

## Neonatal Jaundice: Knowledge, attitude beliefs, and practices of postnatal mothers in a tertiary care hospital in Uttarakhand, India

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### ABSTRACT

**Background:** Neonatal jaundice (NNJ), a preventable cause of brain damage, is the most common cause of admission in the 1<sup>st</sup> week of life in neonatal intensive care unit. **Objective:** To determine the knowledge attitude and practices of postnatal mothers toward NNJ in tertiary care hospital. **Materials and Methods:** In this descriptive analytical study, 350 mothers who underwent delivery in our institute were interviewed within first 72 h of delivery using a structured questionnaire. Data were entered in Microsoft Excel 13 and analyzed with SPSS 23. **Results:** Mean knowledge score was  $6.48 \pm 3.93$  (0-21). 73% of the mothers knew the site of recognition in NNJ. However, inadequate knowledge regarding causes, danger signs of severity, complications and treatment were seen among respondents. At least one correct answer for cause, danger sign and complication of NNJ was reported by 28%, 54%, and 33% mothers, respectively. Only 8% mothers attributed it as a risk factor for death in the baby. Phototherapy and exchange transfusion as treatment modality was answered by 15% mothers only. Their knowledge score was significantly associated with parity, education level, residence, religion and previously affected babies but not with age. Regarding attitude, 20% mothers were willing to take the baby to the hospital within 24 h on recognition of jaundice, and almost 91% of those seeking medical advice were ready to follow it. **Conclusion:** Although awareness of NNJ was seen in the majority of mothers, there was a paucity of knowledge regarding causes, danger signs, and effective treatment available. Cultural beliefs and traditional infant care practices do have a significant impact on mothers. Special educational programs and involvement of electronic media are needed to increase the awareness of mothers regarding NNJ.

**Key words:** Attitude, Beliefs, Neonatal jaundice, Practice, Postnatal mothers, Kernicterus, Knowledge

Neonatal jaundice (NNJ) is one of the most common morbidity in the 1<sup>st</sup> week of life, occurring in 60% and 80% of term and preterm newborn, respectively, and is also the most common cause of readmission after discharge from birth hospitalization [1,2]. Unconjugated hyperbilirubinemia in most of the newborns reflects a normal transitional phenomenon and results from several physiologic processes. In some infants, serum bilirubin levels may increase excessively leading to acute and chronic bilirubin encephalopathy causing irreversible brain damage. Thus, NNJ is an important preventable cause of neurological handicap and early death of affected infants [3]. While the incidence of severe hyperbilirubinemia has decreased in developed countries, this is not reflected in resource-limited countries leading to medical, economic and social burden on the patient, family and society at large [4,5]. Limited and wrong parental knowledge, beliefs passed along years to mothers, perceptions and parental attitude toward the condition may possibly explain delay in seeking medical advice immediately [5]. Severe jaundice and a higher incidence of kernicterus in outborn babies or home-delivered babies highlight the importance of mother to be knowledgeable of jaundice [5,6]. Furthermore, with

increasing trend of early discharge and short post-natal hospital stay, responsibility of mothers to recognize jaundice becomes more important [7,8].

Therefore, the primary caregiver, i.e., mother must be able to recognize the jaundice and bring affected babies to the hospital for prompt care and management. Due to paucity of data regarding knowledge, attitude, and practice (KAP) of mothers regarding NNJ from Uttarakhand state, the present study was designed to assess the knowledge regarding NNJ and to identify barriers in mother's health-seeking behavior.

### MATERIALS AND METHODS

This cross-sectional descriptive, prospective interview-based study was conducted over a period of 4 months from March 1, 2017, to June 30, 2017, at a tertiary health care center in Uttarakhand state in Northern India. The study participants were 350 perinatal mothers admitted in obstetric ward in first 72 h of their postpartum period. The mother who was sick, admitted in intensive care unit (ICU), those whose babies were admitted in neonatal ICU (NICU) or were stillborn and mothers

who refuse to participate in the study were excluded from the study. Institutional Ethical approval was obtained, and informed verbal consent was also obtained from the study participants after explaining them the purpose of study. Data was collected using a structured questionnaire which included sociodemographic data, KAP with regard to NNJ.

