

Bacterial Infections in Urinary Tract among Pregnant Women in Nassiriyah City, Iraq

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Abstract—Urinary tract infection (UTI) is a very common infection in pregnant women .It causes severe consequences for both the fetus and the mother. This study was accomplished to detect the prevalence of microorganisms causing UTI in pregnant women. One hundred and twenty participants of pregnant women were included in this study. Urine samples were collected from each participant and cultured on blood and MacConkey agars, followed by macro and microscopic identification and biochemical tests. API 20E and API Staph compact systems were used as a confirmatory test. The results showed that the ratio of positive urine culture was 53 (44.2%) , and the highest positive urine cultures were detected in the second trimester 23/53 (43.3%). Also, gram positive bacteria especially, *Staphylococcus spp* bacteria were the most common frequency (60.2 %) in this study. Also, it was found that *Staphylococcus aureus* was the most common microorganism isolated from pregnant women with UTIs followed by *Escherichia coli* (19%) . UTI stills a major health problem among pregnant women especially during the last two trimesters of pregnancy. And *Staphylococcus aureus* is the most dominant pathogen nowadays causing UTIs in different trimesters.

Keywords—UTI , Pregnant women , Nassiriyah City ,

I. INTRODUCTION

Pregnancy is a series of successive changes that occurs in the woman's organs and tissues as a result of the growth of the fetus causing structural, physiological and functional changes in the urinary tract, and that leads to the rise of bacteria to the urinary bladder and causes infections in urine tract of pregnant women [1] .

UTI is primarily caused by the presence and growth of bacteria in the urinary system, which represents the most prevalent infection in all age groups, particularly during pregnancy [2].The prevalence of the infection is higher among pregnant women than non-pregnant women.UTI infection considers a major health problem recorded among

20% of the pregnant women and a common cause of admission in obstetrical wards [3-4] .This often begins in week 6 and increases during weeks 22 to 24 of pregnancy due to a number of factors urethral dilatation, increase in bladder volume and decreasing in the bladder tone and urethral tone. These factors contribute to increase urinary stasis and ureterovesical reflux. 70 % of pregnant women develops glycosuria, which encourages bacterial growth in the urine [5] .

UTIs refer to the presence of a significant amount of microbial pathogens within the urinary tract. Although UTI may be caused by any pathogen that colonizes in the urinary tract like fungi, parasites, and viruses ,but the most causative agents are bacteria of enteric origin [6,7] .

E. coli is the most common pathogenic microorganisms associated with UTI and counting up to 60–80% of all UTIs [1].

Other pathogens like *Klebsiella pneumoniae*, *Proteus mirabilis*, *Staphylococcus saprophyticus*, *Enterococcus faecalis*, Group B Streptococcus (GBS), *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Candida spp.* are relevant as hospital-acquired and catheter associated infectious agents [8-10]. The current study was designed to detect the frequency and type of bacteria causing urinary tract infection in pregnant women in the city of Nasiriyah.

II. PATIENTS AND METHODS

A. Design of Study

The cross-sectional study included 120 participants of pregnant women no use any antibiotics . The samples were collected between the period of September 2022 to January 2023 from patients who attending to AL-huboby hospital and private clinics with the age range of (16-45) .

B. Methods

Urine samples were collected from each participant in sterile containers, and then transported to the laboratory for further analysis. The urine samples were processed routinely then cultured on blood and MacConkey agars. The positive growth samples were further analyzed by Macroscopic



characteristics of the colonies and Microscopic examination by Gram's stain. Then, the colonies were examined for their biochemical profile using routine biochemical tests (Oxidase , catalase ,manitol salt agar ,novobiocin tests ,IMViC) and confirmatory tests (API 20E and API Staph) for isolates .

C. Statistical Aanalysis

A chi –square test was used to compare percentage of this study $P \leq 0.05$ were used interpreted significant .Microsoft@Excel2010 was used to create the graphs .

