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Care of Newborn and Infant Skin by Ayurveda

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Neonatal skin suffers a progressive adaptation to the extrauterine environment and special care is needed during this period. This skin is very sensitive, thin and fragile. Immaturity of the epidermal barrier reduces the defense against the excessive proliferation of microbes and makes the skin more vulnerable to trauma and percutaneous drug toxicity. Because of the peculiar characteristics of newborn, infant and children's skin, the use of cosmetic products designed for hygiene and protection requires caution. In order to preserve the integrity of neonatal and child's skin, this article reviewed basic preventive care practices in relation to hygiene, bathing, cleansing agents, topical products and their percutaneous toxicity.

Keyword: Cosmetics; Emollients; Newborn; Twacha; Ayurveda.

1. Introduction

In Ayurveda the word "TWACHA" or "CHARMA" is used for skin ^[1]. Twacha is derived from 'Twach-Savarne' Dhatu meaning the covering of body.

The development of skin follows the fertilization of Shukra & Shonita. In foetal stage (garbha) different layers of the skin are formed & this formation is caused by all the three doshas and particularly by Pitta. The formation of skin layers is just similar to the formation of layers, on the upper or outer surface of boiled milk. Just as the santanika formed in layers & gradually increase in thickness, all the layers formed in the developmental stage of the embryo of foetus join together to become the skin on the outer surface of the fully developed foetus ^[2]. The six layers of the Twak are formed from the Mamsa Dhatu ^[3] or Rakta dhatu ^[4]. After the Paka of Rakta by its Agni, it gets dried up to form the skin, like the deposition of cream on the surface of boiling milk. There are six factors which are considered responsible in the formation of Garbha. Twak is

formed & nourished by Matruja Bhava^[5] and in shaddhatvatmak bhava twak is considered as parthiv ^[6].

In our modern world skin is a multifunctional organ of great importance that promotes, through skin barrier function, mechanical protection, thermoregulation, immune surveillance, and prevents the loss of bodily fluids ^[7-9]. As previously thought that the skin barrier function reached its maturity at about 34 weeks of gestation. However, recent data show that it continues to develop until 12 months after birth ^[10].

The skin of the neonate is subjected to a gradual process of adaptation to the extra uterine environment, and special care becomes necessary during this period ^[9]. The neonate's skin is characterized by being sensitive, thin and fragile. Moreover, when compared with the skin of term NB, the skin of premature NB is even thinner, with a thinner stratum corneum, reduced cohesion between the epidermis and dermis and a less effective skin barrier function. As a consequence,

there is greater transepidermal water loss, increased percutaneous absorption of chemicals and easily induced skin trauma, even with the removal of any adhesive bandage. This leads to tendency to infections, toxicity and difficulties in fluid homeostasis [11].

The acidic pH of skin surface seen in adults and adolescents (pH <5) has a protective effect against microorganisms. In NB, especially in premature ones, skin surface pH tends to be neutral, which significantly reduces protection against excessive microbial growth. This may also promote increased transepidermal water loss, signaling an alteration of epidermal barrier function. Epidermal lipids play an important role in maintaining skin barrier function and skin integrity [12]. However, the lipid content of the skin of infants is lower due to the low activity of the sebaceous glands. On the other hand, their skin has a high water content [13]. In nurselings, the hydrolipid film is gradually replaced by nonglandular epidermal lipids, which are less effective in protecting the skin. In addition, the protective lipid barrier may not be reproduced by artificial means, so maximum care is needed not to destroy this barrier. Destruction occurs primarily by the use of inappropriate chemical products [12]. The dermis of NB and nurselings has less mature collagen than that of adults, and because it contains a high concentration of proteoglycans, it reaches higher water content. Other differences between the skin of NB, nurselings and children compared to that of adults are smaller thickness of the stratum corneum, increased number of vellus hair follicles, lower buffering capacity and higher surface/body volume ratio. The younger the child, the more evident these characteristics are, and they more pronounced in preterm NB, which implies greater susceptibility to potentially harmful external agents, increased transepidermal fluid loss, less ability to maintain homeostasis, and increased percutaneous absorption, which leads to greater systemic toxicity [14-15]. It is, therefore, particularly sensitive to excessive glandular secretion (sweat and sebum), to house dust mites, bacteria present in the external environment, impurities accumulated in the diaper area (feces

