



Research article

Baby-skin care habits from different socio-economic groups and its impact on the development of atopic dermatitis

Fatma Akpinar^{1*}, Ayla Balci², Gulcan Ozomay², Ayca Sozen², Esra Kotan³, Gulendam Kocak² and Feyzullah Cetinkaya⁴

¹ Department of Dermatology, Faculty of Medicine, Maltepe University, Istanbul, Turkey

² Department of Pediatrics, Faculty of Medicine, Maltepe University, Istanbul, Turkey

³ Department of Pediatrics, Acibadem International Hospital, Istanbul, Turkey

⁴ Department of Pediatric Allergy and Immunology, Faculty of Medicine, Maltepe University, Istanbul, Turkey

* **Correspondence:** Email: fatmaakpinarr@yahoo.com; Tel: +905056696492.

Abstract: Skin care practices of children vary among communities and are based on experience, tradition and culture. It was aimed to determine the baby-skin care approaches of mothers from three different socio-economic groups and its effect on the development of atopic dermatitis. The study comprised mothers with children under 2 years of age from three different socioeconomic groups in Istanbul in the first half of 2014. A questionnaire with 38 items related to demographic variables, feeding habits, and baby-skin care were distributed to the mothers and asked to fill at sight. The study comprised of 207 children with 69 from lower socio-economic group, 92 children from group middle socio-economic and 46 children from higher socio-economic group. Mean age was 8.48, 8.74, and 10.98 months, respectively. Atopic dermatitis was reported in 19% of the children from higher socio-economic and 9% of the children in other two groups each. The proportion of using no care products after bath was found to be lower in children with atopic dermatitis from all three groups. The proportion of using wet wipes for diaper care was significantly lower in children with atopic dermatitis in comparison to children without atopic dermatitis. Atopic dermatitis was more common among children from higher socioeconomic group and skin care after bath seems to be an important factor in the development of atopic dermatitis.

Keywords: allergy; atopic dermatitis; baby care; bath products; dexpanthenol; diaper dermatitis; skin care; skin barrier; washing products; wet wipes

1. Introduction

Barrier function of the skin begins to develop in the prenatal period and undergoes substantial development within the first year of life [1]. Epidermal barrier has immunological and antioxidant functions as well as tasks including defense against infections, protection from ultraviolet rays, and modulation of water balance of the skin. Many of these functions occur in the stratum corneum. The disruption of the structural and functional integrity of the stratum corneum leads to xerotic and eczematous skin changes in atopic dermatitis [2]. In addition, environmental factors such as skin care and cleaning routines also create skin barrier damage and result in development of atopic dermatitis [3]. Infant skin is more prone to the development of irritant or allergic contact dermatitis than adult skin [4]. For this reason, age-appropriate skin care is very important. Skin care practices of children vary among communities and are based on experience, tradition and culture.

In this study, we aimed to detect the skin care habits of children in different socioeconomic groups, and to investigate the effects of these habits in development of diaper dermatitis and atopic dermatitis.

2. Materials and methods

2.1. Methods

This cross-sectional study was conducted in three hospitals where children from three different socio-economic groups admit in Istanbul between January–June 2014. The hospitals were Sisli Pediatric Education and Research Hospital (Group I, lower socio-economic group), Maltepe University Hospital (Group II, middle socio-economic group), and Istanbul Acibadem International Hospital (Group III, higher socio-economic group).

Mothers of children under 2 years of age were recruited from the pediatric outpatient departments of these hospitals. A questionnaire with 38 items related to demographic variables, feeding habits, and baby-skin care were distributed to the mothers and asked to fill at sight (Table 1).

The study protocol was approved by the ethical committee of Maltepe University Faculty of Medicine.

2.2. Statistical analysis

Definitive statistics were expressed as mean \pm standard deviation for continuously measured variables, and as case number and (%) for nominal variables. Fisher's exact mid-P method was used to compare the effects of the categorical variables on the development of atopic dermatitis, and t-test was used for continuous variables. $P \leq 0.05$ was considered significant for both cases. Statistical analyses were performed using Matlab R2012a.

Table 1. Some important questions that took place in the questionnaire.

