ARC Journal of Pediatrics
Volume 10 Issue 4, 2025, PP 28-33
ISSN 2455-5711
DOI: https://doi.org/10.20431/2455-5711.1004004
www.arcjournals.org

Outcome of Newborns with ABO Incompatibility in a Tertiary Care Hospital

Dr. Murshida Akhter[1*], Dr. Sk. Mohammad Ali Rashed[2], Prof. Dr. Soofia Khatoon[3], Prof. Dr. Nazneen Akhter Banu[4]

[1]*Junior Consultant, Department of Pediatric Cardiology, National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh*

[2]*Senior Consultant, Department of Pediatric, Rajshahi Medical College Hospital, Rajshahi, Bangladesh.*

[3]*Academic Director and Head, Department of Pediatrics, Institute of Woman and Child Health and Ashulia Women and Children Hospital, Savar, Dhaka, Bangladesh*

[4]*Professor (Ex-Head), Department of Pediatrics, Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh*

Received: 07 July 2025 Accepted: 22 July 2025 Published: 30 July 2025

Corresponding Author:** ***Dr. Murshida Akhter, *Junior Consultant, Department of Pediatric Cardiology, National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh.*

Abstract

Introduction: *The most prevalent cause of hemolytic disorders of newborn (HDN) is ABO incompatibility. It occurs as a result of ABO blood group incompatibility between the mother and fetus. So, the aim of the present study was to assess the outcome of newborns with ABO incompatibility*

Aim of the study: *The aim of this study was to evaluate the outcome of neonates with ABO incompatibility in a tertiary care hospital.*

Methods: *This cross-sectional type of observational study was carried out on all icteric newborns admitted to Shaheed Suhrawardy Medical College Hospital during a 6-month period, from July 2013 to January 2014, in Dhaka, Bangladesh. Among forty-nine patients admitted with neonatal jaundice, ABO incompatibility was found in 30 cases. Cases were detected according to history, examination and fulfillment of criteria.*

Results: *Among the ABO incompatibility cases, the age of onset of jaundice, noticed by parents were: 1st 24 hours, 11 (36.67%) cases, 24 hours to 72 hours, 16 (53.33%) cases and >72 hours, 5 (16.67%) cases. Coomb's test was negative in all the cases. Exchange transfusion was needed in 4 (13.33%) cases, 26 patients improved with phototherapy alone (86.67%) and the duration of phototherapy was >48 hours in 20 cases (66.67%) and ≤48 hours in 10 (33.33%) cases.*

Conclusion: *Phototherapy is an effective measure in treating hyperbilirubinemia in most cases, and it reduces the need for exchange transfusions. But phototherapy should not be used as a substitute when there is an indication for an exchange transfusion.*

Keywords: *ABO incompatibility, Neonatal jaundice, Hyperbilirubinemia, Phototherapy, Exchange transfusion*

1. Introduction

Neonatal Jaundice refers to the yellow discoloration of a newborn baby's skin and sclera that results from hyperbilirubinemia.[1] It is the most common condition requiring medical attention in newborn babies. In most cases, jaundice occurs due to physiological causes.

Among the pathological causes, HDN is one important condition, causing early neonatal jaundice. ABO incompatibility is the most common unavoidable cause of HDN. When a woman has blood group O & fetus has A or B, maternal-fetal ABO incompatibility occurs. This condition develops in 15–25% of pregnancies and 10% of such offspring develop hemolytic disease. This is because the majority of naturally occurring antibodies are IgG. Thus, ABO isoimmune hemolytic disease may occur even in first-born babies. During the first week of life, jaundice affects about 60% of term and 80% of preterm babies. Depending on the cause, it could

exist from birth or could show up at any point in the neonatal stage.[2] In most infants with jaundice, there is no underlying disease, and the jaundice is termed physiological. Among the pathological causes, hemolytic disease of newborn is one important condition causing early neonatal jaundice and ABO incompatibility is the most common and unavoidable cause of hemolytic disease of newborn. When a woman has blood group O and the fetus has blood group A or B, maternal-fetal ABO incompatibility occurs. In 15–25% of pregnancies, this condition develops.[3]

ABO incompatibility occurs in 20-25% of pregnancies and 10% of such offspring develop hemolytic disease[2]. This is because the majority of naturally occurring anti A and anti B antibodies are of the IgM subclasss which do not cross the placenta.

