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Microbiological Study of Pathogens Isolated From Women with Genital Tract Infection

Shilan S. Ahmad[1] and Fattma A. Ali[2]

[1]Department of Laboratory- Maternity Teaching Hospital, Erbil, Iraq.
[2]Department of Microbiology- College of Medicine/ HawlerMedicalUniversity, Erbil, Iraq.

Abstract: This study was carried out during the period (March to July 2012). A total of two hundred and fifty high vaginal swabs were collected from (100 pregnant and 150 non- pregnant) women patients with genital tract infection at the age ranged between (18- 55) years, who attended the gynecology clinics and obstetrics department of Maternity Teaching Hospital in Erbil city. Vaginal swab samples were collected and direct examined, microscopic Gram stain examination and culture techniques. Isolated microorganisms were identified using microscopical, morphological, biochemical tests, analytic profile index system and Vitek 2 compact system.The results showed that positive vaginal cultures were detected in 233 (93.2%) women patients, among pregnant were 95 (95%), while among non- pregnant were 138 (92%) but differences is not significant according to statistical analysis. The total number of microorganism isolates obtained from women patients were (263) isolates. These isolates were distributed between Gram- positive bacteria 118 (44.9%), Gram- negative bacteria 73 (27.7%) and fungi 72 (27.4%). Single isolates found in 203 (77.2%) and mixed 60 (22.8%). The most frequent microorganisms isolated from vaginitis patients were *Candida albicans* 62 (23.6%), followed by*Escherichia coli* 42 (15.96%), *Staphylococcus haemolyticus* 19 (7.2%), *Staphylococcus auricularis* 19 (7.2%), *Enterococcus faecalis* 19 (7.2%), *Klebsiella pneumoniae*14 (5.3%) and *Staphylococcusaureus* 13(4.9%). The highest percent of vaginitis occurred at pH 6 were 140 (60.1%), the highest percent of vaginitis occurred in the age group (26-35) years were 113 (48.5%) and the most common symptoms were abnormal vaginal discharge 132 (56.7%), among pregnant and non- pregnant women.
Keywords: Genital Tract Infection, Pathogens.

Introduction

The three common diseases associated with vaginal infection include bacterial vaginosis (40- 45%), vulvovaginal candidiasis (20- 25%) and trichomoniasis(15-20%). Vaginitis is usually characterized by a vaginal discharge or vulvar itching and irritation; a vaginal odor may be present[1].

The normal vaginal ecosystem is a complex micro environment with important interrelationships among endogenous microflora and their metabolic products, estrogen status and pH[2] . Lactobacilli maintain the normal vaginal pH (3.8- 4.2) by producing lactic acid, stabilizing the vaginal ecosystem and hydrogen peroxide, suppressing the growth of gram- negative and Gram- positive facultative and obligate anaerobes[3].

Bacterial vaginosis (BV) is the most common vaginal infection of reproductive age women and is the most frequently cited cause of vaginal discharge and malodor[4].

The predominant bacterial pathogen associated with vaginal infection were aerobic isolates *Escherichia coli*, coagulase negative Staphylococcui(CoNS), *Staphylococcus aureus, Klebsiella pneumoniae*[5], while the

Staphylococcus aureus, Streptococcus spp. and *Proteus* spp. were the most prevalent organism in high vaginal swab samples[6].

Organisms may also be introduced into the genital tract by instrumentation, presence of a foreign body, or irritation can cause infection. Infections transmitted in this way are often caused by the same organisms that cause skin and wound infections[7].The frequent cause of vaginal discharge is an infection or colonization of different microorganisms[8].

Vaginal discharge constitute a considerable problem for many women causing discomfort, anxiety affecting women. Some vaginal discharges are normal and can vary with age, use of contraceptives and menstrual cycle[9].

There are several risk factors for the bacterial vaginosis. Women with BV also have an elevated risk especially after surgical abortion in the first trimester [10].Many diseases of the genitourinary system are still common due to sexual activity, availability of contraception. Many bacteria are associated with urogenital tract infection especially women with intrauterine contraceptive device[11].

Enterococci, they are usually non- hemolytic, but occasionally alpha- hemolytic. There are at least 12 species. Enterococci are transmitted from one patient to another primarily on the hand of hospital personnel, occasionally are transmitted on medical devices [12].

