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Education on Adverse Effects of Sugar Sweetened Beverages at Santo Kristoforus II High School Jakarta

Putriana Rachmawati*, Caecilia Divany Hanan, Fionna Nathaniel, Kenneth Faustin, Jessica Manuain, Linda Sanjaya, Tommy Nugroho Tanumihardja

Department of Pharmacy, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta, 12930. Indonesia

*Corresponding author: **putriana.rachmawati@atmajaya.ac.id**

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ABSTRACT

The consumption of sugar-sweetened beverages (SSBs) has increased among adolescents, leading to adverse health effects such as a higher risk of type II diabetes mellitus, cardiovascular disorders, and obesity. This educational program aims to enhance students' understanding of the adverse effects of SSB consumption through lectures and workshops. The education was conducted at SMA Santo Kristoforus II on 26 April 2024 as part of a community service activity by the Pharmacy Study Program of the Faculty of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia. The methods employed included delivering material on daily sugar requirements, the sugar metabolism cycle, the adverse effects of excessive sugar consumption, the sugar content in foods and drinks, and strategies to reduce sugar intake. Additionally, sugar content measurements were conducted on various packaged beverages using a refractometer. Pretest and post-test were used as indicators of the performance of the education process. Pretest results showed an average student understanding score of 63.8, which increased to 79.78 on the post-test, indicating a significant improvement in students' comprehension. The distribution of scores also improved, with more students achieving higher scores after their education. A satisfaction survey revealed that over 75% of students found the program beneficial and aligned with their needs. The increases in understanding and high satisfaction levels demonstrate the effectiveness of this program in conveying relevant and practical information. This educational program can be expanded to other schools to reduce SSB consumption among adolescents and mitigate health risks associated with excessive sugar intake.

Keywords: adolescents, cardiovascular health, diabetes mellitus, health education, sugar

INTRODUCTION

Sugar is a type of carbohydrate, which is an essential source of energy for living organisms. Sugar intake can be obtained from various types of sources, one of which is packaged sweetened beverages (MBDK). Although it is a basic need, there is still a daily limit for sugar consumption. Excess sugar consumption can be harmful, as it can trigger diseases such as cardiovascular disorders, type II diabetes mellitus, and insulin resistance. Research conducted in 2024 on high school students in Jakarta showed that 12.69% of respondents fell into the high MBDK consumption category. Meanwhile, based on the Indonesian Minister of Health Regulation No. 30 of 2013 recommends that the amount of sugar consumption in 1 day is expected to be no more than 50 grams. The large amount of

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sugar in MBDK is certainly not included in the amount of sugar that will be obtained from daily foods. This causes people's sugar consumption to exceed the recommended limit. This MBDK consumption habit is a factor contributing to type II diabetes mellitus (T2DM) among productive-age individuals, particularly students.

According to the International Diabetes Federation (IDF), the national prevalence of diabetes in Indonesia was estimated at 6.2% in 2019 and 10.8% in 2021, placing Indonesia among the top 10 countries with the highest prevalence of T2DM and the fastest-growing cases.1 According to the 2018 Basic Health Research (RISKESDAS) in Indonesia, as many as 10.9% of the population aged ≥15 years have T2DM. The majority of these patients also experience acute or chronic complications. Hyperglycemia is associated with several potentially life-threatening microvascular and macrovascular complications, including heart failure, coronary artery disease (CAD) and chronic kidney disease (CKD). Because of these complications, diabetes poses a high risk of decreased quality of life and economic burden, making it an important chronic disease to overcome.

