

Assessment of parental knowledge of daily skin care of children under three years*

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ABSTRACT

Introduction: The skin is an organ which plays many important functions. It is e.g. a highly specialized barrier and protects against mechanical trauma and UV radiation. Moreover it participates in the synthesis of vitamin D and also participates in the immune system. The skin of a newborn needs specific treatment due to its functional and anatomical differences. Skin of the baby achieves similarity to adult skin in 3 years old child. Significant difference included higher body surface vs. volume ratio which increases the permeability for potentially undesirable substances. Moreover the thinner stratum corneum of the epidermis and neutral pH provides insufficient protection against irritations and microorganisms. Therefore the skin

of the newborn requires special care and cosmetics as well as application of skin care methods which should take into account morphological and anatomical dissimilarity.

Materials and methods: The study was conducted on 125 parents, living in the West Pomeranian region, on the basis of the diagnostic survey method, using the author's questionnaire survey.

Conclusions: The parents have awareness about the composition nursing products and cosmetics. For the respondents, the internet and the doctor were the most important sources of information about child skin care.

Keywords: infant care; skin cream; substance.

INTRODUCTION

An integral part of baby care is skin care, taking into account differences in its structure in newborns and young children [1].

The stratum corneum consists of keratinocytes arranged in several levels. In the skin of an adult, dead skin cells are arranged horizontally and close to each other. In a child's skin, keratinocytes of the stratum corneum are loosely arranged, with only the cells of the lower layers tightly connected. In newborns, the epidermis is thinner. In children born before the 24th week, the stratum corneum is poorly developed or does not occur at all, which markedly increases the transepidermal water loss (TEWL), a marker of the efficiency of the epidermal barrier. In addition, in newborns, restoration of the protective lipid coat takes longer [2].

In premature babies with the corneal layer already present, its thickness is about 27.4 µm (vs. 50 µm in adult), so it is very thin. The skin of the arms, forehead and upper back is covered with buckled hair. The degree of immaturity affects the overall, changing appearance of the skin. In premature babies, the skin is red, transparent and its consistency is gelatinous. An increase in water and sodium content in the dermis with a smaller amount of collagen fibers promotes the formation of edema. Newborns born before 30th week still have a higher TEWL value, as opposed to children born on time. It depends on the very thin horny layer composed of only 2–3 layers of corneocytes [3].

At birth, the child's skin is covered with fetal vernix. Thanks to this, it is easier to move in the genital canal and the skin is properly moisturized and has protection against pathogenic microorganisms. Fetal vernix has a pH in the range of 6.7–7.4. In addition, it contains fatty acids, which protects the skin against the colonization of bacteria. Moreover, ceramides, cholesterol, wax esters and fewer remaining lipids are present [2]. The pH value of a newborn's skin is about 6.2–7.5, which means that it is neutral. Gradually in the initial 3 weeks of life, it decreases to 5.0–5.5 depending on the area of the body. On the skin of the buttocks, the pH is 6.2–6.8, while the skin of the lower limbs has a pH of 5.2–5.5. Lowering the pH is important because the acid reaction of the skin prevents the growth of microorganisms. Considering the fact that the skin of a newborn has a high pH and its immune system is poorly developed, it is extremely susceptible to infection [3].

The granular layer develops, the earliest, in the epidermis of the hands and feet. In other areas it appears later. It contains keratin, filling the spindle-shaped cell series. In the histological image, there is no continuity in it, it is fragmented and poorly visible [2].

The base layer includes, in addition to keratinocytes, melanocytes. They connect keratinocytes with cytoplasmic extensions in which melanosomes (where melanin is synthesized) are transported. One melanocyte may be connect with 36 keratinocytes and form together a melanin-epidermal unit [4].

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There is little melanin in the skin of a newborn, although melanocytes transfer the dye to keratinocytes in the epidermis from the 20th week of fetal life [5]. A smaller amount of melanin in the base layer results in a very low degree of protection of the skin against ultraviolet radiation. Children are therefore particularly vulnerable to sunburn [6], and recent reports show that sunburn occurring in childhood significantly increases the risk of development malignant melanoma in adulthood [7].

