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Original Article

The Association Between Preference and Consumption of Vegetables and Fruits on Health and Non-Health University Students in Yogyakarta, Indonesia

Hubungan Antara Preferensi dan Konsumsi Sayur dan Buah Pada Mahasiswa Jurusan Kesehatan dan Non-Kesehatan di Yogyakarta, Indonesia

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Abstract: *Fiber content in vegetables and fruits have benefits to prevent various diseases. Lack of consumption of vegetables and fruit can be influenced by various factors, such as preference factors. The difference of preference among students may impact their consumption status. The aim of this study was to identify the association of preferences with consumption of vegetables and fruits among health and non-health students.: This was a cross-sectional study with 272 subjects and the data was taken by systematic random sampling. Data were collected using the online FFQ questionnaire which was conducted during November-December 2020 in Alma Ata University Yogyakarta. Data were analyzed using the Chi-Square test using SPSS v.23. This study showed that there was no difference between vegetable and fruit preferences among students (p>0.05). There were differences in the type of vegetable consumption (p = 0.049), and there is no difference in the type and frequency of fruit and vegetable consumption among health and non-health students (p>0.05). This study concluded that there was no difference in preference, type of fruit consumption, the frequency of vegetables and fruit consumption among health and non-health students. However, there were differences in the types of vegetables consumptions among health and non-health students. These findings suggested that the habit of consuming vegetables and fruits need to be improved as part of their lifestyle.*

Key word: Preference, Consumption, Vegetables, Fruits, Students

1. INTRODUCTION

Vegetables and fruits constitute a category of sustenance rich in essential micronutrients crucial for bodily metabolism, providing vital nourishment necessary to fulfill the body's requirements for fiber, vitamins, minerals, and several beneficial enzymes that aid in digestive function, cardiovascular health, and the prevention of Diabetes Mellitus (1–3). The results of the survey found that the consumption of vegetables and fruits in the Indonesian population is still low (4,5). Basic Health (Riskesdas) Survey 2018 showed that 95.4% of Indonesians consume less vegetables and fruit (<5 servings per day in a week) at the age of ≥5 years. The proportion of less vegetable and fruit consumption for Yogyakarta Special Region (DIY) is 90.8% (6).

Factors that influence the low consumption of vegetables and fruits in adolescents include the late introduction of fruit and vegetables by parents in childhood, the inability of parents to set an example of good fruit and fruit consumptions, the low socio-economic status of the family and the limited availability of vegetable and fruit at home (7). Behavior consumption of fruit and vegetables in adolescents can also be influenced by several factors such as age, gender, preference for vegetables and fruit, cultural background, pocket money, availability of vegetable and fruit in the home as well as influence of parents and peers (8,9).

The cause of low consumption of vegetables and fruits in students is due to knowledge, attitudes and actions. A person who has a good level of nutritional knowledge is expected to have a good and correct pattern of consumption so that he can choose food that is of high nutritional value and adequate to his body's needs (5,10). Health students are students who have acquired nutritional knowledge from the school bench and little doubt have learned the benefits of vegetables and fruits. While non-health students do not get knowledge about nutrition from the college bench, but it does not mean they do not have knowledge about vegetable and fruit, because they could get the information through social media and other sources (11). This knowledge can influence their attitudes and actions in the consumption of vegetables and fruits (12).

In a study conducted by Ulfah (2014) on Universitas Indonesia (UI) placed in Depok hostel students, the majority of students, 84.1% do not have the habit of eating vegetables and fruits every day (13). Nenobanu (2018) explains that in 20 UKSW University hostels students found that 53% of students consumed less vegetables and fruits in accordance with the recommendations of Balanced Nutrition, which is less than 3-5 servings per day. (14). There are several determining factors associated with the consumption of vegetables and fruits in adolescents: age, gender, socio-economic, preference, and food availability (15). Therefore, high consumption of vegetables and fruits should be given particular attention to both health students and non-health students as it can prevent the risk of non-communicable diseases such as overweight and obesity (16,17). This study aims to find out the relationship between vegetable and fruit preferences and fruit consumption in Health and Non-Health Students of the University of Alma Ata Yogyakarta where studies on the relationship of fruit and vegetable preferences with vegetable and fruit intake in health and non-health students have never been done.

