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Research Article

Factors Associated with the Incidence of Atopic Dermatitis in School-Age Children in the Working Area of the Waai Health Center in 2022

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Abstract

Background: Atopic dermatitis is a global health issue if it is seen from the increasing prevalence and high cost of treating atopic dermatitis. Atopic dermatitis is an inflammation of the skin in the form of chronic residue dermatitis, accompanied by itching, and affecting certain body parts, especially in the face in infants (infantile phase) and sural parts of the extremities (in the child phase). Several triggering factors for atopic dermatitis include intrinsic factors such as genetics, characteristics of atopic skin, immunological disorders, stress, and extrinsic factors such as the environment, irritants, allergens, food, microorganisms, and weather.

Objectives: The purpose of this study was to determine the relationship between genetics, food allergies, and the environment with the incidence of atopic dermatitis in the working area of the Waai Health Center.

Methods: The research design used was descriptive-analytical with a cross-sectional study approach. The population is all Elementary School 163 Central Maluku, Elementary School 224 Central Maluku, and Elementary School 25 Central Maluku which are in the working area of the Waai Health Center, there are 433 children. Sampling with accidental sampling technique. The sample in this study found 208 children.

Results: The results obtained a significant relationship between genetics, food allergies, and environment with the incidence of atopic dermatitis with a value ($p = 0.000$).

Conclusion: It is recommended for families to supervise and supervise children if there is a history of atopy in family members to reduce the risk factors for atopic dermatitis in children because this atopic dermatitis cannot be cured but its recurrence can be controlled.

Keywords: atopic dermatitis, genetic, food allergy, environment

Introduction

Atopic dermatitis is one of the global health problems when viewed from the increased prevalence and high cost of treatment of atopic dermatitis.¹ Atopic dermatitis is an inflammation of the skin in the form of chronic recidivist dermatitis, accompanied by itching, and affects certain parts of the body, especially on the face in infants (infantile phase), and the flexural part of the extremities (in the child phase).² According to the World Health Organization (WHO) in a 2013 American Academy of Allergy, Asthma and Immunology (AAAAI) survey, dermatitis is a common skin problem where there are 5.7 million doctor visits per year due to dermatitis.³ The International Study of Asthma and Allergies In Childhood (ISAAC) states that the prevalence of atopic dermatitis varies between 0.3% and 20.5% in 56 countries based on questionnaire surveys conducted between 2002 and 2003.⁴ Based on data from the Directorate General of Medical Services of the Ministry of Health of the Republic of Indonesia in 2014, it was found that the number of cases of skin diseases and other subcutaneous tissues was 15.6%, where dermatitis reached 66.3%.⁵ The prevalence of atopic dermatitis disease is obtained every year in Indonesia, obtained recapitulation data that has been conducted by the Child Dermatology Study Group (KSDAI), from 10 hospitals spread throughout Indonesia, especially in 5 major cities in Indonesia atopic dermatitis has been ranked first out of the top 10 skin diseases in children, namely as many as 23.7%.⁶

According to White Book on Allergy, 2011, atopic dermatitis with a lifetime prevalence reaches 15-30% in children and 2-10% in adults. In children about 45% of cases of atopic dermatitis appear within the first 6 months of life, 60% appear within the first year of life and 85% of cases appear before the age of 5 years. Most of the 70% of cases of people with atopic dermatitis will experience a period of spontaneous remission before adulthood. But atopic dermatitis can also occur in adulthood (*Late-onset atopic dermatitis*).⁴ Atopic dermatitis is referred to as a multifactorial disease and each individual has different triggering factors.⁷ Some of the triggering factors of atopic dermatitis include intrinsic factors such as genetics, skin characteristics of atopic patients, immunological disorders, stress, and extrinsic factors such as the environment, irritant ingredients, allergens, food, microorganisms, and weather.^{7,8,9} In this study, the factors that cause the incidence of atopic dermatitis in school-age children in the work area of Waai Care Health Center are genetics, food allergies, and the environment.

Data on children aged 6-12 years in Waai Village, Salahutu District, Central Maluku Regency in 2020 as many as 443 children, and data on children aged 6-12 years in Waai Village, Salahutu District, Central Maluku Regency in 2021 as many as 433 children (Data for Elementary School 224 Central Maluku, Elementary School 163 Central Maluku, Elementary School 25 Central Maluku, 2020; Design data for Elementary School 224 Central Maluku 224, Elementary School 163 Central Maluku, Elementary School 25 Central Maluku, 2021). Data from the Waai Care Health Center in 2020 obtained 28 children with atopic dermatitis and in 2021 there were 48 children with atopic dermatitis (Medical Record Data at the Waai Care Health Center, 2020; Medical Record Data at the Waai Care Health Center, 2021). The purpose of this study was to determine the relationship between genetics, food, and the environment with the incidence of atopic dermatitis in the working area of the Waai Health Center.

