



Nutrition status affects High School Students achievement: A massive prospective cohort study at Sleman, Yogyakarta-Indonesia



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ABSTRACT

Background: Riskesdas research results in 2013 showed that the number of adolescents aged 15-18 years overall very thin prevalence raised by 0.4% and overweight prevalence rose by 5.9%, which indicates that the level of adolescent nutritional intake is still not balanced. The average of the national high school examination results in Yogyakarta has decreased, in 2015 the average value was 61.14, became 57.41 in 2016. Therefore, this research aims to know the correlation between nutritional status to academic performance.

Method: This study is a prospective cohort study. The research population is 11.230 students. The sample of research is 112 students and taken by

simple random sampling technique. Data collected with questionnaires and documentation. Data analysis used simple linear regression.

Result: The results showed that the value of significance obtained by 0.005 where the value is smaller than 0.05. The value of R Square obtained for 0.071; it means the magnitude of the relationship of nutritional status to learning achievement is 7.1%. Thus, the results of this study indicate that nutritional status is significantly related to academic performance.

Conclusions: According to the data result, nutritional status is related to academic performance.

Keywords: Nutritional status, learning achievements

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INTRODUCTION

Nutrition is the most basic thing in human life.¹ Someone's nutrition was gained from the daily menu consumed. If the list consumed contains balanced diet that the body needs, then the person can have normal nutritional status. Nutritional status indicates a person's condition or condition due to the use, absorption, and use of food.² One result of a lack of nutrient intake in the body is malnutrition. Malnutrition is a condition caused by the consumption of bad nutritious foods and harm the body.³

Riskesdas research that was conducted in 2013 showed that the nutritional status of short prevalence adolescents aged between 16-18 years nationally is 31.4%.⁴ Besides, the results of the study also showed that thin prevalence of adolescents aged between 16-18 years nationwide is 9.4%. Prevalence of overweight adolescent was 5.7% and 1.6% for obesity adolescents. The results also show that the number of skinny teenagers overall is the same as in 2007, the very thin prevalence raised by 0.4% and the prevalence of overweight and obesity increased from 1.4% in 2007 to 7.3% in 2013. Those showed that the level of nutritional intake of adolescents aged 16-18 years is still unbalanced.

A person who experiences malnutrition early in his/her growth as a child can have a serious impact on his future life.⁵ Malnutrition experienced may result in the person experiencing depression, anxiety, poor cognition that can lead to declining learning achievement.

Learning achievement is the ability of students to accept, reject, or assess the information obtained through learning activities, whether done in school or independently at home.⁶ Students follow the learning activities to increase knowledge and skills possessed as an investment in the future. Learning activities can be conducted together in schools with teachers as facilitators, as well as at home independently. The results of the learning activities received by the students then tested to determine the development level of knowledge and skills gained through the learning activities. Learning achievement is one of the benchmarks of success for students.⁷ Therefore, to measure the ability of students, it can be test or exam every single period.

The average value of national high school exam results in Yogyakarta decreased by three points more. Department of Education, Youth, and Sports Yogyakarta said the average value of 2016 senior

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Table 1 Respondents Characteristic Distributions

Variable	Category	Total	
		n	%
Gender	Female	67	59.8
	Male	45	40.2
	Total	112	100.0
Usia	16 years old	63	56.3
	17 years old	47	42.0
	18 years old	2	1.8
	Total	112	100.0
Body Weight	≥81 kg	6	5.4
	71-80 kg	6	5.4
	61-70 kg	19	17.0
	51-60 kg	41	36.6
	≤50 kg	40	35.7
	Total	112	100.0
Body Height	≥181 cm	3	2.7
	171-180 cm	16	14.3
	161-170 cm	43	38.4
	≤160 cm	50	44.6
	Total	112	100.0

