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Original Research Article

Impact of fever in pregnancy on maternal and fetal outcomes: a prospective observational study of 171 cases

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ABSTRACT

Background: Fever during pregnancy is a high-risk condition associated with adverse fetomaternal outcomes; however, region-specific data from Indian tertiary care government hospitals remain limited. This study evaluated fetomaternal outcomes and etiological spectrum of fever in pregnancy.

Methods: This prospective observational study was conducted over 18 months in the Department of Obstetrics and Gynaecology of a tertiary care government hospital. Total 171 pregnant women with oral/axillary temperature $\geq 38^{\circ}\text{C}$ were enrolled after informed consent. Demographic, obstetric, fever-related variables were recorded, maternal and neonatal outcomes were followed until 6 weeks postpartum. Data were analysed using SPSS with chi-square/Fisher exact test; $p < 0.05$ was considered statistically significant.

Results: Most women were aged 21-35 years (91.2%) and multigravida (52.0%). Fever occurred predominantly in second trimester (43.3%) and was low-to-moderate grade (94.7%). Urinary tract infection (23.4%), typhoid fever (14.6%), upper respiratory tract infection (13.4%) were commonest causes. Vaginal delivery occurred in 49.1%, caesarean section in 43.9%, abortion in 7.0%. Maternal complications occurred in 51.5%, mainly anaemia (19.9%), preterm labour (15.2%); one maternal death. Among neonates, 23.97% required NICU admission, 21% had coexisting adverse outcomes, two intrauterine and two neonatal deaths occurred. Typhoid, dengue, malaria, acute febrile illness of unknown cause, primigravidity, first-trimester fever onset, moderate-grade fever was significantly associated with adverse fetomaternal outcomes ($p < 0.05$).

Conclusions: Fever in pregnancy is associated with substantial maternal and neonatal morbidity. Early diagnosis, prompt treatment, close antenatal surveillance may improve fetomaternal outcomes.

Keywords: Fetomaternal outcome, Fever in pregnancy, Maternal complications, Neonatal outcome, Tertiary care hospital

INTRODUCTION

Fever may convert an otherwise uncomplicated pregnancy into a high-risk. In pregnant women, fever is defined as a single oral temperature of 39°C or greater, or a temperature of $38-38.9^{\circ}\text{C}$ that persists on repeat measurement after 30 minutes.¹ Fever is further graded as low ($37.5-38.0^{\circ}\text{C}$), moderate ($38.1-39.0^{\circ}\text{C}$), high ($39.1-41.0^{\circ}\text{C}$), and hyperthermia ($>41.0^{\circ}\text{C}$).²

The aetiology of fever in pregnancy may be infectious including urinary tract infection, respiratory tract infection, typhoid, malaria, dengue, and intra-amniotic infection or non-infectious, such as autoimmune disease, thromboembolism etc.³ Depending on the severity, timing, and duration of the febrile illness, maternal fever has been linked to miscarriage, preterm birth, premature rupture of membranes, intrauterine growth restriction, stillbirth, low birth weight, poor Apgar scores, and increased perinatal

mortality, as well as maternal complications such as pre-eclampsia and sepsis.^{4,6} Because early recognition and treatment of the underlying cause can prevent many of these adverse outcomes, even a mild fever in pregnancy warrants close monitoring.⁵

Despite the well-recognised risks, region-specific evidence on the etiological spectrum and fetomaternal impact of fever in pregnancy from Indian tertiary care government hospitals remains limited. This study was undertaken to evaluate the maternal and fetal complications of fever in pregnancy and their association with maternal age, parity, socioeconomic status, and characteristics of the febrile illness among women attending a tertiary care government hospital.

The primary objectives were to study the fetomaternal outcomes of fever in pregnancy and to determine its etiology at a tertiary care hospital. The secondary objective was to determine the association between the etiology of fever and fetomaternal outcomes.

METHODS

This prospective observational study was conducted at Grant Government Medical College and Sir JJ Group of Hospitals in the Department of Obstetrics and Gynaecology of a tertiary care government hospital over a period of 18 months between October 2024 to March 2026. Using an expected fever-in-pregnancy incidence of 10.5% reported in prior literature with a 95% confidence level ($Z=1.96$) and 5% absolute precision, the minimum calculated sample size was 145.⁸ To improve study power, 171 consecutive eligible women were enrolled during the study period.

