

Correspondence

An inexpensive and 'do it yourself' infant warmer without electricity

Hypothermia is one of the most important risk factors for morbidity and mortality in newborns, more so in those with low weights at birth or those born prematurely.¹ Such newborns not only require good thermal insulation to conserve their heat, they also require additional thermal energy in the few initial days to prevent hypothermia.

Many techniques have been used to provide thermal insulation to newborns in the early hours after birth² but there is an unmet need for a safe, effective, inexpensive and electricity-independent heating source.

A few attempts have been made to address this requirement.³ Though such warmers are advertised as inexpensive, they cost around ₹6000. Moreover, the details of the substance which provides heating is not disclosed, which restricts their widespread fabrication and use. We have designed a sleeping bag for newborns with a unique warmer (Fig. 1). This sleeping bag has a foldable top which is zipped to cover the baby and a cap, and two washable urine soaks. It has thick inner thermal insulation to minimize heat losses. There is a zipped pocket at one of its ends and the unique warmer pouches are placed inside this pocket.

The warmer pouch works on the principle of phase transition. These pouches are filled with 1 kg of crude palm oil. Crude palm oil melts at around 37 °C which is also the mean human body temperature. When the warmer pouch is kept at temperatures higher than 37 °C such as in a hot water bath, the oil absorbs heat energy and melts. As soon as the entire oil in the warmer pouch melts, it is then placed inside the sleeping bag in its designated pocket. The child is never in direct contact with the oil pouch. The molten oil begins to provide thermal energy to the baby. In this process the oil gets cooled and begins to solidify. The oil continues to provide thermal energy and maintain its temperature at 37 °C until all the oil becomes solid. This energy is called the latent heat of fusion. By choosing crude palm oil we have ensured that the baby will never be exposed to a temperature higher than 37 °C because a just-melted oil pouch is to be placed inside the sleeping bag.

When two pouches, each having just-melted 1 kg crude palm oil, are placed inside a sleeping bag, the temperature inside the bag reaches 35 °C within 30 minutes and drops to 30 °C only after 7–8 hours. It is possible to use common 'hot water rubber bottles' as pouches for filling the crude palm oil. Crude palm oil is used in most oil mills and soap manufacturing units as a raw material and it costs around ₹70 per kg. The sleeping bag designed by us along with two oil pouches presently costs around ₹1000.

Such sleeping bags with a heat source can be used for low-birth



FIG 1. The infant warmer

weight babies who are either born at home or go home after discharge from newborn nurseries. They can also be useful in newborn care units, especially where the power supply is erratic and infant warmers and incubators are scarce. To prevent hyperthermia, we recommend stopping the use of warmer pouches when the baby's weight increases to above 2 kg and no sleeping bag when the weight increases to 2.5 kg. An evaluation of the safety of this sleeping bag is currently ongoing in a rural hospital and its community programme in Bilaspur, Chhattisgarh. A video which describes this sleeping bag is available at <http://www.youtube.com/watch?v=6Qz2LUkSp8o> and at www.nmji.in.

REFERENCES

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- 3 Available at <http://embraceglobal.org/> (accessed on 2 Mar 2014).

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