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Study of Congenital Hydrocephalus (HCP) in associated with TORCH infection in Children

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Abstract

Background:*Congenital hydrocephalus is common among the etiological basis of hydrocephalus and torch infection in womb in highly associate with dislesion which sometimes difficult to diagnose and differentiate from is other. Acronym TORCH means-toxoplasmosis, Rubella, Cytomegalovirus (CMV) and Herpes simplex virus (HSV) and these group of viruses produces sever central nervous system (CNS) abnormality which are potentially treatable and preventable*

Aim of the study:*Aim of the study was to find out the association between HCP in neonate & infantwith Congenital TORCH infectionfor early diagnosis and to reduce Congenital anomalies.*

Methods: *Neonates to infants with the diagnosis of hydrocephalus where included in this study conducted in Bangladesh Shishu Hospital and Institute (BSH&I) from July 2019 to December 2021. Thirty two babies where prospectively screened and analyzed for TORCH antibodies. Secondary cases of hydrocephalus like-cerebral tumor, trauma and others where excluded from the study.*

Result:*TORCH antibodies where found positive in significant (75.38%) number of patient (p=<0.05). TaxoplasmaGondii (T.Gondii) IgG was 18.5% (p=<0.05)Positive, CMV IgM was 9% (p=<0.05), CMV IgG 47.7% positive (p=<0.05), Rubella IgG was Positive in 13% and HSV 1 IgG 19% & HSV2 IgG was 6% Positive were identified.*

Conclusion: *Majority of cases of hydrocephalus in neonate & infant in a single center study was post infectious in etiology which are associated with TORCH infectious. Most of these cases could be prevented with proper screening and treatment. This study in a single institution may not be the represented of the whole national population. Multicentric further study and implementation of proper screening protocol would likely be benefited for the nation.*

Keywords: *Congenital Hydrocephalus, TORCH Infection preventive measurement*

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I. Introduction

TORCH infections cause significant morbidity and mortality in neonates. Transplacental spread is the usual route of infection in neonates. Post-infections hydrocephalus caused by congenital RoRch infections is a significant source of morbidity and mortality, and its prevalence is known to vary by region. This pilot study was done to assess the association between Congenital HCP and ToRCH infection. Early diagnosis and treatment of congenital ToRCH infections Leads to improved outcomes. In an Indian study in Hyderabad 28% T. Gondii was present and CMV was present in 92% population among pregnant women[1.] Post-infections

etiology has been shown to be more prevalent in low and middle income countries compared with high-income countries. Congenital toxoplasmosis may lead to a wide range of ocular and neurologic sequal, including hydrocephalus, although avoiding exposure to cats and uncooked meat can aid prevention. Toxoplasma tachyoites are secreted into milk in various farm animals [2] Hydrocephalus has been estimated to affect approximately 4% of infants with congenital toxoplasmosis and is a significant cause of morbidity and mortality in this disease[3]. The incidence of congenital rubella syndrome was significantly reduced over the last century due to vaccination[4]. CMV is the most common cause (10-20%) of congenital infection in the united states[5,6]. Such infants have a mortality rate of 12% by six months of age[7]. Global prevalence of CMV infection in developed countries (45%) and developing countries (100%)[8]. Herpes simplex is most often acquired during deliveryrather than during gestation, it is more preventable and treatable compared with CMV of Rubella[9].Aim of the study was to find out the association between HCP in neonate & infant with Congenital TORCH infection for early diagnosis and to reduce Congenital anomalies.

II. Methodology & Materials

A prospective observational study was conducted in Faculty of Pediatric surgery under theDepartment of Pediatric Neurosurgery in Bangladesh Shishu Hospital and Institute (BSH&I) from July 2019 to December 2021. In Thirty two (n=32) patients were included in this study. According to Inclusion criteria of children with hydrochaplaus whose age were <1 year. Exclusion criteria were HCP associated with cerebral tumor, trauma, hemorrhage, arachnoid cyst, and Dandy Walker Malformation. In all 32 patient serological examination for TORCH screening (ELISA) for TORCH screening and proper treatment protocols was performed. Data was collected in a prefromed data sheet and ware analyzed to establish and association between HCP in neonate and Congenital TORCH infection. Data were analyzed using one sample test where p Value <0.05 was considered statistically significant.

