

# Hubungan tingkat asupan sukrosa dalam *sugar-sweetened beverage* dengan *overweight* dan *hyperglycemia* pada mahasiswa Prodi Gizi UNESA

## *The relationship between sucrose intake from sugar-sweetened beverage with overweight and hyperglycemia among Nutrition Science students at UNESA*

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### Abstract

**Background:** In the increasingly advanced era, advertisements for high-sugar foods and beverages are prevalent, which can negatively influence a person's behavior. It has been found that individuals may experience an increase in sugar-sweetened beverage consumption of up to 4,8 grams. The consumption of sugar-sweetened beverages has increased among undergraduate student, among nutrition students at UNESA, data show that approximately 48,46% frequently consume sugar-sweetened beverages more than five times per week. Excessive consumption of sugar-sweetened beverages significantly contributes to the incidence of overweight and hyperglycemia. This study is an extension that examines the sucrose content in sugar-sweetened beverages, building upon previous research that investigated the frequency of beverage consumption without considering their sucrose content.

**Objectives:** To determine the relationship between sucrose intake from sugar-sweetened beverages with overweight and hyperglycemia among Nutrition students at UNESA.

**Methods:** A cross-sectional design was conducted on 95 students selected using stratified purposive sampling. Data on sugar-sweetened beverage consumption were obtained through interviews using the SQ-FFQ. Fasting blood glucose (FBG) levels were measured using a glucometer. Nutritional status data were obtained from Body Mass Index (BMI) through measurements of height and weight. Bivariate data analysis was conducted using the Somers'd test.

**Results:** 88,4% of respondents consumed a moderate amount sucrose intake from sugar-sweetened beverages (1–50 g/day), 76,8% had normal IMT non-overweight (18,5–25 kg/m<sup>2</sup>), and 78,9% had normal fasting blood glucose levels non-hyperglycemia (< 90 mg/dL). There was a significant relationship between sucrose intake from sugar-sweetened beverage with overweight (P-value = 0,021; r = 0,407), but no significant relationship with hyperglycemia (P-value = 0,407) which is classified as a moderate correlation.

**Conclusion:** There is a significant relationship between sucrose intake from sugar-sweetened beverage with overweight, but no significant relationship with hyperglycemia.

### Keywords:

Hyperglycemia, overweight, sucrose intake, sugar-sweetened beverage

### Abstrak

**Latar belakang:** Di era ini iklan makanan dan minuman tinggi gula, secara negatif akan memodulasi perilaku seseorang. Ditemukan fakta bahwa seseorang dapat mengalami peningkatan konsumsi minuman tinggi gula hingga 4,8 gram gula. Peningkatan pembelian minuman berpemanis mengalami peningkatan pada kalangan mahasiswa, termasuk pada mahasiswa gizi UNESA didapatkan data yaitu sekitar 48,46% mahasiswa sering mengonsumsi minuman berpemanis dengan frekuensi lebih dari 5 kali dalam satu minggu. Konsumsi minuman berpemanis berlebih berkontribusi penting terhadap angka kejadian

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overweight dan hiperglikemia. Penelitian ini merupakan pengembangan dan menelaah terkait kandungan sukrosa dalam minuman berpemanis dari penelitian sebelumnya yang meneliti frekuensi konsumsi minuman berpemanis tanpa melihat kandungan sukrosanya.

**Tujuan:** Untuk mengetahui hubungan antara tingkat asupan sukrosa dalam minuman berpemanis dengan overweight dan hiperglikemia pada mahasiswa gizi UNESA.

**Metode:** Desain cross-sectional pada 95 mahasiswa yang dipilih secara stratified proportional purposive sampling. Data konsumsi minuman berpemanis didapat melalui kuesioner SQ-FFQ. Data kadar gula darah puasa didapat dari pengukuran menggunakan alat glucometer. Data status gizi didapat dari perhitungan Indeks Massa Tubuh (IMT) melalui tinggi badan dan berat badan. Analisa data bivariat menggunakan Uji Somers'd.

