

Infective Etiologies in Patients with Bilateral Congenital Cataract

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ABSTRACT

Objective: To determine the frequency of positive Toxoplasma, Rubella, Cytomegalovirus, Herpes Simplex virus and Syphilis serology in patients with bilateral congenital cataract and their correlation with different type of cataracts and age groups.

Study Design: Cross sectional study.

Place and Duration of Study: Department of Pediatric Ophthalmology and Strabismus, Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from May to Dec 2022.

Methodology: Data was collected by a single investigator on Microsoft Excel sheet including patient's age, gender, mode of delivery, consanguinity of parents, and type of congenital cataract, results of TORCH Screening and Presence or absence of amblyopia. TORCHS screening comprised of serum IgM and IgG levels for Toxoplasmosis, Rubella, Cytomegalovirus, Herpes Simplex virus and Syphilis.

Results: A total of 134 patients reported to our institute with bilateral congenital cataract during the study period. Out of them 56 patients had positive results of TORCH screening (41.7%) Out of total 56 patients with bilateral congenital cataract testing positive for TORCH, 30(53.6%) were male while 26(46.4%) were female. Age range was from 1-17 months (9.2±4.2 months). Lamellar cataract was the most common cataract type in our study sample 16(28.6%).

Conclusion: In patients with bilateral congenital cataract positive TORCHS serology was most frequent. Serum Rubella IgM followed by Rubella IgG was positive in most cases. Most common age of presentation in our study was from 4-7 months. Furthermore, lamellar cataract followed by nuclear cataract was the commonest cataract type.

Keywords: Amblyopia, Congenital cataract, Congenital rubella syndrome, TORCHS screening.

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INTRODUCTION

Congenital cataract can present initially in a mild form with decreased brightness sensitivity and impaired night vision and can progress to complete blindness.^{1,2} Globally, cataract is the leading cause of preventable blindness. In 2020, 15.2 million people over the age of 50 were blind due to cataract and an additional 79 million had moderate to severe vision impairment. The age standardized prevalence of cataract induced blindness has increased by 27.5% since 2000.³

Childhood cataracts are responsible for 10.7-14% of blindness in children worldwide. The exact etiology is varied and the cataract can present as unilateral or bilateral.⁴ The World Health Organization's VISION 2020 programme is focused on preventing childhood blindness worldwide. It showed that around 5-20% of all childhood blindness cases are due to cataract. Around 200,000 children are estimated to be blind due to cataract with 20,000 to 40,000 children being born annually with bilateral developmental cataract. One of

the most important causes of congenital cataract is intra-uterine Rubella infection.⁵

Congenital cataracts have multiple causes which can be broadly classified as genetic, metabolic, infectious, syndromic and prematurity.⁶ For the purposes of this study, we shall be focusing more on infectious causes of congenital cataract, namely the TORCHS (Toxoplasmosis, Rubella, Cytomegalovirus, Herpes, Syphilis and Others) infections. According to a study conducted in Southern India out of 109 patients diagnosed with congenital cataract, TORCH infections accounted for 33.4% of all cases and were by far the most common cause of congenital cataract. 23.8% of mothers had contributory risk factors and 8.2% tested positive for TORCH titers.⁷

By far the most common cause of congenital cataracts are intrauterine infections and certain metabolic disorders. IgM antibody against TORCH is used as a method of diagnosis and patients usually present with bilateral or unilateral white pupillary reflex.⁸ Among TORCH, the most common cause is Rubella followed by CMV. Hence whenever a child tests positive for TORCH; they are all screened for presence of deafness, petechial hemorrhages, jaundice, microcephaly and

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other abnormalities present with CMV infection.⁹ We conduct this study to determine the frequency of positive Toxoplasma, Rubella, Cytomegalovirus, Herpes Simplex virus and Syphilis serology in patients with bilateral congenital cataract and their correlation with different type of cataracts and age groups.