In their study, Martin et al. in Antigua and Barbuda found that idiopathic (71%), sepsis (16%), preterm (9%), ABO incompatibility (3%), and rhesus isoimmunization (1%), were the most prevalent causes of hyperbilirubinaemia.[4] Neonatal hyperbilirubinaemia is severe enough to cause kernicterus and irreparable brain damage.[5] Acute bilirubin encephalopathy is reported to have occurred in 0.9/100 000 cases[6] of hazardous hyperbilirubinaemia in the UK and Ireland over a 2-year period, [7] according to surveys. In the USA, on the other hand, kernicterus is reported to have occurred in 1.5/100 000 cases and hazardous hyperbilirubinaemia in 1/10 000 cases.[8, 9]

There are very few studies conducted in our country on the causes and outcomes of newborn jaundice. In our country, a study was conducted on the risk factors and outcomes of neonatal jaundice in a tertiary hospital, and ABO- and Rh-incompatibility were detected in 13.3% and 3.3% of the patients, respectively. Septicemia was diagnosed in 26.7% of the cases, G6PD deficiency was confirmed in only one (1.7%).[10] The study revealed that a considerable number of neonatal jaundice had a history of shorter gestational age (<32 weeks of gestation) in Bangladeshi neonates (35%); and lower gestational age is significantly associated with septicemia and possibly with hyperbilirubinaemia.[10]

A prospective diagnosis is based on the presence of ABO incompatibility, a weakly to moderately positive direct comb's test, and hyperbilirubinemia. Hemoglobin levels may be as low as 10-12 gm/dl, and reticulocyte counts may be increased to 10-15%. The unconjugated bilirubin levels may reach 20 mg/dl or more.[2] Phototherapy is an effective treatment to reduce serum bilirubin levels. Exchange transfusion with type O blood of the same Rh type as the newborn is directed in severe cases to correct dangerous levels of hyperbilirubinemia.[2]

The aim of the present study was to assess the outcome of newborns with ABO incompatibility to give more attention towards ABO incompatibility to prevent the development of bilirubin-associated neurodevelopment sequelae and to reduce serum bilirubin levels with minimal adverse effects.

2. Objectives

The aim of this study was to evaluate the outcome of neonates with ABO incompatibility in a tertiary care hospital

3. Methodology & Materials

This cross-sectional type of observational study was carried out in all icteric newborns admitted to Shaheed Suhrawardy Medical College Hospital during a 6-month period, from July 2013 to January 2014, in Dhaka, Bangladesh. Forty-nine patients were admitted with neonatal jaundice during the study period. Among them ABO incompatibility was found in 30 cases. Cases were detected according to history, examination and fulfillment of criteria according to operational definition. All neonates admitted with neonatal jaundice due to ABO incompatibility were included in the study. Neonatal jaundice due to other causes, mothers unwilling to participate in the study, and very sick neonates were excluded. After getting informed consent from the parents', a detailed history was taken using a preset questionnaire. All investigations of the working definition were done on each of the study populations on the first or second day of admission. Findings from the patient's history, clinical examination, investigations and follow-up were recorded in the form and analyzed. ABO incompatibility was confirmed according to the criteria of the operational definition. Quality was maintained by the check and recheck method. Consent was obtained from the parents and guardians of the study population. Proper intervention was taken accordingly and outcome was recorded. Data was analyzed with the help of SPSS-21 and Microsoft.

4. Result

A cross-sectional study was conducted to analyze the outcome of newborns with ABO incompatibility. A total 30 neonates were selected according to selection criteria as having ABO incompatibilities. There were 21 (70.00%)