Sociodemographic data included age, religion, education status, residence (rural/urban), family type (nuclear/joint), occupation, and parity. The knowledge of participants was assessed regarding correct site for recognition of jaundice (eyes/skin), causes (physiological, prematurity, infection, mother-baby blood group discrepancy, and inadequate breastfeeding), knowledge about presentation of jaundice requiring immediate medical attention (involvement of palms and soles, jaundice within 24 h of age, and jaundice persisting for more than 2 weeks), danger signs of severity of NNJ (refusal to feed, high pitched cry, arching of body, convulsion, and fever), NNJ as a risk factor for death, long-term complications of NNJ (deafness, blindness, physical handicap, mental retardation, growth failure, and seizure disorder), and treatment of NNJ (phototherapy [PT] and exchange transfusion).

The participant's answer to the questions was graded as either correct or incorrect. Each incorrect and don't know response was scored as zero, correct answer scored 1 mark, and in multiple correct responses maximum score was 4 in each category making a total score of 20. Further, the knowledge score was categorized as good score  $\geq 14$ , average 7-13, and poor  $\leq 6$ . To determine the attitude and practices with respect to NNJ, mothers were assessed regarding their action on noticing baby developing icterus at home, time frame for seeking medical advice, their willingness for investigation and admission of a baby in the hospital, reasons in case of denial of treatment advised. All the mothers were educated regarding different aspects of NNJ including treatment and complication after completing questionnaire.

Data were entered in Microsoft Excel 13 and analysis was performed using SPSS version 20. Frequencies, percentages, standard deviation (SD), and mean score were used to interpret the data. Chi-square statistical test and Fisher's exact test were used to test the association between sociodemographic variables and knowledge score. The level of significance was set at  $p < 0.05$ .

## RESULTS

During the study period, 350 mothers were interviewed using a structured questionnaire. Sociodemographic characteristics of the participants are shown in Table 1. The majority of mothers were in the age group 19-34 years (mean  $\pm$  SD; 27.25 $\pm$ 3.97), 70% resided in the urban area, 92% were housewives, 81% lived in joint family, and 68% were multiparous. 67% mothers were educated above middle school while 15% were illiterate. 27% mothers had a previous baby affected with NNJ of which only 68% mother sought medical treatment while 20% mothers opted traditional methods like incantation, wrapping of black thread (tawiz) around neck or exposure to sunlight. Table 2 summarizes the results of the assessment of maternal knowledge about NNJ.

**Table 1: Sociodemographic characteristics of mothers**

Variable	Frequency n=350 (%)
Age (years)	
19-24	118 (33.71)
25-34	222 (63.42)
$\geq 35$	10 (2.85)
Religion	
Hindu	258 (73.71)
Muslim	92 (26.28)
Residence	
Urban	248 (70.85)
Rural	102 (29.14)
Type of family	
Joint	284 (81.14)
Nuclear	66 (18.86)
Education	
Illiterate	52 (14.85)
primary level	62 (17.71)
Secondary level	98 (28)
Tertiary level	138 (39)
Parity	
Primiparous	92 (26.28)
Multipara	238 (68)
Grand multipara	20 (5.71)

Total 88% mothers were aware of the possibility of neonate getting affected with jaundice. 51% mothers reported skin while 44% reported eye as well as skin as a major site for recognizing onset of NNJ. 62% mothers were unable to answer even a single correct cause of NNJ. Infection, inadequate breastfeeding, mother-baby blood group discrepancy, and prematurity were underestimated as potential risk factors of NNJ and reported only by 12%, 10%, 8%, and 5% mothers, respectively. 14% mothers reported NNJ as a physiological phenomenon. 13% mother believed maternal food intake especially yellow colored foods, exposure to hot or cold weather as well as lack of exposure to sun rays and other miscellaneous factors may be risk factors for NNJ.

