Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v30i19.3823

FREQUENCY OF HYPOTHERMIA AND FACTORS DURING TRANSFER OF NEWBORN BABY FROM DELIVERY ROOM TO NEONATAL NURSERY

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Abstract:

Background:

The neonatal period, which lasts from birth to 28 days, is known as the newborn baby or neonate stage. After delivery, the infant experiences a number of changes and must adapt to numerous physiological mechanisms in order to survive. Because there is less body fat in a newborn after birth, the baby's body temperature might drop quickly. Shivering and non-shivering thermo genesis allowed newborns to maintain their body temperature under the supervision of the brain and endocrine pathways. Hypothermia has been established as a substantial contributor to neonatal death because it frequently occurs as a co-morbidity with other infant causes

Objective: To inquire the frequency of occurrence of Neonatal hypothermia during transfer of baby from delivery room to neonate nursery.

Methodology: A cross sectional analytical study was conducted at one public and one private tertiary care hospitals of Multan, Punjab. The Study population consisted of the newborn babies born at the selected hospitals. A stratified random sample of n=200 participants was recruited. All participants were assessed with the help of an observational checklist. A written consent was implied to parents of every participant. After data collection it was entered and analyzed in SPSS version- 21.

Results: Findings revealed that majority of newborns 100 (50%) had temperatures in the range of 97.9 - 98.9°F at birth, and very few 3 (1.5%0 had temperature 96.9 - 97.8°F at birth. Temperature 10 minutes after Birth was also observed where majority 160 (80%) had temperature 97.9 - 98.9°F while 32 (16%) had temperature 99 - 100°F 10 minutes after birth. Moreover, temperature 10 minutes before Nursery shifting was assessed where a good majority 161 (80.5%) had temperature 97.9 - 98.9°F, 22 (11%) had temperature 96.9 - 97.8°F and very few 17 (8.5%) had temperature 99 - 100°F. The majority of newborns had temperatures in the range of 97.9 - 98.9°F both at birth (50%) and 10 minutes after birth (80%). The distribution of temperatures 10 minutes before nursery shifting is similar to that after birth, with the majority falling in the 97.9 - 98.9°F range.

Conclusion: The percentage distribution indicates that a significant portion of newborns had temperatures within the normal physiological range.

Key words: Hypothermia, Newborn, frequency

Introduction.

A newborn child is a mother's divinely wonderful gift from a God. Thus, the delivery of a neonate is among the most amazing and joyous occurrences that take place in a woman's life. Neonatal crying is the only form of communication and conveys the message "I need care." This also seeks to protect the infant from environmental hazards and practical injury, such as maintaining appropriate body temperature(Bourguignon, Parent, Kleinjans, Nawrot, Schoeters, & Van Larebeke, 2018).

The neonatal period, which lasts from birth to 28 days, is known as the newborn baby or neonate stage. After delivery, the infant experiences a number of changes and must adapt to numerous physiological mechanisms in order to survive. Because there is less body fat in a newborn after birth, the baby's body temperature might drop quickly. Shivering and non-shivering thermo genesis allowed newborns to maintain their body temperature under the supervision of the brain and endocrine pathways (Paudel et al., 2020). A newborn's high body surface to volume ratio, which is especially common in neonates with low birth weight, is the main cause of their rapid heat loss and eventual hypothermia. When a newborn loses four times as much body heat as they should, they become moist, as do newborns who are exposed to radiation or whose bare skin comes into contact with objects that are colder to the touch (Sharma & Singh, 2021).

Because of their insufficient capacity to produce and retain heat, newborns are more likely to develop hypothermia. An important part of newborn care, especially in the early neonatal period, is managing hypothermia. Therefore, tremendous care must be taken to correctly clothe the infant and to keep the environment at the right temperature and humidity for the particular baby (W. Alebachew Bayih, N. Assefa, M. Dheresa, B. Minuye, & S. Demis, 2019a). The WHO has designated body temperatures below the usual range (36.5°C - 37.5°C) or below 37.0°C as neonatal hypothermia (Yitayew, Aitaye, Lechissa, & Gebeyehu, 2020).

