

Atopic dermatitis incident in the first 6 months of life

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Abstract. Background: Atopic dermatitis (AD) is a skin inflammatory disease that appeared at the early age of life and a journey beginning of the development of the atopic march which can develop into allergic rhinitis and asthma in the majority of patients. Aim: To summarize the occurrence of AD and factors that influence AD in the first 6 months of life. Material and Methods: This descriptive study included 50 infants aged 0-6 months suffering from AD. Data were collected from a questionnaire and patient's medical records. Results: AD incidence was more common in boys (56%). At least 42% infants had moderate risk allergy. Consumption milk-base formula is a diet that most widely given to infants (54%). The onset of the emergence of atopic dermatitis mostly occurred at the age of 1 month (38%). Conclusion: AD mostly occurred at 1 month of age and it is mostly caused by the consumption of milk formula. Predicting the risk of allergies and avoiding of hyperallergenic milk formula is the key in preventing the occurrence of AD in the first 6 months of life.

Key Words: atopic dermatitis.

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Introduction

Atopic dermatitis (AD) is an inflammatory pruritic skin disease that occurs with peak onset in infancy, and a journey beginning of the atopic march which is progressed to allergic rhinitis and asthma in the majority of children. (Zhang et al 2011; Leung et al 2004). A prospective study in England reported that AD incidence at the age of 0-6 months was 21% (Wadonda-Kabondo et al 2003). The incidence of AD generally occurred at the first 6 months of life because the development of innate immune system in infants is not fully working (Munasir et al 2011; M'Rabet et al 2008).

The incidence of AD is most frequently caused due to cow's milk consumption provided by a mother who did not give breast milk to their infants and it will trigger cow's milk protein allergy (CMPA), particularly in infants with atopic heredity (Hóst et al 2002; Smith and Ownby 2009; Hóst and Halken 2003). The incidence CMPA in the first year of life seems to be 2 to 3% in developed countries. Most infants develop their CMPA symptoms before 1 month of age, within 1 week after introduction of cow's milk based-formula (Hóst 2002). Cow's milk protein triggers the activation of Th-2 and IgE production that causes type I and IV hypersensitivity mechanisms and resulting early inflammation in the skin. CMPA can also be a way for other allergens such as peanut, seafood, wheat and egg to cause allergic reactions (Safri et al 2015; O'Brien 2002).

To know that cow's milk allergen bound to mast cells in the skin and caused an allergic reaction, skin prick test must be performed. This test which is sensitive, fast, and easy in detecting cow's milk-specific IgE. Skin prick test is often used to help the diagnostic accuracy of allergic disease in infants (Lasley and Shapiro 2000; Hahn and Bacharier 2005).

Exclusive breastfeeding during the first six months of life may prevent the onset of allergy, specifically in high-risk infants. Colostrum in breast milk will prevent allergic reactions by inhibiting the entry of foreign protein in the intestine (Leung and Sauve 2005).

Materials and methods

A descriptive study was conducted in the Dr. Zainoel Abidin Hospital, Banda Aceh, from January to June 2014. Subjects were infants aged 0-6 months suffering from AD with a low, moderate or high allergic risk and have a history of consuming breast milk, cow's milk or any other milk-base formula. We excluded infants with any infection or congenital disease. The diagnosis of AD was based on Hanifin-Rajka criteria (Hanifin and Rajka 1980).

Primary data were collected from respondents through interviews to parents with guidance of a questionnaire that inquired information on the type of diet given and the age of the emergence of AD symptom. Secondary data derived from patient's medical records. A type of diet that is given by the mothers are grouped into exclusive breastfeeding, given concurrently with any milk-base formula such as cow's milk, or only given milk formula without breastfeeding. Onset age when infants suffered from AD in the first 6 months of age categorized as 1,2,3,4,5 or 6 months of age and the breakdown for type of diet categorized according to each months. Secondary data from the patient's medical records used to obtain age, genders and family history of allergy which is used to categorized infants into low risk, moderate risk or high risk of allergy. We assessed the risk of allergy in subjects by counting the family atopic scores in parents and

