

Evaluation of the incidence of pre-eclampsia, preterm labor in association with urinary tract infection (UTI) during pregnancy: An observational study

Hakeem Sayeda Bee Bee Hajira¹, Hassan Shaikh Imrana², Sadgunothama Goud Kamparaj³

¹Department of Obstetrics and Gynecology, Fathima Institute of Medical Sciences, Ramarajupalli, Kadapa, Andhra Pradesh, India

²Department of Obstetrics and Gynecology, MES Academy of Medical Sciences, Perinthalmanna, Kerala, India

³Department of Pharmacology, Fathima Institute of Medical Sciences, Ramarajupalli, Kadapa, Andhra Pradesh, India

Abstract

Introduction: Urinary tract infection (UTI) is the furthestmost prevailing bacterial infection in pregnancy that may lead to serious complications in some cases like preterm labor, anemia, pre-eclampsia, birth defects, septicemia, and maternal death. Pre-eclampsia(PE) is a multi-system vascular syndrome of pregnancy with a 5% - 8% global prevalence. Over 15 million babies are born beyond 20 gestation weeks. One of the prime contributors to death in children below 5 years is preterm birth, which may be due to inadequate achievable and cost- effective healthcare facilities. So this study was executed to evaluate the incidence of pre- eclampsia, preterm labor in association with UTI during pregnancy.

Materials and methods: Around 252 patients were employed in the present prospective study, and the patients were screened for UTI by standard laboratory procedures. Socio-demographic data was obtained by standard questionnaires. Colony counts resulting in bacterial growth of graterthan 10^5 /ml was considered significant in both symptomatic and asymptomatic pregnant women after overnight incubation at 37°C for 24 hours. The collected data was tabulated and analysed by SPSS (descriptive statistics).

Results: Out of 252 study participants 51 patients were screened positive for UTI. Among study patients, pre-eclampsia was observed in 19 patients (12 were < 34 weeks, 7 were >34 weeks). Preterm birth was observed in 27 patients (10 were between 28-32 weeks, & 17 were between 32-37 weeks). Surprisingly 16 UTI cases were observed during delivery may be due to relapse or asymptomatic UTI.

Conclusion: The observational study demonstrated that pre-eclampsia, and preterm births were significant perinatal adverse out comes due to UTI during pregnancy. The incidence of UTI, pre-eclampsia, and preterm birth in the present study were 20.24%, 7.5%, and 10.7% respectively.7.2% of UTI cases were also observed during pregnancy which were maybe due to relapse or because of asymptomatic bacteriuria. Hence, regular screenings (cost- effective) at every trimester need to be incorporated as a routine antenatal care to minimize maternal newborn adverse outcomes due to UTI. In order to decrease maternal adverse out comes, the health care facilities need to be improved.

Keywords: Urinary tract infection (UTI), Preterm birth, Pre-eclampsia (PE)

Introduction

Urinary tract infection (UTI) is the furthestmost prevailing bacterial infection during pregnancy. The urinary tract infection in pregnancy may be symptomatic (cystitis, pyelonephritis) or asymptomatic (bacteriuria without symptoms). Pyelonephritis in pregnancy can lead to preterm labor, septicemia, anemia, and seldom, maternal death. UTI in pregnancy is also associated

with pre-eclampsia and birth defects^[1]. Approximately 150 million deaths per year are observed because of UTI and its associated complications which can be developed in 40%-50% of women and 5% of men^[2]. It has been observed that UTI was about 4-10 times more prevalent in pregnant than in non-pregnant women around 20%^[3]. Based on research evidence available, the prevalence of symptomatic and asymptomatic

Address for Correspondence:

Dr. Hakeem Sayeda Bee Bee Hajira

Department of Obstetrics and Gynecology,

Fathima Institute of Medical Sciences, Ramarajupalli, Kadapa, Andhra Pradesh, India

Email: hshajira4@gmail.com, sadgunaaindian@gmail.com

urinary tract infections in pregnant women has been 17.9% and 13% respectively^[2]. Studies have suggested that 25%-40% of untreated asymptomatic pregnant women with bacteriuria will eventually advance to acute pyelonephritis, as furthestmost cause of pre-delivery hospitalization^[4].

