A Study to Assess the Maternal and Newborn Risk Factors Associated with Neonatal Jaundice among Newborn Babies in Selected Hospitals of Guwahati, Assam

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1. Introduction

"There is a disease, which has been called Morbius Regius or The Royal Disease, because it brings with it the colour of Gold unto them that have it. But so poor a recommendation will not make the jaundice to be wished for."

-Cotton Mather

Newborn babies constitute the foundation of a nation. In India approximately 26 million children's born each year; among which 12 million children's die during the first four weeks. Neonatal jaundice is one of the common physiological occurrences in newborn with over half of term and 80% of preterm neonates. It describes the yellow orange hue of the skin caused by excessive level of bilirubin that accumulates[1].

The word "Jaundice" is derived from the French word "Jaunce" meaning "yellow", and then it simply means that the color of skin in newborns appears yellow and the baby is jaundiced. Consistently about 65-70% of newborn babies have visible jaundice in the first few days of life [2]. There are two types of neonatal jaundice such as physiological and pathological jaundice but physiological jaundice commonly found in both term and preterm babies. It is generally appearing between the 3rd and 4th days life[3]. Jaundice results in yellowish discoloration of skin and sclera caused by accumulation of bilirubin in the skin and mucous membrane. It requires close consideration, assessment and treatment as it is the most widely recognized reason for neonatal re-confirmation and neonatal mortality [4].

According to the Millennium Developmental Goal- 4
The goal was - "To reduce under-5 child mortality and morbidity rate by 2015". Along with this goal, more consideration was centred on the neonatal infections and related mortality and morbidity[5]. When the total serum bilirubin level is 34μmol/L and ascend to 308μmol/L, then neonatal jaundice can be analysed clinically[6]. The incidence of neonatal jaundice is higher in East Asians, American Indians and lower in African Americans[7].

1.1 Background of the study

Neonatal jaundice has been portrayed in a Chinese textbook 1000 years ago. Several thesis in 18th and 19th century describes a lethal course in infants who probably had Rh isoimmunization. In the year 1875, Orth firstly described yellow staining of the brain, termed by Schmorl as "Kernicterus". Bilirubin level more than 34μmol/l (2mg/dl) may be visible clinically but in some cases, it might ascend to 308μmol/l (18mg/dl) and leads to hyperbilirubinemia. However, in some newborns, Total Serum Bilirubin (TSB) may rise unreasonably, which can be cause of concern for long lasting neurologic issue, it requires legitimate indicative assessment[8]. As it is the most widely recognized condition that requires medical consideration and emergency clinic re-confirmation/ re-admission of the babies[9].

Scrafford CG, Mullany LC, Katz J, Khatry SK, LeClerq SC, Darmstadt GL et al. conducted a study on Incidence and risk factors for neonatal jaundice among newborns in Southern Nepal in May 2003. Study participants are 18,985 newborn babies, borns in Sarlahi District in Southern Nepal and this study conducted from September 2003 to January 2006, to quantify the incidence and risk factors for neonatal jaundice among infant's referred for care. Cluster-randomized, placebo- controlled, community-based trial conducted to evaluate the impact of whole-body skin cleansing and treatment of the umbilical cord with chlorhexidine on neonatal mortality and morbidity. The study showed that, incidence of referral neonatal jaundice was 29.3 per 1000 live births and male infant, high birth weight, warm air temperature, primi-parity, skilled birth attendance, place of delivery, prolong labor, oil massage, paternal education and ethnicity, infant with difficult feeding, born in healthcare facility, are blue/grey at birth, or had an injury at birth and had history of prolong labour are significant risk factors (p value <0.001) for jaundice[10].

1.2 Need of the study

Neonatal jaundice is the visible manifestation of hyperbilirubinemia. It is also termed as **icterus neonatrum** or **neonatal hyperbilirubinemia**.In India it affected approximately 55.2% of newborns. Out of which 60% are term neonates and 80% are preterm neonates, who have Total Serum Bilirubin (TSB) >5mg/dl in first week of life and about 6% of term babies will have bilirubin level exceeding 15mg/dl[11]. Characteristics of jaundice appears in between 24-72 hours of age in term babies and in preterm babies may appear earlier but not before 24 hours of age. It usually disappears by 7th-10th day in term babies and 14th day in preterm babies.