2. METHODS

This is an observational study with a cross-sectional design. This research was conducted during November and December 2020 at Alma Ata University utilizing an online survey with a Google form among Health and Non-Health University Students. The data was gathered online since the circumstances surrounding the Covid-19 pandemic made it difficult to meet and conduct interviews in person.

The overall number of students enrolled in the study is 320, but 40 dropped out due to a lack of commitment, leaving a total of 272 students (136 health students and 136 non-health students). The study used systematic random selection from a total of 2.849 active health and non-health students in 2020. **Figure 1** displays a diagram of the sampling process for the research subject.

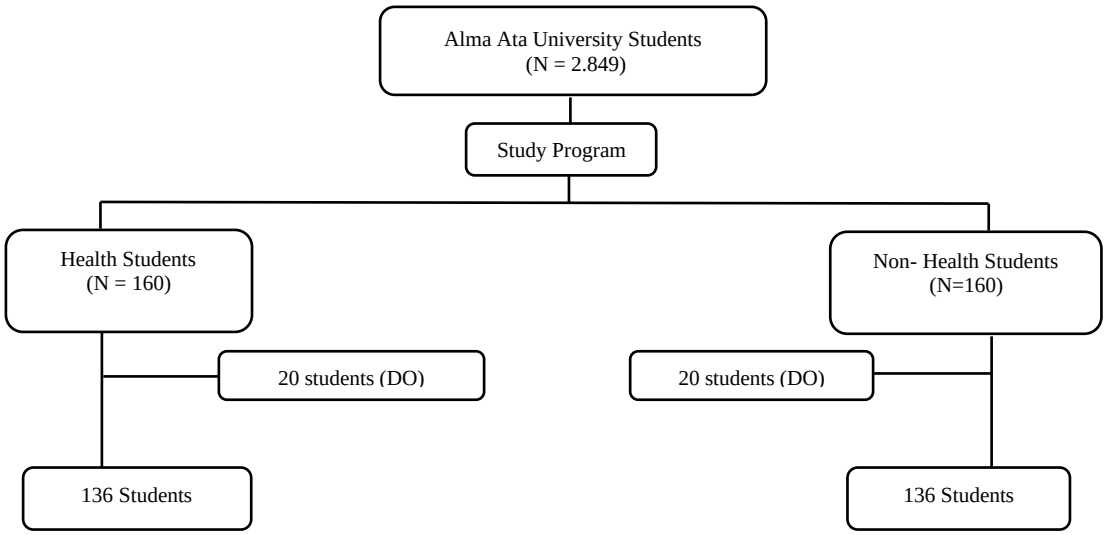

Figure 1. Recruitment Process of Research Subjects

Characteristic data of the subjects taken included personal identity such as name, gender, age, address, major, cell phone number, and domicile. The variable of vegetable and fruit preference is defined as a judgment of the subject's preference for vegetables and fruits (16). This data was obtained from a structured questionnaire on vegetable and fruit preferences adopted from the previous study which consisted of 57 questions 34 consisting of vegetable types and 23 types of fruits, with five options of answers namely (very disliked, dislikes, neutral, like, very like). If the respondent answers a question that does not like, then he gets a score of 0, whereas for the respondents who answer the question that likes, he gets the score of 1. If the total score is obtained <60% is categorized as less and if the total scores are ≥60% are categorised as good. Types and frequencies of vegetables and fruits obtained using the Food Frequency Questionnaires (FFQ) (17). Subjects were asked for vegetable and fruit consumption data in the last week. There are 34 types of vegetables and 23 types of fruit and added types of fruits and vegetables that are not listed in the list (18). Consumption status vegetables are categorized as less (<13 types/week) and good (≥13 kind/week), while for fruit categories are less (<7 kind/ week) and good (≥7 type/week). All subjects fill in the informed consent sheet prior to the data collection process. The subject's confidential is kept and this research proposal has been approved by the Alma Ata University Ethics Committee (KE/AA/XII/10329/EC/2020).

