

# The Effectiveness Of Using Aluminum Foil Baby Scard To Prevent Hypothermi In Lbw At Abdul Manam Simatupang Hospital

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## ABSTRACT

The causes of maternal death have changed, where bleeding and infection tend to decrease while the proportion of preeclampsia-eclampsia is increasing. The general purpose of the study was to find out the relationship between pre-eclampsia and the action of Sectio Caesaria at Abdul Manan Simatupang Hospital in 2021. This research method uses quantitative methods with a cross sectional approach. The population of this study amounted to 73 with a sample of 73 mothers who gave birth by using a total sampling technique. The research instrument used an observation sheet. The data analysis technique used descriptive analysis and chi square test. The results showed that of the 73 respondents who gave birth, the majority experienced severe eclampsia as many as 41 people and 38 people who received Sectio Caesarea (52.1%). Meanwhile, of the 32 mothers who suffered from mild preeclampsia who received Sectio Caesarea, 8 people (11.0%). The results of the chi-square test are known that the significant value of p value is 0.000 ( $p < 0.05$ ), then  $H_0$  is rejected so that in this study there is a significant relationship between pre-eclampsia and sectio caesaria at Abdul Manan Simatupang Hospital in 2021. The conclusion is that there is a relationship between pre-eclampsia and sectio caesarea. Suggestions for this study are expected for health workers to be able to detect complications of pregnancy and childbirth as early as possible in order to minimize the incidence of severe pre-eclampsia.

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## 1. Introduction

LBW is a health problem that requires attention in various countries, especially in developing countries or countries with low socio-economic conditions. WHO (World Health Organization) defines LBW as a baby born weighing 2500 g. WHO data states that the prevalence of babies with LBW in the world is 15.5% or about 20 million babies born every year, about 96.5% of them occur in developing countries (WHO, 2018). Efforts to reduce LBW babies up to 30% in 2025 and so far there has been a decrease in the number of LBW babies compared to the previous 2012 which was 2.9%. With this, the data shows that there has been a reduction from 2012 to 2019 from 20 million to 14 million LBW babies.

One of the main risk factors for LBW is hypothermia. Infant mortality in Indonesia caused by hypothermia is 24.2% of cases. Hypothermia contributes to the infant mortality rate of 6.3%. One of the causes of hypothermia is the poor handling of newborns. One of the appropriate treatments for newborns is the use of a baby swaddle covered with aluminum foil.

Based on the results of the study by comparing the Heat Insulation Blanket with plastic wrap for the Prevention of Decrease in Body Temperature of Baby White Rats. Clinically, the value of the median difference is -0.1, so there is no significant difference in temperature changes at 15 minutes in the blanket and plastic wrap group. At 30 minutes, the median difference was -0.5, so clinically there was a difference in the blanket group and the plastic wrap group with a median difference of 0.1. then clinically there was a difference in the blanket group and the plastic wrap group with a median difference of 1.9.

The purpose of the study was to prevent hypothermia in LBW by using aluminum foil at a more economical price whose use could be reached by all circles. This research needs to be done further in order to provide care for LBW that can be done as soon as possible and can later be used by health workers, especially midwives. So that people with access that is still difficult to get services such as hospitals, can still get services for LBW cases. This research is also supported by the limitations of the incubator owned by the midwife. One of the measures to prevent hypothermia in newborns can be done by warming the baby's body, namely by treating conventionally in an incubator; however, incubator technology is relatively expensive. The use of incubators in developing countries requires special attention, especially the availability of adequate electricity sources, trained personnel for supervision, maintenance and repair of equipment, sterilization of incubators, and the number of incubators. It is often found that one incubator is used for more than

one baby because the number is limited, this increases the risk of nosocomial infection.<sup>6</sup>

If the baby is not treated immediately in order to maintain his body temperature, he will experience hypothermia. Hypothermia has a very severe impact on BBL. Infants with cold injuries and hypothermia are at a higher risk of infection, jaundice and pulmonary haemorrhage (bleeding in the lungs). Babies with hypothermia will be more likely to die compared to BBLs who do not experience hypothermia. Hypothermia can cause morbidity and even death in LBW infants.

