

The correlation between cow's milk allergy and stunting of children under two years old in Banda Aceh

¹Intan Chaharunia Mulya, ²Mulya Safri, ³Sulaiman Yusuf, ⁴Bakhtiar, ⁵Soraya Rezeki, ⁶Husnah

Medicine Syiah Kuala University Banda Aceh, Indonesia

icmulya@yahoo.com, mulya_anak@yahoo.com, sulaimanyusuf@unsyiah.ac.id, bakhtiar@unsyiah.ac.id, sorayarezeki@unsyiah.ac.id, dr_husnah@unsyiah.ac.id

Abstract. Background: Cow's Milk Allergy (CMA) is a common food allergy triggered in early life. CMA has been known to impose potential impacts towards growth disruption. In 2018, Aceh lead Indonesia as the province with the highest stunting prevalence of children under two years old. Limited studies have been conducted to confirm the correlation between CMA and stunting of children under two years old. Therefore, we tried to find out whether there is a correlation between CMA and stunting of children under two years old in Banda Aceh. Methods: This is an analytic-observational study using cross-sectional design. This research measured the length of children fulfilling the research criteria based on the national anthropometry guideline. Samples were collected based on pediatrician diagnosis of CMA supported by diagnostic tests such as Skin Prick Test (SPT), cow's milk protein elimination test and provocation test in Zainoel Abidin General Hospital and Pediatric Allergy Clinic in Banda Aceh since April to October 2019. Results: Sixty children were enrolled in this research in which 39 children (65%) were diagnosed with CMA and 26 children (43, 3%) were diagnosed with stunting. The Chi Square analysis showed an association between CMA and stunting ($p=0.000$). Conclusion: This research found out that there is a correlation between CMA and stunting of children under two years old in Banda Aceh. Children with CMA are 0, 33 more prone to suffer stunting rather than children without CMA.

Keywords: Cow's Milk Allergy; Stunting; Banda Aceh

Introduction

Cow's Milk Allergy (CMA) is a common food allergy triggered in children with atopy consuming substitute milk because of breastmilk unavailability.^[1] The incidence of CMA is raising annually especially in developing country.^[2] Safri in 2018 found that 27,4% children in Banda Aceh under 5 years old that are diagnosed with CMA suffered malnutrition.^[3] CMA has been known to impose potential impacts towards decreased growth in children. The allergic response will reduce children life quality so that cow's milk protein elimination should be planned. Therefore, The inadequacy of nutrition given for the children due to CMA is believed to potentially cause stunting.^[4] Stunting is one of three main health issues prioritized by The Government of Indonesia.^[5] Based on the Basic Health Research (RISKESDAS) 2018, Aceh is known as a province with the highest stunting prevalence of children under two years old in Indonesia (37,9%).⁶ This prevalence is still far from the stunting reduction target of Indonesia that is 28% in 2019.⁵ Stunting prevention is very important as it will impact a lot of burden. In this research, we tried to find the correlation between CMA and stunting of children under two years old in Banda Aceh since the study is still limited.

Methods

This is an analytic-observational study using cross-sectional design. The inclusive criteria of this research are children under two years old, residing in Banda Aceh and should have CMA clinical characteristics such as wheezing, allergic rhinitis, atopic dermatitis, nausea, rhinorrhea, or diarrhea. Children with chronic inflammation or congenital disease were excluded. Samples were collected based on paediatrician diagnosis of CMA supported by diagnostic tests such as Skin Prick Test (SPT), cow's milk protein elimination test and provocation test in Zainoel Abidin General Hospital and Pediatric Allergy Clinic in Banda Aceh.⁷ This research measured the length of children fulfilling the research criteria using infantometer. The data are processed based on the national anthropometry guideline adapted from WHO anthropometry guideline.⁸ Data collection was held from April to October 2019 in Zainoel Abidin General Hospital and private immunology clinic in Banda Aceh. Chi square analysis is used to analyse the correlation between cow's milk allergy and stunting of children under two years old in Banda Aceh.

Results

Sixty children were enrolled in this research. The age and gender distribution of samples is described on Table 1.

Table 1. General Characteristics of Samples

Characteristic	Frequency (n)	Percentage (%)
Age		
0 – 6 months	7	11,67
6 – 12 months	16	26,67
12 – 18 months	22	36,66
18 – 24 months	15	25
Gender		
Boys	36	60
Girls	24	40

The result of this research shows that children aged between 12-18 months dominated the sample. In contrary, previous study mentioned that CMA mostly happened in the first year of life.^[1] The probable underlying cause was delayed of diagnosis and treatment received by the patients. Cow's milk protein exposure in the complementary feeding practice also plays role in the development of CMA after the first six years of life. This research also found that boys were less than girls with comparison of 4:5. The comparison of gender in previous study was different. This may be caused as gender is not a risk factor of CMA.³

Table 4. Chi Square Analysis of the Correlation between Cow's Milk Allergy and Stunting

Cow's Milk Allergy	n	Stunting				Total	P Value	PR
		Yes		No				
		n	%	n	%			
Yes	39	26	66,7%	13	33,3	100%	0,00	0,33
No	21	0	0	21	100			

The Chi Square analysis on Table 4 showed a correlation between CMA and stunting ($p=0.000$). Statistically, children diagnosed with CMA are 0,33 more prone to suffer stunting rather than children without CMA. This result is supported by Robbins in USA which stated that children with CMA tends to have shorter posture.^[4] Another study by Tuokkola in Finland stated that cow's milk protein elimination diet in CMA patient is risky to increase child growth disruption due to micronutrition deficiency.^[9] This study is also consistent with a study conducted in Banda Aceh by Safri in which 27,4% children with CMA under five years old suffered malnutrition.³ In this study, we found that 66,7% of children diagnosed with CMA were also diagnosed with stunting. Food intake plays an important role in child's growth and

Table 2. The Frequency Distribution of Cow's Milk Allergy

	Frequency (n)	Percentage (%)
Cow's Milk Allergy	39	65
Non Cow's Milk Allergy	21	35
Total	60	100

Based on table 2, we found that more samples were diagnosed with CMA (65%) compared to children without CMA. This is related to inclusive criteria which are sensitive for the diagnosis of allergy but not specific for cow's milk allergy. Therefore, the probability of children diagnosed with CMA will be bigger.