Pregnant women presenting with a temperature $\geq 38^{\circ}\text{C}$, whether at home, in the outpatient department, or in the emergency department, and who consented to participate were included. Women with incomplete records, unknown or ongoing pregnancy outcome at study completion, medicolegal cases, and immunocompromised patients were excluded.

After clearance from the Institutional Ethics Committee and written informed consent, demographic details, obstetric history, and characteristics of the febrile illness (grade, duration, frequency, and associated symptoms) were recorded on a structured case record form. Relevant clinical examination and investigations were performed to establish the etiology of fever. Women were followed through delivery and up to 6 weeks postpartum to document maternal outcomes (mode of delivery, preterm birth, abortion, PROM/PPROM, maternal complications, and mortality) and neonatal outcomes (birth weight, Apgar score, NICU admission, congenital anomalies, and neonatal mortality).

Data were entered in Microsoft Excel and analysed using SPSS statistical software. Descriptive statistics

(frequencies and percentages) were computed for all variables, and associations between categorical variables were tested using the chi-square test or Fisher's exact test, with odds ratios and 95% confidence intervals where applicable. A p value <0.05 was considered statistically significant.

RESULTS

A total of 171 pregnant women presenting with fever were analysed.

The majority (91.2%) were aged 21-35 years, 8.2% were ≤ 20 years, and 0.6% were >35 years, indicating that fever was most commonly observed in the peak reproductive age group. Multigravida women were marginally more represented than primigravida; the cohort was predominantly rural and of lower/lower-middle socioeconomic status. The onset of fever occurred most commonly in the second trimester (43.3%), followed by the third (31.0%) and first (25.7%) trimesters. Most febrile episodes were of short duration (≤ 3 days in 76.6%), and none persisted beyond 7 days. Fever was of low grade in 47.4% and moderate grade in 47.4% of women, with high-grade fever in only 5.3%. Table 1 shows the age distribution, obstetric profile, socio-demographic characteristics and various ranges of grades of fever.

Table 1: Age distribution, obstetric profile, socio-demographic characteristics and various ranges of grades of fever of study participants (n=171).

Variable/category	Number	Percent
Age group (years)		
≤ 20	14	8.2
21–35	156	91.2
>35	1	0.6
Total	171	100.0
Obstetric profile		
Gravida-Primigravida	82	48.0
Gravida-Multigravida	89	52.0
Parity-Nulliparous	82	48.0
Parity-Para 1	56	32.7
Parity-Para ≥ 2	33	19.3
History of abortion-Present	28	16.4
Residency		
Residence-Rural	112	65.5
Residence-Urban	59	34.5
Socioeconomic status		
Lower/lower-middle	135	79.0
Upper-middle/upper	36	21.0
Grades of fever		
Low grade (99.1-100.5 F)	81	47.4
Moderate (100.6-102.4 F)	81	47.4
High (>102.6 F)	9	5.3

The most common cause of fever was urinary tract infection (23.4%), followed by typhoid fever with widal

positive status (*S. typhi* > *S. paratyphi* A > *S. paratyphi* B) (15.2%) and upper respiratory tract infection (12.9%). Acute gastroenteritis accounted for 11.1% of cases; the most common organism isolated from stool was *E. coli* f/b *Klebsiella*, while malaria contributed to 9.4%. Less common causes included viral fever (5.3%), dengue fever (4.7%), lower respiratory tract infections (4.1%), and vaginitis (3.5%). A proportion of cases were classified as acute febrile illness of unknown origin (7.6%), while 2.9% were due to other causes such as tuberculosis and chorioamnionitis. Urinary tract infection, typhoid fever, and upper respiratory tract infection together accounted for over half of all febrile episodes. Table 2 shows the etiological spectrum of fever among the study participants.

Table 2: Etiological spectrum of fever among study participants (n=171).