### **LBW**

Low Birth Weight Babies (LBW) are babies born weighing less than 2,500 grams regardless of gestational age (Atikah and Cahyo, 2010). According to Manuaba, 1998 in Anik Maryunani's 2013 book, LBW is a term that has been replaced by prematurity, because there are two causes for the birth of a baby weighing less than 2,500 grams, namely because the gestational age is less than 37 weeks and the birth weight is lower than it should be. age or because of a combination of both. WHO classifies LBW into 3 types, namely LBW (1500–2499 grams), LBW (1000-1499 grams), LBW (< 1000 grams).

### **Hypothermia**

Hypothermia is a medical disorder that occurs in the body, resulting in a decrease in temperature because the body is unable to produce heat to replace rapidly lost body heat. Loss of heat due to external influences such as water, wind, and internal influences such as physical conditions. Symptoms and signs of hypothermia, the baby does not want to suckle, the baby is lethargic, the baby's body feels cold, the baby's heart rate decreases and the baby's skin hardens. Moderate hypothermia: Decreased activity, weak crying, uneven skin color (*cutis marmorata*), weak sucking ability and cold feet. And severe hypothermia: the same as moderate hypothermia, bluish lips and nails, irregular breathing, slow heart sound, then hypoglycemia and metabolic acidosis occur.

#### a. Hypothermia Classification

- 1) Mild hypothermia, temperature <36C
- 2) Moderate hypothermia, temperature between 32C - 36C.
- 3) Severe hypothermia, temperature less than 32C

#### b. Heat loss mechanism

Newborns cannot regulate their body temperature, and can quickly lose heat if not treated immediately. Babies who experience hypothermia are at risk of death. The mechanism of heat loss in newborns occurs through:

1. Radiation is heat loss that occurs when a baby is placed near an object that has a lower body temperature than the baby's body temperature, for example, a baby is placed near an open window.
2. Conduction is the loss of heat through direct contact between the baby's body and a cold surface, for example a baby is placed on a scale or a baby bed without a mattress.
3. Convection is heat loss that occurs in babies when babies are exposed to cooler ambient air, for example wind from fans, air conditioning in the delivery room.
4. Evaporation is heat loss due to the evaporation of amniotic fluid on the body surface after the baby is born because the body is not immediately dried.

### **Aluminum Foil**

Flexible packaging is a form of flexible packaging formed from aluminum foil, plastic film, selopan, plastic film coated with aluminum metal (metalized film) and paper made in one or more layers with or without thermoplastic material or other adhesive materials as a binder or construction coating. Packaging can be in the form of sheets, bags, sachets or other forms. Recently, packaging marketing has become popular for packaging various products, both solid and liquid. Used as a substitute for rigid packaging or canned packaging for economic considerations, ease of handling.

The superior properties of Aluminum when compared to other metals are as follows:

1. Light weight with density aluminum at room temperature (29C) about 2.7 g/cm<sup>3</sup>.
2. Aluminum has a tensile strength of 8 kg/mm<sup>3</sup>, but this strength can turn out to be twice as strong if the Aluminum is subjected to a melting or rolling process. Aluminum also becomes stronger with the addition of other elements such as Mg, Zn, Mn, Si.

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3. Aluminum corrodes by forming a thin oxide layer which is very hard and this layer can prevent rusting of the aluminum underneath. Thus, aluminum is a metal that has better corrosion resistance compared to other iron and steel.
4. Aluminum is the most economical metal as a conductor of electricity because of its density of copper density, where the current capacity of aluminum is approximately twice the current capacity of copper.
5. Aluminum is an anti-magnetic metal.
6. Aluminum is a non-toxic and odorless metal.
7. Aluminum has good properties for mechanical processes from its elongation ability, this can be seen from the process of casting, cutting, bending, extrusion and forging of aluminum.
8. Aluminum has a low melting point, therefore we can recover aluminum metal from scrap.

## Characteristics of aluminum

Aluminum is a very reactive element so it is easily oxidized. Due to its reactivity, Aluminum is not found in nature in elemental form, but in the form of compounds in the form of alumina and silicon oxides. A very economical source of Aluminum is bauxite. Bauxite is a seed that contains a lot of Alumina (Al<sub>2</sub>O<sub>3</sub>) which is 30-60% and 12-30% is water. The more iron oxide that contaminates, the darker the color will be. Bauxite can be white, cream, yellow, red or brown and can be as hard as rock. However, some are as soft as clay (Al<sub>2</sub>O<sub>3</sub>.4SiO<sub>2</sub>.2H<sub>2</sub>O). Aluminum Alloys contain 99% Aluminum and 1% contain manganese, iron, silicon, copper, magnesium, zinc, chrome and titanium. Aluminum also has superior properties compared to other metals.