Methods

This type of research uses descriptive-analytical method or descriptive analysis, with a cross-sectional research design. The population is all children aged 6-12 years (Elementary School 224 Central Maluku, Elementary School 163 Central Maluku, Elementary School 25 Central Maluku) who are in the working area of the Waai Care Health Center in 2021, totaling 433 children with the research sample being all children who are present. at the time of the study, namely Elementary School 224 Central Maluku,

Elementary School 163 Central Maluku, and Elementary School 25 Central Maluku which was in the working area of the Waai Care Health Center in 2021. The technique used in sampling in this study was unintentional sampling.

Techniques used for data collection and collection include observation of the surrounding environment, interviews with one of the health workers at the Waai Care Health Center, taking medical record data at the Waai treatment health center, taking data on elementary schools located in the Waai Care Health Center work area and collecting data through questionnaires from Alini in 2015. After obtaining approval to carry out research, then researchers can conduct research by prioritizing ethical issues that include: approval (informed consent), without name (anonymity), confidentiality, justice, useful, and respondents avoid injury while participating in this study. This research data analysis consists of univariate analysis and bivariate analysis, univariate analysis is carried out to describe the characteristics of respondents by the data obtained from respondents including gender, age, and education then for research variables namely genetics, food allergies, and the environment are explained using frequency and tables than in the bivariate analysis also explained as well as the relationship between genetic variables, food allergies, environment with the incidence of atopic dermatitis. Bivariate analysis was carried out with the SPSS application using the chi-square test.

Result

The results of the study on the characteristics of respondents include gender, age, and education. The most common gender is when the study is female and data has also shown that women are also affected by atopic dermatitis. Ages 6-12 years were used in this study because this age is susceptible to atopic dermatitis. Education from respondents was obtained from 3 different elementary schools. Obtained from this study there is a significant association between genetics, food allergies, and the environment with the incidence of atopic dermatitis ($p = 0.000$).

Table 1. Characteristics of respondents based on gender, age, and education in School-Age Children in the Waai Care Health Center work area in 2022

Characteristic	Frequency	Percentage
	n	%
Gender		
Man	91	43,8
Woman	117	56,3
Age		
6 Years	25	12,0
7 Years	35	16,8
8 Years	34	16,3
9 Years	30	14,4
10 Years	32	15,4
11 Years	45	21,6
12 Years	7	3,4
Education		
Elementary School 163 Central Maluku	94	45,2
Elementary School 224 Central Maluku	54	26,0
Elementary School 25 Central Maluku	60	28,0

Factors Associated with the Incidence of Atopic Dermatitis in School-Age Children in the Working Area of the Waai Health Center in 2022

Table 1 shows that: The gender characteristics of the respondents in the table above show that the majority of school-age children in the working area of the Waai Care Health Center are female, i.e. 117 children (56.3%). The age characteristics of respondents in school-age children in the working area of the Waai Care Health Center are the majority in the group of children aged 11 years with a total of 45 children (21.6%). The educational characteristics of school-age children in the working area of the Waai Care Health Center are the majority in Elementary School 163 Central Maluku as many as 94 children (45.2%), in Elementary School 25 Central Maluku as many as 60 children (28.0%) and. Elementary School 224 Central Maluku totaled 54 children (26.0%).

Table 2. Factors related to the incidence of atopic dermatitis in School-Age Children in the Waai Care Health Center Work area in 2022

Variable	Incidence of Atopic Dermatitis				Total	Chi-square test	
	Yes		No				
	n	%	n	%	n	%	p-Value
Genetic Factors							
Yes	74	35,6	0	0,0	74	35,6	p = 0,000
No	30	14,4	104	50,0	134	64,4	
Total	104	50,0	104	50,0	208	100,0	
Food Allergy Factors							
Yes	52	25,0	0	0,0	52	25,0	p = 0,000
No	52	25,0	104	50,0	156	75,0	
Total	104	50,0	104	50,0	208	100,0	
Environmental Factors							
Yes	58	27,9	0	0	58	27,9	p = 0,000
No	46	22,1	104	50,0	150	72,1	
Total	104	50,0	104	50,0	208	100,0	

Based on table 2 shows that there is a significant relationship between genetics, food allergies, and the environment with the incidence of atopic dermatitis in children. this is evidenced by showing the results of the chi-square test p-value = 0.000.