In vaginal samples the *Escherichia coli* was found to be the most prevalent organism *Klebsiella*spp. found in the mucosa of genitourinary tract. *Klebsiellapneumoniae* ferment lactose with production of acid and gas, citrate is positive and hydrolysis urea. *Proteus vulgaris* and *Proteus mirabilis* show swarming type of growth at 37˚C. It is opportunistic pathogen, may cause urinary tract infection [13].

Pseudomonas aeruginosa is pathogenic only when introduced into areas devoid of normal defenses, e.g. when mucous membranes and skin are disrupted by direct tissue damage; when intravenous or urinary catheters are used. These processes are promoted by the pili and toxins. *Pseudomonas aeruginosa* and other Pseudomonas are resistant to many antimicrobial agents and therefore become dominant and important when many susceptible bacteria of the normal flora are suppressed. Produces infections in patients with abnormal host defenses, and is an important nosocomial pathogen[12].

Candida albican causes about (80- 90%) of cases of vaginal candidiasis; other species of candida account for the remaining cases. Yeast can be carried vaginally in small numbers and produce no symptoms. Erythema are also associated with candidiasis. Frequently, candidal discharge is thick and "cheesy" in appearance [7].

Epidemiological surveys show that within countries and between countries in the same region, the prevalence and incidence of genital tract infections may vary widely even in similar population groups. The prevalence found for BV had varied ranging between (8- 75%),Vulvovaginal candidiasis had presented (2–30%) and trichomoniasis between 0- 34%[14].

Materials and Methods

Samples collection: High vaginal swabswere collected from two hundred and fifty (250) women patients with vaginal symptoms who attended the gynecology clinics and obstetrics department of Maternity Teaching Hospital in Erbil city during the period from March to July 2012. All vaginal swabs were taken from married women patients, of these 100 swabs from pregnant and 150 were from non-pregnant women. The age of these patients ranged between (18- 55) years.

High vaginal swabs were taken from women patients suffering with abnormal vaginal discharge, itching, burning and lower abdominal pain. The samples were taken from each women patient (by doctors) using sterile swabs stick and speculum. Vaginal swab for each patient were transported to the laboratory by inoculating the swab into a sterile tube containing 3 ml of normal saline. The samples were examined by staining with Gram stain.

Full information was taken directly from the patients and special questionnaire sheet was used for each patient. The information included; patient name, data of swabbing, age, location of stay, educational status, in door patient, symptoms, diabetes militus, social status, number of children, type of contraceptive, pregnant and abortion.

Isolation of microorganisms: For isolation of microorganisms, the specimen of vaginal swab was directly inoculated on culture media:Blood agar,MacConkey agar, Sabouraud dextrose agar plates and thioglycolate broth were incubated aerobically at 37˚C for 24-48 hours, and Chocolate agar plates were incubated micro-aerophilically at 37˚C for 24-48 hours. Microaerophillic incubation was in a candle jar supplied 5-10% Co2[15,16].

Identification of microorganisms: Pure colonies of isolated microorganisms were identified using morphological, biochemical tests including API system[7]. Species identification and antibiograms for pathogens were performed using Vitek 2 compact system[17]**.**

Results and Discussion

A total of two hundred and fifty (250) high vaginal swabs were collected from women patients attending Maternity Teaching Hospital in Erbil city suspected of having vaginitis (We exclude the patients who are unmarried). The results showed that among 250 high vaginal swabs only 233 (93.2%) showed culture positive, 138 (92%) were non- pregnant and 95 (95%) pregnant, while 17 (6.8%) samples showed culture negative, 12 (8%) were non- pregnant and 5 (5%) pregnant. The statistical analysis showed no significant differences of infection among non- pregnant and pregnant as shown in table (1).Statistical difference were determined by Chi- square (X^2) test. Probability value (P-value) less than (< 0.05) was considered as statistically significant (*), while P-value more than (> 0.05) was considered as statistically not significant.

The results of this study indicated that high rate of vaginitis detected in pregnant and non- pregnant women with symptoms were 233 (93.2%). These results in agreement with those detected by Razzak*et al*., [16] in Babylon (Iraq) showed that (95.5%) samples gave positive culture, Alim*et al*., [3] from Kabul (Afghanistan) reported that (91.32%). However, lower percentage of infections were reported by other investigators, Jarjees[18] from Erbil (Iraq) reported the rate was (68.3%) and Al- Muk and Hasony[19] from Basrah (Iraq) (67.6%)**.**

The high rate of positive cultures of bacterial vaginosis in our study is probably due to the reason that we have selected only the women with the complaint of abnormal vaginal discharge and vaginitis, and the differences between our results and others might due to sample size and our target populations were selected by physician only women patients with symptoms of vaginitis like abnormal vaginal discharge, itching, burning and lower abdominal pain.