III. Result

A total (32) patients Congenital HCP were included in this study out of 32 cases most of the patients (75.38%) where TORCH positive (Fig:1) Most of the patients came from rural low socio economic status. Male patient were 56.9% rest were Female. The commonest age group was 31.90 days (41.5%) (Fig.2). Age range was 26 days to 6 years. Three patients with concurrent encephalocele and eight patients with concurrent myelomeningocele were also found to have congenital TORCH infections. T. Gondii IgM antibody was absent but in 18.5% patients T. Gondii IgG was positive (p<0.05). Among the 6 cases of toxoplasma positive group 3 (50%) had contact with cat during pregnancy. Rubella IgM & IgG antibody was present in 1.5% and 38.5% respectively. As 86% of population under coverage of vaccination, so, antibody against Rubella may not significant.[11] (Fig 3). CMV IgM & IgG Antibody was present in 9.2% (p=<0.05) and 47.7% (p=<0.05) respectively. HSV 1 IgM & IgG Antibody were present in 4.6% and 26.2% respectively. Herpes 2 IgM Antibody was absent but 9.2% patients were HSV 2 IgG Positive.

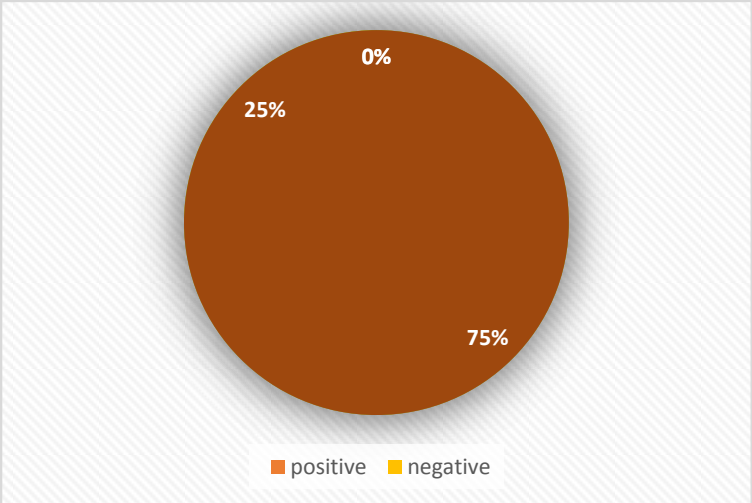

Figure 1:TorCH positive &negative patients presented in pie chart

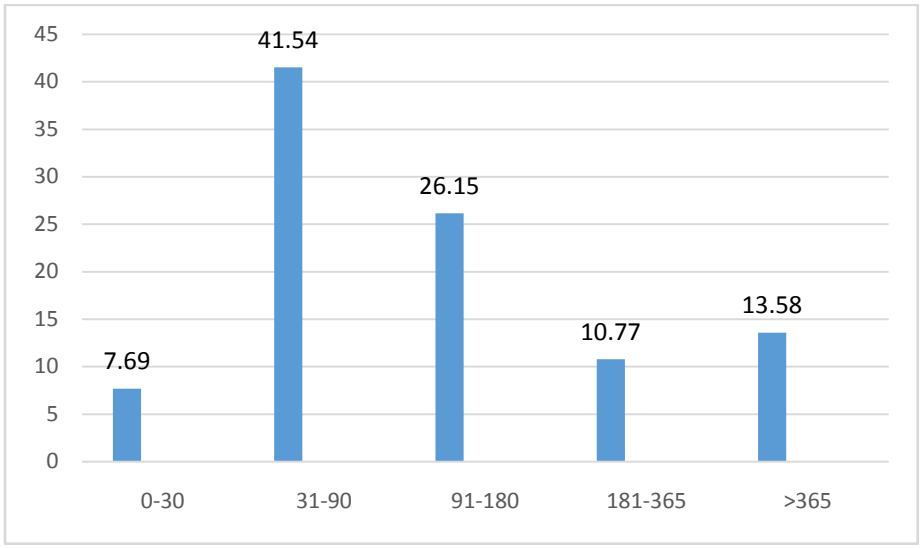

Figure 2: Bar diagram showing age distribution of ToRCH positive patients

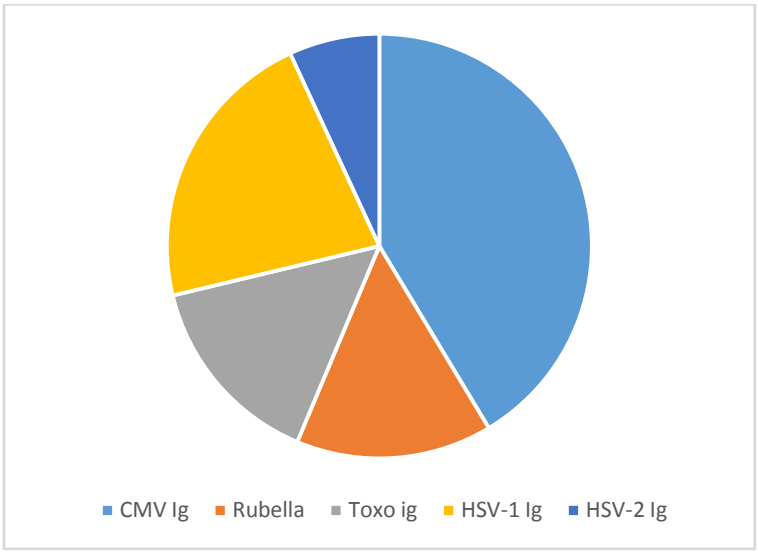

Figure 3:Pie chart presenting IgG antibody of ToRCH positive patients

Table-I: Distribution of T. Gondi IgG, CMV (IgM & IgG), HSV (IgM&IgG) antibody.