and urine), occlusion by diaper material, and extreme weather. Since the epidermal barrier is immature in infants, skin permeability is very high, especially during the first fortnight of life [7]. This causes a substantial risk of toxicity from the percutaneous absorption of drugs [16]. Moreover, this skin is also more easily attacked mechanically, as in the area of contact with diapers or with the use of wipes, which cause repeated and localized removal of cells of the stratum corneum and, consequently, increase the permeability of the skin. Over time, the child's skin becomes more and more impermeable, yet it always remains less permeable than the skin of adults. The skin care of newborn babies, infants and children should seek to preserve skin integrity, prevent toxicity and to avoid exposure of the skin to harmful chemical agents [17]. Since effective skin barrier function is vital for the newborn and its operation is limited by immaturity, optimized skin care is very important and may minimize the morbidity and mortality associated with this problem in the neonatal period. Moreover, it is necessary to bear in mind the special aspects of the skin of babies and children to prevent and avoid risks related to products applied topically in this age group.

2. Bathing

Immediately after birth, the vernix caseosa is often cleaned with a towel. However, the right time for the first bath of the newborn is still controversial. Generally, routine bathing is not considered harmful to the newborn; however, according to World Health Organization (WHO), it is recommended that the first bath be given only six hours after birth due to the risk of hypothermia during and after bathing [35, 58-63]. Nonetheless, a study by Behring *et al* [64]. (2003) showed that there was no significant difference in temperature between infants who were given the first bath one hour after birth and those who had their first bath from 4 to 6 hours after birth, supporting the findings of previous work conducted by PennyMacGillivray (1996) and Behnke and Varda (2000), who also found no difference in temperature related to the time of the first bath [65,66].

Observations on topical preparations

Table 1: Risks of transcutaneous absorption of topical products in newborn babies, infants and children [12-31].

Compound	Toxicity
Aniline (dye used in laundry)	Methemoglobinemia
Pentachlorophenol (laundry disinfectant)	Tachycardia, sweating, hepatomegaly, metabolic acidosis
Hexachlorophene (topical antiseptic)	Vacuolar encephalopathy
Resorcinol (topical antiseptic)	Methemoglobinemia
Boric acid (baby powder)	Vomiting, diarrhea, erythroderma, seizures
Lindane (scabicide)	Neurotoxicity
Salicylic acid	Metabolic acidosis
Isopropyl alcohol	under occlusion Hemorrhagic skin necrosis
Urea (exfoliating, emollient)	Uremia
Povidone-iodine (topical antiseptic)	Hypothyroidism, goiter
Neomycin	Neural deafness
Corticosteroid	Cutaneous atrophy, adrenal suppression
Benzocaine (topical antiseptic)	Methemoglobinemia
Prilocaine (topical anesthetic)	Methemoglobinemia
Methylene blue (dye)	Methemoglobinemia

But some authors [67-69] have established that the first bath should be given only when the temperature of the newborn is stabilized, instead of considering only the number of hours after birth as the ideal time for this. When bathing the newborn, the caregiver should focus especially on the areas that need more attention, such as face, neck, folds and diaper area. [8,70] In relation to routine bathing, it has been demonstrated that the bath itself is better than scrubbing with a sponge or some other cloth. The act of rubbing with a sponge or cloth promotes greater heat loss,

increased transepidermal water loss and reduced hydration of the stratum corneum [71-73]. The bath should be short, no longer than 5 minutes, especially if soap is used [9,74]. This will also help prevent skin maceration.⁷⁵ Frequency of bathing varies greatly between certain regions and countries depending on the culture of each place [68]. In fact, in many places, particularly those with warmer weather, mothers prefer to bathe their babies every day, even if not really necessary [62]

Table 2: Risks of using topical preparations in newborn babies, infants and children [32-57]

Compound	Product	Risk
Triclosan	Soap, deodorants, antiseptics	Same risk of toxicity of other phenolic compounds
Propylene glycol	Emollients, cleaning agents	Skin irritation and burning, Excessive enteral and parenteral use: risk of hyperosmolality and seizures
Benzethonium chloride	Cleaning Agents	Poisoning by ingestion, carcinogenesis
Glycerin	Emollients, cleaning agents	Hyperosmolality and seizures
Ammonium lactate	Exfoliating, emollient	Possible lactic acidosis
Coal tar	Shampoos, keratolytic products	Cancer risk due to excessive use of aromatic hydrocarbons
Tetracaine	Topical anesthetic	Contact Dermatitis
Ethanol	Oral cleaning solutions	Oral carcinogenesis
Methylisothiazolinone	Shampoos	Neurological defects
Sodium lauryl sulfate	Soap, shampoos	Skin irritation / contact dermatitis
Sodium laureth sulfate	Toothpaste, soap, shower gel, bath foam	Skin irritation / contact dermatitis

