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Etiological Spectrum and Maternal–Perinatal Outcomes of Fever in Pregnancy: A Retrospective Observational Study

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ABSTRACT

Background: Fever during pregnancy is a common clinical problem and remains an important contributor to maternal and perinatal morbidity, particularly in low- and middle-income countries. Physiological changes during pregnancy may alter immune responses, increasing susceptibility to infections and their complications. The etiological spectrum of fever in pregnancy varies by region, and its impact on maternal and neonatal outcomes requires continuous evaluation.

Objectives: To assess the etiological spectrum of fever in pregnancy and to evaluate associated maternal and perinatal outcomes in a tertiary care hospital setting.

Methods: This retrospective observational study was conducted at a tertiary care hospital by reviewing medical records of pregnant women presenting with documented fever ≥38°C during pregnancy. A total of 40 eligible cases were included using consecutive sampling. Data regarding maternal demographics, gestational age, etiology of fever, laboratory findings, maternal complications, mode of delivery, and perinatal outcomes were collected. Data were analyzed using SPSS software, with categorical variables expressed as frequencies and percentages and continuous variables as mean ± standard deviation.

Results: The majority of women were aged 20–30 years (67.5%), and fever most commonly occurred in the third trimester (45%). Viral infections were the predominant etiology (40%), followed by bacterial infections (30%), parasitic infections (5%), while 25% of cases remained undiagnosed. Common laboratory abnormalities included anemia (45%), leukocytosis (35%), thrombocytopenia (25%), and elevated liver enzymes (20%). Maternal complications were observed in 60% of cases, with anemia being the most frequent (35%). Sepsis occurred in 15% of women; all cases were mild and managed successfully in high-dependency units. Only one patient required intensive care unit admission, and no maternal mortality was recorded. Vaginal delivery occurred in 55% of cases, while 45% underwent cesarean section. Adverse perinatal outcomes included preterm birth (30%), low birth weight (35%), neonatal intensive care unit admission (25%), and stillbirth (5%). Adverse outcomes were more frequent in bacterial and parasitic infections compared to viral etiologies.

Conclusion: Fever during pregnancy was associated with significant maternal and perinatal morbidity, although severe complications requiring intensive care were uncommon in this cohort. Viral infections were the most common cause, while bacterial and parasitic infections carried a higher risk of adverse outcomes. Early recognition, appropriate etiological evaluation, close maternal–fetal monitoring, and timely management are essential to reduce preventable complications.

Keywords*: Fever in pregnancy; Maternal outcomes; Perinatal outcomes; Etiology; Retrospective study.*