Refusal to feeds and high pitched cry were recognized as danger signs of severity of NNJ by 34% and 13% mothers, respectively, while fever, arching of back, and convulsion as signs of concern were grossly underestimated (2-8%). 63% respondents were clueless about possible long-term complication of NNJ. 25% mothers believed liver weakness and digestion problems in later life as their major concern. 40% mothers were unaware about any treatment available for NNJ. Almost 14% mothers believed incantation and wrapping a locket or tawiz around neck is sole effective treatment for NNJ. Maternal beliefs regarding causes, complication and treatment are elaborated in Table 3.

In respect to attitude, 52% mothers would initially prefer traditional methods of treatment of NNJ on noticing jaundice in baby and only 20% mothers will seek medical care within 24 h. After seeking medical consultation majority of mothers were willing to follow the relevant medical advice (Table 4). Mean maternal knowledge score was 6.48 $\pm$ 3.93. 56%, 35%, and 8%

**Table 2: Knowledge of mothers regarding NNJ**

Variable	Frequency (%)
Knowledge regarding skin as correct site of recognition of NNJ	178 (50.8)
Knowledge about NNJ causes	
Knows one	68 (19.42)
Know two	26 (7.42)
Knows more than 2	4 (1.14)
Don't know	252 (73.14)
Knowledge about NNJ presentation requiring immediate medical attention	
Palms and soles	58 (16.57)
Jaundice within 24 h of life	10 (2.85)
Knowledge danger signs of severity of NNJ	
Knows one	96 (27.42)
Knows two	36 (10.28)
More than two	34 (9.71)
Don't know	184 (52.57)
Knowledge about risk of death in NNJ baby	30 (8.57)
Knowledge about long-term complication of NNJ	
Knows one	26 (7.4)
Knows two	18 (5.14)
Knows more than two	18 (5.14)
Don't know	222 (63.42)
Wrong answer (beliefs)	66 (18.8)
Knowledge of treatment of NNJ	
PT	42 (12)
Exchange transfusion+PT	10 (2.85)
Sunlight exposure	80 (22.8)
Incorrect answer/false belief's	78 (22)
Don't know don't know	140 (40)

NNJ: Neonatal jaundice, PT: Phototherapy

mothers had poor, average, and good knowledge score regarding NNJ, respectively. There was a statistically significant correlation of knowledge score with education, residence, religion, and parity (Table 5). Mothers whose previous babies were affected with jaundice, especially those who underwent medical treatment, had statistically significant better knowledge than others. Of those, whose baby was not treated medically only 1 mother had good knowledge score as her baby had sequelae in the form of physical and mental handicap.

## DISCUSSION

In this cross-sectional study, we found poor to average knowledge score with a mean of 6.48 (SD 3.93). The majority of mothers with good knowledge were the ones whose previous baby suffered from NNJ and treated medically hence received correct information. The knowledge of mothers was adequate with regard to awareness and recognition of jaundice (73%) but, it was less than studies in South Western Nigeria, Port Harcourt, and Malaysia with 100%, 88.2%, and 93.8% of respondents having awareness of the same,

**Table 3: Maternal beliefs and practices regarding causes, complication and treatment of NNJ**

Variable	Frequency (%)
Beliefs regarding causes of jaundice	
Hot/cold water/food ingestion	15 (4.28)
Lack of exposure to sunlight	15 (4.28)
Yellow colored food ingestion	9 (2.57)
Intrauterine and extrauterine environment differences	7 (2.00)
Changes in weather	5 (1.42)
Certain medicine ingestion	5 (1.42)
Evils' eye	4 (1.14)
Belief's regarding complication	
Liver weakness and Digestion problem	90 (25.71)
Weakness in child	70 (20)
Beliefs and practices regarding treatment of NNJ	
Exposure to sunlight	80 (22.85)
Incantation and tawiz wrapping	50 (14.28)
Medicine and herbs	18 (5.14)
Avoidance of certain foods	6 (1.71)
Branding	4 (1.14)
Preventive practices for NNJ	
No particular practice	231 (66)
Exposure to sun	63 (18)
Frequent breastfeeding and hygiene maintenance	33 (9.42)
Avoidance of yellow colored food, milk, rice	23 (6.57)

