Original Research Article

Effect of maternal fever on fetal outcome

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Abstract

Background: Fever in pregnancy is a common clinical problem worldwide. The risk to the mother and fetus is significantly increased in pregnancy complicated by infection and fever. **Aim:** To study the effect of maternal fever on foetal outcome in a tertiary care centre. **Material and Methods:** A total of 196 pregnant women admitted with febrile illness were studied for etiology of fever and fetal outcome in terms of stillbirth, NICU admission and mortality was studied. **Results:** Typhoid (23.98%; 47/196 females), URTI (14.80%; 29/196 females), UTI and viral hepatitis (12.76%; 25/196 females each), LRTI (11.22%; 22/196 females) were the common causes of fever. Still birth (10.71%; 21/196 females), IUD (11.73% 23/196 females), IUGR (12.24%; 24/196 females) were common. Out of the 29 neonates that needed NICU admission, 17.24% (5/29) died while 82.76% (24/29) were discharged. **Conclusion:** Fever during pregnancy is a commonly encountered feature that results in an extensive array of both, maternal and foetal complications. Since the commonly encountered aetiologies of fever are preventable, there needs to be an emphasis on the need for awareness of avoiding such infections to evade life-threatening fetal outcomes.
Key Words: Maternal fever, apgar score, neonatal complications, outcome

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INTRODUCTION

Fever in pregnancy is a common clinical problem worldwide. The risk to the mother and fetus is significantly increased in pregnancy complicated by infection and fever.[1] Obstetricians often face problems in treating fever in pregnancy due to its atypical presentations. Maternal immune function is usually decreased in normal pregnancy and many of the potent antibiotics should be used with caution in pregnant women due to the risk of teratogenicity. Therefore, some febrile diseases may take a more severe course in pregnancy leading to transplacental transmission of infectious agents and fetal risk.[2,3] Fevers in the mother must be treated as any other serious illness. The effects on pregnancy depend on the extent of temperature elevation, its duration, and the stage of fetal development when it occurs. Mild exposures during the pre-implantation period and more severe exposures during embryonic and fetal development often result in miscarriage, premature labor, growth restriction, and stillbirth. Fever also causes a wide range of fetal structural and functional defects, with the central nervous system (CNS) being most at risk.[4-6] While there is a greater incidence of neonatal morbidity and mortality with transmitted infections, not all maternal infections lead to transmission to the fetus, nor does transmission to the fetus lead to disease or sequelae. The present study was conducted to study the effect of maternal fever on foetal outcome in a tertiary care centre.

MATERIAL AND METHODS

This prospective Observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care centre over a period of two years. The study was initiated after obtaining approval from the Institutional Ethics Committee of the study site. The

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purpose and rationale of the study as well as their role as participants was explained to all the patients in the study. Written informed consent was obtained from all the patients prior to enrolling them in the study. This study was conducted in pregnant women with fever attending the study site, and fulfilling the eligibility criteria of the study. The study patients were selected from among those who were admitted in the ward of the study site.

Inclusion Criteria

The patients satisfying the following criteria were enrolled into the study

1. All pregnant women with febrile illness admitted in the ward of the tertiary care centre.
2. Patients older than 18 years of age.
3. Patients willing to give written informed consent.

Exclusion Criteria

The patients fulfilling any of the following criteria were excluded from the study.

1. All pregnant women without febrile illness.
2. Those pregnant women with febrile illness due to: septic abortion, blood transfusion reaction, any drug reaction, hypertension, diabetes mellitus, and renal diseases
3. Patients younger than 18 years of age.
4. Patients not willing to give written informed consent.

Study procedure

On the basis of the study selection criteria, the study population was screened and selected. For this study we used the data from pregnant women who were admitted in our institute during any gestational period due to a febrile episode. The Information was collected from the consenting patients using pre-validated questionnaire and interviews which was scheduled to take place during pregnancy while admitted in ward and by means of phone/mobile contacts after discharge.

The interview included questions concerning the events during the pregnancy including fever, age, period of gestation (the trimester of pregnancy during which fever diagnosis was recorded), occupation, socio-economic status, alcohol consumption, coffee intake, etc. Detailed questions was asked to all women regarding the incidence of fever during pregnancy, number of fever episodes, its duration, body temperature and gestational weeks in which fever was recorded.

Statistical analysis

Descriptive statistics like mean, standard deviations and percentage proportions were used to describe baseline study participant parameters. Parametric tests were used to analyse the parametric data if it passed the tests of normality; if it failed then non-parametric tests were used for analysis. Chi-square test was used to analyse categorical data.