Questions in the questionnaire	
1.	Do you breastfeed your child currently?
2.	How long have you been breastfeeding (months)?
3.	How long have you been breastfeeding with additional food (months)?
4.	If you don't breastfeed nowadays, what is the main food for your child?
5.	From whom have you got the information to care your baby?
6.	How often do you bath your child?
7.	Which products do you use for your child's bath?
8.	Which products do you use for your child's skin after bath?
9.	Which products do you use for cleaning the diaper area of your child?
10.	When has your child experienced the first diaper dermatitis?
11.	When has your child experienced the last diaper dermatitis?
12.	How often does he/she have diaper dermatitis?
13.	Have you changed your diaper care habits for this child according to your older children?
14.	If you have changed your diaper care habits, why?
15.	Which products do you use to prevent the development of diaper dermatitis?
16.	Which products do you use for the treatment of diaper dermatitis?
17.	What are the sources of your information for the care of diaper dermatitis?
18.	What type of detergents do you use to wash the clothes of the child?
19.	Has your child ever had pruritic skin dryness especially in the cheeks and extensor sides of the extremities?
20.	Is there any allergic disease in your family?
21.	Has your child ever been diagnosed as asthma or atopic dermatitis by a medical doctor?
22.	Has your child ever taken vitamin D? Does he/she take currently?

3. Results

A total of 207 children, 69 from group I, 92 from group II, and 46 from group III were included into the study. Male/female ratio was similar in all three groups, and mean age was 8.48, 8.74, and 10.98 months, respectively (Table 2).

Atopic dermatitis was detected in 19% of children in group III, and 9% of children in groups I and II ($p > 0.05$) (Table 2). Atopic dermatitis was higher in females in group III (24%), while it was higher in males from other groups (13% and 10%, respectively, $p = 0.05$). Family history of allergic disease was found to be higher in children with atopic dermatitis compared to those without atopic dermatitis ($p < 0.05$).

There was no statistically significant difference between children with and without atopic dermatitis in terms of gestational age, type of delivery, birth weight, age of mother, education level of mother, age of father, education level of father in all 3 groups ($p > 0.05$) (Table 3).

Mean age for diaper dermatitis was 3.68 months in group III, 2.89 months in group II, and 2.63 months in group I. The proportion of children who had "less or none" diaper dermatitis was significantly lower in group III (61%) compared to group II (91%, $p < 0.05$) and group I (72%, $p = 0.05$).

Table 2. Some important demographic and clinical characteristics of the groups.

	Group I (n = 69)	Group II (n = 92)	Group III (n = 46)
Mean age (months)	8.74	10.98	8.48
Female, n (%)	28 (41)	39 (42)	25 (54)
Male, n (%)	41 (59)	53 (58)	21 (46)
	Group I vs II	Group I vs III	Group II vs III
OR	0.93	0.57	0.62
Fisher's exact p-mid	0.41	0.08	0.09
Type of delivery, n (%)			
Spontaneous delivery	35 (50.7)	10 (10.9)	12 (26.1)
Caesarean section	34 (49.3)	82 (89.1)	34 (73.9)
	Group I vs II	Group I vs III	Group II vs III
OR	8.44	2.91	0.34
Fisher's exact p-mid	0.0001	0.0045	0.0141
Mean gestational age (weeks)	38.8	38.4	38.4
Mean birthweight (gr)	3146.8	3261.5	3121.9
Mean height at birth (cm)	49.5	49.7	49.6
Mean head circumference at birth (cm)	34.8	35.1	34.4
Proportion of breastfeeding, n (%)			
Yes	67 (97.1)	91 (98.9)	45 (97.8)
No	2 (2.9)	1 (1.1)	1 (2.2)
Vitamin D intake, n (%)			
Yes	66 (95.7)	92 (100)	43 (93.5)
No	3 (4.3)	0 (0)	3 (6.5)
Physician diagnosed atopic dermatitis, n (%)	6 (9)	9 (9)	9 (19)
	Group I vs II	Group I vs III	Group II vs III
OR	0.88	0.39	0.45
Fisher's exact p-mid	0.41	0.05	0.06
Diaper dermatitis, n (%)	49 (71)	44 (48)	30 (65)
	Group I vs II	Group I vs III	Group II vs III
OR	2.67	1.30	0.48
Fisher's exact p-mid	0.0017	0.25	0.03
Age of mother (yr), n (%)			
≤20	3 (4.3)	0 (0)	0 (0)
21–30	37 (53.6)	36 (43.9)	21 (45.7)
31–40	26 (37.7)	49 (59.8)	24 (52.2)
41–50	3 (4.3)	7 (8.5)	1 (2.2)
Educational status of the mother, n (%)			
Illiterate	11 (15.9)	0 (0)	0 (0)
Primary school	26 (37.7)	7 (8.5)	3 (6.5)
Secondary school	14 (20.3)	9 (11)	0 (0)
High school	14 (20.3)	17 (20.7)	12 (26.1)
University	4 (5.8)	59 (72)	31 (67.4)