Tabel 2 Research Data Description

Variable	Category	Score Interval	Total	
			n	%
Nutrition Status	Underweight	< -3 SD	0	0.0
	Thin	-3 SD s/d -2SD	4	3.6
	Normal	-2SD s/d 1 SD	91	81.3
	Overweight	1 SD s/d 2 SD	11	9.8
	Obesity	>2 SD	6	5.4
	Total		112	100.0
Learning Achievement	Average score: Indonesia language, mathematics, biology, physics, dan chemistry	≥ 80	49	43.8
		51-79	63	56.3
		≤50	0	0.0
		Total	112	100.0

Table 3 Testing Correlation between Variables Research

Variable	Regression Coefficient	t count	Sig.
Nutrition status → Learning achievement	0.266	2.895	0.005

high school national exam was 57.41 from 20,641 students, while in 2015 amounted to 61.14 from 20,228 students. The decline occurs almost across subjects, so it is worth exploring the factors that can cause the decline.⁸

The research was conducted by Chinyoka associated with nutrition and learning achievement.³ In that study showed that hungry and malnourished students could affect many things, such as students unable to do physical work and doing sports activities sincerely, unable to attend school learning activities, and lose concentration while attending learning. Students who can't follow the learning activities well, then they also won't be able to understand about lessons given by the teacher, so that the students can't do the tasks assigned by teachers, and the impact on the low achievement of teachers.

The study that has conducted by Sarma, Wijesinghe, and Sivananthawerl shows that nutritional status has a positive relationship to student achievement.⁹ This suggests that students with stunting and underweight nutritional status, make it possible to achieve low learning achievement. Conversely, students with normal nutritional status, more likely to get high learning achievement, because students have a healthy body, so they can concentrate better and can understand the subject matter better as well.

Based on the description, it is known that high school students have unbalanced nutritional status. In addition, the average value of national exam of Yogyakarta high school students in 2016 decreased compared to 2015. Therefore, this study aims to determine the relationship of nutritional status with high school student achievement in Sleman, Yogyakarta.

METHODS

This study was a prospective cohort study. The research population is 11,230 students who are a high school from the government or private school. The number of samples was determined using Slovin formula, and Thabane to anticipate the decrease of a sample. The required number of sample from this study was 112 respondents. Samples were taken using simple random sampling technique. Inclusion criteria were high school students of science grade XI, aged 15-18 years, and willing to be involved as respondents, while the exclusion criteria are students who didn't follow all series of research activities.

Independent variables used was nutrition status, and the dependent variable used was learning achievement. Nutrition status is the state of a person's body due to the food and beverages consumed and the absorption of nutrients contained in the food by the body calculated by using body mass index. Learning achievement is the level of student learning success after following

Table 4 Coefficient Determination Test Adjust R Square

Variable	Adjust R Square
Nutrition status → Learning achievement	0.071

the learning activities on the subjects of Indonesian language, mathematics, biology, physics, and chemistry conducted in schools. Nutrition status data were obtained by using questionnaires while learning achievement data obtained by documentation of learning outcomes from final exam value. Analysis of research data was done by using univariate analysis and simple linear regression analysis with SPSS 21 software.

RESULT

Respondents in this study amounted to 112 students of class XI IPA scattered in four schools. Description of respondent characteristics can be seen in [table 1](#).

Based on gender, 67 (59.8%) respondents were female, and male was 45 (40.2%) respondents. Based on age, 63 respondents (56.3%) were 16 years old, 17 years old students were 47 (42.0%) respondents, age 18 was 2 (1.8%) respondents.

According to the weight, 41 (36.6%) of respondents with 51-60 kg, 40 (35.7%) respondents with weight ≤ 50 kg, 19 (17.0%) respondents with between 61-70 kg, 6 (5.4%) respondents with weight ≥ 81 kg, and 71-80 kg as many as 6 (5.4%) respondents. Based on the height, 50 (44.6%) respondents have high ≤ 160 cm, 43 (38.4%) respondents with height 161-170 cm, 16 (14.3%) of respondents have high between 171- 180 cm, and respondents who have height ≥ 181 cm were 3 respondents (2.7%).

The data in this study consists of four variables, namely breakfast habit, nutrition status, and learning achievement. Data description of each variable can be seen in [Table 2](#).