Characteristics	Frequency	Percent
T. Gondi IgG	6	18.75
CMV IgM	3	9.375
CMV IgG	15	46.875
HSV-1 IgM	2	6.25
HSV-1 IgG	8	25
HSV-2 IgG	3	9.375

IV. Discussion

The incidence of Torch infections have changes significantly over the last two decades because of better preventive measures like EPI vaccination program. The potentially significant relation between TORCH infections and CNS congenital anomalies including HCP and also Neural Tube Defects (NTDs) is now an important subject of investigation. Maternal TORCH infection is common in Bangladesh, India, Malaysia and Thailand. [12]The classic triad of T. Gondii infection is: Chorioretinitis, Hydrocephalus, Intracranial Calcifications, and are present concurrently in 61.6% of cases. In 1982 Joksimet all did a study in Yugosavia

where they found 39% congenital HCP was T. Gondii positive. In our study 18.5& HCP was T. Gondii Positive.[13]In 2015 Samuel Huston's study demonstrated 4% congenital HCP associated with congenital T. Gondii[14]. Specific anatomical patterns of toxoplasma infection commonly causes cerebral calciucation and (asymmetrical dilatation of the lateral ventricles) [15]. Treatment for toxoplasmosis in utero and during the first year of life has been shown to improve outcomes significantly. Rubella is a benign, self-limited viral illness. Since the availability of mass immunization, the reported incidence of rubella has dropped significantly [16]. The prevention of congenital rubella infection is dependent upon adequate early immunization. Hydrocephalus may be due to leptomeningitis and is a very rare presentation in congenital rubella syndrome with very few cases been reported in literature[17]. CMV is the most prevalent infections agent causing neurological dysfunction in the developing brain. In addition to the transplacental route, CMV also can be transmitted at delivery via the maternal genital tract, breast milk, and via transfused blood products. CMV easily can be spread in daycare centers in young children. Approximately 40% of maternal primary infections and transmitted to the fetus. However, in first trimester primary maternal infection is more likely to cause neonatal infection that is evident at birth. Transmission of CMV from the mother to fetus can occur even if the mother was infected long before conception. A meta-analysis of fetal ultrasound findings indicates an association between CMV congenital infection and hydrocephalus in 4.7% of pregnancies[18]. CNS anomalies induced by congenital CMV infection are likely to result from a direct effect of viral replication in the brain and in the placenta. HCP in CMV as a result of ventriculitis and inflammatory infiltrate of T lymphocytes in the ependyma, which can detected in antenatal Ultrasonogram (USG) [19]. In our study we found 9.2% of HCP due to recent (IgM) CMV infection and 47.8% HCP had IgG Antibody of CMV infection and 47.7% HCP had igG Antibody of CMV indicate maternal infection at least 3 months before. Congenital CMV infection is diagnosed by culturing the virus in oral secretions or urine, in the first three weeks of life. Transmission of the virus requires direct contact with body fluids. Though hand washing and other preventive hygienic measures can decrease spread in daycare centers and at home[20].Neonatal infection occurs far less frequently than might be expected given the high prevalence (One in five) of seropositivity to HSV-2 in childbearing women[21]. Known complications of intrauterine HSV infection include seizures, lethergy, irritability, tremors, poor feeding, temperature instability, bulging anterior fontanelle, chorioretinitis, microcephaly, microphthalmia and hydranencephaly[22]. In our study HSV-1 IgM positive in 3%, IgG positive in 26.2%. HSV-2 IgM not found in our study. Whereas HSV-2 IgG present in 9.2% cases. So, HSV-IgG present significantly (P<.05), Several literature review indicates with relation between congenital HCP and Herpes infection[23].

Limitations of the study:

Serology (Elisa) was used as a diagnostic tool in our study. However Polymerase Chain Reaction (PCR) is more sensitive and specific for diagnosis in TORCH infection. Other limitations were that birth of baby and blood sample collection interval was not uniform. History regarding immunization of body, seropositivity of mother and contact with disease person was not recorded.

V. Conclusion

CNS involvement especially HCP is a major problem for neonate and infant which creates serious socio-economic burden on family and country. This is a burning issue for diagnosis, treatment, prevention and further research on this aspect.

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Conflict of interest: *None declared*

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