In addition to diabetes, another danger of MBDK is obesity. Obesity is another health problem associated with the consumption of MBDK. The high calories derived from sugar in sweetened beverages can lead to significant weight gain if consumed regularly without being balanced with adequate physical activity. A study revealed that an additional cup of MBDK per day will increase the risk of obesity by 1.6 times in children in America. Several countries, including Australia, have implemented effective policies to control MBDK consumption such as an additional tax of 20% (Newby et al., 2004; Scharf & DeBoer, 2016; Panuganti et al., 2024; Ludwig et al., 2001; Veerman et al., 2016)

The focus of this community service is the health problems caused by the lifestyle of high school students, particularly excessive consumption of packaged sweetened drinks (MBDK). Based on the Survey of Public Understanding and Support for MBDK Excise, data was obtained that adolescents' access to MBDK products, namely 44.8% of adolescents consume MBDK drinks 1-6 times per week. Therefore, it is necessary to carry out education to prevent high MBDK consumption rates. Education is carried out on high school students to increase the awareness of high school students about the dangers of excessive MBDK consumption. Previous research has shown that education about sugar intake is effective in reducing the total amount of sugar consumed, resulting in higher nutrient density.

METHOD

The education process was carried out by the lecture and workshop method by the pharmacy and medical department team, Faculty of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia (FKIK UAJ). Teaching materials are taken from regulations of the Ministry of Health of the Republic of Indonesia, national and international journals, general guidelines and also discussions with FKIK UAJ lecturers. The lecturers who examined the educational materials were Putriana Rachmawati, M.Si and dr. Tommy Nugroho Tanumihardja Sp.An. The educational material includes the need for sugar per day that is safe for the body, how the cycle experienced by sugar when it enters the human body, side effects when consuming excess sugar, sugar content in food and drinks around us and what can be done to reduce the amount of sugar consumption. The workshop method was carried out by measuring the sugar content in packaged drinks with a refractometer. The drinks used during the workshop were fragrant pucuk tea, coca-cola, and ultramilk milk. The team simulated the measurement of sugar content in beverages using a refractometer. In the next session, as many as 6 student representatives measured sugar levels on the samples provided using a refractometer. To measure the success rate of

the education process, pre-tests and post-tests were conducted. The educational session was held at Santo Kristoforus II High School, West Jakarta, on April 24, 2024.

The target group for education is teenagers, men and women and lives in big cities such as Jakarta. This is because access to MBDK is easier to get in big cities and in accordance with the previous explanation that adolescents have a high percentage of MBDK consumption habits. This education is carried out on students of Santo Kristoforus II High School so that it is in accordance with the educational target criteria. To evaluate the success of education, the level of knowledge is measured before and after education. The questions given in the following two stages are covered in Table 1. This list of questions has options A to E where one of them is the correct answer.

Table 1. List of questions to measure knowledge level

No.	Statement
1.	Are sugars included in macronutrients?
2.	Which is an example of a monosaccharide (simple sugar)?
3.	Can sugar be harmful if consumed in excess or in small amounts?
4.	How much sugar do we need per day?
5.	What are the side effects of excessive sugar consumption?
6.	What is gluconeogenesis?
7.	What is glycogenesis?
8.	What is the term used to describe the condition of the body with excess blood sugar levels?
9.	What is the term used to describe a condition of the body with a low blood sugar count?
10.	Is the metabolic process that occurs when a person is hungry and has no food intake?

The sustainability of the event was assessed based on a satisfaction survey. Each statement is followed by 5 likert scale options where scale 1 means "disagree" and scale 5 means "agree. The statement is listed in Table 2 (Sullivan & Artino, 2013). The achievement indicators of the education process are attached to Table 3.

Table 2. List of statements to measure event satisfaction

No.	Statement
1.	I am satisfied with the community service activities organized
2.	Activities that are carried out according to my needs
3.	The activities carried out make me want to change for the better
4.	The time spent in the activity is appropriate
5.	If a similar program is held again, I am willing to participate

Table 3. Indicators of achievement of the education process

Indicator	**Achievement criteria**
Number and category of participants	At least 80% of participants fill out pre-test, post-test and satisfaction survey
Level of understanding after education	• The minimum score for all participants is 60 as the graduation limit and the average is at least 75 • At least 50% of participants experienced an increase in scores

RESULTS

Educational activities regarding the dangers of excessive MBDK consumption for students of Santo Kristoforus II High School were held on Monday, April 6, 2024. This activity aims to increase student awareness related to excessive MBDK consumption through student knowledge education. Students' knowledge was quantitatively measured through pre-tests and post-tests consisting of 10 multiple-choice questions in Table 1 to evaluate their knowledge and understanding of MBDK. The distribution of correct answers to each question can be seen in Figure 1.