Breakfast habit before the whole activity done by 63 (56.3%) respondents, breakfast periodically counted 31 (27.7%) respondents, and rarely breakfast with 18 (16.1%) respondents. Based on these data, it can be concluded that some respondents have a good routine in doing breakfast before morning activities. Average students do breakfast around 6:00 to 6:30 pm. Breakfast menu consumed include rice, tofu, tempeh (soy), eggs, chicken, and vegetables. Drinks served at breakfast include milk, water, and ice tea. There are still some students who haven't eaten breakfast before school, because of fear being late to school, unavailability of breakfast menu, or because they are not used for breakfast. Breakfast menu ate by students in the school that is pukis and chips.

[Table 2](#) shows with 4 (3.6%) of the respondents had skinny nutritional status, normal status was 91 (81.3%), overweight status was 11 (9.8%), and obesity status was 6 (5.4%) respondents. The majority of respondents have normal nutritional status, meaning that the ratio between body weight and height that is owned by adolescence is normal or balanced. Nutritional status is normal due to the height of the body owned according to his weight. It shows the nutritional adequacy of the students, including balanced.

Overall, 63 (56.3%) of respondents had an average of final exam value in the interval range 51-79, while those with ≥ 80 score only 49 (43.8%) respondents. Based on these data, it can be seen that the average learning achievement of the average student is between 51-79. These values indicate that students' cognitive abilities are good enough.

The data has been obtained and then analyzed by using multiple regression. The analysis is used to test the research hypothesis, namely the relationship between breakfast habits and nutritional status of learning achievement. The results of the analysis can be seen in [table 3](#).

[Table 3](#) shows that nutrition status to learning achievement has a t-value of 2.895 with significance 0.005. It means that nutrition status correlates significantly with learning achievement. Furthermore, to know the magnitude of the relationship of nutrition status with learning achievement, it is shown in the coefficient of determination Adjust R Square. The test results can be seen in [table 4](#).

[Table 4](#) shows the coefficient of determination of Adjust R Square for nutrition status with learning achievement has result 0.071. It shows that the magnitude of the effect given by the nutrition status on learning achievement is 7.1%.

DISCUSSION

Adolescents need relatively large amounts of nutrients compared to children because at that age the children have a lot of physical activity.¹⁰ Physical activity can work well if the body gets adequate nutrient intake through the food consumed because the nutritional intake is necessary to increase energy during physical activities.¹¹ Proper nutrition can obtain by eating foods that contain nutrients needed by the body but in amounts appropriate to the needs of the body.

A healthy body condition can be obtained by eating foods with proper nutrition intake.¹² It shows that a balanced nutritional intake makes the body healthy and following the proportion of the body between both height and weight. However, if a person is experiencing malnutrition, it can interfere

with one's activities. Past nutritional deficiencies can have an impact on metabolic changes in the brain.¹³ The brain can't work properly if it doesn't get a balanced nutritional intake. Children with long-term malnutrition have an impact on the incidence of malnutrition and cognitive impairment.¹⁴ If there is cognitive impairment, then the children won't be able to focus and concentrate on learning activities, thus impacting on learning achievement.

The results of this study indicate that nutritional status has a significant correlation with learning achievement. Nutritional status of the students in this study the majority included in the normal category. This means that the ratio between height and weight is quite balanced in the adolescents. Also, the achievements of the students are quite good. This means that students with good/normal nutritional status have a good learning achievement as well.

The results of this study are in line with research conducted by Masdewi et al.¹⁵ That study showed that nutritional status has a relationship with student achievement. Research conducted by Sarma, Wijesinghe, and Sivananthawerl shows that nutritional status has a positive relationship with student achievement.⁹ Students with stunting, underweight, and thin nutritional status was leading to low learning achievement. Research conducted by Chinyoka also shows that a person with malnutrition can affect physical growth, cognitive development, and impact on learning achievement, health, and survival.³ It shows that good nutritional status can help the students to make it easier to receive the subject presented by the teacher. Students who can understand the subject matter will be easy to complete every task given and can do the questions given by the teacher, also ultimately can impact on the achievement of learning satisfactory.