Continued on next page

	Group I (n = 69)	Group II (n = 92)	Group III (n = 46)
Age of father (yr), n (%)			
21–30	31 (44.9)	15 (18.3)	3 (6.5)
31–40	27 (39.1)	60 (73.2)	37 (80.4)
41–50	11 (15.9)	14 (17.1)	5 (10.9)
≥51	0 (0)	3 (3.7)	1 (2.2)
Educational status of the father, n (%)			
Illiterate	3 (4.3)	0 (0)	0 (0)
Primary school	31 (44.9)	6 (7.3)	3 (6.5)
Secondary school	10 (14.5)	7 (8.5)	2 (4.3)
High school	22 (31.9)	21 (25.6)	10 (21.7)
University	3 (4.3)	58 (70.7)	31 (67.4)
Allergic disease in the family, n (%)			
Yes	24 (34.8)	42 (45.7)	25 (54.3)
No	45 (65.2)	50 (54.3)	21 (45.7)
	Group I vs II	Group I vs III	Group II vs III
OR	0.63	0.44	0.70
Fisher's exact p-mid	0.08	0.02	0.17

Table 3. Some important demographic and clinical risk factors on the development of atopic dermatitis.

	Atopic Cases	Non-atopic Cases	
Gestational age	Mean StdDev 38.8, 1.28	Mean StdDev 38.59, 2	p (t-test) 0.326
Type of delivery, n			OR Fisher's exact p-mid
Spontaneous delivery	8	49	1.37, 0.256
Caesarean section	16	134	
Birth weight	Mean StdDev 3238.3, 314.82	Mean StdDev 3186.7, 538.97	p (t-test) 0.323
Age of mother (Years)			OR Fisher's exact p-mid
≤30	10	87	0.79, 0.299
>30	14	96	
Education level of mother, n			OR Fisher's exact p-mid
University	8	86	0.56, 0.107
High school and others	16	97	
Age of father (Years)			OR Fisher's exact p-mid
≤30	5	44	0.83, 0.379
>30	19	139	
Education level of father, n			OR Fisher's exact p-mid
University	13	79	1.55, 0.159
High school and others	11	104	

StdDev: Standart Deviation

Frequency of using wet wipes for diaper care was not statistically different among groups, but was statistically lower in atopic children (38%) compared to non-atopic children (56%) (OR = 0.48, $p = 0.05$) (Table 4). Using soap with water was found to be more frequent in group III (30%) than in group II (1%) and group I (8%). Using dexpanthenol as a preventive product for diaper rash was significantly higher in children with atopic dermatitis (24%) compared to those without atopic dermatitis (8%) (OR = 3.73, $p = 0.012$). The proportion of not using any preventive product for diaper rash was lower in children with atopic dermatitis (7%) compared to those without atopic dermatitis (16%) (OR = 0.48, $p = 0.178$), and this proportion was higher in group I (29%) than that of group II (5%) and group III (4%). Using of dexpanthenol for diaper rash was significantly more frequent in children with atopic dermatitis (40%) compared to those without atopic dermatitis (25%) (OR = 2.13, $p = 0.05$). A mixture of steroid and antifungal agents in group III (26%), Hamamelis virginiana distillate in group II (27%) and powder in group I (21%) were detected to be used more frequently.

Table 4. Risk and protective factors of atopic dermatitis.