III. RESULT AND DISCUSSION

Out of total of 120 subjects were pregnant women in this study, the results of urine culture showed that the incidence ratio of positive urine culture was 53 (44.2%) while 67 (55.8%) was the incidence ratio of negative urine culture, as shown in Figure(1)

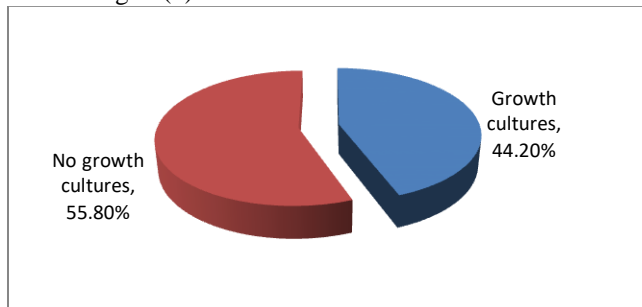


Figure (1) : The ratio of Growth and non Growth culture

The findings growth culture rate in pregnant women with UTI are approximately similar to previous studies in Iraq by Khanamet *al.* and Al-Asady *et al* that recorded growth culture with 55.4 % and 44.8%, respectively [11,12] . The results disagree with data reported by Kibret and Abera who recorded growth culture with only 22.7% [13].

The variation in the results might be due to the differences in the sample size, geographical variation, socioeconomic condition, awareness, and predisposing factors [14] . There are several reasons for negative growth, like the frequent use of antibiotics or other causes of infection such as fungi, viruses, or anaerobic bacteria. these anaerobic bacteria are difficult to isolate using the same methods used to isolate aerobic bacteria because they need special media and conditions for isolation [15] .

The isolated Number of gram-negative bacteria was 12/53 (22.64%) and the number of gram-positive bacteria was 41/53 (77.4%), as shown in figure (2).

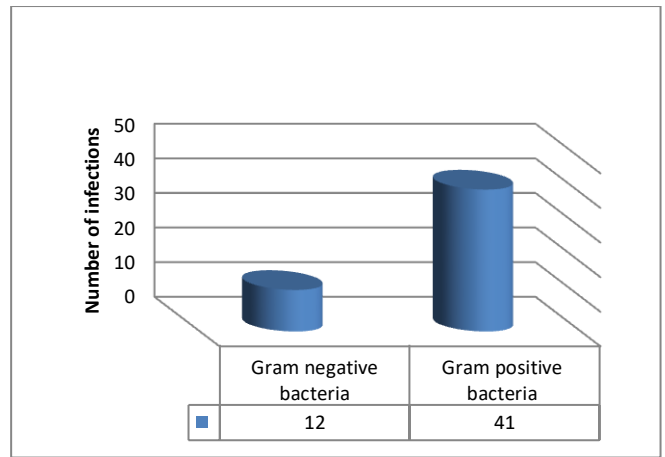


Figure (2) : Distribution of bacteria on positive and negative Gram

The results correspond with the data reported by Naji and Awadh. (2022), who found Gram-positive bacteria were the predominant cause of UTI (66.7%), while Gram-negative bacteria were found 33.3%. On the other hand , the results disagree with a local study that was done by Hussein *et al.* (2021). His study found the majority of the bacteria were gram-negative bacteria 80.95%, while gram-positive bacteria were 19.05% .

The highest percentage of pregnant women with UTI was in the second trimester 23/53 (43.4%), followed by third trimester 18/53 (33.96%), and then the first trimester 12/53 (22.64%) Figure (3).

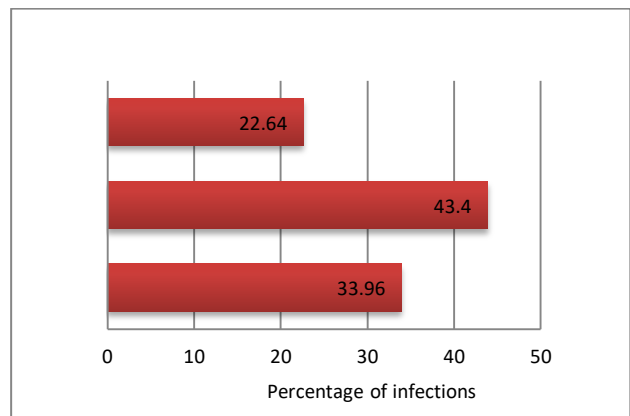


Figure (3) : Relationship between trimesters of pregnancy and the percentage of infections

These findings are consistent with a previous study conducted by Mousa and Qasim (2015) in Nasiriyah south Iraq that found a higher incidence of UTIs happened among women in the second and third trimesters of pregnancy, whereas pregnant women in their first trimester had less bacterial growth [19]. Data of another study reported a higher prevalence of UTIs in the second trimester than in the third and first trimesters [16] .

