidiasis*, ninety nine positive cases (22.5%) were identified. With appropriate treatment, we achieved a cure rate of 91 cases, (91.9%).



Eight cases (8.1%) positive with *Candida* were seen at follow up, five of these women were previously positive for *Trichomonas vaginalis*. This comes in agreement with Gsonka<sup>(36)</sup> who concluded increased incidence of fungi seen in vaginal secretions after successful eradication of *Trichomonas vaginalis* which may be due to unmasking of these organisms rather than real increased incidence. That is why routine prophylactic measures against fungi are not recommended.

Combination chemotherapy was used in many of our patients as recommended by results of culture, and as suggested by the gynaecologist.

**Conclusion:** Depending on the results obtained in the current study it was found that the prevalence of *Trichomonas vaginalis* infection in Mosul area was (15.5%). The highest rate of infection was detected among women at child-bearing age (19-35) year, and among illiterate women.

Different microorganisms were found in association with *Trichomonas vaginalis*, like *Candida* species, *S. epidermidis*, *Lactobacilli*, *Diphtheroids*, *N.gonorrhoeae*, and *E schereshia coli*.

Clinical symptoms and signs alone are insensitive predictors of the causative pathogen of vaginal discharge, beside the possibility of the presence of more than one pathogen in the same woman. Treatment should be based on results of culture.

## REFERENCES

- Petrin D, Delgaty K, Bhatt R, Garber G. . Clinical and Microbiology aspects of *Trichomonas vaginalis*. Clin. Microbiol. Rev. ; 1998. 11(2): 300-317.
- World Health Organization; An overview of selected curable sexually transmitted diseases. In global program on AIDS. WHO ; Geneva ; Switzerland. 1995; 2-27.
- Panikar CKJ. Textbook of medical parasitology. (5<sup>th</sup> ed). New Delhi, laypee Brothers Medical publishers (P) Ltd. 2002. pp 37-38.
- Honigbreg BM. Trichomonad of importance in human medicine. In: Kreier Jp ed. Parasitic protozoa. Vol. I; New York; San Francisco and London: Academic press; 1978: 276-455.
- Trussel R.E. *Trichomonas vaginalis* and Trichomoniasis Springfield, Illinois: Thomas CC; 1947
- Robinson SC, Mirchandani G. Observations on vaginal Trichomoniasis; IV. Significance of vaginal flora under various conditions. Am J Obstet Gynaecol; 1965; 91: 1005-1012.
- Foutes AC, Krause SJ. *Trichomonas vaginalis* Reevaluation of its clinical presentation and laboratory diagnosis. J. Infect Dis; 1980; 141: 137-143.
- El-Fadil OE, Keida MF, Hag AH W. Bacteriology of vaginal discharge in Sudanese women. Trop. Doct 1979; 9: 161-163>
- Belding LD; Textbook of Parasitology; 3<sup>rd</sup> ed. New York: Appleton-century-crofts; 1965: 126-135.
- Winston RML; The relation between size and pathogenicity of *Trichomonas vaginalis*; J. Obstet-Gynecol; 1974; 81: 399-404.
- Sobel J D; Importance of differential diagnosis in acute vaginitis; Am. J. Obstet ; 1985; 152 (7): 921-923.
- Chan L. Investigation and treatment of vaginal discharge and pruritus vulvae. Singapore Med. J.; 1989; 30 (5): 471-472.
- Spigel CA. vaginitis / vaginosis; Clin. Lab. Med; 1989; 9 (3): 525-533.
- Kharofa W A . An epidemiological study and cultivation of *Trichomonas vaginalis* in Mosul city; M.Sc thesis. College of science. University of Mosul. 1999 (In Arabic with English abstract).
- Rahemo Z. I, Kharofa W. A; Cultivation of an Iraqi strain of *Trichomonas vaginalis* and selecting the appropriate PH for growth. Rivista D1 parasitologia; 2001; 18 (1) 3-7.
- AL-Shahbender, N; Histopathologic study of vaginal Trichomoniasis. M.Sc thesis. College of medicine. University of Baghdad; 1979.
- AL-Rawi MAM; Epidemiological study of Trichomoniasis and other microorganisms among Iraqi women complaining of vaginal discharge. Diploma Dissertation. Saddam College of medicine. Baghdad; 1995.
- AL-Kaisi AAR; The incidence of T. vaginalis among females with vaginal discharge; M.Sc thesis; University of Baghdad; 1994.
- AL-Mudhaffar ZMJ; *Trichomonas vaginalis* infection. Clinical, immunological and biochemical studies among Iraqi women complaining of vaginal discharge. M.Sc thesis. Saddam College of medicine. Baghdad; 1995.
- AL-Najar S A; *Trichomonas vaginalis* and other associated microorganisms in female genital tract. Iraq. J. comm. Med 1998; 11 (1): 17-19.
- AL-Mallah O A R; Studies on T. vaginalis infection in Mosul. M.Sc thesis. college of medicine . University of Mosul; 1981.

22. Mahdi N K; Urogenital trichomoniasis in an Iraqi population; East. Medit. Heal. J; 1996; 2 (3): 501-505.
23. Kadir M A , Salehy A, Hammad E E. Studies on *Trichomonas vaginalis* in Erbil teaching hospital; J. Fac. Med (Bagh); 1988; 30 (1): 83-88.
24. Gergis B B; The prevalence of *T. vaginalis* in pregnancy and its relation to demographic status in Kirkuk city; Diploma Dissertation; University of Tikrit; 1995.
25. Thin R N T, Melcher D H, Tanp Jw, Hill J; Detection of *Trichomonas vaginalis* in women; comparison of wet smear result with those of two cervical cytological methods. Brit. J. Vener. Dis. 1969; 45: 332-333.
26. Thomason JL, Gilbert SM; *Trichomonas vaginalis*; Obstet. Gynecol. 1989; 74: 536-541.
27. Omer EE; Cattreall R. D; Ali M H; Erwa H H. Vaginal trichomoniasis. Trop. Doct; 1985; 15: 170-172.
28. Gani ZH; Urogenital trichomoniasis among women in Basrah; M.Sc thesis; Basrah University .2000.
29. Poria VC, Joshi BK, Agrawat HH, Mohils NA. Study of *Candida* and *T. vaginalis* in Leucorrhoea. J. Indian Med. Asso. 1989; 87 (8) : 184-185.
30. Ter-Kuile BH; Carbohydrate metabolism and physiology of the parasite protist *Trichomonas vaginalis*; Microbiology 1994; 140 (9) : 495-502.
31. Fouts AC, Kraus SJ; *Trichomonas vaginalis*: re-evaluation of its clinical presentation and laboratory diagnosis; JAMA , 1980; 141 (2): 137-142.
32. Morton RS. Epidemiological and social aspects of trichomoniasis In: Morton RS, Harris JRW eds. Recent advances in sexually transmitted diseases, No. 1. Edinburgh, London and New York: Churchill Livingstone; 1975: 2 03 - 204.
33. Blackwell A L, Fox R A, Philip S L. Anaerobic vaginosis (non-specific vaginitis) Therapeutic findings. Lancet 1982; 1362 -1379.
34. Blackwell A. Management of vaginal discharge Med. Digest. 1983; 9 (10):12-20.
35. Dunlop EMC, Wisdom A R ; Diagnosis and management of Trichomoniasis in men and women . Brit. J. Vener . Dis. 1965; 41: 85-89.
36. Csonka GW; Long-term aspect of treatment with metronidazole (flagyl) in trichomonal vaginitis. Brit. J. Vener . Dis. 1963; 39: 258-260.