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THE RELATIONSHIP BETWEEN SIMPLE SUGAR INTAKE AND THE ABDOMINAL CIRCUMFERENCE OF PSSK STUDENTS

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ABSTRACT

The abdominal circumference is dependent upon various factors, one of it is the simple sugar intake. Hence, research has been conducted in order to determine the effects of simple sugar intake on the abdominal circumference because there is an increase in people who have a large abdominal circumference in the past years, mainly due to increase in simple sugar intake. The research was conducted using a descriptive design with a cross-sectional analytical research method amongst the Medical Students of Udayana University by providing questionnaires. For the majority of the students, the simple sugar intake appears to be in the mid-range. There are 15 students, whose intake is more than the mid-range and 14 student whose intake below the mid-range. For majority of students, the abdominal circumference appears to be around the mid-range, 65.8cm to 92.8cm. There are 8 students whose abdominal circumference is more than the mid-range and another 8 students whose abdominal circumference is below the mid-range. The Pearson chi-square test value is 25.772 with an asymptotic significance 2 tailed (often referred to as "p", short for probability) value of 0.018. Since this p-value is below 0.05, it means there is a significant or valid relationship between the two variables as expected.In conclusion, there is a significant relationship and moderate correlation between the intake of simple sugars and abdominal circumference amongst the PSSK UNUD students.

Keywords : Simple Sugar Intake., Abdominal Circumference., PSSK UNUD Students

INTRODUCING

Simple sugars, also known as simple carbohydrates, are the most basic form of carbohydrates. They are quickly digested by the body and only contain around one to two sugar molecules, which are known as saccharides. Besides, they are added into processed food in order to provide enhancement for the flavoring, texture, and the shelf-life.[1]

Sugar is the building blocks of carbohydrates and found naturally in many kinds of food such as vegetables, milk, grain, and fruit. It is natural and nontoxic, sweet tasting, and provides 4K calories for every 1 gram of sugar. Sugar has a primary function, which is to provide energy and sweetness. Besides that, sugar also has a role in preservation, fermentation, texture, and color.

According to 2014 Total Diet Study, there is an estimation that 11.8% of the population of Indonesia consumes more than 50g of sugar each day. The amount is more than the normal intake of sugar as per recommendations by WHO, which is below 50g a day. Based on nationwide surveys, the common sources of sugar are table sugar, sweetened condensed milk and syrup. Besides, other types of studies suggested that there is a shift in local diet towards inclusion of more processed foods which contain additional sugars which contribute to an increase in the intake of energy.[2]

The abdominal circumference can be determined by multiple factors. One of the factors influencing abdominal circumference is the intake of sugar. Hence, the amount of simple sugar intake has an effect on the abdominal circumference of a person. Likewise, the higher the amount of sugar a person consumes, the bigger the abdominal circumference of a person will be. This is due to the excessive amount of sugar inflaming the fat cells which then causes them to release chemicals which then increases the abdominal circumference.[3] Based on World Health Organization (WHO), the number of adults in Indonesia who have large abdominal circumference has doubled in the previous two decades. This is due to a shift to processed food products which are often higher in sugar from initial traditional diets since there is easier accessibility to processed food. Hence, the easier access and reasonable prices of unhealthy food leads to increase in abdominal circumference.[4]

In many parts of the world, there is an increasing prevalence in people with high abdominal circumference (. This is because of lifestyle and the diet which leads towards excessive consumption of simple sugars. People with large abdominal circumference are increasing in Indonesia. According to the estimates from the 2018 National Basic Health Research survey, one in five adults, one in seven adolescents aged 13-18, and one in five children aged 5-12 has a large abdominal circumference. This is due to the increased accessibility and affordability of unhealthy foods which contain high levels of fats, sugars and salt. Besides, according to UNICEF, COVID-19 pandemic did contribute to the increasing prevalence of large abdominal circumference amongst people in Indonesia since there were restrictions amended which made it harder for people to find accessibility to healthy foods and remain physically active.[5]

This study is aimed to investigate correlation between sugar intake and abdominal circumference among Medical Students at Udayana University.

