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Role of Some Factors in Distribution of Neonatal Jaundice in Al-Najaf Province, Iraq

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Abstract

The present study occurred to detected on the factors in distribution of neonatal jaundice. During the first week of postnatal life affecting almost two thirds of term newborns, jaundice occurs in 60% of term newborns and 80% of preterm newborns in the first week of birth**. Methods**: The present study was conducted from September 2017 to January 2018. It was included 106 neonatal infants age (at born -17 day) treated with neonatal jaundice, who were Neonatology department at Al-Zahra Teaching Hospital located in Al-Najaf, Iraq. Data were collected using the newborns' medical records and interview sessions with the mothers. **The results** of this study were showed of 106 neonates jaundice infants indicated to significant difference p-value is <0.05 of age groups (<24 Hr. n= 46, 1-8 day n= 42, 9-16 n= 18), of neonatal jaundice infants in parameters included TSB, Hb, weight, and gestation age. The percent of neonatal jaundice rate was highest in male 62(59%) from female 44(41%). Increased of percent of neonatal jaundice rate in Gestation Age group >36 week n = 64(60.40%) more than group =< 35 week n = 42(39.60 %), a statistically significant differences p <0.05 decreased in TSB, Hb, weight, and gestation age of weight group =< 1500 g n=22(20.8%), more than groups1600-2500 g n=32 (30.2%), and >2600 g n=52(49.1%) when compared between them. ABO results: the high percent rate in blood group O maternal (41.5%) when compared with A (32.1%), B (22.65%), and AB(3.8%) maternal blood groups. **Conclusion**: ABO and age gestation was an important factors may be effects of development physiological neonatal jaundice into harmful pathological neonatal jaundice and hyperbilirubinemia.

Introduction

Neonatal jaundice is a common phenomenon, during the first week of postnatal life affecting almost two thirds of term newborns, jaundice occurs in 60% of term and 80% of preterm newborns in the first week of birth. (Mateo *et al*, 2013; Christensen *et al*, 2013). The mechanism of neonatal hyperbilirubinemia is multifactorial, including processes that contribute to extensive bilirubin load, or diminished bilirubin clearance (Lin *et al*., (2015). Many studies have been performed to identify factors affecting neonatal hyperbilirubinemia. Based on the findings, several risk factors have been introduced as the determinants of jaundice including maternal and neonatal risk factors such as the newborn's age, ethnicity, Rh blood group, maternal diseases, neonate's gender, birth weight, frequency of nutrition and defecation, birth trauma, and history of jaundice among siblings (Bhutani 2

et al, 2016; Oyedeji *et al*, 2015; Esmailepour *et al*, 2007). Although both genetic and environmental factors may contribute to the development of neonatal hyperbilirubinemia, the importance of genetically determined conditions has been increasingly recognized (Lin *et al*, 2008). Bilirubin overproduction that occurs in ABO, Rhesus or minor blood group incompatibilities with a positive direct antiglobulin test has been recognized as one of the major risk factors for development of severe hyperbilirubinemia in infants of 35 or more weeks' gestation. Maternal-fetal ABO blood group incompatibility, in which the mother has blood group O and the newborn has blood group A or B, occurs in 15-20% of all pregnancies. The hemolytic process results from maternal anti-A or anti-B immunoglobulin G (IgG) antibodies crossing the placenta and attaching to the appropriate antigens on the neonatal red cells. Resultant heme catabolism causes an increased indirect bilirubin (IB) production, leading to neonatal jaundice (Kaplan *et al*, 2009).