The skin of children is characterized by a smaller number of hemidesmosomes, binding the basal layer of the epidermis with the basal membrane and anchoring fibers that connect the basal membrane with the dermal papillary layer. Collagen, heparan sulphate, laminin and proteoglycans are also present in the basal membrane. Bundles of collagen and elastic fibers develop until the age of 6 months after birth. The dermis is therefore thinner and therefore more susceptible to injuries and abrasions [3].

In premature newborns and children up to 6 months of age, functional immaturity and weaker skin-epidermal connections may be noted [8]. In an adult, the skin is a well-functioning thermoregulatory organ fulfilling its function with the participation of sweat glands, as well as the presence of insulating subcutaneous tissue and a network of blood vessels. In children, maintaining a proper body temperature is more difficult. The loss of heat through radiation is greater through thin epidermis, dermis and subcutaneous tissue. The body's reaction to cooling is disrupted due to the undeveloped central thermoregulation system. The nervous system in the first weeks of life does not control the activity of the sweat glands [9]. Numerous dilated blood vessels also contribute to a significant loss of heat. The disruption of thermoregulation is also caused by the smaller number of sweat glands. This results in worse adaptation to high temperatures and exposure to overheating [10].

The increased surface area of absorption of care agents, e.g. washing, cosmetic or cleansing compounds, which is a consequence of the increased surface in relation to the low body weight of newborns and young children is important [11]. The skin of the newborn in functional and anatomical terms develops reaching fully maturity and resemblance to the skin of an adult after the 3rd year of life [3, 12, 13].

Skin care for a newborn and a young child should strive primarily to maintain the integrity of the skin as a barrier and to exclude any threats. Care should take into account the functional immaturity of the skin as well as its sensitivity to allergic, irritating and toxic compounds. Caring task is to support the adaptation of the child to a new environment [14]. Lack of hygiene and limited parents' awareness of effective skin care of infants can lead to skin and mucous membranes diseases common in the postpartum period, including inflammation of the diaper area, heat and seborrheic dermatitis (*Dermatitis seborrhoica* – DS) [2].

A popular disease that starts in the period of infancy is atopic dermatitis (AZS). According to literature data, the incidence depending on the studied population of children is estimated at 9–30%. According to dermatologists and pediatricians, proper

care of the skin in children with AZS, including systematic application of emollients and a short bath for 3–5 min in water at body temperature, may limit the amount of pharmacological agents used, e.g. glucocorticoids. The application of emollients containing fatty acids, squalene, cholesterol, waxes, urea and ceramides relieve discomfort, dryness and pruritus, can improve the comfort of a young child and overall health [15, 16].

Skin in the diaper area in newborns and infants constantly contacts with harmful chemical agents such as ammonia and urease. In addition, the skin is affected by mechanical stimuli, which is related to the diaper's friction, as well as physical factors, which include temperature and humidity [17]. In diaper care, it is recommended to change nappies every 3–4 h and, according to some specialists, avoid using care tissues. Other specialists recommend cleansing the skin with wet tissues in a gentle manner, avoiding mechanical friction with every change of the diaper [18]. Frequent use of powders, or using them with olives is discouraged. Moisture, which is favored by urine, sweat or olive oil, causes caking of these care products, which irritates the sensitive skin [12].

A good practice in care is to air the skin of the diaper area. It is also important to thoroughly wash and dry the skin folds [19]. After bathing the skin, you should apply a fat cream with allantoin, pro-vitamin B5 and D-panthenol. With healthy skin, the application of preparations with zinc, which is characterized by tightness of adhesion, which promotes maceration and irritation, is not recommended [17]. Experts do not recommend the use of sponges when bathing, in which bacteria can thrive in repeated use. It is therefore recommended to use disposable cotton swabs that can be soaked in clean, boiled water with a mild cleansing agent. An important rule is the use of care products in mind [19].