The classification of the status categories of the types and frequencies of consumption of vegetables and fruits is based on the median values obtained from the total quantity of how many types and the frequency of consume of fruits and vegetables. Univariate analysis is used to find out the frequency distribution of each variable studied. Bivariate analysis is also used to see the relationship between free variables, i.e. vegetable and fruit preferences, with bound variables such as vegetables and fruit consumption, and the test used is a chi-square test with SPSS.

3. RESULTS

Data Characteristics

The frequency distribution of subject characteristics can be seen in Table 1 where there were 272 research subjects with characteristics aged 17-19 years as many as 68 people

(25.0%), and at the age of 20-22 years as many as 204 people (75.0%). In terms of gender, there were more males, namely 158 people (58.1%), than female subjects, namely 114 people (41.9%). Then, in terms of residence, the majority lived with their parents, 118 people (69.1%), compared to living in a boarding house, namely 84 people (30.9%). For the groups, namely 136 health students (50%) and 136 non-health students (50%). There were 251 people (92.3%) who didn't like vegetables, and 21 people (7.7%) liked them. Meanwhile, 193 people (71.0%) don't like fruit preferences, and 79 people (29.0%) like it. Then for the type of vegetable consumption, it can be seen that 114 people (41.9%) are poor and 158 people (58.1%) are good, but it can be seen that 134 people (49.3%) are poor and 138 people are good. (50.7). Meanwhile, the frequency of vegetable consumption which was stated to be insufficient was 132 people (48.5%), and which was good was 140 people (51.8%) and for the frequency of fruit consumption which was declared insufficient was 133 people (48.9%) and which was good was 139 people (51.1%).

Table 1. Characteristic of Subjects

Variables	Total	
	n	%
Age		
a. 17-19 years old	68	25.0
b. 20-22 years old	204	75.0
Jenis kelamin		
a. Men	158	58.1
b. Women	114	41.9
Living with parents		
a. Yes	118	69.1
b. **No**	84	30.9
Groups		
a. Health Students	136	50
b. Non-Heath Student	136	50
Vegetables preference status		
a. Less likely	251	92.3
b. Like	21	7.7
Fruits preferences status		
a. Less likely	193	71.0
b. Like	79	29.0
Type of vegetables consumption		
a. Less	114	41.9
b. Good	158	58.1
Type of fruit consumption		
a. Less	134	49.3
b. Good	138	50.7
Vegetables consumption frequency		
a. Less	132	48.5
b. Good	140	51.8
Fruits consumption frequency		
a. Less	133	48.9
b. Good	139	51.1

Relationship Between Vegetable and Fruit Preferences in Health and Non-Health Students

Table 2 shows that there is no relationship between health students and non-health students with regard to vegetable preferences (p=0.821). Moreover, there has been no relation between health student and non -health student with respect to fruit preference (p =0.143). Both kinds of students, whether health students or not, have something in common that they do not like vegetables and fruits.

Tabel 2. Relationship of Vegetable with Fruit Preferences in Health and Non-Health Students

Variables	Student Group				*p-value*
	Health Student		Non-Health Student		
	n	%	n	%	
Vegetables Preferences					
a. Like	11	4.1	10	3.7	0.820
b. Less Likely	125	45.9	126	46.3	
Fruit Preferences					
a. Like	34	12.5	45	16.5	0.142
b. Less Likely	102	37.5	91	33.5	

Relationship Between Types and Frequencies of Consumption of Fruits and Vegetables in Health and Non-Health Students

Table 3 shows the relationship between the types of vegetable and fruit consumption among health and non-health students (p=0.049). Seeing from the results of the vegetable types it is obtained that the consumptions of vegetables that have a good intake is in non-hygiene students, because even though they are not from the major of health it cannot determine that they are bad in eating vegetables and fruit. Non-healthier students could get information through social media knowledge at the time of the school bench. As for the type of fruit consumption, there is no relationship between health students and non-health students (p=0.090).