**Hasil:** 88,4% responden mengonsumsi minuman berpemanis cukup (1-50 g/hari), 76,8% responden memiliki IMT normal non overweight (18,5-25 kg/m<sup>2</sup>), dan 78,9% responden memiliki gula darah puasa normal non hiperglikemia (<90 mg/dL). Terdapat hubungan signifikan antara tingkat asupan sukrosa dalam minuman berpemanis dengan overweight (P value = 0,021; r= 0,407) yang tergolong korelasi sedang, tetapi tidak terdapat hubungan signifikan dengan hiperglikemia P value=0,407).

**Kesimpulan:** Terdapat hubungan signifikan antara tingkat asupan sukrosa dalam minuman berpemanis dengan overweight, tetapi tidak terdapat hubungan dengan hiperglikemia.

#### Kata Kunci:

Hiperglikemia, overweight, asupan sukrosa, minuman berpemanis

## Introduction

Overweight or excess body weight is a global health issue requiring special attention (Lin & Li, 2021). According to data from the *World Health Organization (WHO) 2025*, in 2022 the prevalence of overweight has increased over, with more than 2,5 billion adults suffering from overweight. According to data from the Basic Health Research (Riskesdas) 2023, in Indonesia, 23,4% of adults are overweight (Elsa Sari Saputri & Samsudi, 2024). Overweight is a condition commonly known as excessive body weight, caused by an imbalance between energy intake and energy expenditure (Malik & Hu, 2022). Overweight can be influenced by many factors, one of which is an unhealthy diet. For example, consumption of sugary drinks (Anggraini & Luhur, 2024).

The trend of consuming sugary drinks has gone global and is highly popular among teenagers and young adults in the United States, Australia, and several Asian countries, including Indonesia. In Indonesia, sugary drink consumption ranks third in Southeast Asia, with an average consumption of approximately 20.23 liters per person per year (Ulfah et al., 2022). An increase in the consumption of sweetened beverages has also been observed among undergraduate students (Dafa et al., 2022). Undergraduate students, accounting for 64% of the population aged 17–21, are classified as frequent consumers of high-calorie sweetened beverages (Daelli & Nurwahyuni, 2019). The consumption of sweetened beverages among university students is largely influenced by peers,

who consume them to accompany their studies or to relax (Veronica & Ilmi, 2020).

In this era of rapidly advancing technology, advertisements for fast food and sweetened beverages are prevalent on various social media platforms. This can have a negative impact and indirectly influence a person's behavior toward an increased preference for consuming fast food and sweetened beverages (Lin & Li, 2021). Sweetened beverages are defined as non-alcoholic beverages that contain sugar (Miller et al., 2020). Sugary drinks contain several types of sugar commonly used as sweeteners in sugary drinks, including glucose, fructose, corn syrup, and brown sugar (Rosyida et al., 2019). Sugar content contributes calories to the body. However, sweetened beverages tend not to provide a feeling of fullness despite their high calorie content, leading many people to continue consuming solid foods even after consuming sweetened beverages (Akhriani et al., 2016). Such dietary patterns can have adverse health effects, including weight gain, obesity, increased risk of type 2 diabetes, and heart attacks. Survey results indicate that daily consumption of sweetened beverages increases the risk of weight gain by approximately 8 kg per year (Masri, 2018).

Additionally, frequent consumption of sweetened beverages can cause blood sugar levels to rise and increase the risk of type 2 diabetes (Hanifah et al., 2023). The sugar content in sweetened beverages triggers glucose to be absorbed and converted into energy with the help of insulin. If these beverages are consumed frequently over the long term, they can increase the risk of insulin resistance and lead to uncontrolled blood sugar levels (Katherine et al., 2021).

The categorization of sucrose intake was based on Ministry of Health Regulation No. 30 of 2013, which is 1-50 grams per day or equivalent to 4 tablespoons. A study in Dormitory reported that young adults consuming over 50 grams of added sugar per day exhibited a significantly greater likelihood of having higher body mass index with an odds ratio of 1,810 (Wicaksari et al., 2021).

Previous studies have primarily focused on the frequency of sugar-sweetened beverage consumption without assessing the actual sucrose composition to metabolic outcomes. However, the amount of sucrose consumed may have a more direct physiological impact on body weight regulation and glucose metabolism than consumption frequency alone. Furthermore, limited evidence is available regarding this relationship in young adult population, particularly among undergraduate student. Based on the background described above, this study was conducted to investigate the relationship between sucrose intake from sugar-sweetened beverages with overweight and hyperglycemia among nutrition science students at UNESA.

