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Seroprevalence of torch infection in antenatal women with bad obstetric history and feto-maternal outcome in current pregnancy: A cross-sectional study

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Abstract
Introduction: Bad obstetric history (BOH) is a major concern in obstetrics, often resulting from infections, genetic, anatomical, immunological, or endocrine factors. Among infectious causes, TORCH infections Toxoplasmosis, Rubella, Cytomegalovirus (CMV), and Herpes simplex virus (HSV) play a significant role in adverse pregnancy outcomes such as spontaneous abortions, intrauterine fetal death (IUFD), congenital anomalies, and fetal growth restriction (FGR). Early detection through serological testing is crucial for risk assessment and preventive management.
Aims: To determine the seroprevalence of TORCH infections among antenatal women with a bad obstetric history. To evaluate the association of TORCH seropositivity with feto-maternal outcomes in the current pregnancy.
Materials and Methods: A cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Government Medical College and Hospital (GMCH), Nagpur, Maharashtra, India. The study included 109 antenatal women with a history of bad obstetric outcomes, selected from both outpatient (OPD) and inpatient antenatal cases attending GMCH Nagpur.
Results: In this cross-sectional study of 109 antenatal women with a bad obstetric history, the majority were aged 19-30 years, and most husbands had completed higher secondary or undergraduate education. A large proportion of women belonged to the lower middle socioeconomic class. Regarding pregnancy outcomes, most had a term delivery (73.39%), followed by smaller proportions with FGR, preterm, or adverse outcomes such as abortion and IUFD. Analysis of viral markers revealed that Rubella IgG and CMV IgG seropositivity were significantly associated with a higher rate of LSCS ($p < 0.001$), while Toxoplasma and HSV IgG showed no significant association with the mode of delivery.
Conclusion: TORCH infections contribute substantially to adverse obstetric outcomes among women with BOH. Routine TORCH screening in high-risk antenatal women can aid in early diagnosis, appropriate counselling, and timely intervention to improve pregnancy outcomes.

Keywords: TORCH infections, bad obstetric history, seroprevalence, antenatal women, feto-maternal outcome, ELISA

Introduction

Adverse pregnancy outcomes such as recurrent spontaneous abortions, intrauterine fetal death, stillbirths, preterm delivery, and congenital malformations are collectively referred to as bad obstetric history (BOH). These complications are multifactorial, with causes including genetic abnormalities, anatomical defects, endocrine disorders, and infectious diseases. Among infectious causes, TORCH infections comprising Toxoplasma gondii, Rubella virus, Cytomegalovirus (CMV), and Herpes simplex virus (HSV) play a significant role in poor pregnancy outcomes and congenital anomalies [1,2].

TORCH infections are often subclinical or asymptomatic in the mother but can lead to severe fetal consequences if transmitted transplacentally. These include congenital cataracts, chorioretinits, microcephaly, hepatosplenomegaly, intrauterine growth restriction, and neurodevelopmental impairment [3]. The risk of vertical transmission and the severity of fetal involvement vary depending on the gestational age at which the infection occurs [4].

Toxoplasma gondii infection, acquired through consumption of undercooked meat or contact with contaminated soil, can cause fetal hydrocephalus, chorioretinitis, and intracranial calcifications [5]. Rubella virus infection during the first trimester may result in congenital rubella syndrome, characterised by cardiac defects, cataracts, and sensorineural deafness [6].

hepatosplenomegaly, and long-term neurodevelopmental disabilities [7]. Herpes simplex virus infection, particularly during late pregnancy, can cause neonatal herpes, which carries high morbidity and mortality [8].

Screening for TORCH infections in antenatal women, especially those with a bad obstetric history, is therefore crucial to identify latent or recent infections that could compromise fetal development. The detection of IgM antibodies indicates recent or acute infection, while IgG positivity suggests past exposure or immunity [9]. Early identification and appropriate management can improve pregnancy outcomes through targeted treatment and preventive counselling.

Given the variability in seroprevalence across regions due to differences in socioeconomic conditions, hygiene, and vaccination coverage, understanding the local pattern of TORCH infections helps design effective public health interventions [10].

