

Relationship between Nutritional Status and Family History of Hypertension with Salt Taste Threshold in Adolescents in Demak Regency, Indonesia

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Abstract. Demak is one of the regencies with highest prevalence of hypertension in Indonesia. The aim of the study was to evaluate the relationship between nutritional status and family history of hypertension with salt taste thresholds in adolescents in Demak Regency. The cross-sectional design was used with 100 adolescents in two high schools in the Demak Regency. Adolescent nutritional status based on BMI-for-age was obtained from anthropometric measurement. The history of family hypertension was obtained from interviews using a questionnaire. The threshold test of salt taste was carried using 6 concentration salt solution, were 4 mmol/L, 6 mmol/L, 8 mmol/L, 10 mmol/L, 12 mmol/L, and 14 mmol/L. Data were tested using Spearman correlation to determine the relationship between variables. The results showed that there was no significant relationship between nutritional status and family history of hypertension with salt taste threshold in adolescents ($p = 0.088$ and $p = 0.485$, respectively), but the value of correlation coefficient showed a positive direction. Adolescents with a history of family hypertension showed a high threshold value of salt taste compared to adolescents who did not have a family history of hypertension. Furthermore, adolescents with overweight and obesity status indicated to have high salt taste thresholds.

Keywords: *family history of hypertension, nutritional status, salt taste threshold*

1. INTRODUCTION

Hypertension is a non-communicable disease (PTM) with a high prevalence in the world. According to the WHO report (2017) [1], in 2015 the prevalence of hypertension for age > 18 years globally was 22.1% while in the Southeast Asian region showed higher data at 25.1%. Based on Riskesdas data (2018) [2] the prevalence of hypertension in Indonesia at the age of ≥ 18 years is 34.1%.

According to Prasetyo [3], health implementation through early detection of adolescents is believed to be able to improve health status in the future. Lifestyle changes such as smoking, alcohol consumption, excessive sodium consumption, lack of physical activity and high levels of stress can lead to cardiovascular disease such as hypertension [4].

The high incidence of hypertension is caused by various factors including age, gender, genetics, ethnicity/race, lifestyle, medication, obesity and food intake [5], [6]. Individuals with overweight and obesity nutritional status tend to have low taste sensitivity, one of which is the sensitivity of salty taste [7]. The high threshold of salt taste is a sign that the ability to detect salt taste has decreased. The high threshold of salt taste is influenced by genetic factors and eating habits [8]. Families tend to share lifestyles especially in terms of differences in salt intake[9]. The results showed that people with higher salt intake tended to have a family history of hypertension [10].

Indonesian people have a high threshold potential for salt taste because of the habit of consuming high salt. A culture of eating that cannot be separated from salt, such as the use of MSG and flavoring in dishes that are sources of sodium is one factor in the high intake of sodium [11]. According to Baharuddin and Sharifudin[12], geographical location and culture can influence taste preferences which will have an impact on eating habits and the threshold of salt taste. Until now there has not been much research related to salt flavor threshold in adolescents in Indonesia, especially inland or non-coastal areas. Further studies are needed regarding the relationship of nutritional status and family history of hypertension with salt taste threshold in adolescents in Demak Regency, Central Java Province.

2. METHOD

2.1 Respondents

The cross-sectional design was used in the research. The population in this study were high school adolescents aged 15-17 years in non-coastal areas of Demak Regency, Central Java (N = 100). The inclusion criteria in this study were adolescents who were not sick, did not smoke and lived with the family. While the exclusion criteria in this study were adolescents who did not come at the time of the study, adolescents who could not detect salty taste and young women who menstruated at the time of the study. This research was approved by the Health Research Ethics Commission of Sebelas Maret University No.52 / KEPK / 2019.

2.2 Procedures

Data on adolescent nutritional status were obtained from the results of anthropometric measurements of body weight and height. Classification of adolescent nutritional status based on BMI-for-age with z-score threshold according to RI Ministry of Health (2010)[13]. Family history of hypertension data was obtained through interviews using a questionnaire by asking whether or not there was a history of hypertension in the second generation (parents). Measuring the threshold of salt taste was obtained by testing 6 samples of salt solution directly by respondents with concentrations of 4 mmol / L, 6 mmol / L, 8 mmol / L, 10 mmol / L, 12 mmol / L, and 14 mmol / L.

