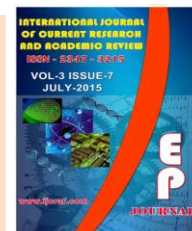




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### Allergy Risk and Developmental Impairment Risk in Infants Aged 0-6 Months Suffering Atopic Dermatitis due Cow's Milk Consumption

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#### KEYWORDS

Atopic dermatitis, cow's milk consumption, atopic infants, developmental impairment

#### A B S T R A C T

Atopic dermatitis is known to be a common allergy symptoms that occur at the early age of life, which is mostly caused by cow's milk protein and strongly associated with developmental and mental health disorders. This study was aimed to find a correlation between the risk factors of allergy and the possibility of developmental disorders in infant aged 0-6 months suffering atopic dermatitis due cow's milk consumption. Data were collected directly from the Dr. Zainoel Abidin Hospital, Banda Aceh, with a PEDS questionnaires completed by the parents and patients' medical records. Data was assessed using the Kolmogorov-Smirnov normality test. A total 32 infants aged 0-6 months suffering AD due cow's milk consumption were included. The majority of infants have a low risk for developmental impairment (71.9%). More than half of total infants have a low-moderate risk for allergy (56%). There is no significant correlation between the risk factors of allergy and the risk factor for development impairment in infant aged 0-6 months suffering atopic dermatitis due cow's milk consumption ( $p = 1.000$ ). The developmental impairment pattern in AD infants aged 0-6 months due cow's milk consumption is still not shown. Then the risk factors of allergy is still can't be predicted the possibility of development disorders in the future.

### Introduction

Nutrition is an important factor for the growth and development of the child. For the first 6 months of life, breastfeeding is the best food that should be given to the baby because it has a lot of nutrition and can protect the baby from allergy

symptoms, especially in infants with atopic heredity (Friedman and Zeiger, 2005; van Odijk et al., 2003). In some cases, mothers who don't want to breastfeed usually give cow's milk formula or any other milk-base formula to her baby and it will lead the baby

to cow's milk allergy (CMA) (Smith and Ownby, 2009; Høst and Halcken, 2003).

Cow's milk protein is known to be a common trigger of an allergic reaction in infants with atopic dermatitis (AD) is an early allergy symptom that usually appear within the first year of life. AD well known as a journey beginning of the development of allergic diseases in atopic infants which if not avoided then can lead to other allergic diseases such as allergic rhinitis and asthma (Høst and Halcken, 2003; Liu, 2006).

Checking a family history of atopy is very important in order to avoid further AD incident and nutritional deficiencies that may resulted in growth and development disorders in atopic infants. Initial assessment of allergy risk factors at an early age is also the best predictor factor in determining whether a child will experience an allergic disease later (Yadav and Yadav, 2005).

Infants with AD is strongly associated with developmental and mental health disorders including attention-deficit/hyperactivity disorder (ADHD), depression, anxiety, conduct disorder and autism (Yaghmaie et al., 2013). This is because infants with AD may have sleeping problems which can be a risk factor for the development of mental health problems in the future (Schmitt et al., 2011).

Early detection of developmental impairment is crucial to prevent mental health problems in the future and do an early intervention to improve the developmental health status. A parents evaluation of developmental status (PEDS) test can be used to evaluate the developmental and mental health status, including cognitive, behavioral, emotional and self-reliance. This test has moderate

sensitivity (79%) and specificity (80%) and performs well to assess the developmental status in the primary care (Sices et al, 2009; Limbos and Joyce, 2011).

The main aim of this study is to find a correlation between the risk factors of allergy and the possibility of developmental disorders in infant aged 0-6 months suffering atopic dermatitis due cow's milk consumption.

### **Materials and Methods**

This cross-sectional study was conducted in the Dr. Zainoel Abidin Hospital, Banda Aceh, from July to December 2014. Subject were 32 infants aged 0-6 months suffering from atopic dermatitis based on the diagnosis of American Academy of Dermatology (AAD) criteria and has a history of consuming cow's milk formula or food containing cow's milk-base formula. We excluded infants with any infection or congenital disease. We assessed the risk of allergy in subjects by counting the family atopy scores in parents and 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 (Eichenfield et al., 2003; Munasir et al., 2011).

Developmental assessment of infants aged 0-6 months is evaluated by using a PEDS test questionnaire. The result of PEDS test were classified into three groups: high risk for developmental disorders, moderate risk and low risk. Informed consent was obtained from the parents after we explained the aim of the study. To describe subjects' characteristics we used univariate analysis.

And in bivariate analysis we conducted the Kolmogorov-Smirnov normality test to find a correlation between variables. Statistical analyses were performed with SPSS for Windows version 17.0 (Chicago, Illinois, USA). A p value <0.05 was considered to indicate statistical significant.

**Results and Discussion**

This study included a total 32 infants aged 0-6 months suffering AD due cow’s milk consumption. The characteristics of subjects are shown in Table 1.

