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PREVALENCE OF URINARY TRACT INFECTION AND ITS RISK FACTORS AMONG PREGNANT WOMEN FAMILY MEDICINE DEPARTMENT AT KFAFH

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Abstract:

Background: *Urinary tract infections (UTIs) are one of the most common medical issues caused by some bacteria among pregnant women, affecting approximately 13–33% worldwide. They are also accountable for 20% of admissions in obstetrical and gynecology units at the general hospitals worldwide. UTIs during pregnancy can lead to major obstetric complications and adverse outcomes for both mother and fetus. UTI is either a lower tract (acute cystitis) or an upper tract (acute pyelonephritis) infection: UTIs (acute cystitis and pyelonephritis) and asymptomatic bacteriuria. Therefore, this study aims to estimate the incidence of UTIs and identify associated risk factors among pregnant women attending the family medicine department's maternity clinic at KFAFH.*

Methods: *A retrospective observational cohort study was conducted from September 1st, 2022, to March 30th, 2023, in the FMD—maternity clinic at the KFAFH, Jeddah, Saudi Arabia. Data was retrieved from electronic medical records and patient charts at the FMD—KFAFH maternity clinic. This included socio-demographic and medical characteristics such as age, gravidity, gestational age, history of UTIs, diabetes mellitus, gestational diabetes, late healthcare presentation, dysuria, urgency, and fever. Urine culture results and urine analysis tests for pregnant women were also extracted. The study sample size was equal to 359, with a 95% confidence level and a ±5% margin of error. We employed a systematic sampling method, selecting every 10th pregnant woman who visited the clinic, resulting in around 540 samples for analysis.*

Results and Conclusions: *In our study involving 540 pregnant women, the prevalence of reported UTIs based on urine culture results was found to be 4.8%. The most commonly identified bacterial pathogen in these cases was Escherichia coli (E. coli), isolated in 2% of the samples. This was followed by Beta-Hemolytic Streptococcus Group B, isolated in 1% of the cases, and Klebsiella pneumoniae, which was isolated in 0.9% of the samples. Additionally, we identified several predictable risk factors for UTIs, including the presence of urine leukocytes ($p = 0.011$), a history of UTIs ($p < 0.001$), and dysuria ($p < 0.001$).*

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INTRODUCTION:

Urinary tract infections (UTIs) are one of the most common medical issues caused by some bacteria among pregnant women, affecting approximately 13–33% worldwide. They are also accountable for 20% of admissions in obstetrical and gynecology units at the general hospitals worldwide. UTIs during pregnancy can lead to major obstetric complications and adverse outcomes for both mother and fetus. UTI is either a lower tract (acute cystitis) or upper tract (acute pyelonephritis) infection: UTIs (acute cystitis and pyelonephritis) and asymptomatic bacteriuria (Ali et al., 2022; Mahmoud et al., 2022).

Asymptomatic bacteriuria, a condition that occurs in 2 to 7 percent of pregnant women, is a key point of intervention. It typically arises in early pregnancy, with only about a quarter of cases identified in the second and third trimesters. However, without treatment, as many as 20 to 35 percent of pregnant women with asymptomatic bacteriuria will develop a symptomatic urinary tract infection (UTI). This risk can be significantly reduced by 70 to 80 percent if bacteriuria is eradicated, underscoring the preventability of UTIs in pregnancy (Gupta, 2024).

Acute Cystitis occurs in approximately 1 to 2 percent of pregnant women, and the estimated incidence of acute pyelonephritis during pregnancy is 0.5 to 2 percent. Most cases of pyelonephritis occur during the second trimester (ACOG, 2023). The literature has reported an association between preterm delivery and low birth weight with acute pyelonephritis. However, no correlation has been established between acute cystitis during pregnancy and adverse outcomes.

In pregnancy, UTIs include asymptomatic bacteriuria (ASB) and symptomatic bacteriuria (SB). ASB is defined as the persistent presence of bacteriuria within a woman's urinary tract with no symptoms of an acute UTI. Symptomatic bacteriuria is divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections. UTI can lead to serious obstetric complications, including poor maternal and perinatal outcomes such as intrauterine growth restriction, pre-eclampsia, cesarean delivery, and preterm delivery. On the other hand, early UTI diagnosis and appropriate therapeutic and preventive approaches can significantly minimize these risks (Mahmoud et al., 2022).

Jain et al. (2013) conducted a prospective cohort study in India, which revealed that the prevalence of ASB was 17% in early pregnancy and 16% in the third trimester. Baker et al. (2015) reported that the prevalence of ASB is doubled in pregnancy to 2–15%, and if left untreated, approximately 40% of those infected will develop acute symptomatic UTIs. The American College of Obstetricians and Gynecologists recommends that all pregnant women be screened for ASB. Urine cultures should be conducted early in pregnancy to detect ASB. When treating UTIs, a comprehensive approach is essential, taking into account the physician's expertise and the individual circumstances of the patient (ACOG, 2023). Likewise, as per King Fahd Armed Forces Hospital (KFAFH) guidelines, all pregnant women undergo routine urine culture and analysis during their first visit. Therefore, this study aims to estimate the incidence of UTIs and identify associated risk factors among pregnant women attending the maternity clinic at the Family Medicine Department (FMD) at KFAFH, Jeddah, Saudi Arabia.