Generally, in the care of the skin of newborns, infants and young children, it is also necessary to take into account the principles of a proper bath, the aim of which is to remove irritating and allergic substances from the area of the skin, in addition to calming, relaxing and feeling the safety of the infant. Bathing in a $\frac{3}{4}$ filled bathtub is recommended. Then, a child held behind the head can float slightly in the water due to its buoyancy and what is important, the body is not exposed to hypothermia [1]. When bathing, special care should be taken to clean up the most delicate places, such as the face, joint flexion, neck. In general care a bath lasting a max. of 10 min is recommended, in water at a temperature of 37–37.5°C, with a frequency of up to 2–3 times a week for infants [15]. Other authors believe that the optimal water temperature should be 34.5–37°C [11] and the bath should be carried out daily or more often when it is related to dirt and high temperatures in the summer months [1]. The ambient temperature in the place where the bath takes place should be 21–22°C. At the end of the bath, it is recommended to dry the skin with a delicate cotton towel, avoiding friction [12].

The selection of skin care cosmetics for newborns, infants and young children is very important. Hypoallergenic mild preparations with neutral pH and without dyes or fragrances should be used. In addition, when deciding to buy a product,

check its expiration date [20]. It is worth using products from the same series, as it reduces the risk of allergy and in case of its occurrence enables quick elimination of the allergen [1].

One of the most important principles in the selection of cosmetics is the presence of the Institute of Mother and Child (IMiD) or Children's Health Center (CZD) acceptance. It is located on the product label. The institution's activity consists in giving opinions on products intended for the market, intended for newborns and children as well as for pregnant women or after childbirth. The toxicological properties are evaluated, taking into account the principles of toxicokinetics and toxicodynamics [21].

MATERIALS AND METHODS

The study was conducted with the participation of 125 parents (average age 29 years) of children from the 1st day of life to the age of 3, residing in the West Pomeranian Voivodeship, randomly selected. The author's research tool was used. Questions in the questionnaire referred to the parent's age, education and gender. Some of the questions in the scorecard concerned children directly, including age and gender. Among the examined children there were 68 girls and 57 boys, at an average age of 18 months. The issues discussed were to collect information on the general care of children's skin by their parents, taking into account the cosmetics they choose and the methods of bathing children. The sources of information on appropriate skin care for children, preferred by parents, were also analyzed.

RESULTS

The average age among the surveyed parents was 29 years. In the gender structure of the parents surveyed, the female sex predominated (92.8%, $n = 116$). The male sex was 7.2% ($n = 9$). Among the respondents, girls accounted for 54%, and boys 46%. The largest group of respondents were parents and children living in cities over 100,000 residents – 57% of respondents. In the villages and agglomerations, 15,000–100,000; 43% of parents and children lived in the town. Higher education had 64% of parents, while general secondary education – 18.4% of the respondents. Secondary vocational education (technical secondary school) had 14.4% parents, primary education – 3.2% of respondents.

Among of respondents 58.4% were in a marriage. In a partner relationship, 30.4% of parents, while the status of a single person – 11.2% of parents. Among parents, 79.2% declared that they bathed the child once during the day. Bathing every other day was indicated by 12% of the respondents. Two times a week, the child was bathed by 6.4% of parents, and twice a day by 1.6% of respondents, one time per week, 0.8% of the respondents (Tab. 1).

TABLE 1. Frequency of bathing of children by parents

Frequency of bathing	n	%
Once a day	99	79.2
Every other day	15	12
Twice a week	8	6.4
Twice a day	2	1.6
Once a week	1	0.8

The washing habit of children's clothing in dedicated preparations was noted by 58% of respondents, 42% of parents did not use specialist products. Parents were also asked about preferences regarding the methods of bathing children. Over half of the respondents (62.4%) bathed children in lukewarm water at a temperature of approx. 35–37°C, for 5–7 min, and 45.6% of parents used emollients during bathing, 16% of parents used a bath with a significant amount of care products, as was cleaning the child's skin in water at approx. 39°C, for a longer time (16%) – Table 2.