Pre-eclampsia (PE) is a multi-system vascular syndrome of pregnancy distinguished by proteinuria, and hypertension, which typically occurs after 20 weeks of pregnancy. Generally the blood volume increases to 2 L which is denoted as gestational hemodilution^[5]. PE is a foremost contributor to perinatal and maternal morbidity and mortality, particularly in socioeconomically weak setup^[6]. Comprehensively, 5%-8% of all pregnant females are affected by pregnancy-induced hypertensive disorders. Pre-eclampsia presenting with proteinuria and hypertension affects 5%-7% of all pregnancies^[7]. The prevalence of pre-eclampsia-eclampsia in India was estimated as 3%-6%^[8]. The prevalence of UTI in pregnancy was reported in US and other developing countries as 2.7% to 8.7%, and 12% to 40%^[9]. UTI during pregnancy increases the risk of PE by 1.31 folds^[10].

According to WHO, Preterm labor is "The onset of labor prior to completion of 37 weeks of gestation, in pregnancy beyond 20 weeks of gestation". Preterm birth affects 15 million newborns annually (more than 1 in 10), is the greatest cause of mortality in children under 5, and resulted in around 1 million fatalities in 2015^[11]. Due to a lack of practical, affordable treatment, around 50% of preterm newborns die^[11]. A significant group of patients from low- and middle-income countries observed a 4-fold increase in maternal mortality as well as an approximately 2-fold increase in perinatal mortality, preterm delivery, and low birth weight as a result of PE^[12].

Though the prevalence of above conditions were reported as high by global studies, Premature birth is still the main cause of new born mortality and morbidity, however there has been a larger improvement in preterm baby survival in recent decades, mostly due to prompt treatments, prenatal usage of corticosteroids, improved NICU care, and exogenous surfactant therapy. India is one of developing countries, and focused on maternal and child health care was improved due to increased improved facilities health care system and awareness. So the present study was conducted to evaluation of the incidence of pre-eclampsia, preterm labour in association with urinary tract infection (UTI) during pregnancy in a teaching based hospital in Kadapa Andhra Pradesh.

Materials and Methods:

A prospective observational study was conducted in Fathima institute of medical sciences Kadapa, with due approval by institutional ethical committee. The women delivering at institution, who were attending care centre regularly, were selected as participants with undersigned inform consent form. The participants were explained thoroughly in local language about the study. Those who were very ill, unable to participate in interviews, pregnancies complicated by congenital malformations, and under antibiotics were excluded in subsequent follow up of the study. The sample size 252 was considered according to UTI prevalence (the margin of error $\pm 5\%$, 95% confidence, potential loss 10%)^[2]. Socio- demographic data was obtained by customised questionnaires (proforma). Each pregnant woman's clean-catch mid stream urine was collected in the early morning and put into a sterile container with a wide opening and sent to laboratory for culture & sensitivity. Colony counts that produced bacterial growth of $\geq 10^5$ /ml after an overnight incubation at 37°C for 24 hours were considered significant in symptomatic as well as asymptomatic pregnant women. The collected data was tabularized and analysed by SPSS (descriptive statistics).

Results:

Among the study participants (Table1), 139 (55.2%) patients were aged between 18-25 years, 95 (37.6%) were aged between 25-32 years, 18 (7.2%) were above 33 years. The diagnostic parameters for UTI revealed 51 patients were infected and 201 patients were not infected with an incidence of 20.24% and 79.76% respectively.

Table 1: Demography of the patients

Variable		Number of patients	Percentage
Age	18-25	139	55.2
	25-32	95	37.6
	>33	18	7.2
	Total	252	100
UTI	Positive	51	20.24
	Negative	201	79.76
	Total	252	100

Table 2: Incidence of maternal outcome in UTI positive and negative pregnant women

	Number of patients	Percentage
UTI during delivery	16	31
Preeclampsia	19	37
Pre-term labour	27	52

Maternal outcomes selected to study were depicted in the table 2, which indicates that 19 patients were diagnosed with preeclampsia and 27 pre-term labours

were observed with an incidence of 37% and 52.9% respectively. Surprisingly UTI also observed in 16 (31%) patients may be due to asymptomatic bacteriuria and relapse.

Table 3: Incidence of preeclampsia based on gestational age

Gestational age in weeks	Number of patients	Percentage
<34 weeks	12	63.2
>34	7	36.8
Total preeclampsia patients	19	100

According to Table 3, out of 19 preeclampsia patients, preeclampsia was observed before 34 weeks of gestational age in 12 patients and after 34 weeks it was observed in 7 patients with an incidence of 63.25% and 36.8% respectively.