MATERIALS AND METHODS:

Research Design

A retrospective observational cohort study was conducted from September 1st, 2022, to March 30th, 2023, in the FMD—maternity clinic at the KFAFH, Jeddah, Saudi Arabia.

Population

Pregnant women who visited the maternity clinic at the FMD in KFAFH between September 1st, 2022, and March 30th, 2023, were included in our study population. We selected these women based on specific inclusion criteria established for our study. We employed a systematic sampling method to ensure a valid and reliable selection process. We chose every tenth pregnant woman who visited the clinic based on the date and time of their arrival. This systematic approach allowed us to gather a representative sample of pregnant women's experiences and healthcare needs during their first clinic appointment.

Inclusion Criteria

This study includes women of reproductive age (18 to 45 years) who are pregnant with asymptomatic bacteriuria and symptomatic UTIs.

Exclusion Criteria:

Pregnant women with kidney diseases or chronic renal diseases and sickle cell anemia or non-pregnant women were excluded from the study. Participants with incomplete data or pending urine culture results were also excluded.

Data Collection

This is a retrospective observational cohort study that specifically focused on pregnant women. Data was

retrieved from the electronic medical records and patient charts of those attending the maternity clinic at FMD—KFAFH—between September 1, 2022, and March 30, 2023.

The data included socio-demographic and medical characteristics such as age, gravidity, gestational age, history of UTIs, history of diabetes mellitus (DM), presence of gestational diabetes (GD), late presentation to healthcare, dysuria, urgency, and fever.

Urine culture results and urine analysis tests, along with related symptoms for pregnant women, were also extracted from the electronic medical records. According to institutional guidelines, urine cultures and analyses were performed for all pregnant women in the first trimester as part of the maternity clinic's screening program at FMD. Additionally, urine analyses were conducted on all pregnant or non-pregnant women who indicated symptomatic or asymptomatic bacteriuria.

The risk factors considered in this study, including age, primigravida status, DM, GD, late presentation to the maternity clinic, history of UTIs, Dysuria, fever, and urgency, are crucial in understanding and managing UTIs in pregnant women. Clinical data will encompass urine sample tests and urine culture results.

Data collection techniques and sample size

As mentioned, every patient who visits the maternity clinic will have urine cultures and analyses performed during their first visit in the first trimester. Additionally, urine cultures were performed for women (pregnant and nonpregnant) who had signs and symptoms of UTIs, those who underwent a urinary procedure, and those who were critically ill.

The maternity clinic at FMD recorded a consistent patient volume, seeing an average of 300 patients weekly. This statistic indicates approximately 1,200 patients per month, resulting in an estimated 7,200 patients over a six-month study period. To enhance the validity of the data, exclusions were made for recurrent visits by the same patients and non-pregnant women, and cases with incomplete data or urine culture results were still pending. Consequently, the final dataset comprised 5,402 unique patients.

The study sample size was equal to 359, with a confidence level of 95% and a margin of error within ±5% of the actual values. Therefore, to ensure a representative sample, we used a systematic sampling method, selecting every 10th pregnant woman who visited the clinic based on the date and time of their arrival. This approach concluded approximately 540 samples, providing a significant dataset that adhered to the statistical criteria for analysis.

Ethical Consideration and Confidentiality

The research was conducted under the highest ethical standards, as approved by the Institutional Review Board (IRB) committee in the Research Center at KFAFH. The ethical approval number was REC 600.

The Institutional Review Board Committee of King Fahd Armed Forces Hospital approved the study (REC 600). The Data is kept confidential and will not be used for other purposes. The data were anonymized, and patients' confidentiality was considered, as they received a registry code in the database to protect their data. Note that patients' informed consent was not needed.

Data Analysis

The Excel workbook was used for the data entry to be coded and analyzed using the Statistical Package for Social Sciences version 27.0 (SPSS Inc., Chicago, USA). Continuous variables were presented as the mean ± standard deviations (SDs). In contrast, categorical variables are denoted as numbers or percentages, where appropriate, chi-square. Logistic regression and multivariate analysis will be performed to determine the risk factors. The results will be considered statistically significant if (P-values < 0.05).

RESULTS:

Sample

A sample of 540 pregnant women was collected for the analysis. We collected maternal age, gestational age by weeks, gravidity, late presentation to the FMD (after 13 weeks); and data about medical-related factors such as history of UTI, diabetes mellitus status, presence of gestational diabetes, fever, dysuria and urgency.

Table 1: Socio-demographic and maternal characteristics of study participants, n = 540

Items	Frequency (%) or mean ± SD [Range]
Age	**30.27 ± 5.51 [18-46]**
Age	
≤ 20	10 (2%)
21-25	100 (19%)
26-30	200 (37%)
31-35	125 (23%)
36-40	78 (14%)
> 40	27 (5%)
Gestational age per week	**11.29 ± 7.01 [2-35]**
Gestational age	
First trimester (0-12)	369 (68%)
Second trimester (13-27)	148 (27%)
Third trimester (28-40)	23 (5%)
Gravity	
Primigravida	104 (19%)
Multigravida	436 (81%)
Late presentation to FMD (Post 13 W)	
No	395 (73%)
Yes	145 (27%)

The characteristics of the study participants have been summarized using descriptive statistics, and their socio-demographic data are presented in Table 1.