term babies and 9 (30.00%) preterm babies (Figure 1). Twenty-one (70%) patients had normal birth weight, 8 (26.67%) patients had low birth weight and 1 (3.33%) patient had very low birth weight (Figure 2). Among the ABO incompatible cases, B positive blood group babies were 14 (46.67%) and 16 (53.33%) were of the A positive blood group (Figure 3). 17 (56.67%) cases were male and 13 (43.33%) cases were female (Table 1). Total serum bilirubin level (TSB) was ≤15 mg/dl in 4 (13.33%) cases, 15-20 mg/dl in 17 (56.67%) cases and in 9 (30.00%) cases, it exceeded >20 mg/dl (Table 2). Among the ABO incompatibility cases, the age of onset of jaundice noticed by parents were: 1st 24 hours of 9 (30.00%) cases, 24 hours to 72 hours of 16 (53.33%) cases, and >72 hours of 5 (16.67%) cases. Coomb's test was negative in all the cases (Table 3). Exchange transfusion was needed in 4 (13.33%) cases, 26 (86.67%) patients improved with phototherapy alone and the duration of phototherapy was >48 hours in 20 (66.67%) cases and ≤48 hours in 10 (33.33%) cases. Hospital stay was <4 days in 22 (73.33%) cases and >4 days in 8 (26.67%) cases (Table 4). In this study, none of the newborn died or developed Kernicterus. All of them improved after getting phototherapy or exchange transfusion (100%).