## Methods

This study is an observational study with a *cross-sectional* design. The cross-sectional design was chosen as it aligns with the objective of this study. Although it does not allow for causal inference, the cross-sectional design remains relevant for identifying correlation and patterns between variables, serving as a foundational step for future research to further explore potential causal relationship. The study was conducted from August to November 2024 with ethical approval from the Health Ethics Committee of the Faculty of Nutrition, Airlangga University, with no. 0785/HRECC.FODM/VII/2024. The study was conducted at the Faculty of Sports Science and Health, Surabaya State University. The study population consisted of nutrition students at UNESA aged 19–23 years. The sample size was calculated using the Slovin formula, resulting in a total of 95 respondents.

$$n = \frac{N}{1 + N(e)^2}$$
$$n = \frac{609}{1 + 609(0,1)^2}$$
$$= 85,9 \rightarrow 86 \text{ respondent}$$

$$n + 10 \%n = 86 + (10\% \times 86)$$
$$= 86 + 8,6$$
$$= 94,6 \rightarrow 95 \text{ respondent}$$

Description :

n : Sample size

N : Population size

e : margin of error (10%)

Sampling was conducted using stratified proportional purposive sampling. The stratified proportional sampling was applied to obtain a representative number of students from each academic year cohort. Then, respondents were selected based on the predetermined inclusion criteria. Respondents were nutrition students who were not currently on a diet, did not engage in regular strenuous physical activity, and had no history of type 2 diabetes melitus. Data on respondents dietary practices and history of type 2 diabetes melitus obtained through interviews, while data on physical activity were collected using IPAQ-SF questionnaire.

Sugar-sweetened beverage consumption was assessed using a *Semi-Quantitative Food Frequency Questionnaire* (SQ-FFQ) over the past month, which had previously been validated with a correlation coefficient (*r*) of 0,67 and reliability value of 0,94. Sugar-sweetened beverage consumption in this study represents the intake of sucrose contained in sugar-sweetened beverages, which can be categorized into three categories: low (<1 g/day), moderate (1–50 g/day), and excess (> 50 g/day). The categorization of sucrose intake was based on Ministry of Health Regulation No. 30 of 2013. Data collection was carried out by the researcher and trained enumerators who had received guidance and instruction beforehand. Hyperglycemia from Fasting blood glucose (FBG) is a measure of blood sugar concentration, measured using a glucometer (*Easy Touch® GCU*) after participants fasted for 10 hours prior to FBG measurement. Fasting instructions will *be reminded* again one day before the study activity. Calibration of the glucometer by the institution or researcher wasn't necessary, as the device contained an internal calibration chip. Nutritional status is determined through the calculation of body mass index (BMI) using anthropometric measurements of height and weight.

Data processing in this study was cooonducted using SPSS version 26. The variables in this study were ordinal, thus non-parametric tests were applied, and normality testing was not performed. Bivariate analysis is used to determine the relationship between two variables using the Somer'd test. The Somers'd test was used to analyze two variables with an ordinal by ordinal data scale, each consisting of three categories, allowing it to

address the issue of TIES (a large number of respondents with the same ranking).

The significance of the correlation was determined using the  $p$ -value and correlation coefficient ( $r$ ). A  $p$ -value  $< 0,05$  indicates a significant relationship, while  $p \geq 0,05$  indicates no significant relationship. The strength of the relationship was classified as very weak (0,00–0,25), moderate (0,26–0,50), strong (0,51–0,75), very strong (0,76–0,99), and perfect (1,00).

## Results

### Respondent Characteristics

**Table 1.** Characteristics of Respondent

Respondent Characteristics		Frequency	
		f	%
Gender	Male	6	6,3
	Female	89	93,7
Age (Years)	19	27	28,4
	20	35	36,8
	21	20	21,1
	22	8	8,4
	23	5	5,3
	Year of Graduation	2020	12
Graduation	2021	12	12
	2022	29	30,5
	2023	42	44,2

The majority of respondents were female, with 89 participants (93,7%). The majority of respondents were aged 19–20 years. The characteristics of the cohort year were obtained by calculating the ratio of the total number of students per cohort year to the total sample required, with the highest number of participants in the 2023 cohort. This can be seen in the following table 1.

