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The Effect of Extensive Hydrolyzate Formula on the Growth and Development of Infants with Cow's Milk Allergy

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***ABSTRACT*:** Cow's milk allergy is a common condition in babies and children. Allergic reactions can occur when the body reacts to the proteins in cow's milk, causing various symptoms such as skin rashes, vomiting, diarrhea, or even more serious reactions. Babies who suffer from cow's milk allergy need appropriate treatment so that their growth and development is not disrupted. One approach used in managing cow's milk allergy is to provide an extensive hydrolyzate formula. The aim of this study was to evaluate the effect of providing extensive hydrolyzed formula on the growth and development of babies suffering from cow's milk allergy. This study used qualitative research methods. The data collection technique in this research is literature study. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and drawing conclusions. The results of the study concluded that the use of extensive hydrolyzed formula is an effective choice for babies who are allergic to cow's milk. This research shows that this formula has a positive impact on the baby's weight growth according to his age. However, in terms of infant development, there is no significant difference in the effect between the use of extensive hydrolyzed formula and soy protein isolate on various aspects, including global development, gross motor skills, fine motor skills, language and social personality in children who are allergic to cow's milk.

Keywords- Extensive Hydrolyzate, Infants, Cow's Milk Allergy

INTRODUCTION

Milk allergy is when a person's body responds to cow's milk protein and its processed products with an excessive immune system, this condition often occurs in children, although some adults can also experience this allergy throughout their life (Saragi et al., 2023). This allergy is often detected in babies under 6 months old and can improve with age, especially around 6 years. People with this

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condition often experience an immediate allergic reaction after consuming cow's milk. Symptoms that may arise include itching, vomiting, difficulty breathing, and digestive problems. In severe cases, cow's milk allergy can cause anaphylactic shock which is life-threatening for the sufferer (Siloam Hospitals, 2024).

It is estimated that around 2% to 3% of babies experience cow's milk allergy (ASS), with a higher figure reaching 30% to 45% in babies who suffer from atopic dermatitis at the age of 1 year. In addition to skin symptoms, ASS can show pulmonary, gastrointestinal symptoms, and even systemic reactions such as anaphylaxis. Delayed reaction symptoms may also appear after 24 hours, including colic syndrome in infants. Diagnosis of ASS in infants and children involves in vitro and in vivo examinations. After anamnesis and physical examination, the diagnosis of cow's milk sensitization can be confirmed through specific immunoglobulin E (IgE) examination of cow's milk and/or skin test of cow's milk. To confirm the diagnosis objectively, a double-blind placebo control food challenge (DBPCFC) test is usually performed if the initial test shows positive results. This method is considered the gold standard in establishing a diagnosis of ASS (Ministry of Health, 2022).

Babies who are allergic to cow's milk need appropriate treatment so that their growth and development is not disrupted. One approach commonly used in managing cow's milk allergy is to provide an extensive hydrolyzate formula. Extensively hydrolyzed formula milk is one formula milk option that can be used for babies who are allergic to cow's milk. This type of milk provides all the essential nutrients needed by babies without causing allergy symptoms that can harm their health. The proteins in hydrolyzed formula have been broken down into smaller fragments, so the baby's body can accept them without producing an allergic reaction. This approach aims to enable the baby's body to consume milk protein without causing a negative immune response, so that babies with cow's milk allergy can receive the nutrition they need without allergic complications (Nareza, 2020).

Previous research by (Rahmasiwi & Hardaningsih, 2017) resulted in 50 research subjects (6-60 months), 29 men and 21 women. A total of 14 children (28%) experienced malnutrition. The extensively hydrolyzed formula provides a higher weight for age value than soy protein isolate. Based on the analysis test, it was found that there was no significance in HAZ (p=1.00), WHZ (p=0.235), HC (p=0.490), MUAC (p=0.667) and significance in WAZ (p=0.004). Conclusion Extensive hydrolyzed formula has a better influence on aspects of weight-for-age growth.

Another study by (Imani et al., 2017) found that there were 4 subjects (16%) in the soy protein isolate group who had suspected developmental disorders. Based on hypothesis testing, there is no significant difference in the effect between the two formula milks on global development (p=0.11), gross motor skills (p=0.49), fine motor skills (p=0.61), language (0.42) and personal social (p=0.46) of children with cow's milk allergy. So there is no significant difference in the effect between the extensive hydrolysis formula and soy protein isolate on global development, gross motor skills, fine motor skills, language or social personality in children with cow's milk allergy.

Based on this background description, researchers are interested in conducting research with the title "The effect of giving extensive hydrolysate formula on the growth and development of babies suffering from cow's milk allergy". The practical implication of this research is that the use of extensive hydrolyzed formula can be an effective option in the management of growth and development of babies suffering from cow's milk allergy. Health practitioners, especially pediatricians and nutritionists, may recommend using this formula as an alternative for babies who are intolerant to cow's milk. The aim of this study was to evaluate the effect of providing extensive hydrolyzed formula on the growth and development of babies suffering from cow's milk allergy.