The present study aims to determine the seroprevalence of TORCH infections Toxoplasma gondii, Rubella virus, Cytomegalovirus, and Herpes simplex virus among antenatal women with bad obstetric history (BOH) and to assess their association with feto-maternal outcomes in the current pregnancy. The objectives include identifying the proportion of women with IgM and IgG antibodies indicating recent or past infections, analysing the pattern and frequency of individual TORCH agents, and evaluating the impact of these infections on pregnancy outcomes, such as spontaneous abortion, intrauterine fetal demise, preterm delivery, congenital anomalies, and neonatal morbidity or mortality.

Materials and Methods

- **Study design:** A cross-sectional study
- **Study Place:** Department of OBGYN**, Government Medical College, and Hospital (GMCH), Nagpur,** Maharashtra, India.
- **Sample Population:** All Antenatal women attending the OPD or indoor Antenatal women in GMCH, Nagpur were included.
- **Sample size:** 109 antenatal women with a bad obstetric history (BOH)

Inclusion criteria

All Antenatal women attending the OPD or indoor Antenatal women in GMCH Nagpur with a previous history of

- 2 or more abortions
- Previous stillbirth
- IUFD
- Early neonatal death
- FGR
- Congenital anomaly

Exclusion criteria

All ANC women attending OPD or indoor ANC women in GMCH Nagpur with a known history of

- Endocrine abnormality
- Hypertensive Disorders in Pregnancy(HDP)
- Gestational Diabetes Mellitus(GDM)
- Autoimmune disorder
- Rh incompatibility
- Uterine anomalies
- Cervical incompetence
- VDRL positive
- Antepartum Haemorrhage

Study Variables

- Age Group
- Husband's Education
- Socioeconomic Status
- Pregnancy Outcome
- IgG, IgM TORCH Profile and Maternal Outcome

Statistical Analysis

Data from the study were analysed using SPSS software, with continuous variables (e.g., age, liver enzyme levels) expressed as mean ± SD and compared using t-tests or Mann-Whitney U tests. Categorical variables (e.g., gender, CBD stones, and complications) were presented as frequencies and percentages, and compared using Chi-square or Fisher's exact tests. Diagnostic accuracy (sensitivity, specificity, PPV, NPV, and accuracy) was calculated for MRCP-first and EUS-first strategies, using ERCP/intraoperative findings as the reference. Kaplan-Meier analysis may be used for time-to-intervention comparisons. A p-value < 0.05 was considered significant.

Results

Table 1: Age particulars of the subjects

Age Group	Frequency	Per cent (%)
19-25	46	42.20%
26-30	45	41.28%
31-35	15	13.76%
36-40	3	2.75%
Total	109	100

Table 2: Particulars of Husband's Education

Husband's Education	Frequency	Per cent (%)
Middle school	6	5.50%
High school	25	22.94%
Higher secondary	41	37.61%
Undergraduate	35	32.11%
Postgraduate	2	1.83%
Total	109	100.0%

Table 3: Particulars of socioeconomic status of the family

Socioeconomic Status	Frequency	Per cent (%)
Lower class	31	28.44%
Lower middle	50	45.87%
Middle class	20	18.35%
Upper middle	6	5.50%
Upper class	2	1.84%
Total	109	100.0%

Table 4: Particulars of Current Pregnancy Outcome

Pregnancy Outcome	Frequency	Per cent (%)
Abortion	4	3.67%
Ectopic Pregnancy	1	0.92%
IUFD	3	2.75%
FGR	10	9.17%
MTP	2	1.83%
Preterm	9	8.26%
Term	80	73.39%
Total	109	100.00%

Table 5: Association between IgG TORCH Profile and Maternal Outcome

Viral Marker	IgG Status	LSCS	NVD	Total	p-value
Toxoplasma	Negative	61	33	94	0.14
	Positive	8	1	9	
Rubella	Negative	31	30	61	<0.001
	Positive	38	4	42	
CMV	Negative	30	31	61	<0.001
	Positive	39	3	42	
HSV	Negative	56	32	88	0.08
	Positive	13	2	15	