In this study, the average mean age of the participants was 30.27 years (SD = 5.51). The age distribution showed that 200 (37%) of the participants were aged 26–30, 125 (23%) were aged 31-35 years, and 100 (19%) were aged 21-25years, 78 (13%) were aged 36-40, 27 (5%) for more than 40s years, 10 (2%) were aged ≤ 20. The majority of women fall into the 26-35 age range (37% in 26-30 years and 23% in 31-35 years).

Additionally, the average mean gestational age among participants was 11.29 weeks (SD = 7.01). Most of the sample selected are women in their first trimester (n = 369, 68%), followed by the pregnant in their second trimester (n = 148, 27%). There are only 23 women (5%) in their third trimester.

The distribution showed that 104 (19%) were primigravida, and 145 (27%) pregnant women attended the FMD post 13 weeks after the first trimester.

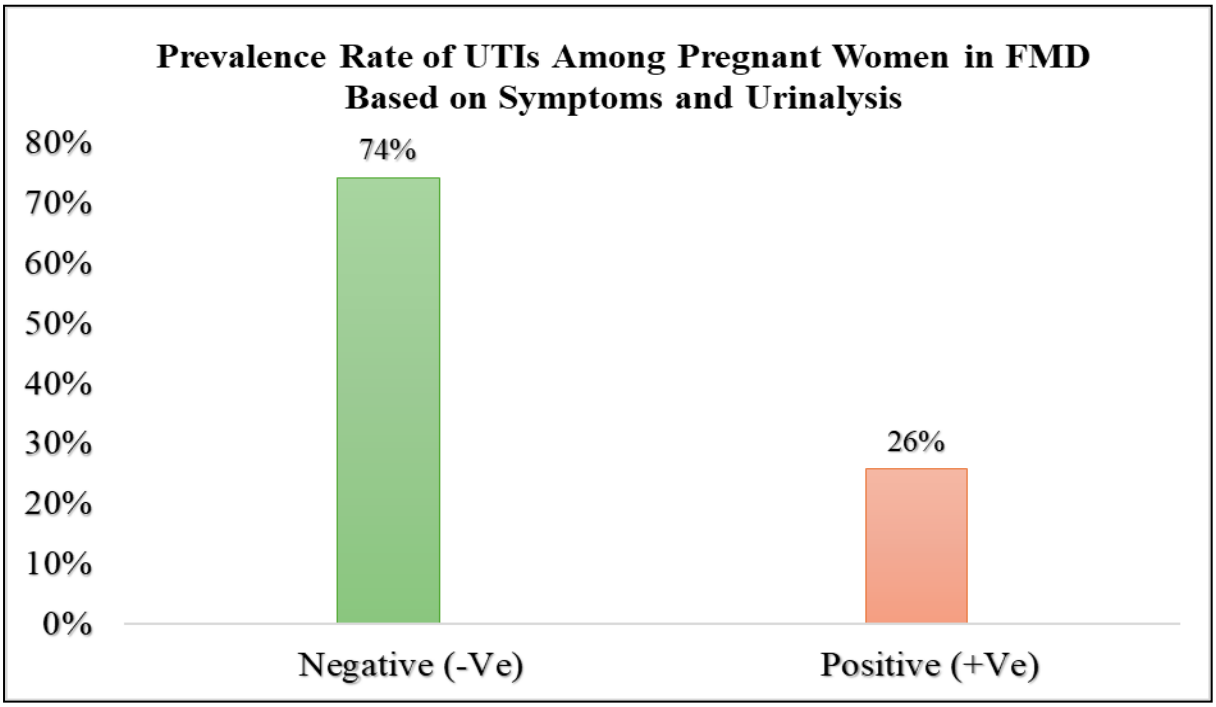

Chart 1: Prevalence Rate of UTIs among Pregnant Women in FMD Based on Symptoms and Urinalysis, n= 540

Chart (1) presents the study results, indicating that 401 participants received a negative result for UTIs, representing 74% of the total. Conversely, 139 participants, accounting for 26%, tested positive for UTIs. These determinations were based on the evaluation of reported symptoms and the results of urinalysis, which assessed the presence of leukocytes, nitrates, or both. This distinction between positive and negative results is essential for understanding the prevalence of UTIs within the studied population.