NNJ: Neonatal jaundice

**Table 4: Attitude of mother toward NNJ and its treatment**

Variable	Frequency (%)
Action of mother on noticing jaundice in baby	
To seek medical care within following time (hours)	
Within 24	70 (20)
24-48	35 (10)
>48	98 (28)
Traditional methods including sunlight*	182 (52)
Nothing	65 (18)
Willingness for relevant medical management as advised by doctor (n=193)	
Willing to admit immediately	165 (86)
Family influencing decision	10 (5.2)
Reason for denial of medical care	
Afraid of hospitalization (n=18)	3 (0.85)
Admission/investigation not required	5 (1.42)
High cost of medical care	4 (1.14)
Lack of transportation and long hours of journey	4 (1.71)
Blood investigation results in anemia	2 (0.57)

\*35 of 182 will seek medical care after 24 h and 98 mothers after 48 h. NNJ: Neonatal jaundice

respectively, in addition to other studies [9,10]. 50% mothers were aware about skin as a site of recognition of jaundice which

**Table 5: Correlation between maternal knowledge score and sociodemographic variable by Chi-square and Fisher's exact test**

Variable	Poor (198)	Average (122)	Good (30)	p
Age (years)				
19-24	84	30	4	0.61
25-34	108	90	24	
≥35	6	2	2	
Religion				
Hindu	132	97	29	<0.001
Muslim	66	25	1	
Education				
Illiterate	36	14	2	0.02
Primary level (1 <sup>st</sup> to 8 <sup>th</sup> )	42	18	2	
Secondary level (9 <sup>th</sup> to 12 <sup>th</sup> )	54	32	12	
Tertiary level	66	58	14	
Parity				
Primiparous	52	38	2	0.008
Multiparous	130	82	26	
Grand multiparous	16	2	2	
Previous baby affected				
Medically treated	12	28	24	<0.0001
Non-medical/none	28	1	1	
Residence				
Rural	70	30	2	0.01
Urban	128	92	28	

was similar to study by Shukla and Agarwal in Lucknow [11]. Furthermore, 14% mothers were clueless about the possibility of neonate developing jaundice. A KAP study about newborn care by Punitha and Kumaravel in Tamil Nadu described adequate knowledge in almost 75% mothers regarding NNJ, but details were not described [12]. Respondent's knowledge about causes of NNJ, recognition of danger signs of the severity of NNJ and complication was unexpectedly poor putting the babies at risk for developing immediate as well as long-term complications if the baby were to develop NNJ at home. Similar findings were reported in a study in Lucknow and Pakistan [11,13].

Total 72% of the mothers did not know single correct etiological factor of NNJ. This was similar to respondent's knowledge in Aba Nigeria and in Iran where 81% and 41% of mothers did not know a single cause of NNJ [10,14]. In contrary to this, in Lucknow study, 60% mothers could answer at least one cause of NNJ and prematurity was identified as the major cause [11]. 13% of the mothers erroneously believed ingestion of certain foods and cold or hot weather and lack of sunlight will cause NNJ in babies. In a study conducted in Lucknow, 50% of the mothers opined consuming special food in pregnancy could prevent NNJ and 18% believed that use of certain medicine could do that. Misconceptions were comparatively less than other studies, e.g., in a study from Iran, 70% mothers believed yellow food ingestion will cause NNJ [14]. Similarly, in a study from Egypt, almost 50% mothers attributed some maternal food intake and exposure to sun rays as risk factors for NNJ [15].

Only 54% and 33% mothers were able to answer at least one danger sign and minimum 1 complication of NNJ. Refusal to feed

was the danger sign of severity answered by maximum mothers (34%). Whereas in Lucknow study 68% and 50% mothers could answer fever and refusal to feed as a danger sign of the severity of NNJ, respectively, and 6% mother could attribute death as a complication of NNJ. Knowledge of NNJ complications was very poor among mothers still better than those in Lucknow. Inadequate knowledge of mother regarding danger sign of severity, complication was in keeping with many other studies [10,13,16] and was in contrary to study in Egypt, and Benin and Sagamu cities of Nigeria [15,17,18].

