Jurnal Kedokteran dan Kesehatan: Publikasi Ilmiah Fakultas Kedokteran Universitas Sriwijaya
Volume 13, No 2. 2026/DOI: 10.32539/JKK.V13i2.904
p-ISSN 2406-7431; e-ISSN 2614-0411
Page: 192-198

A CROSS-SECTIONAL STUDY OF NUTRITIONAL STATUS AND ATOPIC DERMATITIS IN ADOLESCENTS

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ARTICLE INFO

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Kata kunci:
Status gizi
Dermatitis atopik
Remaja
Overweight

Keywords:
Nutritional status
Atopic dermatitis
Adolescents
Overweight

Original submission:
January 19, 2026
Accepted:
April 1, 2026
Published:
April 25, 2026

ABSTRAK

Dermatitis atopik adalah penyakit nomor satu dari sepuluh penyakit kulit terbanyak yang menyerang anak-anak. Status gizi yang tidak normal dapat memengaruhi sistem kekebalan tubuh dan meningkatkan risiko infeksi dan penyakit alergi, termasuk dermatitis atopik. Penelitian ini bertujuan untuk mengetahui hubungan antara status gizi dengan kejadian dermatitis atopik pada remaja. Penelitian menggunakan desain observasional analitik dengan pendekatan potong lintang terhadap 204 remaja usia 10–18 tahun yang dari data rekam medis di RSUD Cengkareng. Status gizi ditentukan berdasarkan indeks massa tubuh menurut umur, sedangkan diagnosis dermatitis atopik diperoleh dari catatan diagnosis dokter spesialis. Analisis data dilakukan menggunakan uji Chi-Square dengan perangkat lunak SPSS. Hasil penelitian menunjukkan bahwa subject penelitian memiliki status gizi normal (50.5%) dan dermatitis atopik (38.7%). Dermatitis atopik lebih banyak dijumpai pada kelompok status gizi *overweight* (40.5%). Pada penelitian ini, status gizi berhubungan signifikan dengan kejadian dermatitis atopik pada remaja (p<0.001).

ABSTRACT

Cross-sectional study of nutritional status and atopic dermatitis in adolescents. Atopic dermatitis is the most common among the top 10 skin diseases affecting children. Abnormal nutritional status can affect the immune system and increase the risk of infection and allergic diseases, including atopic dermatitis. This study aimed to determine the association between nutritional status and the incidence of atopic dermatitis in adolescents. An analytical observational study with a cross-sectional design was conducted among 204 adolescents aged 10–18 years, selected through non-random sampling methods. Data was taken from medical records at Cengkareng Regional General Hospital. Nutritional status was assessed using body mass index-for-age, while the diagnosis of atopic dermatitis was obtained from physicians medical records. Analysis was performed using the Chi-Square test with SPSS. The results showed that most subjects (50.5%) had normal nutritional status, and the incidence of atopic dermatitis was 38.7%. Atopic dermatitis was most commonly found in the overweight group (40.5%). In this study, nutritional status was significantly associated with the incidence of atopic dermatitis in adolescents (p<0.001).

INTRODUCTION

Atopic dermatitis in developing countries such as Latin America and Southeast Asia, is known to have increased in prevalence every year, making it a serious health problem.(1)**Error! Reference source not found.** World Allergy Organization stated 30% of children worldwide suffer from atopic dermatitis. Based on data from Kelompok Studi Dermatologi Anak Indonesia (KSDAI) 2023, the prevalence of atopic dermatitis in Indonesia is 23.67%. Atopic dermatitis is the most common of the top 10 skin diseases affecting children.(2) Atopic dermatitis generally affects individuals from infancy to adulthood.(3) Adolescents are individuals aged 10-18 years.(4) The prevalence of atopic dermatitis in adolescents was found to be 15% in a study conducted on 185 children, where abnormal or relatively high nutritional status was a significant risk factor for the occurrence of atopic dermatitis.(5)

