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AN ASSOCIATION BETWEEN URINARY TRACT INFECTION AND PRE-ECLAMPSIA DURING PREGNANCY- A CASE CONTROL STUDY

Obstetrics & Gynaecology

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ABSTRACT

Background: Pre-eclampsia (PE) is a multisystem hypertensive disorder of pregnancy with unclear etiology, but increasing evidence suggests a link with infections such as urinary tract infections (UTIs). UTIs are common in pregnancy and may contribute to the systemic inflammation implicated in the pathogenesis of PE. **Objective:** To evaluate the association between urinary tract infections and the development of pre-eclampsia during pregnancy. **Methods:** A case-control study was conducted at RMCH, Bareilly, involving 150 pregnant women-75 with pre-eclampsia (cases) and 75 without (controls). Participants were assessed for UTI through medical history and urine culture. Chi-square tests and logistic regression were used to analyze associations, with significance set at $p < 0.05$. **Results:** The mean systolic and diastolic blood pressure in the case group was significantly higher (160.5 ±16.2 mmHg and 104.6 ±11.0 mmHg) compared to controls (116.0 ±10.6 mmHg and 72.1 ±9.3 mmHg). Significant bacteriuria was observed in 61.9% of cases and 38.09% of controls. Symptomatic UTIs were reported in 14 cases and 4 controls. The study found that UTI during pregnancy was associated with a 1.31-fold increased risk of developing pre-eclampsia. **Conclusion:** UTIs in early pregnancy may increase the risk of pre-eclampsia. Routine screening and timely treatment of UTIs in pregnant women could serve as a preventive strategy against pre-eclampsia and its associated complications.

KEYWORDS

UTI, Pre-eclampsia, pregnancy, proteinuria, bacteriuria

INTRODUCTION

Pre-eclampsia is described as a pregnancy-specific syndrome that can affect virtually every organ system[1]. It is characterized by new-onset or worsening hypertension combined with proteinuria and associated signs and symptoms >20 weeks gestational age[2]. 0.2 to 9.2% pregnant women are affected with pre-eclampsia[3]. Over activation of the systemic inflammatory response plays a key role in its pathogenesis of Pre-eclampsia[4]. Preeclampsia pathogenesis is still not well elucidated but existing reports indicate that it is due to abnormal placentation resulting into abnormal perfusion, and hence release of infammatory factors like cytokines which result into endothelial dysfunction[5]. Strikingly, this pathogenesis is most often associated with infections, including UTIs[6]. Urinary tract infection (UTI) is a common occurrence during pregnancy with an estimated incidence of approximately 20%. UTI is thought to play an important role in PE by helping to enhance the maternal systemic inflammatory response. UTI is also implicated as a contributing factor in other complications such as premature rupture of membranes, preterm birth, low birth weight infant, fetal intrauterine growth restriction, and postpartum endometritis[7].

AIM:

To evaluate relationship between urinary tract infection and pre-eclampsia during pregnancy

OBJECTIVE:

To evaluate that the occurrence of UTI during pregnancy is associated with the later occurrence of pre-eclampsia in that pregnancy

METHOD:

After the approval of ethics committee and informed consent from the patient, An observational, case-control study was conducted for a period of 3 months on 150 patients were divided into two equal- case groups (with preeclampsia) and the control group (without preeclampsia), in the Department of Obstetrics and Gynaecology at RMCH Bareilly, a tertiary care hospital. Case group characteristics included preeclampsia, no history of kidney disease normal pregnancy. The characteristics of the control group included no preeclampsia, no history of kidney disease normal pregnancy. The exposure of this study was urinary tract infection in the present pregnancy. History of UTI was assessed using a review of previous medical records, or current laboratory findings. During admission, participants were instructed as how to collect midstream urine sample using sterile plastic urine containers by clean catch method. Urine samples were sent to the laboratory and processed within two hours of collection and if delay was anticipated, samples were placed into a cold box at 4 degree Celsius and processed within 4 hours after collection. To examine the relationships and comparisons between the two groups was used the chi-square test and multivariate logistic regression were used to evaluate the odds of each of the variables. All analyzes were performed using SPSS software version 16 and a significant level (p <0.05)

Inclusion Criteria:

- Blood pressure equal to or greater than 140/90 mmHg after 20 weeks of pregnancy and
- Proteinuria equal to or greater than 300 mg in 24 hours or equal to or greater than 1 plus in the urinary strip.

Exclusion Criteria:

- Pregnancy with kidney disease
- Patients with chronic hypertension
- Patients with chronic UTI before pregnancy

RESULTS

A total of 150 pregnant women were enrolled in this study

- 75 were in each case and control group.
- The mean systolic and diastolic blood pressure of cases were 160.5 ±16.2 mmHg and 104.6 ±11.0 mmHg
- The mean systolic and diastolic blood pressure for controls were 116.0 ±10.6 mmHg and 72.1 ±9.3 mmHg
- A total of 18 (12%) pregnant women had clinical symptoms suggestive of UTIs, 14 from cases and 4 from control group

Table1: Clinical information of pregnant women enrolled.

