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Baby Care – Baby Care Products and Harmful Ingredients Used in Baby Products

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ABSTRACT

Specialized cosmetic products for infant use are gaining a lot of popularity in the Indian as well as global market, as these products have become an inseparable part of modern urban lifestyle. Baby cosmetics are available in a wide range. They claim to be milder than similar products meant for adult use. Present article describes about baby skin structure, difference between adult and bay skin, different baby care products, evaluation of baby care products and different ingredients that cause damage to the baby skin.

Keywords: Structure of baby skin and hair, baby care products, Harmful ingredients used in baby products causing damage to bay skin.

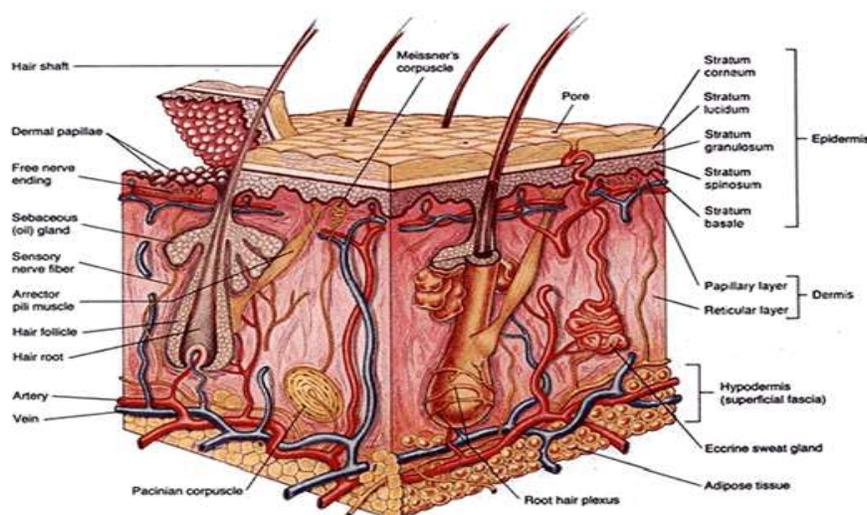
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INTRODUCTION

A great variety of baby skin and hair care products are bought into market. The infant's skin is always at a high risk of skin breakdown due to allergies, extravasation and infections as it is very delicate. It is therefore necessary to preserve its health and integrity (Brod et al. 2015). According to few pediatric publications, babies should be bathed using pH neutral cleansers. The emollients or the preparations that soften the skin should be free of fragrances, dyes or preservatives. The nappy area should be kept moisturized and clean (Visscher and Narendran 2014; McManus 2014). There is a huge range of skin care products specialized for infants including night creams, diaper rash creams, mosquito repellents, massage oils and sunscreen lotions in the market. The manufacturers claim that they are having the goodness of milk, honey and other natural things, and they moisturize and nourish baby's skin. Baby care products, as all cosmetics, are not as strictly evaluated or controlled in the United States as other products regulated by the Food and Drug Administration. According to the FDA's Office of Cosmetics and Colors, most cosmetic products and ingredients are not subject to FDA premarket approval authority. Baby cosmetics include powders, oils, lotions, creams, diaper rash preparation, shampoos



Difference between baby and adult skin

- Skin of children especially infant and new born differ from adult skin both historically and physiologically
- Human skin barrier developments begin in utero and it is said that skin maturation is nearly completed at gestational age of 34 weeks
- The skin of babies is thinner and has small corneocytes and denser micro relief and cell turnover will be faster

- At birth skin will be rough and dry and it smoothens during first month
- Corneocytes are present in lower desquamation zone and its size increases with age when exposed to environment
- Stratum corneum is thin and lacy in historical structure. Thickness of stratum corneum is measured by autopsy or ultrasound echography. Using confocal laser scanning microscopy it is observed that infant skin will be 30% thinner than adult.
- Epidermis is well developed in infants and it will be similar to adult skin
- Stratum germinativum consists of cylindrical keratinocytes, dendritic cell, melanocytes and Langerhans cells and merkel cells in normal number. Its function is photoprotection, immunological barrier, receptor function
- Melanocytes are less pigmented. Hence new born skin will be pale in colour and are much prone to sun burns
- Cohesion and adhesion of epidermal cells in new born are not well developed hence epidermal-dermal layer junction will be weaker
- Basal membrane is similar to adult skin
- Dermis layer consists of numerous fibroblasts which produce elastic and collagen fibers but fewer in number and less dense than in adult
- At the age of 3 the elastic fibers will be completely developed
- Immature hypodermis consists of lobules of roundly developed adipoblasts. They are richly vascularized
- Fatty acids composed of triglycerides, which are highly saturated results in high fusion point of lipids than measured for adult skin