METHODOLOGY

The cross sectional study carried out at Department of Pediatric Ophthalmology and Strabismus, Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, for a period of 6 months from May 2022 to December 2022 (ERC # 275/AFIO/dated 31 Mar 2022). Written informed consent was taken from the parents of all the participants. Hospital’s ethical review committee approved the research protocol and patient’s confidentiality was maintained at all tiers of data collection and dissemination. A sample size of 31 was calculated using OpenEpi Online software, keeping reference prevalence of congenital cataracts to be 2% and confidence level of 95%,¹ but we included all the patients who reported to our institute during study period. Non probability convenient sampling technique was used.

Inclusion Criteria: Patients of either gender, age ranging from 1-24 months with diagnosis of bilateral congenital cataract on 1st Ophthalmological examination were included in the study.

Exclusion Criteria: Patients having a known systemic condition, including metabolic disorders, having history of drug toxicity or any alterative or combined

presence or absence of amblyopia. TORCH screening comprised of serum IgM and IgG levels for Toxoplasmosis, Rubella, Cytomegalovirus, Herpes Simplex virus and Syphilis. For ease of data analysis, we documented amblyopia and cataract type in right eye only for our patients with bilateral cataracts.

Results were analysed using Statistical Package for Social Sciences (SPSS) version 23.0. Chi square test was applied and *p*-value of ≤ 0.05 was considered statistically significant.

RESULTS

A total of 134 patients reported to our institute with bilateral congenital cataract during the study period. Out of them 56 patients had positive results of TORCH screening (41.7%). Out of total 56 patients with bilateral congenital cataract testing positive for TORCH, 30(53.6%) were male while 26(46.4%) were female. Age range was from 1-17 months (9.2±4.2 months). Lamellar cataract was the most common cataract type in our study sample 16(28.6%) followed by nuclear cataract 13(23.2%). Amblyopia was found in 20(35.7%) patients. Parents of 35(62.5%) patients had consanguineous marriage. From birth history it was ascertained that 31 patients were delivered by spontaneous vaginal delivery (55.4%) while 25(44.6%) patient were delivered by lower segment Cesarean section surgery.

Correlation of different age groups with TORCH screening results is shown in Table-I. Correlation of

Table-I: Association of TORCH Serology with different age groups at Presentation (n=134)

Age Group	Rubella IgM	Rubella IgG	Toxoplasma IgM	Toxoplasma IgG	CMV IgM	CMV IgG	Herpes IgM	Herpes IgG	Syphilis IgM	<i>p</i> -value
1-3 months	3(5.4%)	0	0	0	0	1(1.8%)	0	0	0	0.04
4-7 months	2(3.6%)	5(8.9%)	1(1.8%)	0	4(7.1%)	4(7.1%)	0	3(5.4%)	1(1.8%)	
8-12 months	3(5.4%)	4(7.1%)	4(7.1%)	3(5.4%)	0	1(1.8%)	3(5.4%)	0	0	
13-16 months	4(7.1%)	2(3.6%)	0	3(5.4%)	0	0	3(5.4%)	1(1.8%)	0	
17-24 months	0	0	0	1(1.8%)	0	0	0	0	0	
Total	12	11	5	7	4	6	6	4	1	

diagnosis contributing towards leucocoria like Coats disease, persistent primary vitreous, retinopathy of prematurity, and or retinoblastoma were excluded from the study. Patients having co-existing retinal pathologies like salt and pepper retinopathy were also excluded.

Data was collected by a single investigator on Microsoft Excel sheet including patient’s age, gender, mode of delivery, consanguinity of parents, and type of congenital cataract, results of TORCH screening and

TORCH screening results with type of congenital cataract in right eye is given in Table-II.

DISCUSSION

Congenital cataract is a serious condition with a multitude of causes. The causes depend on the region of the world being studied. In industrialized countries the vast majority of cases do not have an underlying cause with around 50% of bilateral cases and almost all unilateral cases being idiopathic.⁵ However, in the case

Table-II: Association of TORCH serology with type of Bilateral Congenital Cataract (n=134)