**Table 2.** Characteristics of Respondent in Consuming Sugar-Sweetened Beverages

Variable	Frequency	
	f	%
Consumption of Sugar-Sweetened Beverages		
Frequency Category		
Never	1	1
Rarely ( $< 5x/week$ )	26	27,4
Frequent ( $\geq 5$ times/week)	68	71,6
Type of Sweetened Soft Drink		

Carbonated drink	13	13,7
Fruit-flavored beverages	11	11
Fruit juice with sugar	20	21
Sports drink	5	5,3
Flavored Milk	29	30,5
Coffee and tea	16	16,8
Do not consume	1	1,1
Sucrose Intake Level from Sugar-Sweetened Beverages		
Insufficient ( $< 1$ g/day)	1	1,1
Moderate (1–50 g/day)	8	8,4
Excessive ( $> 50$ g/day)	10	10,5

Table 2 presenting data related to the characteristic of respondent in consuming sugar-sweetened beverage. It consist of categories such frequency, sugar intake levels, and types of sugar-sweetened beverage.

**Table 3.** Frequency Category of Fasting Blood Glucose Levels and Nutritional Status

Fasting Blood Glucose Level	Frequency	
	f	%
Normal ( $< 90$ mg/dL)	75	78,9
At risk (90–109 mg/dL)	17	17,9
Hyperglycemia ( $\geq 110$ mg/dL)	3	3,2
Nutritional Status		
Malnutrition ( $< 18,5$ kg/m <sup>2</sup> )	9	9,5
Normal Nutrition (18,5 – 25 kg/m <sup>2</sup> )	73	76,8
Overweight ( $> 25$ kg/m <sup>2</sup> )	13	13,7

Table 3 presents data related to fasting blood sugar levels and nutritional status among respondents. The majority of respondents (78,9%) had fasting blood sugar levels in the normal range (less than 90 mg/dL) non hyperglycemia, and the majority of respondents (76,8%) had normal nutritional status with a BMI of 18,5–25 kg/m<sup>2</sup> non overweight.

### Relationship between Sucrose Intake from Sugar-Sweetened Beverage with Overweight

Table 4. Presenting data related to the relationship between sucrose intake from sugar-sweetened beverages with overweight, it was found that the majority of respondents (70,5%) who consumed sucrose from sugar-sweetened beverages at moderate category had normal nutritional status, with a correlation level of 0,407, which can be interpreted as a moderate correlation level.

**Table 4.** Relationship between Sucrose Intake from Sugar-Sweetened Beverage with Overweight

Sucrose Intake Levels in Sweetened Soft Drinks	Nutritional Status			Total	p-value	r
	Underweight (<18,5 kg/m <sup>2</sup> )	Normal (18,5–25 kg/m <sup>2</sup> )	Overweight (>25 kg/m <sup>2</sup> )			
Low (<1 g/day)	1	0	0	1	0,021*	0,407
Moderate (1–50 g/day)	8	67	9	84		
Excess (>50 g/day)	0	6	4	10		
Total	9	73	13	95		

**Relationship Sucrose Intake Levels from Sugar Sweetened Beverage with Hyperglycemia**

Table 5 presents data related to the relationship between sucrose intake from sugar-sweetened beverages with hyperglycemia. It was found that the

majority of respondents (70,5%) who consumed sucrose from sugar-sweetened beverages at moderate category had normal fasting blood sugar levels, while the second group (15,8%) had fasting blood sugar levels at risk hyperglycemia.

**Table 5.** Relationship Sucrose Intake from Sugar Sweetened Beverage with Hyperglycemia

Sucrose Intake Levels in Sweetened Soft Drinks	Fasting Blood Sugar			Total	P
	Normal (< 90 mg/dL)	At risk (90–109 mg/dL)	Hyperglycemia (≥110 mg/dL)		
Low (< 1 g/day)	1	0	0	1	0,407
Moderate (1–50 g/day)	67	15	2	84	
Excess (>50g/day)	7	2	1	10	
Total	75	17	3	9	

