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Neonatal Skin Care

Khaled El-Atawi^{1*} and Mahmoud Elhalik²¹Consultant Neonatologist, NICU and Clinical Quality Specialist, Latifa Hospital, UAE²Consultant Neonatologist, Head of Pediatric Department and Head of Health Informatics Unit, Latifa Hospital, UAE***Corresponding author:** Khaled El-Atawi, Consultant Neonatologist, Latifa Hospital, DHA, Dubai, UAE, **E-mail:** kelatawi@eim.ae

Skin is an integral component of integumentary system that prevents the internal organs from the harmful external stimuli and ensures better survival of the organisms. Other than protection, the integumentary system also serves other vital functions such as; thermoregulation, gas exchange, and conservation of proper hydration. Skin is developed by the 20th week of gestation and becomes functional even before the child is born [1]. Soon after birth, the skin of neonates witnesses a rapid change in its external environment; from a warm and aqueous environment in the uterus to a frequently changing cool and dry extra-uterine environment. The sudden change in the external environment makes the neonatal skin highly vulnerable for several adverse reactions.

The structure, function, and composition of neonatal skin are remarkably different from that of an adult [2]. The epidermal barrier function of the skin is closely linked to the gestational age; therefore poor skin integrity is commonly seen in premature neonates that predispose them to serious bacterial infections [3]. The skin of a full-term neonate is competent enough to protect the internal organs from harmful pathogens and dehydration, however; the thickness and structural integrity is still unfledged. The neonatal skin lacks in epidermal- dermal layer thickness, protective keratinocytes produced antimicrobial peptides (AMPs), natural moisturizing factor concentration, and collagen fibre density [4]. Unlike the skin of a full term neonate, the premature neonate lacks fully formed vernixcaseosa and normal desquamation pattern, which make them highly vulnerable to harmful exogenous agents and skin damage [2,3]. The pH and stratum corneum water content of neonatal skin is also higher comparable to adult skin. The commensal bacterial composition of neonatal skin includes *Firmicutes* (predominantly *Staphylococci*), followed by *Actinobacteria*, *Proteobacteria*, and *Bacteroidetes* that differs from the bacterial composition of an adult's skin [5]. Functionally, the neonatal skin has higher rates of water absorption, desorption, and trans-epidermal water loss (TEWL), the levels of TEWL are comparably higher in premature neonates [6].

Even though, the neonatal skin is able to protect it from the harmful external environment, it lacks functional competency like the adult skin. Therefore, a comprehensive neonatal skin care regime is needed to prevent potential skin breakdown, impede the percutaneous entry of pathogens and to prevent dehydration of the internal organs. It has been observed that neonates who are subjected to good skin routine care have no or few episodes of acute dermatitis and irritant diaper dermatitis [7].

Beneficial effects of good and hygienic cleansing practices in neonates are known to all. Lund et al. [8] provided evidence-based clinical practice guideline for neonatal skin care. These guidelines suggests a comprehensive neonatal skin routine care that includes; regular newborn skin assessment, bathing, vernix removal, umbilical cord care, circumcision care (if any), use of skin-disinfectants, preventive measures

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for diaper dermatitis, application and removal of medical adhesives, use of emollients, prevention of TEWL in preterm neonates, measures to avoid skin breakdown, and protocol for safe intravenous infiltration [8].

A proactive skin assessment in neonates is essential to identify any sign of skin breakdown, skin lesions, device related ulcers/pressure sores, and rashes. As per the AWHONN (Association of Women's Health, Obstetric, and Neonatal Nurses) [9] guidelines, a Neonatal Skin Condition Score (NSCS) should be used to assess the skin of neonate at time of birth, at time of shift-change of caregiver, and at the time of diaper change.

Bathing is the next important step for neonatal skin care. Untilldate, no fixed guidelines have been set-up that elaborate the frequency of bath among neonates. However, it was observed that majority of full-term healthy neonates were made to bath on the first day of life. However, first bath in preterm neonate depends on stability of its physiological condition. Studies indicate that healthy newborns bathed as soon as 1 hour after delivery are able to maintain their body temperature [8]. AWHONN [10] guidelines suggest that neonates with stable vital signs and body temperature are fit to take bath 2-4 hours after birth, while WHO recommends that first bath should be at least 6 hours after birth. A common consensus between AWHONN and WHO suggests that first bath should be done without antiseptic cleanser and all the vernix should not be scrubbed off. First bath of the neonate could be a sponge bath, under the faucet, tub bath, immersion bath, or swaddle bath with gentle cleansers and clean water depending on condition of neonate and parent's preference. This can be followed by skin lubrication and adhesive removal (if any) [8-11]. In preterm neonates bathing is related to decreased colonization of gram negative and gram positive bacteria, though incidence of colonization is independent from the frequency of bathing [12,13].

The consensus panel of the first European round table meeting of a group of clinical experts in paediatrics and dermatology held in 2007 stated that, liquid cleanser should be preferred over plain water for neonatal skin care because liquid cleaner have better cleaning and hydrating properties [14]. An ideal cleaner should not cause irritation, not change the pH of the skin and should not hurt the eyes of the neonate. It is believed that an ideal neonate/infant cleanser should contain one surfactant molecule and two other hydrophilic and lipophilic molecules. Such cleanser facilitates easy cleansing without need of excessive friction or rubbing the skin during bath [15]. In a comparative study between neonatal skin care regimen using liquid cleaner and water alone it was found that after 8 weeks of life, skin surface pH was significantly lower in neonates who were bathed with a liquid cleanser versus those who were bathed with water alone [11]. Another comparative study was conducted with 180 infants to compare the efficacy of daily bathing with water and mild cleanser to bathing with water alone. After two weeks of the observation, the study results showed

that cleansing with water alone led to a significant increase in erythema from baseline. In contrast, there was no change in skin erythema from baseline in the group that was cleansed with water and mild cleanser [16].

Neonatal skin tends to lose moisture quickly and become dry and scaly [17]. Hence, proper lubrication of the skin is also an integral part of neonatal skin care. Most of the parents, clinicians and care-givers believe that applying mild emollient to the skin of neonates after bathing helps to improve the hydration of the skin [11]. Emollients supply necessary lipids and water to the stratum corneum layer of skin that helps in preserving the hydration of the neonatal skin, decreasing TWEL, and improving its structural integrity, particularly in preterm neonates [18]. Studies have proved that emollients are helpful in reducing chances of infective dermatitis in pre-term neonates [19]. Few studies have also elaborated that prolonged use of emollient is helpful in improving the overall barrier function of the skin [20]. In preterm neonates the use of emollients improves the skin integrity and is closely associated with decreased incidence of dermatitis; however efficacy and choice of emollient always remain debatable in premature infants [21].

As a standard neonatal skin care regime, use of antiseptic disinfectants should be avoided. Studies report that antiseptic disinfectants are likely to cause chemical burns in the neonates [8,9,22]. Similarly extra caution should be taken while applying or removing adhesive tapes to the neonates, as these are associated with incidence of skin tears, tension blisters and contact dermatitis. Ideally, silicone adhesives should be used with neonates. Use of organic solvents, oil-based solvents, or silicon-based removers is suggested for safe adhesive removal in neonates [22].

Proper skin-care regime is required for neonates to maintain its structural integrity and functional competence. Regular bathing with mild liquid cleanser followed by application of an emollient is considered gold-standard skincare regime for a neonate.

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