Materials and Methods:

The present study was conducted from September 2017 to January 2018. It was included 106 neonatal infants age (at born -17) day, treated with neonatal jaundice, who were Neonatology department at Al-Zahra Teaching Hospital located in Al-Njaf, Iraq. Data were collected using the newborns' medical records and interview sessions with the mothers. A checklist consisting of demographic, neonatal, and maternal information was used for data collection, in this study, the relationship between the severity of jaundice and predisposing factors including Age, gender, Gestation Age, birth weight, and ABO. Infants were divided into groups according Age (<24 Hr. n= 46, 1-8 day n = 42, 9-16 n = 18), gender (Male n = 62 and Female n = 44), Gestation Age (=< 35 week n = 42, >36 week n = 64), birth weight (=< 1500 n = 22, 1600-2500 n=32, >2600 n=52), maternal and neonatal ABO were classified into four groups: A (n=34,32); B n=(24,34); AB (n=4,6); and O (n=44,34) respectively. 5.2milliliters of blood was collected in a plain bottle from the femoral vein. The samples were tested in the Department of Hematology Biochemistry clinical and Blood Bank of laboratory Al-Zahra Teaching Hospital. The mother ' s and neonate ' s blood groups were estimated along with hemoglobin levels, WBC, and total serum bilirubin of the neonate. Criteria for inclusion were all neonates with the diagnosis of jaundice as well as G6PD tests and Rh testing of mother and newborn.

Statistical analyses :

were performed using (SPSS 24.0 Inc., Chicago, IL, USA). Categorical variables were presented with absolute numbers and percentages for each groups. Testing of significance between groups regarding the analyzed parameters was performed with: Student independed t-test, Chi-square, and ANOVA test. The result was considered significant ($p < 0.05$). 3

Results :

The results of this study were showed of 106 neonates jaundice infants.**Table (1)** indicated to a significant difference p-value is <0.05 of age groups (<24 Hr. (n=46),1-8 day (n=42), 9-16 (n=18), of neonatal jaundice infants in parameters included TSB, Hb, weight, and gestation age. Therefore, no a significant difference in same of these parameters when compare between male and female neonatal jaundice infants **table (2)**, but the percent of neonatal jaundice rate was highest in male 62(59%) from female 44(41%) **figure (1). table (6)**

The result statistically significant in the **table (3)** and **figure (2**) cleared increased of percent of neonatal jaundice rate in Gestation Age group >36 week n= 64(60.40%) more than group=< 35 week n = 42(39.60 %,), but the Gestation Age wasn`t effected (no significant differences) of TSB and study parameters levels between two groups.

Table (4) and figure (3) showed a statistically significant differences p <0.05 decreased in TSB, Hb, weight, and gestation age of weight group =< 1500 g, more than groups1600-2500 g, and >2600 g when compared between them, thus highest percent of neonatal jaundice rate in group >2600 g n=52(49.1%), but in n=22(20.8%) and n=32 (30.2%) of groups =< 1500 g and 1600-2500 g respectively. **table (6)**.

Not statistically significant of study parameters in ABO groups of neonatal infants and those mothers **table (4)**, also the result in the **figure (4)** indicated to percent neonatal jaundice rate about A (30.2%), B(5.7%), AB(32.1%) and O(32.1%) blood groups of neonatal infants respectively, but the high percent rate in blood group O maternal 41.5% when compared with A (32.1%), B (22.65%), and AB(3.8%) maternal blood groups respectively.

table(6). Table (1) Descriptive Statistic of TSB level and study parameters according age groups in neonatal jaundice infants

Age	Parameters Statistics	Mean	Std. Error	Minimum	Maximum
<24 Hr.	TSB (mg/dl)	11.435 *	.8189	1.8	15.0
N= 46					
WBC (cell*103)	16.830	1.4203	8.0	29.3	
HB (mg/dl)	18.383 *	.6100	13.2	23.0	
Weight (g)	2313.04 *	214.500	600	4250	
Gestation Age (week)	33.43 *	.873	27	40	
1-8 day	TSB (mg/dl)	15.905 *	.9025	4.3	18.9
N= 42					
WBC (cell*103)	16.105	.7888	7.4	26.0	
HB (mg/dl)	16.390 *	.8661	6.8	21.0	
Weight (g)	2604.76 *	202.541	1100	4000	
Gestation Age (week)	35.19 *	.642	28	38	
9-16 day	TSB (mg/dl)	17.611 *	1.0095	7.6	17.2
N=18					
WBC (cell*103)	16.556	1.3585	9.3	22.0	
HB (mg/dl)	17.089	.7662	12.3	20.0	
Weight (g)	2944.44 *	175.682	2000	3750	
Gestation Age (week)	36.11 *	.200	35	37	

