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Serological evaluation of prevalence of TORCH amongst antenatal mothers attending a rural tertiary care hospital

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ABSTRACT

Introduction: Infections due to agents like *Toxoplasma gondii*, *Rubella* virus, *Cytomegalo* virus (CMV), *Herpes simplex* virus (HSV) [TORCH] are important causes of bad obstetric outcome (spontaneous abortions, still births, pre term delivery and congenital anomalies) in antenatal mothers. Such infection in adults and pregnant women are very mild or even asymptomatic but causes serious consequences in the foetus. Serological tests usually ELISA is the main mode of diagnosis.
Aim: To evaluate the role of infections due to TORCH in causing pregnancy loss in BOH (bad obstetric history) mothers.
Materials and Methods: A hospital based cross-sectional study was conducted to identify TORCH as a causative factor in loss of pregnancy in pregnant women with bad obstetric history attending our Antenatal OPD from March 2019 to August 2019. Enzyme Linked Immunosorbent Assay (ELISA) was done in 97 serum samples of such pregnant mothers.
Results: Our observation revealed that maximum history of BOH was found in mothers aged between 26-30 years (50/97 i.e.51.55%)**.** The IgM seropositivity was detected mostly against CMV–09/97 cases (9.28%) and abortion was found to be the commonest outcome in mothers showing IgM seropositivity to both CMV and *Rubella*.
Conclusions: This study helps us to draw the conclusion that TORCH is an important cause of BOH and should be routinely screened.

1. Introduction

Bad obstetric history (BOH) is a condition where there is loss of the foetus in previous two/more pregnancies either as spontaneous abortions, intrauterine foetal death/stillbirth, congenital anomalies or preterm labour.BOH may be due to genetic, hormonal or due to prenatal/perinatal infections by the TORCH complex [*Toxoplasma gondii, Rubella virus, Cytomegalovirus* (CMV), *Herpes simplex* virus type 1 and 2 (HSV 1 & 2)] or other agents—*Chlamydia trachomatis, Treponema pallidum, Neisseria gonorrhoea*, HIV and others.[1] TORCH infections are usually asymptomatic causing little or no complications in the mother but serious adverse effects in the foetus.[2]

Toxoplasma gondii is an intracellular protozoa, transmitted through contaminated food/ water and undercooked meat. Within 5-25 days, cyst (the infective form) develops in the body causing Toxoplasmosis in man. After infection, the patient remains asymptomatic but

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when she becomes pregnant, may lose the foetus either as abortion, stillborn or may give birth to a congenitally malformed baby.[3,4]

Rubella, an RNA virus gets transmitted via droplets and through placenta from mother to the foetus. The incubation period is for 2–3 weeks and the infection persist for 5 days.[5] It causes mild or asymptomatic infection in children and adults but if it crosses the placental barrier, it leads to abortions, intra uterine foetal death, or congenitally malformed baby—the congenital *rubella* syndrome (CRS).[6]

Cytomegalovirus (CMV) is transmitted through saliva, urine, or genital secretions of the infected individual with man being the reservoir of the virus.[7] CMV may also causes apart from abortions—intrauterine growth retardation, microcephaly with intracranial calcification, hepatosplenomegaly, jaundice, chorioretinitis, thrombocytopenic purpura, anaemia in neonates[8] leading to deafness, blindness, hearing, cerebral palsy like features, decreased coordination and even seizures.[9]

Toxoplasma and CMV are the commonest infections being present in 40-45% of all the infections;[10] *Rubella* virus, however, affects only 10-20% women.[11]

Herpes simplex virus is a very common infection worldwide.[3] It is of 2 types—HSV 1& 2. HSV1 is transmitted from non-sexually, while HSV2 is always transmitted via the genital tract causing genital herpes.[12,13] Genital herpes infection in pregnant mothers leads to spontaneous abortion and prematurity.[14]

Prevalence of TORCH infection in pregnant women is usually established serologically—identifying the presence of specific IgM/IgG antibodies in paired sera. The IgM antibody titre falls slowly becoming undetectable within 6 months. IgG appears within 3-4 weeks of infection and persists in low titres lifelong.[15] A positive IgG titre confirms previous infection with TORCH.[16]

Studies on the role of TORCH in BOH mothers are few and hence the present study aims to establish this by evaluating the IgM antibody levels and their role in undetected abortions, stillbirths, and congenital anomalies.