An estimated 3.6 million newborn deaths occur every year. In 150 infants between the ages of 0 and 648 hours, 93 (or 62% of them) suffered hypothermia, which is a major cause of newborn diseases and fatalities in both developed and poor regions of the world. Hypothermia of mild and moderate severity was responsible for 47.3% and 52.7% of cases, respectively. Infants less than 24 hours had the highest prevalence of hypothermia (72.4%). Additionally, it was greater (64.4%) among babies that were born outside the womb as opposed to inside. Hypothermia affected 82.5% more preterm infants than term infants (84.5%) (Soares, Pedroza, Breigeiron, & Cunha, 2019).

Approximately four million babies worldwide perish within the first four weeks of life, which accounts for 2/3 of all first-year mortality and 40% of deaths among children under the age of five. The vast majority of neonatal mortality (99%) occur in low- and middle-income nations, (United Nations (UN). 2014's Millennium Development Goals Report. It was discovered that developing nations had a 57.2% prevalence of newborn hypothermia (Beletew, Mengesha, Wudu, & Abate, 2020)

In Pakistan, Although trends of infant mortality in decline the infant mortality rate is now 56.8 deaths per 1000 live births in 2022, (United Nations - World Population Prospects). By 2030, all nations must work to reduce neonatal mortality to 12 deaths or less per 1,000 live births, in accordance with the Sustainable Development Goals (SDGs), in order to halt the preventable death of newborns and young children. But the existing patterns are alarming (Lawn, Bhutta, Ezeaka, & Saugstad, 2023). The newborn mortality rate worldwide is 17 per 1000 live births, and 63 nations are not on track to fulfill the SDG objective for neonatal mortality, according to the UN IGME report from 2021. Between 2021 and 2030, 8 million under-five deaths might be avoided if every nation met or exceeded the SDG objective (Kc et al., 2020). The first month of life is the most perilous for a child's survival since in 2030, 2.4 million babies will die during this time. Leading causes of death among children under 5 years old include prematurity, hypoxia, infections, and

other problems at delivery and in the first 28 days of life (Manik, Dubey, & Joshi, 2023). Numerous risk factors, including internal elements like the neonate's physiological and behavioral traits and those of the careers, as well as external factors like the environment, have been linked to neonatal hypothermia (Vilinsky-Redmond, 2019).

Hypothermia has been established as a substantial contributor to neonatal death because it frequently occurs as a co-morbidity with other infant causes (Mank, van Zanten, Meyer, Pauws, Lopriore, & Te Pas, 2016). A ten-step "warm chain" strategy was recommended by the World Health Organization to reduce the risk of baby deaths from hypothermia. Warm delivery rooms between 25 and 28 degrees, quick drying with warmed towels prior to placenta delivery, and the kangaroo mother care philosophy of infant nursing (within an hour) or at least on the first day of birth, delaying the newborn's weight and bathing for at least 6 and 24 hours, respectively, are a few of these rooming-in by keeping the mother and child close; wearing appropriate clothing and bedding (with at least three layers of dry, absorbent material) (Nyandiko, Kiptoon, & Lubuya, 2021).

Training in warm resuscitation and ongoing thermal care for parents, careers, and healthcare professionals. Keeping Warm Use of a warm wrap, an outside heat source, and skin-to-skin contact this study set out to gather information on the frequency of newborn hypothermia, its contributory factors, and the level of compliance with WHO thermal treatment recommendations among infants admitted to hospitals (Brambilla Pisoni et al., 2022). In general, lowering newborn morbidity and mortality necessitates that the immediate care recognize any warning symptoms in the neonates and go to the local clinic. Given the brief hospital stay following delivery and the lack of enough time for newborn assessment, it is increasingly the mother's obligation to recognize warning indications (Ahmed & Al-Gamar, 2022).