CONCLUSION

Based on the results of the study, nutrition status has a significant relationship to learning achievement. The result of the research showed that the correlation between nutrition status and learning achievement was 7.1%. This meant there were still other factors related to learning achievement and further research needed.

CONFLICTS OF INTEREST

All authors declare there is no conflict of interest regarding publication of this manuscript

REFERENCES

1. Naik, SR., Itagi, SK., & Patil, M. Relationship Between Nutrition Status, Intelligence and Academic Performance of Lambani School Children of Bellary District, Karnataka. *International Journal of Farm Sciences*, 2015; Vol. 5, No. 3, 259-267.
2. Suhardjo. *Berbagai Cara Pendidikan Gizi*. Jakarta: Bumi Aksara; 2003.
3. Chinyoka, K. Impact of Poor Nutrition on The Academic Performance of Grade Seven Learners: A Case of Zimbabwe. *International Journal of Learning & Development*, 2014; Vol.4, No.3, 73-84.
4. Kementerian Kesehatan RI. *Riset Kesehatan Dasar*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan; 2013.
5. Lateef, O. J., Njogu, E., Kiplamai, F., Haruna, U. S., & Lawal, R. A. Breakfast, Food Consumption Pattern and Nutritional Status of Students in Public Secondary Schools in Kwara State, Nigeria. *Pakistan Journal of Nutrition*, 2016; Vol. 15, No. 2, 140-147.
6. Hamdu, G., & Agustina, L. Pengaruh Motivasi Belajar Siswa terhadap Prestasi Belajar IPA di Sekolah Dasar. *Jurnal Penelitian Pendidikan*, 2011; Vol. 12, No. 1, 81-86.
7. Komara, I. B. Hubungan antara Kepercayaan Diri dengan Prestasi Belajar dan Perencanaan Karir Siswa. *Psikopedagogia*, 2016; Vol. 5, No. 1, 33-42.
8. Evani, FS. 2016. Rata-Rata Hasil UN SMA DIY Turun 3,73 Poin. *Jurnal, Beritasatu*. Diakses pada tanggal 30 Agustus 2016 dari <http://www.beritasatu.com/kesra/363800-ratarata-hasil-un-sma-diy-turun-373-poin.html>
9. Sarma, M. S. G., Wijesinghe, D. G. N. G., & Sivananthawerl, T. The Effects of Nutritional Status on Educational Performance of Primary School Children in the Plantation Sector in Nuwara Eliya Educational Zone. *Tropical Agricultural Research*, 2013; Vol. 24, No. 3, 203-214.
10. Sediaoetama, A.D. *Ilmu Gizi untuk Mahasiswa dan Profesi*. Jakarta: Dian Rakyat; 2008.
11. Hidayat, A.A.A. *Pengantar Ilmu Keperawatan Anak*. Jakarta: Salemba Medika; 2008.
12. Roves, P. M. G., Zapico, P. G., Patterson, A. M., & Gutierrez, E. I. Nutrient Intake and Food Habits of Soccer Players: Analyzing the Correlates of Eating Practice. *Nutrients*, 2014; Vol. 6, No. 7, 2697-2717. Diakses pada tanggal 17 November 2017 dari <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4113765/>
13. Sa'adah, R. H., Herman, R. B., & Sastri, S. Hubungan Status Gizi dengan Prestasi Belajar Siswa Sekolah Dasar Negeri 01 Guguk Malintang Kota Padangpanjang. *Jurnal Kesehatan Andalas*, 2014; 3 (3), 460-465.
14. Woodhouse, A., & Lamport, M.A. The Relationship of Food and Academic Performance: A Preliminary Examination of the Factors of Nutritional Neuroscience, Malnutrition, and Diet Adequacy. *Christian Perspectives in Education*, 2012; Vol. 5, Issue 1, 1-14.
15. Masdewi., Devi, M., & Setiawati, T. Korelasi Perilaku Makan dan Status Gizi terhadap Prestasi Belajar Siswa Program Akselerasi di SMP. *Teknologi dan Kejuruan*, 2011; Vol. 34, No. 2, 179-190.



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