Table 3. The Frequency Distribution of Stunting

	Frequency (n)	Percentage (%)
Stunting	26	43,3
Non Stunting	34	56,7
Total	60	100

In this research, we found that the stunting prevalence of children was 43,3% and a bit higher than the stunting prevalence of Aceh in 2018 that is 37,9%.^[6] This research also confirms that the national target of stunting reduction in Indonesia has not been accomplished.

development. The nutrition need has to be served optimally to prevent comorbidities. Breastmilk is the main nutrition source for children and has to be given exclusively in the first six months.^[10] However, there are lots of obstacle that may disrupt breastmilk availability. Children who couldn't receive breastmilk needs to consume milk substitution based on their conditions.^[11] Most of milk substitution contains cow's milk protein able to sensitize allergic response in atopic children causing CMA.^[7] CMA is the most reported food allergy in children so that the elimination of cow's milk protein in children diet is needed. Due to diet elimination, the risk of malnutrition in CMA patients become higher.⁴

Stunting in CMA is caused by the inadequacy of nutrition given in long term such as protein, calcium, vitamin D, and vitamin B12.^[11] In this research, the delayed diagnosis and treatment received by CMA patients is believed to cause chronic malnutrition such as stunting. Besides, children not consuming breastmilk are lack of growth hormone and enzyme.^[11] Parents have to be educated about stunting prevention related to exclusive breastfeeding, complementary feeding practice, basic immunization, food variants of the pregnant and breastfeeding woman, health and clean lifestyle, and routine anthropometry.^[12] Allergic response such as diarrhea, asthma, and atopic dermatitis will also inhibit children growth.

Based on our analysis, we conclude that children with CMA has to receive adequate nutrition based on their condition. Exclusive breastfeeding is highly recommended to fulfil children need and prevent CMA. For children with CMA, early treatment with substitute milk has to be given to prevent chronic malnutrition. Thus, we could prevent stunting of the CMA patients.

Our study has several limitations. First, we didn't consider other risk factors that could play role in the development of stunting such as parental education and socioeconomic status. Second, this research didn't survey the feeding practice history of children to confirm whether milk unavailability was happened. Other than that, we didn't characterize the cow's milk protein elimination result in long term to confirm whether there is a catch up growth after CMA treatment.

Conclusions

CMA was significantly correlated with stunting of children under two years old in Banda Aceh. Children with CMA is 0,33 more prone to suffer stunting. Therefore, immediate treatment is needed to reduce stunting in Indonesia.

References

1. Munasir Z, Muktiarti D. The management of food allergy in Indonesia. *Asia Pac Allergy* 2014;3(1):23–8.
2. Mehaudy R, Parisi CAS, Petriz N, Eymann A, Orsi M. Prevalence of cow's milk protein allergy among children in a university community hospital. *Arch Argent Pediatr* 2018;116(3):219–23.
3. Safri M. Cow's milk consumption and the incidence of wheezing in children. *Int J Curr Res Acad Rev* 2018;6(4):1–6.
4. Robbins KA, Wood RA, Keet CA. Milk allergy is associated with decreased growth in US children. *J Allergy Clin Immunol* 2014;134(6):1466-1468.e6.
5. Peraturan Presiden RI. Rencana pembangunan jangka menengah nasional (RPJMN) 2015-2019. 2015.
6. Kementerian Kesehatan Republik Indonesia. Hasil utama RISKESDAS 2018. Jakarta: 2018.
7. Espa S, Martorell-aragonés A, Echeverría-zudaire L, Alonso-lebrero E. Position document: IgE-mediated cow's milk allergy. *Allergol imunopathologia* 2015;1–20.
8. Kementerian Kesehatan Republik Indonesia. Keputusan menteri kesehatan Republik Indonesia nomor: 1995/Menkes/SK/XII/2010 tentang standar antropometri penilaian status gizi anak. Indonesia: 2011.
9. Tuokkola J, Luukkainen P, Nevalainen J, Toppan J, Ilonen J, Veijola R, et al. Eliminating cow's milk, but not wheat, barley or rye, increases the risk of growth deceleration and nutritional inadequacies. *Acta Paediatr* 2017;106(7).
10. Dupont C, Chouraqui J, Linglart A, Bocquet A, Darmaun D, Feillet F, et al. Nutritional management of cow's milk allergy in children: An update. *Arch Pediatr* 2018;25:236–43.
11. Scherbaum V, Sroul ML. The role of breastfeeding in the prevention of childhood malnutrition. *World Rev Nutr Diet* 2016;115:82–97.
12. Gubernur Aceh. Peraturan Gubernur Aceh Nomor 14 Tahun 2019 tentang Pencegahan dan Penanganan Stunting Terintegrasi di Aceh. 2019.