INTRODUCTION

Fever during pregnancy is a common clinical presentation and remains a significant cause of maternal morbidity and adverse perinatal outcomes, particularly in low- and middle-income countries where infectious diseases are endemic and access to timely healthcare may be limited [1]. Pregnancy is associated with physiological, immunological, and hormonal changes that alter the maternal response to infections, often modifying the clinical presentation, severity, and progression of febrile illnesses [2]. Fever in pregnancy may result from a wide etiological spectrum, ranging from benign self-limiting viral infections to severe life-threatening conditions such as malaria, dengue, enteric fever, urinary tract infections, pneumonia, and emerging viral infections, including influenza and COVID-19 [3]. Acute gastroenteritis is another frequently encountered cause of fever in pregnancy, particularly in low- and middle-income settings, where contaminated food and water sources contribute significantly to infectious morbidity.Non-infectious causes such as autoimmune disorders, drug reactions, and thromboembolic events may also contribute, though infectious etiologies predominate in most clinical settings [4]. The etiological profile of fever in pregnancy varies widely depending on geographic location, seasonal patterns, socio-economic conditions, and local disease burden, making regional epidemiological data essential for effective diagnosis and management [5]. Fever itself, irrespective of the underlying cause, has been implicated in adverse maternal and fetal outcomes due to hyperthermia-induced physiological stress, inflammatory responses, and placental dysfunction [6]. Maternal hyperthermia during early pregnancy has been associated with an increased risk of congenital anomalies, neural tube defects, and spontaneous abortion, while fever in later gestation is linked to preterm labor, intrauterine growth restriction, fetal distress, and stillbirth [7]. Furthermore, certain infections causing fever in pregnancy, such as malaria, dengue, scrub typhus, and listeriosis, have a direct pathogenic effect on the placenta, leading to placental insufficiency, vertical transmission, and adverse neonatal outcomes [8]. Maternal complications associated with febrile illnesses include anemia, thrombocytopenia, hepatic dysfunction, acute kidney injury, sepsis, and multi-organ failure, which significantly increase the risk of maternal mortality if not promptly recognized and managed [9]. Febrile illnesses may necessitate hospitalization and close maternal–fetal monitoring, with intensive care admission required only in selected severe cases. [10]. From a perinatal perspective, neonates born to mothers with fever during pregnancy are at increased risk of prematurity, low birth weight, birth asphyxia, neonatal sepsis, and admission to neonatal intensive care units [11]. Despite the clinical significance of fever in pregnancy, diagnosis is often challenging due to overlapping symptoms, atypical presentations, and limitations in diagnostic facilities, particularly in resource-constrained settings [12]. Empirical treatment without etiological confirmation is common and may contribute to inappropriate antimicrobial use and delayed targeted therapy [13]. Retrospective observational studies play a crucial role in understanding the etiological spectrum, clinical patterns, and outcomes associated with fever in pregnancy, as they allow evaluation of real-world data across diverse patient populations [14]. Such studies help identify prevalent causes, seasonal trends, risk factors for adverse outcomes, and gaps in existing management protocols [15]. Understanding the relationship between specific etiologies of fever and maternal–perinatal outcomes is essential for developing evidence-based guidelines, improving antenatal surveillance, and optimizing referral systems. Moreover, early identification of high-risk febrile illnesses can facilitate timely intervention, reduce preventable complications, and improve both maternal and neonatal survival. Given the ongoing emergence and re-emergence of infectious diseases and the persistent burden of febrile illnesses in pregnancy, particularly in tropical regions, there is a continued need for comprehensive studies evaluating the etiological spectrum and associated outcomes. The present retrospective observational study aims to contribute to this evidence by analyzing the causes of fever in pregnancy and their impact on maternal and perinatal outcomes, thereby providing valuable insights for clinicians, policymakers, and public health planners.

METHODOLOGY

Study Design

This study was conducted as a retrospective observational study based on a systematic review of hospital medical records.

Study Setting

The study was carried out at a tertiary care teaching hospital with dedicated obstetrics, gynecology, and neonatal services.

Study Duration

The study was conducted over a defined retrospective period of one year. Medical records of eligible patients admitted during this period were reviewed and analyzed.

Participants

Inclusion Criteria

- Pregnant women of any gestational age
- Documented fever ≥38°C during pregnancy
- Availability of complete medical records

Exclusion Criteria

- Women with incomplete or missing medical records
- Women presenting with postpartum fever
- Fever due to clearly documented non-infectious causes such as autoimmune disorders or drug reactions

Study Sampling

A consecutive sampling method was employed. All pregnant women who met the inclusion criteria during the study period were included until the required sample size was achieved. This non-probability sampling technique was selected to minimize selection bias and ensure that all eligible cases were captured during the study duration.

Study Sample Size

The sample size for this retrospective observational study was calculated using prevalence data from a previously published study. Egloff et al. (2020) reported an overall complication rate of approximately 22% among pregnant women presenting with fever, which was used as the reference proportion for estimation. The standard formula for calculating sample size for a single proportion was applied, using a Z value of 1.96 corresponding to a 95% confidence interval. The estimated prevalence (p) was taken as 0.22, with q calculated as $1 - p$ (0.78). An absolute precision (d) of 0.15 was selected, considering feasibility constraints related to the retrospective design and short study duration. After substitution of values, the calculated sample size was approximately. To compensate for incomplete records and potential data attrition, a 20% allowance was added, resulting in a final sample size of approximately 40 patients. This sample size was considered adequate to assess clinical characteristics, complications, and outcomes.

Study Parameters

The study assessed a range of maternal and perinatal parameters. Maternal variables included age, gestational age, trimester at presentation, duration and grade of fever, etiological diagnosis, laboratory findings, and mode of delivery. Maternal complications such as anemia, thrombocytopenia, and sepsis were documented. Details regarding level of care, including high-dependency unit management and intensive care unit admission, were specifically recorded.

