



RESEARCH ARTICLE

A STUDY TO ASSESS KNOWLEDGE ON PRACTICE AND ATTITUDE REGARDING NEWBORN THERMOREGULATION AMONG CAREGIVER AT SELECTED HOSPITALS OF GANGTOK, SIKKIM

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ARTICLE INFO

Article History:

Received 09th February, 2025
Received in revised form
21st March, 2025
Accepted 19th April, 2025
Published online 30th May, 2025

Keywords:

Knowledge, Practice, Attitude, Newborn, Neonates, Thermoregulation.

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Citation: Sujen Cintury, Reshma Tamang and Sonam Zangmu Sherpa, 2025. "A Study to Assess Knowledge on Practice and Attitude Regarding Newborn Thermoregulation among Caregiver at Selected Hospitals of Gangtok, Sikkim". International Journal of Current Research, 17, (05), 33006-33010.

INTRODUCTION

The infant is warm and well-insulated in the aqueous uterine environment prior to birth¹. One of the most important physiological hurdles a newborn must deal with after delivery is maintaining a neutral thermal environment. In order to lower neonatal morbidity and mortality, thermal care is essential. The capacity to maintain body temperature within a specific normal range by balancing heat production and loss is known as thermoregulation². Thermoneutral temperature is the ideal temperature at which babies should be fed to facilitate optimal somatic and cerebral growth, and it is the limited range of external temperatures at which a baby may maintain normal body temperature with little oxygen consumption¹. The newborn's risk of hypothermia is greatly influenced by the ambient temperature during birth and the postoperative period. Newborns generally require a considerably warmer environment than adults³. The following significant factors contribute to physiological risk factors: lack of knowledge about infant care, baby separation from mother, cold environment, temperature change, insufficient warming, and excessive heat loss⁴. In order to prevent the child from becoming excessively hot (hyperthermia) or too cold (hypothermic), a "warm

chain" is maintained both at birth and during the first few days of life. This keeps the baby's body temperature between 36.5°C and 3.5°C³. In their study, Lunze et al. (2014) discovered that health professionals and caregivers were aware of thermo-protective techniques, such as warming the birthplace, drying and covering the baby, delaying bathing, and breastfeeding exclusively and immediately. However, within the first few hours after giving birth, the warm chain was not continuously maintained. This practice could be facilitated by training family members to assist moms in providing thermoprotection for their newborns⁵. Following delivery, the newborn's health is determined by the family's health care habits, particularly those of the mothers. Reducing mortality and morbidity during the neonatal period can be achieved by providing information about neonatal issues and infant care procedures, such as maintaining thermoregulation. A mother should have a good attitude and sufficient understanding about newborn thermoregulation because she will be the one caring for the infant throughout the entire process. Research done by Prasad et al. (2018) found that the majority 68% of mothers had average knowledge regarding neonatal thermoregulation, and the majority 56% of mothers had good practice. They emphasize enhancement regarding knowledge and practice towards neonatal thermoregulation⁶. The data on knowledge on practice and attitude of

caregivers regarding newborn thermoregulation among normal-term neonates is limited, especially in the north-eastern part of India. Newborn care practices like thermoregulation by parents, especially mothers, immediately following birth are important elements of neonatal well-being. This study aimed to assess maternal knowledge on practices regarding one of the most essential newborn care practices, like thermoregulation, and their attitude towards newborn thermoregulation.

METHODS

Objectives of the study

1. To assess the knowledge on practice and attitude regarding newborn thermoregulation among caregiver
2. To determine association between knowledge on practice and attitude regarding newborn thermoregulation among caregiver
3. To determine the correlation between knowledge on practice and attitude regarding newborn thermoregulation

Research Hypotheses

- H_1 - There is a significant association between knowledge on practice and attitude regarding newborn thermoregulation among caregiver with selected demographic variables.
- H_2 - There is a significant correlation between knowledge on practice and attitude regarding newborn thermoregulation.