2. Materials and Methods

A six months hospital based cross-sectional study March 2019 to August 2019 was carried out in the Microbiology Department of a rural tertiary care hospital of Eastern India. Approval from the Institutional Ethics Committee was attained. Informed consent was also taken from the pregnant women with history of undesirable pregnancy outcomes in earlier conceptions.

The inclusion criterion in our study was pregnant women with history of abortions/ intrauterine foetal deaths/preterm deliveries or congenital anomalies in their previous pregnancies.

Pregnant mothers giving history of high blood pressure, diabetes mellitus, Rh- incompatibility or others causes of previous pregnancy loss were excluded from the study.

97 pregnant women aged from 21-35 years were included in the study. Aseptically about 3 ml of blood was collected from each patient in a sterile container. Sera was extracted by centrifugation and kept at -20^{0}C. IgM ELISA test was thereafter conducted in these serum samples using kits manufactured by Calbiotech (Cal#TX024M & Lot # TXM4546). Syphilis was excluded by RPR test and to exclude HIV 3 step immunodot assay was done.

3. Results

In this study, seropositivity of IgM antibodies against TORCH agents in 97 pregnant mothers between 21-35 years with history of BOH in their previous pregnancies was studied. They were followed up till their delivery to know the outcome of their present pregnancy. Maximum history of BOH was found in mothers aged between 26-30 years (50/97 i.e.51.55%) followed by the 21-25yrs [32/97 (32.99%)].

Of the 97 cases, ELISA detected the presence of IgM against TORCH in 20 cases (20.62%) -03cases/97 total BOH mothers (3.09%) against *Toxoplasma*, 06/97(6.19%) against *Rubella*, 09/97 (9.28%) against CMV and 02/97 (2.06%) against HSV 2.

Maximum mothers of the age group 26-30yrs showed the presence of IgM antibodies against the TORCH —2 (10%) against *Toxoplasma*, 3 (15%) against *Rubella*, 5(25%) against CMV and 2 (10%) against HSV 2 followed by the 21-25 yrs age group.

It has been also found that IgM antibody was detected highest against CMV in all the age groups of the BOH mothers 09 (45%). [Table 2]

All the mothers were followed up till their delivery to find the obstetrical outcome in their present pregnancy. Abortion was found to be the commonest outcome in mothers showing IgM seropositivity to *Toxoplasma* alone or with *Rubella* and mixed infection, mainly of CMV and *Rubella*. Congenital malformation of meningomyelocele was found in a mother with mixed infection of CMV & *Toxoplasma*. Full term delivery by Caesarean Section/vaginal delivery of apparently normal baby were found in 4 cases though these mothers had IgM mixed seropositivity to CMV, *Rubella* and HSV 2. [Table 3]

4. Discussion

Our study show that the TORCH agents are important causes of BOH in pregnant women and being significantly responsible for pregnancy loss.[17] These infections leads to neonatal mortality and perinatal/childhood morbidity.[18] Except HSV2, rest of the TORCH agents causes an infection in the mother infecting the placenta and the foetus. HSV 2 virus is present as a latent infection in the genital tract of these infected mothers which becomes active with

Table 1: Obstetrical history in different age groups in the study population

Outcome	21-25yrs	26-30 yrs	31-35 yrs	Total
Abortion	21	33	07	61
Intra-uterine death	07	09	04	20
Preterm delivery	04	07	03	14
Congenitalanomaly	00	01	01	02
Total	32(32.99%)	50(51.55%)	15(15.46%)	97(100%)