Study Procedure

After obtaining approval from the institutional ethics committee, hospital medical records were accessed through the medical records department. Eligible case files were identified using admission registers and diagnostic codes. Each record was reviewed in detail to extract relevant clinical, laboratory, and outcome data. No direct patient contact occurred, and no modifications were made to standard clinical care, as all information was obtained retrospectively.

Study Data Collection

Data were collected using a structured data extraction form specifically designed for the study. Information was obtained from admission notes, case files, laboratory and imaging reports, delivery records, and neonatal charts. To ensure confidentiality, all patient identifiers were removed, and each case was assigned a unique study code. The collected data were cross-verified to minimize transcription errors and missing entries.

Data Analysis

The collected data were entered into Microsoft Excel and subsequently analyzed using Statistical Package for the Social Sciences (SPSS) software. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as mean ± standard deviation. Associations between etiological factors and maternal or perinatal outcomes were assessed using the Chi-square test or Fisher's exact test, as appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee prior to commencement. As the study was retrospective and record-based, informed consent was waived. Strict confidentiality was maintained throughout the study, and data were used solely for research purposes. No personal identifiers were disclosed, and all procedures adhered to ethical guidelines for biomedical research involving human participants.

RESULTS

A total of **40 pregnant women with documented fever ≥38°C** during pregnancy were included in the final analysis. The results are presented in the form of tables describing demographic profile, etiological spectrum, maternal complications, and perinatal outcomes.

Table 1: Distribution of Study Participants by Maternal Age

Age group (years)	Number (n)	Percentage (%)
<20	4	10.0
20–25	14	35.0

26–30	13	32.5
31–35	7	17.5
>35	2	5.0
Total	**40**	**100**

The majority of pregnant women presenting with fever belonged to the **20–30 years age group (67.5%)**, which represents the most common reproductive age group. Extremes of maternal age constituted a smaller proportion of cases.

Table 2: Trimester-wise Distribution of Fever

Trimester	Number (n)	Percentage (%)
First	8	20.0
Second	14	35.0
Third	18	45.0
Total	**40**	**100**

Fever was most commonly observed during the **third trimester (45%)**, followed by the second trimester. This may be due to increased healthcare utilization and higher susceptibility to infections in late pregnancy.

Table 3: Duration of Fever at Presentation

Duration of fever	Number (n)	Percentage (%)
≤3 days	16	40.0
4–7 days	18	45.0
>7 days	6	15.0

Most patients presented with fever lasting **4–7 days (45%)**, indicating delayed hospital presentation, possibly due to initial home management or referral from peripheral centers.

Table 4: Etiological Spectrum of Fever in Pregnancy

Etiology	Number (n)	Percentage (%)
Viral	16	40.0
Bacterial	12	30.0
Parasitic	2	5.0
Undiagnosed	10	25.0
Total	**40**	**100**

Parasitic infections constituted a small proportion of cases (5%), while a higher proportion of cases remained undiagnosed despite evaluation.

