Studying the Influence of Maternal Factors on Iraqi Pediatrics patients Presented with Neonatal Hyperbilirubinemia

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Abstract

Background: Hyperbilirubinemia regarded as common problem in neonates. Risk factors for elevated indirect bilirubin include maternal age, race, prematurity, and breast-feeding.

Material and Methods: This study include mothers of term newborn infants with neonatal hyperbilirubinemia requiring phototherapy and/or exchange transfusion that are combatable or have maternal-fetal ABO incompatibility to evaluate maternal contributing factors which related to development of hyperbilirubinemia in newborns.

This study found that higher serum bilirubin level (31.32 ± 2.30mg/dl) found in 28%neonate for mother were **≥30** years old. There was no significant difference found in serum bilirubin level according to parity (primi or multi). There was association between the neonatal serum bilirubin level with maternal ABO blood groups which showed highest mean of neonatal serum bilirubin reported in neonate for mothers carry blood group A and B (17.92 ± 10.32), (17.28±6.85) respectively.While a result of the association of neonatal serum bilirubin level to maternal Rh reuses factor found that there was no significant differences among them (P>0.05).

Conclusions: hyperbilirubinemiawas more frequent in neonate for mothers**≥30** years old.Presence of highest mean of neonatal serum bilirubin reported in neonate for mothers carry blood group A or Band Rh - women.

Keywords: *Hyperbilirubinemia, Maternal factors, Neonate's blood group.*

Introduction

Hyperbilirubinemia regarded as common and non-threatening problem in neonates. Jaundice is observed during the 1st week of life in approximately 60% of term infants and 80% of preterm infants[(1,2)].The raises of indirect, unconjugated bilirubin are potentially neurotoxic. Thus health care providers monitor bilirubin levels and provide treatment for the newborns jaundice to prevent the growth of kernicterus (also called bilirubin encephalopathy)[(3)].The general presentation may be asymptomatic in physiological jaundice or ill neonate (vomiting, lethargy, poor feeding, behavioral changes, tachypnea, pale stools and dark urine[(4)].Risk factors for elevated indirect bilirubin include maternal age, race (Chinese, Japanese, and Native American), maternal diabetes, prematurity, drugs (vitamin K3), altitude, polycythemia, male sex, trisomy 21, breast-feeding, and a family history[(1)].

In relating with "maternal-fetal ABO blood group incompatibility", in which the mother has blood group O and the newborn has blood group A or B, in whichthe hemolytic disease grows in approximately 10% of such newborns and may be associated with clinically significant neonatal hyperbilirubinemia[(5)]. The hemolytic disease of the newborn due to ABO incompatibility frequently noticed during the first pregnancy, and about 50% of infants are affected unlike rhesus hemolytic disease of the newborn which noticed in subsequent babies rather than the first baby[(6)].Recent study showed that there is

no need of exchange transfusion for ABO incompatible neonates and incompatible neonates needed the duration of phototherapy for ≥24 hours [7].

Material and Methods

This study is cross sectional study and descriptive analytic study has been done from March 2020to December 2020 include mothers of term newborn infants (gestational age >36 weeks) with neonatal hyperbilirubinemia (serum bilirubin level more than 5 mg/dl) requiring phototherapy and/or exchange transfusion who are combatable or have maternal-fetal ABO incompatibility to evaluate causes, maternal contributing factors which related to development of hyperbilirubinemia in newborns with jaundice.Jaundice was already diagnosed clinically and laboratory inside the hospital.This study has been accomplished over a half-year, on 75 newborns and their mothers who admitted to [Neonatal and ImmaturityDepartment] in child central teaching hospitalCCTH hospital and from consultation private clinic in Baghdad, Iraq. The ethic committee of approval was done in this study. A special questionnaire used tocollect and record information from all newborns a d their mothers.

The maternal data like socio-demographic and clinical parameters, and neonatal plasma bilirubin level on admissionwere all recorded.Finally, several laboratory tests madesuch as (indirect and direct bilirubin, blood type, Rh factor).

Patients Criteria:

-Inclusion Criteria:-

1- Neonates babies (age less than 1month) with hyperbilirubinemia that require phototherapy or exchange transfusion.

2- Mothers of neonates who involved in the study.

-Exclusion Criteria:-

1- Neonate babies with any other severe diseasesorwith other known causes of jaundice and hemolysis.

2- Mothers with hemolytic disease or with other serious diseases.

Statistical Analysis

Statistical analysis was carried out using the Minitab 16.1(2010). Data expressed as numbers (%) and (mean±SD).Chi-square (X^2)was to detect significant value differences among study variables.

Results

Table (1) showed the maternal socio- demographic characteristics of 75 women were delivered children with hyperbilirubinemia. Regarding maternal age the study found that 54(72%) of women were **(<30** years) and 21**(28 %)** were (> 30 years) with highly significant differences between them (P<0.01).On the other hand 13(17.3%) of women were primi parity and 62(82.7%) were multi parity and highly significant differences between them (P<0.01).Considering the smoking history, most of women had no history for smoking 63(84%) and only 12(16%) had a positive history for smoking with highly significant differences between them (P<0.01).