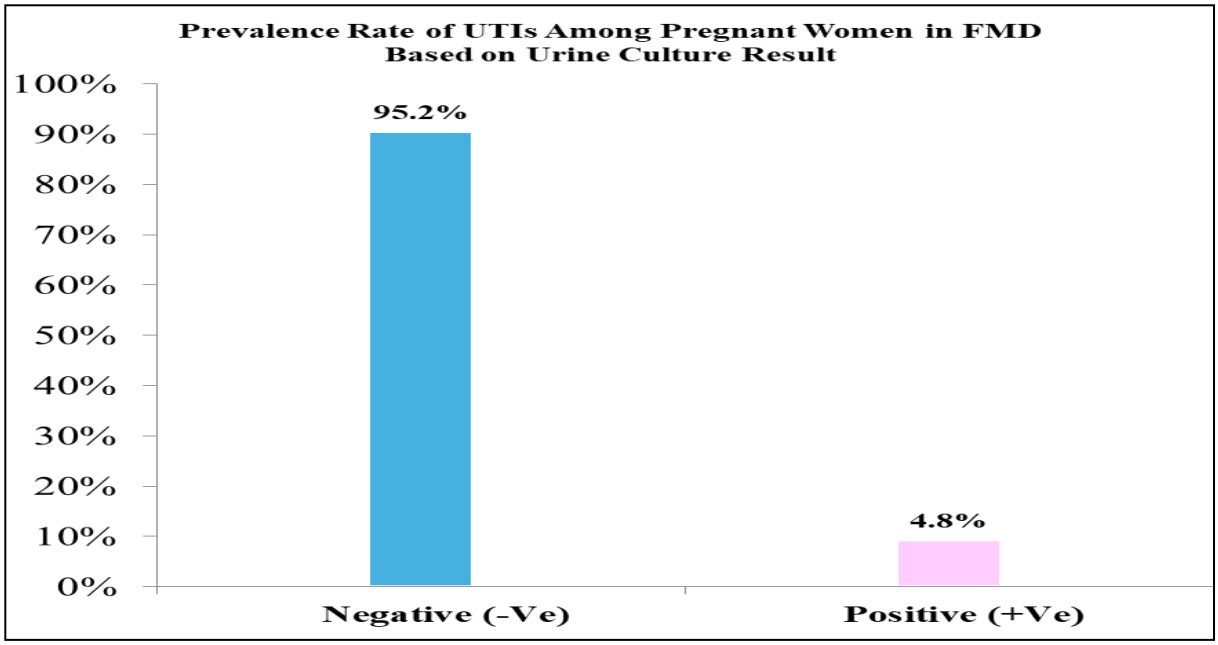

Chart 2: Prevalence Rate of confirmed UTIs cases among pregnant women who displayed in the FMD, n = 540 based on urine culture

Chart (2) presents the findings from a study involving 540 participants regarding urinary UTIs). It reveals that a significant majority, 489 individuals, representing 90% of the sample, received negative test results for UTIs. In contrast, only 51 participants, which accounts for 9% of the total, were diagnosed with UTIs confirmed by urine culture analysis. This data highlights the prevalence of negative UTI diagnoses within the examined group.

Table 2: Medical-related factors of study participants, n = 540

Items	Frequency (%) or Mean ± SD [Range]
Urine Culture	
Negative	489 (90.6%)
Positive	51 (9.4 %)
Urinalysis Test	
Negative	401 (74%)
Positive	139 (26%)
Urine PH	**6.13 ±1.21 [4-9]**
Urine Glucose	
No	534 (98.9%)
Yes	6 (1.1%)
Urine Nitrite	
Negative	536 (99.3%)
Positive (all are positive for Leukocyte esterase)	4 (0.7%)
Urine Blood	
Negative	455 (84%)
Positive	85 (16%)
DM	
No	514 (95%)
Yes	26 (5%)
Gestational Diabetes	
No	481 (89%)
Yes	59 (11%)
History of UTIs	
No	376 (70%)
Yes	164 (30%)
Dysuria	
No	441 (82%)
Yes	99 (18%)
Fever	
No	540 (100%)
Yes	0 (0%)
Urgency	
No	493 (91%)
Yes	47 (9%)

The data in Table 2 displays the medical factors related to pregnant women. The average urine PH of the participants was 6.13 (SD = 1.21). In addition, it was found that only 6 (1%) of the participants had a positive result of glucose in their urine, and 4 (0.7%) had positive urine nitrite (all of them are positive for Leukocyte esterase as well). Urine blood test results showed that 455 (84%) had no blood in their urine, with 85 (16%) testing positive. Regarding diabetes mellitus (DM), only 26 (5%) of participants had a history of DM, and 59 (11%) had gestational diabetes (GDM) during this pregnancy. About 3 in 10 women (n = 164, 30%) had a previous history of UTI during their pregnancy. Moreover, 99 (18%) of those pregnant complained of dysuria during their current pregnancy, and 47 (9%) complained of urgency. However, none of those pregnant had reported fever.

Table 3. Type of infection in UTI cases, n = 540

Type of infection (organisms)	Frequency (%)
No Growth	489 (90.6%)
Streptococcus Agalactiae, Group B Isolated	25 (4.6 %)
Escherichia Coli Isolated	10 (1.9 %)
Beta Hemolytic Streptococcus Group B Isolated	6 (1 %)
Klebsiella Pneumoniae Isolated	5 (0.9%)
Methicillin Resistant Staphylococcus Aureus	1 (0.2%)
Enterobacter Cloacae Isolated	1 (0.2%)
Enterococcus Faecalis Isolated	1 (0.2%)
Enterococcus Aerogenes	1 (0.2%)
Candida Species	1 (0.2%)

The data presented in Table 3 showed that the dominant bacteria isolates were Escherichia Coli Isolated, 10 (2%), followed by Beta-Hemolytic Streptococcus, which was present in 6 (1%) of UTI cases. Klebsiella Pneumoniae was 5 (0.9%) of the UTI cases. The remaining cases included Staphylococcus Aureus, Enterobacter Cloacae, and Enterococcus Faecalis, each accounting for 1 case (0.2%) of the UTIs. Note that Streptococcus Agalactiae Group B Isolated was found in 25 (4.6%) cases. For this reason, we did not consider urine culture with streptococcus Agalactia as positive since it is considered a part of normal vaginal flora.