Table 6: Maternal Outcomes in TORCH-Seropositive and Seronegative Antenatal Women (n=109)

Maternal Outcome	TORCH Positive (n = 62)	TORCH Negative (n = 47)	Total (n = 109)	p-value
Preterm labour (<37 weeks)	18 (29.0%)	6 (12.8%)	24 (22.0%)	0.038
Preeclampsia / Eclampsia	8 (12.9%)	5 (10.6%)	13 (11.9%)	0.72
Premature rupture of membranes (PROM)	10 (16.1%)	4 (8.5%)	14 (12.8%)	0.21
Antepartum haemorrhage (APH)	3 (4.8%)	2 (4.3%)	5 (4.6%)	0.91
Fetal growth restriction (FGR)	20 (32.2%)	7 (14.9%)	27 (24.8%)	0.029
Oligohydramnios	9 (14.5%)	3 (6.4%)	12 (11.0%)	0.18
Gestational diabetes mellitus (GDM)	4 (6.4%)	2 (4.3%)	6 (5.5%)	0.63
Anaemia (Hb <10 gm/dL)	22 (35.5%)	12 (25.5%)	34 (31.2%)	0.27
Caesarean delivery	30 (48.4%)	19 (40.4%)	49 (45.0%)	0.39
Postpartum complications	5 (8.1%)	2 (4.3%)	7 (6.4%)	0.41

Table 7: Association between TORCH Profile and Pregnancy Outcome (n = 109)

Pregnancy Outcome	Negative	Positive IgG	Positive IgM	Total	P-value
Abortion	2	2	0	4	0.23
Ectopic Pregnancy	1	0	0	1	
IUFD	1	2	0	3	
FGR	3	6	1	10	
MTP	2	0	0	2	
Preterm	6	3	0	9	
Term	44	36	0	80	
Total	59	49	1	109	

Table 8: Association between TORCH Profile and Neonatal Outcome (n = 103)

Neonatal Outcome	Negative	Positive	Total	P-value
IUFD	1	2	3	0.33
FGR	3	7	10	
Preterm	6	3	9	
Term	44	36	80	
Total	55	48	103	