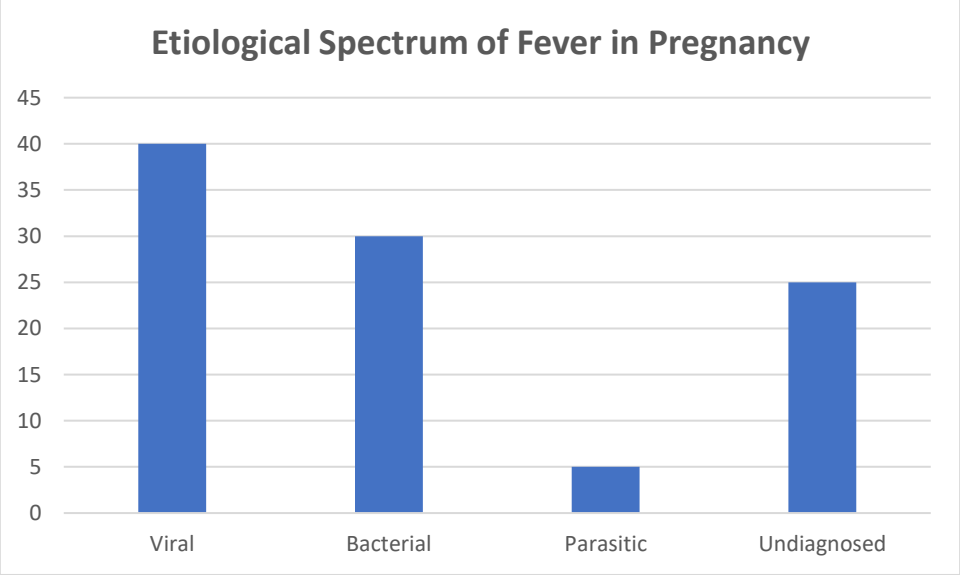


Table 5: Common Laboratory Abnormalities Observed

Laboratory abnormality	Number (n)	Percentage (%)
Anemia	18	45.0
Thrombocytopenia	10	25.0
Elevated liver enzymes	8	20.0
Leukocytosis	14	35.0

Anemia was the most frequently observed laboratory abnormality, followed by leukocytosis. Thrombocytopenia and hepatic dysfunction were commonly associated with viral and parasitic infections.

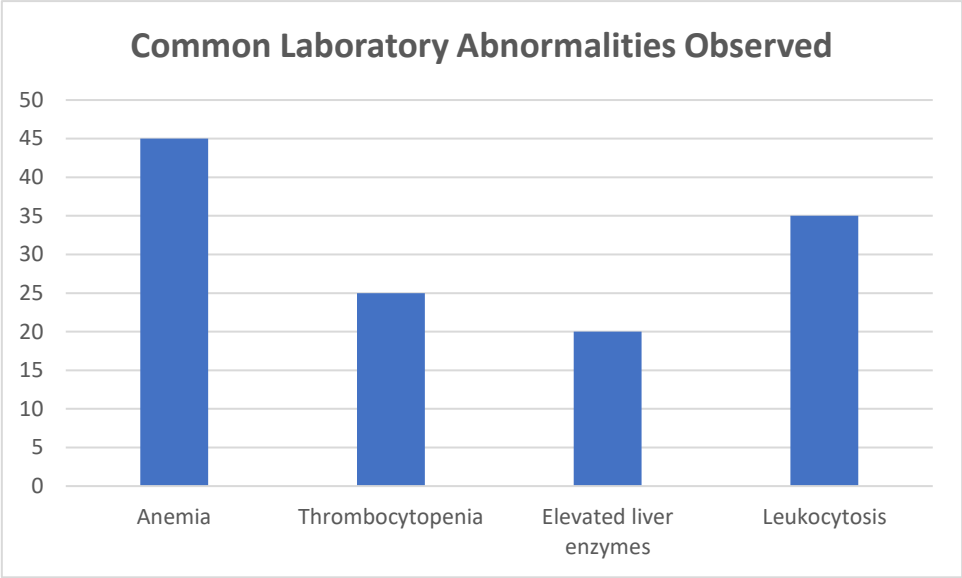


Table 6: Mode of Delivery

Mode of delivery	Number (n)	Percentage (%)
Vaginal delivery	22	55.0
Cesarean section	18	45.0
Total	**40**	**100**

More than half of the women delivered vaginally. However, a relatively high cesarean section rate was observed, possibly due to fetal distress and maternal complications related to febrile illness.