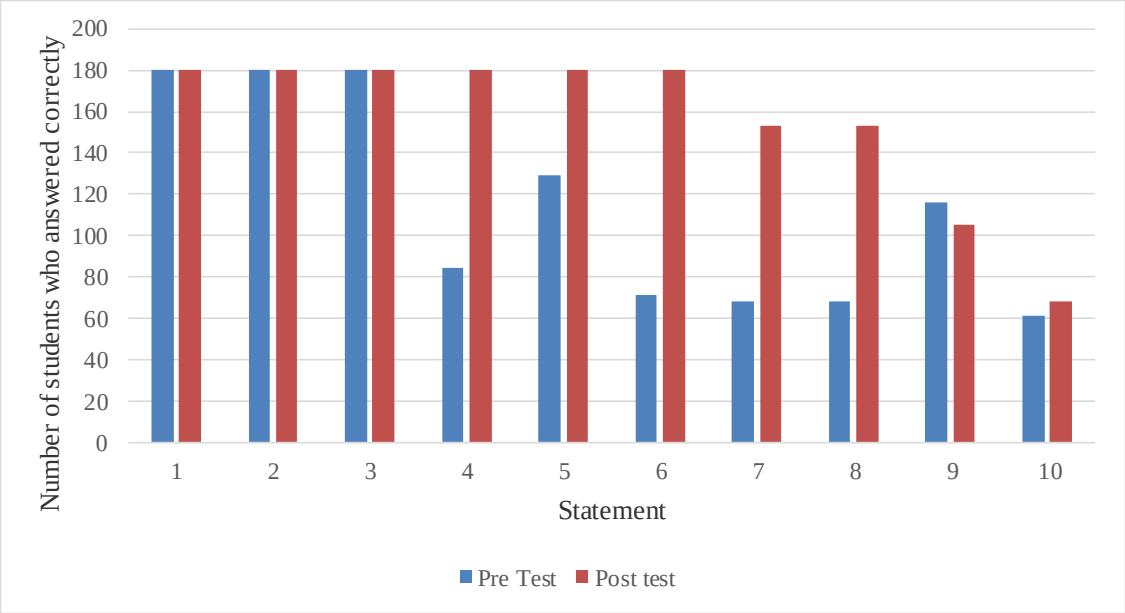
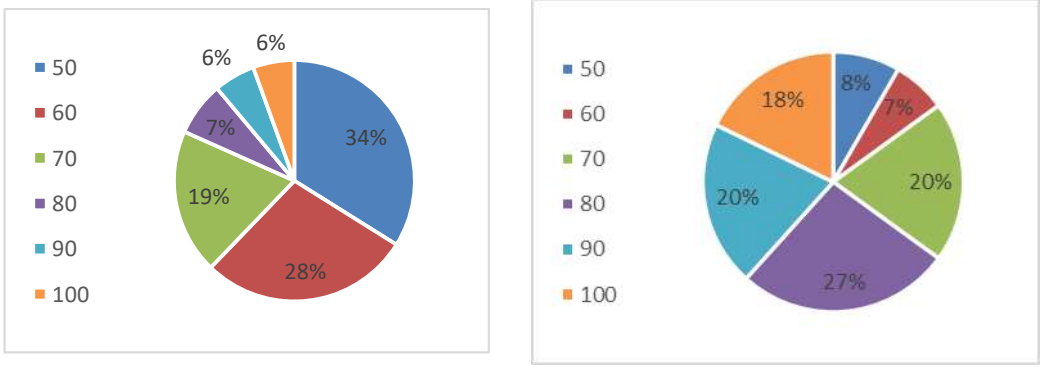


Figure 1. Number of students who answered correctly on pretest and posttest

Figure 1 shows that there is an increase in the number of students who answered correctly in each statement, except for question number 9. This is also shown in figure 2 where the percentage of students who got scores of 70, 80, 90 and 100 increased while students with scores of 50 and 60 decreased. The average score for the pretest was 63.8 and the posttest was 79.78.



