Should we use olive oil or sunflower oil on a preterm infant’s skin?

Many health professionals recommend olive oil as a topical emollient for infant skin regardless of gestational age. A preterm infant’s skin has a much thinner protective skin barrier than a term baby. The use of olive oil, which is high in oleic acid, has a damaging effect on the skin’s protective barrier and therefore may further compromise the well-being of an already vulnerable baby. Alternatively, highly refined sunflower oil, which is very low in oleic acid, has positive antibacterial, moisturising and regenerative properties on the skin’s protective barrier.

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Key points
de Meza T. Should we use olive oil or sunflower oil on a preterm infant’s skin? Infant 2013; 9(5): 170-72.
1. Many health professionals recommend olive oil for emollient use on preterm and term infants’ skin.
2. At 32 weeks’ gestation, a baby’s skin is immature and the protective skin barrier is thin.
3. The main constituent of olive oil is oleic acid, which can damage the stratum corneum.
4. Sunflower oil is very low in oleic acid and has properties that enhance the stratum corneum.
5. A review of practice guidelines is suggested to include recommendations for preterm infants’ skin

Structure and function of the skin
The skin is the largest organ of the human body, possessing a variety of essential functions. Its primary function is to act as a protective barrier against external pathogens and environmental allergens, toxins and irritants. In addition it acts as a sensory organ to touch, pressure and temperature and also maintains thermoregulation, prevents dehydration and helps in the elimination of waste products. Skin consists of three main layers: 1. The epidermis, the outermost layer 2. The dermis, the middle layer 3. The hypodermis, a deep layer of subcutaneous fatty tissue.

The stratum corneum – the ‘skin barrier’ – is the most superficial layer of the epidermis. Exposed at the surface of the skin, the stratum corneum is made up of keratinocytes surrounded by lipid layers in a formation comparable to bricks and mortar; the bricks representing the keratinocytes and the mortar the surrounding lipid layers.

Structure of a neonate’s skin
Babies born at term (37-42 weeks’ gestation) have a skin structure resembling...
that of an adult however, a baby’s skin is more vulnerable and less mature than adult skin. The stratum corneum and the epidermis are much thinner and contain fewer lipid layers, resulting in increased permeability, increased rate of transepidermal water loss (TEWL) and therefore reduced barrier function. Premature infants have immature immune systems, contributing to their continuous risk of infection, and their skin barrier status is dependent on their gestational age at birth. At approximately 32 weeks’ gestation the layers that make up the epidermis are complete but still very immature, with the stratum corneum only 2-3 cells thick. Consequently, extra special care should be taken to preserve the integrity of their skin to reduce the risk of acquired infections.

Neonatal skin undergoes a progressive adaptation to the extra-uterine environment. The skin of a newborn baby born at term has a pH of 6.34, which reduces to approximately 4.95 in the days following birth, to around 4.7 over the following month. The low pH of the skin surface creates an ‘acid mantle’ that helps protect against potentially harmful bacteria. Maintaining this pH is essential for providing a protective barrier function and for the maturation of the stratum corneum.

Due to the increased rate of TEWL in both premature and term infants, the skin becomes dry in the neonatal period and goes through a process of desquamation. The skin barrier continues to develop and is not fully mature until 12 months following birth. As a neonate’s body surface to body weight ratio is higher than an adult’s, their skin has increased vulnerability to the use of topical agents.

**Literature review: olive oil or sunflower oil?**

Baby massage has been practised for centuries in many cultures worldwide. ‘Positive touch’ is a therapy designed to allow parents of premature infants the precious opportunity to have gentle, loving contact while in the special care baby unit. Oil is used as a lubricant to prevent friction of the skin. Research demonstrates that positive touch therapy enhances the emotional development and weight gain of the preterm infant and also promotes maternal-infant attachment.

