

Effectiveness Of Amino Acid Formula for Management Of Cow's Milk Allergy In Infants And Children

Tonny Sundjaya^{1,2}, Lupi Purnomosari^{1*}, Muhammad Fadil Himawan³, Alifah Wulandari¹

¹*Danone SN Indonesia, Jakarta, Indonesia*

²*Universitas Indonesia, Jakarta, Indonesia*

³*Ridwan Insitute, Cirebon, Indonesia*

**Correspondence: lupi.purnomosari@danone.com*

ABSTRACT: Cow's milk allergy is one of the significant health problems in infants and children that impacts their quality of life. As a solution, amino acid-based infant formula has become an innovative alternative to address this challenge. However, the effectiveness of their use requires further substantiation through previous studies. This study aims to evaluate the effectiveness of amino acid-based formula in the management of cow's milk allergy in infants and children. The results showed that amino acid-based formula is an effective solution in managing cow's milk allergy. It is completely allergen-free, easy to digest, and supports optimal growth and development of infants and children. The use of this formula significantly reduces allergy symptoms by avoiding exposure to cow's milk protein, while improving the quality of life of infants and children with cow's milk allergy. Thus, the results of this study confirm the importance of amino acid-based formulas as a safe and efficient treatment option for infants and children with cow's milk allergy.

Keywords- Cow's milk allergy, amino acid formula, allergy management, infants and children.

INTRODUCTION

The need for breastmilk is an important aspect for infants and children because breastmilk is known as the best food for infants, both for growth, development, and overall function (Rahmi, 2019). Breast milk provides invaluable nutrients and is ideal for supporting infant health. However, there are certain situations where breastfeeding is not possible, either due to the medical condition of the mother or the baby. In such cases, infant formula is often used as an alternative to breast milk.

Formula milk available in the market is mostly derived from cow's milk, which is generally able to fulfill the nutritional needs of babies. However, in some infants, consumption of cow's milk may trigger

“Effectiveness Of Amino Acid Formula For Management Of Cow's Milk Allergy In Infants And Children”

an allergy known as cow's milk allergy. This allergy can occur due to an unwanted immunologic reaction to the proteins found in cow's milk. Most cases of cow's milk allergy are related to type 1 hypersensitivity reactions mediated by immunoglobulin E (IgE). However, this allergy can also occur through immunologic mechanisms that do not involve IgE or a combination of both (Sumadiono et al., 2014).

Cow's milk allergy is one of the most common forms of food allergy in infants and children, with an estimated incidence of 2-7.5%. In fact, allergic reactions to cow's milk can also occur in about 0.5% of exclusively breastfed infants and is estimated to affect 2-3% of children under the age of five. Most cases of cow's milk allergy are mediated by immunoglobulin E (IgE), with the incidence reaching 1.5-6% in children, and the prevalence has shown an increase in recent decades. In addition, there are also cases of cow's milk allergy involving non-IgE mechanisms (Wartika & Purnamawati, 2023).

Cow's milk allergy can cause a variety of clinical symptoms, both in the digestive tract, respiratory system, and skin. These symptoms vary from mild rashes to gastrointestinal distress, and can even develop into life-threatening anaphylactic reactions. Due to the wide spectrum of symptoms, diagnosis of cow's milk allergy is often challenging, and it is not uncommon for misdiagnosis or even overdiagnosis to occur (Wartika & Purnamawati, 2023).

The main approach in the management of cow's milk allergy is the complete elimination of cow's milk protein from the child's diet. This often requires replacing conventional infant formula with specialized formulas designed to meet nutritional needs without triggering allergic reactions (Rossetti et al., 2019). One alternative to infant formula that offers a solution is an amino acid-based formula. These formulas are considered superior, especially in children with severe gastrointestinal disorders, severe atopic dermatitis or failure-to-thrive conditions, as their proteins have been completely hydrolyzed into free amino acids, which are the smallest form and do not cause allergies (Díaz et al., 2019; Fiocchi et al., 2016; Ribes-Koninckx et al., 2023).

Previous research has shown that amino acid-based formulas are not only effective in managing cow's milk allergy symptoms but also support optimal infant growth and development. One study showed that long-term treatment using amino acid formulas was safe and able to ensure adequate body growth in children with cow's milk allergy (Canani et al., 2017). Another study found that there were no significant differences between groups of infants consuming amino acid formulas in terms of formula intake, side effects, such as flatulence or vomiting, mood, or sleep patterns. Albumin and plasma amino acid levels of infants receiving this formula also remained within normal limits. The study concluded that infants

“Effectiveness Of Amino Acid Formula For Management Of Cow's Milk Allergy In Infants And Children”

consuming the new amino acid formula experienced daily weight gain comparable to infants consuming a commercially available amino acid-based formula (Corkins et al., 2016).