A study was conducted by Brits H, Adendorff J, Huisamen D, Beukes. D, Botha K, Herbst H, et al. on the prevalence of

neonatal jaundice and risk factors in healthy term neonates at National district Hospital in Bloemfontein in April, 2018. In this cross-sectional study, 96 along with their infants are conveniently sampled after delivery and before discharge. They are interviewed and their case records are reviewed for collecting data related to risk factors for neonatal jaundice and the clinical assessment of the newborn also done. The bilirubin levels of the infant's measure with non-invasive transcutaneous bilirubin meter. Collected data are analysed using M.S Excel data sheet and it is done by Department of Biostatistics, UFS using SAS version 9. The study showed that prevalence of neonatal jaundice was 55.2% and the newborn babies 72 hours or older, 88.5% mother no history of smoking, oxytocin use seen in 19.8% cases, majority of newborn babies born via normal vaginal delivery had greater chances of having neonatal jaundice [12].

By the report in "Indian Express" it was identified that: out of 100 infants every 90 infants expected to develop jaundice in Chandigarh, India. Paediatricians point out the urgency of medical help for jaundice affected newborn babies since the high level of bilirubin can cause permanent damage to the brain. They warn the parents against the tendency of it which can have strong effect on the development of the child's brain if neglected[13].

Based on the literature review and the investigator's experience it was felt that many parents and their families have limited knowledge about the neonatal jaundice condition and its related risk factors. They are unaware of the seriousness of it and often do not even realize that their newborns need early medical care, treatment and management of the jaundice.Knowing the maternal and newborn risk factors will help to reduce the risk for occurrence of neonatal jaundice and reduces the neonatal mortality rate to some extent. It is also the prime responsibility of the health care providers to give health education to the expectant and families about the neonatal jaundice and its outcomes that it can be lethal to the newborns.

1.3 Problem Statement

"A study to assess the maternal and newborn risk factors associated with neonatal jaundice among newborn babies in selected hospitals of Guwahati, Assam."

1.4 Objectives

1.4.1 General Objective
To identify the maternal and newborn risk factors associated with neonatal jaundice among newborn babies in selected hospitals.

1.4.2 Specific Objectives
1) To quantify the maternal risk factors with neonatal jaundice among newborn babies.
2) To evaluate the association of maternal risk factors with neonatal jaundice among newborn babies.
3) To quantify the newborn risk factors with neonatal jaundice among newborn babies.
4) To evaluate the association of newborn risk factors with neonatal jaundice among newborn babies.

5) To determine the association between maternal risk factors and selected socio-demographic variables.
6) To determine the association between newborn risk factors and selected socio-demographic variables.

1.5 Operational Definitions

1) **Neonatal Jaundice:** In this study, neonatal jaundice means yellowish discoloration of the white part of the eyes and skin in a newborn baby due to high bilirubin levels (if, serum bilirubin ≥5mg/dl).
2) **Newborn Babies:** In this study, newborn refers to babies from birth to about 1 months of age.
3) **Selected Risk Factors:** In this study, selected risk factors are devoted to the risk factors which responsible for occurrence of the neonatal jaundice and which are studied under this study.
   a) **Maternal risk factors**: In this study, the selected maternal risk factors included are mode of delivery, duration of labour, any intoxicants intake and time of initiation of breastfeeding, maternal illness, maternal blood group and Rhfactor.
   b) **Newborn risk factors:** In this study, the newborn risk factors included are age of the newborn (in days), newborns birth weight, place of delivery, apgar score at birth, Total Serum Bilirubin (TSB) at birth and any injury atbirth.

1.6 Assumptions

1) There will be some relation between the selected maternal risk factors and neonataljaundice.
2) There will be some relation between the selected newborn risk factors and neonataljaundice.
3) There is increase in mortality of newborns due to neonataljaundices.
4) Their families have limited knowledge about the neonatal jaundice and its related riskfactors.

1.7 Hypothesis

The hypotheses are tested at 0.05 level of significance.
1) H_1: There is significant association between maternal risk factors and neonataljaundice.
2) H_2: There is significant association between newborn risk factors and neonataljaundice.
3) H_3: There is significant association between maternal risk factors and selected socio-demographic variables.
4) H_4: There is significant association between newborn risk factors and selected socio-demographic variables.

1.8 Delimitations

1) The present study is delimited only to the newborn babies suffering from neonataljaundice.
2) Mother's having history of any psychiatricillness.