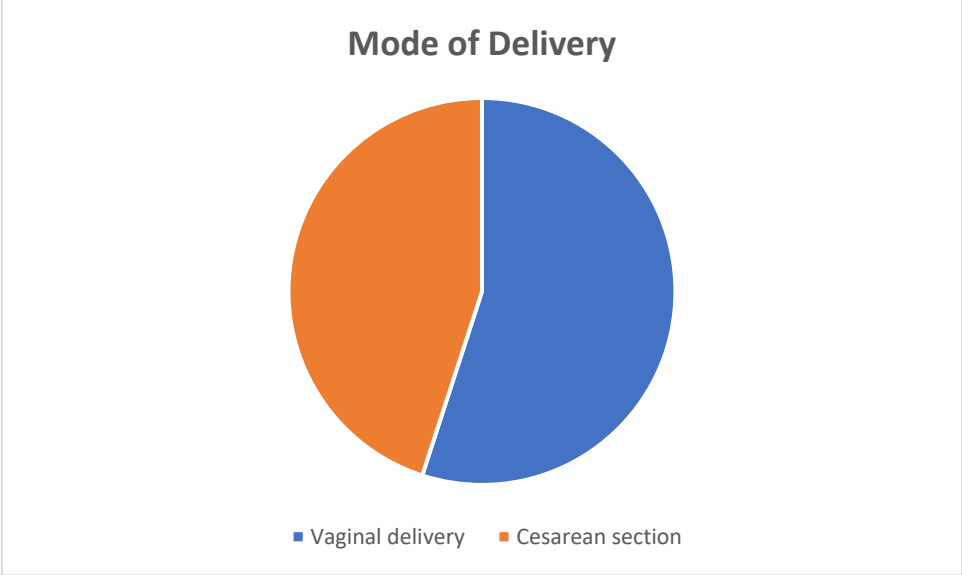


Table 7: Maternal Complications Associated with Fever

Maternal complication	Number (n)	Percentage (%)
Anemia	14	35.0
Sepsis	6	15.0
ICU admission	1	2.5
No complications	16	40.0

Maternal complications were observed in 60% of cases, with anemia being the most common. Sepsis was mild in nature and was successfully managed in high-dependency wards. Only one patient required intensive care unit admission during the study period, and no fever-related maternal deaths were recorded..

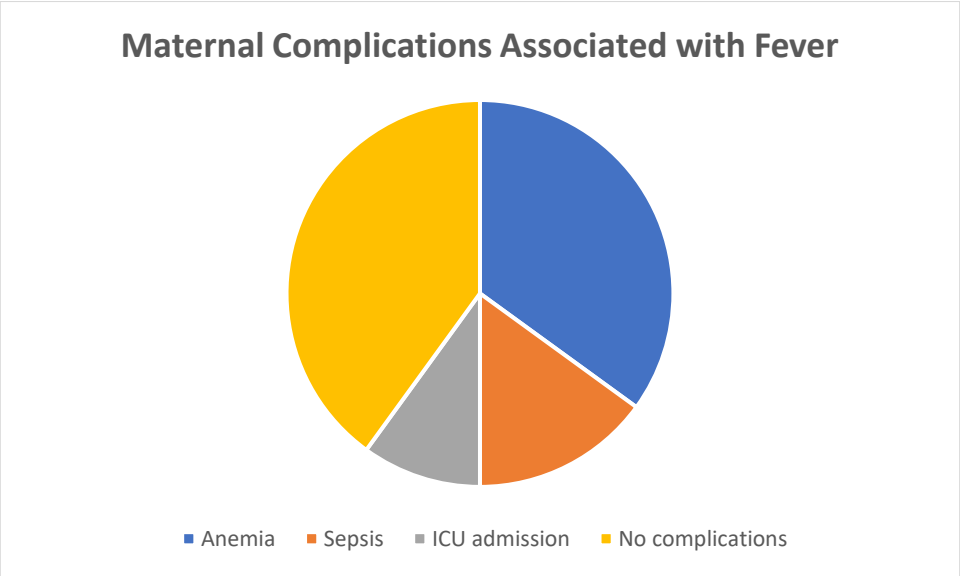


Table 8: Gestational Age at Delivery

Gestational age at delivery	Number (n)	Percentage (%)
Preterm (<37 weeks)	12	30.0
Term (≥37 weeks)	28	70.0
Total	**40**	**100**

Preterm delivery occurred in **30% of cases**, highlighting the association between maternal fever and increased risk of preterm birth.