**Discussion**

**Respondent Characteristics**

The subjects of this study were 95 students from the Nutrition program at Universitas Negeri Surabaya. The majority of respondents were female, with 89 participants (93,7%). The gender imbalance between male and female participants may be due to the fact that the majority of Nutrition students at UNESA are female. However, the imbalance in gender distribution may not inherently introduce bias into the study findings. A large population-based study in Taiwan demonstrated that the association between sugar-sweetened beverage consumption and metabolic risk was evident in both sexes. However, the strength of this relationship was moderated by individual lifestyle determinants, including physical activity levels, nutritional status, and overall dietary habits (Kuo et al., 2023). It was found that the majority of subjects (71,6%) frequently consumed sweetened beverages, and the majority of subjects (30,5%) consumed sweetened beverages in the form of *flavored milk*. Other studies indicate that students frequently consume sweetened beverages (Irfan & Ayu, 2022). However, there are other studies stating that the majority fall into the category of rarely consuming sweetened beverages (Hardiansyah et al., 2017). There are many factors influencing the

frequency of sweetened beverage consumption among students, one of which is peer influence to accompany tasks or relax (Veronica & Iلمي, 2020).

This study shows that the majority of respondents (88,4%) have a moderate category of sucrose intake from sugar-sweetened beverages, which is 1-50 grams per day or equivalent to 4 tablespoons. The recommended intake limit for sucrose is regulated by Ministry of Health Regulation No. 30 of 2013. However, contrary to the results of this study, other studies indicate that the majority of students consume more than 50 grams of sucrose from sweetened beverages (Wicaksari et al., 2024).

This study shows that the majority of subjects (78,9%) have normal fasting blood sugar levels. Additionally, 17,9% of the subjects have fasting blood sugar levels at risk hyperglycemia, and 3,2% have hyperglycemia. Another study also noted that younger individuals mostly had normal fasting blood sugar levels, as stated in the research that most subjects were still young adults, so carbohydrate metabolism in the body was still functioning well in controlling blood sugar levels (Putra et al., 2015).

The results of this study indicate that 76,8% of subjects have normal nutritional status, 13,7% overweight, and 9,5% have underweight. Another study reported similar findings, with the majority of

students having normal nutritional status (Prastia, 2019). The issue of students with undernutrition or obesity is influenced by various factors. Students with undernutrition are generally caused by low energy and protein intake, or in other words, daily energy and protein requirements are not met over a long period of time (Malik & Hu, 2022). Students with overweight are generally caused by low physical activity and an imbalance between energy consumed and calories expended (Irfan & Ayu, 2022).

#### **Relationship between Sucrose Intake from Sugar-Sweetened Beverage with Overweight**

The results of the bivariate analysis indicate a significant association between the level of sucrose intake in sweetened beverages and overweight ( $p = 0,021$ ), as shown in Table 4 above. Sucrose intake from sugar-sweetened beverages, composed of glucose and fructose, is broken down in the small intestine, where glucose increases blood sugar and insulin secretion, while fructose is mainly processed in the liver. Excessive fructose metabolism promotes *de novo* lipogenesis converting it into fatty acids stored as triglycerides. Furthermore, high fructose intake fails to induce satiety due to its limited effect on leptin and ghrelin regulation, resulting in greater energy intake. Liquid calories from sugar sweetened also produce lower satiety compared to solid foods, contributing to a sustained positive energy balance and fat accumulation. Consequently, high sucrose consumption can cause energy imbalance, enhanced fat synthesis, and hormonal dysregulation, which together increase the risk of overweight (Geidl-Flueck et al., 2021).

A study in Jakarta also found similar results, indicating a significant association between sucrose content in sweetened beverages and nutritional (Anggraini & Luhur, 2024). Additionally, a study conducted on medical students at UISU also reported the same findings, stating that the influencing factor is the calories obtained from beverages, which are often overlooked in the appetite mechanism, leading to the desire to consume food and beverages. As a result, individuals often continue to eat solid foods even after consuming sweetened beverages with a similar calorie (Irfan & Ayu, 2022).

Research findings on the relationship between sucrose intake from sweetened beverages with overweight showed different results in a study conducted in Bengkulu City, which found no association between the two. This could be due to the sucrose in sweetened beverages being moderate to meet an individual's daily energy requirements but not exceeding them. In addition, the factor that may

have contributed to the different results from this study is that the respondents in that research were actively participating in extracurricular activities and physical exercise (Sari et al., 2024).