## 2. Method

This type of research uses a quasi-experimental research design with a pretest posttest control group design.

### 1. Population and Research Sample

The population in this study was 60 LBW in RSUD H. Abdul Manan Simatupang. The sampling technique used is purposive sampling.

### 2. Data collection

The type of data collected is primary data in the form of respondents' identities, along with the variables studied through questionnaires and secondary data from respondents' medical records.

### 3. Processing and analysis of data

The data will be processed using SPSS version 20 software. Data analysis will be carried out using quantitative analysis to obtain research results.

## 3. Research Results and Discussion

### 3.1. Univariate Analysis

#### 3.1.1. Characteristics of Respondents

The characteristics of respondents at the HAMS Hospital Kisaran 2021 in this study were grouped by gender. Characteristics of respondents are described in table 1 as follows:

TABLE 1.

CHARACTERISTICS OF RESPONDENTS AT HAMS HOSPITAL IN 2021

Demographic Data	Frequency	%
<b>Gender</b>		
Man	9	45.0
Woman	11	55.0
<b>Amount</b>	<b>20</b>	<b>100</b>

Based on the table above, it is known that the respondents' characteristics based on gender are 11 people (55%), the majority of the babies are female, while 9 people are male (45.0%).

#### 3.1.2. Hypothermia Incidence in LBW at HAMS Hospital Simatupang

Data on the incidence of hypothermia in LBW at HAMS Simatupang Hospital obtained from 20

respondents can be seen in table 2 below:

TABLE 2.  
THE INCIDENCE OF HYPOTHERMIA IN LBW BEFORE AND AFTER BEING SWADDLED USING ALUMINUM FOIL AT THE HAMS SIMATUPANG HOSPITAL

Hypothermia Classification	Before being swaddled		After being swaddled	
	f	%	f	%
Normal temperature	0	0.0	19	95.0
Light (32-36 <sup>o</sup> C)	20	100.0	1	5.0
Medium (28-32 <sup>o</sup> C)	0	0.0	0	0.0
Weight (<28 <sup>o</sup> C)	0	0.0	0	0.0
Amount	20	100	20	100

Based on table 2 above, it can be explained that of the 20 respondents obtained before the Aluminum Foil baby swaddle was carried out as many as 100% (20 babies) experienced mild hypothermia, the temperature was between 32-36<sup>o</sup>C. While after swaddling the baby with Aluminum Foil, it was found that 95% (19 people) had experienced normal temperatures between 32-36<sup>o</sup>C and only 5% (1 person) had mild hypothermia.

### 3.1.3. Average temperature of LBW before using aluminum foil baby swaddle

LBW temperature data before Aluminum Foil Baby Swaddle is performed at HAMS Simatupang Hospital can be seen in table 3 below:

TABLE 3.  
MEASUREMENT OF LBW TEMPERATURE BEFORE USING ALUMINUM FOIL AT SIMATUPANG HAMS HOSPITAL

Variable	mean	median	SD	Min	Max
LBW temperature before being swaddled with aluminum foil	35.72	35.8	0.326	35.1	36.0

Based on table 3 above, it can be explained that from 20 respondents the average body temperature of LBW before the Aluminum Foil swaddle was 35.72<sup>o</sup>C or 100% (20 people) experienced mild hypothermia with temperature between 32-36<sup>o</sup>C, with Median 35.8, standard deviation 0.326, Minimum 35.1 and Maximum 36.0.

### 3.1.4. Average LBW temperature after Aluminum Foil

LBW temperature data after Aluminum Foil Bedding at HAMS Simatupang Hospital can be seen in table 4 below:

TABLE 4.  
LBW TEMPERATURE MEASUREMENT AFTER ALUMINUM FOIL AT SIMATUPANG HAMS HOSPITAL

Variable	mean	median	SD	Min	Max
LBW temperature after aluminum foil swaddling	36,80	36.75	0.344	36.0	37.5

Based on table 4 above, it can be explained that from 20 respondents the average body temperature of LBW after aluminum foil swaddling was 36.80.<sup>o</sup>C or 95% (19 people) experienced mild hypothermia with temperature between 32-36<sup>o</sup>C, with Median 36.75, standard deviation 0.344, Minimum 36.0 and Maximum 37.5.