Operational definition of terms

- **Knowledge on practice:** It refers to information or response given by the caregiver regarding newborn thermoregulation evaluated with a standardized knowledge questionnaire.
- **Attitude:** It refers to the belief of caregiver regarding newborn thermoregulation as assessed using structured 5 Point Likert Scale on attitude.
- **Caregiver:** It refers to mother who has delivered through normal vaginal route and who is taking care of the new born baby.
- **Thermoregulation:** It is the ability of a newborn to maintain their body temperature within normal range i.e. 36.5°C to 37.5°C (97.7°F to 98.6 °F) as given by WHO.
- **Newborn:** It refers to babies delivered through normal vaginal route at selected hospitals of Gangtok, Sikkim and meeting the inclusion criteria.
- **Selected Hospitals:** It refers to Central Referral hospital (CRH) and New Sir Thutob Namgyal Memorial (STNM) Hospital in Gangtok, Sikkim.

RESEARCH METHODOLOGY

This study adopted a cross-sectional descriptive study design, and the setting was Central Referral Hospital and New Sir Thutob Namgyal Memorial (STNM), Gangtok, Sikkim. Inclusion criteria for the study were mothers who delivered a term and healthy newborn through the vaginal route, were accessible when the data was being collected, and were willing to participate, whereas mothers who had delivered newborns through LSCS/vacuum/forceps were excluded from the study. A total of 93 samples fulfilled the inclusion criteria and enrolled in the study. Interview techniques were used to access knowledge and attitude, while observation techniques were applied for practice. Reliability of the structured knowledge questionnaire was established by the split-half technique and computed by Spearman Brown and found reliable with an r value ($r = 0.87$). The reliability of the 5-point Likert scale was assessed using Cronbach's alpha and found reliable with an r value ($r = 1$), reflecting good internal consistency. The data was analyzed using descriptive and inferential statistics using SPSS 20 version.

Data Collection Procedure : The data was collected after obtaining permission from the Department of Health and Family Welfare, Government of Sikkim, and concerned authorities. The ethical clearance was obtained from Institutional Ethics Committee, SMIMS (SMIMS/IEC/2020-33). Participant was enrolled only after explaining purpose of the study and obtaining informed consent. The data were collected by face-to-face interview technique. Whereas for practice infrared thermometer was used for checking the temperature of newborn at three different intervals soon after birth, after shifting to the mother's side, and after 24 hours of birth using the same.

RESULTS

Description of demographic profile of caregiver and newborn: The data presented in table 1 show that the majority 53% of participants belong to the age group of 25–31 years, with the majority 34% of them having a high school certificate. The majority 79% of participants were unemployed. The data presented in table 2 show that at the time of data collection, the majority 56% of participants were 24 to 31 hours old. Approximately 59% of participants were male with a gestational age of majority. 81% of participants were $\geq 39 + 1$ weeks with birth weights of the majority 80% of the newborns were between 2 and 3.4 kg.

Figure 1 represents the temperature of newborns measured at three different intervals, i.e., soon after birth, after shifting to the mother's side, and after 24 hours of birth. At birth, only 56% had a temperature within the normal range (36.5–37.5°C), with 33% below 36.5°C, indicating possible hypothermia. After being shifted to the mother's side, the percentage in the normal range increased to 55%, and those below normal dropped to 10%, suggesting thermal regulation benefits from maternal contact. By 24 hours post-birth, 90% of newborns reached normal temperature, with no infant in the $\geq 37.6^\circ\text{C}$ range, indicating effective stabilization over time.

