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Differences Baby's Body Temperature in the Six Hours Postpartum between a Cold Room And A Warm Room

Rahmatul Ulya, Ratna Dewi, Sri Burhani Putri

***Abstract*— In developing countries including Indonesia, high newborn morbidity and mortality is still a major problem. One of the causes of morbidity and mortality is hypothermia. Hypothermia is a condition characterized by a decrease in body temperature below 36.50C due to imperfect regulation of the baby's body temperature.**

***Index Terms*— hypothermia, body temperature.**

I. INTRODUCTION

In developing countries including Indonesia, high newborn morbidity and mortality is still a major problem. One of the causes of morbidity and mortality is hypothermia. Hypothermia is a condition characterized by a decrease in body temperature below 36.50C due to imperfect regulation of the baby's body temperature.

Newborns can't regulate their own body temperature unlike adults, so a newborn's body temperature will cool or heat up quickly depending on the temperature of the room where the baby is. There are four factors that can cause heat loss in newborns, namely evaporation, conduction, convection and radiation. At first, because it was born wet, the newborn will lose most of his body heat through evaporation from the surface of his wet skin. The baby will then lose heat again due to contact with cold surfaces (conduction), contact with cold air (convection), or contact with lower temperature objects in the vicinity, such as cold walls and open windows (radiation).).

One effort to prevent further heat loss in newborns is to delay bathing the newborn, even if bathing him in warm water. This is because newborns have not been able to adapt to conditions outside the mother's womb.

The World Health Organization (WHO) itself even recommends bathing a newborn who is full-term and healthy when he is more than six hours old or until the baby's body temperature becomes stable, which is around 36.50C - 37.50C. Six hours is the process of a baby to reach a stable body temperature. Because newborns in the first minutes of life experience a decrease in body temperature of 2-4 0C, and the most heat lost occurs in the tenth to twenty-first minutes after birth, then it will return to normal after the baby is four to eight hours old. , provided that the ambient temperature is set as well as possible.

From the results of Joseph Mizzi's research, it is evident that delaying bathing newborns results in a significant advance in heat treatment in newborns. The incidence of hypothermia was more common in infants who were bathed immediately (74.5%) than infants who were bathed on the second day of life (56.6%). In this study, it was also found that differences in environmental temperature also influenced the incidence of hypothermia in newborns, hypothermia was more common in winter (80.4%) than in summer (61.9%).

In Indonesia, the room temperature in each region varies greatly depending on the location of the area in the lowlands or highlands (mountains). With the difference in room temperature, of course there is a difference in the adjustment time for the baby's body temperature to be stable or normal so that the care provided to the baby will also be different.

II. MATERIALS AND METHODE

A. Study Desain and Research Sample

The design used is a comparative analytical method of study by taking data prospectively from examination and observation of room temperature and body temperature of newborns and continued every thirty minutes until the baby is 6 hours old. This study studied the dynamics of changes in body temperature of normal newborns in 6 hours postpartum who were born in a cold room with a warm room.

The number of samples to be studied is 60 babies, consisting of 30 babies from a cold room and 30 babies from a hot room. The sampling technique in this study is consecutive sampling.

B. Operasional Definitions

The variables of this study included independent variable is room temperature and dependent variable is baby's temperature.

C. Data Collection Technique

Newborn data is taken directly from the medical record, while to obtain data about room temperature, a room thermometer is used, and to obtain data about the baby's temperature, a digital thermometer is used. The measurement process is carried out after the baby is born and is continued every thirty minutes until the baby is six hours old, then the results obtained are recorded on the

Rahmatul Uliya, Midwifery Programme, Sumatera Barat University, Lubuk Alung, West Sumatera Province, Indonesia
Ratna Dewi, Midwifery Pasaman Barat Academy, Simpang Ampek, West Sumatera Province, Indonesia
Sri Burhani Putri, Nursing Programme, Sumatera Barat University, Lubuk Alung, West Sumatera Province, Indonesia

observation sheet. If at the same time it turns out that there are several babies that must be examined, the researcher involves team members (2 midwifery students) so that the data can be collected properly.