However, it is recommended that baths not be given daily [17, 76]. They should be given approximately twice a week until the baby starts to crawl [17, 76]. Premature infants should be bathed every 4 days [77]. The water temperature should be close to body temperature (37-37.5 °C) [68, 78]. However, some authors recommend a slightly lower temperature, corresponding to the temperature of the skin (34-36 °C) [73]. After the bath, if the skin of the newborn and infant shows any sign of dryness or cracking, an appropriate emollient should be applied, which, in addition to treating dry skin, protects the integrity of the stratum corneum and skin barrier [37,79]. Emollients are even more beneficial to babies with a higher risk of developing atopy (positive family history), and in these cases they should be used during and after bathing [68, 80-85]. Some authors have reported benefits with the use of emulsifying oils [86, 87]. The oils reduce water loss from the stratum corneum and keep skin clear of scales and crusts [15]. However, one should avoid adding olive and mustard oils to the bath due to the risk of contact dermatitis, although existing studies have been conducted only with adults [55, 68]. Furthermore, we should be careful with bath oils, as they can turn the bathtub into a slippery and dangerous surface [57]. Further studies about the implications of using these oils in infants are still needed.

Cleaning agents

Soaps are obtained by the reaction of a base with a mixture of fatty acid esters. Traditional bar soaps have good detergency, emulsifying power and produce enough lather, but they have an irritant action and their alkaline pH can destroy the superficial lipid layer of the skin of the baby, leading to excessive skin dryness [88-90]. Therefore, they should be avoided. Glycerine soaps, due to the excessive content of glycerin, which is a potent humectant, can absorb excess water out of the skin, potentially causing more dryness and irritation [74,91]. Syndets, also called synthetic detergents or 'soap without soap', do not have the disadvantages of soap and can be a good choice. They consist of surfactants with a

good detergent effect, have neutral or slightly acidic pH, are low-lather substances and cause little irritation. They may be solid or liquid, and although pleasant, they should not be used excessively [74,91]. Ideal cleaning agents should be liquid, mild, soap free, fragrance free, with neutral or slightly acidic pH; they should not irritate the skin or eyes of the baby nor change the protective acid mantle of the skin surface [8, 17, 34, 68, 73, 74,88-90, 92]. Some studies show that use of these liquid cleaners is better than use of only water in the bath, both in terms of hygiene (fecal matter and urine) and drying of the skin [88,93-104]. An additional protective effect to the skin of the baby and child can be achieved using a liquid cleaning agent containing an emollient [35, 36, 88, 98, 101]. Although this is the routine recommendation, studies regarding the use of cleaning agents are still limited. In a recent study, the effects on the development of the skin barrier of newborn babies who were given a bath with water, cleansing gel and topical lotion and of those who had a bath with only water were compared [104]. Adverse effects were not observed on the epidermal barrier in any of the groups. Regarding the appropriate time to introduce cleaning agents into the bath of infants, some studies recommend their use soon after the umbilical cord falls, [73] while others specify a time ranging from 2-4 weeks to 6 weeks after birth [88]. However, this time varies according to the personal preference of each mother [68]. Regarding shampoos, there is not a standard pediatric formula. They are usually based on amphoteric, nonionic agents. While the hair is short, thin and fragile, it is not necessary to use shampoos. The same product can be used for the body and hair [68]. This, however, is a matter of choice. When shampoos are used, the same aspects should be considered: they should be gentle, only slightly detergent with a pH close to the tear not to burn and irritate the eyes or skin, and they should not change the roots of the hair or be aggressive to the scalp, which are fragile in infancy [13,57,68,89,105]. Despite the fact that cleaning wipes are practical and have a pleasant smell, they are not recommended by most authors due to the risk of removing the lipid film of the

skin and causing sensitization. It should be noted that they contain soap, and that their continued contact with the skin can damage its barrier, causing contact dermatitis. It would be appropriate to rinse after use. Antiseptic soap and lotions [106, 107] should also be avoided.

3. Other skin care recommendations for newborn babies, infants and children

Some other precautions that should be taken to preserve baby's skin: - In infants, regular cleaning of the umbilical cord with clorexedine in the first 10 days of life until the cord falls can greatly reduce the risk of infection and the risk of neonatal death [63,108,109]. -The nails of babies should be kept clean and short to avoid injuries to the skin [9]. - Diapers should be changed frequently and superabsorbent disposable diapers should be used because they have greater capacity of maintaining the diaper area dry. [10] The hygiene of the diaper area with warm water and cotton without soap is sufficient for the daily cleaning of urine. For stools, mild soap is recommended. The routine use of topical preparations to prevent diaper dermatitis is not necessary for children with normal skin [106]. Additives in these preparations have the potential to cause contact sensitization, irritation and/or percutaneous toxicity. - The use of adhesive bandages on the skin of babies, particularly preterm ones, should be avoided to the maximum due to the risk of lacerating their skin, which is very thin. If their use is really necessary, very small pieces should be used, and they should be removed carefully. To facilitate removal, an emollient can be used [7].

