

A cross-sectional study of the etiological factors of neonatal jaundice

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The present study documents the etiological factors of neonatal jaundice. A field survey was carried out in two different hospitals on 30 subjects. An extensive and effective questionnaire set was prepared to conduct this survey. Thirty fully completed responses were accumulated from the mothers of the neonate jaundice patients. This study reveals many insights of neonatal jaundice. There is a positive relation between gestational diabetes of mother and Bilirubin level of the neonate. This correlation is found that $53\% \pm 7\%$ of the mother having Gestational Diabetes may birth to neonate with Bilirubin level of 10-20 mg/dl. Overweight mothers are mostly subjected to have caesurae baby and there is proportional relation of high probability to give birth of neonate with Bilirubin level. Mother's Hb level of blood and Bilirubin level of child have an inverse relation with Pearson Correlation of -0.15 ($P=0.05$) of significant at the 0.05 level. Most of the premature babies are under weight and all of them have high Bilirubin level of clustered around 11.56 mg/dl. And 75% of the affected neonates cannot do exclusive breast feeding. $97\% \pm 3\%$ are cared through phototherapy, among them 23% faces milk-indigestion.

Keywords: Bilirubin level, Gestational diabetes, Hb, Neonatal jaundice, Overweight mother.

I. Introduction

Neonatal Jaundice is a yellowing of the skin and other tissues of a new born infant. The condition occurs because the baby's blood contains an excess of Bilirubin, a yellow colored pigment of red-blood cells. Bilirubin level of more than 5mg/dl manifests clinical jaundice in neonates where as in the adults 2mg/dl would look critic. Bilirubin, the agent that causes the yellow color of jaundice, is a normal part of the waste produced when "used" blood cells are broken down. The liver filters Bilirubin from the bloodstream and releases it into intestinal tract. Bilirubin is removed from the body primarily in the stool. Before birth a mother's liver removes Bilirubin from the baby's blood [1,2,5].

A new born infant has a large amount of red-blood cells, and the rate at which they are produced and broken down is relatively fast. Also, the liver of a newborn is immature and often can't remove Bilirubin quickly enough. Jaundice due to these new born conditions, or physiologic jaundice, typically appears on the second or third day of life. [2,3,8]

Before reaching to the liver, the Bilirubin, as a break down product of red-blood cells, this Bilirubin is called indirect (unconjugated) Bilirubin. Once in liver, most Bilirubin attaches to certain sugar creating what's called direct (conjugated) Bilirubin. Direct Bilirubin is released into the bile and stored in the gallbladder before eventually being excreted in stool. Higher than normal levels of direct and indirect Bilirubin may indicate different types of liver problem. Most infants develop visible jaundice due to elevation of unconjugated Bilirubin concentration during their first week. [4,5,6,7,9,10]

A premature baby may not be able to Bilirubin as quickly as full term babies do. Also, he or she may feed less and have fewer bowel movements. These conditions result in less Bilirubin eliminated in baby's stool.

Breast fed babies have a higher risk of jaundice, particularly those who are having difficulty or not getting enough nutrition from breast feeding. Dehydration and low intake of calories from poor breast feeding may contribute to the onset of jaundice. [13,16,18, 20,21,22]

Whereas breast feeding jaundice is a mechanical problem, breast milk jaundice is more of a biochemical problem. The term applies to jaundice in a new born baby who is exclusively and in whom other causes of jaundice have been ruled out. The jaundice appears at the end of first week of life and hence overlaps the physiological jaundice. It can last for up to two months. Several factors are thought to be responsible for this condition. [11,12,14,15]

II. Methods and Materials

2.1 Study Type

The study was descriptive cross sectional.

2.2 Study Population

This study was conducted in different hospitals in Dhaka city. Data were collected from neonate admitted in BIRDEM hospital and Azimpur child Care and Maternity Clinic.

2.3 Selection Of Samples

An application was written to the Head of Pediatrics Unit of BIRDEM hospital and to the Superintendent of Azimpur Child Health Care and Maternity Clinic, to study the record of patients admitted in neonatal unit. After getting permission from the hospital authority all the records from August to December were collected. The relevant particulars of the patients like chief complaints, history, general examinations, systemic examinations, anthropometry, investigations, diagnosis and treatment were included in the research instrument.

2.4 Anthropometric Data

2.4.1 Body Weight

Salter scale (England) was used for those children who were 0-2 years of age and Bathroom scale (Health, Japan) was used for the mother. The balance was standardized regularly before used. The body was recorded barefooted.

2.4.2 Length Or Height

The length was measured with length meter.

2.5 Anthropometric Indices

2.5.1 Bmi (Body Mass Index)

BMI of the subject's mother was measured from body weight and height using the following formula.

BMI= Body Weight in Kg/ Height in Meter Square

2.6 Sample Size

Samples were collected purposively depending on availability. And the sample size was 30.

Socio-economic parameters e.g. income, occupation etc. Anthropometric parameters e.g. age, sex, height, weight, Biochemical parameters e.g. serum Hb level, serum Bilirubin level and Dietary parameters e.g. food intake pattern, physical activity and life style score were assessed with the use of 24-Hr Recall Method and food frequency etc. all these variables were considered in this study.

2.7 Data Management And Analysis

After data collection procedure the questionnaire was checked to identify any discrepancy in information quality and coding. The checked data were then be entered in the computer using SPSS and EPI-info. The data were analyzed using SPSS v-12 and EPI-info.

