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Nutritional and Motor Ability Status of Elementary School Student

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ABSTRACT
Nutritional disorders in childhood may cause a decrease in motor abilities and increased morbidity and mortality in adulthood. Since nutritional status can influence the expression of children's motor capacities, a study has been carried out in order to examine differences in motor abilities of children in relation to their nutritional status. The sample included 60 children lower elementary school grade students (36 boys, 24 girls). Students' motor ability status was evaluated by barrow motor ability test, while nutritional status was evaluated based on the body mass index. IOTF criteria were used in order to assign participants into four distinctive groups – underweight, normal weight, overweight and obese. Differences between groups in motor ability status were tested by Kruskal-Wallis and Mann-Whitney tests. No significant differences were found between groups of a different nutritional status in most of the motor abilities, suggesting that BMI does not represent a high-quality predictor of motor abilities of children of lower elementary school grades.

Keywords*: nutritional status, motor ability, elementary school student*

1. INTRODUCTION

Indonesia is still experiencing malnutrition problems up to recently. As a result of malnutrition, it causes stunting and abnormal motor development. Stunting or height problems are caused by chronic malnutrition which resulted from lack of nutritional intake since the fetus is in the womb. Malnutrition at an early age increases infant and child mortality, causing sufferers to get sick easily, abnormal motor development and having bad posture when they get older, and the decreasing of thinking (cognitive) ability. Basic Health Research in 2013noted that national stunting prevalence reached 37.2 percent, increasing from 2010 (35.6%) and 2007 (36.8%). It means that the unmaximum growth is suffered by around 8 million Indonesian children, or one of three Indonesian children. Stunting prevalence in Indonesia is higher than other countries in Southeast Asia, such as Myanmar (35%), Vietnam (23%), and Thailand (16%).Stunting is a problem of chronic malnutrition caused by insufficient nutrition intakewithin a long period of time due to feeding that is not in accordance with nutritional needs. Stunting starts when the fetus is still in the womb and only appears when the child aged. Malnutrition at an early age increases infant and child mortality, causing sufferers to easily get sick and have bad posture when they get older. The cognitive abilities of sufferers are also reduced, resulting in long-term economic losses for Indonesia. Indonesia ranks fifth in the world for the number of children with stunting conditions. The heights of more than a third of children under five years old in Indonesia are below average.

Malnutrition status is caused by the low intake of nutrients consumed by students. Nutritional intake of students is strongly influenced by parents' feeding pattern and the level of knowledge of mothers preparing family meals. If the consumption of children's food is well regulated according to the needs and activities of the child, it will affect the nutritional status of the child. Good nutritional status will affect motor skills and children's intelligence development. Previous research indicates that nutritional status is very important prerequisite for healthy development, including motor development, during childhood. Since there is an obvious lack of research analyzing the relationship between nutritive and motor status of children in Serbia, a study has been carried out with the main goal to examine the differences in motor abilities of students in relation to their nutritional status (Milosevic et al. 2018). The purpose of this study is to analyze the relationship between nutritional status and motor skills of elementary school children.

2. METHOD

This type of research is a quantitative cross-sectional approach that explores information in a cross section. The children were weighed using a Camry® portable electronic scale and their height was measured with a microtoise. Nutritional status was assessed on the basis of the indicators suggested by the World Health Organization (WHO). "The United States Centers for Disease Control and Prevention (CDC) charts for 2000 were used as a reference standard for calculating the z-values and percentiles of the nutritional indicators"[1]. The weight for age and sex and height for age and sex indicators were considered normal if they were within ±2 SD according to the z-score. According to the weight for age and sex indicator, underweight was defined as below −2 SD and overweight as above +2 SD. The body mass index (BMI) for age and sex indicator was considered very low or thin if it fell below the 5th percentile, low between the 5th and below the 25th, normal between the 25th and below the 85th, at risk of overweight between the 85th and below the 95th and obese above the 95th percentile. Students' motoric abilities were measured by barrow motor abilities. Explosive power was quantified by measuring a standing broad jump. "Strength endurance was evaluated on the basis of the number of medicine ball. Speed over 20m and agility were obtained using a standardized protocol, with a stopwatch and cones, to identify the distance to be covered in the shortest possible time" [2].

3. RESULT AND DISCUSSION

Descriptive statistics of used variables, as well as results of nutritional status gender differences is shown in Table 1. Testing the normality of the distribution with the K-S test has showed that there are statistically significant deviations from the normal distribution. For further analysis non-parametric techniques for data processing have been used.

