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THE EFFECTS OF CLOTHING ON THE THERMOREGULATORY PROCESS TO BABIES UNDER 37 WEEKS

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The paper presents the role of clothing on hypothermia which remains a widespread problem in this segment babies, especially after birth and through the first weeks of life. Thermoregulation is the ability to balance heat production and loss, in order to maintain body temperature within a certain normal range. In this context, it has been recognized the need to maintain optimal body temperature for babies, with clothing suitable for the gestation period. Comfort in this case is determined by a series of clothing properties that affect the thermal conditions and certain physiological indicators. In this respect 15 preterm were used as subjects of study and their temperature profile was registered. The developed textile products aimed to maintain the baby's temperature in the normal range and thus contributing in thermoregulation.

Keywords: clothes, hypothermia, thermal stability, body temperature, neonate.

INTRODUCTION

About 15 million babies are premature each year (5% to 18% of all births). These babies are born at less than 37 weeks and have low weight (<2500 grams) [1]. Among them, 1 in 8 low birth weight infants are likely to be hypothermic, and their survival is dependent on thermo-conservation [2]. The World Health Organization has predicted that 75% of these infant deaths could be prevented by avoiding hypothermia [3]. It has been demonstrated that „external sources of heat generation are much more effective at keeping infants warmer...and improving health outcomes...than routine preventative action” [4].

PURPOSE

Hypothermia occurs when the body temperature drops below 36.5°C (97.7°F), the lower limit of the normal range of 36.5–37.5°C (97.7–99.5°F). The new born infant with a body temperature of between 36.0–36.4°C (96.8–97.5°F) may be under cold stress which gives rise to concern. An infant with a temperature of 32.0–35.9°C (89.6–96.6°F) has moderate hypothermia, while a temperature below 32°C (89.6°F) is considered to be severe hypothermia (figure 1).



Although hyperthermia also increases energy needs, hypothermia seems to carry a higher risk of complications [6]. The reported studies revealed that premature neonate are vulnerable to heat loss (Table 1) and hypothermia following birth due to large surface area to weight ratio, immature thermal regulatory mechanisms and limited energy resources for heat production.

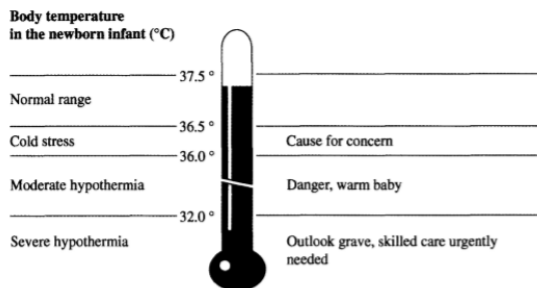


Fig. 1. Hypothermia in the case of the new-born infant

Table 1 - Source of heat loss in the case of neonate

Sources	Definition	Image
Conduction	Heat loss to a cooler object with contact to that object.	 A. Conduction
Convection	Loss of heat to circulating air that is cooler.	 B. Convection
Evaporation	Loss of heat to circulating air that is cooler.	 C. Evaporation
Radiation	Heat loss to a cooler object without contact to that object.	 D. Radiation

Adapted after Sherman et. all [5]



RESULTS AND DISCUSSION

The pilot clinical study took place in a neonatal intensive care unit in Public Medical-Sanitary Institution Municipal Clinical Hospital No. 1, Chisinau city, Republic of Moldova, where low birth weight babies were examined. This controlled study was performed under the supervision of physicians and nurses. The babies were dressed and their temperatures were monitored at 15 minutes for the first hour and then half an hour. Any adverse events such as hypothermia or hyperthermia were monitored, documented and appropriate measures were taken.

The data collected following the study performed in the hospital at the intensive care unit, which shows an insignificant decrease in body temperature in the case of children dressed in products adapted to the morphometry of preterm infants. The graph of the oscillation of the body temperature values are presented in figure 2.

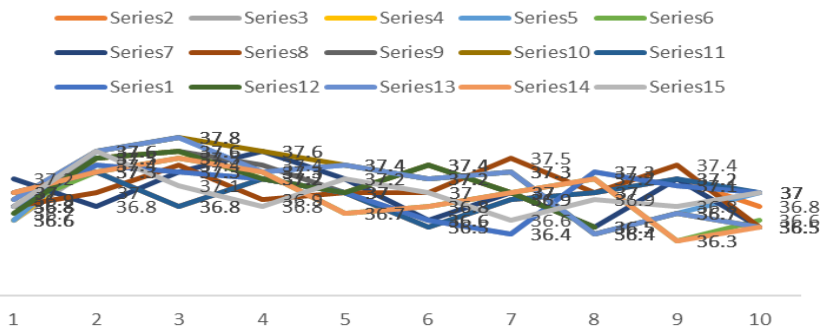


Fig. 2. Graph of body temperature diagram

Clothing plays an important role in this context. It is known that clothing forms a microenvironment, which is an insulating layer that decreases the potential for heat loss through evaporation. The clothing developed aims to increase thermal insulation, providing clothing comfort. So, the main functional advantage for the developed clothes is the reduction of additional risk factors for heat loss.

In order to ensure the comfort of premature babies, the best choice for these clothing products are natural materials, such as organic cotton, linen, lyocel. The materials from which the products were made have a pleasant touch, are hygroscopic, and allow the exchange of heat and moisture with the environment.

The developed products also satisfy the need for medical activities and manipulations. The solutions are recommended in the strategies of intensifying the medical efforts by creating the chances of survival and rehabilitation of children born prematurely. The proposed constructive and technological solution aimed to provide the necessary thermal and hygienic comfort to premature babies [7]. Anthropometric correspondence of the products, for the static and dynamic positions of the child, offers the possibility to provide medical help in a short time.



CONCLUSION

The study presents a solution to the problem of ensuring the thermal comfort of the premature child in the incubator by means of appropriate products corresponding to the morphometric characteristics and the necessity of carrying out certain activities and medical manipulations. These products have to offer thermal insulation and convenience to various movements and medical manipulations.

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ВЛИЯНИЕ ОДЕЖДЫ НА ТЕРМОРЕГУЛЯТОРНЫЙ ПРОЦЕСС У НЕДОНОШЕННЫХ ДЕТЕЙ, РОЖДЁННЫХ ДО 37 НЕДЕЛЬ

В статье представлена роль и значение одежды при переохлаждении недоношенных детей, которое остается широко распространенной проблемой у детей этого сегмента, особенно после рождения и в первые недели жизни. Терморегуляция - это способность уравновешивать производство и потерю тепла, чтобы поддерживать температуру тела в определенном нормальном диапазоне. В этом контексте необходимо поддерживать оптимальную температуру тела младенцев с помощью одежды, подходящей для данного периода гестации. Комфортность в этом случае определяется рядом свойств одежды, которые влияют на тепловой режим и определенные физиологические показатели. В связи с этим в качестве объектов исследования были взяты 15 недоношенных детей и зарегистрирован их температурный профиль. Разработанные текстильные изделия призваны поддерживать температуру тела ребёнка в нормальном диапазоне и тем самым способствовать хорошей терморегуляции.

Ключевые слова: одежда, гипотермия, термостабильность, температура тела, новорожденный.