Almost 25% of the mothers reported liver and digestion problem as possible long-term complication leading to weakness in child. This misconception may be due to their correlation of digestion and jaundice with liver. Exposure to sunlight was seen as prominent preventive and treatment practice in large subset of patients, especially in Hindu mothers. Mothers giving sunlight to their babies for the prevention or treatment of NNJ have been described in other studies also [9,10,17,18]. Although sunlight is effective in lowering bilirubin levels concerns about potential dangers from ultraviolet (UV) rays, infrared rays and sunburns have been expressed in several studies and avoidance of these practices is recommended even by American Academy of Pediatrics [19,20]. However, use of filtered sunlight which allows selective transmission of blue light is removing UV and infrared light rays can be of help, especially in resource limited settings where PT is not available avoiding harmful effects [21,22].

Only 15% of study participants had identified PT and exchange transfusion as the standard management of NNJ. Many respondents still considered home remedies and some regional



practices as initial treatment options. Incantation also termed as exorcism where people go to tantric where he chants some words purporting to have magical power and touches baby/patient with broom or give enchanted tawiz to wear. Incantation and tawiz wrapping around neck were widespread amongst Muslim mothers and exposure to sunlight was common in Hindu mothers showing a high rate of regional influence on maternal beliefs and practices. Four mothers also told skin branding as a method of treatment emphasizing urgent need to work at grass root level for increasing awareness so as to remove such social stigma.

In context with other studies [14,17,18], it was seen that level of education and increasing parity significantly affected respondents knowledge score. Although the level of education affected knowledge score positively at a significant level, mean knowledge score among graduate and postgraduate was average 7.28 ( $\pm 3.6$ ). Medical personnel involved in baby treatment are supposed to give the most correct information to relatives compared to any other person. In our study also mothers whose previous baby was affected with NNJ and treated medically had better knowledge score compared to others. However, there was no significant association between the age of the mothers and their knowledge of NNJ ( $p=0.6$ ) keeping up with Benin city [17], while other studies showed significant association of knowledge with age also [18,23].

This study revealed an average attitude toward management of NNJ in comparison to other previous studies by Rodrigo and Cooray, Egube *et al.* [16,17]. Overall almost 60% mothers responded they will seek medical care if their baby developed NNJ earlier or later, but only 20% mothers agreed to take the baby to the hospital within 24 h of identification of jaundice. Despite good attitude of mothers, it has been shown in many studies that they report to hospital quite late almost after 36 h of appearance and many times when complications sets in Hussein and Aziz, Murki *et al.* [23,24]. Lack of knowledge regarding complication of delayed treatment, lack of transportation, high cost of NICU care, fear of medical treatment and blood sampling, misconceptions about prevention and treatment of NNJ and high influence of elderly family members in treatment decisions are few of the contributory factors for delayed treatment. It has been shown that higher bilirubin levels especially more than 20 mg/dl even for short duration of time before treatment results in neurological disorders in at least few babies and this incidence increases with increased duration of higher total serum bilirubin values before treatment [17]. Henceforth maternal education regarding risk factor, identification of danger sign and complication involved in delayed treatment should be emphasized through information, education, and communication (IEC).

There were few limitations of our study as we had only single Indian study as a baseline to compare study outcome. Ours was a tertiary hospital based study where only those mothers undergoing institutional deliveries were interviewed, and maternal beliefs may not have been analyzed to the extent present in the actual community. It is possible that if we had done a community-based study, we would have been better able to understand the maternal beliefs and practice widespread in the region and to know the

barriers in health seeking behavior of mothers. We recommend a large community-based study to understand same and formulate strategies for better health education in the community.

## CONCLUSION

There is a high degree of the paucity of knowledge among mothers regarding NNJ emphasizing the urgent need for improving maternal education through IEC. Traditional beliefs, cultural and regional practices have influence on mother's knowledge, attitude, and behavior. Use of electronic media and for increasing awareness of the condition in general population, incorporation of the topic in high school teaching may help to improve the knowledge of mothers.

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