Atopic dermatitis causes persistent and recurrent skin inflammation.(3) This disease is commonly characterized by scaly, itchy lesions and erythema on parts of the body, especially body folds such as the creases of the hands and thighs.(6) Although widely considered a dermatological condition, evidence has emerged in recent years, with research conducted by Sendrea et al.(7) showing that this disease is associated with comorbidities such as cardiovascular disease, metabolic syndrome, and obesity. Atopic dermatitis is influenced by various factors, with genetic factors playing an important role in about 82% of cases, where a family history of similar conditions increases a person's risk of developing atopic dermatitis. Additionally, nutritional status and environmental factors, such as exposure to allergens, pollution, and hygiene conditions, contribute to the development of this disease.(5,8)

Research by Rosmalika et al.(5) showed that excessive nutritional status (overweight and obesity) is identified as a factor that influences atopic dermatitis. This finding was in line with Lim's research.(9) In adolescents, abnormal nutritional status (overweight or obese) can trigger systemic inflammation and increase the risk of infection and allergic diseases. Thus exacerbating the symptoms of atopic dermatitis. Obesity can lower skin hydration, alter lipids, leading to higher trans-epidermal water loss, and higher skin pH, which can lead to dysbiosis and skin barrier dysfunction. Heredity, epidermal dysfunction, abnormalities in the skin microbiome, and T-cell-induced inflammation contribute to the development of atopic dermatitis. (9,10) Meanwhile, the result of a study conducted by Kreibl et al.(11) showed no relationship between nutritional status and atopic dermatitis, which was considered to be due to hormonal changes.

Research on nutritional status and atopic dermatitis in adolescents is currently limited in Indonesia, particularly research focused on adolescents. Furthermore, given the high prevalence of atopic dermatitis among adolescents, the researcher will conduct research on the relationship between nutritional status and the incidence of atopic dermatitis in adolescents, with the aim of contributing to reducing the prevalence of atopic dermatitis in this age group.

METHOD

An observational, cross-sectional study was conducted from February to November 2025 using secondary data from medical records of patients who visited Cengkareng Regional General Hospital, West Jakarta, from January to December 2024. The inclusion criteria were patient data (age, gender, body weight, and height). Nutritional status is determined based on body mass index for age, according to the WHO reference 2007 for 5-18-year-olds. Body

mass index was calculated from body weight and height data. Atopic dermatitis data is obtained from a clinical doctor's diagnosis in medical records. Patients receiving long-term systemic corticosteroids or immunosuppressants were excluded from this study. Sample selection was performed using non-random sampling until the desired sample size was reached. Descriptive statistics were used to illustrate the univariate analysis. Bivariate data analysis was performed using the Chi-Square test with a significant level of $p<0.05$, 95% CI.

RESULT

This study involved 204 data from patient medical records during the period from January to December 2024. Subject characteristics were described in Table 1 below.

Table 1. Distribution of research subject characteristics (n=204)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	86	42,2
Female	118	57,8
Age		
10-13	109	53,4
14-16	69	33,3
17-18	27	13,2
Nutritional status		
Severly thinness & thinness	0	0
Normal	103	50,5
Overweight	59	28,9
Obesity	42	20,6
Atopic dermatitis		
Yes	79	38,7
No	125	61,3

Table 1. shows the distribution of subject characteristics based on gender, with females being the most dominant (57.8%). Based on age, the subjects were commonly aged 10-13 years old (53.4%). Based on nutritional status, most subjects had normal nutritional status (50.5%). There was no subject with nutritional status of severely thinness & thinness in this study. Atopic dermatitis was found in 79 subjects (38.7%).

Table 2. Distribution of atopic dermatitis based on gender and age in research subjects (n=204

Variable	Atopic Dermatitis	
	Yes, n (%)	No, n (%)
Gender		
Male	36 (45,6)	50 (40,0)
Female	43 (54,4)	75 (60,0)
Age (year)		
10-13	46 (58,2)	63 (50,4)
14-16	22 (27,8)	46 (36,8)
17-18	11 (13,9)	16 (12,8)

Table 2. above shows the distribution of subject characteristics based on the variables studied. Based on gender, most subjects in the atopic dermatitis group were female,

numbering 43 (54.4%). Meanwhile, based on age, the group with the highest incidence of atopic dermatitis was the 10–13 age group, with 46 (58.2%) subjects.