TABLE 2. Characteristics of children's bathing by parents

Characteristics	n	%
Bath in lukewarm water at a temperature of about. 35–37°C, for 5–7 min	78	62.4
Bath with emollients or other oiling preparations	57	45.6
Bath with a large amount of care products, e.g. shampoo with gel and bath lotion	20	16
Cleaning at 39°C for a longer time	20	16

An overview of cosmetics used for bathing for children showed that 58% of respondents chose bath liquids or 3 in 1 liquids. Shampoos were indicated by 39% of respondents, while cleansing soaps – 14% of parents. An overview of the forms used to care for the child's skin after bathing showed that 50.4% of the parents applied emollients to the child's skin, while 45.6% of the parents used grooming creams, 17.6% of respondents used olive oil and 13.6% used powders or backfills (Tab. 3).

TABLE 3. Cosmetics used for the care of the child's skin after bathing

Type of cosmetic	n	%
Emollients	63	50.4
Care creams	57	45.6
Olive oil	22	17.6
Powders	17	13.6

The most popular means chosen by parents for diaper care were wet wipes – 83.6%. Special-purpose creams (e.g. against chafes) were indicated by 53.6% of parents, while nursing creams – 32%. Powders and backfills were used by 20.8% of respondents (Tab. 4)

TABLE 4. Products used by parents to care for the diaper area

Type of products	n	%
Wet wipes	105	84
Special-purpose creams (against sore spots)	67	53.6
Care creams	40	32
Powders	26	20.8

The factors conditioning the purchase of the cosmetics for 64% of parents were quality, for 48% the presence of the approval and recommendations, while for 36% of the respondents the company, for 33.6% the purchase decision was influenced by the opinion of others. An attractive price was indicated by 24.8% of people, while the composition was accounted for by 12% of respondents. The appearance of the packaging and advertising did not determine the choice of the preparation (Tab. 5).

TABLE 5. Factors determining the purchase of baby skin care products

Factor	n	%
Quality	80	64
Certified	60	48
Good price	31	24.8
Firm	45	36
Opinion of others	42	33.6
Composition of the cosmetic	15	12
Package	0	0
Publicity	0	0

The overview of the product composition from the label was carried out by 72% of respondents (n = 90), while 28% (n = 35) of the respondents did not analyze the content of substances in the product. The list of substances avoided by parents when choosing a caring agent is listed in Table 6. The analysis concerned respondents who declared that they analyze the composition of cosmetics (72%, n = 90).

The parents were also asked about the substances they desired in the care products (Tab. 7).

TABLE 6. Substances avoided by parents in skin care products for children

Substances	n	%
Dyes	36	40
Fragrances	16	17.7
Alcohol	54	60
Emulsifier	33	36.6
Mineral oils	15	16.6
Preservative	36	40
Detergents	48	53.3
All substances	2	2.2

TABLE 7. Substances sought by parents in skin care products for children

Substances	n	%
Panthenol	51	56.6
Vitamin	65	72.2
Glycerine	9	10
Essential unsaturated fatty acids	3	3.3
Shea butter	32	35.5
Allantoin	33	36.6
Aloe	26	28.8
Calendula	11	12

Among respondents, 64.8% sought knowledge about the skin care of children on the Internet, 3.2% of respondents used their own knowledge. Specialist literature was an important source of information for 19.2% of respondents, while midwife's knowledge for 17.6% of respondents; 35.2% of the recommended recommendations were obtained from acquaintances; 55.2% of respondents used the advice of a doctor, e.g. a pediatrician or dermatologist, and 4% of respondents from a nurse's advice – Table 8.

TABLE 8. Source of knowledge preferred by parents of skin care of children

Source	n	%
Internet	81	64.8
Own knowledge	4	3.2
Specialist literature	24	19.2
Midwife	22	17.6
Friend	44	35.2
Pediatrician/dermatologist	69	55.2
Nurse	5	4

DISCUSSION

The skin of a newborn and infant is essentially different to the skin of an adult. The anatomical maturity and adaptation to the function of the skin reaches only from 3–4 years of age. An important feature differentiating the skin of a newborn baby is the 3 times greater surface to mass ratio, which promotes the possibility of penetration into the bloodstream of various toxic substances. The stratum corneum is thinner and the skin-epidermal border connections are looser. The skin of infants and newborns is therefore delicate and more susceptible to injuries and moreover characterized by increased permeability to exogenous compounds. All the above anatomic features of the skin of infants help to understand why care products for children should be selected with special care [22].