As a result, 489 (90.6%) of the pregnant women had negative urine culture results, and 25 (4.6%) resulted in Streptococcus Agalactiae Group B Isolated. Thus, only 26 (4.8 %) of the cases resulted in positive for UTIs.

Predictors of UTI cases among pregnant women

This study investigated the association between various characteristics, including maternal age, gestational age in weeks, gravidity status, urine sample results, DM, GDM, history of UTI, urgency, and dysuria, concerning UTI occurrences among pregnant women. Categorical variables were assessed using chi-square tests (or Fisher's Exact for small frequencies), while numerical variables were analyzed using binary logistic regression. The outcomes of this research are anticipated to offer valuable insights into the determinants influencing the prevalence of UTI in pregnant women. A summary of the findings is presented in (Table 4).

Table 4. Predictors of UTI among pregnant women, n=540

Predictors	UTI Cases Frequency (%) or OR (95% CI)	P-value
Maternal Age	0.97 (0.94 – 1.00)	**0.047** [L]
Maternal Age		**0.020** [F]
≤ 20	7 (70%)	
21-25	46 (46%)	
26-30	74 (37%)	
31-35	39 (31%)	
36-40	24 (31%)	
> 40	14 (52%)	
Gestational Age	0.99 (0.97 – 1.02)	0.824 [L]
Gestational Age		0.680 [C]
First trimester (0-12)	144 (39%)	
Second trimester (13-27)	52 (35%)	
Third trimester (28-40)	8 (35%)	
Gravida		0.404 [C]
Primigravida	43 (41%)	
Multigravida	161 (37%)	
Parity		0.335 [C]
Primipara	42 (42%)	
Multipara	162 (37%)	
Late Presentation (Post 13 Weeks)		0.807 [C]
No	148 (38%)	

Yes	56 (39%)	
Urine Leukocytes (WBC)		**0.033** [C]
Negative	141 (35%)	
Positive	63 (45%)	
Diabetes Mellitas		0.941 [C]
No	194 (38%)	
Yes	10 (39%)	
Gestational Diabetes		0.180 [C]
No	177 (37%)	
Yes	27 (46%)	
History of UTI		**<0.001** [C]
No	69 (18%)	
Yes	135 (82%)	
Urgency		**<0.001** [C]
No	169 (34%)	
Yes	35 (75%)	
Dysuria		**<0.001** [C]
No	121 (27%)	
Yes	83 (84%)	

* Note: OR = odds ratio, CI = confidence interval;
[L] p-value from Binary Logistic regression, [C] p-value from Chi-square test, [F] p-value from Fisher's Exact test

Table 4 shows no significant associations between gestational age, gravida, parity, late presentation (post 13 weeks), diabetes mellites, and gestational diabetes with UTI since all p-values > 0.05.

The results show a significant relationship between maternal age and UTI with OR = 0.97, suggesting that younger patients have a higher rate of UTI, p = 0.047. Maternal age groups are also significantly different concerning UTI rates, with younger mothers (≤30) having higher rates than those in the 31-40 age category, p = 0.020.

Positive urine leukocytes, history of UTI, urgency and dysuria are found to be significant risk factors when it comes to UTI (p = 0.033, p < 0.001, p < 0.001, p < 0.001, respectively).

Considering multiple factors are associated with UTI among pregnant women from bivariate analysis, we performed multivariable logistic regression to explore all significant factors simultaneously. Model results are presented in Table 5 below.

Table 5. Predictors of UTI among pregnant women (multivariable analysis), n = 540

Predictors	OR (95% CI)	P-value
Maternal Age	0.97 (0.94 – 1.01)	0.102
Urine Leukocytes (WBC)		
Negative	reference	
Positive	0.47 (0.26 – 0.84)	**0.011**
History of UTI		
No	reference	
Yes	17.27 (9.48 – 31.45)	**<0.001**
Urgency		
No	reference	
Yes	0.91 (0.38 – 2.16)	0.829
Dysuria		
No	reference	
Yes	3.64 (1.76 – 7.54)	**<0.001**

* Note: OR = odds ratio, CI = confidence interval.

The multivariable logistic regression model is overall statistically significant (χ^2 (5) = 224.53, $p < 0.001$) and has good predictive ability (Nagelkerke pseudo-R-square = 0.463). Three predictors are still statistically significant in the model: urine leukocytes ($p = 0.011$), history of UTI ($p < 0.001$), and dysuria ($p < 0.001$). History of UTI is the strongest and most influential predictor; patients with prior history of UTI are 17.27 times more likely to have UTI in current pregnancy compared to those with no prior history, controlling for other factors.