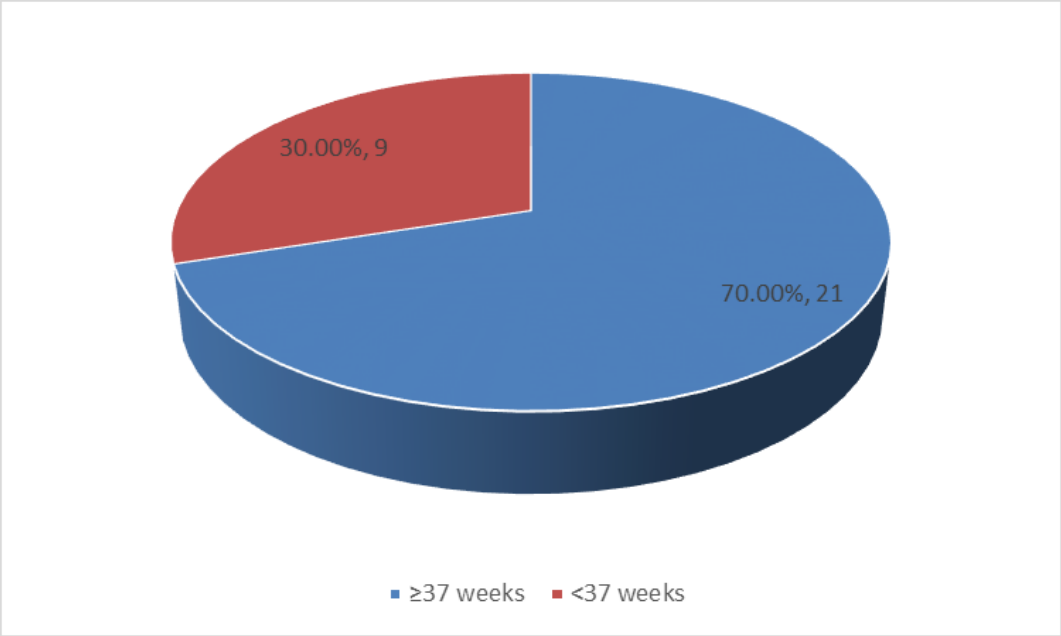

Figure 1. *Gestational age of patients with ABO incompatibility (N=30).*

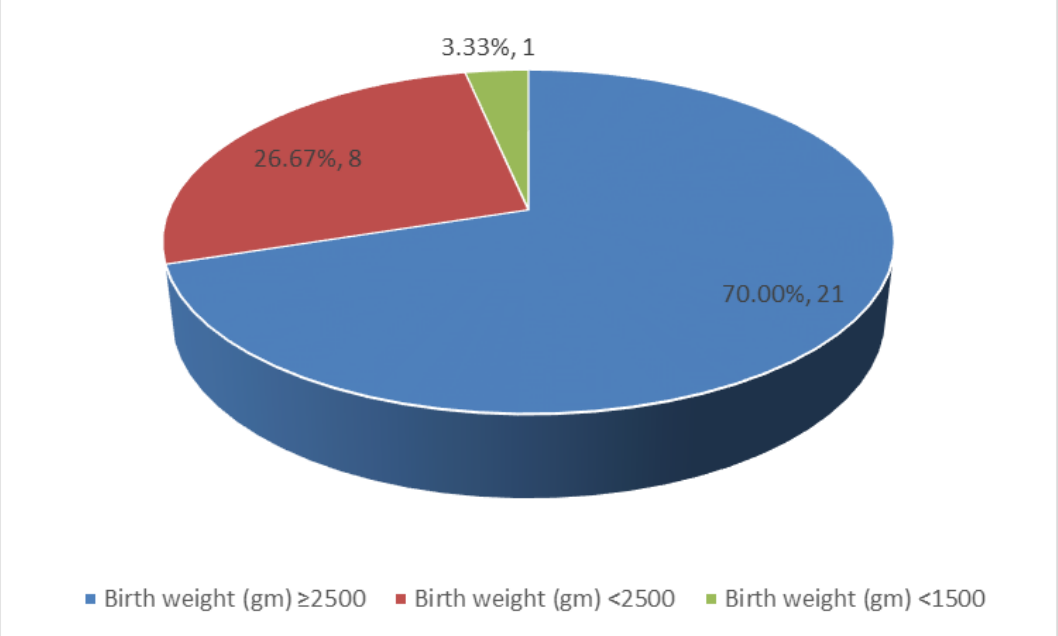

Figure 2. *Birth weight with ABO incompatibility (N=30).*

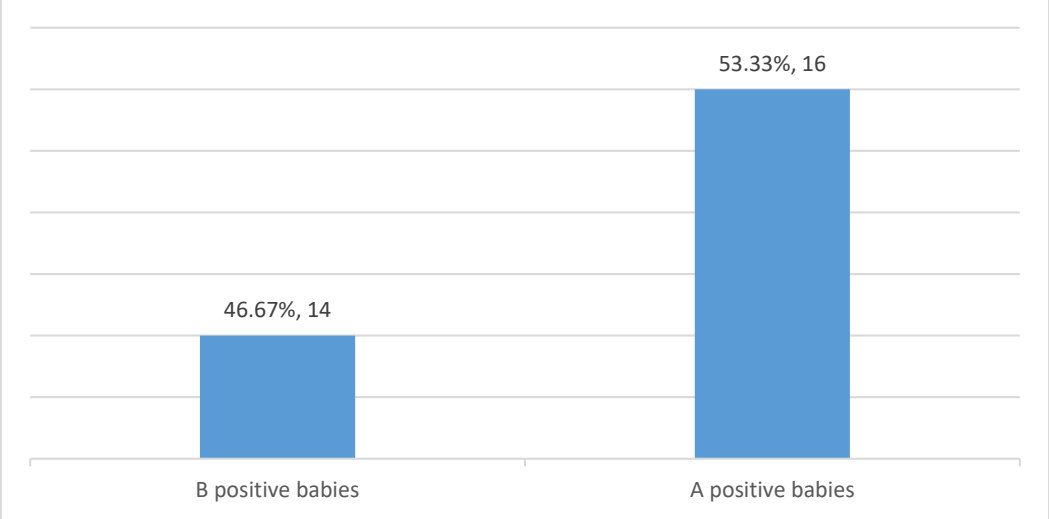

Figure 3. *Frequency of ABO incompatibility among the population (N=30).*

Table 1. *Gender of patients with ABO incompatibility (N=30).*

Sex	No. of patients	Percentage (%)
Female	13	43.33
male	17	56.67

Table 2. *Total Serum Bilirubin level of the patients with ABO-incompatibility (N=30).*

TSB level (mg/dl)	No. of patients	Percentage (%)
≤15 (mg/dl)	4	13.33
15-20 (mg/dl)	17	56.67
> 20 (mg/dl)	9	30.00

Table 3. *Distribution of the neonates according to criteria for diagnosis of severe ABO incompatibility (N=30).*

Socio-demographic factors	Frequency	Percentage (%)
Onset of jaundice		
1st 24 hours	9	30.00
24-72 days	16	53.33
>72 days	5	16.67
Direct Coomb's test		
Positive	0	0.00
Negative	30	100.00

Table 4. *Modalities of treatment and duration (N=30).*

Modalities of treatment	Frequency	Percentage (%)
Exchange transfusion	4	13.33
Phototherapy	26	86.67
Duration of phototherapy		
>48 hours	20	66.67
≤48 hours	10	33.33
Hospital stay		
<4 days	22	73.33
>4 days	8	26.67