RESULTS

A total of 196 females with maternal fever were enrolled. In the present study, 0.005% (1/196) female was <20 years of age (one patient of 19 year of age), 62.24% (122/196) females were between 20-25 years, 29.59% (58/196) were between 26-30 years, and 7.65% (15/196) were >30 years old. Majority i.e. 68.37% (134/196) females resided in rural areas whereas the rest 31.63% (62/196) were urban residents. 77.04% (151/196) females were housewives, 14.80% (29/196) females were labourers, 5.10% (10/196) females were working in a private job and 3.06% (6/196) females had a government job. 65.31% (128/196) belonged to the lower strata, 27.04% (53/196) belonged to the middle strata and 7.65% (15/196) belonged to the upper strata. Among the females enrolled in our study, 54.59% (107/196) were primi gravida, 33.67% (66/196) were in second gravida, 9.69% (19/196) were in third gravida, while 1.02% (2/196) each were in the fourth and sixth gravida. Majority (62.76%; 123/196) had temperatures ≥100ºF and in 37.24% (73/196) it was recorded to be <100ºF. In our study, at presentation with fever, 13.26% (26/196) females were in their first trimester, 13.77% (27/196) females were in their second trimester, whereas most i.e. 72.95% (143/196) females were in their third trimester.

Table 1: Distribution of cases according to causes of fever

Causes of fever	No.	%
Typhoid	47	23.98
Upper respiratory tract infection (URTI)	29	14.80
Urinary tract infection (UTI)	25	12.76
Viral hepatitis	25	12.76
Lower respiratory tract infection (LRTI)	22	11.22
Malaria	18	9.18
Dengue	11	5.61
Chickenpox	6	3.06
Pulmonary koch's	6	3.06
Jaundice	3	1.53
Pyrexia of unknown origin (PUO)	3	1.53
Obstructive jaundice	1	0.51

Typhoid (23.98%; 47/196 females), URTI (14.80%; 29/196 females), UTI and viral hepatitis (12.76%; 25/196 females each), LRTI (11.22%; 22/196 females) were the common causes of fever in our study (Table 1). In the present study, of the total 196 cases, there were 168 delivered cases, 5 were undelivered cases and there were 23 miscarriages. Still birth (10.71%; 21/196 females), IUD (11.73% 23/196 females), IUGR (12.24%; 24/196 females) were common. Among the 168 successful deliveries taken place, foetal birthweight was normal in 29.76% (50/168) cases, low in 60.12% (101/168) cases, very low in 7.14% (12/168) cases and extremely low in 2.98% (5/168) cases.

Table 2: Pregnancy outcomes

Pregnancy outcomes	No.	%
Delivered	168	85.71
Undelivered	5	2.55
Miscarriage	23	11.73
Still birth	21	10.71
Anomalous baby	1	0.51
Intra-uterine death (IUD)	23	11.73
Intra-uterine growth restriction (IUGR)	24	12.24
Foetal birthweight (n=168)		
Normal (>2.5 kgs)	50	29.76
Low (1.5 - 2.5 kgs)	101	60.12
Very low (1 - <1.5 kgs)	12	7.14
Extremely low (<1 kgs)	5	2.98

There were 40.48% (68/168) pre-term deliveries and 59.52% (100/168) full-term deliveries. among the 168 females that had successful deliveries, 38.70% (65/168) underwent pre-term normal delivery, 36.30% (61/168) underwent full-term normal delivery, 23.21% (39/168) underwent full term LSCS and 1.79% (3/168) underwent pre-term LSCS. Among 42 females that delivered by LSCS, 71.42% (30/42) delivered by LSCS due to foetal distress, 14.28% (6/42) delivered by LSCS due to scar tenderness and 14.28% (6/42) delivered by LSCS due to other indication (e.g. Malpresentation, Cephalopelvic Disproportion, Placenta Previa, etc.). The APGAR score at 5 min. was 7 in 50.34% (74/147) babies, <7 in 19.73% (29/147) babies and 10 in 29.93% (44/147) babies. Among the 147 neonates delivered, 19.73% (29/147) needed NICU admission, while NICU admission was not needed for most (80.27%; 118/147) neonates. Out of the 29 neonates that needed NICU admission, 17.24% (5/29) died while 82.76% (24/29) were discharged.

Table 3: Causes of Neonatal Mortality

Causes of Neonatal Mortality	No. (n=5)	%
Respiratory distress syndrome	2	40
Early onset neonatal sepsis	1	20
Hypoxic ischemic encephalopathy	1	20
Meconium aspiration syndrome	1	20

In the current study, 40% (2/5) babies died due to respiratory distress syndrome, and 20% (1/5) babies died due to early onset neonatal sepsis, hypoxic ischemic encephalopathy and meconium aspiration syndrome each.