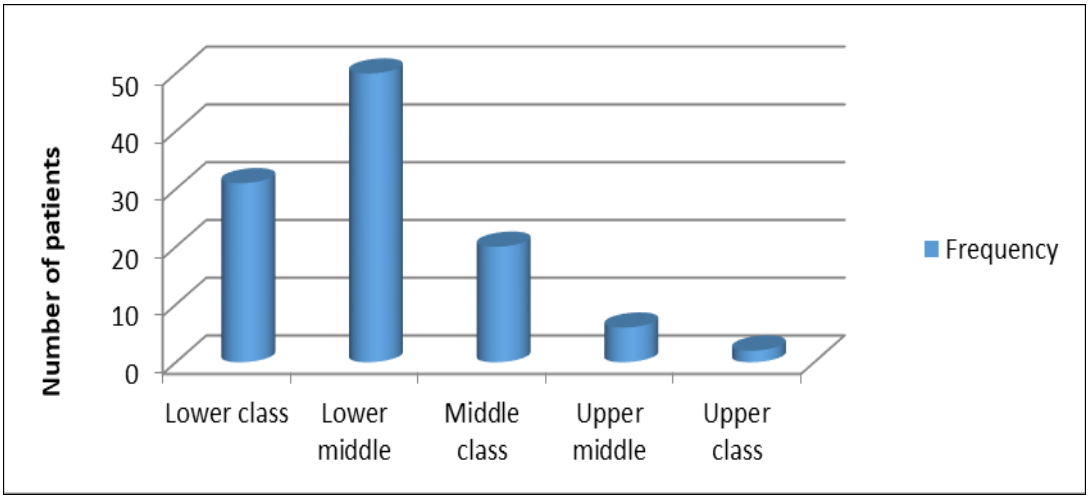

Fig 1: Particulars of the socioeconomic status of the family

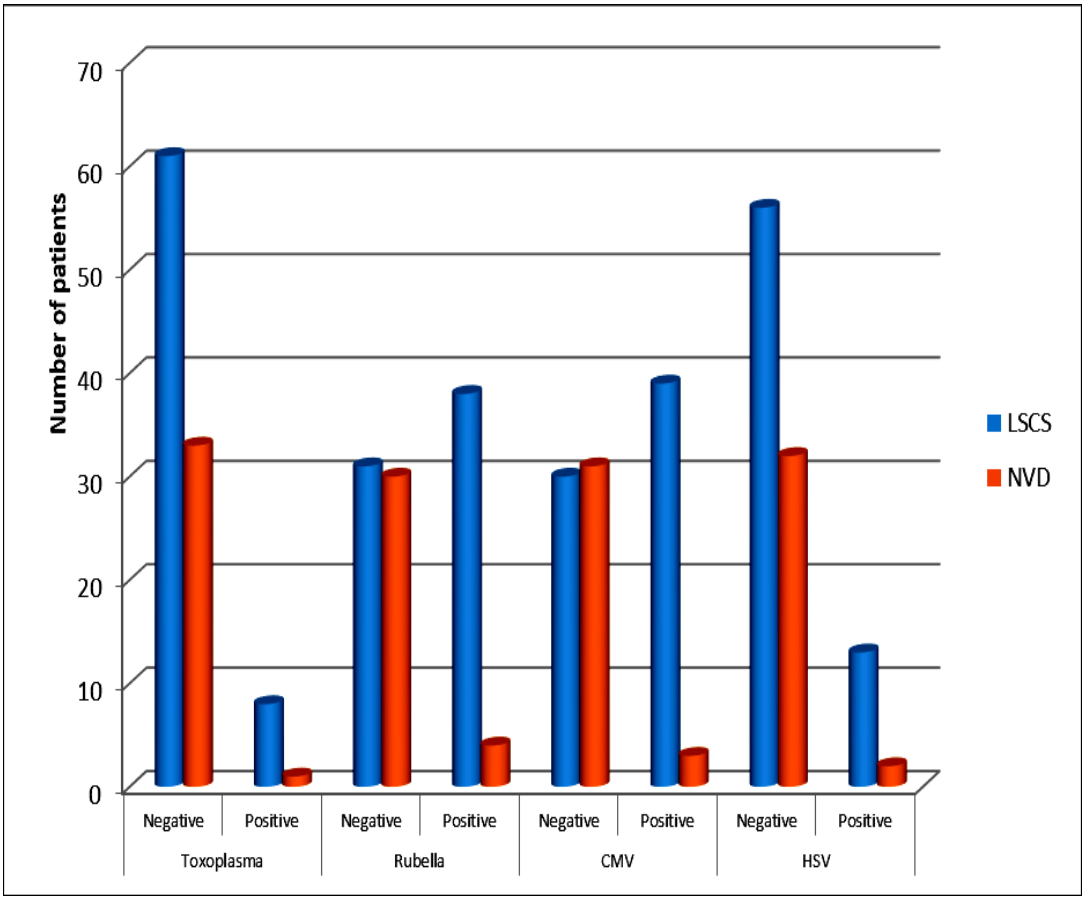

Fig 2: Association between IgG TORCH Profile and Maternal Outcome

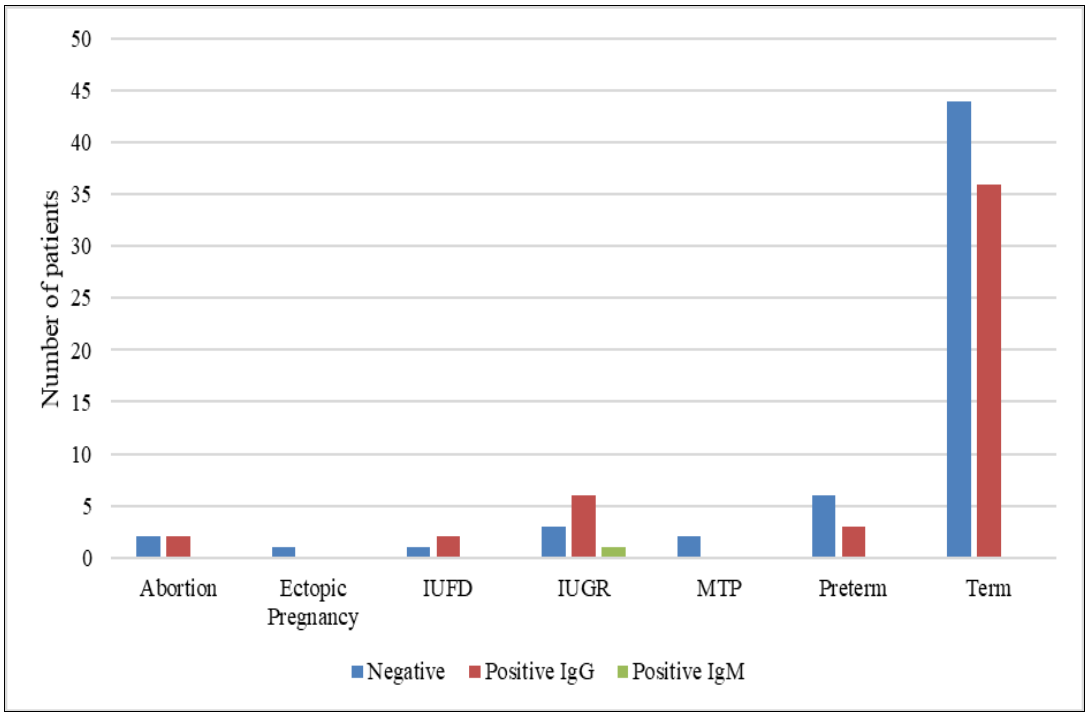

Fig 3: Association between TORCH Profile and Pregnancy Outcome

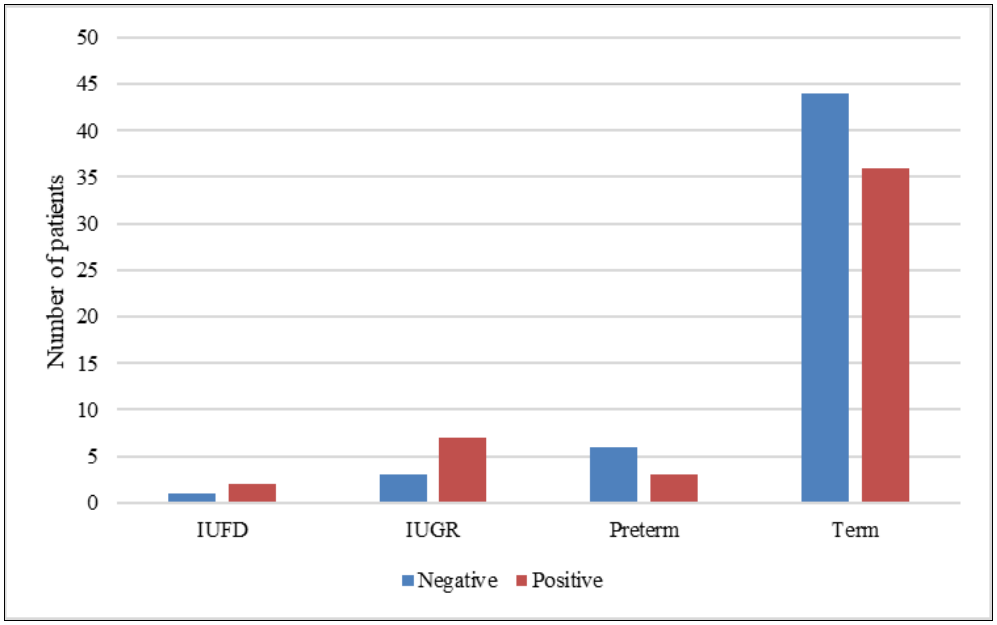

Fig 4: Association between TORCH Profile and Neonatal Outcome

In our study, the majority of cases were in the 19-25 years age group (46 patients; 42.2%), followed by 26-30 years (45 patients; 41.28%). A smaller proportion of cases were aged 31-35 years (15 patients; 13.76%), while only 3 patients (2.75%) belonged to the 36-40 years age group**.** (Table 1)

In the present study, the majority of patients' husbands had completed higher secondary education (41 patients; 37.61%), followed by undergraduate education (35 patients; 32.11%). High school education was noted in 25 husbands (22.94%), while 6 husbands (5.50%) had studied *p* <to middle school, and only 2 husbands (1.83%) were postgraduates. (Table 2).

