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THE RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND HYDRATION STATUS IN SCHOOL CHILDREN

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Abstract. Dehydration in adolescents is still a global problem. Individuals with obesity tend to be more prone to dehydration. This study aims to determine the relationship between nutritional status and hydration status in SMPIT Alam Ar-Royyan Padang students. This study is an analytic study with a cross-sectional approach. This study was conducted from February 2023 to January 2024 at SMPIT Alam Ar-Royyan, Pegambiran, Padang. Data were collected using the total sampling method with a total sample of 61 people who met the inclusion and exclusion criteria. Data analysis was analyzed by using the Chi-square test. The results showed that 78,7% respondents were male, 57.4% respondents had normal nutritional status, and 73.8% respondents had moderate dehydration. Chi-square analysis results showed a p value = 0.260 (p> 0.05). It can be concluded that there is no statistical relationship between nutritional status and hydration status in students of SMPIT Alam Ar-Royyan Padang.

Keywords: Adolescents; Dehydration; Hydration Status; Obesity; Junior High School Students

INTRODUCTION

Dehydration is a state of total water deficiency in the body (Lacey et al., 2019). Dehydration can cause the body to lose electrolytes, leading to electrolyte imbalances. This situation can lead to decreased performance of nerves, tissues, and muscle fibers, which ultimately disrupt the body's performance (Samodra, 2020). If this condition continues, it can eventually cause blood thickening, interfering with organ function (Anggraeni & Fayasari, 2020). In addition, dehydration can interfere with the brain's executive function and information processing in the brain (Wittbrodt & Millard-Stafford, 2018). Moods also tend to change quickly in a dehydrated state because they cause heat stress and difficulty doing work, which increases stress hormones and ultimately changes moods (Zhang et al., 2019).

Dehydration in adolescents is still a global problem. Adolescence is a transition from childhood to adulthood, with a rapid increase in weight and height, so more nutrients, including water, are needed (Santoso et al., 2014). Research conducted in 13 countries shows that most children and adolescents are at risk of insufficient fluid intake (Iglesia et al., 2015). A survey conducted in Singapore by Temasek Polytechnic and the Asian Food Information Center also showed that most adolescents aged 15-24 years consumed insufficient amounts of fluids, where the average amount of fluid consumption in men was 1.5 liters per day and in women was 1.6 liters per day (Briawan et al., 2011). The Indonesian Hydration Regional Study (THIRST) also revealed that 46.1% of the subjects exhibited mild dehydration. This study found that mild dehydration was more prevalent in adolescents aged 15-18, which amounted to 49.5% (Hardinsyah et al., 2009).

Age, nutritional status, gender, physical activity, body temperature, and environment can influence dehydration. Obese people are more prone to dehydration because they have

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more fat cells in their bodies. Obese people have less total body water compared to non-obese people. The water content of fat cells is less than the water content in muscle cells, so they tend to lack water more quickly than non-obese people (Santoso et al., 2017). In other words, obese people also have a greater need for water than non-obese people because water needs depend on metabolic rate, body surface area, and body weight. People with a higher BMI have higher energy needs, food consumption, and metabolic production, so their water turnover rate tends to increase more (Chang et al., 2016).

The 2018 Riset Kesehatan Dasar (Riskesdas) report obtained data on the prevalence of nutritional status (IMT/U) of adolescents aged 13-15 years in Indonesia, namely 1.9% skinny, 6.8% thin, 75.3% normal, 11.2% overweight, and 4.8% obese (Kementerian Kesehatan Republik Indonesia, 2018a). The 2018 West Sumatra Province Riskesdas contains the latest data on the nutritional status of Padang City. The data shows that the prevalence of nutritional status (IMT/U) aged 13-15 years in Padang City is 3.59% very thin, 3.63% thin, 74.83% normal, 10.10% overweight, and 7.84% obese (Kementerian Kesehatan Republik Indonesia, 2018b).