2. Research Methodology

A Quantitative research approach is used and cross-sectional descriptive research design is used to assess the maternal and newborn risk factors associated with neonatal jaundice among newborn babies. The study population were the

newborn babies and total 100 samples are selected by the convenience sampling technique for study based on the study criteria. The variables are divided i.e.

a) **Independent variables**: It includes Maternal and Newborn risk factors associated with neonatal jaundice among newborn babies.
b) **Dependent variables**: Neonatal jaundice among newborn babies.
c) **Socio-demographic variables:** Maternal age, educational qualification, mother's occupation, religion, monthly family income, parity, gravida, sex of the newborn baby and residence.
d) **Clinical variables:**
   - **Maternal characteristics**: Mode of delivery, duration of labour, any intoxicants intake during pregnancy, time of initiation of breast feeding, maternal illness during pregnancy, maternal blood group and Rh factor.
   - **Newborn characteristics**: Age of the newborns (in days), birth weight of the newborns, place of delivery of the newborns, apgar score of the newborns at birth, total serum bilirubin level and history of any injury at birth.
   - **Extraneous variables**: Unknown factors responsible for neonatal jaundice i.e. environmental factors, ambient air temperature etc.

3. Analysis and Interpretation

The analysis of data is organized and interpreted under the following section: -

3.1 Section I: Descriptive analysis of socio-demographic variables of the and newborn babies.

3.2 Section II: Quantifying the maternal and newborn risk factors associated with neonatal jaundice by frequency and percentage.

3.3 Section III: Evaluate the association of maternal and newborn risk factors with neonatal jaundice by inferential statistics

3.4 Section IV: Evaluate the association of maternal and newborn risk factors with socio-demographic variables

3.1- Section I: Descriptive analysis of socio-demographic variables of the and newborn babies (in frequency and percentage), N =100

S.NO	Particulars	Frequency	Percentage
1.	**Maternal age (in years)**		
(a)	≤ 20 years	38	38%
(b)	21-25 years	47	47%
(c)	26-30 years	15	15%
(d)	≥ 31years	-	-
2.	**Educational Qualification**		
(a)	Illiterate	45	45%
(b)	High School	39	39%
(c)	Higher Secondary	10	10%
(d)	Graduates and above	6	6%
3.	**Mother's Occupation**		
(a)	Housewife	55	55%
(b)	Self-employed	8	8%

(c)	Service	2	2%
(d)	Labourer	35	35%
4.	**Religion**		
(a)	Hindu	39	39%
(b)	Muslim	52	52%
(c)	Christian	7	7%
(d)	Others	2	2%
5.	**Monthly Family Income**		
(a)	≤ Rs 5000	4	4%
(b)	Rs 5001 – Rs 10,000	52	52%
(c)	Rs 10,001 – Rs 15,000	34	34%
(d)	≥ Rs 16,000	10	10%
6.	**Parity**		
(a)	Primipara	60	60%
(b)	Multipara	29	29%
(c)	Grandmultipara	11	11%
7.	**Gravida**		
(a)	Primigravida	60	60%
(b)	Multigravida	40	40%
8.	**Sex of the Newborn baby**		
(a)	Male	64	64%
(b)	Female	36	36%
(c)	Others	-	-
9.	**Residence**		
(a)	Urban	29	29%
(b)	Rural	56	56%
(c)	Semi-urban	15	15%

3.2-Section II: Quantifying the Maternal and Neonatal Risk Factors Associated with Neonatal Jaundice by frequency and percentage

3.2.1 To quantify the maternal risk factors associated with neonatal jaundice

S.No	Particulars	Frequency	Percentage
1.	**Mode of delivery**		
(a)	Normal Vaginal Delivery	46	46%
(b)	Forceps delivery	22	22%
(c)	Ventous delivery	20	20%
(d)	Caesarean Section	12	12%
2.	**Duration of labour**		
(a)	0-6 hours	0	0%
(b)	7-12 hours	31	31%
(c)	13-18 hours	52	52%
(d)	19-24 hours	17	17%
3.	**Any intoxicants intake**		
(a)	Yes	57	57%
(b)	No	43	43%
4.	**Time of initiation of breastfeeding**		
(a)	Within ½ hour	34	34%
(b)	Within 1-2 hours	44	44%
(c)	Within 3-4 hours	13	13%
(d)	≥ 4 hours after birth.	9	9%
5.	**Maternal illness**		
(a)	Yes	57	57%
(b)	No	43	43%
6.	**Maternal blood group**		
(a)	A blood group	22	22%
(b)	B blood group	56	56%
(c)	AB blood group	8	8%
(d)	O blood group	14	14%
7.	**Rh Factor**		
(a)	Positive	89	89%
(b)	Negative	11	11%