LITERATURE REVIEW

Simple Sugar

Simple sugars, also known as simple carbohydrates, can be found in various sources of natural food including fruit, vegetables, and milk. Besides, they contain the ability to provide food a sweet taste. Besides, they can raise the level of glucose in blood rapidly.. Simple sugars are formed by shorter chains of molecules and are quicker to be digested. Besides, they can be available in healthy foods and also in foods consisting of low nutritional value.[6–8]

Simple sugars are the most basic form of macronutrient which is referred to as carbohydrates and are a readily available source of energy. On a molecular level, the commonly used sugars are the same simple sugars which naturally occur in foods. However, dietitians do warn against consuming simple sugars in huge amounts.[6–8]

Abdominal Circumference Anthropometry

Abdominal circumference is a simple, precise, and accurate measurement used to determine abdominal obesity or excess visceral fat. The normal abdominal circumference is less than 102 cm for males and less than 88 cm for females. More so, abdominal circumference assesses the abdominal obesity which predicts obesity and any health-related risk.[9]

Based on national books, the measurement of abdominal circumference is addressed as distinct measures. The most accurate measurement for the abdominal circumference has been proposed as taken on the umbilical scar.[10]

Correlation Between Simple Sugar Intake And Abdominal Circumference

The glycemic index measures how much a specific food is able to spike the levels of blood sugar. Simple sugars contain a high glycemic index, which include spikes of blood sugar. The rapid increase in the levels of blood glucose triggers a strong insulin response which will inhibit the mobilization of nutrients. It equates to increase in uptake of glucose and storage of glycogen. The excessive glycogen unfortunately becomes converted into fat, which then leads to increase in abdominal circumference.[2]

Satiety tends to be a potential mechanism which is related to high glycemic index and increase in abdominal circumference. A simple sugar with low glycemic index will delay hunger and reduce the subsequent food intake. Contrary, simple sugars with high glycemic index go through fast digestion. Hence, it doesn't keep a person satiated and triggers hunger. These cravings lead to excessive eating and frequent snacking, which then becomes a factor in developing a high abdominal circumference.[2]

Besides, studies have shown that the quality of simple sugars instead of quantity influences whether or not a person will gain weight and become obese. Hence, if a person has a tendency of gaining weight, then he or she should refrain from consuming foods such as white bread, pasta, chips, foods which are processed, cakes, and cookies. This is due to the high glycemic index in those foods which will lead to sudden increase in level of sugars in blood. Hence, the increase blood sugar will build up as fat if it is not utilized by the body.[11]

METHOD

As far as we are all aware, the amount of simple sugar consumed by a person has an effect on the abdominal circumference of that person. The larger the amounts of simple sugars consumed, the larger the abdominal circumference. This occurs due to an increase in the amount of sugar inflaming the fat cells which then release chemicals called obesogens to increase the abdominal circumference of a person. Besides, the amounts of simple sugars can vary in different kinds of foods.

Despite people knowing the fact that the abdominal circumference of a person can be affected by the amounts of simple sugars consumed, yet they tend to disregard the fact and continue to consume high levels of simple sugars on a daily basis by having an unhealthy and an unbalanced diet. If this habit continues, then there will be an increase in people with high abdominal circumference in the community.