Hair

- they are developed in 14th gestational week and are well developed
- They are fine, round and less frequently medullated and light in colour
- Babies some time are born with lanugo hair which are developed at the end of 2nd trimester
- After birth hair passes from anagenic to telogenic phase
- 8th week baby loses hair and hair cycle begins which is similar to adults
- Nearly 5 million hair follicles cover baby body which is 10 times more than adult hair
- Erythematous lesions are not found in area which do not have hair follicles. It indicates that micro organisms assess from hair follicle

- Sebaceous glands are visible at 8th week of gestational age and able to produce lipids soon after, when stimulated by the androgens originated from mother
- It constitute large part of vernix caseosa. It act as barrier film produced in late pregnancy and is responsible for moisturization anti infective, antioxidant, wound healing, water proofing
- Vernix caseosa is complex w/o mixture containing sebum, peridermal cells, lanugo hair
- Vernix film also retain endogenous chynotrypsin, thus presenting loss of epidermal enzyme and protecting the epidermal barrier from noxious substances
- WHO developed general guidelines recommending that neonatal bathing should not be undertaken within the first 6 hours of birth
- Increase in sebum secretion was observed after birth at the end of first week
- In certain cases large sebum glands are observed together called acne neonatorium which are commonly seen in male newborns and can persist for few months
- Hydrolipidic layer is composed of sebum, water fro eccrine glands and TEWL
- It is not fully developed in babies and protective w/o activity is nearly absent
- Sebaceous fatty acids have antimicrobial activity and sebum contains vitamin E and has antioxidant activity
- Eccrine sweat glands structure is fully developed but intervention is immature affecting thermoregulation
- These sweat glands in soles and feet are developed in first trimister and will come to adult structure by 24-29weeks of gestational age
- They are initially developed in upper dermis later move to lower dermis
- Number of glands per unit area of skin is high than adults
- Transdermal potential is developed by sweat glands
- Certain skin diseases cause decrease in reabsorption of chloride ions fro sweat and increase negative trans epidermal potential and high chloride ion concentration in sweat
- These secretions contain antimicrobial peptide called “dermicidin” which is responsible for innate immunity of the skin barrier

Parameter	Baby	Adult
Skin thickness	1.2 mm	2.1mm
Surface of epidermis	Dry at birth, covered with vernix caseosa, highly hydrated after one week, denser micro relief	dry

Skin PH	6.34(amniotic fluid)	4.5 to 6
Thickness of epidermis	40-50 micrometers	50 micrometers(20 micrometers on face and 1 mm on sole)
Stratum corneum	7.5 to 10 micrometers, 15+ cell layer	9-15 micrometers, 15+cell layer
Barrier function	effective	effective
Eccrine sweat glands dermis	Not fully active, still in upper dermis	Active, in lower dermis
Thickness	3.5	
hypodermis	Thin subcutaneous fatty layer	Depends on nutrition

- Dermal absorption- similar to adult skin. However, in babies a number of potential risk factors exists
- Hair follicle density decreases with age
- Surface area/body weight ratio-2.3-fold high in newborn than adult and it decreases to 1.8 fold and 1.6 fold at 6-12 months
- Pharmacokinetic properties-differ widely between babies and adult. Has decreased clearance or high t1/2 of bioavailable substances thus increases the potential risk of adverse reactions in babies
- Water content in infants is 80-90% and in adults it decreases to 55-60%

Trans epidermal water loss (TEWL)

- It was reported that average water loss from upper back skin in first 10 days is slightly but significantly lower (30%)compared to adult skin. the water loss was found to be $0.18 \pm 0.06 \text{mg/cm/hr}^2$ where as in adults it is $0.27 \pm 0.04 \text{mg/cm/hr}^2$.
- Effect of relative humidity on the production and loss of heat in the newborns was evaluated by hey and co workers
- High TEWL values are observed in case of skin damage
- Sudden decrease in TEWL explains the drying of skin immediately after the birth.

