Original Article

Monitoring Temperature of Low-Birth-Weight Newborns

Comparison between Temperature Watch and Mercury Thermometer in Monitoring Temperature of Low-Birth-Weight Newborns at Kangaroo Mother Ward Children Hospital Chandaka Medical College Larkana

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ABSTRACT

Objective: The study observed the comparison of the temperature measuring by mercury thermometer in the axilla (standard method) and another measurement method by device BEMPU Temperature monitoring watch.

Study Design: Controlled prospective study

Place and Duration of Study: This study was conducted at the Kangaroo mother care ward, CMC Children Hospital, Larkana from November 2021 to December 2021.

Materials and Methods: In the study according to selection criteria, 100 neonates were selected, in which they were tied temperature monitoring watch for 02 days. The study assessed the comparison of the temperature measuring method by mercury thermometer in the axilla (standard method) and another measurement by temperature watch device. The temperature was monitored by a trained staff nurse, for two minutes every 6 hours for 48 hours, on standard method in axilla while on BEMPU watch device, whenever watch beep and blink pink light.

Results: A total of 100 neonates were included in the study, 1080 times temperature was observed, among them 215 times hypothermia monitored. In the study female neonates seemed more participation; male to female ratio was 1:1.2. The majority of neonates was registered below 7 days and had very low weights below 1500gms and preterm. On screening, the sensitivity and specificity of the BEMPU wrist device in monitoring hypothermia were 98.60% and 95.11% respectively. The positive and negative predictive values of the BEMPU wrist device were 83.79% and 95.11% respectively. The accuracy of the wrist in diagnosing hypothermia was 95.82%.

Conclusion: The temperature watch (BEMPU wrist device) is reliable detecting and alerting tool for newborn hypothermia, allowing for quick treatment and perhaps avoiding problems.

Key Words: Temperature, Watch, BEMPU watch, Very, Low, Birth, Weight, Kangaroo

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INTRODUCTION

Maintaining normal body temperature in newborn infants has, for decades, been shown to improve their survival and outcomes.[1-3]

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Interventions maintaining normal body temperature can help to reduce neonatal mortality or morbidity by 18% to 42%.[4]

The World Health Organization (WHO) defined hypothermia in newborns as body temperature <36.5°C. The causes of hypothermia in preterm and low birth weight newborns are less subcutaneous fat, decreased amount of brown fat, and an immature temperature regulating system.[5] The hypothermia is one of the most important causes of diseases and deaths in newborns in developing countries,6 as compared to term and normal birth weight newborns.[7]According to a study conducted at Aga khan university hospital Karachi in 2019, the frequency of hypothermia in low birth weight neonates is 2.5%.[8] Many instruments are used to record the temperature of newborns such as mercury and digital thermometer managed manually and take time to record the temperature and their perfection is uncertain.[9] The

temperature watch tied on the wrist is an automated continual recording instrument that can record the temperature in newborns and specify incidents of hypothermia by blinking pink light and ring. Whereas normal body temperature is shown by blinking the blue light. The temperature watch is user-friendly and helps in the continuous monitoring of temperature easily observed by caregivers and staff. The temperature watch has a hypothermia incident sensitivity of 98.6% while specificity is 95%.[10] The temperature watch has clinical proof in enhancing weight gain and encouraging Kangaroo Mother Care in low birth weight newborns.[11]A study was conducted in India on the temperature watch that has shown to decrease death in low birth weight newborns.[12]

The rationale of this study is to detect hypothermia in newborns in the Kangaroo mother care ward by using a temperature watch and compare with routine mercury thermometer monitoring in detecting hypothermia.

MATERIALS AND METHODS

Study Design: Controlled prospective study

Study Setting: Kangaroo mother care ward, CMC Children Hospital, Larkana.

Duration of Study: This study was conducted from 1st November to 31st December 2021.

Sample Size: A total of 100 neonates were included in the study for screening to compare the monitoring of temperature by watch device and mercury thermometer.

SELECTION CRITERIA

Inclusion criteria:

- Newborns having a low birth weight
- Parental consent to participate in this study

Exclusion criteria:

- Newborns having congenital malformations
- Sick newborn vitally unstable
- Parents not willing to participate in this study

Data Collection Procedure: A controlled prospective study was conducted in the Kangaroo mother care ward, CMC Children's hospital, Larkana during the period from 1st November to 31st December 2021. In the study, a total of 100 newborns were included. Newborns having low birth weight without congenital malformations, vitally stable, and parents who were willing to participate were included in this study.