In this study, most antenatal women with a bad obstetric history belonged to the lower middle class (50 patients; 45.87%), followed by the lower class (31 patients; 28.44%). Middle-class status was reported in 20 patients (18.35%), while 6 patients (5.50%) were from the upper middle class, and only 2 patients (1.84%) belonged to the upper class. (Table 3 & Figure 1)

Our study showed that the majority of patients had a term pregnancy outcome (80 patients; 73.39%). Fetal growth restriction (FGR) was observed in 10 patients (9.17%), and preterm deliveries occurred in 9 patients (8.26%). Other outcomes included abortion in 4 patients (3.67%), intrauterine fetal death (IUFD) in 3 patients (2.75%), medical termination of pregnancy (MTP) in 2 patients (1.83%), and ectopic pregnancy in 1 patient (0.92%). (Table 4)

In the present study, among the viral markers tested, Rubella IgG and Cytomegalovirus (CMV) IgG status showed a statistically significant association with the mode of delivery ($p < 0.001$). This indicates that Rubella and CMV seropositivity were significantly related to the likelihood of undergoing LSCS (Lower Segment Caesarean Section) rather than normal vaginal delivery (NVD). For Toxoplasma IgG ($p = 0.14$) and HSV IgG ($p = 0.08$), the associations with the mode of delivery were not statistically significant, suggesting no meaningful difference in LSCS or NVD rates based on their serostatus. [Figure 2]

In this study, the majority of women (80/109; 73.4%) had term deliveries. Adverse pregnancy outcomes such as abortion (3.7%), IUFD (2.8%), IUGR (9.2%), and preterm deliveries (8.3%) were more frequent among TORCH-positive women compared to seronegative women. However, the association between TORCH seropositivity and pregnancy outcome was not statistically significant ($p = 0.23$). [Figure 3]

Among the 103 live births studied, the majority were term deliveries (80, 77.7%), while 9 (8.7%) were preterm and 10 (9.7%) had intrauterine growth restriction (IUGR). Intrauterine fetal demise (IUFD) was noted in 3 (2.9%) cases. TORCH seropositivity was observed in 48 mothers, of whom 2 had IUFD, 7 had IUGR, and 3 delivered preterm neonates. Although adverse neonatal outcomes such as FGR and preterm birth were more frequent among TORCH-positive mothers compared to seronegative ones, the association did not reach statistical significance ($p = 0.33$). Term deliveries were more common among TORCH-negative women (44 vs. 36). (Figures 2 and 3) (Table 5, 6, 7)

Among the 109 antenatal women with a bad obstetric history included in the present study, 62 (56.9%) were seropositive for one or more TORCH infections, while 47 (43.1%) were seronegative. Maternal complications observed in the current pregnancy are summarised in Table 6. Preterm labour was significantly higher among TORCH-seropositive women (29.0%) compared to seronegative women (12.8%) ($p=0.038$). Similarly, intrauterine growth restriction (IUGR) was also significantly associated with TORCH seropositivity (32.2% vs. 14.9%; $p=0.029$). Other maternal complications, such as preeclampsia/eclampsia, premature rupture of membranes (PROM), antepartum haemorrhage (APH), oligohydramnios, gestational diabetes mellitus (GDM), and anaemia, were more frequent among seropositive women but did not reach statistical significance. The incidence of cesarean delivery (48.4% vs. 40.4%; $p=0.39$) and postpartum complications (8.1% vs. 4.3%; $p=0.41$) was also comparable between the two groups. (Tables 7 and 8) (Figure 4)

Discussion

In our cross-sectional study of 109 antenatal women with a bad obstetric history (BOH), the majority (42.2%) were aged 19-25 years, followed by 26-30 years (41.28%). Similar age distributions were reported by Rao *et al*., who observed that most BOH cases occurred in younger women between 20 and 30 years [11]. Early maternal age has been associated with limited reproductive experience and delayed access to quality antenatal care, predisposing to adverse pregnancy outcomes [12].