Of the study population, higher percentage 40(53.3%) was found in women with blood group O, while 15(20%), 11(14.7%), 9(12%) was women with blood group A, AB, B respectively and highly significant differences found between them (P<0.01).

Interestingly, most of women included in this study 48(64%) were delivered by caesarian section (C/S) while 27(36%) were delivered by vaginal delivery and significant differences found between the two types of delivery (P<0.05).

Table (1): Maternal socio- demographic characteristics

Variable	Study group		P-value
Maternal age(years)	**N**	**(%)**	
<30	54	72	0.001**
>30	21	28	
Parity	N	(%)	P-value
Primi	13	17.3	0.001**
Multi	62	82.7	
Smoking Hx	N	(%)	P-value
Yes	12	16	0.001**
No	63	84	
Blood group (mother)	N	(%)	P-value
A	15	20	0.001**
B	9	12	
AB	11	14.7	
O	40	53.3	
Delivery type	N	(%)	P-value
Vaginal	27	36	0.015*
C/S	48	64	

Data presented as number of patients (n) and percentage (%)**.**

NS: No significant differences (P>0.05), (*) Significant difference (P<0.05), (**) Highly Significant difference (P<0.01).

C/S: Caesarian Section

Table (2) found that 54 (72%) women who were below 30 years old the mean serum bilirubin was (24.34 ± 3.08 mg/dl) while (31.32 ± 2.30mg/dl) serum bilirubin level found in 21(28%) of woman who were equal or higher than 30 years old and highly significant level between them (P<0.01).

Table (2): Comparison of serum bilirubin for neonate according to maternal age in the study group

Age (years)	Serum bilirubin level (mg/dl)	N	%	P-value
< 30 years	24.34 ± 3.08	54	72	0.001**
≥ 30 years	31.32 ± 2.30	21	28	

Data presented as mean ± SD, number of patients (n) and percentage (%).

NS: No significant differences (P>0.05), (*) Significant difference (P<0.05), (**) Highly Significant difference (P<0.01).

Table (3) found that in women with primi parity the mean serum indirect bilirubin level for neonate was (14.73 ± 6.75 mg/dl) while in women with multi parity the mean was (13.68± 4.56 mg/dl) but no significant differences found between them (P>0.05).

Table (3): Comparison of serum bilirubin according to parity in the study group.

Parity	Serum Indirect bilirubin level (mg/dl)	*P*-value
Primi	14.73 ± 6.75	$0.495^{N.S}$
Multi	13.68± 4.56	

Data presented as number of patients (n) and percentage (%).

NS: No significant differences (P>0.05), (*) Significant difference (P<0.05), (**) Highly Significant difference (P<0.01).

Table (4) reported highest mean of neonatal serum bilirubin in neonate for mothers carry blood group A and B (17.92 ± 10.32), (17.28±6.85) respectively, while lowest mean of the serum bilirubin reported in neonate for mothers carry blood AB (10.24± 4.05) with highly significant differences between them (P<0.01).

Table (4): Association of the neonatal serum bilirubin level with maternal ABO blood groups

Maternal blood groups	Serum Indirect bilirubin level (mg/dl)
A	17.92 ± 10.32 a
B	17.28±6.85 ab
AB	10.24± 4.05 c
O	13.86±3.75 bc
P-value	0.008**

Data presented as mean±SD , ©One way ANOVA were used to test Maternal blood groups,

** Highly significant (P<0.01), Means that do not share a letter are significantly differentaccording to Fisher test.

On the other hand, the serum bilirubin level in Rh + women was (14.28 ± 5.04) while for Rh – women was (14.64 ± 6.85) with no significant differences among them (P>0.05), table (5).

Table (5): Association of neonatal serum bilirubin level with maternal Rh factor

Rh factor	Serum Indirect bilirubin level (mg/dl)
Rh+	14.28 ± 5.04
Rh-	14.64 ± 6.85
P-value	0.804 N.S

Discussion

This study was assumed to find out the contributions of each ofthe associated risk factors. One of most serious clinical problem inside the hospitals with the mysterious etiology was hyperbilirubinemia between neonates;including not only a danger to infants but also taking much valuable time of laboratory and medical supervise[8].

Table 1 reveals the maternal socio-demographic variables. The results showed that most of mother`s age was ≤ 30years olds while the remaining mothers was ≥ 30 with highly significant difference between them ,these results compatible with Sumangala Devi D ***etal***for the same study[9].