Table 1. Subjects characteristics (N=50)

Characteristics		n	%
Gender	Boys	28	56
	Girls	22	44
Allergy risk	Low	18	36
	Moderate	21	42
	High	11	22
Type of diet	Exclusive breastfeeding	8	16
	Breastfeeding + milk formula	15	30
	Only milk formula	27	54
Skin Prick Test Result	Positive	13	26
	Negative	37	74

siblings based on medical records. Subjects received a score of 2 if parents or siblings had been diagnosed with allergies by a doctor, a score of 1 if the allergy symptoms still unconfirmed, a score of 0 if they had no any allergy symptoms. Subjects were divided into low, moderate or high risk for allergy based on the total score (Anggraeni et al 2014). Informed consent was obtained after we explained the purpose of the study. The study protocol was approved by the ethical committee of University of North Sumatra. To describe subjects characteristics we used univariate analysis.

Results

A total 50 infants aged 0-6 months suffering AD were included to this study. AD incidence was more common in boys than girls, 28 (56%) vs. 22 (44%), respectively. At least 21 infants (42%) had moderate risk allergy. Consumption only milk-base formula is a type of diet that most widely given by the mothers to 27 infants (54%) (Table 1).

The onset of the emergence of atopic dermatitis in the first 6 months of age, that mostly occurred at 1 month of age were seen in 38%. Consumption only milk-base formula is a type of diet that most widely given to AD infant 1 month old (10 cases) (Table 2).

Table 2. Onset age of the emergence of atopic dermatitis in the first 6 months of age and the breakdown for type of diet according to each months (N=50).

Onset age of the emergence of atopic dermatitis	n (%)	Type of diet		
		EBF*	BMF**	MF***
1 month	19 (38)	5	4	10
2 months	13 (26)	2	5	6
3 months	5 (10)	1	2	2
4 months	7 (14)		3	4
5 months	4 (8)		1	3
6 months	2 (4)			2

*EBF = Exclusive breastfeeding.

**BMF = Breastfeeding + milk formula.

***MF = Only milk formula.

Discussion

Early onset of allergies during the first 6 months of life may be influenced by many factors, such as Asian race/ethnicity, a family history of atopy, male gender and age of infant (Safri and Putra 2015; Keski-Nisula et al 2010). In our study, all infant are Asian race and most of them have the risk of allergy in the family. This explain why the incidence of AD generally occurred at the first 6 months of life. This study also found that 38% of infants suffering from DA at 1 month of age. At this age the baby should still exclusively breastfed, but in our study approximately 53% of infants have obtained only milk formula from their mother's and this is also a major trigger the onset of AD at an early life (Schoetzau et al 2002).

Exclusively breastfeeding should protect the infant from allergic disease, but atopic dermatitis that has happened in the first month of life might influence the mother's decision to continue exclusive breastfeeding. This is because the mothers may give the impression that breast milk is a causative agent of AD. When in fact giving breastfeeding for a month is not fully protect the infants from AD. However breastfeeding might be the cause of AD due to hyperallergenic food intake from the mother (von Berg et al 2003; Munasir et al 2011).

Atopic dermatitis that has occurred at the early age of life can develop into allergic rhinitis and asthma in the future (Leung et al 2004). The incidence of AD generally occurred at the first 6 months of life because the development of innate immune system in infants is not fully working (Munasir et al 2011; M'Rabet et al 2008).