Discussion

Characteristics of Respondents

Atopic dermatitis is a major health problem worldwide with a prevalence of 10-20% in children and 1-3% in adults.¹⁰ The data obtained for the age category of respondents in the results of the study are as follows: 45 (21.6%) 11 years of age and 7 (3.4%). In this study, the researchers referred to respondents aged 6-12 years because according to the researchers, that age is the age most often found in children with atopic dermatitis. The researcher's assumptions are in line with the research of Evina (2015) and Linuwih (2016) which also states that in children about 45% of cases of atopic dermatitis appear in the first 6 months of life and almost 70% of cases of atopic dermatitis in children appear/spontaneous remission occurs before adulthood, namely age. 6-12 years.^{22,23} The results of the study for gender showed that the majority of respondents were female, namely 117 (56.3%). It is known that at the time of the study, according to the questionnaire and the results of observations, it was found that more female

respondents suffered from atopic dermatitis than male respondents. According to the researcher, this is because the number of female respondents was greater at the time of the study but also because women are more susceptible to atopic dermatitis, the researcher's assumption is in line with one study which stated that there were more cases of atopic dermatitis in women than men with atopic dermatitis. a ratio of 1.3: 1.0 and it is said that there is a tendency to occur more in women.¹⁰

The research results used for the Education category were made according to a predetermined sample cluster, namely, from 3 research locations (Elementary School 163 Central Maluku, Elementary School 224 Central Maluku, and Elementary School 25 Central Maluku), each obtained a different number. representative sample but still with the same age group (6-12 years). According to the researcher, based on observations made at the research site, ages 6-12 years are the ages of children who are at the elementary school level who are in grade 1, grade 6, age varies according to the age that has been set. determined by the school, ranging from ages 6-12 years. By the WHO (World Health Organization) which states the definition of school children is a group of children aged between 7-15 years, while in Indonesia usually children aged 7-12 years.

Genetic Relationship with the Incidence of Atopic Dermatitis in School-age Children in the Waai Care Health Center Work Area in 2022.

Heredity/genetic or heredity is the basic conception or capital for the development of living things.¹¹ The results of this study showed that 74 (35.6%) respondents who had genetic factors, as many as 74 (35.6%) respondents who had been known through questionnaires there were family members who had a genetic history passed down to children described as follows: atopic dermatitis due to genetic factors inherited from grandfather as many as 13 people, grandmothers as many as 17 people, fathers as many as 21 people and mothers as many as 23 people. According to researchers, genetic factors are very related to the incidence of atopic dermatitis because if in the family there are family members (father/mother, grandparents) who have a history of atopic dermatitis disease can be sure the child will also get atopic dermatitis for that parents as the closest person and who knows the growth and development of children and daily activities should be wary of children against atopic dermatitis early. Uehara and Kimura (1993) stated that 60% of atopic dermatitis patients have atopic children. If both parents have atopic dermatitis, then 81% of their children are at risk of atopic dermatitis. If only one of his parents suffers from atopic dermatitis, the risk of suffering from atopic dermatitis becomes 59%.¹² This research is also in line with the opinion (Susanto, 2013: Djuanda, 2010: Abdi, 2020: Judarwanto, 2000) which says that atopic dermatitis is an allergic disease that is believed to be genetic or hereditary that often occurs in families whose family members who have a history of atopian in the family such as allergic rhinitis and *bronchial asthma*.^{12,13,14}

According to Susanto, (2013) atopic dermatitis is a disease that is often believed to be genetic/hereditary and often occurs in families whose family members also have asthma disorders, itching rashes are mainly seen on the scalp, neck, elbows, back of the knees, buttocks and other studies that conclude that the decline in atopic dermatitis is maternal.²⁴ It is well known the link between atopic dermatitis, bronchial asthma, and allergic rhinitis due to atopic dermatitis, bronchial asthma, and allergic rhinitis also referred to as Triassic Atopic.¹⁵ Other studies have also proven Chromosome 5 (interleukin cluster): many studies of chromosome 5 show a relationship between asthma, atopy, and atopic dermatitis with 5q23-31 which is a cytokine cluster.¹² Although in the results of this study there is a significant relationship between genetics and the incidence of atopic dermatitis, this study also found 30 (14.4%) respondents who do not have a genetic history but suffer from atopic dermatitis. This shows that the incidence of atopic dermatitis is not all influenced by genetic factors but many other factors that also play a role in the incidence of atopic dermatitis this study 30 (14.4%) respondents were divided

into (food allergy factors as many as 16 respondents and environmental factors as many as 14 respondents).

