

Anemia and Wasting in Adolescent Girls: A Cross-Sectional Study in Aceh, Indonesia

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ABSTRACT

The purpose of this study was to assess the anemia and nutritional status in adolescent girls. A cross-sectional study was conducted on 348 senior high school girls. Nutritional status was determined by BMI-for-age Z-score for those younger than 19 years and BMI for those older than 19 years. Anemia was determined using the standard of severely low hemoglobin level of less than 12 mg/dL. Data analysis used the logistic regression test at the 95% confidence interval. The results showed that 40.5% of adolescent girls had anemia, 50.9% were wasted, and 14.4% were overweight/obese. Wasting and obesity are risk factors for anemia in adolescent girls. Intervention is needed to prevent anemia and wasting by improving balanced diet and nutrition education.

Keywords: adolescent, anemia, children, hemoglobin, wasting

INTRODUCTION

The prevalence of anemia among adolescents in Indonesia increased from 21.7% in 2013 to 23.7% in 2018, with higher prevalence among adolescent girls than boys. Adolescent girls are at risk of nutritional problems, especially anemia and wasting. Malnutrition during this period has a long-term effects on their health. Anemia is a deficiency of hemoglobin (Hb) in the blood due to a lack of the nutrients needed to produce hemoglobin. Adolescents are diagnosed with anemia when their hemoglobin level is below 12 gr/dL. Adolescent girls are more susceptible to anemia because of their rapid growth and development during this stage, which increases their need for macronutrients and micronutrients, particularly during menstruation (Fentie *et al.* 2020). This study aimed to determine the prevalence of anemia and the nutritional status of adolescent girls.

METHODS

This study used a cross-sectional design and was conducted on 348 senior high school girls in the districts of Banda Aceh and Aceh Besar using cluster random sampling. Data collected included

sample characteristics using interview, height and weight data using anthropometric measurements, and hemoglobin levels by examination using the Hemocue by the family doctors. Nutritional status was determined by Body Mass Index for Age (BMI-for-age z-score) for adolescents <19 years, with the classification <-2 SD as thin, -2 to 1 SD as normal, 1 SD to 2 SD as overweight, and >2 SD as obese. For adolescents older than 19 years, BMI was also used, with classification of wasting if BMI was <18.5, normal if BMI was between 18.5 and 25, and overweight/obese if BMI was >25.5. The status of anemia was assigned if the hemoglobin level was <12 mg/dL. Logistic regression test with 95% confidence level was used for data analysis.

RESULTS AND DISCUSSION

The results of this study (Table 1) showed that most of the subjects had normal nutritional status and hemoglobin levels, while 40.5% had anemia, 50.8% were wasted, and 14.3% of the adolescents were overweight/obese. Adolescents older than 19 years have a significantly lower risk of anemia, and adolescents who are wasted and obese have a higher risk of developing anemia (Table 2). Wasting is caused by a lack of energy

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Table 1. Socio-demographic characteristic, nutritional status and anemia in adolescent girls

Variable	N	%
Age (years)		
<15 years old	47	13.5
15–18 years old	237	68.1
≥19 years old	64	18.4
Anemia status (Hb)		
Severe anemia	6	1.7
Moderate anemia	84	24.1
Mild anemia	51	14.7
Normal	207	59.5
Nutritional status (BMI)		
Severe wasting	124	35.6
Wasting	53	15.2
Normal weight	121	34.8
Overweight	30	8.6
Obesity	20	5.7

BMI: Body Mass Index; Hb: Hemoglobin

and nutrients, which inhibits the metabolism of the body and the formation of red blood cells because of a lack of protein and micronutrients (WHO 2023). This leads to an increase in hepcidin, a peptide hormone that can decrease iron absorption in the intestine, due to chronic inflammation (Alshwaiyat *et al.* 2021). Khakurel

Table 2. Association of adolescent girls' age and nutritional status (BMI) with anemia status

Dependent variables	Anemia AOR (95% CI)	P
Adolescent aged (years)		
<15 years old	1	
15–18 years old	0.711 (0.244–2.067)	0.531
≥19 years old	0.175 (0.075–0.407)	0.000*
Nutritional status		
Normal	1	
Wasted	2.351 (1.155–4.785)	0.018*
Overweight/obese	3.072 (1.463–6.451)	0.003*

*Significant at 95% Confidence Interval

AOR: Adjusted Odd Ratio; BMI: Body Mass Index

et al. (2017) found a significant relationship between BMI and hemoglobin levels. Wasting can also be caused by inadequate food intake, a diet lacking in variety, and inadequate consumption of fruits and vegetables. Not eating at least three meals a day and not consuming enough fruits and vegetables can lead to malnutrition in young women (Handayani *et al.* 2019).

CONCLUSION

Among the adolescent girls sampled, 40.5% had anemia, 50.8% were wasted, and 14.3% were overweight/obese. Age, wasting, and obesity are risk factors for anemia in adolescent girls. Anemia and wasting are still serious public health problems in Aceh. Interventions are needed to prevent anemia and wasting by improving balanced diet and nutrition education for adolescents.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare that there are no potential conflict of interest associated with the research, authorship, or publication of this article.

REFERENCES

- Alshwaiyat NM, Ahmad A, Wan Hassan WMR, Al-Jamal HAN. 2021. Association between obesity and iron deficiency. *Exp Ther Med* 22(5):1–7. <https://doi.org/10.3892/etm.2021.10703>
- Fentie K, Wakayo T, Gizaw G. 2020. Prevalence of anemia and associated factors among secondary school adolescent girls in Jimma Town, Oromia Regional State, Southwest Ethiopia. *Anemia* 2020. <https://doi.org/10.1155/2020/5043646>
- Handayani D, Pamungkasari EP, Sulaeman ES. 2019. Application of path analysis on incidence of anemia in female Adolescents.

- J Gizi Pangan 14(1):37–44. <https://doi.org/10.25182/jgp.2019.14.1.37-44>
- Khakurel D, Uprety Y, Łuczaj Ł, Rajbhandary S. 2021. Foods from the wild: Local knowledge, use pattern and distribution in Western Nepal. *Plos One* 16(10): e0258905. <https://doi.org/10.1371/journal.pone.0258905>
- [WHO] World Health Organization. 2023. Accelerating anaemia reduction: A comprehensive framework for action. Geneva (CH): WHO.