***significant difference at p <0.05 between groups**

Table (2) Descriptive Statistic of TSB level and study parameters according Gender groups in neonatal jaundice infants

Gender	Parameters Statistics	Mean	Std. Error	Minimum	Maximum
Male N= 62	TSB (mg/dl)	15.97	.7409	2.1	17.5
	WBC (cell*103)	16.377	.9549	8.2	29.3
	HB (mg/dl)	17.068	0.6522	6.8	22.9
	Weight (g)	2629.03	146.313	1000	4250
	Gestation Age (week)	34.65	0.582	28	39
Female N=44	TSB (mg/dl)	14.01	0.9573	1.8	18.9
	WBC (cell*103)	16.664	1.1124	7.4	26.3
	HB (mg/dl)	17.805	0.6370	9.2	23.0
	Weight (g)	2404.55	232.246	600	4000
	Gestation Age (week)	34.50	0.813	27	40

Table (3) Descriptive Statistic of TSB level and study parameters according Gestation Age groups in neonatal jaundice

Gestation Age	Parameters Statistics	Mean	Std. Error	Minimum	Maximum
=< 35 week N=42	TSB (mg/dl)	16.88	0.6739	3.2	15.0
	WBC (cell*103)	13.548	1.0129	7.4	26.3
	HB (mg/dl)	17.757	0.7587	6.8	23.0
	Weight (g)	1702.38	149.024	600	3250
>36 week N= 64	TSB (mg/dl)	13.08	0.8080	1.8	18.9
	WBC (cell*103)	18.431*	0.8325	9.3	29.3
	HB (mg/dl)	17.122*	0.5882	8.3	22.9
	Weight (g)	3082.81*	109.931	2000	4250

***significant difference at p <0.05 between groups**

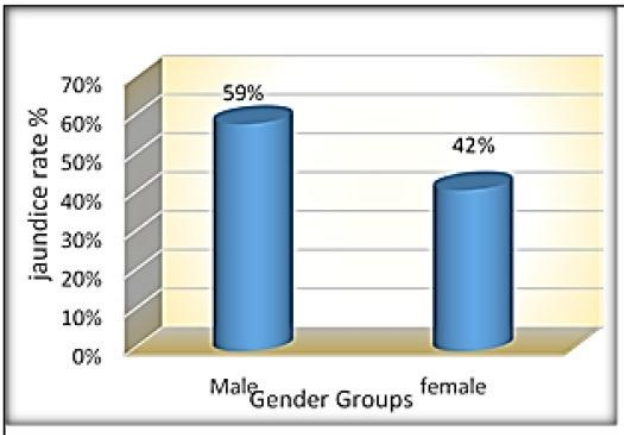

Figure (1) compare between male and female infant of percentage of neonatal jaundice

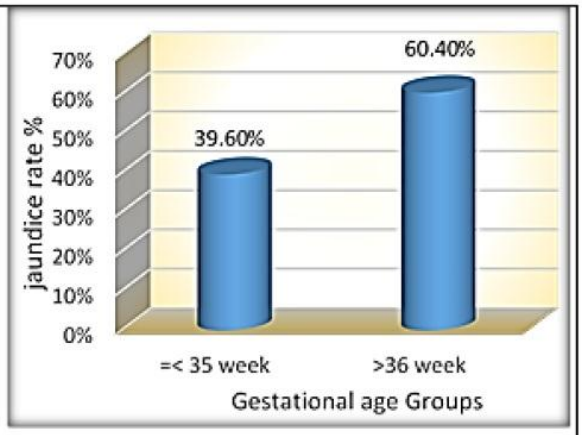

Figure (2) effect of gestation age of percentage of neonatal jaundice infant

Table (4) Descriptive Statistic of TSB level and study parameters according Weight groups in neonatal jaundice infants

