

EFFECT OF GENDER, AGE AND BILIRUBIN LEVELS ON NEONATAL JAUNDICE

¹Afra Fatima and ²Anil B

¹MSc Student, ²Head and professor

Department of Nutrition, Capital Degree and PG College –Hyderabad, Telangana, India

ABSTRACT

Neonates frequently experience hyperbilirubinemia, which can be either normal or pathological. Conjugated hyperbilirubinemia may be brought on by medical or surgical procedures, and if left untreated, it may cause irreparable liver damage. In the present study a total number of 200 neonates were observed, primarily the bilirubin levels were taken into consideration. The most effected neonates were of male gender and of age 0-1 month. This gender-based difference in the newborn has been attributed to the male disadvantage chromosomal impact. Male newborns' abnormal placental metabolic rates, among other things, are contributory reasons. By catalysing the addition of glucuronic acid to endoxenobiotics, uridinediph glucuronyltransferase (UDP-GT) increases hydrophilicity and facilitates removal.

Keywords: Neonatal jaundice, hyperbilirubinemia, threshold, statistical analysis.

INTRODUCTION

Neonatal jaundice (NNJ) is a common condition worldwide occurring in up to 60% of term and 80% of preterm newborns in the first week of life. Because their blood contains high amounts of bilirubin, newborns often display clinical symptoms that begin on their head and face and spread to their trunk and limbs. The increased release of haemoglobin from the breakdown of red blood cells causes jaundice in infants owing to newborn red blood cells' shorter lifespan (70-80 days) compared to that of adults (90-120 days), high levels of haemoglobin at birth, and immature hepatocytes' decreased ability to process bilirubin. The majority of this neonatal hyperbilirubinemia is a normal development that goes away by the first week of life as the liver matures. Kernicterus is a common side effect of hyperbilirubinemia, and it imposes a significant medical, financial, and social burden on patients, families, and communities. (Richard K et al., 2018).

Infant jaundice is yellow discoloration of a newborn baby's skin and eyes. Infant jaundice occurs because the baby's blood contains an excess of bilirubin, a yellow pigment of red blood cells. (Richard K et al.,

2018). Infant jaundice is a common condition, particularly in babies born before 38 weeks' gestation (preterm babies) and some breast-fed babies. Infant jaundice usually occurs because a baby's liver isn't mature enough to get rid of bilirubin in the bloodstream. In some babies, an underlying disease may cause infant jaundice. (Richard K et al., 2018). Most infants born between 35 weeks' gestation and full term need no treatment for jaundice. Rarely, an unusually high blood level of bilirubin can place a newborn at risk of brain damage, particularly in the presence of certain risk factors for severe jaundice (Richard K et al., 2018). Hence present study aims to discover about the effect of gender and ages on the most frequent disease which develops in new born called neonatal jaundice.

MATERIALS AND METHODS

The survey was conducted in hospitals which deals with majority of NNJ cases like Niloufer hospital and TelanganaGOVT hospitals at Hyderabad. This study had questionnaire – the Neonatal Jaundice Analysis Questionnaire (NNJAQ). Neonatal jaundice (NNJ) is a major cause of hospital admission during the neonatal period and is associated with significant mortality. This casestudy with cross-sectional design sought to identify the possible factors associated with neonatal jaundice and assess the causing factors.

Study Design

This study was conducted in Niloufer hospital at Red hills, Lakdi ka pul, Hyderabad. Which consists of 500 beds. This hospital is specialized for women and children care and is most popular for treatment of NNJ. The socioeconomic classes range from peasant fisherman and street hawkers to civil servants and business executives.

Study Population

A total of 200 neonates was conveniently recruited into the study. All neonates, either out born or inborn, who presented to the paediatric ward of the hospital were included in the study. Babies who were above 28 days and babies whose parents did not consent to be enrolled were excluded.

Collection of Socio Demographic Data

Socio demographic data such as age, marital status, educational level, occupation, and residence and clinical data of neonates and mothers such as mode of delivery, duration of labour, bleeding prior to labour were collected through interview and also from folders using well-structured questionnaire.

Sampling Process

The process took up to 3 to 4 days to collect data from the time of admission to time of discharge and to complete the count of 200 cases. The interviews were conducted by the examiner who distributed the questionnaires and also help people to answer and complete the survey.

Statistical Analysis

Mean and average of the date collected will be calculated and the results will be presented in the form of graphs and pie charts. Statistical analysis was done considering standard threshold p value i.e., ($\alpha \leq 0.05$). The statistical analysis was done on the gender and ages of the infants and was performed in Excel sheet using data analysis.

