Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2024i1.758
*Biol. Clin. Sci. Res. J., Volume, **2024**: 758*
Original Research Article

FREQUENCY OF TORCH INFECTION AMONG CONGENITAL CATARACT PATIENTS

BHUTTO SA*[1], ABRO AA[1], KATPAR NA[1], SHAIKH DD[1], ABBASI SA[1], GUL PA[2]

[1]*Department of Ophthalmology, Chandka Medical College & Hospital Shaheed Mohtarma Benazir Bhutto Medical University Larkana, Pakistan*
[2]*Department of Ophthalmology, Layton Rahmatulla Benevolent Trust (LRBT) Gambat Sindh, Pakistan*
**Corresponding author's email address:* shabeerahmadbhutto@gmail.com

(Received, 08th December 2023, Revised 28th January 2024, Published 22nd March 2024)

Abstract: *The objective of this descriptive cross-sectional study was to determine the frequency of TORCH infections among congenital cataract patients. The study was conducted at Shaheed Mohtarma Benazir Bhutto Medical University Larkana, from September 22, 2021, to March 21, 2022. Patients meeting the inclusion criteria, including those diagnosed with congenital cataracts and TORCH infection within the age range of one day to ten years, were included after obtaining informed consent from their guardians. A slit lamp examination was performed to identify lens opacities indicative of congenital cataracts. Subsequently, patients with congenital cataracts were sent for laboratory investigation. TORCH infections were diagnosed based on IgM levels and clinical manifestations specific to each pathogen. The results revealed that the age range of the patients included in the study was one day to ten years, with a mean age of 17.9 ± 21.8 months. Of the 85 patients with congenital cataracts, 36 (42.5%) were male, and 49 (57.5%) were female. Interestingly, TORCH infection was identified in 17 (19.6%) patients with congenital cataracts, while the remaining patients showed no evidence of TORCH infection. In conclusion, TORCH pathogens, particularly cytomegalovirus and rubella virus, were found to be frequent causative agents of congenital cataracts. These findings highlight the importance of early diagnosis and management of TORCH infections in patients with congenital cataracts to prevent visual impairment and other associated complications.*

Keywords: TORCH, Congenital Cataract, Children

Introduction

TORCH infections, which include toxoplasmosis, rubella, cytomegalovirus, and herpes virus, are known to cause significant prenatal, perinatal, and postnatal morbidity and mortality (Morsy et al., 2022). Infants may exhibit evidence of infection at birth, during infancy, or even years later. Treatment or prevention strategies are available for many of these pathogens. The key lies in early recognition, which includes prenatal screening (Neu et al., 2015). Congenital cataract, a distressing eye condition with a multifaceted origin, can lead to reversible blindness in young ones. Thanks to the advancements in genomics research, we now have the opportunity to delve deeper into understanding the underlying causes of cataract development (Sekeroglu and Utine, 2021). During a study conducted in Beijing, it was found that 17.2% of pregnant women tested positive for various infections. The highest positivity rates were observed in cases of HSV immunoglobulin (Ig)M infections (Lu and Yang, 2016; MATOBA, 1984). Early detection and treatment of congenital cataracts and other visual deprivation disorders are crucial in safeguarding a child's developing visual system. These conditions have the potential to permanently impair both central and peripheral vision (Katre and Selukar, 2022). Hence, it is imperative to promptly diagnose and provide surgical intervention, along with appropriate refractive error correction, amblyopia therapy, and long-term monitoring. Ensuring comprehensive care and follow-up is vital to mitigate the impact on a child's visual health (Rajavi et al., 2015). Additionally, serum calcium, phosphorus, glucose, and ferritin levels are typically examined. These tests provide valuable insights into the condition and help guide appropriate treatment (Akter et al., 2020). In a recent study involving 120 children under the age of 6 who were diagnosed with congenital cataracts, certain infections were examined using serology and polymerase chain reaction (PCR). The results revealed that 5.8% of the children tested positive for rubella, 1.6% for HSV, and 8.3% for T. gondii based on IgM positivity. Additionally, the PCR analysis showed that 33.3% of the children had rubella, 20.8% had HSV, and 32.5% had T. gondii, with average copy numbers of 1599 copies/µL, 1716 copies/µL, and 1503 copies/µL respectively (Singh et al., 2016). These findings shed light on the prevalence of these infections among young children with congenital cataracts. The presence of infectious causes plays a crucial role in the development of congenital cataracts, especially when it comes to the rubella virus, a disease that holds the potential for eradication (Dishika and Kanchan, 2022). At Dow University of Health Sciences (DUHS), Civil Hospital Karachi, a recent study revealed that 16 patients (23.52%) tested positive for antibodies against TORCH organisms. Among these patients, 10 (14.7%) were males and 6 (8.82%) were females (Saleem et al., 2015).