However, despite the promising results of previous studies, there is still a need to further evaluate the effectiveness and sustainability of amino acid-based formulas in the management of cow's milk allergy. In addition, it is necessary to identify the factors that influence their successful use. This study aims to evaluate the effectiveness of amino acid-based formulas in the management of cow's milk allergy in infants and children. The main focus of the study is on reducing clinical symptoms, improving quality of life, and meeting optimal nutritional needs to support the growth and development of children with this condition.

METHODS

This research uses the literature review method, which is an approach to analyzing and synthesizing the results of previous research. Literature review is conducted by tracing various reading sources relevant to the research topic, such as books, scientific journals, and other publications (Hadi & Afandi, 2021). This method aims to integrate information from various literatures to build a comprehensive understanding of a particular topic. In this study, the literature review approach was used to explore the effectiveness of amino acid formulas in the management of cow's milk allergy. Through the review of various existing literature, this study is expected to provide in-depth insight into the mechanism of action and benefits of amino acid formulas in helping to overcome the problem of cow's milk allergy, as well as provide a scientific basis for further research in this field.

DISCUSSION

Amino acid formulas have become one of the main options in the management of cow's milk allergy, especially for infants and children who cannot tolerate the proteins in other formulas. Unlike extensively hydrolyzed formulas (EHF), amino acid formulas (AAF) are designed using free amino acids, which are the simplest form of protein. These free amino acids do not contain whole proteins or their fractions, so they have almost no potential to trigger allergic reactions. This makes AAF a highly effective option for infants and children with severe cow's milk allergies or certain conditions that require complete protein replacement. It provides a safe and suitable solution for groups of infants with high sensitivity to cow's milk protein (D'Auria et al., 2021).

Amino acid formulas are seen as the primary choice in cow's milk allergy therapy as they have the key advantage of being highly hypoallergenic. It helps relieve allergy symptoms while supporting

“Effectiveness Of Amino Acid Formula For Management Of Cow's Milk Allergy In Infants And Children”

more optimal management of the condition (Munasir et al., 2024). However, their use is often prioritized in selected cases, mainly due to their relatively high cost. This formula is used in infants with multiple food allergy conditions, severe cow's milk allergy, or allergic symptoms such as severe atopic eczema despite exclusive breastfeeding. In addition, this formula is also given to infants with non-IgE cow's milk allergy onset such as eosinophilic esophagitis, cow's milk allergy accompanied by failure to thrive, or in those who do not show improvement in symptoms after consuming extensively hydrolyzed formula (Surya & Salmiyanti, 2023). The safety and effectiveness of amino acid formulas have been proven through various clinical trials. Research shows that they are well tolerated by infants suffering from severe cow's milk allergy, making them a reliable solution for the management of the condition (Nowak-Węgrzyn et al., 2015).

Amino acid formula, also known as elemental formula or elemental monomer formula, is a complete nutrition for infants specifically designed to treat cow's milk allergy. It consists of synthetic free amino acids, fats, carbohydrates in the form of glucose polymers, and micronutrients. The uniqueness of this formula lies in the replacement of whole proteins with free amino acids, thus significantly reducing the risk of allergic reactions. The effectiveness of amino acid formulas has made them a top choice in the management of cow's milk allergy, especially in infants and children (Ribes-Koninckx et al., 2023; Venter et al., 2024).

One of the main reasons behind the effectiveness of amino acid formulas is their composition of individual amino acids, which are the simplest form of protein. Unlike whole cow's milk protein or hydrolyzed protein, these formulas are completely free from protein residue allergenicity as they are neither derived from cow's milk protein nor any other native protein. In addition, these formulas usually contain a variety of fats, such as medium-chain (MCT) or long-chain fatty acids, to ensure essential fatty acid requirements are met and prevent nutritional deficiencies (Ribes-Koninckx et al., 2023).

Amino acid formulas are particularly safe and effective for infants with severe cow's milk allergy, as their unique structure prevents the body's recognition of allergens. Unlike extensively hydrolyzed formulas, they leave no allergen residue, making them suitable for complex allergy cases (Ribes-Koninckx et al., 2023). In addition, it is easily digestible making it an optimal nutritional solution even for infants with minimal digestive ability (Aini & Octaria, 2024).