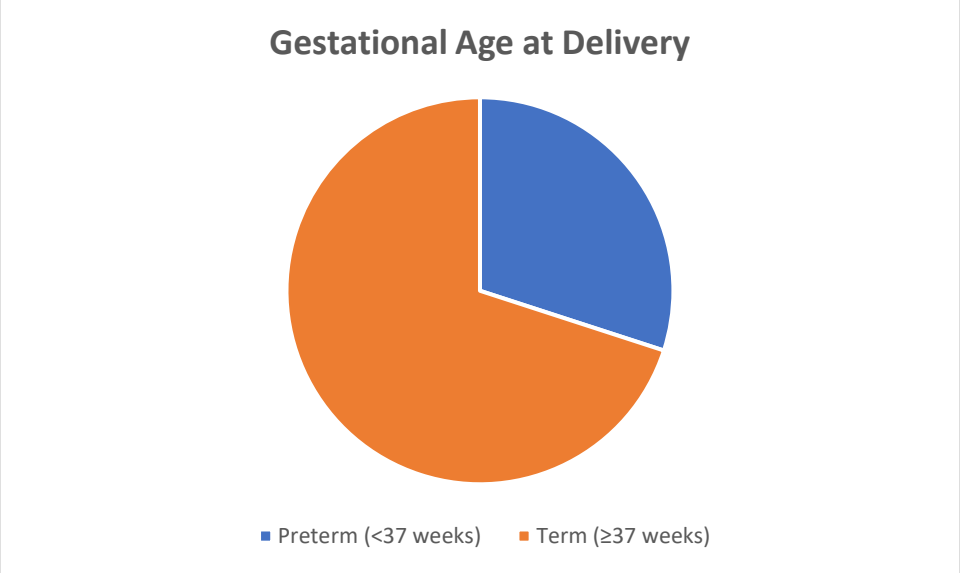


Table 9: Neonatal Outcomes

Neonatal outcome	Number (n)	Percentage (%)
Low birth weight	14	35.0
NICU admission	10	25.0
Stillbirth	2	5.0
Normal outcome	14	35.0

Low birth weight was the most common adverse neonatal outcome. A quarter of neonates required NICU admission, indicating significant perinatal morbidity associated with maternal fever.

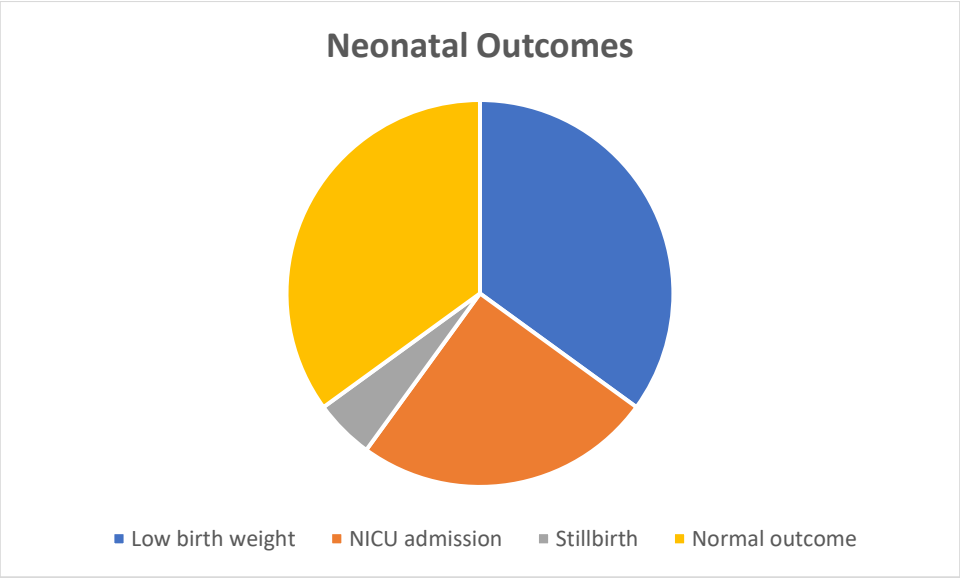
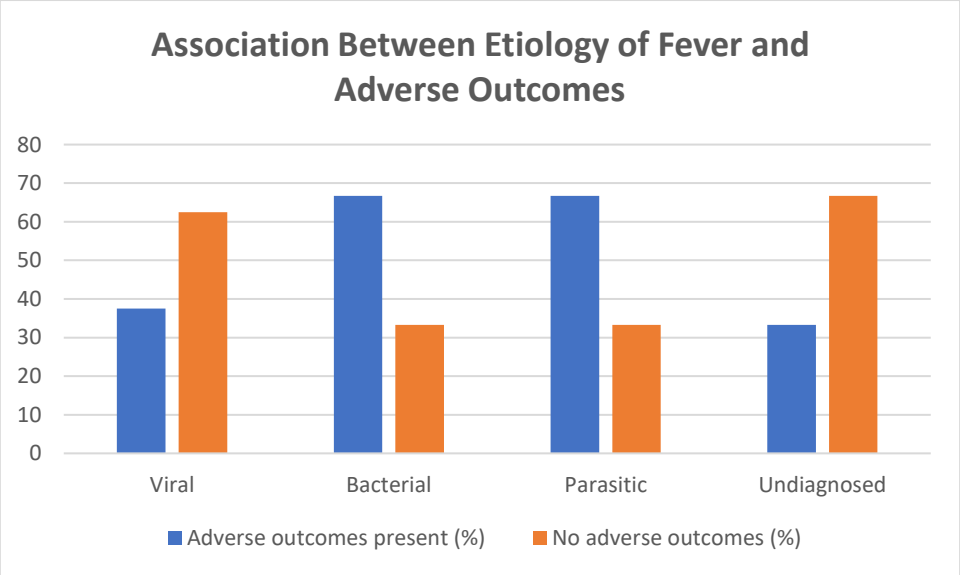