Weight (g)	Parameters Statistics	Mean	Std. Error	Minimum	Maximum
=< **1500**	TSB (mg/dl)	13.75	0.8057	4.3	11.5
N= 22	WBC (cell*103)	13.709	1.7667	7.4	26.3
	HB (mg/dl)	18.545	0.7836	13.5	23.0
	Gestation Age (week)	29.82	0.519	27	32
1600-2500	TSB (mg/dl)	17.36 *	1.1487	2.4	17.2
N= 32	WBC (cell*103)	15.463 *	1.0044	8.4	26.0
	HB (mg/dl)	17.050	1.0147	6.8	21.0
	Gestation Age (week)	34.50 *	0.806	27	38
> **2600**	TSB (mg/dl)	13.85 *	0.8121	1.8	18.9
N= 52	WBC (cell*103)	18.312 *	0.9978	9.0	29.3
	HB (mg/dl)	17.077	0.6279	9.2	22.9
	Gestation Age (week)	36.65 *	0.337	30	40

***significant difference at p <0.05 between groups**

Table (5) Descriptive Statistic of TSB level and study parameters according ABO groups in neonatal jaundice infants

ABO	Parameters Statistics	Mean	Std. Error	Minimum	Maximum
A	TSB (mg/dl)	14.22	1.1461	1.8	18.9
N= 32					
	)3WBC (cell*10	17.488	1.2386	8.0	26.0
	HB (mg/dl)	18.088	.7862	9.2	22.7
	Gestation Age (week)	34.94	.854	27	40
	Weight (g)	2571.88	253.762	1000	4250
B	TSB (mg/dl)	14.85	1.0832	2.1	17.5
N=34					
	)3WBC (cell*10	14.818	1.0642	8.2	26.0
	HB (mg/dl)	16.871	.4835	12.3	20.0
	Gestation Age (week)	34.47	.879	28	38

Weight (g)		2764.71	198.189	1000	4000
AB	TSB (mg/dl)	15.43	3.6762	4.6	17.2
N= 6					
)3WBC (cell*10		13.333 *	3.1248	7.4	18.0
HB (mg/dl)		18.633	.8762	17.0	20.0
Gestation Age (week)		34.33	1.202	32	36
Weight (g)		1916.67	363.242	1250	2500
O	TSB (mg/dl)	15.4	.8843	4.3	17.5
N= 34					
)30WBC (cell*1		17.800	1.4393	9.3	29.3
HB (mg/dl)		16.982	1.1403	6.8	23.0
Gestation Age (week)		34.41	.908	27	39
Weight (g)		2382.35	243.177	600	3900