This variety might be due to a change in the stasis of urine and vesicoureteral reflux or attribute to the

decreasing in urinary progesterone and estrogen during the trimester of pregnancy [17].

Our current data disagrees with a previous study by Ajala *et al* who found the highest positive culture was at the first trimester (81.8%), followed by the second trimester (50%) and the lowest at the third trimester (40%). Moreover, the decreasing in the number of bacteria in pregnant women in the third trimester is due to frequent urination at this stage of pregnant, which will not give enough time for bacteria to multiply before the urine is emptied [18]. The current data showed that the most prevalent microorganisms were Gram-positive cocci and *Staphylococcus spp.* were the most prevalent (60.2%), as shown in Figure (4).

S. aureus was the most common microorganism isolated from the women with UTIs 16 (30%) isolates, while coagulase-negative staphylococcus (CONS) include *S. haemolyticus*, *S. epidermitis*, *S. saprophyticus*, and *S. xylosum* isolation ratios were (13.20%, 11.32%, 3.77%, and 3.77%, respectively).

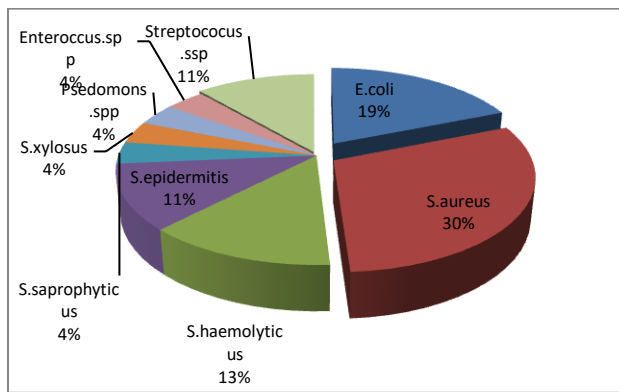


Figure (4): Bacterial isolates of UTI in pregnant women

The high prevalence rate of staphylococci spp. This study corresponds with by Al-Saadiet *al.* who reported 56.4% [20]. Also, another study showed that *Staphylococcus spp.* are the most common gram-positive pathogens causing UTIs [21].

The percentage of *Staphylococcus aureus* isolates in the current study is almost similar to the results of the above mentioned two studies [22, 23]. While these results are different with other studies that had lower percentage than this study [24,25].

Escherichia coli was the second microorganism isolated from women with a UTIs of 10 (19%) isolates. The present results agree with the data reported in Iraq by Mohammed *et al.* who found their isolation's ratio at 17.34% [26].

E. coli accounts as one of the most prominent bacteria leading to urinary infections due to number of virulence factors like the colonization and invasion of the urethral epithelium, and microorganisms emerging from per urethral areas contaminated with fecal flora due to proximity to the anus and warm, moist environment [27].

Another bacteria such as *pseudomonas spp.* two isolates with (4%), two *Enterococcus ssp.* with (4%) percentage and 6 isolets from *Streptococcus spp.* with (11%) percentage were isolated in this study.

The results *pseudomonas*spp and *enterococcus*spp ratio in the current study are consistent with study Baba *et al.* who found 2% and 4.1%, respectively [28].

Also, the results indicated that the highest infection rate for pregnant women with UTI was with CONS bacteria, in line with two local studies conducted in Iraq which found similar results for CONS isolation [29, 30]. Whereas this results disagree with previous studies, which found a lower percentage than this study for isolation of CONS [31,32].

IV. CONCLUSION

Bacterial infection in the urinary tract stills a significant health problem among pregnant women especially during the last two trimesters of pregnancy. *Staphylococcus aureus* is the predominant pathogen presently causing urinary tract infections at all stages of pregnancy. Therefore, sustainable prenatal care and health education are essentially in reducing the incidence of urinary tract infections.

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ETHICAL CONSIDERATION

The ethical permission was obtained from the AL-huboby hospital and from all participants in this work (patients and healthy) to conduct the research.

CONFLICT OF INTEREST

The authors declare no conflicts of interest

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