Statistical analysis showed that in table (2) the incidence of microorganisms isolated from single culture growth 203 (87.1%) significantly higher compared to that from mixed culture growth 30 (12.9%) P< 0.05. Our results were higher than the results reported by Razzak*et al*.,[16] in Babylon (Iraq) (52.3%), Mohamed and Al-Thwani[20] from Baghdad (Iraq) (81.5%), Alim*et al*., [3]from Kabul (Afghanistan) (68.5%), they reported that most of vaginitis infections had single microorganisms infection.

The incidence of isolation of microorganisms (single and mixed) among non- pregnant were 154 (58.6%) significantly difference compared to that of pregnant 109 (41.4%) P <0.05, was explained in table (3). This rate of infection was higher than that demonstrated by Zaria *et al*., [21] from Nigeria he found that the number of microorganisms isolated from non- pregnant were (26.1%) and in pregnant was (24.6%).Our resultsdisagree with Isibor*et al*., [22]from Nigeria who found that the number of microorganisms were isolated from pregnant (45%) higher than non- pregnant (39%).

The number and percentage of microorganisms isolated from 233 patients with vaginitis and distribution of isolated microorganisms among pregnant and non- pregnant women with vaginitis are showed in table (4) also explain the identification of these microorganisms are shown in figure (1,2,3,4,5,6 and 7). The most common organisms isolated were *Candida albicans* 62 (23.6%). No anaerobic microorganisms were detected.Relatively similar observation was also reported by Mohamed and Al- Thwani[20] from Baghdad (Iraq) (32.81%). Ogunshe and Bakare[23] from Nigeria (26.5%), they showed that *Candida albicans*was the most common yeast isolated in vaginitis infections. Disagreement with Holland *et al*., [24] from Australia who showed that the incidence of *Candida albicans* isolated (89%).Also agree with Isibor*et al*., (2011) from Nigeria, he showed that the incidence rate of *Candida albicans*in pregnant women (51.1%) compared to non-pregnant women (30.8%), could be due to increased estrogen content, glycosuria in the acidity of the vagina due to rich glycogen content of the vaginal mucosa thereby providing an ample supply of utilizable sugar that favor the growth of *Candida albicans* during pregnancy.

The second most common isolated microorganisms from the vaginal women with vaginitis was *Escherichia coli* 42 (15.96%). Other results consistent with our result by Mumtaz*et al*., [25]from Pakistan (13.7%), and with Alli*et al*., [26] from Nigeria (12.1%).The presence of this bacteria in large percent in urinary tract and bacterial vaginosis might be attributed to the fact that this bacteria is part of the normal fecal flora and different virulence factors contributing to their pathogenicity and the difference in the result might be attributed to the number of sample taken and the difference in the time (year) of the study.

The highest percent of the isolates belonged to Gram-positive bacteria were *Staphylococcus haemolyticus* 19 (7.2%), *Staphylococcu sauricularis* 19 (7.2%), followed by *Staphylococcus aureus* 13 (4.9%), *Staphylococcus saprophyticus* 8 (3%) and *Staphylococcus epidermidis* 5 (1.9%). Similar finding have been reported by Al- Musawi*et al*., [27]from Al- Diwaniya (Iraq), who reported a prevalence of isolated *Staphylococcusaureus*was (5.6%) and *Staphylococcus saprophyticus* was (4.8%). Agree with Al- Jammaly and Abdulla [28]from Mosul (Iraq), who reported the rate of infection by *Staphylococcus saprophyticus* was (1.9%).

Most female vaginal infections are caused by bacteria endogenous to the female genital tract[29].The composition of the vaginal ecosystem is not static but changes over time and in response to endogenous and exogenous influences [30].The relation between the age of patient and the highest percentage of infection detected at age group (26- 35) years 113 (48.5%).In table (5) statistical analysis showed that in positive culture the incidence of infection in age group (26- 35) years was significantly higher compared to other age groups ($P< 0.05$). Similar results were reported by Hassan *et al*., [31] from Basrah (Iraq) who showed that the highest percentage of infection occurred (47.2%) at the same age group. Bhalla *et al*.,[32] from India showed the highest prevalence of infection in age (> 30) years. The study by Sewankambo *et al*., [33] showed a strong association between the presence of bacterial vaginosis with age (> 25) years.