	Atopic Cases N%	Non-atopic Cases N%	OR (95% CI) Fisher's exact p-mid
Wet wipes for diaper care (line number deleted)			
Yes	9 (38%)	102 (56%)	0.48, 0.05
No	15 (62%)	81 (44%)	
Using dexpanthenol preventive			
Yes	6 (24%)	15 (8%)	3.73, 0.012
No	18 (76%)	168 (92%)	
No using preventive products			
Yes	2 (7%)	29 (16%)	0.48, 0.178
No	22 (93%)	154 (84%)	
Use dexpanthenol for diaper rash			
Yes	10 (40%)	46 (25%)	2.13, 0.05
No	14 (60%)	137 (75%)	
Using soap powder as washing product			
Yes	13 (54%)	64 (35%)	2.20, 0.05
No	11 (46%)	119 (65%)	

There was not any difference between the groups in terms of bath products. The percent of not using any care products after bath was found to be lower in children with atopic dermatitis (8%). The frequency of using olive oil after bath was not found statistically different between children with and without atopic dermatitis, was found similar in group III and group I (11% and 15%, respectively).

Soap powder as washing product was detected to be used more frequently in children with atopic dermatitis (54%) compared to those without atopic dermatitis (35%) (OR = 2.20, $p = 0.05$) (Table 4).

The mothers from groups II and III learned baby care mostly from pediatricians (29% and 35%, respectively), and group I learned from the grandmothers (28%). All three groups learned diaper care products mostly from the pediatricians (33%).

It was found that all children in this study had used vitamin D except six children without atopic dermatitis.

4. Discussion

Atopic dermatitis is a chronic, inflammatory skin disease resulting from the interaction between the skin barrier and genetic, environmental, pharmacological and immunological factors [5]. It has been shown that about 20% of newborns develop atopic dermatitis within the first 6 months of life [6]. In a study of 373 infants, development of atopic dermatitis was reported within the first 2 years of life [7]. The development of atopic dermatitis is a result of the interaction between genetic and environmental factors, with the indication of family history in several studies [8,9]. In our study, a family history of allergic disease made a statistically significant difference.

Skin dryness is a common feature of atopic dermatitis and results from disruption of normal skin barrier. Proteases provide normal desquamation in low pH values and their function increases in high pH values of stratum corneum. In addition, lipid regulating enzymes decrease. Water loss through skin and decrease in surface lipids results in disruption of structure of stratum corneum [8]. Considering that the frequency of hospital admissions because of atopic dermatitis increased from year to year, protective and preventive recommendations in addition to treatment also become important [8–10]. Guidelines recommend using emollients after bathing of the babies who carry the risk of atopic dermatitis [6]. Consistent with this knowledge, our study showed that the proportion of not using any care products after bathing was significantly lower in children with atopic dermatitis.

In this study, the least incidence of the children without diaper dermatitis in group III might be due to less incidence of atopic dermatitis in this hospital and an increased risk of the development of irritant contact dermatitis. Additionally, the proportion of not using any rash prevention products was found to be lower in group III and in children with atopic dermatitis.

Olive oil has been shown to cause erythema in skin by disrupting the integrity of the stratum corneum [11]. Despite coming from very different socio-economic environments, Group I and Group III reported that they were using olive oil to moisturize the skin of their children at similar rates, but their children had different incidences of atopic dermatitis. These results suggest that olive oil is traditionally known by all segments of society in our country and trusted because it is natural, and the development of atopic dermatitis is mainly determined by genetic factors.

Although cleaning the diaper area with water and cotton, towel or cloth is the gold standard, disposable wet wipes has become a practical alternative in recent years. Even wet wipes with acidic pH containing emollient cleanser and not containing alcohol and detergent were reported to protect skin barrier better than water and cloth [12]. Using soap with water was found more frequent in the group III. This may be associated with the hard water. Some studies had found that water hardness is a risk factor for atopic dermatitis in children [13–15]. Although baby powder is not recommended because of the risk of inhalation and irritant contact dermatitis [16], some of the mothers in our study reported that they had used it regularly. Barrier paste is recommended to be used in every diaper exchange to treat and prevent diaper dermatitis. It protects the skin from the moisture and the irritants by forming a lipid layer on the skin. It contains mainly zinc oxide, petrolatum or both [17]. In spite of this fact, we found that dexpanthenol had been used most commonly by the mothers to prevent and treat diaper dermatitis in our study. Dexpanthenol increases water content of stratum corneum and decreases inflammation [18].

This study has some limitations: Firstly, we have no control of potential confounders. Secondly, the study has small power to detect significant differences of risk factors. The third limitation is that the participation rate is not indicated.