RESEARCH METHODS

This study used qualitative research methods. Qualitative research methods are research approaches that aim to understand social phenomena in depth, complex and contextual. This method emphasizes interpreting the meaning of the data obtained, as well as paying attention to the context and situation in which the phenomenon occurs (Sari et al., 2022). The data collection technique in this research is literature study. Literature study data collection techniques are methods in which researchers collect information from various literature sources that are relevant to the research topic being studied. This involves searching, selecting, and analyzing scientific articles, books, research reports, and other documents related to the research topic (Jailani, 2023). The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and drawing conclusions.

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RESULTS AND DISCUSSION

Babies are children with an age limit of 0-11 months. Toddlers is a term for children aged 12 months to 59 months or also known as children under five years of age. The baby and toddler period is a golden period and is very sensitive to the environment. The baby will grow and develop with the influence of care other than the birth process. This care process is not just daily care, but also includes giving milk (Mafticha et al., 2019). Providing this milk is intended so that children experience optimal growth and development.

Growth and development are two terms that are always used interchangeably. The two cannot be separated, but rather depend on each other and can even be differentiated with the aim of further clarifying their uses. Human growth and development takes place from before birth (prenatal) until maturity. Growth is a concrete physiological change consisting of size, size and area, as well as biological structure. Development is development that lies in the function and psychological organs of students (Limbong & Maharani, 2024). Meanwhile, development is a series of progressive changes that occur as a result of the process of maturity and experience, working in a process of change relating to physical and psychological aspects or changes in behavior and abilities throughout the process of individual development starting from conception until death (Amat, 2021).

Growth and development are influenced by various factors including endocrine, genetic, constitution, environment, nutrition, and preterm birth. Preterm birth factors are classified into five categories: genetic factors, nutrition, smoking, pregnancy characteristics or complications, and disease-related characteristics (Marsurbin et al., 2023). Growth and development also require stimulation so that it can run optimally (Ningrum et al., 2023). The process of growth and development during infancy and toddlerhood is a very important process in determining a child's future both physically, mentally, and behaviorally. A baby's growth and development is largely determined by the amount of breast milk they receive, including the energy and other nutrients contained in the breast milk. Breast milk without other food ingredients can meet growth needs until the baby is 6 months old (Sajiman et al., 2016).

Milk is an almost perfect natural food. Milk has very high levels of calcium, the lactose content in milk helps absorption in the digestive tract. The substances contained in milk are a commodity with high nutritional content, which has the function of helping growth and maintaining health. Children who are under five must receive adequate nutritional intake to support their growth (Fitria & Fahrudin, 2019). Breast milk is food that has been prepared for the future baby when the mother is pregnant.

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Providing breast milk to babies aged 0 - 1 year has very important meaning, especially regarding meeting the needs for nutrients and other substances that form the body's immunity against disease. Common causes of failure to provide exclusive breastfeeding are the mother's lack of knowledge about exclusive breastfeeding and breastfeeding, working mothers, no support from the family, inappropriate breastfeeding techniques and the myth that watery breast milk is not good for the baby (Hajifah et al., 2022).

Giving breast milk to babies has benefits. Breast milk as an anti-body, in creating healthy and quality human resources according to the application of breast milk during physical, psychological, social and spiritual formation. Babies who consume exclusive breast milk can avoid the risk of death due to diarrhea by 3.9 times and Upper Respiratory Tract Infections (ARI) by 2.4 times. Babies who are given exclusive breast milk in the first month of birth are less susceptible to disease than babies who are given breast milk or formula milk. The complete contents of breast milk can prevent acute physical diseases including gastrointestinal diseases, otitis media, upper tract infections (ARI), and entero necrotizing neonatal colitis. It can also prevent chronic diseases such as asthma, allergies and obesity and for mothers can be useful as a natural contraceptive. (Hasriyana & Surani, 2021).

Failure to breastfeed is caused by the mother's nutritional status before pregnancy, during pregnancy and during breastfeeding. This happens because during breastfeeding, the mother's body fat is mobilized to produce breast milk and the fat stores of mothers with nutritional status are lower than the body fat stores of normal mothers. The mother's nutritional status during breastfeeding is an effect of the mother's nutritional status before pregnancy and during pregnancy (weight gain during pregnancy). Maternal weight gain during pregnancy depends on the nutritional status of the mother before pregnancy. Mothers who have good nutritional status during pregnancy have sufficient body fat reserves to breastfeed for 4 - 6 months, but mothers with poor nutritional status may have insufficient body fat reserves to breastfeed their babies for 4 - 6 months (Nisa & Merben, 2023).