The results also showed that the highest percentage of vaginitis in age group (26- 35) years in both non-pregnant and pregnant were 64 (46.4%) and 51 (51.6%) respectively. Similar findings were reported byJarjees[18] from Erbil (Iraq), who showed that in non- pregnant women were (46.87%) and pregnant women were (60.6%) at the same age group the infection of bacterial vaginosis which are higher than other groups.

The highest incidence of vaginal infections was noted among young, sexually active females. The different pattern of infection in the present study may be owing to the prevalent conditions like health education, sanitation and medical coverage available in each country.

The most pregnant and non- pregnant women complained from only abnormal vaginal discharge 132 (56.7%) and also about 101 (43.3%) of women complained of other symptoms, mainly these symptoms also with abnormal vaginal discharge are shown in table (6).The highest percentage of important symptoms related to vaginitis was abnormal vaginal discharge 132 (56.7%). Similar finding have been obtained bySadiq and Yousif[34] from Najaf (Iraq) (47%), Burhan[35] from Tikrit (Iraq) in a rate of (60.86%) and from Kirkuk (Iraq) in a rate (30.35%).

It clears from the results showed in table (7), the highest percentage of vaginitis infection among women patients occurred in out- Erbil (Rural) was 99 (96.1%). These results were disagreement with this reported by Bhalla*et al.,*[32] from India reported the highest prevalence of BV was seen in urban (38.6%) followed by rural community (28.8%).The prevalence of bacterial vaginosis varies widely among different areas and communities within the country, the varies prevalence may be because of various reasons such as differences in economic status and educational background, study population and method used for diagnosis of bacterial vaginosis[32].

On the other hand table (8) shows the highest percentage of vaginitis infection among women patientshad non- educational status (illiterate) were 146 (94.8%), higher than with finding of Bahram*et al*., [35]in Zanjan (Iran) highest (34.2%) and lowest (10%).The highest percent of infection among illiterate women might be due to the careless in the personal hygiene and there is relation between the rate of infection by vaginosisand economic status, educational background and study population.Bacterial vaginosis is a common condition characterized by a polymicrobial disorder, with an overgrowth of several anaerobic or facultative bacteria with a reduction or absence of Lactobacillus colonization. The prevalence of BV ranges from (4- 64%), depending on the geographic and clinical characteristics of the study population [36].

Out of 21 cases of diabetic women showed 19 (90.4%) cases positive culturewas showed in table (9). This result agrees with Jarjees[18] from Erbil (Iraq) who showed that bacterial vaginosis in diabetic women were (72%).The role of intrauterine device as predisposing factor in vaginitis. It was also found that there were

significant differences in alteration of vaginal discharge and presence of reproductive tract infection among women used IUD in comparison to women not used IUD[37].

Out of (24) cases of non- pregnant women using intrauterine contraceptive 23 (95.8%) cases had positive culture were using intrauterine contraceptive and only 2 (100%) cases had positive culture were using oral contraceptive are summarized in table (10). This result agrees with the results reported by Razzak*et al*., [16] in Babylon (Iraq), who found that about (71%) of women reported vaginitis due to intrauterine contraceptive.A homogenous, malodorous thin and grey discharge, which occurred in high percentages of women with intrauterine contraceptive device about four times more common than those women without it. Also the normal Lactobacilli dominated microbial vaginal flora was replaced by many other opportunistic pathogens among women used IUD with discharge[38].