Exogenous factors such as cow's milk consumption in the first 6 months of life will increase the production of interleukin (IL)-4, IL-5, IL-10 and IL-17 secreted by T helper (Th)-2 and T regulatory cell (Treg) (Safri et al 2015; Høst and Halken 2003; Rottem et al 2008). Furthermore, production capacity of interleukin-5 (IL-5) as a marker of Th-2 cytokine activity in boys is higher girls therefore boys had greater risk to suffer from allergy than girls (Sheriff et al 2001). Similar with previous report, this study found that AD incidence was more common in boys (56%). Other study also reported during the early age of life, boys had earlier onset of AD than girls (Eller et al 2009). Family history of atopy significantly associated with an increased risk of AD during first 6 months of life. The Copenhagen Prospective Study on Asthma in Childhood (COPSAC) and

other cohort revealed that a maternal history of AD or other atopic symptoms are significantly related to AD in the first 6 months of life. In addition, a paternal history of AD also related to an increased risk for AD in infants, but other atopic condition such as asthma and allergic rhinitis were not related to an increased risk for AD (Halkjær et al 2006; Moore et al 2004; Sugiyama et al 2007).

Ushiyama et al (2002) reported that hypersensitivity reactions and subsequent allergic disease in newborn can result from maternal diet during pregnancy. But previous study also suggest maternal hyperallergenic food avoidance during pregnancy seems no benefit in preventing the occurrence of allergy in infants at an early life (Munasir et al 2011; Fälth-Magnusson et al 1987). Predicting the risk of allergies based on family history of atopy and do a prevention of exogenous factors such as hyperallergenic foods is the key in avoiding the occurrence of AD (Kjellman 1998). In addition, feeding a hydrolyzed formula during the first 4 months of life as a substitute is very helpful in reducing the risk of AD in the first year of life (von Berg et al 2003; Safri and Putra 2015).

Using skin prick test to conclude the formula or breast milk as a cause of AD can result in bias.

Conclusion

The emergence of AD mostly occurred at 1 month of age and it is mostly caused by the consumption of milk formula. Predicting the risk of allergies based on family history of atopy and do an avoidance of hyperallergenic milk formula is the key in preventing the occurrence of AD in the first 6 months of life.