### 3.1.5. Differences in LBW temperature before and after using Aluminum Foil Baby Swaddle

The results of the analysis of the effectiveness of using aluminum foil baby swaddles to prevent hypothermia in LBW at HAMS Simatupang Hospital using the Wilcoxon test, can be seen in table 5. as follows :

TABLE 5.  
THE EFFECTIVENESS OF USING ALUMINUM FOIL BABY SWADDLE TO PREVENT HYPOTHERMIA IN LBW AT HAMS

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HOSPITAL SIMATUPANG						
Data	N	mean	Mean Different	Z	p-value	
- Before	20	35.72	1.09	-3.927	0.000	
- After	20	36,80				

Table 5 shows that the average value of LBW body temperature before Aluminum Foil Bedding is 35.72 with mild hypothermia category and LBW body temperature after Aluminum Foil Bedding is 36.80 with normal category. The difference in the average value of the increase in LBW body temperature after the Aluminum Foil Baby Swaddle was 1.09.

Based on the results of the Wilcoxon statistical test, it was found that the value of  $Z = -3.927$  with a significant value of  $p\text{-value } 0.000 < 0.05$ , which means that there is a difference in body temperature before and after Aluminum Foil Bedding is performed on LBW infants. These results prove that the use of aluminum foil swaddles to prevent hypothermia in LBW has proven to be effective in increasing LBW body temperature in preventing hypothermia in LBW.

## 4. Discussion

### 4.1. LBW temperature before using Aluminum Foil Baby Swaddle

Based on the results of temperature measurements from 20 respondents, the average body temperature of LBW before the Aluminum Foil swaddle was 35.72°C or 100% (20 people) experienced mild hypothermia with temperature between 32-36°C, with Median 35.8, standard deviation 0.326, Minimum 35.1 and Maximum 36.0.

Respondents in this study all experienced mild hypothermia. Patients who experience hypothermia caused by room temperature that is too low, inhalation and infusion with cold fluids, decreased muscle activity, or the influence of drugs used. Because all of that can affect the decrease in the patient's body temperature so that the patient experiences hypothermia. Hypothermia can occur because the body loses heat quickly, causing body temperature to decrease through several mechanisms such as conduction, radiation, convection and evaporation (Filia, 2019).

Patients who experience hypothermia caused by room temperature that is too cold, infusion with cold fluids, cold inhalation, decreased muscle activity, or the influence of drugs used (such as vasodilators, general anesthetics, etc.) (Elsavir, 2012). Because all of that can affect the decrease in the patient's body temperature so that the patient experiences hypothermia. Hypothermia can occur because the body loses heat through several mechanisms including convection, radiation, evaporation and conduction (Lissauer, 2011).

Sinantyanta (2013) said postoperative patients are also at risk for intra and postoperative hypothermia due to loss of body heat due to exposure to cold operating room temperatures (18).°C). Similarly, Sugiyanto (2013) said that every patient undergoing surgery is at risk of experiencing hypothermia. Similar to this study, the research conducted at the Salatiga Hospital also showed that the majority of postoperative patients also suffered from mild hypothermia. Patients who experience hypothermia is due to factors that are too cold in the room, or the drugs used, because all of these affect the temperature drop.

swaddle (*swaddling*) is a way to wrap a baby in a blanket with the aim of providing a sense of warmth and comfort. Aside from being a hug, swaddling is a replica that is most able to provide an atmosphere similar to when he was still in the mother's womb. (dr. Suririnah, 2011)

According to the theory of development (Gessel) The effect of baby cloth swaddling can foster a comfortable attitude in the baby towards the disturbance of a thing, can create a warmth, calm the baby, help physical perfection. Swaddling will help the baby's bones stay straight and avoid bone defects due to the baby's many behaviors (Yossi, 2012).

Based on the results of the research above, the researcher assumes that by swaddling cloth to newborns, it can increase body temperature because of the comfort and warmth provided by cloth swaddling to newborns. The low body temperature of the baby before the intervention can be caused by several other factors, namely stabilization of the baby's body temperature, because there is no heat loss process either through radiation, convection, evaporation, or conduction. Meanwhile, the incubator still loses heat through radiation. Therefore, cloth swaddling can maintain body temperature in hypothermic babies.