Table 1. Frequency and percentage distribution of demographic profile of caregiver

Sl. No.	Demographic Variables	Frequency (f)	Percentage (%)
1.	Age (in years)		
	a. 18 – 24	24	26
	b. 25 – 31	49	53
2.	c. 32 – 38	20	21
	Education		
	a. No formal education	5	5
	b. Primary school certificate	22	24
	c. Middle school certificate	22	24
	d. High school certificate	32	34
3.	e. Immediate or post high school diploma	5	5
	f. Graduate and above	7	8
	Occupation		
	a. Professional	4	4
	b. Skilled worker	11	12
	c. Unskilled worker	5	5
	d. Unemployed	73	79

Description of knowledge on practice regarding newborn thermoregulation: Figure 2 shows the frequency percentage distribution of the level of knowledge on practice regarding newborn thermoregulation among caregivers. The majority of participants, 82%, demonstrated an average knowledge; 14% had a good knowledge, and 4% exhibited poor knowledge. These findings highlight a general awareness of thermoregulation of newborns. The data presented in table 3 shows the area-wise distribution of knowledge on the practice questionnaire, where the maximum score was obtained in meaning and definition, which consists of 3 questions, and the score obtained is 58%. The minimum score was obtained in risk factors/cause, which consists of 1 question and a score of 23%.

Table 2. Frequency and percentage distribution of demographic profile of newborn

N = 93

Sl. No.	Demographic Variables	Frequency (f)	Percentage (%)
1	Age (in hours)		
	a. 24hr - 31hr	52	56
	b. 32hr - 39hr	36	39
	c. 40hr - 47hr	5	5
2	Sex		
	a. Male	55	59
	b. Female	38	41
3	Gestational age at the time of birth in (weeks)		
	a. < 39 weeks	18	19
	b. ≥ 39 + 1 weeks	75	81
4	Birth weight in (kg)		
	a. 2 kg - 3.4 kg	74	80
	b. 3.5 kg - 4 kg	19	20

Table 3: Area wise distribution of knowledge on practice regarding newborn thermoregulation among caregiver

N = 93

Area of knowledge	Total Items	Total Maximum Score	Total Score Obtained	Mean	Mean %
Meaning & definition	3	3	162	1.74	58%
Risk factors/ causes	1	1	21	0.22	23%
Signs & symptoms	2	2	84	0.90	45%
Prevention/ Management	16	16	879	9.45	59%

Table 4. Association between selected demographic variables and knowledge on practice regarding newborn thermoregulation among caregiver

N = 93

Sl. No.	Demographic Variables	Poor Knowledge	Average Knowledge	Good Knowledge	Fisher's Exact Test/ P-value
1.	Age in years				1.308 .935
	a. 18 – 24	1	21	2	
	b. 25 – 31	2	39	8	
	c. 32 – 38	1	16	3	
2.	Education				4.811 .201
	a. No formal education	0	6	0	
	b. Below graduate	4	66	10	
	c. Graduate and above	0	4	3	
3.	Occupation				15.507 .002*
	a. Professional	0	1	3	
	b. Skilled/ unskilled worker	2	10	4	
	c. Unemployed	2	65	6	
4.	Monthly Income of family				3.856 .472
	a. Upper	0	2	0	
	b. Middle	3	40	10	
	c. Lower	1	34	3	
5.	Religion				5.588 .195
	a. Buddhist	2	16	2	
	b. Hindu	1	47	6	
	c. Others	1	13	5	
6.	Type of family				6.887 .121
	a. Nuclear	0	38	6	
	b. Joint	3	36	7	
	c. Extended	1	2	0	
7.	Have you ever heard about newborn thermoregulation				1.963 .339
	a. No	4	50	10	
	b. Yes	0	26	3	

Table 5. Showing correlation between the knowledge on practice and attitude regarding newborn thermoregulation among caregiver

Variables	r-value	ρ value	Interpretation
Knowledge on practice Attitude	0.024	0.818	ρ > 0.05*

The prevention/management consists of 16 questions, and the score obtained was 59%. Signs and symptoms consist of 2 questions, and the score obtained is 46%.

Description of attitude regarding newborn thermoregulation: Figure 3 results reveal that the vast majority 99% of participants exhibited a favorable attitude towards newborn thermoregulation, while only 1% demonstrated an unfavorable attitude.