General safety considerations for baby care products

- Exposure based risk assessment is key factor for bringing safe baby cosmetics to market. this has also been recognized in Europe by the scientific committee on consumer safety(SCCS)

The SCCS says that

- For the development of baby cosmetics which are used in napkin area, the potential impact of irritation on dermal absorption of the chemical needs to be considered by the safety assessor in the final quantitative risk assessment of their products.

- The SCCS is of the opinion that in general no additional safety factor needs to be included for substances used in children's cosmetics applied to intact skin, as an interspecies assessment factor of 10-covering the toxic kinetic and toxicodynamic differences between children and adults.
- During the development of baby products a number of criteria are taken into consideration.
- High quality of raw materials in terms of purity-stability and micro biology via appropriate certificates of analysis.
- Skin irritation which is dose dependent can be controlled by avoiding well know irritative ingredients or reducing concentration or frequency of application.
- Skin sensitization triggered by a immunological response, is not restricted to the area of application. Therefore induction of sensitization in particular for perfuming ingredients even when international fragrance association tested the 26 allergens identified in the 7th amendment of the European cosmetic legislation should be avoided.
- It is considered to be good practice to add anti oxidant to protect unsaturated from oxidative reactions, the PH of final product should be adjusted between 4.5 and 6, to add chelating agents to prevent heavy metal precipitation and protect the preservative system, to use skin barrier protective ingredients.
- Special attention is given to the concentration of reactive colorants, promotional additives natural and exotic ingredients like plant extracts and ingredients of animal origin, or impure source, potential allergens, penetration enhancers organic solvents foaming agents, highly reactive substances, concentration of preservatives.

CARE OF DIAPER AREA

The hygienic aspects of the cleansing procedures used in diaper area are of considerable importance upto the age of 2 or 3 year.

Diaper rash

- The urinary and fecal excretions of the infant are a constant source of irritation and contamination to the adjacent areas. The diaper, fitting in close proximity to the skin, concentrates the liquid and semiliquid material in a warm, moist and airtight area when rubber pants are used. The normal infants voids a dilute, watery urine of low specific gravity and of large volume in proportion to body weight, about 10 to 14 times a day.
- Urine, even if sterile when passed, is immediately contaminated by organisms on the skin from present or previous fecal discharges.

- Diaper rash is characterized by reddening of the whole diaper area, roughing of skin, finally development of shallow ulcers.
- Other factor for developing diaper rash is improperly laundered diapers which are rough and coarse, alkaline soap remaining in poorly rinsed diapers and antiseptic solutions used to rinsed diapers.
- Cooke proved that ammonia liberated from urinary urea by the action of an intracellular urease presenting *bacillus ammoniagenes* inhabiting the colon was a cause of diaper rash.
- When the intestinal contents are of low acidity, the no.of gram positive bacilli is greatly increased in diaper area. They grow rapidly on the skin under neutral to alkaline condition.
- Other organisms such as *staphylococcus aureus* and *s.albus* also acts similarly on urea.
- *Candida albicans* are most likely etiologic agent in diaper rashes
- 5% saturated boric acid poured over a dry diaper to achieve a residual bacteriostasis.
- Mercuric chloride is completely effective in preventing ammonia dermatitis but its irritation potential and toxicity resulted in its replacement with other antiseptics.
- Cationic quaternary ammonium salts like P-diisobutylcresoxyethoxyethyl dimethyl benzyl ammonium chloride monohydrate has a bactericidal action on *B.ammoniagenes* .
- Solution of alkyl dimethyl benzyl ammonium chloride is effective in curing ammonical diaper rash.
- Cleansing milk, powders, lotions etc., are used in nappy area to avoid diaper rash.