Table 3. Nutritional status and atopic dermatitis in research subjects (n=204)

Variable	Atopic Dermatitis		P-Value
	Yes, n (%)	No, n (%)	
Nutritional status			
Normal	24 (23,3)	79 (76,7)	P<0,001
Overweight	32 (54,2)	27 (45,8)	
Obesity	23 (54,8)	19 (45,2)	

Subjects who experienced atopic dermatitis the most were in the overweight group (40.5%). Conversely, in the group that did not experience atopic dermatitis, the majority of respondents had a normal nutritional status, namely 63.2%. The statistical test results using Chi-square obtained p<0.001, indicating that there was a statistically significant relationship between nutritional status and the incidence of atopic dermatitis in adolescents. Thus, abnormal nutritional status (overweight and obesity) has a greater potential to be associated with atopic dermatitis compared to normal nutritional status.

DISCUSSION

This study involved 204 adolescents, identified from patient medical records at Cengkareng Regional General Hospital, aged 10 to 18 years and with diverse characteristics, including gender, age, nutritional status, and atopic dermatitis incidence. Most subjects had normal nutritional status (50.5%). This study found that 79 (38.7%) subjects were diagnosed with atopic dermatitis, a figure that illustrates the burden of chronic disease in the adolescent population in health facilities. The incidence of atopic dermatitis in this study was higher than that reported in the KSDAI 2023, indicating a relatively high prevalence in children and adolescents. This number was also consistent with epidemiological data, and atopic dermatitis remains one of the most common skin diseases encountered in pediatric outpatient clinics.[5]

Gender distribution in the atopic dermatitis group showed female respondents were dominant, accounting for 54.4%. The finding that female outnumber male in the atopic dermatitis group is consistent with research results in Indonesia, which show a ratio of female to male with atopic dermatitis of approximately 1.3:1.0.[12] This can be explained by the hormonal influence theory (sex hormone immune interaction), which describes differences in hormonal factors such as the role of estrogen in increasing immune response and skin sensitivity to inflammation, or inflammatory responses that may differ according to gender, as discussed in the epidemiology of skin diseases. Exposure to irritants, skin care habits, and psychosocial factors can affect the incidence of skin diseases by gender.[5,13]

Thus, both the atopic dermatitis group and the non-atopic dermatitis group in this study were dominated by females and early adolescents, with varying nutritional statuses. In the non-atopic dermatitis group, most respondents had normal nutritional status, while in the atopic dermatitis group, being overweight was more prevalent. This picture shows that although the demographic characteristics of the two groups are relatively similar, there are differences in the distribution of nutritional status that may contribute to differences in the incidence of atopic dermatitis in adolescents.

Based on age group, most respondents (58.2%) were in the early adolescent age range (10–13 years). These results are relevant considering that atopic dermatitis often appears in childhood and can persist into adolescence.[10] Atopic dermatitis can continue or worsen during adolescence due to hormonal changes, environmental exposure, and increased psychological stress during a child's development into adulthood.[14] Skin conditions in childhood and adolescence are often still in the phase of adapting to the environment, making the skin more susceptible to barrier disorders, allergens, and other triggering factors that increase the risk of developing or relapsing atopic dermatitis.[15] This study's results also consistent with research conducted by Cork et al.[16] which states that the onset of atopic dermatitis often occurs in early adolescence because the skin barrier is not yet fully mature in early adolescents, where trans-epidermal water loss (TEWL) is high and ceramide levels are low, making it easier for allergens to enter, causing inflammation and atopic dermatitis.[16]

Nutritional status is a health condition reflected in the accumulation of nutrients from food and the organs' ability to absorb and utilize them in balance. In this study, most subjects were dominantly in normal nutritional status (50.5%). No subjects had thinness or severe thinness status. These results revealed that all adolescents in this study received sufficient, and in some cases, even more nutritious food to support their growth and development. Most subjects with normal nutritional status did not have atopic dermatitis (76.7%), whereas overweight and obesity showed the opposite. As much as 54.2% and 54.8% of subjects in the overweight and obesity group experienced atopic dermatitis. Given that overweight/obesity indicates above-normal body fat accumulation, this is relevant because the literature shows that excess weight in children and adolescents can increase the risk and severity of atopic dermatitis.[17] A recent study by Lim et al.[9] with a large sample (adolescents aged 12-18 years, more than 144,000 samples) showed that adolescents who were overweight were more likely to be diagnosed with atopic dermatitis than those who were of normal weight.[9] In addition, chronic obesity since childhood can worsen atopic dermatitis and its severity.[17] Therefore, the high proportion of overweight/obesity in the sample reinforces the possibility that nutritional status plays an important role in the characteristics of subjects with atopic dermatitis.