Infant formula milk is intended to be an effective replacement for infant feeding. Although production of a product identical to breast milk is not feasible, every effort has been taken to mimic the nutritional profile of breast milk for normal infant growth and development. Infant formula is an effective substitute for breast milk and is formulated to mimic the nutritional composition of breast milk. The recently updated FDA (Food and Drug Administration) rules on Good Manufacturing Practices for infant formula, require, among other things, that the formula meets the quality factors of normal

physical growth and sufficient biological quality of the protein component (a sufficient amount of protein in a form that can be used by babies). Formula milk is divided into several types, some of which are cow's milk and soy milk. Cow's milk contains higher levels of fat, minerals and protein than breast milk. Therefore, cow's milk must be skimmed and diluted to resemble the composition of human breast milk more closely (Azzubaidi et al., 2023).

Mother's milk (ASI) is good food for babies. However, in certain conditions, due to medical indications, babies are not allowed to receive breast milk, so formula milk is needed. Most of the recommended formula milk comes from cow's milk, but this does not rule out the possibility of children experiencing allergies due to consuming cow's milk (Purnawati & Wiartika, 2023).

Cow's milk allergy is defined as a reproducible adverse reaction to one or more cow's milk proteins (usually casein or serum β-lactoglobulin). Cow's milk allergy (ASS) is an immunologically mediated unwanted reaction to cow's milk protein. Cow's milk allergy is usually associated with a type 1 hypersensitivity reaction which is mediated by IgE (Surya & Salmiyati, 2023).Cow's milk protein is the most common allergen in various hypersensitivity reactions in children. Cow's milk contains at least 20 protein components that can stimulate the production of human antibodies. Cow's milk protein consists of 2 fractions, namely casein and whey. The casein fraction is what makes milk thick (milky) and constitutes 76% to 86% of cow's milk protein. 15 The casein fraction can be precipitated with an acid at pH 4.6 which produces 5 basic caseins, namely α, αδ, β, κ and γ.

IgE-mediated ASS hypersensitivity reactions include respiratory, gastrointestinal and skin problems (Putera, 2023).The main principle of therapy for cow's milk allergy is to avoid (complete avoidance) all forms of cow's milk products but must provide nutrition that is balanced and suitable for the growth and development of the baby/child. Exclusively breastfed babies who are allergic to cow's milk, mothers can continue breastfeeding by avoiding cow's milk protein and its derivative products in their daily diet. Breast milk remains the best choice for babies with cow's milk allergies. Calcium supplementation needs to be considered for breastfeeding mothers who limit cow's milk protein and its derivative products (Sumadiyono et al., 2014).

Food allergies originate from the host's immune system. If someone has an allergy to milk, the immune system will respond to certain milk proteins, triggering an immune response, and attempting to neutralize the triggering protein. When the body comes into contact with the protein again, the immune response will recognize the protein. This triggers the immune system to mount a response,

including the release of histamine and other immune mediators. The release of these chemicals causes signs and symptoms of cow's milk allergy (Edward & Younus, 2023).

The existence of ASS hypersensitivity reactions makes extensive hydrolyzate a substitute for formula milk with cow's milk. One strategy to prevent cow's milk allergy in non-breastfed infants is the use of partially hydrolyzed formula (pHF) in high-risk infants, which are infants born into families with atopic disease. pHF is considered a protein source that can be used in standard infant formula. pHF also meets all the nutritional requirements as required for standard CMF (Vandenplas et al., 2019). But, extensive hydrolyzate formula, soy protein isolate formula, and amino acid formula; has almost the same effect on the normal growth of children allergic to cow's milk. This is thought to be because the soy protein isolate content has been fortified and added so that the minerals for bone maturation are as good as the extensive hydrolyzate formula (Rahmasiwi & Hardaningsih, 2017). Extensive hydrolyzateprovide a better influence on aspects of weight growth for age (weight for age). Meanwhile, in terms of infant development, there was no significant difference in the effect between the extensive hydrolysis formula and soy protein isolate on global development, gross motor skills, fine motor skills, language and social personality of children with cow's milk allergy.

Thus, the use of extensive hydrolyzed formulas in infants with cow's milk allergy has a significant impact on their growth and development. Although breast milk is the best choice, in cases of cow's milk allergy, formula milk is an important alternative. ASS hypersensitivity reactions require complete avoidance of cow's milk products, making extensive hydrolyzate formulas an effective option. Although extensive hydrolyzate formula has almost the same impact as soy protein isolate on normal growth, research shows that extensive hydrolyzate has a better effect on aspects of weight-for-age growth, while there is no significant difference in child development between the two types of formula. Therefore, the use of an extensive hydrolyzed formula can be an effective solution in providing the necessary nutrition for babies with cow's milk allergy, allowing them to grow and develop optimally.

CONCLUSION

The use of an extensive hydrolyzate formula can be an effective solution for treating cow's milk allergies in babies. From the research results, it appears that the use of this formula has a beneficial effect on the baby's weight growth according to the stage of development. However, in terms of overall baby development, there is no significant difference in the impact between the use of extensive

hydrolyzed formula and soy protein isolate on various aspects, including global development, gross and fine motor skills, language skills, and the child's personal social interactions. suffer from cow's milk allergy.

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