Table showing association between various maternal risk factors, N =100

S. No	Particulars	Frequency (F)	Percentage (%)	Frequency (F)	Percentage (%)
		Primigravida		Multigravida	
1.	**Mode of delivery**				
a)	Normal Vaginal Delivery	18	18%	28	28%
b)	Forceps Delivery	18	18%	4	4%
c)	Ventous Delivery	14	14%	6	6%
d)	Caesarean Section	7	7%	5	5%
2.	**Duration of labour**	**Primigravida**		**Multigravida**	
a)	7-12 hours	7	7%	24	24%
b)	13-18 hours	38	38%	14	14%
c)	19-24 hours	14	14%	3	3%
3.	**Type of intoxicants intake**	**Frequency(F)**		**Percentage(%)**	
a)	Betel-nuts and pan	38		38%	
b)	Smokeless tobacco/ Betel quid (Ghutka)	7		7%	
c)	Over the counter drug (paracetamol, disprins, painkiller)	8		8%	
d)	Alcohol	4		4%	
4.	**Type of maternal illness**				
a)	Nausea and vomiting	28		28%	
b)	Edema in lower extremities	14		14%	
c)	Gestational hypertension	8		8%	
d)	Gestational Diabetes mellitus	4		4%	
5.	**Type of maternal blood group**	**Rh Factor**			
		Positive Blood Group		Neagtive Blood Group	
		Frequency (F)	Percentage (%)	Frequency (F)	Percentage (%)
a)	A – Blood group	22	22%	0	0
b)	B - Blood group	51	51%	5	5%
c)	AB - Blood group	4	4%	4	4%
d)	O - Blood group	12	12%	2	2%

3.2.2 - To quantify the maternal risk factors associated with neonatal jaundiceN =100

S.No	Particulars	Frequency (F)	Percentage (%)
1.	**Newborn's age (in days)**		
(a)	At birth	32	32%
(b)	1-3 days	42	42%
(c)	4-6 days	16	16%
(d)	≥ 7 days	10	10%
2.	**Birth weight of newborn**		
(a)	≤ 1.5 kg	27	27%
(b)	1.6kg – 2.4 kg	46	46%
(c)	2.5kg-3.5kg	17	17%
(d)	≥ 3.6kg	10	10%
3.	**Place of delivery**		
(a)	Home	2	2%
(b)	Health care centre	10	10%
(c)	Hospital	88	88%
(d)	Others	0	0%
4.	**Apgar scoring**		
(a)	0 - 3 score	0	0%
(b)	4 - 6 score	13	13%
(c)	7 - 10 score	87	87%

5.	**Total Serum Bilirubin (TSB) level of newborn at birth**		
(a)	≤ 5mg/dl	16	16%
(b)	6 – 10 mg/dl	49	49%
(c)	11 – 15 mg/dl	21	20%
(d)	≥ 16 mg/dl	14	14%
6.	**Any injury at birth**		
(a)	Yes	28	28%
(b)	No	72	72%
7.	**Type of birth injury to newborn's**		
(a)	Caput succedaneum	15	15%
(b)	Cephal-hematoma	5	5%
(c)	Skin lacerations	8	8%

3.3-Section III: Evaluate the association of maternal and newborn risk factors with neonatal jaundice by inferential statistics

Table 3.3.1: Association between the maternal risk factors and neonatal jaundice among the newborn babies, N =100

S. NO	Maternal risk factors	Neonatal jaundice		X^2	df	p Value	Remarks
		Present	Absent				
1.	**Mode of delivery** a) NSVD b) Forcepsdelivery c) Ventous delivery d) LSCS	34 18 20 12	12 4 0 0	9.656	3	0.022	*s
2.	**Duration of labor** a) 0-6hours b) 7-12hours c) 13-18hours d) 19-24hours	0 22 46 16	0 9 6 1	5.982	2	0.050	NS
3.	**Any intoxicants intake** a) Yes b) No	49 35	8 8	0.381	1	0.537	NS
4.	**Time of initiation of breastfeeding** a) Within ½hour b) Within 1-2hours c) Within 3-4hours d) ≥4hours	29 36 10 9	5 8 3 0	2.397	3	0.494	NS
5.	**Maternal illness during pregnancy** a) Yes b) No	48 36	9 7	1.004	1	0.947	NS
6.	**Maternal blood group** a) A bloodgroup b) B bloodgroup c) AB bloodgroup d) O bloodgroup	15 49 8 12	7 7 0 2	6.161	3	0.104	S
7.	**Rh factor** a) Positive b) Negative	73 11	16 0	2.354	1	0.125	NS