5. Discussion

ABO incompatibility occurs in 20-25% of pregnancies, with 10% of affected offspring developing hemolytic disease. This is due to the fact that most naturally occurring anti-A and anti-B antibodies are of the IgM subclass, which do not cross the placenta, while evidence of fetal sensitization occurs in just 3-4% of cases. Symptomatic ABO hemolytic illness affects 1% of neonates but accounts for almost two-thirds of all instances of hemolytic disease in neonates.[11]

In this study, 17 (56.67%) of the newborns were male and 13 (43.33%) were female. Male infants consistently had higher bilirubin levels compared

to females.[12] This finding is consistent with the studies by Rasul et al.[13] and Abbas et al.[14], which also reported a predominance of males among their patients.

In this study, most neonate were of gestational age ≥37 weeks 21 (70.00%). This is similar to the study of Abbas et. al., [14] where majority of the newborns 56 (74.70%) were of ≥37 weeks.

In our study, 21 (70.00%) had normal birth weight, 8 (26.67%) had low birth weight, and one 1 (3.33%) had very low birth weight. This is similar to the study of Dechen et. al., [15] where majority of the newborns 334 (82.06%) had normal birth weight.

A+ve blood group was found in 16 (53.33%) cases, and rest 14 (46.67%) had B+ve blood group. This is consistent with the studies of Abbas et al.[14], Faris et al.[16] and Mentzer et. al.[17]

The total serum bilirubin (TSB) was ≤15 mg/dl in 4 (13.33%) cases, 15-20 mg/dl in 17 (56.67%) cases, and in 9 (30.00%) cases, it exceeded >20 mg/dl. It indicates that ABO-incompatibility is an important cause of hyperbilirubinemia. This is consistent with the study done by Boskabadi et al.[18]

In the current study, 16 (53.33%) presented with jaundice during 24-72 hrs of life, whereas, 9 (30.00%) of them presented in the first day of life and 5 (16.67%) cases presented after the third day of life. Similar finding was reported previously in other studies.[19, 20] Coomb's test was negative in all the cases. Similar report was found in another study done by Barbara J. Stoll and Robert M. Kliegman.[2, 21]

Exchange transfusion was needed in 4 (13.3%) cases for single time and were double volume exchange and total serum bilirubin was lowered down to >50% in every cases. 26 (86.67%) patients improved with phototherapy alone and duration of phototherapy was >48 hours in 20 (66.67%) cases and ≤48 hours in 10 (33.33%) cases. Hospital stay was <4 days in 22 (73.33%) cases and >4 days in 8 (26.67%) cases. Among the prolonged hospital staying cases, 4 had fever and they needed second generation antibiotics. Also, in other 4 cases hospital staying was prolonged in whom, 2 were reluctant to feed and in other 2 cases, duration of phototherapy was not adequate. In this study, all patients improved after taking the appropriate measures. This indicates that phototherapy is an effective measure in treating hyperbilirubinemia and it reduces the need for exchange transfusion. But phototherapy should not be used as a substitute, when there is an indication for exchange transfusion. Similar observations were reported by previous study.[15]

6. Limitations of the Study

The study was done in a single centre and sample size was small. Laboratory facilities were not available for 24 hours. If samples were collected from the patients of different hospital that might give more precise information. Therefore, in future further study may be under taken with large sample size.

7. Conclusion

The study may conclude that male babies and babies possessing blood group A+ve suffer more from ABO incompatibility, which occurs irrespective of gestational age and birth weight. Anti-hemolysin titre is a strong marker for hemolysis, and timely intervention based on its levels can significantly improve neonatal jaundice caused by ABO incompatibility.

8. Declaration

I hereby declare that the research paper titled "Outcome of Newborns with ABO Incompatibility in a Tertiary Care Hospital**"** is my original work. The material borrowed from similar titles from other sources and incorporated in the dissertation has been duly acknowledged. I understand that I myself could be held responsible and accountable for plagiarism, if any, detected later on.

References

[1] Khan MR, Rahman ME. Neonatology. In: Essence of Pediatrics. 4th edition. new Delhi: Elsevier, 2011 p 35-41.

[2] Maheshwari A, carlo WA. Digestive System Disorder. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF eds.. Nelson Textbook of Pediatrics. 20th edition. Philadelphia: Saunders Elsevier, 2015 p 871- 87.

