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Cow's Milk Consumption and the Incidence of Wheezing in Children

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Abstract

Wheezingis the main symptom of asthma in children.One of the predisposing factors is cow's milk consumption. The aim of this study is to identify the association between cow's milk consumption and wheezing incidence in children inBanda Aceh. This is an analytic observational study with cross-sectional design. The sample included 84 children aged 6 months to 5 years were obtained by consecutive sampling. Data collected using questionnaires that included question about cow's milk consumption and ISAAC. The results showed that a statistically significant association between cow's milk consumptionand wheezing incidence in children aged 6 months to 5 years (p=0.045). It is advisable to replace cow's milk with partially or fully hydrolized formula to prevent the occurence of wheezing and malnutrition in children.

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Introduction

Asthma is a chronic common lung disease that marked by chronic inflammatory airway obstruction especially in atopic children (Kliegman *et al.,* 2015).

Asthma symptoms are characterized by the appearance of wheezing, coughing, shortness of breath and pain. The most frequent factors that trigger the occurence of asthma in children is smoker parent and food allergy (Killen, 2013).

Food allergy can be caused by more than 170 types of foods.Cow's milk, eggs, seafood and peanut are the most common causes of food allergies in children (Sampson 1993). Cow's milk sensitization frequently occurred in the first 3 years of life and could be characterized as wheezing (Abraham and Ownby 2005; Smith and Ownby 2009).

Previous study showed that children were feeded with formula based on cow's milk have greater risk of suffering from wheezing (Safri *et al.,* 2015). Cow's milk protein stimulates type I and IV hypersensitivity reaction and resulting in chronic inflammatory airway obstruction (O'Brien 2002).

Materials and Methods

This observational analytic with cross-sectional study was conducted in Pediatric Allergy and Immunology Clinic inBanda Aceh, the capital of Aceh Provence, from September to December 2017. A total of 84 children aged 6 months to 5 years were collected by consecutive sampling. Children feeded with formula based on cow's milk or partial/fully hydrolyzed formulawere included into inclusion criteria. Children suffering from other lung diseases, congenital problem, smoker parent, have pets, sputum retention and bronchiolitis were excluded in this

study.Data collected from questionnaires completed by parents and ISAAC question. Chi-square test were performed to analyze the obtained data. Data collected included age, sex, nutritional status, history of wheezing, allergy risk and history of previous treatment. All analyses were performed with SPSS ver. 22.0 (IBM SPSS Statistics for Windows, Ver 22.0. Armonk, NY, USA). Test results revealed statistically significant if *P* value of <0.05.

Results and Discussion

We obtained 84 children that fulfilled the inclusion criteria. Subject characteristics are shown in Table 1. Male subject have slightly different numbers than female subject, 41 (48.4%) vs 43 (51.2%), respectively. Most of the subject aged between 4 to 5 years old (36.9%).

More than half of the study subject has a normoweight nutritional status (52.4%). Around 54 (64.3%) children suffering from wheezing. Although 48 (57.2%) children were feeded with formula based on cow' milk, but the amount of children that were feeded with partial/fully hydrolyzed formulaalso reached 42.8%. Furthermore, 63 (75) chidren were categorized into low-moderate allergy risk. We analyzed the relation between variables in Table 2. From a total 54 children suffering from wheezing, around 42 children were feeded with formula based on cow's milk. The results showed statistically significant difference between variables (*P*=0.000). We also analyzed the correlation between wheezing and allergy risk in the family. But there was no statistically significant difference between variables (*P*=0.430).

Wheezing incidence especially in atopic children is associated with many factors such as smoker parent, allergy risk, consumption of food containing allergens especially cow's milk (Safri *et al.*, 2015). In our study, 64.3% of children aged less than 5 years suffered from wheezing. Wheezing incident are often occurs at an early age. Several studies have shown that symptom usually appear within first year of life and will disappear as the child getting older (Safri and Putra, 2015). Previous study in Michigan also mentioned that the incidence of wheezing most commonly occurs in the first 2 years of life that is amount to 27.2% (Wegienka *et al.*, 2009).