***significant difference at p <0.05 between groups**

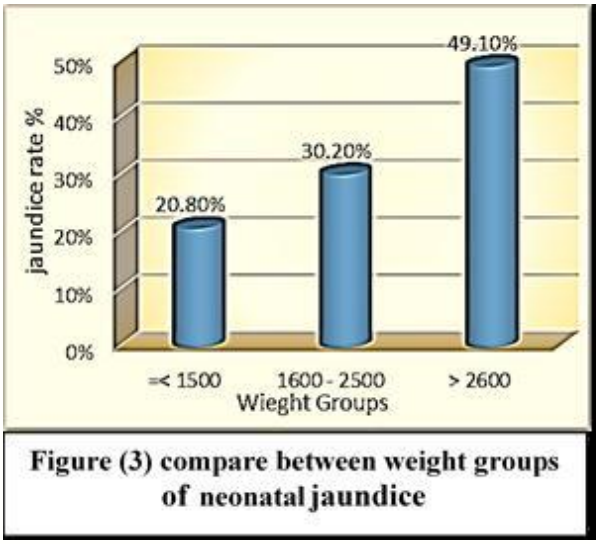

Figure (3) compare between weight groups of neonatal jaundice

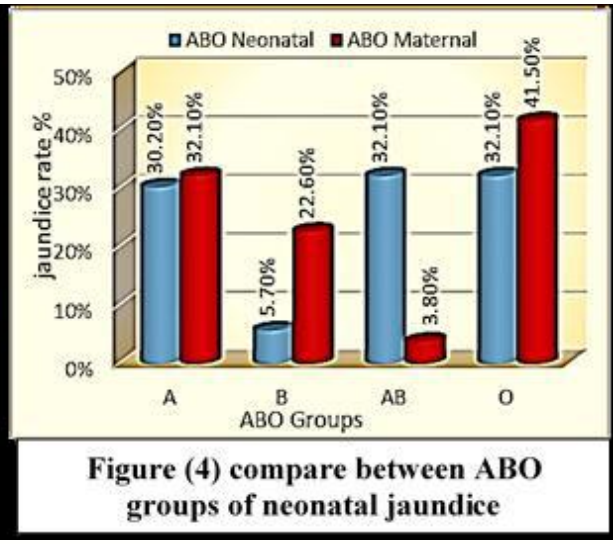

Figure (4) compare between ABO groups of neonatal jaundice

Table (6) Chi- Square test and p-values for groups of study

statistics	**Gender groups**	**Gestation groups**	**Weight groups**	**ABO neonatal**	**ABO maternal**	**Age groups**
Chi-Square	3.057	4.566	13.208	21.245	33.019	12.981
df	1	1	2	3	3	2
p-value	.080	.033	.001	.000	.000	.002

Dissection

Various studies show large differences in the prevalence of neonatal jaundice in the world. This difference is more pronounced, especially for many factors that causes physiological and pathological neonatal jaundice leading to hyperbilirubinemia in newborn (Christensen *et al*, 2013; Nepal *et al*, 2010). Study included 106 cases of Neonatal jaundice cases. Range age of the (> 24 hr. to 17 day), among them male 62(59%) while 44(41%) were female. Neonatal jaundice was more common in male infants as compared to female infants in two different studies done by Mantani *et al* (2007)(62% vs. 38%) and Sharma *et al* (2006)(1.3:1), because the number of erythrocytes in male more than in female; But The results of (Ivana *et al*, 2014)

showed that the incidence of jaundice does not be influenced by on the gender and that it is so common in male and female neonates. In present study, percentage of Gestation Age group =<35 week (39.60%,), were mean of (29.82±0.519) week babies having low birth weight (<1500 g), and TSB (16.88±0.76) mg/dl, whereas in Gestation Age group >36 week (60.40%), were mean about (36.65±0.33) week babies having normal weight (>2600) week were mean about (3082.81±109.93)g, and TSB (13.08 ±0.80) mg/dl, these results are agreed with the study of (Lee *et al*., 2016), and a research of (Ivana *et al*., 2014) showed that the occurrence of jaundice in newborns with a low birth weight is linked to low gestational age. he wasThe shared of jaundiced newborns of gestational age of fewer than 37 weeks in the total number of infants of the same age is 56%. Lin *et al*., (2015) the literature revealed to incident neonatal jaundice are caused by unconjugated bilirubin in the blood resulted of breakdown of RBC and elevated bilirubin formation and because the neonatal liver is unable to removal bilirubin rapidly enough from the blood lead to hyberbilirubinemia.

In our study the result indicated to not statistically significant of study parameters in ABO groups of neonatal infants and those mothers, but percent neonatal jaundice rate about A (30.2%), B(5.7%), AB(32.1%) and O(32.1%) blood groups of neonatal infants respectively, but the high percent rate in blood group O maternal 41.5% when compared with A (32.1%), B (22.65%), and AB(3.8%) maternal blood groups respectively. These agree with other findings that jaundice resulting from incompatibility usually present higher levels of serum bilirubin (Ella *et al*., 2013; Vijaya *et al.*, 2018)The bilirubin levels was high in the samples of babies with blood group A or B born to mothers with blood group O with 27.1 mg/100ml for the baby with blood group B. The difference was however not statistically significant. (Ella *et al*., 2013). Another research from India evaluating 151 neonates also showed no difference in severity between O-A and O-B for hemolytic disease of the newborn (Bhat *et al*, 2012). The reason for this difference may have been that “A” and “B” antigens are weaker antigens and the distance between a/b antigen sites on the fetal red cells as compared to adult red cells is more. It is a very reliable indicator. **To conclude**, Neonatal Jaundice in the prematurity and perinatal period is related with the gestational age, weight birth, most of the cases were having idiopathic jaundice although and ABO- were not exceptional. Also prematurity and low birth weight were having higher levels of bilirubin. In any infant, 24 hours old any jaundice is considered pathologic and requires estimation.

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