The National Institute for Health and Care Excellence (NICE) postnatal care guideline does not mention or recommend oils for use on a baby’s skin, whether preterm or term. Despite this, a qualitative study discovered that many mothers use olive oil on their babies’ skin, as it is recommended by health professionals as an emollient to alleviate dry skin in the early neonatal period. There is no available evidence to support the use of olive oil.

When vegetable oils are used for topical application on the skin they penetrate the stratum corneum. Various research studies have revealed that oils containing high concentrations of oleic acid can damage the skin’s protective barrier. Even small amounts of oleic acid disrupt the lipid barrier in the stratum corneum, which consequently causes increased skin permeability, inducing skin barrier breakdown. The main constituent of olive oil is oleic acid, comprising 55-85% of the oil.

Based on these research findings an international clinical expert group in paediatric dermatology stated that the use of olive oil as a topical medium on the skin of babies should be avoided. Similarly, the International Association of Infant Massage (IAIM) does not recommend the use of olive oil for infant massage.

However, a recent survey of maternity and neonatal units in the UK found that olive oil was the most widely recommended oil with 81.6% of the units recommending its use as an emollient or for positive touch therapy.

In contrast to the high percentage found in olive oil, sunflower oil has only 16-19% oleic acid and is comprised mostly of linoleic acid (68-72%). Sunflower oil mirrors skin lipids, resembling naturally occurring sebum in human skin. It has regenerative, restructuring and moisturising properties due to its high essential fatty acid content, namely the linoleic acid that enhances the skin barrier. Studies on mice revealed that a single application of sunflower oil on damaged skin significantly accelerated skin barrier recovery within one hour of application, with the effect still visible five hours later. Comparable findings were discovered regarding the anti-bacterial effect of sunflower oil and its ability to restore the intracellular lipids, reducing the occurrence of dermatitis. However, it was noted that the risk of nosocomial infections was increased and therefore it was advised that emollients should not routinely be used on premature infants.
contrast, research studies conducted within neonatal units in Bangladesh and Egypt found that the topical use of sunflower oil on preterm infants considerably improved skin condition and dramatically reduced the incidence of nosocomial infections and mortality24-27.

Refined oil is free from impurities, thin in texture, has almost no smell and has a longer shelf life8. The refining process destroys allergen-bound proteins, reducing the risk of allergic reaction29. Consequently, highly refined sunflower oil is safe, non-toxic and recommended for use on premature infants’ skin for positive touch therapy11,12. Comparatively, cold-pressed oils are not sterile and as such may contain bacteria and fungal spores, which may grow when they have access to moisture on the skin5.

Summary and recommendations
Research carried out over the last 15 years has revealed the damaging effects of olive oil on the skin barrier. The skin of an infant born at term is not fully mature until at least 12 months of age and a preterm infant’s skin is far more vulnerable. Despite the wealth of evidence that promotes the benefits of sunflower oil, too many health professionals still recommend olive oil as a topical skin emollient for all infants.

Substantial research has revealed the benefits of topical use of sunflower oil on a preterm infant’s skin. It has been found to promote barrier function and reduce bacterial infections, so much so that a clinical expert group in paediatric dermatology and also the IAIM no longer recommend the use of olive oil11,12. Highly refined oil is safer to use, as it is unlikely to cause a skin allergy. In order to ensure that the use of sunflower oil in the hospital setting complies with current safety measures, all bottles should be manufactured, labelled and provided by the hospital to avoid any risk of contamination or the illegal practice of decanting oil into unsuitable containers.

Highly refined food-grade sunflower oil is used in the SCBUs of two London hospitals. The clear, pale yellow, odourless oil is manufactured in the UK and bottled and labelled within a UK hospital pharmacy6. It is supplied in small 50mL plastic bottles to prevent it from becoming rancid; bottles are not meant to be shared and therefore should be labelled with each baby’s identity.

Fractionated coconut oil is also recommended for topical use on preterm infants in the SCBU as an alternative to sunflower oil31, however further empirical research should be undertaken to support its use. In order to initiate a change in current practice, the author recommends that NICE review its postnatal guidance to include recommendations for preterm infants’ skin.

References