CLEANSING MILK

- For cleansing of the baby especially diaper zone liquid cleansers based on oil in water emulsions are often used especially when water and wash clothes are not well tolerated by baby skin.
- They are easy to use and contain anionic or non ionic tensides.
- When a baby is prone to contact dermatitis it is advised to screen the ingredients list because those tissues often contain high concentrations of preservatives necessary to prevent micro biological contamination of the tissues.
- Mineral oil impregnated tissues can increase presence of candidia in the diaper area and change the composition of the skin surface lipids

CLEANSING COSMETICS-BABY PRODUCTS

- Bathing a baby for 5 to 7 minutes in lukewarm water is sufficient. Recent studies also showed that bathing milder than washing and using mild detergents is milder than using water alone.
- Daily bathing practice is general but not optimal as it has risk of drying out and irritating baby skin in particular when aggressive anionics with high degreasing properties are involved. Hence non ionics and amphoteric or mild anionics such as sulfosuccinates, isothionates and protein fatty acid condensate.
- Use of bath oil is preferred in case of dry skin, sensitive skin or atopic eczema is present.
- Starch containing bath additives help to restore an impaired skin barrier.
- Usually bath foam is not suitable for babies because of its high content of primary tensides producing the excessive foam.
- PH of cleansing products can change the micro biological spectrum of skin.
- High soap PH value encourages propionibacterial growth on skin.
- Synthetic detergents with PH of 5.5 will not cause any change in microflora.
- Water alone or mild wash gel and soap will not impact the bacterial colonization.

BABY SHAMPOOS

- Baby shampoo usually has PH of 6 to 7.
- It should contain only mild tensides.
- example: mixtures of non ionic and amphoteric substances.
- It should be non irritating to eyes.
- To avoid contact with eyes viscosity should be increased.
- Ingredients required to produce a sufficient amount of stable foam are often quite irritating and not suitable to use alone in baby shampoo. ex: alkyl sulfates, alkyl ether sulfates.
- As the hydro-lipidic layer is not yet formed on baby skin sebum production is low, the amount of lipids distributed on the hair is limited and is easily washed away hence washing of hair daily is not recommended.
- These baby shampoo formulations are low tear and mild formulations combine high foaming anionic surfactants like Sodium Laureth sulfate and some mild anionic, amphoteric and/or nonionic surfactants. The viscosity of the formulation is adjusted.
- These formulations are known to have low eye or skin irritation properties. All ingredients are readily available from many manufacturers across the world.

De ionized water	66.0	diluent
Sodium laurel sulfate	8.0	surfactant
Cocamidopropyl betaine	5.0	surfactant
Disodium cocoamphodiacetate	2.0	surfactant
Disodium oleamide-MIPA	4.0	Foaming agent
PEG-80 sorbitan laurate	10.0	Thickening agent
coco-glucoside	5.0	surfactant

Total batch 100.0 grams

Preparation:

All the ingredients in the above table are taken in order as listed and dissolved in deionized water, if necessary heated at lower degrees to dissolve all the ingredients. then suitable preservatives, perfume, dye and pearlizing agent are added as desired. Adjust the formulation to a desired pH 5 – 6.5 with Citric acid 50% solution.

BABY SOAP

- Soaps possess good cleansing and lathering properties , is normally a mixture of alkali salts of long chain fatty acids. They should be of pH 5.5-6.5
- Soaps possess good cleansing and lathering properties , is normally a mixture of alkali salts of long chain fatty acids.
- They liberate alkali when comes in contact with water and increases PH upto 10 and also precipitation occurs with calcium and magnesium ions from hard water.
- When soap and wash cloth are used in diaper area the buffering capacity of the skin is further compromised.
- In addition perfumed cleansing products may cause contact allergic reactions due to enhanced skin penetration of perfumes by the presence of anionic soap ingredients.
- Use of Germicidal soap is significantly lower than use of non medicated soaps.
- The finished soap properties are primarily dependent on the mixture and ratio of triglycerides used. ex: tallow gives much harder soap than coconut oil
- Potassium soaps are much softer than their sodium based counterparts, although they are rarely used.
- Finished soap bar can be modified by the addition of other ingredients like emollients, opacifiers and chelating agents
- Ingredients used in baby soap preparation
- Sodium palm kemelate, sodium palmate, water, mineral oil, sodium chloride, fragrance, glycerin, titanium dioxide, dimethicone, C12-C15 alkyl benzoate, disodium EDTA,

stearoxytrimethylsilane, stearyl alcohol, disodium etidronate, tocopheryl acetate, hydrolyzed milk protein