Before the study, all the information regarding the study was given to the neonate's parents and written consent was taken and ethical permission was taken from the ethical review committee of SMBB Medical University. Demographic and other related information such as name, age, gender, gestational age, and birth weight were recorded. BEMPU temperature watch was tied to the neonate's wrist at the time of admission. BEMPU temperature watch device beep and flash pink light when the infant is in hypothermic condition. BEMPU temperature watches were applied for 48 hours on each neonate, monitored by the trained staff nurse. During the study, help was taken by mothers/attendants to alert staff nurses when a beep alarmed and pink light flashed. The staff nurse recorded axillary temperature 02 minutes every 6 hours for 48 hours and at the time when the watch device indicated. And also temperature is recorded when the watch device flashes pink light, to cross-check the temperature, to verify or deny the hypothermia. Both recordings (axillary method and watch device) were cross-checked with each other.

Statistical Analysis: Data was analyzed on SPSS version 21.0. Percentage and frequency were calculated for categorical variables like gender, gestational age, diagnosis, and the number of hypothermia episodes. Mean and standard deviation was calculated for quantitative variables like age, weight at admission, daily weight, and final weight.

RESULTS

In the current study, a total of 100 neonates, with low birth weight according to eligible criteria were selected i.e. The mean age of the infants observed was 6 days ± 0 days, and according to the age, less than 7days 77% of newborns and age more than 07 days seemed in 23% newborns.

Male (55%) participation seemed more as compared to female (45%) while frequency related to the gestational age seemed more in preterm neonates (59%), after that term, and post-term (41%) and (05) respectively. Frequencies of neonates regarding the weight of neonates have seemed less than 1500 grams 56%, less than 2000 grams 39% and less than 2500grams were 5% consequently. Table 1.

Table No. 1: Characteristics of study participants

Characteristics		Distribution
Age	<7 day	77
	>7 day	23
Sex	Male	55
	Female	45
Weight	<1500gm	56
	<2000gm	39
	<2500gm	05
Gestational age	Preterm	59
	Term	41
	Post Term	00

In the current study, a total of 253 hypothermia episodes were identified by the watch device equipment, with 212 of these being true positives. The equipment identified a total of 800 normal temperature occurrences, with 03 of these being false negatives. The device's sensitivity and specificity were 98.6 percent and 95.11percent, respectively, with 83.79 percent and 95.11 percent positive and negative predictive values. Table: 02 At least one episode of hypothermia was experienced by 90 of 100 newborns or 90 percent of the

research participants. Each of the 15 neonates experienced four episodes of hypothermia; 25 and 25 babies experienced three and two episodes, and 30 babies experienced just one episode.

Table No.2: Screening of Hypothermic Episodes by Temperature Watch versus Standard Monitoring With Mercury Thermometer and Weight Gain

	Neonate Truly Hypothermic (Axilla < 36.5 C)	Neonate Truly Non-Hypothermic (Axilla > 36.5 C)
BEMPU Showing Hypothermia (Positive Alarm)	212	41
BEMPU Showing Non-Hypothermia (Negative/No Alarm)	03	797

DISCUSSION

Preterm newborn infants whose birth weight is < 1.5 kg (very low weight) are prone to hypothermia. They suffer because their skin is not functionally mature and the high transepidermal water loss can result in hypothermia.[13] Additional physiologic risk factors for hypothermia include decreased brown fat, a large surface area–to–body mass ratio, and a poor metabolic mechanism for responding to thermal stress.[14]Results from this study are promising in that the temperature watch's ability to detect hypothermia at a significantly higher rate of sensitivity and specificity. It's worth noting that 95 of the 100 newborns in the research experienced hypothermia at least once. Hypothermia is a regular occurrence in postnatal wards, according to this study. Furthermore, monitors provide continuous monitoring easily picked by a caregiver. Thus temperature watches help to facilitate early detection of hypothermia and early intervention thus preventing serious consequences in newborns, especially low birth weight is a great challenge for survival. This will facilitate kangaroo mother care and the overall outcome of preterm and low birth weight newborns.[15]

CONCLUSION

Temperature watch's ability to detect hypothermia at a significantly higher rate than with standard intermittent monitoring by staff. Furthermore, monitors provide continuous monitoring easily picked by a caregiver. Thus temperature watches help to facilitate early detection of hypothermia and early intervention thus preventing serious consequences in newborns. This will facilitate also kangaroo mother care at home.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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