**Table.1** Characteristics of subject (N=32)

<b>Characteristics</b>	<b>n</b>	<b>%</b>
<b>Gender</b>		
Boys	20	62.5
Girls	12	37.5
<b>Aged when suffering AD</b>		
0-3 months	12	37.5
4-6 months	20	62.5
<b>Birth Weight</b>		
< 2500 gr	12	37.5
> 2500 gr	20	62.5
<b>Birth Length</b>		
< 45 cm	8	25
> 45 cm	24	75
<b>Allergy risk</b>		
Low-moderate	18	56
High	14	44
<b>Risk for developmental disorders</b>		
Low	23	71.9
Moderate	5	15.6
High	4	12.5

The majority of infants have a low risk for developmental impairment (71.9%). More than half of total infants have a low-moderate risk for allergy (56%). Furthermore, atopic dermatitis was more common in boys (62.5%), while the aged when infants is suffering from AD is 4-6 months (62.5%). Only 12 infants (37.5%) with AD have a birth weight below 2500 gr. At least 8 infants (25%) with AD have a birth length under 45 cm.

infant aged 0-6 months suffering atopic dermatitis due cow’s milk consumption.

Based on the Kolmogorov-Smirnov normality test, there is no significant correlation between the risk factors of allergy and the risk factor for developmental impairment in infant aged 0-6 months suffering atopic dermatitis due cow’s milk consumption (p = 1.00). The result is shown in Table 2.

The correlation between the risk factors of allergy and development impairment risk in

**Table.2** The correlation between the risk factors of allergy and developmental impairment risk in infant aged 0-6 months suffering atopic dermatitis due cow’s milk consumption

Allergy risk	Risk for developmental disorders						p
	High risk		Moderate risk		Low risk		
	n	%	n	%	n	%	
Low-moderate	2	11.1	3	16.7	13	72.2	1.000
High	2	14.3	2	14.3	10	71.4	

Allergy disease in parent and allergic risk in infants has a significant correlation, which is infants with a high risk of allergies were more common suffered allergic disease especially in the first year of life (Safri et al., 2015). Previous study also reported that more than 30% of infants suffered from allergic disease if their mother or father has a history of atopy (Johansson et al., 2004). Atopic dermatitis is a common chronic disease that was appeared at the early age of life and characterized by pruritic skin lesions (Zhang et al., 2011). AD is often the first step of the atopic march which is progressed to allergic rhinitis and asthma in the majority of patients and it’s mostly caused by cow’s milk consumption (Leung et al., 2004; Høst et al., 2002). Previous study in Jakarta shown the occurrence of AD in infants aged 0-6 months was 16.4%; of those subjects with AD, only 8.1% had a high risk of allergies (Munasir et al, 2011).

Mental impairment pattern in AD infants has been recognized as a complication of the disease. Mostly infant who have suffered from AD in the first year of life may have a risk factor for impaired development of mental health. This is because infants with AD usually have inadequate sleep at night due to pruritus and inadequate nutrient intake due to dietary restriction (Schmitt et al., 2011; Henriksen et al., 2000).

Previous study reported children with atopic dermatitis was significantly increased the odds of having attention-deficit/

hyperactivity disorder (OR 1.87; 95% CI 1.54-2.27), depression (OR 1.81; 95% CI 1.33-2.46) anxiety (OR 1.77; 95% CI 1.36-2.29), conduct disorder (OR 1.87; 95% CI 1.46-2.39), and autism (OR 3.04; 95% CI 2.13-4.34) compared to non-atopic dermatitis controls (Yaghmaie et al., 2013). In contrast with the previous studies, our result shown that developmental impairment pattern in AD infants aged 0-6 months due cow’s milk consumption is still not shown. This is presumably because the baby is still too young to do an assessment of the development and mental health status. Although we have assessed the risk of allergies, but it can’t predict the possibility of developmental disorders. We also recommend to avoid the consumption of cow’s milk formula in atopic infants especially with a high risk of allergy.

Avoidance of hyperallergenic foods such as cow’s milk is still the mainstay of treatment for allergic disease especially AD caused by cow’s milk consumption, although it may also contribute adversely to nutrient intake (Mehta et al., 2013). Therefore infants suffering AD due cow’s milk consumption need an annual nutrition assessment to prevent inadequate nutrient intake. Nutrition education should be informed to the parent to avoid all forms of the allergen and incorporate appropriate alternative foods (Christie et al., 2002).

In conclusion, Developmental impairment pattern in AD infants aged 0-6 months due

cow's milk consumption is still not shown. Then the risk factors of allergy is still can't be predicted the possibility of development disorders in the future.

### **Disclosure**

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### **Abbreviations used**

PEDS : Parents Evaluation of Developmental Status  
ADHD: Attention-deficit hyperactivity disorder  
AAD : American Academy of Dermatology  
AD : Atopic dermatitis  
CMA : Cow's milk allergy

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