	Type of Cataract								p-value
	Lamellar	Blue dot	Sutural	Pulverulent	Nuclear+Cortical	Anterior Polar	Posterior polar	Nuclear	
Rubella IgM	3(5.4%)	3(5.4%)	0	0	2(3.6%)	0	0	4(7.1%)	0.18
Rubella IgG	6(10.8%)	0	1(1.8%)	1(1.8%)	0	2	0	1(1.8%)	
Toxoplasma IgM	0	0	0	0	1(1.8%)	1(1.8%)	2(3.6%)	1(1.8%)	
Toxoplasma IgG	2(3.6%)	1(1.8%)	0	0	0	0	0	4(7.1%)	
CMV IgM	0	1(1.8%)	1(1.8%)	1(1.8%)	0	0	1(1.8%)	0	
CMV IgG	0	0	0	0	1(1.8%)	2(3.6%)	2(3.6%)	1(1.8%)	
Herpes IgM	1(1.8%)	1(1.8%)	1(1.8%)	1(1.8%)	1(1.8%)	0	0	1(1.8%)	
Herpes IgG	3(5.4%)	0	0	0	0	0	0	1(1.8%)	
Syphilis IgM	1(1.8%)	0	0	0	0	0	0	0	
Total	16	6	3	3	5	5	5	13	

of developing countries the predominant cause of congenital cataracts are TORCH infections.^{8,10-12}

The primary method of testing for TORCH infection cataracts is using IgG and IgM antibody titers. Maternal IgM-antibody does not cross the placenta. Hence, IgM in the fetus is specific for fetal infection, which usually persists for up to 3–4 months of age. In contrast, maternal IgG can cross the placenta and provide immunity to the immunologically immature newborn till 6 months of age or more. After a period of around 6 months these antibodies start to wane. A persistent elevation in IgG or a presence of IgM antibodies thus indicates a fetal infection.¹³ TORCH screening using antibody titers is the predominant method of diagnosis however, there is a lack of specificity while testing and thus, it should not be the only factor being considered for diagnosis. A combination of clinical and environmental correlation along with serology should be used for accurate diagnosis.¹⁴

According to study conducted in Beijing around 17.2% of pregnant women were tested positive for TORCH infections.¹⁵ According to another study conducted in southern India out of a total sample size of 95 children with congenital cataracts, 26% were seropositive for Rubella. Rubella specific IgM was detected in the saliva.¹⁶ Another study conducted in Northern India showed a 91.3% sero-positivity for 1 or more TORCH agents in children with congenital cataracts. However, the sample size was much smaller at 46.¹² Our study showed a predominant percentage of congenital cataract patients were positive for TORCH at 41.7% thus agreeing with the findings done in earlier studies. The Chinese study showed a higher percentage of HSV associated cataracts at approximately 17%,¹⁵ while in the case of our study the predominant cause of congenital cataracts was found to be Rubella.

An important question arises due to the clear correlation between TORCH infections and congenital cataracts. What is the clinical value of TORCH screening and how and when should it be done? The precise answer to this question cannot be given due to lack of adequate data and limited number of studies having been conducted on the matter. Some studies indicate that in all small for gestational age infants (SGA), TORCH screening should be done. However, this association between the two still warrants further study and has not been definitively proven. Several studies have assessed the association between SGA and TORCH infections. They did not demonstrate a cost-effective benefit for testing for TORCH in all SGA infants.¹⁷ However, the fact that a predominant portion of congenital cataract cases are due to TORCH infection particularly in developing countries does raise an alarm and should warrant further research into prevention strategies.¹⁸ Increased education and awareness campaigns to improve maternal health along with prenatal and postnatal care and measures to increase vaccination rates is sure to provide a noticeable benefit and reduction in cases of congenital cataract due to TORCH infections.

LIMITATIONS OF STUDY

Limitations of our study were limited sample size and lack of long-term post-operative follow up. Also an account of systemic manifestations of TORCH infections is not given for our sample population.

CONCLUSION

In patients with bilateral congenital cataract positive TORCHS serology was most frequent. Serum Rubella IgM followed by Rubella IgG was positive in most cases. Most common age of presentation in our study was from 4-7 months. Furthermore, lamellar cataract followed by nuclear cataract was the commonest cataract type.

Conflict of interest: None

Author’s Contribution

Following authors have made substantial contributions to the manuscript as under:

AQ & SN: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

TAK & UNK: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

TL & WRB: Conception, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

conceptualized the study, collected the data, analysed it, written the manuscript and proof read the final document.

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