Table 4: Gestational age at the time of delivery among preterm births

Gestational age in weeks	Number of deliveries	Percentage
<28 weeks	0	0
28-32	10	37
32-37	17	63
Total preterm births	27	100

In the present study (Table 4), among observed pre-term labours^[27], 10 live pre-term births were during gestational age 28-32 weeks, 17 were observed in between 32-37 weeks with an incidence percentage of 37% and 63% respectively. There was no preterm delivery observed in the present study less than 28 weeks of gestational age.

Discussion:

Current study explored the incidence of UTI in pregnant women and its impression on the health in terms of selected maternal adverse outcome (preeclampsia, preterm births) in a teaching based hospital in kadapa, Andhra Pradesh. Based on the global prevalence of UTI, the sample size was calculated into 252 patients. Among the participants, 139 patients were aged between 18-25 years, 95 were aged between 25-32 years, 18 were above 33 years. The patients were under standard antimicrobial therapy during the study. Due to the rise in sex hormones, anatomical modifications and physiological changes that occur during pregnancy, urinary tract infections are one of the furthestmost prevalent health issues in pregnant women. Such changes can start as early as six weeks during the pregnancy, peaking between 22 and 24 weeks^[13]. This study observed 20.24% of UTI patients. The study conducted by mobbasher et al., the

incidence of UTI was 3.7% which was lower than the present study incidence. Similarly studies conducted by bookallil et al., turpin et al., Hernandez et al., Tadesse et al., the incidence of UTI was 4.9%, 7.3%, 8.4%, 9.8% respectively^[2,14,15,16]. In contrast the study conducted by Lekshmi Balachandran et al., observed 26.6% of women with UTI and the study conducted by Faidah et al. also observed similar UTI incidence(20%)^[4,17].

There was a greatest association between preeclampsia and maternal mortality, around 4 times in comparison with non-preeclampsia patients^[18]. The present study observed that 19 Preeclampsia patients with UTI during pregnancy (12 were <34 weeks, 7 were >34 weeks) with an incidence of 37%. Hill JA, Devoe et al stated that 50.4% of pregnant women with preeclampsia had substantial bacteriuria, which is unexpectedly high and implies that UTIs are more common in this critical state^[19] Joshua Kaduma et al demonstrated a strong association between UTI and preeclampsia^[20].The present incidence was approximately similar with global incidence^[7,11]. Chang et al. demonstrated significance relationship between PE and UTI during pregnancy (1.72, 95% CI 1.16-2.54^[21]. Abalos et al demonstrated in their study that the incidence of pre-eclampsia was 2.16%^[22] and PE is the disorder with the most variation with incidences ranging from 0.20% in Vietnam to 6.71% in Mongolia^[22].

The risk factors of preterm birth were revealed as younger maternal age <20 years, no formal education, no receipt of antenatal iron, calcium or vitamins, less than four ANC visits, severe antepartum hemorrhage, maternal hypertensive disorders, and fatal malpresentation. Preterm birth was observed in 27 (52.9%) patients (10 were between 28-32 weeks & 17 were between 32-37 weeks) in this study. The present study was supported by Rebecca J. Baer et al demonstrated that Pregnant Females with UTIs early in pregnancy had an 1.2 fold (28.8%) of increased risk of PTB^[23]. Mina Qobadi et al also demonstrated the significant association between UTI and pre term birth^[24].

The present study was supported in terms of association between Preterm birth and UTI by the study conducted by Yamini V. Pusdekar et al with an incidence of 12.6% and also by Reddy, et al with 10.86%^[25,26,27]. The incidence was higher in developing countries than developed countries. The prevalence of preterm birth was demonstrated as 11.41% in a study conducted by Dagnew Getnet Adugna^[27]. Wagura et al., and I Bekele et al in their study demonstrated incidence was 18.3%^[28,29]. In the present study, Surprisingly 16 (31%) UTI cases were observed during delivery may be due to relapse or asymptomatic UTI.

Conclusion:

The observational study demonstrated that preeclampsia, and preterm births were significant perinatal adverse outcomes due to UTI during pregnancy. The incidence of UTI, preeclampsia, and preterm birth in the present study were 20.24%, 37%, and 52.9% respectively. 31% of UTI cases were also observed during pregnancy which may be due to relapse or because of asymptomatic bacteriuria.

Recommendations:

Hence, regular and repeated screenings (cost-effective) at every trimester need to be incorporated as a routine antenatal care to minimize maternal newborn adverse outcomes due to UTI. In order to decrease maternal adverse outcomes, the health care facilities need to be improved.

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