DISCUSSION

Fever during pregnancy is a frequently observed clinical issue globally, that significantly increases the risk to the mother as well as the foetus when complicated by infection. Owing to its atypical presentations, management of pyrexia during pregnancy is often challenging. With the decline in maternal immune function most potent antibiotics have to be used with caution in pregnant females keeping in mind the teratogenic risk involved.[7,8] Researchers analyzing data from the National Birth Defects Prevention Study concluded that fever contributes to the excess risk in contrast to the illnesses associated with it and might serve as a marker for more severe infections.[9] Due to maternal pyrexia, the foetus is exposed to numerous inflammatory mediators.[3,6,10] Among the females enrolled in our study, majority (62.76%) had temperatures ≥100ºF and in 37.24% it was <100ºF. From the data analyzed by *Andersen and colleagues*, from the Danish National Birth Cohort Study, among the patients with fever, 58.3% (2187/3752) women reported a maximum temperature, of which 44.5% (974/2187) reported incidents of ≥39.0ºC.[11] In the present study, we found the following causes of fever among our study patients: typhoid (23.98%; 47/196 females), URTI (14.80%; 29/196 females), UTI and viral hepatitis (12.76%; 25/196 females each), LRTI (11.22%; 22/196 females), malaria (9.18%; 18/196 females), dengue (5.61%; 11/196 females), chicken pox and pulmonary koch's (3.06%; 6/196 females each), jaundice and PUO (1.53%; 3/196 females each), and obstructive jaundice (0.51%; 1/196 females). The aetiologies of fever, among their pregnant population, reported by *Nath J et al* included: malaria (21.6%; 40/185 women), dengue (21%; 32/185 women), UTI (20%; 37/185 women), RTI (12.4%; 23/185 women), viral hepatitis (8%; 15/185 women), typhoid/enteric fever (7%; 13/185 women), tuberculosis (4%; 8/185 women), chicken pox (2.8%; 4/185 women), and PUO (3.2%; 6/185 women).[12] *Biswas J and associates* recorded the following aetiologies of fever amongst their study population: malaria (35%; 64/183 females), tuberculosis (3.8%; 7/183 females), UTI (21.3%; 39/183 females), RTI (16.4%; 30/183 females), viral hepatitis (10.4%; 19/183 females), chicken pox (6%; 11/183 females), and typhoid (7.1%; 13/183 females).[13] Of the total 196 cases, there were 168 delivered cases, 5 were non-delivered cases and there were 23 miscarriages. The following pregnancy outcomes were recorded: still birth (10.71%), anomalous baby (0.51%, Neural Tube Defect), IUD (11.73%), Preterm Birth (40.48%) and IUGR (12.24%). Among the 168 successful deliveries, foetal birthweight was normal in 29.76% cases, low in 60.12% cases, very low in 7.14% cases and extremely low in 2.98% cases. *Biswas J and associates* found that in majority of the cases (56.8%) foetal outcome was low birth weight, which was followed by pre-term birth (36%), IUGR (30%), and still birth (2.1%) ,IUD(1.4%).[13] Almost similar findings were recorded by *Nath J et al*, wherein there were 52.6% low birth weight cases, 27.8% preterm births, 20.3% IUGR, 5% still birth, and 2.8% IUDs.[12] At the time of delivery, the gestational age of our study patients was as follows: there were 40.48% pre-term deliveries and 59.52% full-term deliveries. Among the 168 females that had successful deliveries, 38.70%

underwent pre-term normal delivery, 36.30% underwent full-term normal delivery, 23.21% underwent full term LSCS and 1.79% underwent pre-term LSCS. In our study, among 42 females that delivered by LSCS, 71.42% delivered by LSCS due to foetal distress, 14.28% delivered by LSCS due to scar tenderness and 14.28% delivered by LSCS due to other indications (e.g. Malpresentation, Cephalopelvic Disproportion, Placenta Previa, etc.) In our study, the APGAR score at 5 min was 7 in 50.34% (74/147) babies, <7 in 19.73% (29/147) babies and 10 in 29.93% (44/147) babies. Like in our study, *Nath J et al* found low APGAR score (<7) in 18.6% cases.[12] However, *Biswas J and associates* found a higher proportion of cases, i.e. 44.8% with similar low APGAR scores.[13] Among the 147 neonates delivered, 19.73% needed NICU admission, while NICU admission was not needed for most (80.27%) neonates. Out of the 29 neonates that needed NICU admission, 17.24% (5/29) died while 82.76% (24/29) were discharged. The distribution of cases according to causes of neonatal mortality included: 40% babies died due to respiratory distress syndrome, and 20% babies died due to early onset neonatal sepsis, hypoxic ischemic encephalopathy and meconium aspiration syndrome each.

CONCLUSION

Fever during pregnancy is a commonly encountered feature that results in an extensive array of both, maternal complications and foetal and neonatal complications. Since the commonly encountered aetiologies of fever are preventable, there needs to be an emphasis on the need for awareness of avoiding such infections to evade life-threatening foeto-maternal outcomes. Basic laboratory investigations can assist in early diagnosis and subsequent treatment. Therefore, standard methods of infection controls in homes, communities and healthcare settings, improving health education and awareness will go a long way in preventing such adverse foeto-maternal outcomes.

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