#### **Relationship between Sucrose Intake from Sugar-Sweetened Beverage with Hyperglycemia**

In this study, most students were found to have normal fasting blood glucose levels. Fasting blood glucose can be influenced by several factors, one of which is fasting duration. This finding may be attributed to the fact that most participants fasted for more than 10 hours. Consequently, the extended fasting period may have affected the glucose measurement results. This finding is consistent with the study who reported that respondents who fasted for 12 hours experienced a decrease in blood glucose levels due to the breakdown of glycogen molecules into glucose as an energy source (Indriani, 2021).

Bivariate analysis of sucrose intake in sweetened beverages with hyperglycemia showed no significant relationship ( $p=0,407$ ), as seen in Table 5 above. This is consistent with a study conducted on school teachers in Yogyakarta City, which may be attributed to the relatively young age of the participants, thereby reducing the risk of elevated fasting blood glucose (FBG) levels (Rosyida et al., 2019). This finding is supported by studies indicating that individuals in the young adult age group still possess good carbohydrate metabolism function, thereby maintaining adequate control over FBG (Putra et al., 2015).

The result of the research contradict those conducted in Semarang Regency, which found a correlation between sucrose intake from sugar-sweetened beverages with hyperglycemia. This is attributed to high sucrose content in these beverages, leading to elevated blood sugar levels. The difference in research results may be due to the different data collection methods used. That study used the 3 x 24 h recall method, whereas this study used the SQ-FFQ for the past month (Hifayah et al., 2018).

The findings of this study contradict those Popa study, who reported a significant association between sugar-sweetened beverage consumption and fasting blood glucose levels. The discrepancy may be attributed to differences in dietary patterns, as respondents in Popa study frequently consumed both sugar-sweetened beverage and fast food, resulting in higher caloric intake. This study, however, did not assess fast food or macronutrient intake. Additionally, differences in sample size and assessment period 1200 respondent over one year in Popa study versus 95

respondent over one month in this study, may have influenced the results (Popa et al., 2019).

### Research Limitations

This study has several limitations that should be acknowledged. First, although sucrose intake was assessed, fasting blood glucose levels and participants' nutritional status are also influenced by overall macronutrient intake. However, this study did not include a detailed analysis of the macronutrient composition of the sugar-sweetened beverages consumed. Second, variations in the fasting duration among respondents during blood sample collection may have introduced measurement bias and affected the accuracy of fasting blood glucose values. Lastly, the unequal distribution of male and female participants may have limited the generalizability of the findings to the broader population.

### Conclusion

This study demonstrated a significant relationship between sucrose intake from sugar-sweetened beverages and overweight status among nutrition students at UNESA ( $p = 0,021$ ;  $r = 0,407$ ), indicating a moderate positive correlation. However, no significant association was observed between sucrose intake and hyperglycemia. These findings suggest that excessive consumption of sugar-sweetened beverages may contribute to weight gain rather than directly affecting fasting blood glucose levels. Further research involving larger and more diverse populations is recommended to explore long-term metabolic impacts and potential gender-related differences.

Recommendations, respondents who frequently consume sugar-sweetened beverages are encouraged to reduce or limit their intake, as excessive consumption is associated with overweight and may disrupt fasting blood glucose stability. From a practical standpoint, public health interventions and nutrition education programs should emphasize the importance of moderating sugary drink consumption to prevent obesity-related complications. For future research, it is recommended to standardize fasting duration among participants to improve the accuracy of blood glucose measurements. Researchers are also advised to analyze the macronutrient and energy content of sugar-sweetened beverages to better understand their contribution to total daily energy intake and metabolic outcomes.

### Conflict of Interest

The author states that the research results and publication have no conflict of interest.