RESULTS AND DISCUSSION

Socio Demographic Data of male and female infant showed in Table 1, in this study among 200 neonates’ male neonates (140) and female (60) selected.

TABLE 1: Socio Demographic Data

CHARATERISTICS	N(200)	N(%)
Gender		
Males	140	30%
Females	60	70%
Age N (200)		
0-1 Month	55	27.5%
1-2 Months	30	15%
2-3 Months	35	17.5%
3-4 Months	50	25%
4-5 Months	30	15%

Phototherapy required for neonates during Jaundice showed in Table 2. One-hour duration of phototherapy given for 13 neonates, two hours duration of phototherapy given for 56 neonates, Three hours duration of phototherapy given for 115 neonates,more than three hours duration of phototherapy given for 16 neonates.

TABLE 2: Phototherapy given for Neonatal Jaundice

CHARACTERISTICS	N(200)	N(%)
Duration ofPhototherapy Given		
For an Hour	13	6.5%
For 2 Hours	56	28%

For 3 Hours	115	57.5%
For >3 Hours	16	8%

Amount of Bilirubin present in neonates showed in Table 3, at the time of admission in hospital Bilirubin content (4 mg/Dl) found for 100 respondents of neonates, whereas, at the time of Discharge from hospital Bilirubin content (1.5 mg/Dl) found for 105 respondents of neonates. 37 respondent of neonates showed Complications Along with Neonatal Jaundice.

TABLE 3: Amount of Bilirubin Present in Neonatal Jaundice

CHARATERISTICS	N(200)	N(%)
Amount of Bilirubin at Time of Admission (4mg/Dl)	100	50%
The Average Amount of Bilirubin at Time of Discharge (1.5mg/Dl)	105	52.5%
Infants Having Complications Along with NNJ	37	18.5%

Symptoms appeared in neonates showed in Table 4, yellowing of eyes found for 50; yellowing of nails found for 106; yellowing of skin found for 172, yellowing of palms found for; yellowing of tummy area found for 179respondents of neonates.

TABLE 4: Symptoms Appeared During Neonatal Jaundice

CHARACTERISTICS	N(200)	N(%)
Yellowing of Eyes	50	25%
Yellowing of Nails	106	53%
Yellowing of Skin	172	86%
Yellowing of Palms	86	43%
Yellowing of Tummy Area	179	89.5%

Knowledge check to parents about Neonatal Jaundice knew about 187,mode of delivery Caesarean 127 and Normal 73 noticed shown in Table 5.

Table 5: Knowledge Check About Neonatal Jaundice

CHARACTERISTICS	N(200)	N(%)
Number of Parents Who Knew About Neonatal Jaundice	187	93.5%
Number of Parents Who Does know About Neonatal Jaundice	13	7.5%
Mode of Delivery		

Caesarean	127	63.5%
Normal	73	36.5%

Factors Causing Neonatal Jaundice

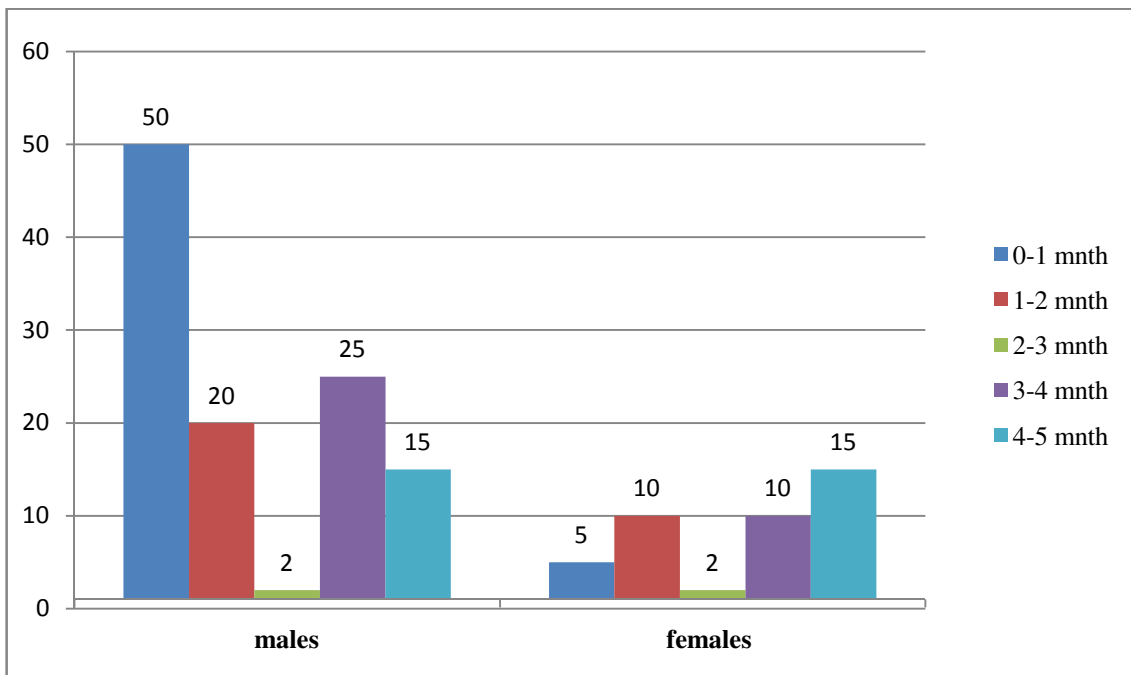
Total 200 neonates were taken to study about the causes of neonatal jaundice. As shown by the study that mostly the male gender was affected.