Etiology	Number	Percent
Urinary tract infection	40	23.4
Typhoid fever	25	14.6
Upper respiratory tract infection	23	13.4
Acute gastroenteritis	19	11.1
Malaria (<i>P. vivax</i> + <i>P. falciparum</i>)	16	9.3
Acute febrile illness of unknown origin	13	7.6
Viral fever	8	4.6
Lower respiratory tract infection	7	4.1
Dengue fever	6	3.5
Vaginitis	6	3.5
Other/mixed infections (tuberculosis, scabies, coinfections)	8	4.5

The most common associated symptoms were bodyache/myalgia followed by headache and cough with/without expectoration, chills/rigors, and abdominal pain. Urinary symptoms such as burning micturition, increased frequency of micturition and gastrointestinal symptoms including loose stools/diarrhea, nausea, and vomiting were also frequently reported. Constitutional symptoms such as weakness/lethargy were present in 19 patients. A small proportion of women presented with per-vaginal symptoms, breathlessness, or no associated symptoms. Overall, headache, respiratory complaints, myalgia, chills, and abdominal pain were the predominant symptoms accompanying fever in the study population.

Regarding obstetric outcome, 49.1% of women delivered vaginally and 43.9% underwent caesarean section, while 7.0% had an abortion; preterm delivery (vaginal or caesarean) accounted for 16.4% of all deliveries (Table 3).

Maternal complications occurred in 51.5% of women overall, most commonly anaemia (19.9%, of whom nearly half required blood transfusion), preterm labour (15.2%),

hypothyroidism (8.1%), and PROM/PPROM (5.8%); 4.1% of women required ICU/CCU admission, and one maternal death occurred (dengue haemorrhagic shock with disseminated intravascular coagulation and acute kidney injury) shown in Table 4.

Table 3: Obstetric outcome among study participants (n=171).

Outcomes	Number	Percent
Vaginal delivery-term	70	40.9
Vaginal delivery-preterm	14	8.2
Caesarean section-term	61	35.7
Caesarean section- preterm	14	8.2
Abortion	12	7.0

Table 4: Maternal complications associated with fever in pregnancy (n=171).

Complication category	Number	Percent
No complications	83	48.53
Anaemia (including cases requiring transfusion)	34	19.88
Preterm labour	26	15.20
Hypothyroidism	14	8.10
PROM/PPROM	10	5.84
ICU/CCU admission	7	4.09
Hypertensive disorders of pregnancy	6	3.50
Other (GDM, PPH, DIC, thrombocytopenia, sepsis, mortality)	9	4.86

Categories are not mutually exclusive; several women had more than one concurrent complication, reflecting compounded morbidity

Table 5: Fetal and neonatal outcomes among study participants (n=171).

Outcomes	Number	Percent
Healthy neonate	91	53.21
NICU admission	41	23.97
Low birth weight (< 2.5 kg)	34	22.38*
Hyperbilirubinemia of newborn	11	6.43
Meconium-stained liquor	8	4.67
Fetal distress	8	4.67
Abortion	12	7.00
Intrauterine fetal demise	2	1.16
Neonatal mortality	2	1.16
Congenital anomaly (cystic hygroma)	1	0.58

*The denominator for birth weight is live births (n=159)

Among neonates, 53.2% were healthy at birth while 23.97% required NICU admission. Table 5 fetal and neonatal outcomes in study participants. Low birth weight (<2.5 kg) was recorded in 22.4% of live births, and 89.2%

of neonates had a normal Apgar score (7-10) at 1 minute, improving to 93.6% at 5 minutes, Apgar score is represented in Figure 1. Two neonatal deaths and two intrauterine fetal demises occurred; one neonate had a congenital anomaly (cystic hygroma).

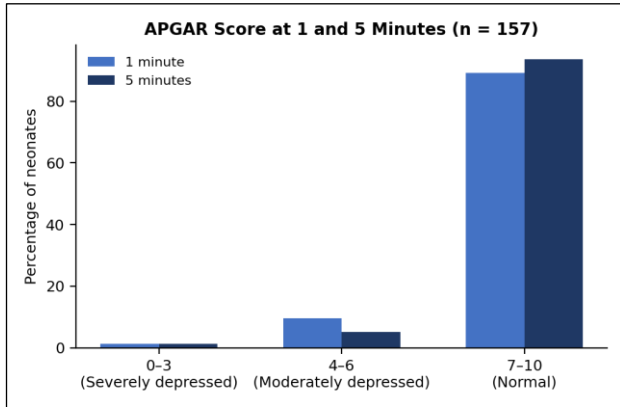


Figure 1: Apgar score distribution at 1 and 5 minutes (n=157).