The Rationale of this study was to observe the frequency of torch infection amongst congenital cataracts in this part of Pakistan. Previously this study has not been conducted in our part of the country so we are lacking in data and this study would provide data on this topic for researchers. This vital study would help us in developing preventive measures

[Citation: Bhutto, S.A., Abro, A.A., Katpar, N.A., Shaikh, D.D., Abbasi, S.A., Gul, P.A. (2024). Frequency of torch infection among congenital cataract patients. *Biol. Clin. Sci. Res. J.*, **2024***: 758*. doi: https://doi.org/10.54112/bcsrj.v2024i1.758]

against torch infection and guide us in developing therapeutic measures as well. e.g.: live rubella virus ass found in congenital cataracts caused by rubella which can contaminate surgical instruments and disseminate.

Methodology

A Cross Sectional study was conducted from September 22, 2021, to March 21, 2022, in the Department of Ophthalmology, Shaheed Mohtarma Benazir Bhutto Medical University Larkana. All patients included in the study were aged 1 day to 10 years and associated with unilateral or bilateral lens opacities, regardless of gender and duration. Congenital cataracts due to systemic Disease, Genetic Disease, Metabolic Disease, Congenital anomalies, and trauma were excluded from the study. Patients whose slit lamp examination shows lens opacities were considered and assessed clinically as congenital cataracts. Patients with congenital cataracts were sent to a laboratory for investigation. If the IgM level is greater than or equal to 1.1 and the presence of a positive history of fever and exposure to household cats, in addition to the presence of enlarged cervical lymph nodes and bruises under the skin it was labeled as positive for Toxoplasma, and positive for Rubella. If the IgM level was greater than or equal to 1.1 and the presence of other signs of Rubella like cardiac defects and hearing loss and positive for Cytomegalovirus if the IgM level was greater than or equal to 1.1 and positive for Herpes Simplex if the IgM level was greater than or equal to 1.2. TORCH PROFILE was done by the Pathology department of CMCH Larkana.

Results

The age range of the patients in this study was 1 day to 10 years with mean age of 17.9 ± 21.8 months. Out of 85 patients, 36(42.5%) were male and 49(57.5%) were female, as shown in table # 1.17(19.6%) of the patients with congenital cataracts had and the rest of the patients had torch infection and the rest of the patients with congenital cataract had no torch infection, shown in table. 1. When the outcome variable was stratified concerning age and gender, no significant difference was observed, as shown in Table 2.

Table 1. Demographics and descriptive statistics parameters of study participant

Parameters	
Age (years)	17.9±21.8
Gender	
• Female	49(57.5%)
• Male	36(42.5%)
Frequency of Torch Infection among Congenital Cataract Patients	
• Yes	17(19.6%)
• No	68(80.4%)

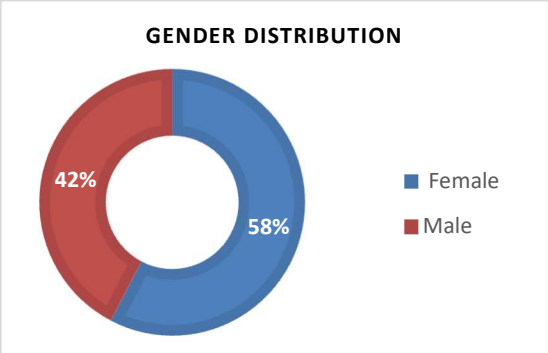

Figure 1: Distribution of gender in the study population

Table 2: Stratification of different variables with respect to torch infection among congenital cataract patients