4. Discussion

Use of synthetic based products, chemicals and their derivatives cause skin hazard with several side effects leading to numerous diseases. Allopathic system alone proving insufficient and there is need to supplement it with Ayurvedic herbal drugs. Now –a-days, in the whole world there is a turn to return the use of herbal products and adopt more natural way of life. The natural content in the herbs does not have any side effects on the skin of newborn and infants instead

enrich the skin with nutrients and other useful minerals. **Bala oil:** From very starting of life Ayurveda care the newborn skin, according to Acharya Charaka after Ulva parimarjan (Removing *vernix caseosa*), give massage to baby with Bala oil [111]. According to Ayurveda 'Bala' balances all the doshas – *vata, pitta, kapha*. It has more effect on vata dosha. Bala oil can be used orally, externally for massage and for giving enema (*basti*) also. bala is the best nervine tonic and rasayana for all kinds of vata disorders. It is also rejuvenative, nutritive and stimulant to the skin. **Almond oil:** The almond oil is obtained from *Prunus dulcis*. The almond oil basically contains about 78% of this fat. This oil contains very small amounts of super-unsaturated Omega-3 essential fatty acids. It proves to be very nourishing, and softens and strengthens the hair. The almond oil also proves to be a very good cleansing agent. Almond oil has been used for many centuries, even before it's spread as a commercial agro-product. **Coconut oil:** Coconut oil comes from the fruit or seed of the coconut palm tree *Cocos nucifera*, family *Arecaceae*. The melting point of coconut oil is 24 to 25 °C (75-76 °F) and thus it can be used easily in both liquid or solid forms and is often used in cooking and baking. Coconut oil is excellent as a skin moisturizer and softener. A study shows that extra virgin coconut oil is effective and safe hen used as a moisturizer, with absence of adverse reactions [3]. **Sunflower oil :** It is the non-volatile oil expressed from sunflower seeds obtained from *Helianthus annuus*, family *Asteraceae*. Sunflower oil contains lecithin, tocopherols, carotenoids and waxes. In cosmetics, it has smoothing properties and is considered noncomedogenic. **Turmeric:** Turmeric, *Curcuma longa* is a rhizomatous herbaceous perennial plant of the ginger family *Zingiberaceae*. New born babies also rubbed with turmeric on their forehead for good luck. Curcuminoids inhibit leukotriene biosynthesis via the lipoxygenase pathway and decrease prostaglandin formation [112]. **Aloe:** A native of southern Africa, the aloe vera plant has fleshy spiny-toothed leaves and red or yellow flowers. It is an ingredient in many cosmetics because it heals moisturizes, and softens skin.

Simply cut one of the aloe vera leaves to easily extract the soothing gel. **Green Tea** Green tea is tea made solely with the leaves of *Camellia sinensis* belonging to family Theaceae. Whether applied topically or consumed as a beverage or dietary supplement, green tea is a premiere skin protectant. It protects against direct damage to the cell and moderates inflammation, according to research from the Department of Dermatology, Columbia University, New York. Studies suggest that the catechins in green tea are some 20 times stronger in their antioxidant powers than even vitamin E. Men, women and children need to position this super shield on their side against the ravaging effects of the sun. **Neem** : The herb, *Azadirachta indica*, family Meliaceae has been found to have the properties of a Blood purifier, beauty enhancer. It is used for a number of medicinal purposes. Some areas where it can be used in the treatment of common cosmetic problems are skin cleanser [113]. Ayurveda views skin disease as relating mainly to high pitta and ama in the liver, plasma, and blood tissue. Although pitta is the primary dosha considered in such conditions, the characteristics of the rash may vary depending on whether other doshas are present. If vata is involved there can be much dryness, scaling, and cracking, when kapha is present, then there may be more swelling and weeping. There is often an immunological and emotional component connected to skin conditions that should also be considered and addressed.

5. Conclusion

The knowledge of medicinal plants used describe in Ayurveda seems to be well known to its culture and tradition. The present study identifies Ayurvedic herbs used to cure dermatological disorders of newborn and infants and minimizes side effects of chemical containing baby product. Herbs are having dual use, both as curative and cosmetic. Further extensive ethnobotanical and ethnopharmacological study may lead to the discovery of herbal compounds for skin care and cure

6. References

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