Table 2: Sero-positivity of IgM to different members of the TORCH profile in different age groups

Age group	Toxoplasma IgM	*R ubella* IgM	Cyto-megalo virus (CMV) IgM	Herpes simplex virus 2 IgM	Total
21-25yrs	00	01	02	00	
26-30yrs	02	03	05	02	
31-35yrs	01	02	02	00	
Total	03(15%)	06 (30%)	09 (45%)	02 (10%)	20 (100%)

Table 3: Association between IgM & obstetrical outcome in study group due to torch agents

Outcome	IgM	Type of infection
Abortion	08	*Toxoplasma, Toxoplasma* & CMV, CMV & *Rubella*
Intra-uterine death	05	CMV, CMV & *Rubella*
Preterm delivery	02	*Rubella*, CMV & *Rubella*
Congenitalanomaly	01	CMV & *Toxoplasma*
Normal delivery	02	CMV & *Rubella*, CMV
Caesearian section	02	CMV & HSV2.
Total	20 (100%)	-

pregnancy–moves up and infects the foetus.[19]

Persistent encysted forms of *Toxoplasma* present in the infected uterus spreads to the placenta causing infection to the baby in the first trimester terminating in abortion.

The IgM antibodies against *Toxoplasma gondii* were detected between 7.7%-76.7percent in different studies. We, however, found IgM antibodies against *Toxoplasma gondii* in 3.09% cases which is in concordance with a study undertaken by Padmavathy M et al who found a seropositivity of IgM antibodies of 5.8%.

Rubella is a rubivirus which causes mild infection in patients. WHO states that every year, 1 lakh children are born with (combination of deafness, cataract, cardiac complications) congenital *rubella* syndrome specially in developing countries. *Rubella* IgM antibodies produces lifelong immunity[18] and primary viral infection during pregnancy may cause foetal damage.[18,19]

The seropositivity of *rubella* IgM antibodies in our study amongst 97 BOH mothers was 06/97(6.19%). IgM positivity of 4.66%, 4.6% and 6.5% in BOH mothers was reported by Surpam RB et al, Padmavathy M et al and Yasodhara et al respectively.

Against CMV, we found a high seropositivity of IgM antibodies (09/97, 9.28%) similar to Padmavathy M et al (9.2%).

CMV persists in the body indefinitely as a latent infection (Collennberge et al., 2006). Pregnancy probably reactivates the latent virus leading to reproductive loss. Primary CMV infection causes symptomatic infection in the foetus and ultimately foetal death. But in adults the infection is asymptomatic and is difficult to diagnose clinically.[1]

Primary infection or reactivation of an old infection in pregnant mothers during pregnancy leads to the mortality and morbidity due to HSV 2 in neonates. Studies have opined that primary infection of HSV in $1^{st}/2^{nd}$ trimester pregnancy leads to increased rate of spontaneous abortion and/or prematurity and growth retardation of the foetus.

We found a seropositivity of IgM antibodies (02/97, 2.06%) in our study against HSV 2 which is similar to the result obtained by Padmavathy M et al (2.3%). IgM seropositivity of 3.6% and 3.3% was reported by Turbakar et al and Janak et al.

Congenital infections due to TORCH (*Toxoplasma gondii, Rubella*, CMV) thus is responsible for a large number of neonatal and early childhood morbidity/mortality worldwide and it has also been re-established by our study. We also found that TORCH is responsible for a large number of adverse consequences in pregnancy-abortion being the commonest end result (08/97, 8.25%).

5. Conclusion

Thus in conclusion, based on our study, we have found that TORCH infections play an important role in adverse consequences of pregnancy. Therefore it is advisable that all antenatal mothers be routinely screened for TORCH

because early diagnosis and interventions may lead to decreased foetal morbidity and mortality.

6. Conflict of Interest

None.

7. Source of Funding

None.

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