Leukocytes (WBC) have a protective effect in multivariable models and are associated with lower odds of UTI. Patients with dysuria are 3.64 times more likely to be diagnosed with UTI than patients without dysuria, with other factors held constant.

DISCUSSION:

This study was designed to gather information on the prevalence of urinary tract infections (UTIs) and associated predictable factors among pregnant women attending the maternity clinic at FMD, KFAFH, in Jeddah, Saudi Arabia. In accordance with institutional guidelines and procedures, all pregnant women visiting the maternity clinic—particularly on their first visit—are required to undergo urinalysis tests and urine culture collection, regardless of whether they show symptoms of UTIs.

The study comprised 540 samples, with urinalyses conducted via dipstick testing and urine cultures performed on all 540 pregnant women. The maternity clinic at FMD consistently managed a patient volume of approximately 300 patients weekly, translating to about 1,200 patients monthly and an estimated total of 7,200 patients over the six-month study period. To enhance data validity, exclusions were made for recurrent visits by the same patients, non-pregnant women, and cases with incomplete data or pending urine culture results. As a result, the final dataset included 5,402 patients. A systematic sampling method was employed, selecting every 10th pregnant woman who visited the clinic based on their arrival date and time, ultimately yielding 540 participants.

UTIs are among the most common medical concerns encountered by family physicians during pregnancy. Prior research has shown that bacterial UTIs are the most frequently observed infections during this period. If these infections are not properly managed, they may lead to serious complications.

According to the KFAFH standard, a diagnosis of UTIs is substantiated when urine culture susceptibility tests yield a positive result. This indicates that the urine culture demonstrates the presence of pathogenic bacteria and delineates their susceptibility to specific antibiotics, thereby providing a dependable foundation for diagnosing a UTI. This systematic approach ensures that appropriate therapeutic interventions can be initiated based on the identified pathogens and their sensitivities. However, to mitigate potential complications during pregnancy, it is imperative to implement medical intervention and commence antibiotic treatment in accordance with the observed clinical symptoms and urinalysis findings.

The present study found that the incidence of UTIs among the pregnant women we studied was **4.8%.** This finding is of significant importance as it establishes a benchmark for understanding the prevalence of UTIs in our study population at KFAFH. Interestingly, our results are comparable to those of a previous study conducted in Riyadh, Saudi Arabia, which reported that 5% of pregnant women were diagnosed with UTIs based on bacterial cultures (Barnawi et al., 2024). The results of this study indicated that the prevalence of UTIs during pregnancy is lower than the global average. For example, a previous study conducted in Iran reported a prevalence of 9.8% (Barnawi et al., 2024). In the United States, studies reported a prevalence ranging from 11% to 26% across different sites, with an overall prevalence of 18% (Johnson et al., 2021).

A systematic review of developing countries in Africa and Asia found an overall prevalence of 13.5% (Belete & Saravanan, 2020). Our findings, particularly the lower prevalence, raise important questions about the potential implications for maternal health in different regions.

In Ethiopia, the pooled prevalence of UTIs during pregnancy was 15.37% (Getaneh et al., 2021), while another study in the same country reported a prevalence of 14.75% (Girma et al., 2023). In the United Arab Emirates, the prevalence of symptomatic UTIs was reported to be 17.9% (Dube et al., 2022). The prevalence of the Buea Health District of Cameroon was notably high at 31% (Ngong et al., 2021). Similarly, a study in Tamale, Ghana, found a prevalence of 33.5%, and in South-Western Uganda, it was reported at 35% (Laari et al., 2022).

The predominant bacterial pathogen identified in pregnant women with UTIs is Escherichia coli (E. Coli), isolated at a rate of 2%. Similar to the literature that indicates that E. Coli is the most commonly identified pathogen in UTI (Barnawi et al., 2024; Ravi et al., 2022; Rosana et al., 2020). . A study

conducted by AlShamlan (2022) in Saudi Arabia reported that E. coli is the predominant bacterial species detected in pregnant women with ASB across most studies. Streptococcus agalactiae Group B is frequently observed as a secondary pathogen in pregnant women with UTIs. Additionally, various other bacterial species such as Beta-Hemolytic Streptococcus, Klebsiella Pneumoniae, Staphylococcus Aureus, Enterobacter Cloacae, and Enterococcus Faecalis have also been identified in these cases.

Several studies have examined the predictable factors associated with UTIs during pregnancy, particularly the impact of maternal age on the risk of developing such infections (Dube et al., 2022). The findings indicate a significant correlation: an OR of 0.97 suggests that younger patients exhibit a higher incidence of UTIs. Specifically, mothers aged 30 years or younger are more likely to have UTIs compared to those in the 31-40 age group. Furthermore, Laari et al. (2022) research revealed that the risk of UTIs diminishes in women aged 36 to 45 years, making this cohort less susceptible to UTIs than those aged 15 to 25.

This study's results indicate that women in their first trimester are more likely to develop UTIs than those in later trimesters, as 68% of infected women were in their first trimester. This finding aligns with a study conducted by Balachandran et al., which also noted a higher prevalence of UTIs during the first trimester, while Dube et al. (2022) reported a higher incidence in the second trimester. In contrast, gestational age is not considered a predictable factor of UTI occurrence.