Table (1): Distribution of women patients with vaginitis in relation with pregnant and non- pregnant

	Non- pregnant		Pregnant		Total	
Culture results	**No.**	**%**	**No.**	**%**	**No.**	**%**
Positive culture	**138**	**92 %**	**95**	**95 %**	**233**	**93.2 %**
Negative culture	**12**	**8 %**	**5**	**5 %**	**17**	**6.8 %**
Total	**150**	**60%**	**100**	**40 %**	**250**	**100 %**
Chi- square (x^2)	**0.85 N.S.**					

Note: N.S. = No Significant

Table (2): The incidence of all microorganisms isolated in single and mixed culture from vaginal infections

No. of organisms		**No. of culture growth**	**Microorganisms**			**Total No. of isolated**	**Chi-square (X^2)**
			Gram-positive Bacteria	**Gram- negative bacteria**	**Fungi**		
Single	**No.**	**203**	**102**	**56**	**45**	**203**	**14.57***
	%	**87.1 %**	**86.4 %**	**76.7 %**	**62.5 %**	**77.2 %**	
Mixed	**No.**	**30**	**16**	**17**	**27**	**60**	
	%	**12.9 %**	**13.6 %**	**23.3 %**	**37.5 %**	**22.8 %**	
Total	**No.**	**233**	**118**	**73**	**72**	**263**	
	%	**100 %**	**44.9 %**	**27.7 %**	**27.4 %**	**100 %**	

***Significant (P < 0.05)**

Table (3): The incidence of Gram- positive and Gram- negative bacteria and fungi in vaginal infection in relation to pregnant and non- pregnant women

Group		**No. of culture positive**	**Gram-positive bacteria**	**Gram-negative bacteria**	**Fungi**	**Total isolated of microorganisms (single&mixed)**	**Chi-square (X^2)**
Non-pregnant	**No.**	**138**	**72**	**53**	**29**	**154**	**16.14***
	%	**59.2 %**	**46.8 %**	**34.4 %**	**18.8 %**	**58.6 %**	
Pregnant	**No.**	**95**	**46**	**20**	**43**	**109**	
	%	**40.8 %**	**42.2 %**	**18.3 %**	**39.5 %**	**41.4 %**	
Total	**No.**	**233**	**118**	**73**	**72**	**263**	
	%	**100 %**	**44.9 %**	**27.7 %**	**27.4 %**	**100 %**	

- **Significant (P < 0.05)**

Table (4): Frequency of microorganisms from vaginal sample in pregnant and non- pregnant women

Isolated pathogens	Non- pregnant		Pregnant		Total	
	No.	%	No.	%	No.	%
Staphylococcus aureus	8	5.2 %	5	4.6 %	13	4.9 %
Staphylococcus lentus	1	0.64 %	2	1.83%	3	1.1 %
Staphylococcus epidermidis	5	3.3 %	0	0 %	5	1.9 %
Staphylococcus hominis	1	0.64 %	2	1.83 %	3	1.1 %
Staphylococcus intermedius	1	0.64 %	0	0%	1	0.4 %
Staphylococcus haemolyticus	15	9.74 %	4	3.7 %	19	7.2 %
Staphylococcus auricularis	5	3.3 %	14	12.84 %	19	7.2 %
Staphylococcus saprophyticus	2	1.3 %	6	5.5 %	8	3.0 %
Staphylococcus capitis	1	0.64 %	1	0.91 %	2	0.76 %
Staphylococcus sciuri	1	0.64%	1	0.91 %	2	0.76%
Staphylococcus warneri	1	0.64 %	0	0 %	1	0.4 %
Staphylococcus cohnii	1	0.64 %	0	0 %	1	0.4 %
Kocuriakristinae	6	3.9 %	1	0.91 %	7	2.6 %
Kocuriarosea	0	0 %	1	0.91 %	1	0.4 %
Kocuriavarians	3	1.95 %	1	0.91 %	4	1.5 %
Enterococcus faecalis	12	7.8 %	7	6.42 %	19	7.2 %
Enterococcus casseliflavus	1	0.64 %	0	0 %	1	0.4 %
Enterococcus gallinarum	1	0.64 %	0	0 %	1	0.4 %
Enterococcus faecium	3	1.95 %	0	0 %	3	1.1 %
Dermacoccusnishinomiyaensis/ Kytococcussedentarius	1	0.64%	0	0 %	1	0.4 %
Alloiococcus otitis	1	0.64 %	0	0 %	1	0.4 %
Micrococcus luteus/ lylae	0	0 %	1	0.91 %	1	0.4 %
Lactococcusgarvieae	1	0.64 %	0	0 %	1	0.4 %
Granulicatellaadiacens	1	0.64 %	0	0 %	1	0.4 %
Escherichia coli	30	19.5 %	12	11.0 %	42	15.96 %
Klebsiellapneumoniae	12	7.8 %	2	1.83 %	14	5.3 %
Proteus mirabilis	3	1.95 %	2	1.83 %	5	1.9 %
Pseudomonas aeruginosa	2	1.3 %	0	0 %	2	0.76 %
Pseudomonas luteola	1	0.64 %	0	0 %	1	0.4 %
Serratiafonticola	1	0.64 %	1	0.91 %	2	0.76 %
Serratiaplymuthica	1	0.64 %	0	0 %	1	0.4 %
Enterobacteraerogenes	0	0 %	1	0.91 %	1	0.4 %
Acinetobacterlwoffii	1	0.64 %	0	0 %	1	0.4 %
Raoultellaornithinolytica	1	0.64 %	0	0 %	1	0.4 %
Pantoeaagglomerans	0	0 %	1	0.91 %	1	0.4 %
Sphingomonaspaucimobilis	0	0 %	1	0.91 %	1	0.4 %
Ewingellaamericana	1	0.64 %	0	0 %	1	0.4 %
Candida albicans	26	16.9 %	36	33.02 %	62	23.6 %
Candida famata	3	1.95%	3	2.8 %	6	2.3 %
Cryptococcus laurentii	0	0 %	4	3.7 %	4	1.5 %
Total	154	58.6 %	109	41.4 %	263	100 %