BABY OIL

- Though there is some evidence that oils used are greasy materials and can occlude the skin surface predispose infants to prickly heat, but surprisingly baby oils remains a popular product
- Skin folds of bay are cleansed with water, oil, alcohol. there are several references in the literature to use of “antiseptic oils”
- These preparations are based on mineral oil and vegetable oil (peanut, sesame, olive, cottonseed) used separately or in admixture
- Some oils contain hexachlorophene as antiseptic, and an antioxidant(tocopherol or butylated hydroxy anisole) to retard development of rancidity of the vegetable oils.
- Antiseptic baby oils are far less irritating than ammoniated mercury ointment and have enjoyed wide usage from many years.

Examples:

- Formula 1
- Mineral oil 60%
- Groundnut oil 40%
- Antioxidant q.s
- Formula 2
- Groundnut oil 100%
- Antioxidant q.s

SYNDETS

- Syndets don't precipitate with hard water and have an adjustable PH to neutral or slightly acidic.
- The syndets can be aggressive(like alkyl sulfates)or mild(like isothionates)depending on the choices and mixtures maid.
- Like soaps they dry out the skin when not containing lubricant additive.
- Aggressive tensides disturbs flora of new born skin and can lead to infections.

BABY POWDER

- After bathing ,powder is carefully applied to the skin folds.
- During the hot months, the powder is usually applied all

- over skin areas to accelerate evaporation of perspiration, act as a water repellent, and serves as lubricant to prevent chafing
- Talc powders are not often applied in the napkin area.
- They absorb moisture, decrease maceration and prevent irritation of baby skin.
- Powders however pose a potential inhalation risk and can form on the skin little granules that induce friction
- Talc is susceptible to contamination with microorganisms and needs sterilization.
- Usually in soaps boric acid has been used as antiseptic and buffer in baby powders. Its use as a buffer is desirable because a 10% aqueous suspension of cosmetic grades of domestic and imported talc has a PH range of 8.4 to 9.4
- Johnstone and co-workers stated that an unbuffered talcum powder with a PH of 9.3 is rather alkaline in range for use on the delicate skin of infants. About 3 to 5% boric acid was used to neutralize the slight alkalinity of moistened talc which usually concentrates and cakes in moist skin folds and which may induce irritation when unbuffered.
- The boric acid reacts with the traces of calcium oxide to produce insoluble calcium borate, and with 5% added, the PH of the aqueous talc suspension is stabilized in a neutral range. Any traces of free boric acid tend to neutralize ammoniacal products in the diapers and to act as a buffer in maintaining the PH of the diaper just below neutrality
- Brooke and Boggs stated that "Boric acid and sodium borate are sufficiently poisonous to cause severe symptoms and death when used in amounts commonly considered to be perfectly harmless".
- Ducey and Williams stated that "Borated dusting powders shown to be capable of forming saturated solution in common clinical situations with possible resultant absorption of toxic quantities through broken skin".
- Vignec and Ellis demonstrated that 5% boric acid in talc was practically unabsorbed through the intact skin of infant even if erythema was present. The explanation for the lack of absorption of boric acid in talc and the ready absorption of boric acid in solution was attributed to the fact that ionized forms are not transmitted through the skin as readily as undissociated molecules.
- After consideration of many differing reports, opinions and official pronouncements, pediatricians do not recommend the use of boric acid in baby cosmetic.

- Kaessler described the use of baby powder containing silicone, allantoin and hexachlorophene in talc base. The product was reported to be essentially moisture repellent, mildly keratolytic and bacteriostatic.
- Another raw materials used in baby powders is corn starch in place of talc as it does not dust as freely as talc and also act as absorbent for moisture but it may cake on the skin and undergo bacterial decomposition .
- Starch powder containing cationic like methyl benzethonium chloride(preservative) was more effective in curing and controlling diaper rash and intertrigo than the corn starch powder.