Table 1.Criteria for classification of the study variables.

Variable	Criterion	Classification
Nutritional Status (BMI-for-Age)	Z-Score <-3 SD	Underweight
	Z-Score <-2 SD to 1 SD	Healthy weight
	Z-Score >1 SD to 2 SD	Overweight
	Z-Score >2 SD	Obesity
Family history of hypertension		Nothing
		Father or mother
		Father and mother

STT	4 mmol/L – 6 mmol/L	Low
	8 mmol/L – 10 mmol/L	Medium
	12 mmol/L – 14 mmol/L	High

2.3 Statistical analysis

Data were analyzed using SPSS version 20. Bivariate analysis was conducted to determine the relationship between independent variables and dependent variables, namely the relationship of nutritional status and family hypertension history with the threshold of salt taste in adolescents. The statistical test used was Spearman.

3. RESULT AND DISCUSSION

3.1 Characteristics of Respondents

Table 2. General characteristics of the respondents ($n = 100$).

Variables	Value n (%)
Gender	
- Male	42
- Female	58
Age (years)	
- 15	6
- 16	59
- 17	35
BMI-for-Age	
- Underweight	3
- Healthy weight	77
- Overweight	19
- Obesity	1

The respondents in Table 2 indicated the highest age category 16 years was 59%. The biggest BMI displayed by respondents with Healthy weight category, were 77%. For the obesity displayed the lower, was 1%.

3.2 Comparisons of nutritional status and family history of hypertension among adolescents with salt taste threshold.

Table 3. Comparisons of nutritional status and family history of hypertension among adolescents with salt taste threshold.

	STT			p*	Correlation Coefficient
	Low	Medium	High		
Family history of hypertension					
- Nothing	8	31	36	0,485	0,071
- Father or mother	2	8	13		
- Father and mother	0	1	1		
Nutritional Status (BMI/age)					
- Underweight	1	0	2	0,088	0,172
- Healthy weight	9	33	35		
- Overweight	0	6	13		
- Obesity	0	1	0		

BMI, body mass index; STT, salt taste threshold.

* Spearman Correlation.

In Table 3 it can be seen that adolescents who live in non-coastal areas tend to have a high threshold of salt taste. Based on bivariate analysis, it was found that there was no significant relationship between family hypertension history and the threshold of salt taste ($p = 0.486$). However, the number of correlation coefficients shows that there is a positive relationship between family hypertension history and salt taste threshold in adolescents. Adolescents with a history of family hypertension showed a high threshold value of salt taste compared to adolescents who did not have a family history of hypertension. A history of family hypertension is strongly associated with a decrease in salt taste sensitivity [8]. According to Takeshima[9] families tend to share lifestyles, especially in terms of salt intake. The more often a person consumes food with a salty taste, the higher the threshold [14].

The results of bivariate analysis between nutritional status and salt taste threshold did not show a significant relationship ($p = 0.088$). Correlation Coefficient value of 0.172 indicates the strength and direction of the relationship between two positive variables. Adolescents with overweight and obese nutritional status showed a high threshold value of salt taste compared to adolescents with normal nutritional status. Subjects who are overweight and obese tend to have taste sensitivity disorders that have an impact on the increased desire to consume food, thus leading to excessive energy intake [15]. In obese adults it is also known to consume excess energy from foods that are classified as having salty taste and high in fat [16]. This shows that salt sensitivity can affect eating behavior and simultaneously affect one's BMI.

4. CONCLUSION

There was no significant relationship between nutritional status and family history of hypertension with salt taste threshold in adolescents, but the value of correlation coefficient showed a positive direction. Adolescents with a history of family hypertension showed a high threshold value of salt taste compared to adolescents who did not have a family history of hypertension. Furthermore, adolescents with overweight and obesity status indicated to have high salt taste thresholds.

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