Parameter of Age - The age group of 0-1 months were most effected of the gender male as shown in the table

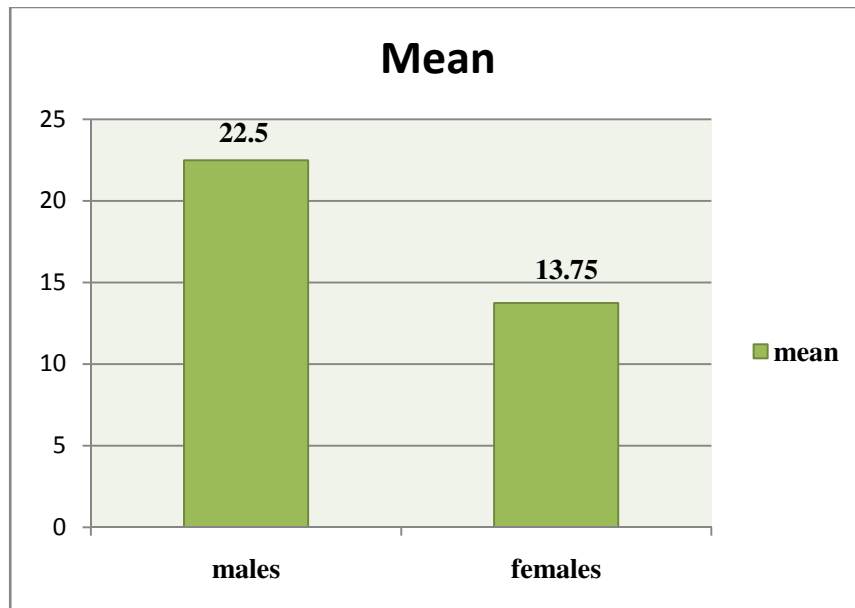
Table 6: Age Wise Infants Affected by Neonatal Jaundice

AGE	FEMALES	MALES	PERCENTAGE
0-1 month	5	50	27.5%
1-2 months	10	20	15%
2-3 months	10	25	17.5%
3-4 months	20	30	25%
4-5 months	15	15	15%

Total 30% affected were females and 70% affected were males. Out of which 25% were the age group of 0-1. As shown in the graph below.



Note – The X-axis represents the gender of the infant; The Y-axis represents the number of infants. The mean value between both the genders being as females was ± 13.75 and that in males was ± 22.5 and the difference being statistical $P = 0.03$.



Note: X-Axis represents, the gender; Y-Axis represents the mean value

Statistical Analysis

The table below represents the T test comparison analysis between males and females, the age being the dependent variable and jaundice being the independent variable. A calculated p-value is deemed statistically significant if it falls below a predefined cut off (0.05). According to the null hypothesis, the observed data is therefore unlikely to have happened by chance alone. If the estimated p-value exceeds the cut off, the null hypothesis is rejected in favour of the alternative hypothesis and is not regarded as statistically significant. This implies that the observed data is consistent with the null hypothesis of random chance. We reject the null hypothesis (H0) in favour of the alternate hypothesis (H1) because the difference between ages are all below the standard significance level or alpha level (0.05), demonstrating that there is a significant difference of the effect of jaundice based on ages. (Dr Veni K, 2013)