#### 4.2. LBW temperature after using Aluminum Foil Baby Swaddle

After the intervention in the treatment group or patients who were treated with swaddling using aluminum foil the average temperature increased at normal temperatures, namely temperatures between 36-37.5°C or no longer hypothermic as many as 19 people (95%) and 1 person still experiencing mild hypothermia (5%). So that patients who were treated with a foil blanket experienced more temperature increases.

The results of this study are in line with research by Mulyo, et al (2020) which states that the application of aluminum foil blanket therapy is proven to be able to increase the temperature in patients so that it is useful to apply to postoperative patients with hypothermia. The decrease in temperature measured using a thermometer and given the intervention of aluminum foil blanket therapy reported the highest temperature increase was 2.6°C and the lowest was 0.6°C. The average temperature increase is 1.12°C.

According to Avellanas (2011), aluminum foil is used for passive external rewarming in the event of hypothermia due to ambient temperature. Aluminum foil blanket is not only used to warm the body but also helps in maintaining body heat, is able to withstand 90% of body heat so that it can be used to prevent and recover from hypothermia, is waterproof and windproof, provides compact emergency protection in all weather conditions, can be used as a tool Signaling because the surface is very reflective and reflects sunlight very well, reflector heat from the sun so that it can be used as a shade in hot conditions, lightweight and can be folded into a wallet size so it is easy to carry and use.

According to the researcher's assumption, the use of aluminum foil baby swaddles has proven to be effective in preventing the occurrence of hypothermia in LBW infants. From the results of measuring the body temperature of LBW infants after being given the intervention of aluminum foil blanket therapy, they reported that the average temperature increase was 1.09°C the highest. Because the aluminum foil baby swaddle, in addition to warming the body, also helps in maintaining body heat, being able to hold 90% of body heat so that it can be used to prevent and restore hypothermia conditions.

#### 4.3. Effectiveness of Using Aluminum Foil Swaddle to Prevent Hypothermia in LBW

The results of data analysis showed that the average value of LBW body temperature before Aluminum Foil Bedding was 35.72 with mild hypothermia category and LBW body temperature after Aluminum Foil Bedding was 36.80 with normal category. The difference in the average value of the increase in LBW body temperature after the Aluminum Foil Baby Swaddle was 1.09.

Based on the results of the Wilcoxon statistical test, it was found that the value of  $Z = -3.927$  with a significant value of  $p\text{-value } 0.000 < 0.05$ , which means that there is a difference in body temperature before and after Aluminum Foil Bedding is performed on LBW infants. These results prove that the use of aluminum foil swaddles to prevent hypothermia in LBW has proven to be effective in increasing LBW body temperature in preventing hypothermia in LBW.

Because even though they are both passive external warmers, cotton blankets only function to warm the body, while aluminum foil blankets, apart from warming the body, also helps in maintaining body heat, able to withstand 90% of body heat so that it can be used to prevent and recover from hypothermia conditions. water and wind resistant, provides compact emergency protection in all weather conditions, can be used as a Signaling aid because the surface is highly reflective and reflects sunlight very well, solar heat reflector so it can be used as a shade in hot conditions, lightweight and can be folded into a size wallet so that it is easy to carry and tuck in a backpack/carrier.

Aluminum foil blanket itself has benefits according to research conducted by Harris (2012) aluminum foil is used as a blanket to warm premature babies, with the principle of kangaroo care which is carried out for 30-60 minutes. According to Avellanas (2011), aluminum foil is used for passive external rewarming in the event of hypothermia due to ambient temperature. According to Brugger (2011), aluminum foil is used to prevent temperature drops in landslide events. In addition, aluminum foil is used as a building material and as a wrapping material.

So that patients who were treated with a foil blanket experienced a significant increase in temperature compared to patients who were not treated with an aluminum foil blanket.

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## 5. Conclusions

Based on the description of the results of research and discussion, it can be concluded as follows:

1. The average body temperature of LBW before the Aluminum Foil swaddle was 35,720C or 100% (20 people) experienced mild hypothermia, the temperature was between 32-360C.
2. The average body temperature of LBW after the Aluminum Foil swaddle was 36.800C or 95% (19 people) experienced mild hypothermia, the temperature was between 32-360C.
3. There was a difference in body temperature before and after the Aluminum Foil Swaddle was performed on LBW infants, with a p-value of 0.000. These results prove that the use of aluminum foil baby swaddles to prevent hypothermia in LBW has proven to be effective in increasing LBW body temperature in preventing hypothermia in LBW.

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