[3] Yigit S, Gursoy T, Kanra T, Aydin M, Erdem G, Tekinalp G, Yurdakok M. Whole blood versus red cells and plasma for exchange transfusion in ABO haemolytic disease. Transfusion medicine. 2005 Aug; 15(4): 313-318.

[4] Martin TC, Shea M, Alexander D, Bradbury L, Lovell-Roberts Li. Did exclusive breastfeeding and early discharge lead to excessive bilirubin levels in newborns in Antigua and Barbuda. West Indian Med J 2002; 51**:** 84-8.

[5] Ebbesen F. Extreme hyperbilirubinemia in term and near term infants in Denmark. Acta Paediat rica, 2005; 94:59–64.

[6] Manning D. Prospective surveillance study of severe hyperbilirubinaemia in the newborn in

the UK and Ireland. Fetal and Neonatal Edition, 2007; 92:F342–F346.

[7] Allen NM. Severe hyperbilirubinaemia and kernicterus: more caution is needed in newborn jaundice surveillance. Irish Medical J, 2009; 102: 228–29.

[8] Burke B. Trends in hospitalizations for neonatal jaundice and kernicterus in the United States! 988-2005. Pediatrics 2009; 123:534–32.

[9] Bhutani VK, Johnson L. Kernicterus in the 21st century: frequently asked questions. Perinatolo gy, 2009; 29(Suppl. 1): S20–S24.

[10] Zabeen B, Nahar J. Risk factors and outcome of neonatal jaundice in a tertiary hospital. Ibrahim Med. Coll. J. 2010; 4(2): 70-3.

[11] Gomella, TL, Cunningham, MD, Eyal, FG. eds. Neonatology: management, procedures, on-call problems, diseases, and drugs. 5h edition. New York: McGraw-Hill; 2004 p 381-88.

[12] John A. Ozolek, Jon F. Watchko, Mimounia F. Prevalence and lack of clinical significance of blood group incompatibility in mothers with blood type A or B. The Pediatrics, Pennsylvania. 1994; 125(1): 87-91.

[13] Rasul CH, Hasan MA, Yasmin F. Outcome of neonatal hyperbilirubinemia in a tertiary care hospital in Bangladesh. Malays J Med Sci. 2010; 17(2):40–4.

[14] Abbas SH, Nafea LT, Abbas RS. Prevalence of ABO Incompatibility and its effect on Neonates Hyperbilirubinemia. Res J Pharm Technol [Internet]. 2020; 13(1):141.

[15] Dechen K, Lhadon T, Mynak ML, Phurpa P. Clinical profile of pathological Jaundice among neonates admitted in the National Referral Hospital, Bhutan. Bhutan Health Journal. 2021; 7(2):13–8.

[16] Faris B, Swaf AL, Rekan S. Jumaa, Hemolytic disease of newborn due to ABO incompatibility. Tikrit Medical Journal 2009; 15(2):70-78.

[17] Mentzer WC, Glader BE: Erythrocyte disorders in infancy. In: Taeusch HW, Ballard RA, eds. Avery's diseases of the newborn. 7th ed - Philadelphia, pa. WB saunders. 1998; 108011.

[18] Vulliamy D.G. Haemorrhage and Jaundice. In: The Newborn child. 4th .ed. Hong Kong Pa: Churchill living stone 1977; 156-157.

[19] Boskabadi H, Maamouri G, Mafinejad S, Rezagholizadeh F. Clinical Course and Prognosis of Hemolytic Jaundice in Neonates in North East of Iran. Mecedonian Medical Science. 2011; 4(4):403-7.

[20] Edward wasserman, Lawrence B. Slobody. Diseases of the newborn. In: Survey of clinical pediatrics. 6th .ed. Tokyo - Japan. Mc Graw Hill Koga Kusha, Ltd. 1974; 564 567.

[21] Swinhoe D, Gilmore D, McNay M, Whittlem. Rh hemolytic disease: continuing problem of management. Archives of Disease in Childhood, 1990; 65(4): 365-8.

Citation: *Dr. Murshida Akhter et al. "Outcome of Newborns with ABO Incompatibility in a Tertiary Care Hospital". ARC Journal of Pediatrics. 2025; 10(4):28-33. DOI: https://doi.org/10.20431/2455-5711.1004004.*