VARIABLE	**Torch infection among Congenital Cataract Patients**		***P*-Value**
	Yes	**No**	
Age Group			
• 1st day to 5 years	13(15.28%)	54(63.52%)	0.750
• 6 years to 10 years	4(4.70%)	14(16.47%)	
Gender			
• Male	7(8.23%)	29(34.11%)	0.738
• Female	11(12.94%)	38(44.70%)	

Discussion

The rubella virus has been the primary focus regarding viral infections that result in congenital cataracts (Gordon-Lipkin et al., 2021; Mawson and Croft, 2019). It is believed that intrauterine TORCH infections, specifically HSV, can contribute to the development of cataracts in newborns. TORCH infections are a group of infections that can be transmitted from mother to fetus during pregnancy (Baghel and Inamdar, 2020). These infections include toxoplasmosis, rubella, cytomegalovirus, herpes simplex virus, and syphilis. The author suggests that the presence of maternal IgG antibodies in the newborn can be used to detect intrauterine HSV infection. IgG antibodies are produced by the immune system in response to an infection (Megli and Coyne, 2022). If a mother has been infected with HSV during pregnancy, she will produce IgG antibodies that can be passed on to the fetus. The presence of these antibodies in the newborn can indicate that the fetus was exposed to the virus in utero (Hammad and Konje, 2021). The detection of IgM antibodies post-birth may not be sufficient to conclusively link the existence of TORCH pathogens with the development of congenital cataracts, as these antibodies are generated due to self-infection in kids. Nevertheless, the results of this research correspond with the findings of de Jong et al., as both the evaluation of IgG and IgM antibodies produced comparable outcomes (de Jong et al., 2013). Lens opacification in infants who test

positive for IgG antibodies may indicate a past infection, while congenital cataracts occur within one year after birth for children who do not have lens opacification at birth. Infants with congenital cataracts at birth have transparent lenses and are typically manifest by IgM for TORCH pathogens (Naz et al., 2016). Infants who have been exposed to intrauterine infections or have mothers with infections may harbor disease-causing viruses without exhibiting any visible symptoms. The reactivation of the immune system due to secondary virus infection can initiate unidentified biological processes, ultimately resulting in the manifestation of clinical symptoms, such as the development of a cloudy lens (Ting et al., 2020).

Herpes simplex virus type 1 (HSV-1) is a common virus, most people can control the virus with their immune system, but some individuals are more susceptible to severe infections. In a study conducted by Lafaille et al, it was found that children with deficiencies in toll-like receptor 3 (TLR3) innate immunity were at a higher risk of developing HSV-1 encephalitis. TLR3 is a protein that plays a crucial role in the innate immune response to viral infections. It recognizes viral double-stranded RNA and triggers the production of interferon-α/β, which helps to control the spread of the virus. In the absence of TLR3, the immune system is less able to detect and respond to viral infections, making individuals more susceptible to severe diseases (Taruscio et al., 2011).

Nerve fibers within the lens remain unidentified, but their potential presence could significantly contribute to HSV neuronal infection and impact lens development through various direct or indirect mechanisms, including keratitis, uveitis, and retinitis (Lin et al., 2015). HSV II primarily causes skin infections in the genital area and below the waist. Additionally, there is an increased likelihood of fetal infection during pregnancy (Holmes et al., 2003). The age range of the patients included in this study was from 1 day to 10 years, with a mean age of 17.9 + 21.8 months. Among the 85 patients, 36 (42.5%) were male and 49 (57.5%) were female. It was found that 17 (19.6%) of the patients with congenital cataracts had TORCH infections, while the remaining patients with congenital cataracts did not have any torch infection.

Bhatti et al. (Bhatti et al., 2003) findings indicated the absence of a causal link between CMV infection and congenital cataracts. However, the study conducted by Abrahamsson and colleagues (Abrahamsson et al., 1999) focused on the correlation between cataract protein gene mutations and various factors. In particular, their research shed light on the involvement of heat shock factor 4 (Hsf4b) in the suppression of the CMV promoter as a downstream regulatory element. Hsf4b has a dual function as a transcriptional activator and inhibitor, which affects the channel activity of the lens protein and other biological substances. Furthermore, the occurrence of retinal choroidal inflammation, caused by CMV, results in alterations within the lens environment, ultimately leading to the development of cataracts.