Food Allergy Relationship with the Incidence of Atopic Dermatitis in School-Age Children in the Waai Care Health Center Work Area in 2022.

Food allergies are part of a hypersensitivity reaction, i.e. immunological hyperresponsivity to specific antigens derived from food. Food allergens are specific components of food or foodstuffs (typically protein, but can also be in haptens form) recognized by immune cells which then cause immunological reactions mediated by the mast and IgE cells.¹⁶ The results of this study showed that of the 52 (25.0%) respondents who were allergic to food, as many as 52 (25.0%) respondents experienced a known incidence of atopic dermatitis through questionnaires that began with itching and redness of the skin after consuming one or several types of food as described as follows: consuming eggs, snacks and cow's milk as many as 23 people, Consume seafood (fish, shrimp, crab, shellfish) as many as 15 people and consume nuts as many as 14 people.

According to researchers, each individual has a different body metabolism so the response of even sensitive individuals will not be the same as each other. Thus individuals with atopic dermatitis that are sensitive to food vary, meaning that the type of food of each individual will determine what food and how long it takes for a person to be re-sensitized and react (itching, redness, skin inflammation, and other clinical symptoms present in someone with atopic dermatitis). Supported by Hendra (2020), who said that food allergies are immune system reactions that occur after exposure to certain foods and the reaction time after exposure to antigens ranges from 15-30 minutes, but sometimes can also experience delays of up to 10-12 hours, depending on the immune response of each individual. Food allergic reactions are tissue responses that occur due to the cross-bond between allergens and IgE. Once allergen sensitization occurs, the antigens that are re-exposed will result in manifestations in the form of atopic dermatitis.¹⁶

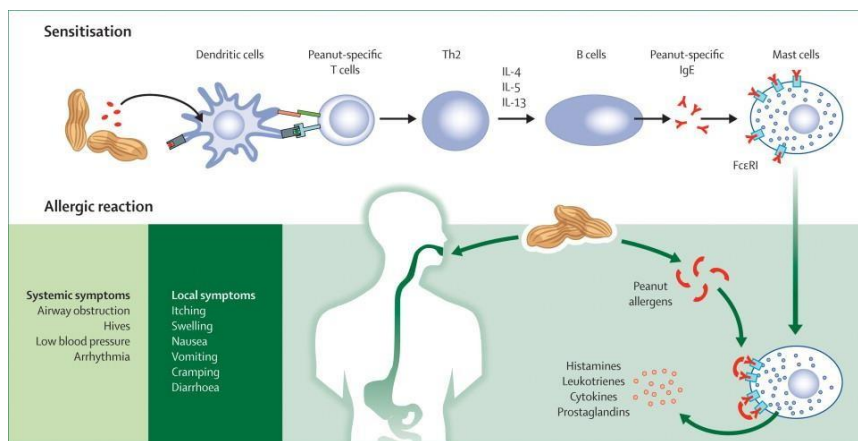


Figure 1. Mechanism of Allergic Reactions¹⁶

Food allergies are part of a hypersensitivity reaction, i.e. immunological hyperresponsivity to specific antigens, which can come from food or pathogenic microorganisms or their products, or to their antigens that are presented inappropriately. In food allergies, there is the penetration of antigen molecules into the body, which stimulates immunological reactions. This reaction does not arise upon first contact with the antigen, but symptoms will arise in the second exposure to the same allergen. Generally, re-exposure to allergens will increase a specific secondary immune response. In cases of hypersensitivity or allergies, an excessive immune reaction occurs and then causes tissue damage. Once allergen sensitization occurs, re-exposed antigens will result in the local or systemic manifestation of food allergies.¹⁶ The common

mechanism of this food allergic reaction is as follows: allergens cross-bind to IgE. Mast cells and basophils secrete vasoactive amines and other chemical mediators so that manifestations arise in the form of atopic dermatitis.¹⁷ Described in more detail by Hanifin (1992) who said food allergens are absorbed through the small intestine, then enter circulation and are associated with mast cells that have been sensitized with specific IgE in the skin (Langerhans cells) this interaction will release histamine and other mediators that cause redness of the skin (erythema) and pruritus (itching). In this study food allergies became the cause of atopic dermatitis, because atopic dermatitis in respondents can be provoked by certain foods.¹⁸