Table 10: Association Between Etiology of Fever and Adverse Outcomes

Etiology	Adverse outcomes present n (%)	No adverse outcomes n (%)
Viral	6 (37.5)	10 (62.5)
Bacterial	8 (66.7)	4 (33.3)
Parasitic	4 (66.7)	2 (33.3)
Undiagnosed	2 (33.3)	4 (66.7)

Adverse maternal or perinatal outcomes were more frequently observed in **bacterial and parasitic infections** compared to viral etiologies, suggesting higher severity and complication risk with these causes.



DISCUSSION

The present retrospective observational study analyzed the etiological spectrum and maternal–perinatal outcomes of fever in pregnancy among 40 pregnant women and demonstrated that fever during pregnancy was associated with considerable maternal and neonatal morbidity. In the current study, the majority of women were in the 20–30-year age group (67.5%), reflecting the predominant reproductive age group, and fever occurred most frequently in the third trimester (45%), followed by the second trimester (35%). These findings were consistent with prior observations that late pregnancy is a vulnerable period for febrile illnesses and related complications. Viral infections constituted the most common etiology in the present study (40%), followed by bacterial infections (30%), Parasitic infections accounted for a smaller proportion of cases (5%), while a notable proportion (25%) remained undiagnosed, reflecting diagnostic limitations commonly encountered in retrospective studies. This etiological pattern closely mirrored the findings of Egloff et al., [16] reported viral infections as the predominant cause of fever in pregnancy (37%), with influenza accounting for 21% and an undiagnosed etiology in 15% of cases [4]. Similarly, the proportion of undiagnosed fever in the present study (15%) was identical to that reported by Egloff et al., highlighting persistent diagnostic challenges

despite available investigations. Laboratory abnormalities were frequent in the present study, with anemia noted in 45% of women, leukocytosis in 35%, thrombocytopenia in 25%, and elevated liver enzymes in 20%, reflecting systemic inflammatory and hematological disturbances commonly associated with febrile illnesses.