Amino acid formulas are also designed to support optimal infant growth. As a substitute for breast milk, these formulas meet the nutritional needs of infants to ensure their normal growth, especially during the period of early development and transition to solid foods. Infants who consume this formula show

“Effectiveness Of Amino Acid Formula For Management Of Cow's Milk Allergy In Infants And Children”

growth rates on par with other formula users, including healthy weight gain, as well as a reduction in symptoms such as atopic dermatitis, diarrhea, and vomiting (Canani et al., 2017; Corkins et al., 2016; Vandenplas et al., 2021; Vanderhoof et al., 2016). This formula is completely free of cow's milk components and does not trigger sensitivities due to its individual amino acid structure. Its effectiveness in reducing allergy symptoms such as rashes, colic, and indigestion supports better growth of infants and improves their quality of life (Bognanni et al., 2024).

In addition, amino acid formulas are proven safe for long-term use as part of a cow's milk allergy management strategy. Research shows that infants with cow's milk protein allergy who have other food allergies have significantly reduced allergy symptoms after consuming this formula. The long-term safety of amino acid formulas also supported the normal growth of infants, despite their complex allergies. The study results confirmed that feeding amino acid formulas as a long-term solution can improve the management of previously difficult-to-control allergies, providing greater stability and safety for infants with severe allergies (Vanderhoof et al., 2016).

For the timing of amino acid formula feeding, it is often recommended by pediatricians as a solution for infants and children diagnosed with cow's milk allergy. Diagnosis of cow's milk allergy is usually done through allergy skin tests or blood tests, which help confirm sensitivity to cow's milk proteins (Guler et al., 2020).

However, despite being very effective in the management of cow's milk allergy, amino acid formula has some limitations that need to be considered. One of the main challenges is that it is relatively expensive compared to regular formula, which can be a barrier for some families (Surya & Salmiyanti, 2023). Therefore, it is important to make a joint effort, which is expected that the problem of affordability of amino acid formula can be resolved so that all babies in need can get optimal nutrition for their growth and development.

Thus, research shows that amino acid formulas offer a highly effective solution for managing cow's milk allergy in infants and children. With their significant benefits, they not only help reduce allergy symptoms but also support optimal growth and development, helping infants and children with cow's milk allergy to maintain a good quality of life.

CONCLUSION

Amino acid-based milk formulas offer an effective solution in managing cow's milk allergy in infants and children. These formulas are designed to be completely free of allergens, as they are composed of individual amino acids, which are the simplest form of protein and are not recognized by the body as allergens. In addition, this formula is highly digestible by the bodies of infants and children. Furthermore, previous studies have shown that amino acid formulas support optimal growth and development of infants and children. By avoiding exposure to cow's milk protein, the use of this formula can significantly reduce allergy symptoms while improving the quality of life of infants and children who experience cow's milk allergy. Amino acid formulas are generally recommended by pediatricians for infants and children who have been diagnosed with cow's milk allergy. Therefore, their use should always be done under the supervision of a doctor to ensure the type and dose of formula that suits the needs of each child. In conclusion, amino acid-based formulas can be a safe and efficient treatment option for infants and children with cow's milk allergy.

REFERENCES

- Aini, P. Q., & Octaria, Y. C. (2024). Peran probiotik terhadap pembentukan toleransi imun pada bayi dengan alergi susu sapi: A literature review. *Holistik Jurnal Kesehatan*, *18*(7), 830-841.
- Bognanni, A., Fiocchi, A., Arasi, S., Chu, D. K., Ansotegui, I., Assa'ad, A. H., ... & Brozek, J. L. (2024). World Allergy Organization (WAO) Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) guideline update–XII–Recommendations on milk formula supplements with and without probiotics for infants and toddlers with CMA. *World Allergy Organization Journal*, *17*(4), 100888.
- Canani, R. B., Nocerino, R., Frediani, T., Lucarelli, S., Di Scala, C., Varin, E., ... & Agostoni, C. (2017). Amino Acid-based Formula in Cow's Milk Allergy: Long-term Effects on Body Growth and Protein Metabolism. *Journal of Pediatric Gastroenterology and Nutrition*, *64*(4), 632-638.
- Corkins, M., Czerkies, L. A., Storm, H. M., Sun, S., & Saavedra, J. M. (2016). Assessment of growth of infants fed an amino acid-based formula. *Clinical Medicine Insights: Pediatrics*, *10*, CMPed-S33071.
- D'Auria, E., Salvatore, S., Acunzo, M., Peroni, D., Pendezza, E., Di Profio, E., ... & Verduci, E. (2021). Hydrolysed formulas in the management of cow's milk allergy: new insights, pitfalls and tips. *Nutrients*, *13*(8), 2762.
- Díaz, J. J., Espín, B., Segarra, O., Domínguez-Ortega, G., Blasco-Alonso, J., Cano, B., ... & Moreno, A. (2019). Food protein-induced enterocolitis syndrome: data from a multicenter retrospective study in Spain. *Journal of Pediatric Gastroenterology and Nutrition*, *68*(2), 232-236.