Tabel 3. Relationship Between Types and Frequencies of Consumption of Fruits and Vegetables in Health and Non-Health Students

Variabel	Kelompok				*p-value*
	Kesehatan		Non-kesehatan		
	n	%	n	%	
Type of vegetables consumption					
a. Good	71	26.1	87	32	0.049
b. less	65	23.9	49	18	
Type of fruit consumption					
a. Good	62	22.8	76	27.9	0.090
b. less	74	27.2	60	22.1	
Vegetables consumption frequency					
a. Good	69	25.4	71	26.1	0.808
b. less	67	24.6	65	23.9	
Fruits consumption frequency					
a. Good	68	25	71	26.1	0.716
b. less	68	25	65	23.9	

4. DISCUSSION

Relationship Between Vegetable and Fruit Preferences in Health and Non-Health Students

This study showed that vegetable preferences in both health and non-health students have a p-value of 0.820 and fruit preference in health and not-heath students have p-values of 0.142, which suggests that p>0.05 indicates that there is no relationship between vegetable and fruit priorities in health students and non -health. It is in line with Nadya, Itsal Muna (2019) research that there is no significant relationship between vegetable and fruit preferences in adolescents with a p=0.051 value (19). This result also in line with Soraya's research that shows that there is no meaningful relationship between preferences in adolescents (p=0.432) (20). The research by Bella et al., also mentions that there is no significant relationship between food preferences in adolescents (p=0.552) (21).

Preference isn't the only thing that drives the consumption of vegetables and fruits, but there are factors like taste, texture, appearance. (21). Availability factors can be said that if the availability of fruits and vegetables is low, then the patterns of consumption of vegetables and fruits will not differ so preferences do not affect. (22). The most popular vegetables for students are potatoes 71%, carrots 68%, mushrooms 64.8%, spinach 64%, and kangaroo 63%. The most unfavoured vegetables are leaves of talas 86%, shrimp 83%, melinjo leaves 77%, ginger 73.90%, and oyong 71%. According to Figure 5. The most preferred fruits are mangoes 84%, wine 74%, apples 71%, pears 70%, and oranges 70%. While the most disliked fruits are bleweh 62.5%, dondong 56%, belimbing 53%, salak 46%, and papaya 46%. So that's what makes this student consume it a lot.

Vegetables and Fruit Consumption Status on Health and Non-Health Students

It is known that the type of vegetable consumption in health students and non-health students has a p-value of 0.049 which indicates that there is a difference in the kind of vegetables intake in health and not health students (12). There is a difference in the type of vegetable consumption among health students and non-health students due to receptivity. On the type of vegetables have different taste, aroma, texture. Research conducted by Dwi, Panddrya Dhaneswara (2017) mentions that students mention that they do not like vegetables because of its less attractive presentation so students do not want to consume vegetables (23).

Looking at the vegetable consumption results, it was found that non-health students had a good vegetable intake, compared to health students. This is because of knowledge. In health students who are known to have good knowledge, not necessarily apply a good eating attitude of vegetables and fruits anyway. In contrast to non-health students who do not have good nutritional knowledge, rather can consume a good kind of vegetable, because they can get a lot of information about nutrition in the mass media, so can apply it to the behavior of eating vegetables on a daily basis (12,24).

According to Hermina (2016) stated that changes in consumption patterns have led to a shortage of vegetables and fruits in almost all provinces in Indonesia because at the moment people prefer to consume ready-made and practical foods (25). A study by Nenobanu et al (2019) found that the more teenagers consume fast food, the less they consume vegetables and fruits. Based on the observations carried out by the study, there are no canteens around the hostel that sell fruits and vegetables, but there are very many five-foot vendors on the street who sell fast foods and drinks such as gorengan, fried potatoes, boba, fries, etc. that are easily accessible by students (26). The results of this study are also in line with Bella et al., (2017), which found that there is a significant relationship between the consumption of vegetables and fruits in secondary

school students in Denpasar with p-value ($p<0.05$). Consumption behavior of vegetables and fruits is influenced by attitudes, nutritional knowledge, availability, media exposure, and parents' income (21).