Table 6 shows the association between etiology of fever, neonatal and maternal complications. A higher proportion of maternal complications was observed in typhoid fever, dengue fever, malaria and acute febrile illness of unknown cause. Statistical analysis revealed that typhoid fever ($p=0.025$), dengue fever ($p=0.030$), and malaria ($p=0.036$) were significantly associated with maternal complications. Other etiologies such as UTI, URTI, acute gastroenteritis and coinfections did not show statistically significant associations.

Table 6: Association between etiology of fever and adverse maternal and neonatal outcomes (n=171).

Etiology	Maternal complications, p value	Adverse neonatal outcome, p value
Typhoid fever	0.025	0.048
Malaria (<i>P. vivax</i>)	0.036	0.552 (NS)
Dengue fever	0.030	0.031
Acute febrile illness of unknown cause	0.389 (NS)	0.009
Urinary tract infection	0.896 (NS)	0.444 (NS)
Upper respiratory tract infection	0.101 (NS)	0.812 (NS)

NS=not statistically significant ($p \geq 0.05$). Typhoid fever, malaria, and dengue fever were significantly associated with maternal complications; typhoid fever, dengue fever, and acute febrile illness of unknown cause were significantly associated with adverse neonatal outcomes

Statistical analysis demonstrated that typhoid fever ($p=0.048$), dengue fever ($p=0.031$), and acute febrile illness of unknown cause ($p=0.009$) were significantly

associated with adverse neonatal outcomes. Other causes of fever, including UTI, URTI, malaria, viral fever, LRTI, vaginitis, acute gastroenteritis and coinfections did not show a statistically significant association with neonatal outcomes.

Table 7: Predictors of adverse fetomaternal outcome among study participants (n=171).

Risk factor	Adverse outcome, N (%)	P value
Age ≥ 30 years	21 (40.4)	0.048
Primigravida	34 (41.5)	0.036
Fever in first trimester	17 (47.2)	0.041
Moderate-grade fever	33 (40.7)	0.032
Typhoid fever	11 (42.3)	0.039
Dengue fever	6 (100.0)	0.032
Acute febrile illness of unknown cause	7 (53.8)	0.009
Malaria (<i>P. vivax</i>)	3 (23.0)	0.036

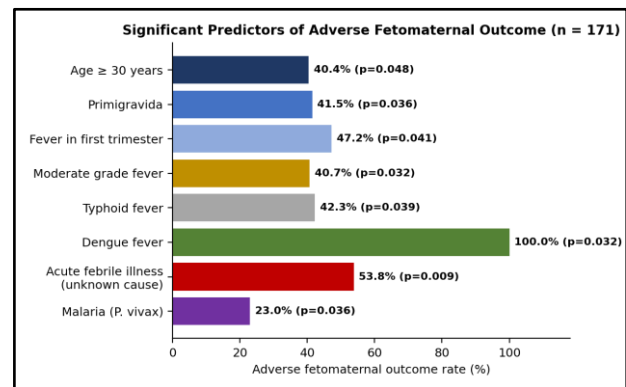


Figure 2: Significant predictors of adverse fetomaternal outcome.

On analysis of predictors of adverse fetomaternal outcome, maternal age ≥ 30 years ($p=0.048$), primigravidity ($p=0.036$), fever onset in the first trimester ($p=0.041$), moderate-grade fever ($p=0.032$), typhoid fever ($p=0.039$), dengue fever ($p=0.032$), malaria ($p=0.036$), and acute febrile illness of unknown cause ($p=0.009$) were significant predictors of adverse fetomaternal outcome. A statistically significant association was also observed between increasing grade of fever and the presence of maternal complications ($p=0.039$) shown in Table 7 and represented in Figure 2. The poorer outcomes observed in women with typhoid fever and dengue may be explained by the systemic inflammatory response and multisystem involvement associated with these infections. Typhoid can lead to prolonged maternal bacteraemia, sepsis, and placental dysfunction, increasing the risk of preterm birth and fetal compromise. Dengue is associated with thrombocytopenia, plasma leakage, haemorrhage, and shock, which may impair uteroplacental perfusion and contribute to adverse maternal and neonatal outcomes. These findings highlight the importance of early diagnosis,

prompt treatment, and close fetal surveillance in pregnant women with these infections.