2.8 Ethical Consideration

Participants, hospital management committee and family members of the patient were clearly informed about the objective of the study. Written informed consent was obtained from each participant before enrolment and they had the right to withdraw their participant at any moment.

III. Results and Discussions

Table 1: Frequency Distribution of Premature/Normal Birth

Status of Birth	Frequency	%
Normal	16	53%
Premature	14	47%
Total	30	100%

In TABLE 1, almost 50% of the jaundice affected neonates are having a premature birth. There was a positive relation between preterm infant and neonatal jaundice which was found from different study. Most of the premature neonates are having high level of Bilirubin. It is found that most of the premature affected neonates have an average Bilirubin level of 13.59 mg/dl with standard deviation of 2.13 mg/dl and the significance is at the level of 0.05.

Table 2: Cross-Tab Relation between "Status of Birth" and "Average Birth Weight"

Status of Birth	Avg. Birth Weight	
	<=2.5kg	>2.5kg
Normal	25%	75%
Premature	50%	50%

Table 3: "Status of Birth" vs "Bilirubin Level of Neonate"

	Bilirubin Level		
	5 To 10	10 To 20	Avobe 20
Normal	22%	29%	3%
Premature	9%	34%	3%

In TABLE 3, Most of the premature are having high level of Bilirubin. It is found that most of the premature affected neonates have an average Bilirubin level of 13.59 mg/dl with a standard deviation of 2.13 mg/dl and the significance is at the level of 0.05.

Table 4: Frequency Distribution of Type of Therapy

	Frequency	%
Phototherapy	29	97%
Sunlight	1	3%
Total	30	100%

Table 5: Milk Indigestion Problem for neonates, being undertaken Phototherapy Treatment

	Frequency	%
No	22	73%
Yes	8	27%

Table 6: Exclusive Breast Feeding Statistics

	Frequency	%
No	23	77%
Yes	7	23%

Table 7: "Birth Weight" vs "Sex of the affected neonates"

Sex	LBW	Normal
Female	23%	20%
Male	35%	21%

In Table 4 and 5, Most of the neonates are taken care through Phototherapy. About 97% of the neonates are taken under the treatment of phototherapy. And 24% of the phototherapy taken neonate faced milk indigestion side effects, which is mentioned in some study.

In Table 6 and 7, 77% of the affected neonates are having non-exclusive breast feeding. And male neonates are of more LBW than female. Almost 35% among the male neonates are of LBW where as 23% if for females.

Table 8a: Relation between Mother and Neonate Blood group

Mother-Child Blood Group	Fequency	Precentage
Same	6	20%
Different	24	80%

Table 8b: BMI analysis among the 20% samples of Table 8a

BMI	Fequency	Precentage
<18.5	-	0%
>=18.5	6	100%

Table 9: Analysis of all-mother delivered caesuraen baby among the 20% Samples of Table 8a

<i>Birth Order</i>	Fequency	Precentage
1st	4	67%
2nd	2	33%

In TABLE 8a, 80% of neonatal jaundice caused from Rh-factor incompatibility. And rest of the 20% cases, all mother had gestational diabetes, almost 67% neonate were of first birth order and among these 83% neonates Bilirubin level ranges from 10-20 mg/dl and that was found on TABLE 9, 10, 11, 12.

Table 10: Analysis of all-mother on 1st delivery (Table 8a)

<i>Gestational Diabetes</i>	% of Frequency
Yes	100%
No	0%

Table 11: Analysis of neonate's Bilirubin level among the 20% of Table 8a

<i>Bilirubin Level</i>	% of Frequency
5 to 10	17%
10 to 20	83%
Above 20	0%

Table 12: Relation between Mother's BMI and Neonate's Bilirubin Level

<i>BMI</i>	Bilirubin Level		
	5 To 10	10 To 20	Above 20
<18.5	0%	0%	0%
18.5-25	10%	40%	3%
25-30	13%	27%	0%
>30	0%	3%	3%

Table 13: Correlation between "Hb Level of Mother" and "Bilirubin Level of Neonate"

	Bilirubin of Neonate
Pearson Correlation	-0.12
Sig. (2-tailed)	0.95

In TABLE 13, there was a little inverse relation between mother's Hb level in blood and neonate's Bilirubin level. There is negative relation between mother's Hb level in blood and neonate's Bilirubin level. The higher the Hb levels of mother's blood the lower the Bilirubin level of neonate. The Pearson correlation is of -0.12 with the significant at the level of 0.05.

In dietary analysis, middle class people were consuming more fruits and vegetables (specially seasonal fruits e.g. guava, amloki, aamra, bel, papaya, banana etc.) but though their neonates suffered a little bit more than lower class and upper class, might be the food frequency history wasn't adequate of might be the sample size was small to interpret this findings.

IV. Conclusion

The cross sectional study concluded that in neonatal jaundice subjects main etiological factor were Rh-factor incompatibility, gestational diabetes of mother, overweight, seizure neonate, LBW neonate, preterm neonate, socioeconomic status etc. in this study, there were more or less significant relations among the etiological factors.

As gestational diabetes mother's neonate suffered from more Bilirubin level, almost 80% neonate suffered from great Bilirubin level because of Rh-factor incompatibility, overweight mother, seizure neonates, LBW neonate, preterm neonate, neonate of middle class mother suffered from Bilirubin level though the consumption of quality food was very larger than the lower class mother.

The findings demand more and more public awareness especially mother's awareness about their neonate's so that excess Bilirubin can't cause any damage to the brain because Bilirubin is very toxic to brain.

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