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References

- Anggraeni M, Wati KD, Tangking K. Using family atopy scores to identify the risk of atopic dermatitis in infants. *Paediatr Indones* 2014;54:330-337.
- Eller E, Kjaer HF, Høst A, Andersen KE, Bindslev-Jensen C. Development of atopic dermatitis in the DARC birth cohort. *Pediatr Allergy Immunol* 2010;21:307-314.
- Fälth-Magnusson K, Kjellman NI. Development of atopic disease in babies whose mothers were receiving exclusion diet during pregnancy-a randomized study. *J Allergy Clin Immunol* 1987;80:868-875.
- Hahn EL, Bacharier LB. The atopic march: the pattern of allergic disease development in childhood. *J Immunol Allergy Clin N Am* 2005;25:231-246.
- Halkjær LB, Loland L, Buchvald FF, Agner T, Skov L, Strand M. Development of atopic dermatitis during the first 3 years of life: The Copenhagen Prospective Study in Childhood Cohort Study in High-Risk Children. *Arch Dermatol* 2006;142(5):561-566.
- Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. *Acta Derm Venereol (Stockh)* 1980;92(Suppl):44-47.
- Høst A. Frequency of cow's milk allergy in childhood. *Ann Allergy Asthma Immunol* 2002;89(Suppl 1):33-37.
- Høst A, Halken S. Approach to feeding problems in the infant and young child. In: [Pediatric Allergy: Principles and practice. 7th ed] Leung DY, Sampson HA, Geha RS, Szeffler SJ (eds). Missouri: Mosby 2003; p. 488-494.
- Høst A, Halken S, Jacobsen HP, Christensen AE, Herskind AM, Plesner K. Clinical course of cow's milk protein allergy/intolerance and atopic disease in childhood. *Pediatr Allergy Immunol* 2002;13:23-28.
- Keski-Nisula L, Lappalainen HJ, Mustonen K, Hirvonen MR, Pfefferle PI, Renz H, et al. Production of interleukin-5, interleukin-10 and interferon- γ in cord blood is strongly associated with the season of birth. *Clin Experiment Allergy* 2010;40:1658-1668.
- Kjellman N-IM. Prediction and prevention of atopic allergy. *Allergy* 1998;53:67-71.
- Lasley MV, Shapiro GG. Testing for allergy. *Pediatr Rev* 2000;21:39-43.
- Leung AK and Sauve RS. Breast is the best for babies. *J Natl Med Assoc* 2005;97(7):1010-1019.
- Leung DY, Boguniewicz M, Howell MD, Nomuro I, Hamid QA. New insight into atopic dermatitis. *J Clin Invest* 2004;113:651-637.
- Moore MM, Rifas-Shiman SL, Rich-Edwards JW, Kleinman KP, Camargo CA, Gold DR, et al. Perinatal predictors of atopic dermatitis occurring in the first six months of life. *Pediatr* 2004;113:468-474.
- Munasir Z, Sastroasmoro S, Djauzi S, Waspadji S, Ramelan S, Aminullah A, et al. The role of allergic risk and other factors that affect the occurrence of atopic dermatitis in the first 6 months of life. *Asia Pac Allergy* 2011;1:73-79.
- M'Rabet L, Vos AP, Boehm G, Garssen J. Breast-feeding and its role in early development of the immune system in infants: consequences for health later in life. *J Nutr* 2008;138:1782S-1790S.
- O'Brien RM. Skin prick testing and in vitro assays for allergic sensitivity. *Austr Pres* 2002;25:91-93.
- Rottem M, Shostak D, Foldi S. The predictive value of specific immunoglobulin E on the outcome of milk allergy. *Allergy Clin Immunol* 2008;10:862-864.
- Safri M, Lubis B, Munasir Z, Mulyadi, Mudatsir, Putra AR. Cow's milk protein sensitization on the lymphocyte Th-1 and Th-2 activity in relation to wheezing in the first year of life. *HVM Bioflux* 2015;7(1):31-37.
- Safri M, Putra AR. Early allergy symptoms in infants aged 0-6 months on breast milk substitutes. *Pediatr Indones* 2015;55(1):18-22.
- Schoetzau A, Filipiak-Pittroff B, Franke K, Koletzko S, von Berg A, Gruebl A, et al. Effect of exclusive breast-feeding and early solid food avoidance on the incidence of atopic dermatitis in high-risk infants at 1 year of age. *Pediatr Allergy Immunol*. 2002;13:234-42.
- Sheriff A, Peters TJ, Henderson J, Strachan D. Risk factor associations with wheezing patterns in children followed longitudinally from birth to 31/2 years. *Inter J Epidem* 2001;30:1473-1484.
- Smith HP, Ownby DR. Clinical significance of Immunoglobulin E. In: [Middleton's Allergy: Principles and practice. 7th ed]. Adkinson NF, Bochner BS, Busse WW, Holgate ST, Lemanske RF, Simons FE (eds). Missouri: Mosby 2009; p. 845-857.
- Sugiyama M, Arakawa H, Ozawa K, Mizuno T, Mochizuki H, Tokuyama K, et al. Early-life risk factors for occurrence of atopic dermatitis during the first year. *Pediatr* 2007;119(3):e716-e723.
- Ushiyama Y, Matsumoto K, Shinohara M, Wakiguchi H, Sakai K, Komatsu T, et al. Nutrition during pregnancy may be associated with allergic disease in infants. *J Nutr Sci Vitaminol* 2002;48:345-351.
- Von Berg A, Koletzko S, Grübl A, Filipiak-Pittroff B, Wichmann H-E, Bauer CP, et al. the effect of hydrolyzed cow's milk formula for allergy prevention in the first year of life: The German Infants Nutritional Intervention Study, a randomized double-blind trial. *J Allergy Clin Immunol* 2003;111:533-540.

Wadonda-Kabondo N, Sterne JA, Golding J, Kennedy CT, Archer CB, Dunnill MG, ALSPAC study team. A prospective study of the prevalence and incidence of atopic dermatitis in children aged 0-42 months. *Br J Dermatol* 2003;149:1023-1028.

Zhang T, Yu J, Oh MH, Zhu Z. The Atopic March: Progression from atopic dermatitis to allergic rhinitis and asthma. *Allergy Asthma Immunol Res* 2011;3(2):67-73.

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