Based on the analysis in this study, a significant relationship was found between excessive nutritional status and atopic dermatitis in adolescents. This study supports most of the literature that shows that being overweight or obese has the potential to increase the risk of atopic dermatitis. There are several studies that support this, such as the study conducted by Lim et al.[9], which shows that adolescents who are overweight are more likely to be diagnosed with atopic dermatitis. In addition, a meta-analysis of 30 observational studies found that individuals who are overweight or obese have a higher chance of developing atopic dermatitis than individuals of normal weight.[18] Biologically, excess body fat in overweight/obese individuals is believed to affect skin function and the immune system. Excess body fat, through the production of adipokines and inflammatory mediators, can trigger chronic inflammation and disrupt the skin barrier, thereby increasing susceptibility to atopic dermatitis.[17] The relationship between higher nutritional status and atopic dermatitis can be explained by the fact that being overweight indicates an increase in body fat mass, which causes metabolic and immune changes such as adipokines and inflammatory mediators. These metabolic changes result in skin barrier disorders or skin dysfunction, which can ultimately increase the tendency for skin inflammation and exacerbate the symptoms of atopic dermatitis.[19,20] Overweight and obesity are known to play a role in increasing inflammation through increased production of adipokines, such as leptin, which can trigger Th2 and worsen skin barrier dysfunction in atopic dermatitis.[20,21]

The study by Kreibl et al.[11] reported no significant relationship between nutritional status and the incidence of atopic dermatitis in children and adolescents. These results are not in line with the findings of this study, which showed a relationship between nutritional status and atopic dermatitis. This difference in results is likely due to variations in the characteristics of the study subjects, differences in the methods used to determine nutritional status and diagnose atopic dermatitis, and differences in the confounding factors controlled for in the analysis. The study by Kreibl et al.[11] used a population with a more heterogeneous age range and environmental background, so that other factors, such as genetics, allergen exposure, socioeconomic status, and diet, may have had a greater influence on the incidence of atopic dermatitis than nutritional status. In addition, the use of different study designs and assessment instruments may also have contributed to the discrepancy between the results of that study and this study.

Several studies have found no significant association between excess weight or obesity and atopic dermatitis or have shown different results depending on the study design, sample size, and population characteristics. Confounding factors such as genetics, family history of allergies, and environmental conditions may also play a role.[15] Excessive nutritional status in adolescents may be a contributing factor to an increased risk of atopic dermatitis through mechanisms of inflammation, immune dysregulation, and skin barrier dysfunction. Management of atopic dermatitis in adolescents with excessive nutritional status should also consider weight control interventions as part of a comprehensive approach to skin health care.[9]

The results of this study indicate a significant relationship between nutritional status and the incidence of atopic dermatitis in adolescents, with important clinical implications for health care practice. Nutritional status assessment should be considered as part of routine screening in adolescents with atopic dermatitis, given that several studies have shown that individuals with excessive nutritional status have a higher risk of developing atopic dermatitis compared to individuals with normal nutritional status. [9,18]

In addition, clinical studies show a link between excessive nutritional status and an increase in the incidence and severity of atopic dermatitis in adolescents.[7] Therefore, the management of atopic dermatitis in adolescents should not only focus on dermatological therapy, but also include a comprehensive approach consisting of nutritional education, weight control, and lifestyle modifications to support skin condition improvement and reduce the risk of atopic dermatitis recurrence.

However, the study design has limitations to show causal inference. Nutritional status cannot be the sole factor influencing the incidence of atopic dermatitis. Many factors associated with atopic dermatitis were not assessed in this study, which could provide a better understanding of its incidence.

CONCLUSION

This study showed 38.7% of subjects were diagnosed with atopic dermatitis, and 69.6% of them had nutritional status above normal. There was a significant relationship between nutritional status and the incidence of atopic dermatitis in adolescents ($p < 0.001$; 95% CI).

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