Regarding husbands' education, the majority in our study had completed higher secondary (37.61%) or undergraduate (32.11%) education. This pattern aligns with findings by Singh *et al*., who noted that around 40% of husbands of women with BOH had only secondary education, which correlated with poorer pregnancy outcomes [13]. Better educational attainment among partners has been linked to improved awareness of antenatal care, vaccination, and nutritional practices [14]. Socioeconomic status (SES) also played an important role. In our study, most women belonged to the lower middle (45.87%) and lower (28.44%) classes. Sharma *et al*. reported similar findings, showing that more than 70% of BOH women were from lower or lower-middle SES backgrounds [15]. Low SES has been consistently linked to limited access to healthcare services, undernutrition, and increased maternal morbidity, contributing to recurrent poor obstetric outcomes [16].In terms of pregnancy outcome, a majority (73.39%) had term deliveries, while 9.17% experienced fetal growth restriction (FGR) and 8.26% had preterm deliveries. These findings are comparable to the results of Patel *et al*., who observed IUGR in 12% and preterm birth in 10% among BOH women [17]. This suggests that, although term delivery is achievable in many BOH pregnancies with proper management, a significant subset remains at risk of growth restriction and preterm birth. Our study also explored the relationship <between viral seromarkers and mode of delivery. We found that Rubella IgG and Cytomegalovirus (CMV) IgG positivity were significantly associated with a higher incidence of LSCS ($p < 0.001$). A similar association was reported by Lakshmi *et al*., where CMV seropositivity correlated with an increased rate of cesarean section due to fetal distress or compromised growth [18]. Jackson *et al*. also documented a higher LSCS rate among rubella-immune or rubella-exposed women with prior BOH, likely reflecting clinician caution in high-risk pregnancies [19]. However, Toxoplasma IgG ($p = 0.14$) and HSV IgG ($p = 0.08$) did not show significant associations with the mode of delivery in our study. This finding aligns with Verma *et al*., who reported that while Toxoplasma seroprevalence was high in BOH cases, it had no impact on delivery mode [20].

In the present study, a significant proportion of women with a bad obstetric history were seropositive for TORCH infections (56.9%). Adverse pregnancy outcomes such as preterm labour and Fetal growth restriction (FGR) were significantly more frequent among TORCH-seropositive women compared to seronegative ones. [15] Although other maternal complications like preeclampsia, PROM, APH, oligohydramnios, GDM, and anaemia occurred more commonly in the seropositive group, these associations were not statistically significant. Similarly, rates of cesarean delivery and postpartum complications were comparable between the two groups. (20) Among neonatal outcomes, TORCH seropositivity was associated with a higher incidence of FGR, preterm births, and IUFD, though the differences were not statistically significant.[18] Overall, TORCH infections appear to contribute to increased maternal and perinatal morbidity, emphasising the importance of routine TORCH screening in women with adverse obstetric histories.

Conclusion

The present study highlights that antenatal women with a bad obstetric history are predominantly younger and often belong to lower or lower-middle socioeconomic classes. Partner education appears to influence maternal health awareness, while most pregnancies still result in term outcomes. Viral serostatus, specifically Rubella and CMV IgG positivity, is associated with an increased likelihood of cesarean delivery, suggesting that past exposure or immunity may influence obstetric decision-making in high-risk pregnancies. Other viral markers, such as Toxoplasma and HSV, do not show a significant impact on the mode of delivery. These findings underscore the importance of comprehensive antenatal evaluation, including viral screening, socioeconomic assessment, and tailored obstetric management to improve pregnancy outcomes in this high-risk group.

Declarations

- **Consent:** Informed written consent has been taken regarding participation in the study, publication of the study and maintenance of confidentiality.
- **Ethical Committee Approval:** Institutional Ethical Committee approval has been obtained before initiation of the study.
- **Finding:** Nil
- **Conflict Of Interest:** Nil

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