Table (5): Relation between age groups and positive culture of vaginal swabs in pregnant and non- pregnant women

Age group (years)	Non- pregnant		Pregnant		Total	
	No.	%	No.	%	No.	%
< 26	13	9.4%	39	41.0%	52	22.3%
26- 35	64	46.4%	49	51.6%	113	48.5%
36- 45	41	29.7%	7	7.4%	48	20.6%
> 45	20	14.5%	0	0%	20	8.6%
Total	138	59.2%	95	40.8%	233	100%
Chi- square (X^2)	23.13 *					

*** Significant (P < 0.05)**

Table (6): The number and percentage of important symptoms and positive culture of vaginal swabs in pregnant and non- pregnant women

Symptoms and Signs	Non- pregnant		Pregnant		Total	
	No.	%	No.	%	No.	%
Abnormal vaginal discharge	78	56.5%	54	56.8%	132	56.7%
Itching	5	3.6%	1	1.1%	6	2.6%
Burning	1	0.7%	0	0%	1	0.4%
Lower abdominal pain	7	5.1%	3	3.2%	10	4.3%
Lower abdominal pain + Abnormal vaginal discharge	6	4.4%	5	5.3 %	11	4.7%
Burning + Abnormal vaginal discharge	4	2.9%	8	8.4%	12	5.2%
Itching + Abnormal vaginal discharge	30	21.7%	19	20%	49	21.0%
Lower abdominal pain+ Itching +Abnormal vaginal discharge	1	0.7%	3	3.1%	4	1.7%
Itching + Burning + Abnormal vaginal discharge	6	4.4%	2	2.1%	8	3.4%
Total	138	59.2%	95	40.8%	233	100%

Table (7): Relation between location of stay in pregnant and non- pregnant women and positive culture of vaginal swabs

Location of stay	Non- pregnant		Pregnant		Total	
	No. & % of samples	No. & % of positive culture	No. & % of samples	No. & % of positive culture	No. & % of samples	No. & % of positive culture
In- Erbil (Urban)	93 62%	84 90.3 %	54 54%	50 92.5 %	147 58.8%	134 91.2 %
Out- Erbil (Rural)	57 38%	54 94.7 %	46 46%	45 97.8 %	103 41.2%	99 96.1 %
Total	150 60%	138 92%	100 40%	95 95%	250 100%	233 93.2%
Chi- square (x^2)	1.56 N.S.					

Note: N.S. = No Significant

Table (8): Prevalent of microorganisms in relation to education status in pregnant and non- pregnant women of vaginal swabs

Educational status	Non- pregnant		Pregnant		Total	
	No. & % of samples	No. & % of positive culture	No. & % of samples	No. & % of positive culture	No. & % of samples	No. & % of positive culture
Non (Illiterate)	97 64.6%	92 94.8%	57 57%	54 94.7%	154 61.6%	146 94.8%
Primary school	28 18.7%	24 85.7%	28 28%	28 100%	56 22.4%	52 92.9%
Secondary school	12 8%	10 83.3%	10 10%	9 90%	22 8.8%	19 86.3%
Higher education	13 8.7%	12 92.3%	5 5%	4 80%	18 7.2%	16 88.8%
Total	150 60%	138 92%	100 40%	95 95%	250 100%	233 93.2%
Chi- square (x^2)	5.67 N.S.					