Previous studies have indicated that a history of urinary tract infections (UTIs) significantly heightens the risk of recurrence during pregnancy (Barnawi et al., 2024; Belete & Saravanan, 2020; Voruganti & Khan, 2023). This aligns with findings from the current study, which identifies a prior history of UTIs as the most potent predictor of future infections. Specifically, patients with a previous UTI are 17.27 times more likely to experience another UTI during their current pregnancy compared to those without such a history after adjusting for other influencing factors.

Dysuria is a significant risk factor and diagnostic criterion for UTIs across pregnant women. Its presence increases the likelihood of UTI and influences medical intervention and treatment strategies. Recognizing dysuria as a critical symptom can improve the accuracy of UTI diagnoses and the effectiveness of subsequent treatments. Multiple studies have investigated the role of dysuria in diagnosing and predicting UTIs, highlighting its significance as a risk factor. We noticed that patients with dysuria are 3.64 times more likely to be diagnosed with UTI than patients without dysuria, with other factors held constant.

Interestingly, several medical factors assessed in this study did not significantly correlate with the prevalence of UTIs. Specifically, gravida, parity, late presentation (after 13 weeks), diabetes mellitus, and gestational diabetes were found to have no correlation with UTI prevalence. In contrast, previous studies have indicated that gravida, parity, diabetes mellitus, and gestational diabetes are strongly linked to the occurrence of UTIs among pregnant women (Getaneh et al., 2021; Girma et al., 2023; Lee et al, 2019; Johnson, Rocheleau et al., 2021; Voruganti & Khan, 2023).

LIMITATION AND RECOMMENDATIONS

It is noticeable that there is a significant difference between the diagnosis of urinary tract based on urine analysis (139 patients) composed of 26 % of the participants, and (26 patients) composed of 5% of the participants. It is either due to over-diagnosis of UTI based on urine analysis since Leukocyte can be present as a contamination from Vagina. Also, it could be due to underdiagnosis due to false negative urine cultures. When the patient was found to have urinary tract infection symptoms, she asked to do a urine culture. The time between providing urine analysis and urine culture samples is 2 hours maximum. In order to get more accurate urine culture results, urine has to be incubated for a longer time in the bladder, which is not the case at the primary health care clinic at KFAFH.

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REFERENCES:

1. Ali, A. H., Reda, D. Y., & Ormago, M. D. (2022). Prevalence and antimicrobial susceptibility pattern of urinary tract infection among pregnant women attending Hargeisa Group Hospital, Hargeisa, Somaliland. *Scientific Reports*, 12(1), 1–10. https://doi.org/10.1038/s41598-022-05452-z