* Significant level (p) < 0.05, NS – Not significant, S– Significant

Table 3.3.2: Association between the newborn risk factors and neonatal jaundice among the newborn babies

N=100

S.No	Newborn risk factors	Neonatal jaundice		X^2	df	P-Value	Remarks
		Present	Absent				
1.	**Age of newborn (in days)** a) Atbirth b) 1-3days c) 4-6days d) ≥ 7days	25 37 12 10	7 5 4 0	4.215	3	0.239	**NS**
2.	**Birth weight of the newborn** a) ≤ 1.5 kg b) 1.6 -2.4 kg c) 2.5 – 3.4 kg d) ≥ 3.5 kg	17 40 17 10	10 6 0 0	14.33	3	0.002	***S**
3.	**Place of delivery** a) Home b) Health carecenter c) Hospital d) Others	2 6 76 0	0 4 12 0	5.032	2	0.081	**NS**
4.	**Five-minute apgar scoring** a) 0-3score b) 4-6score c) 7-10score	0 13 71	0 0 16	2.846	1	0.092	**NS**
5.	**Total Serum bilirubin level** a) ≤ 5mg/dl b) 6 – 10 mg/dl c) 11 – 15 mg/dl d) ≥ 16 mg/dl	12 39 19 14	4 10 2 0	4.995	3	0.172	**NS**
6.	**Any injury at birth** a) Yes b) No	24 60	4 12	1.085	1	0.771	**NS**

*Significant level (p) < 0.05, NS – Not significant, S– Significant

3.4 Section IV: Evaluate the Association of Maternal and Newborn Risk Factors with Socio-Demographic Variables

3.4.1 Association between maternal risk factors and socio-demographic variables

The data given in the above tables were analyzed to find out the association between the maternal risk factors with the socio-demographic variables that is mode of delivery, duration of labor, any intoxicants intake during pregnancy, time of initiation of breastfeeding, maternal illness, maternal blood group and Rhfactor with the neonatal jaundice.

The calculated Chi square test value of mode of delivery (maternal risk factor) with maternal age is 21.92. The p-value is $0.001 < 6$ (df) at 0.05 level of significance, hence there is significant association between the mode of delivery with the maternal age.

The calculated Chi square test value of mode of delivery (maternal risk factor) with gravida (socio-demographic variable) is 18.04. The p-value is $0.001 < 3$ (df) at 0.05 level of significance, hence there is significant association between the gravida of the mother with the maternal age.

The calculated Chi square test value of duration of labor (maternal risk factor) with educational qualification of the postnatal mother (socio-demographic variable) is 23.91. The p-value is $0.001 < 6$ (df) at 0.05 level of significance, hence there is significant association between the duration of labor with educational qualification of the postnatal mother.

The calculated Chi square test value of any intoxicants intake by the during her pregnancy (maternal risk factor) with maternal age (socio-demographic variable) is 7.331. The p-value is $0.026 < 2$ (df) at 0.05 level of significance, hence there is significant association between intoxicants intake by the during her pregnancy with her age.

The calculated Chi square test value of any intoxicant's intake by the during her pregnancy (maternal risk factor) with educational qualification of the mother (socio-demographic variable) is 9.139. The p-value is $0.028 < 3$ (df) at 0.05 level of significance, hence there is significant association between intoxicants intake by the postnatal mother during her pregnancy with her educational qualification.

The calculated Chi square test value of any intoxicant's intake by her during pregnancy (maternal risk factor) with religion of the mother (socio-demographic variable) is 8.361. The p-value is $0.039 < 3$ (df) at 0.05 level of significance, hence there is significant association between intoxicants intake by the postnatal mother during her pregnancy with her religion.

The calculated Chi square test value of history of any illness of the postnatal mother during her pregnancy (maternal risk factor) with maternal age (socio-demographic variable) is 7.691. The p-value is $0.021 < 3$ (df) at 0.05 level of significance, hence there is significant association between history of maternal illness during pregnancy with her age.

The calculated Chi square test value of postnatal mother's blood groups (maternal risk factor) with postnatal mother's

age (socio-demographic variable) is 12.76. The p-value is 0.047 < 6 (df) at 0.05 level of significance, hence there is significant association between mother's blood group with her age.

The calculated Chi square test value of postnatal mother's blood groups (maternal risk factor) with postnatal mother's educational qualification (socio-demographic variable) is 19.79. The p-value is 0.019 < 9 (df) at 0.05 level of significance, hence there is significant association between mother's blood group and her educational qualification.

