

Association of Animal Protein Adequacy with Nutritional Status: A Study on High School Adolescents in Semarang City

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ABSTRACT

This study aimed to determine the relationship between animal protein and calcium adequacy with nutritional status. This is a cross-sectional study with 78 subjects selected by purposive sampling method. This study was conducted in State Senior High School 2 and State Senior High School 9 Semarang. The data were analyzed using Spearman's rank test. The results showed an association between animal protein adequacy and nutritional status ($p=0.027$, $r=-0.250$). There was no association between calcium adequacy and nutritional status ($p=0.574$, $r=0.065$). In conclusion, protein adequacy is associated with nutritional status among adolescents, but calcium is not.

Keywords: adolescents, animal protein, calcium, nutritional status

INTRODUCTION

The adequacy of nutrition is essential to support the rapid growth and development of adolescents (Retnaningrum & Dieny 2015). According to the 2018 National Basic Health Research data, 8.7% and 8.1% of adolescents aged 13–15 years and 16–18 years, respectively, were considered to be undernourished. In addition, about 16% and 13.5% of adolescents aged 13–15 years and 16–18 years respectively were overnourished (MoH RI 2018). Protein is an essential macronutrient that helps build and repair tissues, enhances the immune system, and synchronizes cellular activity. Therefore, animal protein is considered to have higher quality than plant protein because it contains the optimal essential amino acids for muscle mass (Lim *et al.* 2021). Calcium is one of the essential micronutrients that helps the body's metabolism, nerve connection, heart function, muscle movement, and especially the formation of bones and teeth (Aji & Fitriani 2022). This study aimed to determine the relationship between animal protein and calcium adequacy with nutritional status.

METHODS

This cross-sectional study was conducted in State Senior High School 2 and State Senior

High School 9 Semarang in October 2022. A total of 78 respondents were selected using purposive sampling method. The data were analyzed using Spearman's rank test. The animal protein and calcium adequacy data were obtained using the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) from direct interviews with students. The BMI-for-Age Z-score (BAZ) as the nutritional status of the respondents was classified according to the Regulation of the Minister of Health No.2 of 2020. The category of the nutritional status is as follows: underweight (-3 to <-2 SD), normal weight (-2 to $+1$ SD), overweight ($+1$ to $+2$ SD), obesity ($>+2$ SD).

RESULTS AND DISCUSSION

Characteristics of the respondents

Table 1 shows that most of the subjects (71.8%) were adolescent females. The majority of them (92.3%) met $>40\%$ of animal protein adequacy and all subjects met $<70\%$ of the calcium adequacy. The mean animal protein adequacy and calcium adequacy of the subjects were $141.17\% \pm 84.12$ and $24.60\% \pm 17.15$, respectively. According to BAZ, most subjects (61.5%) were considered to have normal nutritional status.

Association between animal protein adequacy and nutritional status

The association test showed a relationship

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Table 1. Distribution of respondents based on research variables

Characteristics	n	(%)
Gender		
Male	22	28.2
Female	56	71.8
Adequacy of animal protein		
Less (<20%)	2	2.6
Adequate (20–40%)	4	5.1
Over (>40%)	72	92.3
Adequacy of calcium		
Less (<77%)	78	100
Adequate (>77%)	0	0
Nutritional status		
Underweight (-3–<-2 SD)	4	5.1
Normal weight (-2–+1 SD)	48	61.5
Overweight (+1 –+ 2 SD)	9	11.5
Obesity (>+ 2 SD)	17	21.8
Total	78	100

between animal protein adequacy and nutritional status ($r=-0.250$, $p=0.027$). There is a relationship between adequacy of animal protein and nutritional status because animal protein contains nine amino acids in perfect proportion for human body, so it is referred to as complete protein, which is useful as a source of energy for human body and can increase muscle and skeletal mass (Suryandari & Widyastuti 2015).

Association between calcium adequacy and nutritional status

Bivariate analysis showed no association between calcium adequacy and nutritional status ($r=0.065$, $p=0.574$) (Table 2). Calcium is one of

Table 2. Association between animal protein and calcium adequacy with nutritional status

Variable	r	p^*
Animal protein	-0.250	0.027
Calcium	0.065	0.574

*Spearman's rank test

the most abundant macrominerals in the body. The majority, approximately 99%, of the calcium is found in bones and teeth, with the remainder found in blood and extracellular fluid. In addition to its essential role in bone mineralization and formation, calcium also plays an important role in maintaining the body's acid-base balance. These mechanisms are also synergistically regulated by vitamin D, calcitonin, and parathyroid hormone (Aji & Fitriani 2022).

CONCLUSION

There is a significant association between animal protein adequacy and nutritional status.

DECLARATION OF CONFLICT OF INTERESTS

The authors have no conflicts of interest to declare.

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