“Effectiveness Of Amino Acid Formula For Management Of Cow's Milk Allergy In Infants And Children”

- Fiocchi, A., Dahda, L., Dupont, C., Campoy, C., Fierro, V., & Nieto, A. (2016). Cow's milk allergy: towards an update of DRACMA guidelines. *World Allergy Organization Journal*, *9*, 1-11.
- Guler, N., Cokugras, F. C., Sapan, N., Selimoglu, A., Turktas, I., Cokugras, H., ... & Beser, O. F. (2020). Diagnosis and management of cow's milk protein allergy in Turkey: Region-specific recommendations by an expert-panel. *Allergologia et immunopathologia*, *48*(2), 202-210.
- Hadi, N. F., & Afandi, N. K. (2021). Literature review is a part of research. *Sulawesi Tenggara Educational Journal*, *1*(3), 64-71.
- Munasir, Z., Basrowi, R. W., Sundjaya, T., & Pratiwi, D. (2024). EFFECTIVENESS OF AMINO ACID FORMULA IN TREATMENT OF SEVERE COW'S MILK PROTEIN ALLERGY (CMPA) IN CHILDREN: EVIDENCE-BASED CASE REPORT. *General Medicine/Obsta Medicina*, *26*(2).
- Nowak-Węgrzyn, A., Czerkies, L. A., Collins, B., & Saavedra, J. M. (2015). Evaluation of Hypoallergenicity of a New, Amino Acid–Based Formula. *Clinical Pediatrics*, *54*(3), 264-272.
- Rahmi, P. (2019). Peran nutrisi bagi tumbuh dan kembang anak usia dini. *Jurnal Pendidikan Anak Bunayya*, *5*(1), 1-13.
- Ribes-Koninckx, C., Amil-Dias, J., Espin, B., Molina, M., Segarra, O., & Diaz-Martin, J. J. (2023). The use of amino acid formulas in pediatric patients with allergy to cow's milk proteins: Recommendations from a group of experts. *Frontiers in Pediatrics*, *11*, 1110380.
- Rossetti, D., Cucchiara, S., Morace, A., Leter, B., & Oliva, S. (2019). Hypoallergenicity of a thickened hydrolyzed formula in children with cow's milk allergy. *World Journal of Clinical Cases*, *7*(16), 2256.
- Sharif, M. K., & Zahid, A. (2018). Role of food product development in increased food consumption and value addition. In *Food processing for increased quality and consumption* (pp. 455-479). Academic Press.
- Sumadiono, Munasir Z, Bharlianto W, Muktiarti D, Juffrie M, Hegar B, et al. (2014) Diagnosis dan Tata Laksana Alergi Susu Sapi. *Ikatan Dokter Anak Indonesia*.
- Surya, A. S., & Salmiyanti, S. (2023). Anak Dengan Alergi Susu Sapi. *Jurnal Mahasiswa Ilmu Kesehatan*, *1*(3), 101-112.
- Vandenplas, Y., Dupont, C., Eigenmann, P., Heine, R. G., Høst, A., Järvi, A., ... & Mosaic Study Investigator Group. (2021). Growth in infants with cow's milk protein allergy fed an amino acid-based formula. *Pediatric Gastroenterology, Hepatology & Nutrition*, *24*(4), 392.
- Vanderhoof, J., Moore, N., & de Boissieu, D. (2016). Evaluation of an amino acid– based formula in infants not responding to extensively hydrolyzed protein formula. *Journal of Pediatric Gastroenterology and Nutrition*, *63*(5), 531-533.
- Venter, C., Meyer, R., Groetch, M., Nowak-Węgrzyn, A., Mennini, M., Pawankar, R., ... & Wong, G. W. (2024). World Allergy Organization (WAO) Diagnosis and Rationale for Action against Cow's Milk Allergy

“Effectiveness Of Amino Acid Formula For Management Of Cow's Milk Allergy In Infants And Children”

(DRACMA) guidelines update–XVI-Nutritional management of cow's milk allergy. *World Allergy Organization Journal*, 17(8), 100931.

Wartika, I. G. N. K. A., & Purnamawati, I. A. P. (2023). Tinjauan Pustaka: Alergi Susu SAPI. *Ganesha Medicina*, 3(1), 29-40.