The calculated Chi square test value of postnatal mother's blood groups (maternal risk factor) with parity (socio-demographic variable) is 8.22. The p-value is 0.006 < 6 (df) at 0.05 level of significance, hence there is significant association between mother's blood group with parity of the mother.

Table 29.1.4 and 29.1.7 shows that there is no significant association between the time of initiation of breastfeeding and Rh factor with the socio-demographic variables.

Thus, the research hypothesis "There is significant association between maternal risk factors and selected socio-demographic variables", isaccepted. Thus, it can be inferred that there is significant association between the maternal risk factors and the neonatal jaundice among the newborn babies.

3.4.2 Association between newborn risk factors and socio- demographic variables
The data given in the above tables were analyzed to find out the association between the newborn risk factors that is age of the newborns (in days), birth weight of the newborns, place of delivery of the newborns, apgar score at birth, total serum bilirubin (TSB) at birth level and any injury at birth with the socio-demographic variables .

The calculated Chi square test value of newborns age in days (newborn risk factor) with maternal age (socio-demographic variables) is 14.33. The p-value is 0.026< 6 (df) at 0.05 level of significance, hence there is significant association between the newborns age (in days) with the maternal age (in years) .

The calculated Chi square test value of newborns age in days (newborn risk factor) with educational qualification of the postnatal mother (socio-demographic variables) is 39.72. The p-value is 0.010< 9 (df) at 0.05 level of significance, hence there is significant association between the newborns age (in days) with the educational qualification of the postnatal mother.

The calculated Chi square test value of newborns age in days (newborn risk factor) with residence of the postnatal mother (socio-demographic variables) is 24.10. The p-value is 0.001< 6 (df) at 0.05 level of significance, hence there is significant association between the newborns age (in days) with the residence of the postnatal mother.

The calculated Chi square test value of newborns age in days (newborn risk factor) with residence of the postnatal mother (socio-demographic variables) is 24.10. The p-value is 0.001< 6 (df) at 0.05 level of significance, hence there is

significant association between the newborns age (in days) with the residence of the postnatal mother.

The calculated Chi square test value of birth weight of the newborn (newborn risk factor) with age of the mother (socio-demographic variables) is 13.08. The p-value is 0.042< 6 (df) at 0.05 level of significance, hence there is significant association between the birth weight of the newborn with age of the mother.

The calculated Chi square test value of birth weight of the newborn (newborn risk factor) with occupation of the postnatal mother (socio-demographic variables) is 17.17. The p-value is 0.046< 9 (df) at 0.05 level of significance, hence there is significant association between the birth weight of the newborn with occupation of the postnatal mother.

The calculated Chi square test value of place of delivery of the newborn (newborn risk factor) with sex of the newborns (socio-demographic variables) is 10.19. The p-value is 0.006< 2 (df) at 0.05 level of significance, hence there is significant association between the place of delivery of the newborn with sex of the newborns.

The calculated Chi square test value of apgar score of the newborn at birth (newborn risk factor) with occupation of the postnatal mother (socio-demographic variables) is11.68. The p-value is 0.009< 3 (df) at 0.05 level of significance, hence there is significant association between apgar score of the newborn at birth with occupation of the postnatal mother.

The calculated Chi square test value of Apgar score of the newborn at birth (newborn risk factor) with monthly family income of the postnatal mother (socio-demographic variables) is 8.842. The p-value is 0.031< 3 (df) at 0.05 level of significance, hence there is significant association between apgar score of the newborn at birth with monthly family income of the postnatal mother.

The calculated Chi square test value of Apgar score of the newborn at birth (newborn risk factor) with parity of the postnatal mother (socio-demographic variables) is 8.254. The p-value is 0.016< 3 (df) at 0.05 level of significance, hence there is significant association between apgar score of the newborn at birth with parity of the postnatal mother.

The calculated Chi square test value of total serum bilirubin level (TSB) of the newborn at birth (newborn risk factor) with age of the postnatal mother (socio-demographic variables) is 18.14. The p-value is 0.006< 3 (df) at 0.05 level of significance, hence there is significant association between total serum bilirubin level (TSB) of the newborn at birth with age of the postnatal mother.

Table 29.2.6 shows that there is no significant association between history of any injury at birth with the selected socio-demographic variables.