Ingredients	Formula	use
Talc	90.25	Slipping agent
Lithium stearate	2.50	Water repellent, stabilizer
Kaolin	5.0	adsorbent
Zinc oxide	2.0	Opaifying agent
perfume	0.25	Pleasant odour
Ingredients	formula	Use
Corn starch	99.70	adsorbent
Hyamine 10-X	0.05	germicide
perfume	0.25	Pleasant odour

procedure: all the powdered raw materials are passed through sieve to obtain uniform particle size. Then a portion of absorbent is mixed with perfume. Remaining raw materials are mixed and perfume portion is added to it and blended. As baby skin is more prone to microbial attack the powder should be sterilized by dry heat sterilization.

BABY LOTIONS

- The increasingly popular cleansing products, probably at the expense of baby oils, are antiseptic nonionic, anionic, or cationic lotions.
- The oil in water lotions have the advantage over the oils in providing a source of water for the water-soluble soil. The hydrophilic surface active agents aid in the emulsification of all types of soil in diaper area. Glaser and co-workers reported a study of an oil in water lotion containing mineral oil, lanolin, and 1% hexachlorophene as the antiseptic.
- Protective film of minerals oil and lanolin as a prophylactic measures against diaper rash.
- Kahan and co-workers described the use of an emollient lotion.
- The effectiveness of this anionic oil in water lotion was ascribed to the water-repellency of the silicone oil, the nonirritant keratolytic action of allantoin to stimulate epithelial

healing, the relatively nonsensitizing bactericidal action of the hexachlorophene, and the emollient oils.

- Cationic agents are used in oil in water lotions as the antiseptic ingredient to prevent the growth of urea splitting organisms. The compounds like P-diisobutyl sresoyethoxyethyl dimethyl benzyl ammonium chloride monohydrate and cetyl pyridinium chloride are used in baby lotions.
- Baby lotions have been formulated to prevent and cure diaper rash, check diaper odor, soften and hydrate the skin, and provide an emollient, lubricating oily film in skin folds to prevent friction and subsequent chafing.
- The bacteriostatic and bactericidal activities of hexachlorophene are adversely affected by certain nonionic emulsifiers. Similarly, cationics are inactivated by anionic fatty acid compounds present in the oil phase.
- The final choice and concentration of antiseptic will therefore be dependent upon the degree of activity desired within the limits of safety on the skin
- Antiseptic baby lotions can be prepared by using cationic quaternary compounds like pyridinium chloride

Ingredients	Official formula	Uses
PART A		
Cetyl alcohol	0.50	emollient
Glyceryl monostearate	1.0	Thickening agent, emulsifying agent
Lanolin	1.0	emollient
Amerchol L-101	8.0	Emollient, emulsifier
PART B		
methyl paraben	0.15	preservative
glycerol	2.0	humectant
Lactic acid	0.10	Reduce acne breakouts
Hyamine 10-X	0.15	germicide
water	86.0	Aqueous vehicle
perfume	0.10	Impart aroma

Procedure: part A and part B are heated to 75°C except perfume. When both the phases reach 75°C, add part B to part A with continuous stirring. Add perfume when the temperature reaches 35°C and mixed to get uniform dispersion of perfume.

BABY CREAMS

- Baby creams generally have a higher ratio of oil/water phase than the lotions, and hence they can provide a greater degree of emollients and lubrications per unit weight of product.

- They are used in the diaper area, following the oil or soap and water cleansing, to restore a protective, lubricant film to the skin, which is subject to constant friction, chafing, and wetting.
- To prevent chafing of those skin surfaces that are in apposition and for their emollient effect to soften, relieve, and prevent chapping of the skin exposed to climates and low humidity.
- The water in oil creams has greater water repellency and provide a more lipophilic emollient effect, with a warm feel on the skin in contrast to the cooling effects obtained with the oil in water emulsions.
- These creams contain zinc oxide, antiseptic, fungicides, antibiotics, vitamins, cod liver oil, polyunsaturated fatty acids or glycerides antipruritic, anesthetics, sunscreens, insect repellents