Table (9): The relation between positive culture of vaginal swabs in pregnant and non- pregnant women and diabetic and non- diabetic women

Diabetic	Non- pregnant		Pregnant		Total	
	No. & % of samples	No. & % of positive culture	No. & % of samples	No. & % of positive culture	No. & % of samples	No. & % of positive culture
Diabetic	18 12%	16 88.9%	3 3%	3 100%	21 8.4	19 90.4%
Non diabetic	132 88%	122 92.4%	97 97%	92 94.8%	229 91.6%	214 93.4%
Total	150 60%	138 92%	100 40%	95 95%	250 100%	233 93.2%
Chi- square (x^2)	0.2 N.S.					

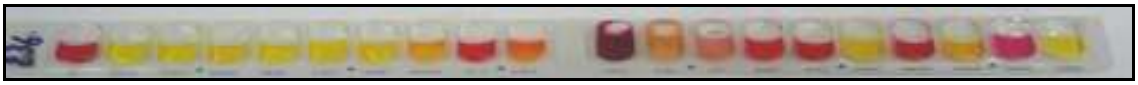
Note: N.S. = No Significant

Table (10): The relation between positive culture of vaginal swabs in non- pregnant women and using of contraceptive

Contraceptive	Non- pregnant women			
	No. & % of samples		No. & % of positive culture	
Oral	2	1.3%	2	100%
Intrauterine contraceptive	24	16%	23	95.8%
Non- using	124	82.7%	113	91.1%
Total	150	100%	138	92%

Staphylococcus auricularis **profile number (6310041)**

Staphylococcus saprophyticus **profile number (663010)**



Staphylococcus aureus **profile number (6714150)**

Kocuriakristinae**profile number (6310010)**

Figure (1): API Staph system for identification of Staphylococci

Figure (2): *E. coli* colonies on eosin methylene blue agar (Metallic green sheen color)

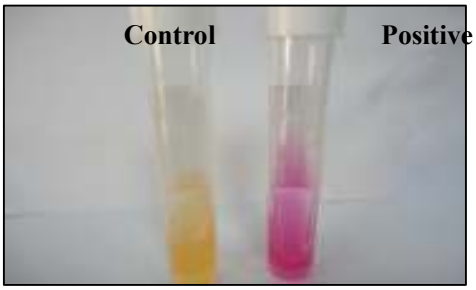


Figure (3): Urea test positive by *Proteus mirabilis* (Positive- pink color)

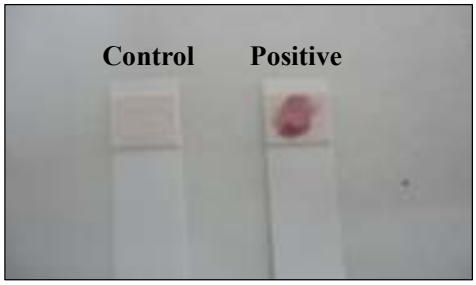


Figure (4): Oxidase test of *Pseudomonas aeruginosa*(Positive- violet color)

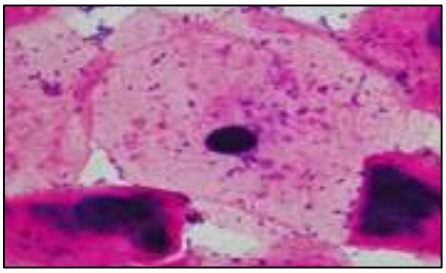
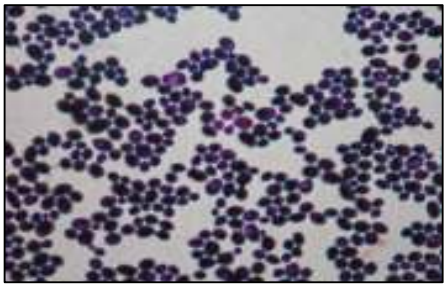


Figure (5): Show direct microscopic examination of vaginal swab by Gram stainslide, show clue cells are vaginal epithelial cells with adherent of bacteria



A

B

Figure (6): Display (A) Cell morphology by Gram stain, (B) Indicate germ tube formation by *Candida albicas*

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