Thrombocytopenia, observed in one-quarter of cases, was particularly relevant when compared with Sagili et al., [17] reported significantly higher rates of thrombocytopenia among pregnant women with dengue infection (24.7%) compared to non-dengue cases (14.6%, p=0.02), supporting the contribution of viral and parasitic infections to hematological complications observed in the current study. Maternal complications were documented in 60% of women, with anemia being the most frequent (35%), followed by sepsis (15%). Notably, sepsis cases were mild and managed in high-dependency units, and only one patient required ICU admission during the entire study period. No maternal mortality was observed. In contrast, Brar et al. [18]reported a substantially higher maternal mortality rate of 16% among 181 pregnant women with fever, with hepatitis E, dengue, and tuberculosis accounting for the majority of deaths. The absence of maternal mortality in the present study may be attributable to the smaller sample size, earlier presentation, or differences in etiological distribution, as hepatitis E and tuberculosis were not predominant causes in the current cohort. Mode of delivery analysis in the present study showed that 55% of women delivered vaginally, while 45% underwent cesarean section, suggesting a relatively elevated operative delivery rate. This observation was in agreement with the findings of An et al., [19] demonstrated that intrapartum fever was significantly associated with increased rates of operative delivery, with odds ratios of 2.24 for fevers of 38.0–38.9 °C and 3.59 for fevers ≥39.0 °C compared to lower temperature ranges. Although the present study did not stratify fever severity in degrees, the higher cesarean section rate supported the association between maternal fever and operative intervention. From a perinatal perspective, the present study revealed preterm delivery in 30% of cases, low birth weight in 35%, NICU admission in 25%, and stillbirth in 5%, with only 35% of neonates having an uncomplicated outcome. These findings were consistent with prior evidence that maternal fever adversely affects neonatal outcomes. An et al. [19] reported a stepwise increase in neonatal sepsis and NICU admission with rising intrapartum temperature, with odds ratios of 4.28 and 1.73 for fevers of 38.0–38.9 °C, increasing to 6.40 and 2.23, respectively, for fevers ≥39.0 °C. Although temperature stratification was not performed in the present study, the observed NICU admission rate of 25% supported the association between maternal fever and neonatal morbidity. Similarly, Wang et al. [20] demonstrated that maternal fever during labor, particularly epidural-associated fever, significantly increased the risk of conversion to surgery (AOR 4.05) and neonatal infections (AOR 5.13), though it did not significantly increase NICU admissions. The higher NICU admission rate observed in the present study compared to Wang et al. may reflect differences in fever etiology, as the latter primarily focused on epidural-associated fever rather than infectious causes. When etiological categories were analyzed in relation to outcomes, adverse maternal or perinatal outcomes were observed in 66.7% of bacterial and parasitic infections compared to 37.5% of viral infections and 33.3% of undiagnosed cases. This finding aligned with Brar et al., [18] reported severe outcomes and high mortality associated with infections such as hepatitis E, dengue, and tuberculosis and with Sagili et al., [17] demonstrated increased risks of stillbirth (RR 2.67), low birth weight, and preterm birth among women with dengue infection. The stillbirth rate of 5% observed in the present study was lower than the risk reported by Sagili et al., [17] but nonetheless emphasized the contribution of infectious fever to fetal loss. The overall complication rate observed in the present study was comparable to the complication rate reported by Egloff et al., [16] noted complications in 13% of all patients and 22% among those with confirmed fever , supporting the relevance of the current findings despite differences in population size. Additionally, the substantial proportion of empiric management and undiagnosed etiologies observed in earlier studies underscored the diagnostic uncertainty that persists in febrile pregnant patients, a challenge also reflected in the 15% undiagnosed cases in the present study. Collectively, these comparisons demonstrated that fever in pregnancy, regardless of etiology, was consistently associated with adverse maternal and perinatal outcomes across diverse settings. The present study reinforced existing evidence that bacterial and parasitic infections carry a higher risk of complications compared to viral causes, and that fever severity and associated systemic responses play a crucial role in determining outcomes. Despite limitations such as retrospective design and small sample size, the study contributed meaningful data from a tertiary care setting and highlighted the need for early identification, targeted etiological diagnosis, and prompt management of febrile illnesses in pregnancy to reduce preventable maternal and neonatal morbidity.

CONCLUSION

The present retrospective observational study concluded that fever during pregnancy is a clinically significant condition associated with considerable maternal and perinatal morbidity. Viral infections were the most common etiology; however, bacterial and parasitic infections were associated with a higher proportion of adverse outcomes. Fever occurred most frequently in the second and third trimesters and was commonly accompanied by laboratory abnormalities such as anemia, leukocytosis, and thrombocytopenia. A substantial number of women developed maternal complications, and adverse perinatal outcomes including preterm birth, low birth weight, NICU admission, and stillbirth were observed. These findings emphasize that fever in pregnancy should not be considered benign and highlight the importance of early recognition, thorough etiological evaluation, close maternal–fetal monitoring, and timely, targeted management to reduce preventable maternal and neonatal complications, particularly in resource-limited settings.

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