Table 9: Statistical analysis T test Male and Female

T TEST	FEMALE	MALE
Mean	13.75	22.5
Variance	22.91667	41.6666
Observations	4	4
Pearson Correlation	0.40452	
Hypothesized Mean Difference	0	
df	3	
t Stat	-2.78152	
P(T<=t) one-tail	0.034452	
t Critical one-tail	2.353363	
P(T<=t) two-tail	0.068904	
t Critical two-tail	3.182446	

P-value<0.05: significant or P-value>0.05: non-significant

Hyperbilirubinemia is felt to be benign for infants born at term or near term g Neonatal hyperbilirubinemia results increase in bilirubin load in decreased hepatic uptake and conjugation of bilirubin. In some of the studies there was an increased in male infants and in some studies the difference in bilirubin levels between males &female infants (Jennifer A et al., 2005).

The male has disadvantage chromosomes effect has been postulated to be responsible for this gender-based diff the new born. Dysfunction of the placental metabolic rate in the male infants etc the contributing factors (Jennifer A. et al., 2005).Uridinediph glucurony ltransferase (UDP-GT) catal addition of glucuronic acid to endo xenobiotics increasing hydrophilos enhancing elimination (David B et al., 2009).

Gender divergent glucuronidation rates were observed in humans. In a study by John Fevery, the serum levels of unconjugated bilirubin were lower in females during reproductive age than in male, this might be due to oestro-progesteron and testosterone effect on conjugation rate because testosterone down regulates UDP-GT, whereas combination of oestro-progesterone enhances enzyme activity (John fevery., 2008). High concentrations of estrogens and certain progesterone in the fetal blood and it was also suggested that the fetus exposed to stress during labour produces higher progesterone levels, which may protect the foetus against sequala of hypoxia (M Hill et al., 2010).In the present study the difference in total bilirubin between female & male infants were statistically significant. However, observations from

the study by (Agarwal et al) in which the fetal sex and birth weight were not found to be significantly affecting neonatal hyperbilirubinemia (V Agarwal et al., 2007).

On the other hand, in our study the direct (conjugated) bilirubin levels were significantly high in male infants than female infants and were less than 2mg/dl. This indicates that bilirubin conjugation is better in male infants than female infants and indirectly it also supports the high unconjugated bilirubin levels in female infants during neonatal period. These findings can be correlated with the study done by Jennifer A. Tioseco et al reported high peak serum bilirubin in male low birth weight babies and the difference in bilirubin levels were significantly high only in the larger birth weight category (weight, 1500-2499 g) and it was thought that other risk factors such as sepsis and intra vascular hemorrhage etc., may play an important role than gender in influencing bilirubin levels in the smaller-weight categories (Jennifer A et al., 2005).

Hyperbilirubinemia can be aggravated by lactation failure, but it also occurs in the presence of successful lactation (Manning et al., 2007). It is due to dehydration, caloric deprivation and enhanced enter hepatic circulation (Gourley GR, 2002). In the present study all the infants who were exclusively on breast feeding and were associated with elevated serum total bilirubin levels. Similar observations were found in the study of Maisels and Gifford et al where serum bilirubin concentration greater than 12.9 mg/dl was strongly associated with breast feeding and percentage of weight loss, decreased gestational age, male sex, bruising and induction of labour (Maisels MJ et al., 1988).

Chang PF and Cheng et al documented that male breastfed neonates with a variant nucleotide 211 in UGT1A1 have a high risk for developing prolonged unconjugated Hyperbilirubinemia (Chang PF et al 2009). It was observed by Maruo Y and Nishizawa K et al that the defects of UGT1A1 were an underlying cause of the prolonged unconjugated hyperbilirubinemia associated with breast milk. One or more components in the milk may trigger the jaundice in infants who have such mutations. (Maruo Y et al., 2000).

CONCLUSION

Gender has an impact on serum bilirubin levels during the neonatal period despite the fact that several maternal & foetal variables are involved. In our study, there was no discernible difference in perinatal age, birth weight, or maternal age between infants who were male or female. According to previous studies, newborns of both sexes had high total bilirubin levels, but the difference was not statistically significant. However, despite being less than 2 mg/dl, the levels of direct bilirubin in male

babies were still considerably higher than those in female infants. All of the infants in our study received only breast milk. In summary, hyperbilirubinemia is a prevalent condition among newborn babies and is linked to breastfeeding. Along with other factors, gender may also have an impact on levels of bilirubin. This could be caused by the Y chromosome's impact, maternal hormones, and the gender variation in UDP-GT mRNA.

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