Data from one study showed the order of allergens that are often found and skin tests react positively to atopic dermatitis are eggs (69%), cow's milk (52%), peanuts (42%), soy (34%), and wheat 33%, and others against fish (seafood), chicken, snacks/snacks containing (monosodium glutamate) and the prevalence of food allergies are found in 40% of cases of atopic dermatitis.^{12,19} It was also found in this study from 156 (75.0%) respondents who did not have food allergy factors there were 52 (25.0%) respondents with atopic dermatitis. Because food allergies are not always the cause of atopic dermatitis, it can be caused by other factors, in this study other factors that can cause atopic dermatitis are genetic factors recorded by as many as 34 respondents and environmental factors by as many as 18 respondents. As we already know that atopic dermatitis is influenced by many factors. As already stated, atopic dermatitis is also referred to as multifactorial disease.⁷

Environmental Relationship with the Incidence of Atopic Dermatitis in School-Age Children in the Waai Care Health Center Work Area in 2022.

The environment has become a dangerous place for individuals who are sensitive to environmental allergens such as house dust mites plus indeed house dust mites are often found in the home. Some research shows that house dust mites are often found in the bedroom, especially on mattresses, fur blanket pillows, fluffy children's toys, and curtains²⁰. External factors (exogenous) especially inhaled allergens (house dust mites) play an important role in the incidence of atopic dermatitis.¹² The results of this study showed that all respondents were 58 (27.9%) who had environmental factors, all atopic dermatitis caused by hot weather as many as 18 people, cold weather by as many as 8 people, house dust mites as many as 21 people and at the time of the change of dry weather to rainy weather and vice versa as many as 12 people. It turned out that out of 150 (72.1%) respondents who did not have environmental factors there were 46 (22.1%) respondents with atopic dermatitis. Known in this study in addition to environmental factors there are also genetic factors and food allergy factors, researchers concluded that the gap in the results of this study is caused by other factors, namely because there are influences from other factors (food allergy factors as many as 16 respondents and genetic factors as many as 30 respondents).

According to environmental factors researchers have a close relationship with atopic dermatitis due to external factors from the environment such as weather (hot/cold), house dust mites weather changes and affect the condition of the skin of children with atopic dermatitis because researchers think the skin is too much sweat, skin that is too dry is susceptible to recurrence of atopic dermatitis let alone rumah dust mites that are widely found in the home environment, especially in the bedroom area. Line with Boediarja (2006) has stated that, hot temperatures, humidity, and sweat that a lot will trigger itching and recurrence of atopic dermatitis. Environmental allergens that are also associated with recurrence of atopic dermatitis lesions are allergens contained in house dust, namely house dust mites. In Ricci G's research, in recent cases of atopic dermatitis, it was proven that the role of house dust mites as a cause of skin lesions with atopic dermatitis became more noticeable.²¹ By a theory that also states that exposure to the environmental factors mentioned above can trigger the occurrence of atopic dermatitis in children due to

changes in air temperature, hot weather that triggers a lot of sweat, cold weather that triggers dry skin, house dust mites can cause lesions on the skin. The response is a hypersensitivity reaction to repeat exposure to allergens that cause the release of inflammatory mediators and abnormalities in organ function so that atopic dermatitis can occur.²⁰

The mechanism of how the environment can cause atopic dermatitis has been revealed by Abdi (2020), when the environment (house dust mites) is exposed to sensitive individual skin, mast cells will bind to the specific IgE in the skin which is Langerhans cells this process runs along with the penetration of allergens so that inflammation occurs and manifestations of atopic dermatitis (pruritus/itching).¹² Because the exact cause of atopic dermatitis is not yet known for that various factors can play a role in triggering atopic dermatitis.¹⁰

Conclusion

Based on the results of research on factors related to the incidence of atopic dermatitis in school-age children in the working area of the Waai Care Health Center in 2022 with a value of $p = 0.000$, it can be concluded that there is a relationship between genetics, food allergies, the environment with the incidence of atopic dermatitis in school-age children in the work area of the Waai care health center. Researchers hope that this study should be able to add reading materials and literature references in the development of science for the Christian University of Indonesia Maluku, especially for the Faculty of Health Nursing Study Program on Factors Related to the Incidence of Atopic Dermatitis in School-Age Children in the Waai Care Health Center work area.

Conflict of Interest Declaration

The researcher states that there is no conflict of interest in this study.

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