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### References

- Akhriani, M., Fadhilah, E., & Kurniasari, F. N. (2016). Hubungan Konsumsi Minuman Berpemanis dengan Kejadian Kegemukan pada Remaja di SMP Negeri 1 Bandung. *Indonesian Journal of Human Nutrition*, 3(1), 29–40. <https://doi.org/https://doi.org/10.21776/ub.ijhn.2016.003.01.4>
- Anggraini, N. V., & Luhur, L. (2024). Hubungan Konsumsi Minuman Berpemanis dengan Risiko Obesitas pada Remaja di SMA Negeri 53 Jakarta. *Jurnal Ilmiah Keperawatan Alturistik (JIKA)*, 7(2), 1–17. <https://doi.org/10.48079/jika.v8i1.116>
- Daeli, W. A. C., & Nurwahyuni, A. (2019). Determinan Sosial Ekonomi Konsumsi Minuman Berpemanis di Indonesia: Analisis Data Susenas 2017. *Jurnal Ekonomi Kesehatan Indonesia*, 4(1). <https://doi.org/10.7454/eki.v4i1.3066>
- Dafa, M., Pratista, T., Febriyanti, E., & Nurmalini, F. (2022). Hubungan Tingkat Stres Akademik dengan Asupan Sugar-Sweetened Beverages pada Mahasiswa di Kota Medan. *Jurnal Makalah Kedokteran Andalas*, 45(3), 348–355. <http://jurnalmka.fk.unand.ac.id>
- Elsa Sari Saputri, & Samsudi. (2024). Hubungan Pola Makan Dan Aktivitas Fisik Dengan Kejadian Obesitas Pada Remaja di SMA Negeri 1 Abuki. *Jurnal Penelitian Sains Dan Kesehatan Avicenna*, 3(2), 156–164. <https://doi.org/10.69677/avicenna.v3i2.86>
- Geidl-Flueck, B., Hochuli, M., Németh, Á., Eberl, A., Derron, N., Köfeler, H. C., Tappy, L., Berneis, K., Spinass, G. A., & Gerber, P. A. (2021). Fructose- and sucrose- but not glucose-sweetened beverages promote hepatic de