Hence, the research hypothesis "There is significant association between newborn risk factors and selected socio-demographic variables", is accepted. Thus it can be inferred

that there is significant association between the newborn risk factors and the selected socio-demographic variables among the newborn babies.

4. Discussion

4.1 "To quantify the maternal risk factors with neonatal jaundice among newborn babies"

The statistical findings of the present study revealed that 46 (46%) delivered by normal virginal delivery and out of these 18 (18%) are primigravida and 28 (28%) are multigravida. Out of total, 52 (52%) undergone 13-18 hours of labor duration and out of this 38 (38%) are primigravida and 14 (14%) are multigravida. From total samples, 57 (57%) has a history of some intoxicants intake during their pregnancy that is 30 (30%) took betel-nuts and pan, 8 (8%) took over the counter drugs, 7 (7%) took betel quid and 4 (4%) took alcohol. Out of total, 44 (44%) -initiated breastfeeding within 1-2 hours after birth of the newborn, 57 (57%) has a history of some illness during their pregnancy and out of this 28 (28%) has episode of nausea and vomiting, 14 (14%) has edema in lower extremities and 8 (8%) has GHTN, 4 (4%) has GDM and 3 (3%) has thyroid problems. From total samples, 56 (56%) belong to B-blood groups and 89 (89%) has positive-Rh factor.

4.2 "To evaluate the association of maternal risk factors with neonatal jaundice among newborn babies"

The present study findings revealed that, among the maternal risk factors, there is significant association between mode of delivery that is normal vaginal delivery and the neonatal jaundice among the newborn babies. The study also revealed that, there is no significant association between duration of labor, history of any intoxicants intake during pregnancy, time of initiation of breast feeding, history of maternal illness during pregnancy, maternal blood group and Rh factors with the neonatal jaundice among the newborn babies.

4.3 "To quantify the newborn risk factors with neonatal jaundice among newborn"

The statistical findings of the present study revealed that, 42 (42%) newborns are between the age group of 1-3 days, 46 (46%) newborns has the birth weight of 1.6-2.4kg, 88 (88%) newborns born in hospital, 87 (87%) newborns apgar scores between 7-10, 49 (49%) newborns first 24 hours TSB level is between 6-10 mg/dl and 72 (72%) newborns has no history of any birth injury at birth.

4.4 "To evaluate the association of newborn risk factors with neonatal jaundice among newborn babies"

The present study findings in this study revealed that, among all the newborn risk factors there is significant association between birth weight of the newborn and the neonatal jaundice among the newborn babies. The study also revealed that, there is no significant association between age of the newborn (in days), place of delivery, apgar scoring, serum bilirubin level and any birth injury with the development of the neonatal jaundice among the newborn babies.

4.5 "To determine the association between maternal risk factors and selected socio-demographic variables"

The present study revealed that, there is significant association between maternal risk factors with socio-demographic variables i.e. maternal age and gravida with mode of delivery, educational qualification of mother with duration of labor, maternal age, educational qualification & occupation with history of any intoxicants intake during pregnancy, maternal age with history of any maternal illness during pregnancy and maternal age, educational qualification & parity with maternal blood group. This study also revealed that there is no significant association between the time of initiation of breastfeeding and Rh factor with the socio-demographic variables.

4.6 "To determine the association between newborn risk factors and selected socio-demographic variables"

The present study revealed that, there is significant association between the newborn risk factors with the socio-demographic variables i.e. maternal age, educational qualification & residence with newborn's age, maternal age& maternal occupation with birth weight of the newborn's, sex of the newborn with the place of newborn's delivered, occupation, family income & parity with apgar scoring of the newborn and maternal age with the total serum bilirubin level of the newborn. This study also revealed that no significant association between history of any injury at birth with the selected socio-demographic variables.

5. Implications

Nurses are in the profession where they act as a liaison between the patients, family and the society with different role as a care giver, main sources of information, educator and manager. Hence, this study has several important implications for nursing profession which has been listed under the following heading:

5.1 Nursing practice

The findings would help the nurse practioner to develop insight about the neonatal jaundice and importance of its treatment modalities and earlymanagement. It alerts the nurse practioner that there is need of clinical research on the prevalence of neonatal jaundice and its associated mortality rate, risk factors mainly responsible for its development, diagnostic and treatment modalities and management of newborns suffering from neonataljaundice.