Table1.Distribution of Respondents by Nutritional Status

	Boys (n=37)	Girls (n=23)	Total (n=60)
Underweight	5(8.3%)	7 (11.7%)	12 (20.0%)
Normal	28 (46.7%)	15 (25.0%)	43 (71.7%)
Overweight	3 (5.0%)	2 (3.3%)	5 (8.3%)

In table 1, it appears that more male students are classified as overweight compared to female students, but underweight is more in the female student group. "Relatively many female students who are underweight may be associated with body image of female students who prefer the ideal body shape and thin and be stressful with a body shape that is not as desired" [3].

Table 2. Differences in motor ability between boys of different nutritional status

Variables	Under weight (n=5)	Normal Weight (n=29)	Over weight (n=3)
Agility	9.10 ± 1.28	9.81 ± 1.0	8.99 ± 1.1
Speed	13.3 ± 0.65	13.7 ± 1.1	13.9 ± 0.6
Strenght	9.97 ± 3.2	10.0 ± 3.7	11.2 ± 5.6
Explosive Power	105.2 ±30.6	97.3 ± 25.2	105.7 ± 17.2

Based on table 2, it is found that male students with underweight nutritional status had an average agility of

9.10 + 1.28 seconds, the average speed of 13.3 + 0.65 seconds, the average strenght of 9.97 + 3.20 meters and the average explosive power of 105.2 + 30.57 cm. Male students with normal nutritional status, have an average agility of 9.81 + 1.04 seconds, the average speed of 13.7 + 1.11 seconds, the average strength of 10.04 + 3.7 meters and the average explosive power of 97.31 + 25.22 cm. Whereas for male students with overweight nutritional status hadan average agility of 8.99 + 1.11 seconds, the average speed of 13.89 + 0.56 seconds, the average strenght of 11.16 + 5.63 meters and the average explosive power of 105.67 + 17.21 cm.A decline in physical abilities in children may be an early marker of cardiovascular and musculoskeletal compromise or a condition that changes over time simultaneously with other metabolic and inflammatory variables "The results of the Kruskal Wallis statistical test showed that there were no differences in motoric abilities based on nutritional status in male students (p> 0.05)" [4]. The findings of this study are different from the results of a study by which states that there are differences in motoric abilities based on nutritional status. "The findings of conclude that in obese children their motor skills are inadequate" [5]. "A decline in physical abilities in children may be an early marker of cardiovascular and musculoskeletal compromise or a condition that changes over time simultaneously with other metabolic and inflammatory variables" [6].

Table 3. Differences in motor ability between girls of different nutritional status

Motor Abilities	Nutritional Status		
	Under weight (n=7)	Normal weight (n=14)	Over weight (n=2)
Agility (sec)	13.07 ± 3.0	11.97 ± 2.4	11.2 ± 1.65
Speed (sec)	17.61 ± 2.7	17.35 ± 2.4	16.5 ± 1.85
Strength (m)	4.96 ± 1.67	6.59 ± 2.46	5.14 ± 1.87
Explosive Power (cm)	73.7± 20.86	79.79 ± 17.9	93 ± 12.7

Based on table 3, it was found that female students with underweight nutritional status, had an average agility of 13.07 + 3.00 seconds, the average speed of 17.61 + 2.65 seconds and the average strength of 4.96 + 1.67 meters and the average explosive power of 73.71 + 20.86 cm. Female students with normal weight nutritional status, had an average agility of 11.97 + 2.42 seconds, the average speed of 17.35 + 2.35 seconds, the average strength of 6.59 + 2.46 meters and the average explosive power of 79.79 + 17.87 cm. Female students with overweight nutritional status, have an average agility of 11.18 + 1.65 seconds, the average speed of 16.54 + 1.85 seconds, the average strength of 5.14 + 1.87 meters and the average explosive power of 93 + 12.73 cm. The results of the Kruskal Wallis statistical test showed no difference in motoric abilities based on nutritional status in female students (p> 0.05).

Table 4. Statistical Test Results of Differences in Motor Ability Based on Gender

Variables	Boys (n=37) M ± SD	Girls (n=23) M ± SD	P value
Agility (sec)	9.10 ±1.28	13.1 ± 3.0	0.004
Speed (sec)	13.3 ±0.65	17.6 ± 2.6	0.000
Endurance(sec)	9.97 ±3.20	4.96 ± 1.7	0.000
Explosive Power (cm)	105.2 ±30.6	73.7 ± 20.86	0.000

From the table it can be seen that the average motoric abilities of male students are better than female students. Statistically there are significant differences in motor skills based on gender (p value <0.05). This finding is in line with the research conducted by Dumith (2010) which states that motoric abilities of boys are better than girls.

4. CONCLUSION

There is a significant difference between the motor skills of male and female students. Boys' motor skills are better than girls. There are no significant differences in motor skills of male and female students based on nutritional status (p value> 0.05).

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