Table.1 Subject characteristics

Variable	N (84)	%
Gender		
Male	41	48.8
Female	43	51.2
Age		
6 months to 2 years	14	16.7
2 to 3 years	22	26.2
3 to 4 years	17	20.2
4 to 5 years	31	36.9
Nutritional status		
Underweight	23	27.4
Normoweight	44	52.4
Overweight	9	10.7
Obesity	8	9.5
Wheezing		
Yes	54	64.3
No	30	35.7
Feeding history		
Partial/fully hydrolyzed	36	42.8
Cow's milk	48	57.2
Allergy Risk		
Low-moderate	63	75
High	21	25

Table.2 Bivariate analyzed between variables

Variable	Wheezing		*P*
	Yes: n (%)	**No: n (%)**	
Feeding history			
Partial/fully hydrolyzed	12 (33.3)	24 (66.7)	0.000
Cow's milk	42 (87.5)	6 (12.5)	
Allergy risk			
Low-moderate	39 (61.9)	24 (38.1)	0.430
High	15 (71.4)	6 (28.6)	

Cow's milk allergy is knows as one of the most common triggers of wheezing in children. In this study, we found 87.5%children that were feeded with formula based on cow's milk experiencing wheezing in their life. This results is in line with previous study that also found the same thing (Sheriff *et al.,* 2001; Lopez *et al.,* 2002). Cow's milk protein stimulates type I and IV hypersensitivity reaction and resulting in chronic inflammatory airway obstruction (O'Brien 2002). Increasing production of immunoglobulin E (IgE) and interleukin (IL)-4, IL-5, and IL-10 were found in children who experienced hypersesitivity reactions triggered by cow's milk protein (Safri *et al.,* 2015; Høst and Halken, 2003).

Cow's milk consists 3 grams of protein per 100ml and included 25 different proteins which may act as antigens.The most common antigens in cow's milk arecasein and whey protein. Wheyconsists of β-lactoglobulin, α-lactalbumin, bovine serum albuminandbovin gamaglobulin which is an allergy-promoting protein (Martorell-Aragonés *et al.,* 2015; Siregar, 2001).

Studies suggest that partially or fully hydrolyzed formula are highly recommended to be given to atopic children in the first 5 years of life. This formula will inhibit the occurence of hypersensitivity reactions due to cow's milk protein (Alexander *et al.,* 2010; Caffarelli *et al.,* 2010). Our study showed that 66.7% of children who were received partially/fully hydrolyzed formula did not suffer from wheezing.

Allergy risk also related with the occurence of wheezing in children. Allergy symptoms were found in 40% children with a family history of atopy, although 10% of children who do not have a history of atopy may also experience allergic symptoms (Johansson *et al.,* 2004). Previous study obtained obtaineda correlation between the allergy risk and the occurence of wheezing, in which infants witha high risk of allergy were more common sufferedfrom wheezing (Safri *et al.,* 2015). Furthermore, children with a history of atopy have 2 times greater risk to suffer from wheezing (Balemans *et al.,* 2006). In contrast of our study, we found no statistically significant difference between allergy risk and wheezing in children. Further research is suggested to see more correlation between these factors.

Cow's milk allergy is also often associated with the incidence of malnutrition in children. This is because children with a history of allergy have impaired nutritional absorption due to bowel inflammation (Seppo *et al.,* 2005). This is in line with our study that also found 27.4% of children suffering malnutrition, but we did not conduct any further analysis on that issue.

In conclusion, cow's milk consumption increased the incidence of wheezing in children aged less than 5 years. This type of milk also associated with the incidence of malnutrition in children. It is advisable to replace cow's milk with partially or fully hydrolized formula to prevent the occurence of wheezing and malnutrition in children.

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