Differences between the groups in terms of sources of information for babysitting lead to the different approaches in babysitting and suggest that environmental factors may be important as well as genetic factors in the development of atopic dermatitis.

5. Conclusion

Frequency of atopic dermatitis was found to be higher among children of families coming from higher socioeconomic group. In addition, skin care after bath seems important in the development of atopic dermatitis.

Conflict of interest

All authors declare no conflicts of interest in this paper.

References

1. Nikolovski J, Stamatas G, Kollias N, et al. (2007) Infant skin barrier maturation in the first year of life. *J Am Acad Dermatol* 56: AB153.
2. Levin J, Friedlander SF, Del Rosso JQ (2013) Atopic dermatitis and the stratum corneum: part 2: other structural and functional characteristics of the stratum corneum barrier in atopic skin. *J Clin Aesthet Dermatol* 6: 49–54.
3. Cork MJC, Murphy R, Carr J, et al. (2002) The rising prevalence of atopic eczema and environmental trauma to the skin. *Dermatol Pract* 10: 22–26.
4. Callard RE, Harper JI (2007) The skin barrier, atopic dermatitis and allergy: a role for Langerhans cells? *Trends Immunol* 28: 294–298.
5. Leung DY, Bieber T (2003) Atopic dermatitis. *Lancet* 361: 151–160.
6. Blume-Peytavi U, Cork MJ, Faergemann J, et al. (2009) Bathing and cleansing in newborns from day 1 to first year of life: recommendations from a European round table meeting. *J Eur Acad Dermatol Venereol* 23: 751–759.
7. Carlsten C, Dimich-Ward H, Ferguson A, et al. (2013) Atopic dermatitis in a high-risk cohort: natural history, associated allergic outcomes, and riskfactors. *Ann Allergy Asthma Im* 110: 24–28.
8. Kvenshagen BK, Carlsen KH, Mowinckel P, et al. (2014) Can early skin care normalise dry skin and possibly prevent atopic eczema? A pilot study in young infants. *Allergol Immunopath* 42: 539–543.
9. Bergmann RL, Edenharter G, Bergmann KE, et al. (1998) Atopic dermatitis in early infancy predicts allergic airway disease at 5 years. *Clin Exp Allergy* 28: 965–970.
10. Horii KA, Simon SD, Liu DY, et al. (2007) Atopic dermatitis in children in the United States, 1997–2004: visit trends, patient and provider characteristics, and prescribing patterns. *Pediatrics* 120: 527–534.
11. Danby SG, AIEnezi T, Sultan A, et al. (2013) Effect of olive and sunflower seed oil on the adult skin barrier: implications for neonatal skin care. *Pediatr Dermatol* 30: 42–50.
12. Visscher M, Odio M, Taylor T, et al. (2009) Skin care in the NICU patient: effects of wipes versus cloth and water on stratum corneum integrity. *Neonatology* 96: 226–234.

13. Arnedopena A, Bellidoblasco J, Puigbarbera J, et al. (2007) Domestic water hardness and prevalence of atopic eczema in Castellon (Spain) school children. *Salud Publica Mex* 49: 295–301.
14. Perkin MR, Craven J, Logan K, et al. (2016) Association between domestic water hardness, chlorine, and atopic dermatitis risk in early life: A population-based cross-sectional study. *J Allergy Clin Immun* 138: 509–516.
15. Engebretsen KA, Bager P, Wohlfahrt J, et al. (2017) Prevalence of atopic dermatitis in infants by domestic water hardness and season of birth: Cohort study. *J Allergy Clin Immun* 139: 1568–1574.e1.
16. Fernandes JD, Machado MC, Oliveira ZN (2011) Children and newborn skin care and prevention. *An Bras Dermatol* 86: 102–110.
17. Stamatas GN, Tierney NK (2014) Diaper dermatitis: etiology, manifestations, prevention, and management. *Pediatr Dermatol* 31: 1–7.
18. Udompataikul M, Limpa-o-vart D (2012) Comparative trial of 5% dexpanthenol in water-in-oil formulation with 1% hydrocortisone ointment in the treatment of childhood atopic dermatitis: a pilot study. *J Drugs Dermatol* 11: 366–374.



AIMS Press

© 2018 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>)