Relationship Between types and frequencies of vegetables and fruits in health and non-health students

The frequency of fruit consumption in both health and non-health students has a p-value of 0.090, which indicates that there is no difference between the type of fruit intake in health students and non -health. This result is also in line with the research carried out by Novita, Rizki Padila (2020), which states that there is no relationship between nutrition knowledge and consumption of vegetables and fruits in nutrition students who mention that when a person has good knowledge then the person will be positive about anything and will influence on the decision or action in consuming fruits and vegetables, or also mostly also based on the intention of a person to consume vegetable and fruit if there is intention then that person will try to optimize to realize action for consuming fruit and vegetable. (27).

On the type of consumption of fruit, it was found that there was no difference between the use of health students and non-health students because adolescents preferred fruit rather than vegetables because the presentation was not complicated because they did not have to cook (22). Between health and non-health students also had a good frequency of consumption of vegetables and fruits. Seeing from table 5, it was found that the average non-hygiene students had good type of fruit intake, frequencies of vegetable and fruit intakes, compared to health students. It shows that knowledge of good nutrition does not necessarily produce a good effect in eating vegetables and fruits. Therefore, a student who has good knowledge does not need to understand or apply it properly (28).

There is no difference in the type of fruit intake as well as the frequency of vegetable and fruit intakes between health and non-health students can also be caused by residence factors. As seen from the respondent's characteristic distribution table, that 69.1% of the students now live with their parents. According to a study conducted by Helda, Dwi Mardiana et al. (2017), fruit and vegetables consumption in adolescents is influenced by several factors, namely the availability of vegetables and fruits at home and the socio-economic. Because parents become the most important figure in promoting the integrity of food in the house, especially vegetables and fruits, so that the consumption of fruits and vegetables is sufficient during the home. Consumption of vegetables and fruits is also affected by socio-economic factors. Because socio-economic is the determinant of the quality and quantity of food consumed. The higher the income, the greater the chance of choosing good food. The level of income also reflects a person's ability to buy good food in good quantity and quality (29). At home, the need for vegetables and fruits will be met. It's different from a student who lives in a house, who has to prepare his own food and have to buy it first. This will make students lazy to eat vegetables and fruits, and prefer fast food. From the statistical tests carried out on this study, it can be concluded that health and non-health students are already quite aware of the importance of eating vegetables and fruits (24). Therefore, it is expected that the campus will provide fruit and vegetables at an affordable price, and it is anticipated that information on the importance of vegetable and fruit consumption and the impact that will arise if not consumed vegetables and fruits will be disseminated, and is expected to provide information both through posters and information on social media, so that students have easier access to such information.

Limitation of the study

The limitation of the study is that the study was not conducted directly, so the researchers do not know whether the subjects actually filled in and understood the questionnaire. In order to prevent this from happening, researchers explain the methods and the contents of the questionnaire in a group chat with the subjects. So when there is something less clear and there are questions to be asked to the researcher, directly in the group chat and directly answered by the researchers. Then the limitation in online data collection is that the subjects are difficult to contact, so unwanted things like researchers' numbers are blocked by the subject and the chats are not answered. When the chat is unanswered, the researchers continue to contact the subject, and ask for his readiness in filling out the survey questionnaire. If the subject does not respond, then the researcher performs a random re-routing to replace the subject.

5. CONCLUSION

Overall, this research found that there were differences between the types of vegetable consumption among Health and Non-Health Students at Alma Ata University, Yogyakarta. However, there is no difference in the type of fruit consumption, frequency of vegetable and fruit consumption among Health and Non-Health Students at Alma Ata University, Yogyakarta. The types of vegetables that students like most are potatoes, carrots and mushrooms, while the types of vegetables that students don't like are taro leaves, kenikir and melinjo leaves. The types of fruit that students like most are mango, grapes and apples, while the types of fruit that students don't like the most are cantaloupe, ambarella and star fruit. The average frequency of consumption of vegetables and fruit among health and non-health students is good.

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in this study.

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