



RESEARCH FOR THE EFFECTS OF Rh AND AB0 INCOMPATIBILITY IN NEWBORN INFANTS ON TOTAL BILIRUBIN LEVELS WITHIN THE FIRST 24 HOURS IN AND AROUND KÜTAHYA

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ABSTRACT

Hyperbilirubinemia is one of the most common clinic findings in the newborn. Hyperbilirubinemia is defined as rising of the plasma level of bilirubin such an extent that it makes sclera and skin yellow. Hyperbilirubinemia might cause death and sequellae. Its main causes are AB0 incompatibility, Rh incompatibility, G-6-PD deficiency and Subgroup incompatibility. It was aimed this study to research the effect of AB0 and Rh incompatibility on total serum bilirubin (TSB) levels of the newborn infants who had been hospitalized due to hyperbilirubinemia diagnosis within the first 24 hours after birth. The subjects were 40 hyperbilirubinemia newborn infants (23 females, 17 males). It was found that TSB levels of the hyperbilirubinemia newborn infants with AB0 and Rh incompatibility were higher than TSB levels of the other hyperbilirubinemia newborn infants and that the difference was statistically significant ($p < 0,05$).

Keywords: *Newborn infant, Rh incompatibility, AB0 incompatibility, Total serum bilirubin level (TSB)*

KÜTAHYA YÖRESİNDE YENİDOĞANLARDA Rh ve AB0 UYUŞMAZLIKLARININ, İLK 24 SAAT İÇİNDE TOTAL BİLİRUBİN DÜZEYLERİNE ETKİSİNİN ARAŞTIRILMASI

ÖZET

Hiperbilirubinemi, yenidoğanda en sık görülen klinik bulgulardan biridir. Hiperbilirubinemi, hemoglobinin, hem parçasının yıkım ürünü olarak yapılan ve dolaşımdan karaciğer tarafından atılan bilirubinin plazma düzeyinin, cilt ve sklerayı sarıya boyayacak kadar yükselmesi olarak tanımlanır. Hiperbilirubinemi, ölümler ve ciddi sekillere neden olabilir. Başlıca nedenleri arasında AB0 uyumsuzluğu, Rh uyumsuzluğu, G-6-PD eksikliği ve Subgrup uyumsuzlukları gelir. Çalışmamızda doğumdan sonra ilk 24 saat içerisinde hiperbilirubinemi tanısı ile yatırılan yenidoğanlarda, total serum bilirubin (TSB) düzeylerine AB0 ve Rh uyumsuzluğunun etkisi araştırılmak istenmiştir. Çalışmamızda, hiperbilirubinemi hastası 40 (23 kız, 17 erkek) yenidoğan üzerinde yapıldı. AB0 ve Rh uyumsuzluğu bulunan yenidoğanların, diğer hiperbilirubinemi yenidoğanların TSB düzeylerinden daha yüksek olduğu ve bu farkın istatistiksel ($p < 0,05$) olarak anlamlı olarak bulundu.

Anahtar Kelimeler: *Yenidoğan, Rh uyumsuzluğu, AB0 uyumsuzluğu, Total serum bilirubin düzeyi (TSB)*

1. INTRODUCTION

Newborn infant jaundice depending on indirect hyperbilirubinemia is one of the problems encountered frequently during the newborn period. Although 60% of the term newborn suffer from jaundice, only 5-10% are serious enough to require hospitalization [1].

The most frequent causes of hemolytic indirect hyperbilirubinemia in the infants hospitalized due to indirect hyperbilirubinemia diagnosis are ABO, Rh, G-6-PD deficiency and subgroup incompatibility [1]. It was reported

that there was ABO incompatibility between the mother and the baby in almost 15- 20% of the live births in only 0.3-2.2% of which hemolytic disease appeared [2].

After ABO, Rh is the most important blood group. Although more than 40 antigens are defined in Rh system, only 5 of them are used commonly (D,C,c,E,e). Rh antigen exists only in erythrocyte membrane. 30-35% of hemolytic disease in the newborn results from Rh incompatibility [3, 4, 5].

Sensitization happens when a Rh negative mother encounters 0,1 ml Rh positive erythrocytes. Mother's blood encounters fetal erythrocytes mainly through birth, miscarriage or fetal-maternal transfusion. The most common type of maternal sensitization is during delivery at 50% rate. Sensitization depending on transfusion appears during the first trimester at 7% rate, during the second trimester at 16% rate and during the third trimester at 15% rate [6].