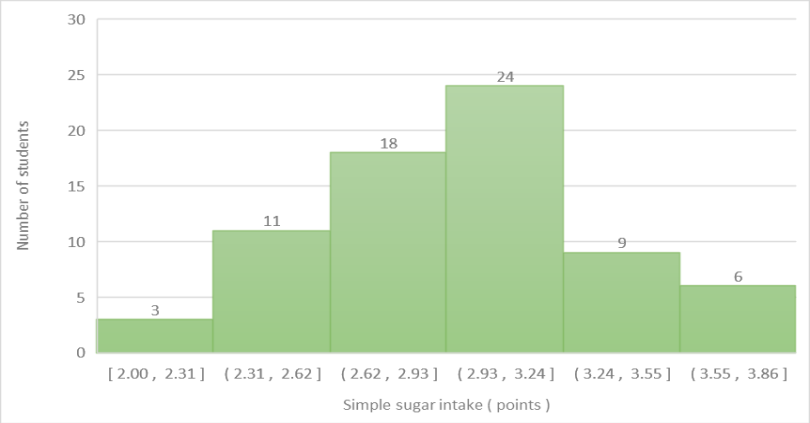
The type of research design which will be used in this study will be descriptive design with cross-sectional analytical research method. The reason for this method to be chosen for this study is because it provides benefits which make it easier for this study to be conducted. Besides, this method is also reasonable and will be able to provide information about the relationship between the amounts of simple sugars consumed and the abdominal circumference of the PSSK FK UNUD students. The research will be conducted at the Medical Faculty of Udayana University which is located at Jalan P. B. Sudirman, Dangin Puri Klod, sub-district of West Denpasar, Denpasar City, Bali. 80232, from May till October 2023The target population in this study will be the medical students . The affordable population in this study will be the medical students who study at the Medical Faculty of Udayana University from May till August 2023 at the Medical Faculty of Udayana University which is located at Jalan P. B. Sudirman. Purposive samling technique was used in this selection process.In this study, the researcher will use primary data which will be grouped by the researcher from the respondents. After complete grouping the inclusion and exclusion criteria, the inclusion criteria respondents will be requested to be prepared to participate in this study. The data tabulation stage is carried out by recording the data in rows and columns and grouped according to the variables. The data is then used to facilitate the statistical analysis process with Univariate analyst and Bivariate Analysis.

RESULT

Data Analysis Of Simple Sugar Intake Of PSSK Students

In this section, the raw data collected from the 15 questions related to the independent variable, simple sugar intake, was scored and given points within the range of zero to five. Zero being the lowest score which reflects minimum intake and five being the highest score which reflects highest intake. The univariate analysis of this variable shows that the intake varies amongst the students as can be seen in the following histogram. For the majority of the students, the simple sugar intake appears to be in the mid-range. There are 15 students, whose intake is more than the mid-range and 14 student whose intake below the mid-range.

Figure 1. Histogram on the Distribution of Simple Sugar Intake



Data Analysis Of Abdominal Circumference Of PSSK Students

In this study, the dependent variable is the abdominal circumference. The frequency distribution of abdominal circumference can be seen the following histogram. For the majority of the students, the abdominal circumference appears to be in the mid-range, 65.8 cm to 92.5 cm. There are 8 students, whose abdominal circumference is more than the mid-range and another 8 students whose abdominal circumference is below the mid-range.

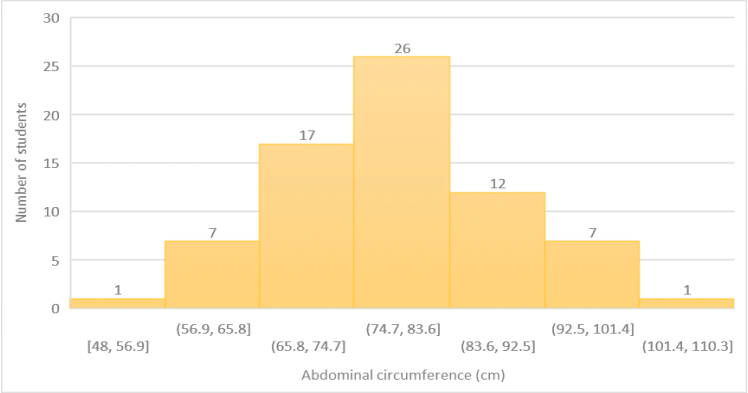


Figure 2. Histogram on the Distribution of Abdominal Circumference

Statistical Test To Evaluate The Relationship Between Simple Sugar Intake And The Abdominal Circumference

In order to achieve the purpose of this study, statistical analysis using Chi-Square tests is applied to the quantitative data of the independent and dependent variables.