This suggests a strong awareness or positive perception among respondents about the importance of maintaining appropriate thermal care for newborns.

Description of association between knowledge on practice and attitude regarding newborn thermoregulation: The data presented in table 4 shows the association between selected demographic variables and knowledge of practice regarding newborn thermoregulation

among caregivers was tested using Fisher's Exact Test to find the association between selected demographic variables and knowledge of practice regarding newborn thermoregulation. The obtained 'p' value was ($p = 0.002$) for occupation, which is less than the 0.05 level of significance. Hence, the association was found between occupation and knowledge of practice. But no significant association was found with other demographic variables. Therefore, the research hypothesis H1 for knowledge was accepted, which stated that occupation is the factor that can influence the knowledge of practice regarding newborn thermoregulation among caregivers.

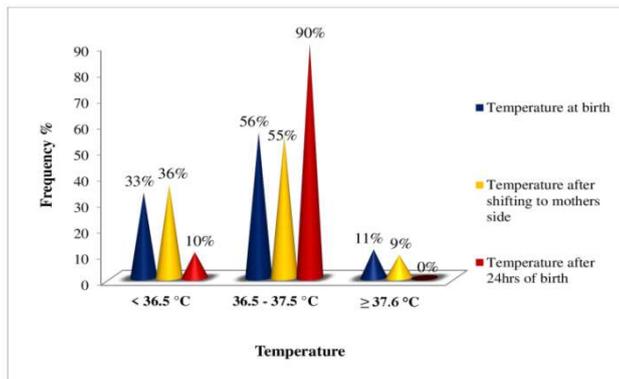


Fig. 1. Distribution of newborn body temperature (N=93) at three time point.

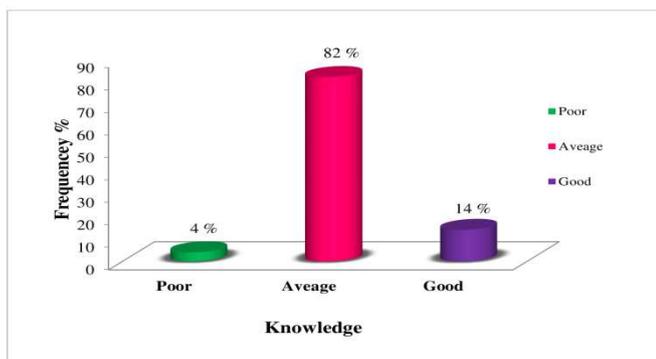


Fig. 2. Frequency distribution of caregivers knowledge on practice on newborn thermoregulation (N= 93)

Description of correlation between the knowledge on practice and attitude regarding newborn thermoregulation: Table 5 presents the correlation between knowledge of practice and attitude regarding newborn thermoregulation among caregivers. The obtained values of 'r' and 'p' are $r = 0.024$ and $p = 0.817$, which is more than 0.05. Therefore, there was a moderately positive correlation between knowledge of practice and attitude regarding newborn thermoregulation. Hence, the research hypothesis H2 was accepted. Although the mean score of knowledge and attitude shows a positive relationship, the correlation is very poor; hence, it is inferred that although the majority of the caregivers scored average in the knowledge of practice on newborn thermoregulation with a more favorable attitude towards it, it was not reflected in the correlation between these two variables.

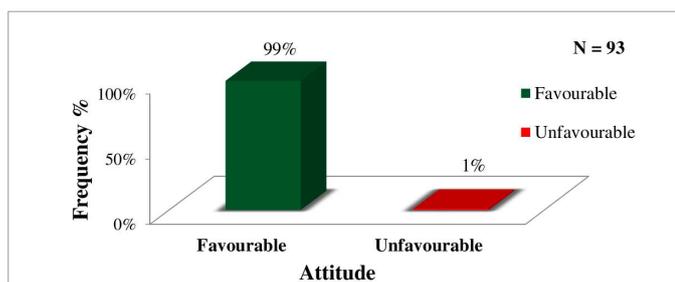


Fig. 3. Distribution of attitude regarding newborn thermoregulation caregiver (N=93)