- novo lipogenesis: A randomized controlled trial. *Journal of Hepatology*, 75(1), 46–54. <https://doi.org/10.1016/j.jhep.2021.02.027>
- Hanifah, R. A., Wiboworini, B., & Budiastuti, V. I. (2023). *Tren Konsumsi Minuman Manis Kekinian Dan Efek Yang Dirasakan Pada Remaja. Vol. 5 No. 1 (2023): Prosiding Temu Ilmiah Nasional PERSAGI Tahun 2023*, 165–172. <https://tin.persagi.org>
- Hardiansyah, A., Yuniyanto, A. E., Laksitoesmi, D. R., & Tanziha, I. (2017). Konsumsi Minuman Manis dan Kegemukan pada Mahasiswa. *Jurnal Gizi Unimus*, 6(2), 20–26.
- Hifayah, Maryanto, S., & Pontang, G. S. (2018). Hubungan Antara Konsumsi Minuman Berpemanis Dan Asupan Serat Dengan Kadar Gula Darah Pada Dewasa Usia 30-50 Tahun Di Desa Nyatnyono Kecamatan Ungaran Barat Kabupaten Semarang. *Jurnal Gizi Dan Kesehatan*, 10(24), 11–19. <https://doi.org/10.35473/jgk.v10i24.27>
- Indriani. (2021). Perbedaan Kadar Glukosa Darah Puasa 8 jam dan 12 jam dengan Sampel Serum menggunakan Metode GOD-PAP. *Jurnal Analis Kesehatan*, 1–5. <https://repository.stikesnhm.ac.id/id/eprint/1114>
- Irfan, M., & Ayu, M. S. (2022). Hubungan Pola Konsumsi Minuman Bergula Terhadap Obesitas Pada Mahasiswa Fakultas Kedokteran Uisu Tahun 2022. *Jurnal Kedokteran Ibnu Nafis*, 11(1), 31–36. <https://doi.org/10.30743/jkin.v11i1.370>
- Katherine, A. J., Luthfiana, D. S., Deviyanti, I. P., & Desi, L. P. (2021). Hubungan konsumsi Sugar-Sweetened Beverages dan pemesanan makanan online dengan kadar glukosa darah pekerja 25-44 tahun di Perumahan Kasuari, Cikarang. *Ghidza: Jurnal Gizi Dan Kesehatan*, 5(2), 221–230. <https://doi.org/https://doi.org/10.22487/ghidza.v5i2.213>
- Kuo, C. T., Chen, D. R., Chan, C. C., Yeh, Y. P., & Chen, H. H. (2023). Sex differences in the association between sugar-sweetened beverages consumption and metabolic risks among the working-age population in Taiwan. *Public Health Nutrition*, 26(3), 653–660. <https://doi.org/10.1017/S1368980022001549>
- Lin, X., & Li, H. (2021). Obesity: Epidemiology, Pathophysiology, and Therapeutics. *Frontiers in Endocrinology*, 12(September), 1–9. <https://doi.org/10.3389/fendo.2021.706978>
- Malik, V. S., & Hu, F. B. (2022). The role of sugar-sweetened beverages in the global epidemics of obesity and chronic diseases. *Nature Reviews Endocrinology*, 18(4), 205–218. <https://doi.org/10.1038/s41574-021-00627-6>
- Masri, E. (2018). Faktor Determinan Konsumsi Minuman Berkalori Tinggi pada Mahasiswa. *Scientia: Jurnal Farmasi Dan Kesehatan*, 8(1), 53. <https://doi.org/10.36434/scientia.v8i1.155>
- Miller, C., Ettridge, K., Wakefield, M., Pettigrew, S., Coveney, J., Roder, D., Durkin, S., Wittert, G., Martin, J., & Dono, J. (2020). Consumption of Sugar-Sweetened Beverages, Juice, Artificially-Sweetened Soda and Bottled Water: An Australian Population Study. *Nutrients*, 12(817), 2–16. <https://doi.org/https://doi.org/10.3390/nu12030817>
- Popa, A. R., Vesa, C. M., Uivarosan, D., Jurca, C. M., Isvoranu, G., Socea, B., Stanescu, A. M. A., Iancu, M. A., Scarneciu, I., & Zaha, D. C. (2019). Cross sectional study regarding the association between sweetened beverages intake, fast-food products, body mass index, fasting blood glucose and blood pressure in the young adults from North-western Romania. *Revista de Chimie*, 70(1), 156–160. <https://doi.org/10.37358/rc.19.1.6872>
- Prastia, T. N. (2019). Gambaran Tekanan Darah Dan Indeks Massa Tubuh Pada Mahasiswa Prodi Kesmas Angkatan 2017 Fikes Uika Bogor Tahun 2018. *Promotor*, 2(3), 234–239. <https://doi.org/10.32832/pro.v2i3.1942>
- Putra, A. L., Wowor, P. M., & Wungouw, H. I. . (2015). Gambaran kadar Gula Darah Sewaktu pada Mahasiswa Angkatan 2015 Fakultas Kedokteran Universitas Sam Ratulangi Manado. *Tagliche Praxis*, 3(2), 835. <https://doi.org/10.1576/toag.2002.4.4.197>
- Rosyida, R. N., Afifah, E., & Kurniasari, Y. (2019). Hubungan Konsumsi Minuman Manis dengan Hiperglikemia pada Kyai dan Guru di Pondok Pesantren Daerah Istimewa Yogyakarta. 2–5. <https://almaata.ac.id/>
- Sari, D., Chandra, F., & Jeki, A. G. (2024). Hubungan Pengetahuan Gizi, Status Sosial Ekonomi Keluarga, Konsumsi Sugar Sweetened Beverages dengan Status Gizi Lebih pada Remaja di SMPN 9 Kota Jambi. 3, 297–304.

- Ulfah, N. H., Wongsasuluk, P., Fauzi, R., Alma, L. R., Katmawanti, S., & Kartikasari, D. (2022). Smartphone usage and dietary habits associated with sugar-sweetened beverages preferences among Indonesian female university students. *Journal of Public Health in Africa*, 13(s2), 55–58. <https://doi.org/10.4081/jphia.2022.2411>
- Veronica, M. T., & Ilmi, I. M. B. (2020). Minuman Kekinian di Kalangan Mahasiswa Depok dan Jakarta. *Indonesian Jurnal of Health Development*, 2(2), 83–84. <https://doi.org/https://doi.org/10.52021/ijhd.v2i2.48>
- Wicaksari, S. A., Chandra, D. N., Khusun, H., & Sunardi, D. (2021). *Sugar-Sweetened Beverages Consumption and Its Association with Body Mass Index among College Students Living in Dormitory*. 1, 33–45. <https://doi.org/10.32789/publichealth.2021.1003>
- Wicaksari, S. A., Chandra, D. N., Khusun, H., & Sunardi, D. (2024). Nutritional Status, Sugar Sweetened Beverage Consumption and Physical Activity Level in Male and Female College Students Living in Dormitory. *Journal of Community Empowerment for Health*, 7(2), 81. <https://doi.org/10.22146/jcoemph.86500>