Previous research has shown that the levels of anti-TORCH antibodies expressed in vivo in women differ based on the country and region. In Portugal, Rahi (Rahi et al., 2000) et al found that 93.3% of pregnant women tested positive for anti-RV IgG, 25.7% for anti-TOX IgG, and 62.4% for anti-CMV IgG. The rates of positivity for Anti-TOX and CMV IgM were 0.25% and 0.09% respectively, while the rates for HSV I and HSV II were 1.2%, and the RV rates were 0%. In a study conducted by Wirth et al (Wirth et al., 2002), Indian women showed positivity rates of 19.4% for anti-CMV IgM, 30.4% for anti-RV IgM, 34.7% for anti-CMV IgM, and 33.5% for anti-HSV II IgM. Lu and Yang. (Lu and Yang, 2016) reported infection rates of 62.5% and 91.4% for CMV among residents and immigrants in Italy, respectively.

The findings suggest that economically developed regions had the highest rates of anti-TORCH IgG antibody positivity among pregnant women, while underdeveloped communities in developing countries had the highest rates of anti-TORCH IgM antibody positivity and a higher incidence of congenital cataracts (Lu and Yang, 2016). The findings imply that congenital cataracts can be attributed to TORCH pathogen infections.

Conclusion

Congenital cataract is frequently caused by TORCH pathogens, with cytomegalo virus and rubella virus being the most prevalent. To avoid complications in infants, it is necessary to raise awareness among both pregnant women and healthcare providers**.**

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned.
Consent for publication.
Approved
Funding
Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

SHABEER AHMED BHUTTO (Associate Professor)
Study Design, Review of Literature.
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.
AMJID ALI ABRO (Trainee)
Coordination of collaborative efforts.
Conception of Study, Final approval of manuscript.
NAEEM AKHTAR KATPAR (Assistant Professor)
Manuscript revisions, critical input.
Coordination of co7llaborative efforts.
DARIKHTA DARGHAI SHAIKH (Associate Professor)
Data acquisition and analysis.
Manuscript drafting.
SAFDER ALI ABBASI (Assistant professor)
Data entry and Data analysis, drafting article.
Coordination of collaborative efforts.
PRINCE AAKASH GUL (Associate Ophthalmologist)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.

References

Abrahamsson, M., Magnusson, G., Sjostrom, A., Popovic, Z., and Sjostrand, J. (1999). The occurrence of congenital cataract in western Sweden. *Acta Ophthalmologica Scandinavica* **77**, 578-580.

Akter, S., Eguchi, M., Kochi, T., Kabe, I., Nanri, A., and Mizoue, T. (2020). Association of serum calcium and phosphate concentrations with glucose metabolism markers: the Furukawa nutrition and health study. *Nutrients* **12**, 2344.

Baghel, S., and Inamdar, S. A. (2020). TORCH Infection and Its Influence on High-risk Pregnancy. *Journal of South Asian Federation of Obstetrics and Gynaecology* **12**, 377.

Bhatti, T. R., Dott, M., Yoon, P. W., Moore, C. A., Gambrell, D., and Rasmussen, S. A. (2003). Descriptive epidemiology of infantile cataracts in metropolitan Atlanta, GA, 1968-1998. *Archives of pediatrics & adolescent medicine* **157**, 341-347.

de Jong, E. P., Vossen, A. C., Walther, F. J., and Lopriore, E. (2013). How to use... neonatal TORCH testing. *Archives of Disease in Childhood-Education and Practice* **98**, 93-98.

Dishika, K., and Kanchan, S. (2022). The Prevalence of Cataract in Children. *Cureus* **14**.

Gordon-Lipkin, E., Hoon, A., and Pardo, C. A. (2021). Prenatal cytomegalovirus, rubella, and Zika virus infections associated with developmental disabilities: past, present, and future. *Developmental Medicine & Child Neurology* **63**, 135-143.