DISCUSSION

It is common information that the morbidity and death of newborns are directly correlated with attitudes and knowledge of infant care and other activities. Early age at delivery, caregiver literacy, and convenient access to medical facilities are some of the significant barriers to improving neonatal health status. This study highlights the critical role of caregiver characteristics in influencing knowledge of practice and attitudes related to newborn thermoregulation, which is an essential factor in reducing neonatal morbidity and mortality. The majority of caregivers in the study were aged between 25 and 31 years, consistent with findings by Qazi M. *et al.*, in which 51% of participants were less than 25 years old, though age distribution patterns varied across different regions⁷. A KPA study done in Sindh, Pakistan, among postnatal mothers showed a different age distribution pattern; the middle-age group, 20–29, was in the majority at 55%⁸. As far as education is concerned, most of the study participants were literate 95%, and only 5% had no formal education. A study conducted among postnatal mothers in Tamil Nadu, India, shows a similar finding: 96.4% literate and 3.4% illiterate⁹. However, it is dissimilar to the data report on women's literacy rate of 75.6 % in Sikkim from the 2011 census¹⁰. Occupationally, 79% of participants were unemployed. This finding is consistent with some regional studies. A study conducted in Bangladesh in 2018 established a result in which they found 100% of housewives¹¹. Whereas another study conducted by Jeffrey Raj P *et al.* in India in 2015 found only 2% to be unemployed, though it differs significantly from others, likely due to methodological variations⁹. This study reported the majority of participants as literate, with most having completed high school. Despite the high literacy rate, 69% of participants had never heard of newborn thermoregulation. Among the 31% who were aware, most received their information from family members. This contrasts with findings from Dhaka, where 70.6% of mothers were aware of thermoregulation, indicating potential disparities in health education and outreach¹². A statistically significant association was found between occupation and knowledge of thermoregulation practices ($p = 0.002$), which supports the findings of Azeez HS38 *et al.* They found $p = 0.000$, which is highly associated, as mentioned in their study, for occupation with knowledge on newborn care for thermoregulation¹³. This finding is contradicted by the result of a study conducted by Musabyemariya E *et al.* They found statistical significance associated between level of knowledge and sociodemographic variables like age ($p = 0.002$), level of education ($p = 0.002$), marital status ($p = 0.000$), religion of participants ($p = 0.000$), occupation ($p = 0.002$), and number of ANC attendance ($p < 0.001$)¹⁴. All variables were significantly associated with the level of knowledge (p value < 0.05). However, other studies have reported broader associations involving variables such as age, education, marital status, religion, and antenatal care attendance. In terms of knowledge, 82% of participants demonstrated average knowledge, 14% good knowledge, and 4% poor knowledge. These findings are consistent with several Indian studies but show variation that may be attributed to differences in study locations, sample sizes, and data collection techniques. Encouragingly, attitudes towards newborn thermoregulation were overwhelmingly positive, with 99% of participants exhibiting a favorable attitude. Overall, while caregiver attitudes toward newborn thermoregulation are encouraging, the presence of significant knowledge gaps—particularly among unemployed or first-time mothers—emphasizes the need for strengthened health education initiatives and targeted interventions to improve neonatal outcomes.

Acknowledgment: The researcher thanks all the participants of the study for their kind cooperation.

Funding: Self-funded.

Conflicts of interest: None declared.

Ethical approval: The study was approved by the Institutional Ethics Committee, SMIMS (SMIMS/IEC/2020-33).

Key points

- The implementers of newborn thermoregulation are mainly mothers; hence, more research is needed to stipulate the extent and status of newborn thermoregulation knowledge on practice and attitude and link it with the neonatal complications during the postnatal period.
- Comparative study can be conducted among primigravida and multi gravid mothers to see the difference in practice regarding thermoregulation.

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