Immune response is generally slow when a mother first encounters Rh positive erythrocytes. First, antibodies are formed in IgM structure. Since they can't penetrate placenta, they don't have any effects on fetus. After the first immune response, the immune response developed when Rh positive cells are encountered is much faster and stronger, because the antibodies have such an IgG structure that can penetrate placenta. The IgG type antibodies that pass to fetal circulation hemolyze Rh positive erythrocytes and cause hemolytic disease in foetus [3, 4, 5].

Destruction of erythrocytes through the effect of anti-D antibodies causes fetal anaemia, leading to more erythrocyte production. When erythrocyte production in the bone marrow cannot cope with the destruction, extramedullary haematopoiesis starts in liver and spleen. Because erythrocyte maturation in extramedullary haematopoiesis is not complete, nucleated erythroid elements start to penetrate to peripheral circulation and the disease is therefore called erythroblastosis fetalis. In subjects with hydrops fetalis, anemia may be accompanied by acid, common oedema, pleural and pericardial effusion. Because the bilirubin developed during fetal period is cleared by placenta, the bilirubin levels of these babies during birth are below 5 ml/dl, but the level might rise rapidly within the first thirty minutes [5].

The most common blood incompatibilities causing haemolyse is ABO incompatibility. Although encountered frequently, it does not lead to serious problems either in intrauterine or postnatal period. It might appear in the first pregnancy of a mother who hasn't been sensitized before [7]. Its clinical symptoms look like those of Rh incompatibility, but its development and pace is different. Jaundice generally appears around 36th hour; however, the rising rate of bilirubin is slower compared to Rh incompatibility. It rarely causes severe haemolysis, jaundice and kernicterus. Haemolytic depending on ABO incompatibility is milder than Rh incompatibility [6].

2. METHOD

The subjects of the study are 40 babies (22 females, 18 males) with hyperbilirubinemia diagnosis; they were born between November and December 2009 in Evliya Çelebi State Hospital and Kütahya State Hospital, staying in the newborn and pediatric services. The babies didn't have any nutrition problem; they were breast-fed in the first hour and were only fed with mother milk. The ones with preterm births and congenital, metabolic, genetic and infectious diseases were excluded.

Three groups were formed: the first group with 13 (7, 6 males) with Rh incompatibility and Rh (-) factor mothers and Rh (+) babies. The second group with 7 babies (4 females, 3 males) with ABO incompatibility and 0 group mothers and A and B groups babies. The third group 24 babies (13 females, 11 males) without any incompatibilities as the control group. Blood samples were taken from all the babies after birth and total serum bilirubin level (TSB) was determined in them.

The statistical analysis of the data was conducted using SPSS for Windows 15,0 program. The Mean and Standard Deviation, T-test were used in the comparison of the data. The significance level was accepted as $p < 0.05$.

3. FINDINGS

In the study, total serum bilirubin levels of babies with and without AB0 and Rh incompatibility were compared. The average total bilirubin level in the blood samples taken from babies with Rh incompatibility within the first 24 hours after birth was determined as 18,94 mg/ml, while it was 12,38 mg/ml in the babies without Rh incompatibility. The difference between the two groups was statistically significant ($p < 0,05$) (Table 1).

	TSB Value (mg/ml)
	Srt. ± Std. Deviation
Rh incompatibility (n=13)	18,94 ± 4,88
Control (n=24)	12,38 ± 3,93
p value	< 0,05

Table 1. Comparison of total bilirubin levels of groups with Rh incompatibility.

Comparing the total bilirubin levels of the newborn infants according to gender, it was determined that it was 15,02 mg/ml in females, while it was 13,96 mg/ml in males. The difference between the two groups was statistically insignificant ($p < 0,05$) (Table 2).

	TSB Value (mg/ml)
	Srt. ± Std. Deviation
Female (n=23)	15,02 ± 4,83
Male (n=17)	13,96 ± 5,47
p value	> 0,05

Table 2. Comparison of total bilirubin levels according to gender.

Comparing the total bilirubin levels in Rh incompatibility according to gender, it was found in females with Rh incompatibility as 19,13 mg/ml and without Rh incompatibility as 12,80 mg/ml, whereas in males with Rh incompatibility as 18,58 mg/ml and without Rh incompatibility as 11,78 mg/ml. It was determined that in both sexes, the values increased statistically significantly according to Rh incompatibility (Table 3).