This study results also revealed that neonatal jaundice mostly leads to newborns mortality and morbidity rate if it is left untreated for long. Therefore, it is the prime responsibility of nurses to direct their role and responsibilities at three levels ofprevention:

- **Primary Prevention**: Nurses should direct their role as an "educator" by educating the population, especially of child bearing age about neonatal jaundice, its risk factors responsible, treatment modalities and management. As, this study focusing on identifying both the maternal and newborn risk factors associated with the

neonataljaundice.

- **Secondary Level of Prevention:** Nurses should direct their role as "nurse practioner and care giver" by involving other nurses effectively in rendering nursing care to all neonates, including neonates with jaundice to prevent complications. Nurses should conduct the thorough examination of the newborns immediately after birth and so on, to plan the nursing care for the newborn. They should counsel the for importance of breastfeeding practices and also advocate them about the provision of phototherapy in the hospitals, to provide promptcare.
- **Tertiary Prevention:** Nurses should focus on treatment modalities and early management any complication caused due to neonatal jaundice. This is very important and crucial period for the newborns suffering from progress state of neonatal jaundice i.e. neonatal hyperbilirubinemia and kernicterus, as they may have chances of developing sever complications like neurological development abnormalities or problems related to growth and development etc.

5.2 Nursing education

In nursing education there is gap between the theory and practice done by the medical staffs in their clinical areas. There is also a lack of evidence-based practices (EBP) among the staffs. In nursing educations, student nurses should be taught thoroughly about the topics and their clinical applications Nurse educator or tutors should focus the application of theoretical knowledge in their clinical setting by the student nurses.

As, this study results revealed that there are many maternal and risk factors which can be prevented for the development of the neonatal jaundice among the newborn babies i.e. mode of delivery practices, prompt management of prolong duration of labor cases, proper counselling at ANC visits, prevention of birth injury of trauma to the newborn, early initiation of breastfeeding etc.

Thus, advancement in various teaching and learning practices in education can help nursing educator and nurses to acquire and learn the recent advancement and modifications related to the nursing practices and services. So, in-service education and continuing nursing education programme is to be performed for the nurses.

5.3 Nursing administration

This study has important implication on the nursing practice, services and administration of the hospital. There are wide numbers of maternal and newborn risk factors associated with neonatal jaundice. So, the health care providers who work with the newborns plays a vital role in identifying these risk factors associated with neonatal jaundice on time and prevent their occurrence where possible. There must be more training of health care providers especially nurses and midwives in early diagnosis of the risk factors of neonatal jaundice and guideless & protocols related should also be provided to them in order to provide appropriatecare.

A health education is necessary for the parents for early detection of neonatal jaundice. The nurse administrator should check all the important information related to all antenatal mother visiting the ANC clinic and counsel them regarding diet pattern, rest, medication and follow up care etc. For the , nurse administrator must focuses on the care of the newborn with neonatal jaundice regarding- breast feeding practices, timely treatment, phototherapy sessions and daily total serum bilirubin monitoring. The present study suggests that the nurse administrator can plan, organize and conduct in-service training programme and awareness programme for the general population in thesetting.

5.4 Nursing research

Research in nursing field helps in the growth of professional and personal life. No profession can exist or develop without research as it is important to develop and modify the existing body of knowledge, rules, practices and services. There is an inevitable need to promote and conduct evidence based practices as nursing is moving towards independent professionalpractices.

This study reveals that maternal and newborn risk factors associated with the neonatal jaundice needs further researches to explore and identify more risk factors associated in the future as it remains a challenging health problem among the newborns.

6. Limitation of the Study

a) Postnatal mothers along with their newborn were taken as study samples that were present at the time of datacollection.
b) The study was conducted only in selected hospitals of Guwahati,Assam.
c) Data were collected from who participated willingly at the time of datacollection.

7. Recommendations

On the basis of the study results, the following recommendations can be made:
a) The study can be replicated on larger sample where findings can begeneralized.
b) A longitudinal study can be conducted to make the study results moreefficient.
c) A comparative study can be conducted among the primi gravida and multi gravida to find the common.

8. Conclusion

The present study found that majority of the samples that is 84 (84%) was having neonatal jaundice. Secondly the neonatal jaundice is significantly associated with the maternal risk factors like mode of delivery and the newborn risk factors like birth weight of the newborns. The development of the neonatal jaundice is also depending upon the socio-demographic variables like maternal age, educational qualification, mother's occupation, residence, parity and gravida, family income and sex of the newborns.

The findings of the study are consistent with the literature and have strong support from some of the studies around the

world and in India. Based on the methods of sample collection, the conclusive nature of the findings and support from some of the studies conducted throughout the world, the findings of the study seem to be reliable.

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