Ingredients	Official formula	Use
PART A		
Bees wax	5.0	Emollient, humectant
Arlacel 60	3.0	o/w emulsifier
Tween 60	3.0	o/w emulsifier
Hydrogenated vegetable oil	17.5	Cleansing agent
Mineral oil	26.0	Cleansing agent
Propyl paraben	0.15	preservative
antioxidant	0.05	
PART B		
Methyl paraben	0.15	preservative
Sorbitol (70%)	4.0	Impart good texture to cream
Citric acid	0.10	antioxidant
water	38.9	vehicle
perfume	0.10	Impart aroma

Procedure: part A and part B are heated to 75°C except perfume. When both the phases reach 75°C, add part B to part A with continuous stirring. Add perfume when the temperature reaches 35°C and mixed to have uniform dispersion of perfume

SPECIAL EVALUATION TESTS FOR BABY CARE PRODUCTS

Skin toxicity test

Six rabbits are selected. On skin of each rabbit round patch is made by removing hair. Preparation is diluted to 8-10% and is applied on to the patches of all rabbits. product is allowed to retain on skin for 3-4 hours and washed completely. After washing skin is observed for any adverse reactions.

Eye toxicity test

Six rabbits are selected, one eye is taken as test eye and other as control. To the test eye product is applied and washed after 20 sec, 5 min and 24 hours. eye is observed for any redness. this test is mostly done to see the safety of shampoo, soap.

Anti microbial activity

In liquid products it is used to see the effect of preservative action and also the effective concentration of preservative can be estimated. Initially microorganism is selected and is considered as test organism. culture of test organisms is prepared. The product is inoculated repeated in culture media and studies are carried out for 10-12 weeks. Along with test, control samples are prepared and reserved as reference. Usually two types of control samples are prepared, one sample with preservative and other sample without preservative. The test comes to conclusion only when it has been proven that has not supported any microbial growth.

Ingredients of Concern The following is an overview of ingredients of highest concern in baby care products listed in the NIH/NLM database:

Parabens:

Parabens are used as preservatives in many baby care products, including lotions, baby washes, wipes and other products for children. Parabens can cause allergic reactions and are irritating to skin and eyes and have been shown to harm human sperm. They are also weak estrogen mimics (chemicals that act like estrogen in the body), making them a concern for reproductive problems and breast cancer. Parabens are readily absorbed through the skin and have been detected in human breast tissue and tumors. There are several specific parabens – propylparaben, methylparaben, ethylparaben, butylparaben, and others – and several of these may be used in the same product. Because parabens are in so many products, children can be exposed repeatedly every day.

Formaldehyde:

Formaldehyde is a probable human carcinogen and is associated with gene damage, mutations and developmental problems. It is used in at least one baby wash product. Triethanolamine and Cocamide DEA Triethanolamine and cocamide DEA can become carcinogenic if mixed with nitrosating agents – agents that form cancer-causing nitrosamines in the manufacturing process or the body.

Some of the many nitro sating agents: 2-bromo-2-nitropropane-1,3-diol, 5-bromo-5-nitro-1,3-dioxane (Bronidox C), Cocoyl Sarcosinamide DEA,DEA compounds, Even without the nitrosating agents, both of these ingredients are irritants, and triethanolamine can cause contact dermatitis. Triethanolamine is used in some shampoos and lotions. Cocamide DEA is used in some bubble baths.

Benzethonium Chloride:

Benzethonium chloride used in some baby wipes is highly toxic. Ingesting even a small amount may cause vomiting, collapse, convulsions, coma or death.

Benzyl Alcohol:

Benzyl alcohol is moderately toxic if inhaled or absorbed through skin contact. It is a moderate skin and eye irritant, and larger exposures can lead to vomiting, diarrhea, central nervous depression or deterioration, respiratory distress and even death. It is found in some baby lotions and diaper rash treatments.

PEGs :

Polyethylene glycols (PEGs) and PEGs Lanolins should not be used on damaged skin due to concerns over kidney toxicity. These chemicals are also prone to ethylene oxide contamination. Ethylene oxide is associated with cancer of the blood and lymph systems.¹³ PEGs are found in cleaning products and lotions.