	TSB Value (mg/ml)
	Srt. ± Std. Deviation
Rh incompatibility female (n=7)	19,13 ± 4,32
Control female (n=13)	12,80 ± 3,73
p value	< 0,05
Rh incompatibility male (n=6)	18,58 ± 6,59
Control male (n=11)	11,78 ± 4,32
p value	< 0,05

Table 3. Comparison of Rh incompatibility with total bilirubin levels according to gender.

In the study, total bilirubin level of 7 newborn infants with AB0 incompatibility was found as 16,82 mg/ml, while it was AB0 12,38 mg/ml in those without incompatibility. The difference was statistically significant ($p < 0,05$) (Table 4).

	TSB Value (mg/ml)
	Srt. ± Std. Deviation
AB0 incompatibility (n=7)	16,82 ± 4,24
Control (n=24)	12,38 ± 3,93
p value	< 0,05

Table 4. Bilirubin levels according to AB0 incompatibility.

4. CONCLUSION & DISCUSSION

The main reasons for hyperbilirubinemia during the newborn period are ABO, Rh, G-6-PD deficiency and subgroup incompatibility [2]. Besides, main risk factors causing hyperbilirubinemia are reported as being the first baby, being male, being fed with mother milk, early discharge from hospital, pathological weight loss, having a diabetic mother, extra vascular bleeding, jaundice in the previous baby and oxytocin use during delivery [8, 9, 10, 11]. Also, it is emphasized that hereditary and environmental conditions are important in the development of hyperbilirubinemia; that the risk factors differ from society to society and therefore that every society should define its own risk factors and bilirubin curves well [8, 10].

Newborn jaundice appears more frequently in male babies [9, 11]. The fact that our study group was composed of 45% males and 55% females is different from the literature. The relation between gender and TSB level was researched, but no significant difference was found.

In the related studies about the effect of mother milk on TSB level, it was reported that 30% of the babies with severe hyperbilirubinemia diagnosis were fed only with mother milk, while 28% were fed mostly with mother milk [12]. In another study, intermediate jaundice (serum bilirubin level >12 mg/dl) was seen in babies fed with mother milk at 14% rate and in babies fed with baby food at 4%, while severe jaundice (serum bilirubin level >15 mg/dl) was seen in babies fed with mother milk at 2% and in babies fed with baby food at 0,3% [13]. In another study, it was seen in babies fed with only mother milk at 44,5%, in babies fed with only baby food at 7,5% and in babies fed with a combination at 48%. Comparing the groups, no statistically significant difference was found between those fed only with mother milk and the other babies in terms of average bilirubin values [9]. In our study, the subjects were babies fed only with mother milk after birth and their TSB levels were found to be high.

It is reported that ABO incompatibility is the most frequent reason for hyperbilirubinemia and kernicterus in term newborns [14]. It is added that there is ABO incompatibility between mother and baby in almost 15- 20% of live births in only 0.3-2.2% of which hemolytic disease appear [2]. Kaini et al. found AB0 incompatibility in 11.1% and Rh incompatibility in 7.4% of indirect hyperbilirubinemia diagnosed patients [15]. Sarica et al. found indirect hyperbilirubinemia in 21.3% of healthy term babies with AB0 incompatibility [16]. Kalakheti et al. found clinically significant indirect hyperbilirubinemia 18,5% of AB0 incompatibility between mother and baby [17]. In the study of Bolat et al., there was AB0 incompatibility in 30.2%, Rh incompatibility in 7.7% and subgroup incompatibility in 3 of the patients [18]. In our study, AB0 incompatibility was found 17,5%, while Rh incompatibility was found 27,5%. Also, in 3 newborn infants, there was both AB0 and Rh incompatibility. It was determined that TSB levels of AB0 and Rh incompatibility newborns within the first 24 hours were higher than other hyperbilirubinemia patients. It was determined that TSB levels in 3 newborns with both AB0 and Rh incompatibility together were higher than 20 mg/ml.

Consequently, it was determined that Rh and ABO incompatibilities are among the major reasons for hyperbilirubinemia in those who were diagnosed hyperbilirubinemia within 24 hours after birth. The TSB value was also analyzed in terms of gender, but although it was more prevalent in male newborn infants in the literature, our study showed that it was more prevalent in female newborn infants. Although TSB level was higher in those who were fed with mother milk after birth, it will be effective to decrease the number of hyperbilirubinemia and TSB levels if they are encouraged to be breast-fed immediately after birth, if families are trained about malnourishment and dehydration.

5. REFERENCES

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