There are no relevant publications on hydration status in general in the West Sumatra region, especially Padang City, even though the Padang City area is located in a coastal area with high temperatures that can reach 34.8°C in January 2021. Furthermore, no prior research has been conducted in Padang City on the relationship between nutritional status and hydration status in school children.

The researcher will conduct research on students of SMPIT Alam Ar-Royyan, one of the schools using the full-day school system in Padang City, where students spend more time at school than home. This school also carries the concept of a natural school where students learn more outdoors than indoors. The school was also very supportive and cooperative in conducting this research, as evidenced by the school's submission to become a research site. This school has previously conducted a program that supports student hydration by providing drinking water in gallons in each class. However, the school wanted to improve the previously carried-out hydration program through this research. Based on preliminary studies conducted by researchers, it was found that water consumption was still insufficient among SMPIT Alam Ar-Royyan students, and many students were obese. Based on these problems, this study aimed to determine the relationship between nutritional status and hydration status in students of SMPIT Alam Ar-Royyan Padang.

METHOD

This study is an analytical study with a cross-sectional approach to determine the relationship between nutritional status and hydration status in students of SMPIT Alam Ar-Royyan Padang. This research was conducted from February to October 2023, with a population of all SMPIT Alam Ar-Royyan Padang students (96 people). Using the Slovin formula, we calculated the minimum sample size, obtaining a minimum of 49 samples. The sampling technique used in this study was total sampling, where the entire population became respondents.

The instruments used in this study measured nutritional status and hydration status. Nutritional status was measured by weighing body weight using a digital scale with an accuracy level of 0.1 kg and measuring height using a microtoise with an accuracy level of 0.1 cm. The measurement results were then entered and scored using the WHO AnthroPlus application. Meanwhile, respondents underwent a urine-specific gravity measurement

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technique to ascertain their hydration status. Urine was collected at 15.00-16.00, describing the hydration status of children at school. The tool used as a measurement tool for hydration status in this study is a urine dipstick with ten parameters and comparison standards. After collecting the data, we analyze it univariately and bivariately (using the Chi-square test).

RESULTS AND DISCUSSION

Characteristics of Respondents

From a total of 96 students, 67 people returned informed consent to the researcher, and 61 people followed the research series until completion, so the number of samples included as research data amounted to 61 people.

Table 1: Characteristics of Respondents

Variable	f (n = 61)	%
Gender		
Male	48	78,7%
Female	13	21,3%
Nutritional Status		
Underweight	4	6,6%
Normal	35	57,4%
Overweight	12	19,7%
Obese	10	16,4%
Hydration Status		
Euhydration	2	3,3%
Mild dehydration	14	23%
Moderate dehydration	45	73,8%

Based on Table 1. above, it can be seen that most of the respondents in this study were male with 48 people (78.7%), more than half of the respondents had normal nutritional status (57.4%), and almost all respondents experienced mild and moderate dehydration (96.8%).

This study was attended by most students with male gender (78.7%). This is due to the student population at SMPIT Alam Ar-Royyan, in which male students dominate. Gender can be a factor that differentiates a person's daily fluid needs. Males have greater muscle mass than females, so their total body water tends to be higher (Saftarina & Fauziah, 2023). In addition, male students tend to play more and do more physical activities than female students, thus requiring more water consumption (Perales-García et al., 2018).

Most of the respondents in this study had normal nutritional status (57.4%). The 2018 Riskesdas report shows that most adolescents aged 13-15 years have normal nutritional status (Kementerian Kesehatan Republik Indonesia, 2018a). In addition, the 2018 West Sumatra Province Riskesdas report also shows that most adolescents aged 13-15 years in Padang City have normal nutritional status (Kementerian Kesehatan Republik Indonesia, 2018b). The Riskesdas findings find support in the research conducted by Daniati et al. in 2020 and Ubaid et al. in 2022, indicating that most adolescents within the same age range in Padang City exhibited normal nutritional status (Daniati et al., 2020; Ubaid et al., 2022).