A critical step in maximizing the neonate's chances of survival is the early identification of neonatal risk signals of hypothermia. It should be mentioned that most newborns in underdeveloped nations are either born at home or are prematurely released from the hospital (Thakur, Sharma, Kumar, Pugazhendi, & Care, 2017). Keeping the mother and baby together is another crucial component in preventing neonatal hypothermia because the neonate's body temperature substantially depends on the mother's temperature. But since caesarian babies are completely separated from their mothers and given separate care after delivery, they do not benefit from the normal maternal bond and are more prone to hypothermia (Getaneh, Misganaw, Mihretie, & Bitew, 2022).

The infant should then be dried right away and dressed in appropriate, warm clothing. Wet diapers must be changed as soon as possible to avoid heat loss by conduction, and the baby's head should be covered with a hat to interfere with the radiation process. Even term newborns should be encouraged to breastfeed and perform kangaroo mother care (KMC) at home because these practices are the primary sources of natural heat production and have a wide range of additional advantages that will improve the development of the growing child (Boundy et al., 2016). Since they are the ones whose understanding in terms of newborns' demands may help baby live from danger conditions, particularly hypothermia, primi gravid mother’s ignorance of neonatal hypothermia contributes significantly to their survival (Akimana, 2017).

Material and Methodology.

A cross sectional analytical study was conducted. Permission was granted from REC of UOL. The study was conducted at Nishtar hospital and City hospital Multan. The Study population consisted of the newborn at the selected hospitals.. A stratified random sample of n=200 participants was recruited. The rules and regulations set by the research ethical committee (REC) of the University of Lahore were followed while conducting the research and the rights of the research participants were respected. Permission was taken from head of both study settings.

Sample was calculated using Openepi software and sample size of 200 cases was calculated with 95% confidence interval, 5% margin of error and expected percentage of hypothermia among neonates is 66.3% (W. Alebachew Bayih, N. Assefa, M. Dheresa, B. Minuye, & S. J. B. p. Demis, 2019b).

$$n = \frac{Z^2_{1-\propto/2}\ p(1-p)}{d^2}$$

Where,
$1-\propto$ 95
P 0.663
d 0.05
n 200

Written informed consent was taken from all the participants. The newborn assessment checklist was used to collect the data. Participants were kept anonymous throughout the study.

Statistical Analysis:
After the data collection it was entered and analyzed in SPSS version- 21. Quantitative variables were presented in the form of mean ± standard deviation. Qualitative variables were presented in the form of frequency and percentages**.**

Results:

Total participants were 200 and a brief overview of the highlighted findings are given below
4.1: DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS:

Tables 1: Demographic Characteristics of Participants (n=200).

Variable	***f***	**Percentage%**
Gender		
Male	107	53.5
Female	93	46.5
Number of New Born		
Single	182	91
Twins	12	6
Triplets	6	3
Skin to Skin Contact		
Yes	194	97
No	6	3
Apgar Score		
Normal	23	11.5
Low	177	88.5
CPR Given		
Yes	11	5.5
No	189	94.5
Wearing Cap		
Yes	183	91.5
No	17	8.5
Dry Proper Wrapping		
No	196	98
Yes	4	2
Warm Transportation		
Yes	155	77.5
No	45	22.5
Obstetric Complications		
Yes	24	12
No	176	88
Birth Weight		

< 2.5kg	47	23.5
2.5 Kg or above	153	76.5
Gestational Week		
< 37 weeks	39	19.5
37 weeks or above	161	80.5
Neonatal Health Problems		
Yes	12	6
No	188	94
Delivery Room Temperature		
<27.5 C^0	60	30
27.5 C^0 Or above 27.5 C^0	140	70
Dry Wrapping Linen		
Dry	192	96
Wet	8	4
Postpartum Temperature		
<27.5 C^0	62	31
27.5 C^0 Or above 27.5 C^0	138	69
Appropriate Clothing		
<2o min	188	94
>20 min	12	6
Rewarming in Underrediant		
Yes	162	81
No	38	19