Patient characteristics	Case number (%)	Control number (%)	Total number(%)
Current blood pressure Mean SBP ±SD (mmHg) Mean DBP ±SD (mmHg)	 160.5 ± 16.2 104.6 ± 11.0	 116.0 ± 10.6 72.1 ± 9.3	
Preeclampsia severity Non severe Severe	 35 (47%) 40 (53%)	 NA NA	 35 40
Symptoms of UTI Symptomatic UTI Asymptomatic	 14 (77.77%) 96 (72.72%)	 4 (22%) 36 (27.27%)	 18 132
Significant bacteriuria Positive Negative	 26 (61.9%) 19 (17.59%)	 16 (38.09%) 89 (82.40%)	 42 108

Figure 1: Distribution of Current mean systolic and diastolic blood pressure in case and control group

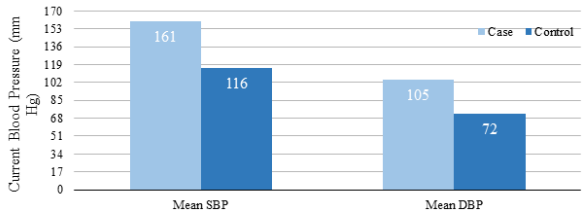
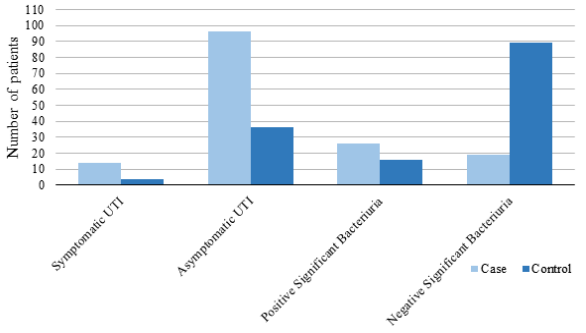


Figure 2: Distribution of patients with systemic UTI, Asymptomatic UTI, positive significant bacteriuria, negative significant bacteriuria



DISCUSSION

This study demonstrated a significant association between urinary tract infections (UTIs) and pre-eclampsia (PE), adding to the growing evidence that infections during pregnancy may play a contributory role in the pathogenesis of hypertensive disorders of pregnancy. Our results revealed that 61.9% of women with pre-eclampsia had significant bacteriuria, compared to 38.1% of those in the control group. These findings suggest that UTIs during pregnancy are associated with a 1.31-fold increased risk of developing PE.

A study by **Minassian et al. (2013)**[8], involving a large UK-based cohort, showed that UTIs diagnosed during mid-pregnancy increased the risk of PE, with the risk being greatest when infections occurred between 16–24 weeks. The authors attributed this to infection-induced systemic inflammation, which may trigger endothelial dysfunction—a hallmark of PE. Our study similarly noted that UTI exposure in pregnancy significantly increased the odds of developing PE.

Similarly **Anand and colleagues (2017)**[9] conducted a cross-sectional study in Maharashtra and observed that 54.6% of women with PE had bacteriuria, compared to 22.7% in normotensive pregnant women. These values closely mirror our findings and suggest a consistent trend in Indian populations. They also emphasized the importance of early detection and treatment of asymptomatic bacteriuria to prevent complications later in pregnancy.

A similar association was found in a study by **Jaiswal et al. (2018)**[10] at King George's Medical University, Lucknow, where the prevalence of UTI in pre-eclamptic women was 50.6%, compared to 20% in the control group. They suggested that maternal infections may lead to exaggerated inflammatory responses, promoting the endothelial dysfunction seen in PE.

Likewise, **Leitich et al. (2004)**[11] from Germany conducted a randomized controlled trial that demonstrated a significant reduction in PE incidence following antibiotic treatment of bacteriuria. These findings align with the potential clinical implications of our study—that early diagnosis and treatment of UTIs may reduce the risk of developing pre-eclampsia.

CONCLUSION

The findings of this study highlight a significant correlation between urinary tract infections during pregnancy and the subsequent development of pre-eclampsia. A greater prevalence of bacteriuria among women with pre-eclampsia suggests that UTIs may play a contributing role in the condition's pathophysiology, likely through inflammatory mechanisms.

Given the ease with which UTIs can be detected and treated, introducing routine urine screening in prenatal care may serve as a practical strategy to reduce the risk of pre-eclampsia. However, further in-depth research involving larger populations is recommended to validate these results and assess the impact of early UTI treatment on preventing hypertensive complications in pregnancy.

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