DISCUSSION

In this study, fever in pregnancy predominantly affected women in the peak reproductive age group (21-35 years), consistent with the observations of Kumar et al and Mbongo et al, who reported similar age distributions in their cohorts.^{8,9} Primigravida women were affected more often, in keeping with the hypothesis that immunological adaptation during the first pregnancy increases susceptibility to infection.⁸

Fever occurring earlier in gestation carries a distinct risk profile from that occurring later: Chambers et al reported an increased risk of neural tube defects and stillbirth with early maternal fever, while Mahajan et al described associations between later fever and PROM, preterm labour, intrauterine growth restriction, and perinatal mortality.^{10,11} Both patterns were reflected in the present cohort, with a cluster of first-trimester abortions and a single congenital anomaly, alongside preterm labour, PROM/PPROM, and fetal distress in women with later-onset fever.

The overall obstetric complication profile in this study preterm delivery, abortion, and operative delivery is comparable to that reported by Prajapati et al and Poovathi et al who documented preterm delivery in 23.7% and 24% of febrile pregnancies, respectively.^{13,14} Maternal morbidity in the present cohort, principally anaemia, thrombocytopenia, and sepsis-related ICU admission, mirrors the pattern described by Knowles et al, who found maternal sepsis to be significantly associated with preterm delivery and anaemia.¹⁴ The single maternal death from dengue-associated haemorrhagic shock and DIC in this series parallels a comparable fatality reported by Lewis et al in their retrospective study of dengue in pregnancy.¹⁵

Adverse neonatal outcomes low birth weight, NICU admission, and low Apgar scores were most strongly associated with typhoid fever, dengue fever, malaria, and acute febrile illness of unknown cause in this study, in keeping with the findings of Lieberman et al on intrapartum fever and neonatal depression, and of Biswas et al, who linked pyrexia in pregnancy with fetal hypoxic injury via increased fetal metabolic demand.^{16,8} The predominance of urinary tract infection, typhoid fever, and upper respiratory tract infection as causes of fever in this cohort is consistent with the etiological spectrum reported by Prajapati et al and Poovathi et al from other Indian tertiary centres, reflecting the continuing burden of endemic infectious disease among pregnant women in this setting.^{12,13}

Maternal age ≥ 30 years, primigravidity, first-trimester fever onset, and specific infectious etiologies (typhoid, dengue, malaria, and unclassified febrile illness emerged as significant predictors of adverse fetomaternal outcome

in this study, corroborating earlier work suggesting that the timing and cause of maternal infection, rather than the fever itself, principally determine fetomaternal risk.^{10,11} Taken together, these findings reinforce the importance of early etiological diagnosis, prompt antimicrobial or supportive treatment, and close antenatal surveillance for febrile pregnant women, particularly in resource-limited government hospital settings where endemic infections remain common.

This study has few limitations. This was a single-centre study without an afebrile control group, which limits generalisability and precludes precise estimation of the risk attributable to fever itself. The small number of high-grade fever cases limited statistical power for some subgroup comparisons, and confounders such as maternal BMI, haemoglobin, and quality of antenatal care were not formally adjusted for in multivariate analysis. Long-term neurodevelopmental follow-up of neonates was also beyond the scope of this study.

CONCLUSION

Fever in pregnancy remains an important contributor to maternal and neonatal morbidity in tertiary care government hospital settings, with typhoid fever, dengue fever, malaria, and febrile illness of unknown etiology carrying the were associated with higher risk of adverse fetomaternal outcomes. Maternal age ≥ 30 years, primigravidity, and first-trimester fever onset further increase this risk. Strengthening antenatal infection screening, prompt etiological diagnosis, and timely multidisciplinary management of febrile pregnant women may substantially reduce the associated maternal and perinatal morbidity.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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