2. AlShamlan, N. A., AlOmar, R. S., Aldossary, R., Alahmari, M., Alghamdi, A., AlGhamdi, M., Alkanaan, N., AlReedy, A. H., AlOtaibi, A. S., & Alghamdi, N. S. (2022). The Epidemiology, Associated Factors and Bacterial Profile of Asymptomatic Bacteriuria in Pregnant Women: A Retrospective Chart Review Study in Saudi Arabia. *International journal of women's health*, *14*, 1749–1759. https://doi.org/10.2147/IJWH.S394936
3. Azami, M., Jaafari, Z., Masoumi, M., Shohani, M., Badfar, G., Mahmudi, L., & Abbasalizadeh, S. (2019). The etiology and prevalence of urinary tract infection and asymptomatic bacteriuria in pregnant women in Iran: a systematic review and Meta-analysis. *BMC Urology*, 19. https://doi.org/10.1186/s12894-019-0454-8.
4. Baker PN, McEwan AS, Arulkumaran S, Datta ST, Mahmood TA, Reid F, Aiken C, (Editors). (2015). Obstetrics: Prepare for the MRCOG: Key Articles from the Obstetrics, *Gynaecology Reproductive Medicine Journal*. UK: Elsevier Health Science.
5. Balachandran, L., Jacob, L., Al Awadhi, R., Yahya, L. O., Catroon, K. M., Soundararajan, L. P., Wani, S., Alabadla, S., & Hussein, Y. A. (2022). Urinary Tract Infection in Pregnancy and Its Effects on Maternal and Perinatal Outcome: A Retrospective Study. *Cureus*, *14*(1), e21500. https://doi.org/10.7759/cureus.21500
6. Barnawi, Y., Alghamdi, A., Ibrahim, A. *et al*. Prevalence of urinary tract infections in pregnant women and antimicrobial resistance patterns in women in Riyadh, Saudi Arabia: a retrospective study. *BMC Infect Dis* **24**, 502 (2024). https://doi.org/10.1186/s12879-024-09385-y
7. Belete, M., & Saravanan, M. (2020). A Systematic Review on Drug Resistant Urinary Tract Infection Among Pregnant Women in Developing Countries in Africa and Asia; 2005–2016. *Infection and Drug Resistance*, 13, 1465 - 1477. https://doi.org/10.2147/IDR.S250654.
8. Dube, R., Al-Zuheiri, S., Syed, M., Harilal, L., Zuhaira, D., & Kar, S. (2022). Prevalence, Clinico-Bacteriological Profile, and Antibiotic Resistance of Symptomatic Urinary Tract Infections in Pregnant Women. *Antibiotics*, 12. https://doi.org/10.3390/antibiotics12010033.
9. Getaneh, T., Negesse, A., Dessie, G., Desta, M., & Tigabu, A. (2021). Prevalence of Urinary Tract Infection and Its Associated Factors among Pregnant Women in Ethiopia: A Systematic Review and Meta-Analysis. BioMed Research International, 2021. https://doi.org/10.1155/2021/6551526.
10. Girma, A., Aemiro, A., Workineh, D., & Tamir, D. (2023). Magnitude, Associated Risk Factors, and Trend Comparisons of Urinary Tract Infection among Pregnant Women and Diabetic Patients: A Systematic Review and Meta-Analysis. *Journal of Pregnancy*, 2023. https://doi.org/10.1155/2023/8365867. (Girma et al., 2023)
11. Gupta, K. (2024). Urinary tract infections and asymptomatic bacteriuria in pregnancy. Wolter Kluwer UpToDate. Accessed at November 30, 2024. Available on**:** **https://www.uptodate.com/contents/urinary-tract-infections-and-asymptomatic-bacteriuria-in-pregnancy**
12. Jain V, Das V, Agarwal A, Pandey A (2013). Asymptomatic bacteriuria & obstetric outcome following treatment in early versus late pregnancy in north Indian women. Indian J Med Res 137:753–758.
13. Johnson, B., Stephen, B., Joseph, N., Asiphas, O., Musa, K., & Taseera, K. (2021). Prevalence and bacteriology of culture-positive urinary tract infection among pregnant women with suspected urinary tract infection at Mbarara regional referral hospital, South-Western Uganda. *BMC Pregnancy and Childbirth*, 21. https://doi.org/10.1186/s12884-021-03641-8.
14. Johnson, C., Rocheleau, C., Howley, M., Chiu, S., Arnold, K., & Ailes, E. (2021). Characteristics of Women with Urinary Tract Infection in Pregnancy. *Journal of women's health*. https://doi.org/10.1089/jwh.2020.8946.
15. Lee, A., Mullany, L., Koffi, A., Rafiqullah, I., Khanam, R., Folger, L., Rahman, M., Mitra, D., Labrique, A., Christian, P., Uddin, J., Ahmed, P., Ahmed, S., Mahmud, A., Dasgupta, S., Begum, N., Quaiyum, M., Saha, S., & Baqui, A. (2019). Urinary tract infections in pregnancy in a rural population of Bangladesh: population-based prevalence, risk factors, etiology, and antibiotic resistance. *BMC Pregnancy and Childbirth*, 20. https://doi.org/10.1186/s12884-019-2665-0.
16. Laari, J., Anab, M., Jabong, D., Abdulai, K., & Alhassan, A. (2022). Maternal Age and Stage of Pregnancy as Determinants of UTI in Pregnancy: A Case of Tamale, Ghana. *Infectious Diseases in*

Obstetrics and Gynecology, 2022. https://doi.org/10.1155/2022/3616028.

17. Mahmouda, M., Kamelb, A., Ahmeda, S., El-Hamed. A. (2020). Prevalence of urinary tract infections among pregnant women at Sohag University Hospital. *Egyptian Nursing Journal.* https://doi.org/10.4103/ENJ.ENJ_7_20
18. Ngong, I., Fru-cho, J., Yung, M., & Akoachere, J. (2021). Prevalence, antimicrobial susceptibility pattern and associated risk factors for urinary tract infections in pregnant women attending ANC in some integrated health centers in the Buea Health District. *BMC Pregnancy and Childbirth*, 21. https://doi.org/10.1186/s12884-021-04142-4.
19. Ravi, B., R., T., & K, S. (2022). BACTERIA ASSOCIATED WITH URINARY TRACT INFECTION IN PREGNANT WOMEN WITH OVERVIEW OF THEIR ANTIBIOTIC SUSCEPTIBILITY TESTS. *International Journal of Current Pharmaceutical Research*. https://doi.org/10.22159/ijcpr.2022v14i4.2007.
20. Rosana, Y., Ocviyanti, D., Halim, M., Harlinda, F., Amran, R., Akbar, W., Billy, M., & Akhmad, S. (2020). Urinary Tract Infections among Indonesian Pregnant Women and Its Susceptibility Pattern. *Infectious Diseases in Obstetrics and Gynecology*, 2020. https://doi.org/10.1155/2020/9681632.
21. The American College of Obstetricians and Gynecologists Publication (ACOG). (2023). Urinary Tract Infections in Pregnant Individuals.*Obstetrics and gynecology*, *142*(2), 435–445. Accessed at November 30, 2024 https://doi.org/10.1097/AOG.0000000000005269
22. Voruganti, S., & Khan, S. (2023). Prevalence and Risk Factors of Urinary Tract Infection in Pregnant Women: Systematic Review and Meta-Analysis. *International Journal For Multidisciplinary Research*. https://doi.org/10.36948/ijfmr.2023.v05i06.9117.