Almost all respondents in this study experienced dehydration in the mild (23%) and moderate (73.8%) categories. This result shows dehydration is still a severe problem,

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especially among schoolchildren. Factors that can cause dehydration include the concept of school as a nature school, the full-day school system's application, and the school environment's high temperature. Applying the nature school concept in daily learning allows students to spend more time learning outdoors than indoors, making them very vulnerable to dehydration. Outdoor activities can lead to increased fluid consumption needs, which, if not balanced with adequate water consumption, will lead to dehydration (Anggraeni & Fayasari, 2020). The researcher observed some respondents doing play activities such as playing soccer and running around before collecting urine during lunch break. Increased physical activity and high ambient temperatures can cause respondents to lose fluid. If, after the activity, the respondent does not drink enough to fulfill their water needs, then the results of the hydration status check have the potential to show dehydration status.

The full-day school system can also be another factor that causes students to become dehydrated. Students spend nine hours a day studying at school. The longer students spend at school, the more the risk of dehydration increases (Rauf & Lestaluhu, 2022). The provision of drinking water facilities by schools also plays a role in the problem of dehydration. The school issues four gallons, but irregular replacements are made, which proves inadequate to fulfill the needs of all students. Students with limited access to drinking water at school are almost twice as likely to be under-drinking during school hours compared to students with sufficient access to water (Bottin et al., 2019).

The school's location in a high-temperature area in Padang City (Urban Heat Island) is also one of the factors that cause the high incidence of dehydration (Fajrin & Driptufany, 2017). High ambient temperature increases the body's fluid expenditure through sweat and breathing frequency so that the body requires more water consumption (Kurdak et al., 2010).

The Relationship Between Nutritional Status and Hydration Status

This study initially used a 4×4 categorization table on the independent (nutritional status) and dependent (hydration status) variables. However, after data processing, the Chi-square test requirements could not be met because there were expected (E) values in cells less than 5 with an amount exceeding 20%, and there were empty or zero cell values. After the researcher read more about statistical testing and consulted with a statistician, the independent variables were combined, where the obesity category was combined with overweight, and underweight was combined with normoweight. In addition, euhydration status was removed from the dependent variable so that the table became 2×2 so that the conditions for using the Chi-square test could be met.

Table 2: Bivariate Analysis

Variabel	Hydration Status				Total		p-value
	Mild Dehydration		Moderate Dehydration				
	f	%	f	%	f	%	
Nutritional Status							
Underweight-Normoweight	30	81,1%	7	18,9%	37	100%	**0,260**
Overweight-Obese	15	68,2%	7	31,8%	22	100%	

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Total	**45**	**76,3%**	**14**	**23,7%**	**59**	**100%**

The bivariate analysis using the Chi-square test obtained a p-value of 0.260 (p> 0.05), which means there is no statistical relationship between nutritional and hydration status. This study corroborates the results of Maharani and Muzayyana et al., who found no significant relationship between nutritional status and hydration status in school children (Maharani, 2018; Muzayyana et al., 2018).

In this study, it was found that dehydration was found not only in respondents with excess nutritional status but also in respondents with normal and less nutritional status. This result contradicts the theory put forward by Santoso, which said that obese people have less total body water compared to non-obese people because the water content in fat cells is lower than in muscle cells, so they are more prone to dehydration due to a lack of water (Santoso et al., 2017).

Researchers suspect this difference may arise due to several factors, such as respondents who do more outdoor learning activities, high ambient temperature around the school, and inadequate provision of drinking water. In addition, external factors can cause this difference, such as an insignificant sample size, so the proportion of respondents with overnutrition status is lower. The possibility of researchers making mistakes when taking measurements can also have an effect, such that the measurement results become less precise.

CONCLUSION

Concluding from the results of the conducted research, most of the respondents are male, have normal nutritional status, and almost all respondents are dehydrated. However, there was no statistical relationship between nutritional status and hydration status.

The school is expected to improve the water supply policy by increasing the amount of water supply according to the needs of the entire school's academic community. In addition, teachers and parents are expected to be involved in implementing student hydration policies at school through the focused group discussion method so that an in-depth explanation of the results obtained is obtained.

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