D. Data Analysis

The quantitative variables were recorded as Mean±SD, median and percentage. Test the normality of data by Shapiro-Wilk test and hypothesis test using paired t test. A two-tailed *P*-value of <0.05 was considered statistically significant. A two-tailed *P*-value of <0.05 was considered statistically significant. Data were analyzed using the Stata version 14.2 (Stata Corporation).

II. RESULTS

The characteristics of mothers who give birth are divided into two variables, namely maternal age and maternal gestational age. While the characteristics of babies born consist of gender, order of children (children to) and birth weight (Table 1).

Table 1. Characteristics of the Mother Who Gives Birth

	Characteristics	Room		Homogeneity test	
		Cold (n = 30)	Hot (n = 30)	t_{test}	P value
1	Mother's Age (Years)			0,71	0,48
	$\bar{x}$ (SD)	29 (5,3)	27,9 (6,2)		
	Range	19 – 39	19 – 40		
2	Gestational Age (weeks)			0,36	0,72
	$\bar{x}$ (SD)	39,2 (0,6)	39,1 (1,4)		
	Range	38 – 40	37 – 42		

Table 2. Characteristics of Babies Born

	Characteristics	Room		P value
		Cold (n = 30)	Hot (n = 30)	
1	Gender			1,0
	Man	16	16	
	Woman	14	14	
2	Birth Weight (grams)			0,052
	$\bar{x}$ (SD)	3253,3 (429,7)	3449,8 (329,9)	t_{test} = 1,99
	Range	2500 – 4000	2750 – 4000	

III. DISCUSSION

From the results of the t test and p values, it shows that there is a difference between the minimum and maximum temperatures between babies born in a cold room and a hot room. This can be seen from the t test value = 6.73 and the p value <0.001 at the minimum temperature, and the t-test = 8.33 and the p value <0.001 at the maximum temperature.

Babies born in cold rooms have an average minimum temperature of 34.98 0C (SD = 0.51) with a range of 34.0 – 35.9 0C, while babies born in hot rooms have an average minimum temperature of 35.78 0C (SD = 0.41) with a range of 35.0 -36.4 0C. Thus, it can be concluded that the average minimum temperature of babies born in a cold room is lower than that of babies born in a hot room.

The average maximum temperature of infants in a cold room is 36.10C (SD = 0.41) with a range of 35.3 – 36.90C, while the average maximum temperature of infants in a hot room is 36.80C (SD = 0.28) with range 35.8 – 37.3 0C. So it can be seen that the maximum temperature of babies born in a cold room is lower than the maximum temperature of babies born in a hot room.

Newborns have a higher risk of becoming hypothermic when in a room that has a low room temperature. According to the research results of the Tehran University of Medical Sciences, every 10C increase in ambient temperature can reduce the incidence of hypothermia by 0.81%(4).

According to Neelam Grover and Richmond Estate (3), hypothermia (decreased body temperature) in newborns is caused by a disorder of the baby's body temperature regulation mechanism and low environmental temperature. This can be seen from the higher incidence of hypothermia in winter (3.9%) than in summer (1.9%). So it can be concluded that babies born in cold rooms have lower body temperatures than those born in hot rooms.

Another study by Kumar and Aggarwal (25) concluded that there is a strong correlation between room temperature and infant temperature. During the winter, 19.1% experienced hypothermia and 8.5% experienced hyperthermia, while during summer only 3.1% experienced hypothermia and 36.8% experienced hyperthermia.

Newborns must be able to adjust themselves from intra-uterine life to extra-uterine life. One form of adjustment to a newborn's life is adjustment to room temperature. Inside the uterus, the baby is in an environment that has a temperature of 370C, and when he is born, he is exposed to an environmental temperature that is much colder than the temperature of the uterus. The lower the temperature of the baby's environment, the harder the baby's efforts to adapt to the temperature of the environment will be. This is because newborns cannot regulate their own body temperature like adults, so the newborn's body temperature will cool or heat up quickly depending on the room temperature the baby is in.

IV. CONCLUSION

1) Within six hours postpartum, babies born in cold rooms have lower minimum and maximum temperatures than babies born in hot rooms.
2) The time to reach the baby's minimum and maximum temperature in six hours postpartum in a cold room is longer than in a hot room.
3) The body temperature curve for babies born in a cold room in six hours postpartum is below the body temperature curve for babies born in a hot room.

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