Findings in table 1 provides insights into various aspects of newborn care, delivery conditions, and associated factors. These are as a record of specific events and conditions during childbirth, with percentages indicating the prevalence of certain practices or outcomes. Among the studied neonates, 107 (53.5%) were male gender while 93 (46.5%) were baby girls. Number of delivered newborn was inquired, where it was observed that 182 (91%) were born single, 12 (6%) were born as twin and 6 (3%) were born as triplets. Moreover mother and baby skin to skin contact was found as that among 194 (97%) babies there was skin to skin contact and among 6 (3%) babies there was no skin to skin contact. Also the APGAR score was assessed where 23 (11.5%) had normal score and 177 (88.5%) had below normal APGAR score. Furthermore, 11 (5.5%) of the newborn were provided CPR whereas 189 (94.5%) of the babies did not need CPR. Wearing cap was found among 183 (91.5%) while among 17 (8.5%), wearing cap was not found. Dry Proper Wrapping was not found among 196 (98%) and was not found among 4 (2%). Similarly the warm transportation was observed among 155 (77.5%) of the newborn whereas among 45 (22.5%), the warm transportation was not found. Obstetric complications were assesses where there were no complications found among 176 (88%) and among 24 (12%) some complications were observed. Birth weight was also observed where 47 (23.5%) babies had low birth weight that is < 2.5kg and 153 (76.5%) had birth weight 2.5 kg or above. Gestational week was observed where 39 (19.5%) newborn were delivered < 37 weeks whereas 161 (80.5%) were having 37 weeks or above gestational age. Neonatal health problems were observed among 12 (6%) whereas 188 (94%) had no Neonatal Health Problems.

Delivery room temperature was found <27.5°C among 60 (30%) and 27.5°C or above among 140 (70%). Moreover, dry wrapping linen were found among 192 (96%) and 8 (4%) had wet linen. Postpartum Temperature was found <27.5°C among 62 (31%) newborn whereas among 138 (69%) the temperature was 27.5°C or above. Among 188 (94%) the appropriate clothing were provided whereas among 12 (6%) appropriate clothes were provided late until 20 minutes. Rewarming in Underrediant was found among 162 (81%) while among 38 (19%), there was no Rewarming in Underrediant found..

4.2: DESCRIPTIVE STATISTICS OF TEMPERATURE AMONG NEWBORN BABIES:

Table 2 Temperature assessment of the study participants (n=200)

Variable	*f*	Percentage%
Temperature at Birth (F^0)		
96.9 -97.8	3	1.5
97.9-98.9	100	50
99-100	97	48.5
Temperature 10 minutes after Birth (F^0)		
96.9 -97.8	8	4
97.9-98.9	160	80
99-100	32	16
Temperature 10 minutes before Nursery shifting (F^0)		
96.9 -97.8	22	11
97.9-98.9	161	80.5
99-100	17	8.5

The table 2 provides information about the temperatures of newborns at various time points - at birth, 10 minutes after birth, and 10 minutes before shifting to the nursery. The majority of newborns 100 (50%) had temperatures in the range of 97.9 - 98.9°F at birth, 97 (48.5%) had temperature 99 - 100°F at birth and very few 3(1.5%0 had temperature 96.9 - 97.8°F at birth. Temperature 10 minutes after Birth was also observed where 8 4%) newborn had temperature 96.9 - 97.8°F, majority 160 (80%) had temperature 97.9 - 98.9°F while 32 (16%) had temperature 99 - 100°F 10 minutes after birth. Moreover temperature 10 minutes before Nursery shifting was assessed where a good majority 161 (80.5%) had temperature 97.9 - 98.9°F, 22 (11%) had temperature 96.9 - 97.8°F and very few 17 (8.5%) had temperature 99 - 100°F. The majority of newborns had temperatures in the range of 97.9 - 98.9°F both at birth (50%) and 10 minutes after birth (80%). The distribution of temperatures 10 minutes before nursery shifting is similar to that after birth, with the majority falling in the 97.9 - 98.9°F range. The percentage distribution indicates that a significant portion of newborns had temperatures within the normal physiological range.