Instead (17.3%) of women were primi parity and (82.7%) were multi parity and highly significant differences between them (*P*<0.01), the results of the study compatible with Oyapero O ***etal***which showed that most women were multiparity or parity of the mothers included in this study was more than P1[10]. While this study is in contrast with Taneja S ***etal*** study which showed that most mother`s presented with primi parity rather than multi parity[11].AlsoOyapero O ***etal***study which showed that majority of the mothers of the study individuals had a 1–2 children[10].

Allowing for the smoking history of mothers,data suggested significant results, the results did not reach for review of the mothers' smoking history and did not permit us to count the accurate number of cigarettes smoking mothers. In a preliminary analysis of the data has found negative association between neonatal jaundiceand other factors such as maternal smoking[12].

Regarding ABO compatibilities higher percentage of mothers 53.3% were with blood group O, while 20%, 14.7% and 12% was in mothers with blood group A, AB, B respectively and highly significant differences found between them (P<0.01).These results consistent with Akanmu AS ***etal*** which found that blood group O of females were 54.3% of the donor population, equally if it can be assumed that sex factor has no influence on ABO gene inheritance and blood group distribution[13].

Considering mode of delivery for mothers in the study, most of mothers (64%) were delivered by caesarian section (C/S) while 27(36%) were delivered by vaginal delivery and significant differences found between the two types of delivery (P<0.05).Concentrating study on the use of oxytocin on mother`s babies showed that the induced labor was associated with more neonatal jaundice[14].In contrast with other study that shows the delivery outcomes for cases and controls,mode of delivery did not show any statistically significant difference between vaginal delivery andcaesarean delivery. About 74% of babies delivered vaginally and 25% caesarean delivered babies developed neonatal jaundice[9].

This results of the study institute that 72% of mothers were below 30 years old with the mean serum bilirubin was (24.34 ± 3.08 mg/dl) while (31.32 ± 2.30mg/dl) serum bilirubin level found in 28% of mothers who were equal or higher than 30 years old and highly significant level between them (*P*<0.01).These results well-matched with Norman M ***et al***and Olusanya BO ***et al***which showed that mothers age was found to be statistically significant in statistical analysis and it also suggested that a higher serum bilirubin levels in

neonates who born for older mothers (more than ≥30 years old) can be linked to increased risk for neonates hyperbilirubinemia[15].

The present study showed that women with primi parity the mean serum indirect bilirubin level for neonate was (14.73 ± 6.75 mg/dl) while in women with multi parity the mean was (13.68± 4.56 mg/dl) but no significant differences found between them (*P*>0.05). Moreover the present study finding suggested that birth in the first pregnancy could be important risk factors in current study population , it could agree with Agarwal V ***etal***, Ekwochi U ***etal***, study which suggested that obstetric factors for mothers associated with an increased risk for developing hyperbilirubinemia in neonates involved primi parity[16,17].

Although a number of parameters, including maternal age and parity have been studied to predict the presence of a newborn with ABO incompatibility and the development of a subsequent hyperbilirubinemia, it stills difficult to expect the real causes behind that[18]. We therefore aimed in this study to determine prospectively the relation between maternal factors and presence of hyperbilirubeinemia in healthy term newborns.

The previous studiesshowed the association between the neonatal serum bilirubin level and maternal ABO blood groupsand OA was more commonly associated than OB blood group[19,20].

Moreover the present results showed highest mean bilirubin in neonate whom their mothers carry blood group A and B (17.92 ± 10.32), (17.28±6.85) respectively, while lowest mean of the serum bilirubin in neonate for mothers carry blood AB (10.24± 4.05) with highly significant differences between them (*P*<0.01). These results compatible withSarici SU***etal*** which found that ABO incompatibility played a major role in development of significant hyperbilirubinemia similar to previous studies. 70/150 (46.66%) babies had ABO incompatibility as compared to 6 babies (4%) who had Rh incompatibility and highly significant differences between them[21].

Then again, a result of the correlationbetween neonatal serum bilirubin level and maternal Rh reuses factor found to be with no statistical differences among them (P>0.05)[22-24].These results compatible with Harry C***etal***which found that ABO blood group incompatibility, was seen in 70 babies as opposed to 6 babies with Rh incompatibility. ABO (17.98) incompatibility resulted in higher serum bilirubin levels with the difference being statistically significant (P=0.026)[25].

Conclusion

Multiple risk factors were associated with development of significant hyperbilirubinemia.The higher percentage of mothers were with blood group O consequently the ABO blood group incompatibility between neonates and their mothers have higher chances of developing significant hyperbilirubinemia in neonates . Moreoverthe result of the occurrence of neonatal hyperbilirubinemia and maternal Rh reuses factor found to be with no statistical differences among them .Thus, it was concluded that an early follow up is still one of important steps to recognize the development of significant jaundiceearly, and if the above mentioned risk factors was diagnosed a more careful follow up and management of those babies can be prepared to prevent development of significant hyperbilirubinemia.

Conflict of Interest: Nil

Source of Funding: self

Ethical Clearance: The patients signing a written consent before doing the questionnaire

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