The scientific data available in specialist literature databases, proving the influence of nursing agents on the functioning of the skin barrier of newborns and infants, are limited and insufficient. There are also no studies that address the issue of parents' preferences regarding the daily care of their children's skin.

The author's examinations showed that the parents most often chose moisturized wipes and specialized creams against chafing to care for the diaper area. Determining the effect of these cosmetics on the physiological parameters of the skin is important. The issue of the impact of wet wipes and anti-sore cream on the functioning of the protective skin barrier was examined by Garcia Bartels et al. [23]. The experiment showed that skin parameters include pH and TEWL value measured on the skin of the children in the diaper area before and after cleansing with wet wipes remained stable. This allows you to suppose that their use does not disturb the proper skin reaction, conditioning the defense against microorganisms that develop on the skin of the diaper area. The proper level of hydration and the TEWL value are also important, the decrease of which may favor skin dryness, pruritus and in consequence development of disease, e.g. inflammation of the diaper area. However, expert opinions regarding the use of wet wipes are divided. Adamczyk and Jurzak recommend cleaning the skin with gentleness and avoiding mechanical friction [18]. Kiełbasińska takes into account the fact that wet wipes may promote skin dryness and disturb the functioning of the protective barrier of the skin, especially in infants under 6 weeks of age [19]. As an important source of information about the skin care of children, the respondents indicated the Internet. Therefore, the role of the Internet should be considered as a way to disseminate information about proper skin care for newborns and infants. In addition, only 4% of parents indicated nurses and 18% of midwives respondents as a valuable source of information.

Maciejewska-Franczak et al. studied the parents' satisfaction with the treatment of AZS in children. Studies have shown that insufficient parenting education regarding nursing behavior and lack of satisfaction with treatment of children with

severe AD are a lack of willingness to follow their doctors' recommendations. In the group of parents, 40% did not comply with at least one therapeutic indication [24]. Counseling is therefore a key element for the proper care of the child's skin. This justifies the need to increase the role of qualified medical staff in promoting proper attitudes to nurture and educate parents in hospitals, outpatient clinics and maternity schools.

Current research has shown that the purchase of baby skin care products by parents mainly determines the presence of the certificate and quality. The respondents did not indicate the advertisement and the attractive external packaging as a determining factor, which proves their awareness and responsibility. The respondents in the children's skin care products sought mainly panthenol and vitamins.

According to scientists and dermatologists, panthenol has a stimulating effect on the synthesis of collagen as well as on the process of epithelialization. It is highly hygroscopic and therefore effectively moisturizes the skin. It regenerates the wound healing process, supports the functioning of the skin as a protective barrier, and what is important, it is well tolerated and does not cause skin irritation [25]. Vitamin E is the most commonly present vitamin in preparations that care for children's skin. Tocopherol is a natural, safe antioxidant. It protects the skin against the action of harmful external compounds and allows you to keep the right amount of lipids in the skin. It has been shown to have a beneficial effect on the wound healing process. The action of this vitamin also consists in neutralizing reactive oxygen species [26].

Undoubtedly, determining uniform guidelines for proper care procedures in newborns and infants is a difficult task. It may be influenced by the multicultural nature of the society and the diversity of the surrounding environment. Researchers, thanks to modern techniques, can effectively assess the dermatological profile of available cosmetics and the safety of their application on baby skin, which is anatomically immature and extremely delicate. Therefore, specialists are of the opinion that the skin care of children should be limited to the use of products from one company, as it reduces the risk of allergies [1, 20].

Our own research has shown that more than half of the parents surveyed used child care products produced by 3 or 4 different manufacturers. Therefore, it would be a good practice to educate parents that avoidance of nursing measures may cause harm in some circumstances. The benefits of care treatments should outweigh their negative impact.

CONCLUSIONS

1. The parents have awareness about the composition nursing products and cosmetics.
2. For the respondents, the internet and the doctor were the most important sources of information about child skin care.

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