DISUSSION

In the current study 107 (53.5%) of the newborn were male while 93 (46.5%) were baby girls. Somewhat similar findings found in a past study where among the 23 549 included infants (male, 12 220 [51.9%]) (Dang et al., 2023). In this study, the neonatal health problems were observed among 12 (6%). Moreover in this current study, the obstetric complications were assesses where among 24 (12%) participants some complications were observed.

In relation a past study found somewhat relevant findings where there overall rate of poor fetal outcomes in Ethiopia was 26.88% (95% CI: 20.73-33.04) (Gedefaw, Alemnew, & Demis, 2020). Birth weight was also observed where a considerable number 47 (23.5%) babies had low birth weight that is < 2.5kg. In a past study from Eastern Africa. Ethiopia the findings revealed that low birth weight prevalence was among (10.06%; 95% CI: 7.21-12.91) (Gedefaw, Alemnew, & Demis, 2020). Similarly in another past study 4.3% were low birth weight (≤2500 g) (Dang et al., 2023). the findings suggest that in our study the rate of low birth weight is relatively high.

In this study, the Gestational week was observed where 39 (19.5%) newborn were delivered < 37 weeks whereas 161 (80.5%) were having 37 weeks or above gestational age. In a past study, the prevalence of Prematurity was observed as (8.76%; 95% CI: 5.4-11.11) (Gedefaw, Alemnew, & Demis, 2020). Similarly in another past study about 5.6% were preterm born (35-36 weeks' gestation) (Dang et al., 2023). In this current study, the Temperature among neonates was found <36.5°C among 62 (31%), which indicated that a remarkable number of newborn had hypothermia. Similar study findings were observed in a past study where the incidence of mild hypothermia was

17.1% and the incidence of moderate/severe hypothermia was 4.6% (Dang et al., 2023). A past study conducted in neonatal intensive care units in Southwest Ethiopia showed that 50.3% of babies were admitted to neonatal intensive care units with neonatal hypothermia which shows high rates as compare to the current study (Ukke & Diriba, 2019).

Another past study was conducted to determine the prevalence, risk factors, and case fatality rate of newborn hypothermia in the Lira district in northern Uganda, where mild hypothermia was more common, 32% of people had it, compared to 18.7% who had moderate hypothermia. There was no severe hypothermia in any of them (Mukunya et al., 2021).

Similarly in another past study also high prevalence of neonatal hypothermia in the study area was observed about 43 percent (Adhikari, 2020). another past study also revealed comparatively high prevalence of neonatal hypothermia where 66.3% (95% CI: 61.1, 70.5%) had hypothermia (Alebachew Bayih et al., 2019a). Moreover another study also showed very high statistics of hypothermia where the prevalence of Neonatal hypothermia was 64% (Zelalem Ayichew, Derseh Gezie, Gelagay, & Anmut Bitew, 2022).

Conclusion:

Based on the findings of the study conducted among the neonates at tertiary care hospitals in Multan, it was concluded that a considerable number, 31% had hypothermia. Furthermore, some poor labor outcomes were observed like low birth weight, preterm birth and low APGAR Scores and CPR practice at birth due to labor complications.

Conflict of Interest:

The authors have no conflict of interest.

RECOMMENDATIONS

Following are future recommendations that need to be observed in future studies.

1. Temperature Monitoring Protocols:
   Researches must be conducted to develop standardized temperature monitoring protocols during the transfer of newborns, emphasizing the importance of maintaining an optimal thermal environment. Also researches need to be conducted to investigate the efficacy of continuous temperature monitoring devices and their integration into routine transfer procedures.
2. Education and Training:
   Implement comprehensive training programs for healthcare providers involved in the transfer of newborns. This should include proper techniques for maintaining thermal stability and awareness of the risk factors associated with hypothermia. Also assess the impact of ongoing education and training initiatives on healthcare providers' adherence to established protocols.

Financial Statement:

The corresponding author has managed himself along with the available resources in the Department of pediatric medicine, Nishtar Hospital Multan.

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