Hammad, W. A. B., and Konje, J. C. (2021). Herpes simplex virus infection in pregnancy–An update. *European Journal of Obstetrics & Gynecology and Reproductive Biology* **259**, 38-45.

Holmes, J. M., Leske, D. A., Burke, J. P., and Hodge, D. O. (2003). Birth prevalence of visually significant infantile cataract in a defined US population. *Ophthalmic epidemiology* **10**, 67-74.

Katre, D., and Selukar, K. (2022). The prevalence of cataract in children. *Cureus* **14**.

Lin, H., Long, E., Chen, W., and Liu, Y. (2015). Documenting rare disease data in China. *Science* **349**, 1064-1064.

Lu, B., and Yang, Y. (2016). Detection of TORCH pathogens in children with congenital cataracts. *Experimental and Therapeutic Medicine* **12**, 1159-1164.

MATOBA, A. (1984). Ocular viral infections. *The Pediatric Infectious Disease Journal* **3**, 358-368.

Mawson, A. R., and Croft, A. M. (2019). Rubella virus infection, the congenital rubella syndrome, and the link to autism. *International journal of environmental research and public health* **16**, 3543.

Megli, C. J., and Coyne, C. B. (2022). Infections at the maternal–fetal interface: an overview of pathogenesis and defence. *Nature Reviews Microbiology* **20**, 67-82.

Morsy, T. A., Hussein, H. E., and MORSY, A. T. (2022). TORCH infections, pathogenicity & mortality assessments. *Journal of the Egyptian Society of Parasitology* **52**, 53-70.

Naz, S., Sharif, S., Badar, H., Rashid, F., Kaleem, A., and Iqtedar, M. (2016). Incidence of environmental and genetic factors causing congenital cataract in Children of Lahore. *J Pak Med Assoc* **66**, 819-22.

Neu, N., Duchon, J., and Zachariah, P. (2015). TORCH infections. *Clinics in perinatology* **42**, 77-103.

Rahi, J. S., Dezateux, C., and Group, B. C. C. I. (2000). Congenital and infantile cataract in the United Kingdom: underlying or associated factors. *Investigative ophthalmology & visual science* **41**, 2108-2114.

Rajavi, Z., Mokhtari, S., Sabbaghi, H., and Yaseri, M. (2015). Long-term visual outcome of congenital cataract at a Tertiary Referral Center from 2004 to 2014. *Journal of Current Ophthalmology* **27**, 103-109.

Saleem, T., Dareshani, S., Quraishy, M. M., and Islam, F. (2015). Infectious aetiology of congenital cataract based on torch. *J Liaquat Uni Med Health Sci* **14**, 48-51.

Sekeroglu, H., and Utine, G. E. (2021). Congenital cataract and its genetics: the era of next-generation sequencing. *Turk. J. Ophthalmol* **51**, 107-113.

Singh, M. P., Ram, J., Kumar, A., Khurana, J., Marbaniang, M., and Ratho, R. K. (2016). Infectious agents in congenital cataract in a tertiary care referral center in North India. *Diagnostic microbiology and infectious disease* **85**, 477-481.

Taruscio, D., Capozzoli, F., and Frank, C. (2011). Rare diseases and orphan drugs. *Annali dell'Istituto superiore di sanità* **47**, 83-93.

Ting, X. W., Teh, W. M., Chan, C. S., Jalil, N. F. A., and Muhammed, J. (2020). Clinical Profile and Visual Outcome of Pediatric Cataract Surgeries in West Malaysia. *Malaysian Journal of Paediatrics and Child Health* **26**, 27-34.

Wirth, M., Russell-Eggitt, I., Craig, J., Elder, J., and Mackey, D. (2002). Aetiology of congenital and paediatric cataract in an Australian population. *British Journal of Ophthalmology* **86**, 782-786.

[Citation: Bhutto, S.A., Abro, A.A., Katpar, N.A., Shaikh, D.D., Abbasi, S.A., Gul, P.A. (2024). Frequency of torch infection among congenital cataract patients. *Biol. Clin. Sci. Res. J.,* **2024***: 758*. doi: https://doi.org/10.54112/bcsrj.v2024i1.758]