Isopropanol:

Isopropanol(isopropyl alcohol) can cause dizziness, loss of coordination, headache, confusion, stupor, vomiting and other serious effects. Isopropanol is found in at least one shampoo.

2-Phenoxyethanol:

2-Phenoxyethanol can cause central nervous depression; nausea, vomiting, and sometimes diarrhea; prominent headache or other pain. It is found in some baby cleansing cloths.

Baby Care Products Colorings FD&C Yellow #5 is an allergen and has been associated with hyperactivity in children. It is added to some bubble baths and baby washes.

Talc: Talc, often used in baby powder, can cause adverse reactions when applied to damaged skin. Talc can also irritate the eyes and damage the lungs if inhaled. It can be found in baby powders and diaper rash treatments.

Other Ingredients of Concern While not as harmful as the ingredients listed above, the following ingredients can still lead to adverse effects in children:

- **Glycerin** can cause mild headache, dizziness, nausea, vomiting, thirst and diarrhea if ingested.
- **Linoleic acid** can cause nausea and vomiting.
- **Cholecalciferol** (Vitamin D) intoxication can lead to excess calcium in the blood. Early symptoms may include weakness, fatigue, drowsiness, headache, loss of appetite, dry mouth, metallic taste, nausea, vomiting, abdominal cramps, constipation, diarrhea, vertigo,

tinnitus, loss of control over muscle movement, skin eruptions, low eye fluid pressure (in infants), muscle pain, bone pain and irritability.

- **Triclosan** is an ingredient of concern in many antibacterial soaps and products. Although it is not used in any of the baby products listed here, many parents are misled into thinking that it is safer for their baby to wash with antibacterial soap. Triclosan has been shown to disrupt thyroid hormone processes in frogs. While there's a big difference between frogs and humans, thyroid hormones play a key role in human brain development and so caution is recommended. Triclosan has been found in human breast milk, although so far not at levels that would cause harm. Triclosan use has also been linked to increased antimicrobial resistance in bacteria – causing harmful bacteria to become resistant to medical antibiotics.
- **Fragrance** is a catch-all term that manufacturers can use without listing specific ingredients. Phthalates, which are often ingredients in fragrances, include chemicals that are suspected carcinogens and hormone disruptors. Some phthalates are increasingly being linked to reproductive disorders. There are many different phthalates, each with its own chemical structure and properties, so it is difficult to generalize their effects. The most widely used phthalate in fragrances is diethyl phthalate (DEP), which has not been shown to be toxic or cause reproductive harm. However, other phthalates are not so harmless, and until manufacturers list all ingredients in their products, it will be difficult to determine if fragrances are safe.
- **Products of Concern:** Plastic Baby Bottles Bottles made of polycarbonate plastic generally contain bisphenol-A. This chemical disrupts proper hormone functioning, alters genes and disrupts normal physical and behavioral development.
- **Disposable Diapers:** Disposable diapers may contain harmful solvents such as toluene, xylene, ethylbenzene, styrene and isopropylbenzene that are known to be toxic to the respiratory system. Off-gassing of these chemicals from disposable diapers has caused asthma-like symptoms in mice. Some diapers are also made from chlorine-bleached pulp. While the chlorine does not appear to put the baby wearing the diaper at any immediate risk, the bleaching process releases cancer-causing dioxins into the air, increasing the risk for those who work or live anywhere that those dioxins travel

CONCLUSION:

Through the time, the baby cosmetic products have become an inseparable part of the modern lifestyle of toddlers and parents. The use of harmful substances as additives in their composition

and surface coatings in the packaging of these products has raised a very intricate environmental and health issue as these products are meant for the use of the high risk group i.e., infants. Hence, care should be taken while choosing baby care products. plastic baby bottles free of bisphenolA or glass baby bottles should be selected . Use of less toxic disposable diapers (including those that are chlorine-free). Better yet, it is safe to use cloth diapers to avoid exposures to solvents. While selecting Skin and Hair Care Products, labels of the products should be read before purchase, and products that contain the above ingredients should be avoided.

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