The first type of chi-square test is the Pearsons's Chi-Square test, this statistical test is commonly used and is applicable to compare the variables in this study. It is to evaluate the relationship between the two variables and to determine if the results obtained is due to chance or if its due to a valid relationship between the independent and the dependent variable. The second statistical test, linear-by-linear association test, is to evaluate the strength of the association between the two variables. Result of the chi-square statistical tests is presented in Table 1

Table 1. Results of Chi-Squared statistical test

Deskription	Value	df	Sig
Pearson Chi-Square	25.772[a]	1254	.018
Likelihood Ratio	10.648	1254	1.000
Linear-by-Linear Association	6.779	1	.018
N of Valid Cases	71		

The Pearson chi-square test value is 25.772 with an asymptotic significance 2 tailed (often referred to as "p", short for probability) value of 0.018. Since this p-value is below 0.05, it means there is a significant or valid relationship between the two variables as expected. The p-value confirms that there is a correlation between simple sugar intake and abdominal circumference and that the relationship is not due to chance or error.

The linear-by-linear association value is 6.779 with a p-value of 0.018, which confirms that the linear-by-linear association is significant. This means there is a strong association between the two variables

DISCUSSION

Generally, people are aware that the intake of simple sugars has an effect on the abdominal circumference. Hence, the expectation of this study is that there is a relationship between these two variables. To confirm if this is true amongst the PSSK UNUD students, this study was set up and the data collected was analyzed. Chi-square statistical tests were used for analysis and the tests provided valuable inferences.

Firstly, the p-value of 0.018 of the Pearson Chi-Square test confirms that there is a significant and valid relationship between the simple sugar intake and the abdominal circumference. Next, the p-value of the linear-by-linear association also indicates that the two variables have a direct connection. So, there is a significant relationship between two variables and that two variables are connected and have a high likelihood of increase in one variable when the other is increased. These results confirms that there is a relationship between the two variables.

The results of this study confirmed and provided statistical values, that there is a significant relationship and association between simple sugar intake and the abdominal circumference. The findings in this study is as expected. Simple sugars are found in fruits, milk products, processed sugars and foods high in sugars such as cookies, cakes, chocolates. Food with simple sugar is digested fast and is suitable as a quick source of energy. These foods have high glycemic index, which means it can rapidly increase the levels of sugar in the blood. Food with high glycemic index go through fast digestion, however it does not keep a patient satiated and triggers hunger. These cravings can lead to excessive eating and frequent snacking. Upon consumption of simple sugars, if and when the increase of sugar in the blood is not utilized by the body, then most of the glucose is converted into glycogen for storage, the excess glycogen gets converted to fat, and often leads to fat stored at the abdominal area causing increase in abdominal circumference.[12]

On the other hand, complex carbohydrates have a low glycemic index, such as vegetables, Basmati rice, grainy bread and brown rice. These foods take longer to digest and helps delay hunger and reduce subsequent food intake, as it keeps a person satiated.[13,14]

I hope the evidence from this study will help the PSSK UNUD students and on a broader scale, the community to understand more about the various types of carbohydrates and the harmful effects of high intake of simple sugars and to positively influence the diet consumed in their everyday life. The quality of carbohydrates consumed does influence the weight of people and the abdominal circumference. Hence, if a person has a tendency to gain weight, then he or she should refrain him or herself from consuming foods such as white bread, chips, foods which are processed, cakes, cookies or other foods that are high content of sugar. If consumption of these foods which area simple sugar continues to rise, the prevalence of obesity will increase.[15]

There are already studies that show that the number of adults in Indonesia who are overweight has doubled in the previous two decades. This is partly due to a shift to processed foods which often are higher in sugars compared to traditional diets.[4] There are also other factors that affect the abdominal circumference such as genetics, age, sex, diseases and physical activity. These factors are not investigated in this study

CONCLUSION AND RECOMENDATION

The study concludes that there is a significant relationship and association between simple sugar intake and abdominal circumference amongst the PSSK UNUD students. The results can also be generalized to the wider population. The results further complement existing data and supports the general awareness on the association between sugars and body weight and obesity.

Based on the outcome of this study, some useful recommendations are:

For PSSK UNUD Students, It would be most beneficial to follow the WHO recommendation of sugar intake to below 50 grams a day. This will reduce the likelihood of an increase in abdominal circumference and therefore, will reduce the risk of developing diabetes and cardiovascular disease.

For future research, To have a larger study sample size of respondents to $N \geq 100$. A larger sample size more closely approximates the population and will provide more data for analysis. With more data, a different statistical tool, FFQ-semiquantitative method can be used for the statistical analysis. This will increase the precision of results

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