(a) (b)

Figure 2. Percentage of students' grades on (a) pretest and (b) posttest

Participant satisfaction with the educational events held is listed in figure 3. More than 75% of students stated that they agreed and strongly agreed with every statement in the satisfaction survey. This shows that the activities held are in accordance with the needs of the participants and motivate participants to improve their excessive sugar consumption

habits. The time and series of activities also went well and were considered in accordance with the purpose of this activity. In this educational process, all participants filled out *a pretest, posttest* and satisfaction survey. In addition, all participants had a score greater than 60 with an average of 79.78. More than 50% of participants experienced an increase in scores. Based on these parameters, all success indicators have been achieved.

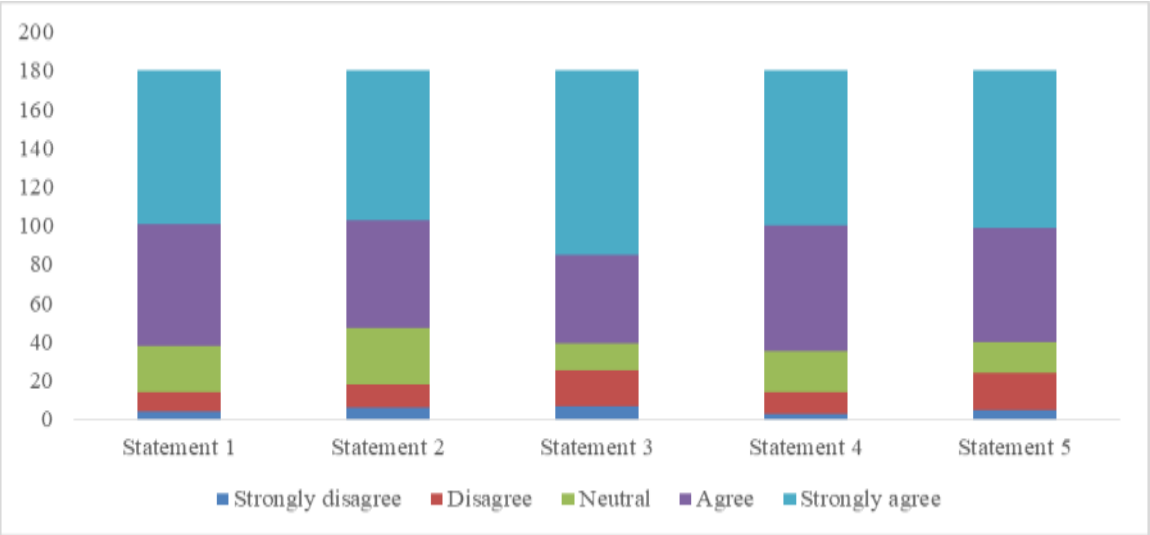


Figure 3. Satisfaction survey on educational events

DISCUSSION

The results obtained from this educational program show that the lecture and workshop methods applied are effective in increasing students' knowledge about the dangers of MBDK consumption. The increase in the average score from 63.8 to 79.78 reflects that students were able to understand and retain the information presented. This is important considering that a good understanding of the dangers of excessive sugar consumption can be the first step in changing students' consumption behavior. The increase in the distribution of grades also shows that the information conveyed can be well received by different levels of students' abilities. The decrease in the number of students who scored low shows that even students who previously had a limited understanding of the topic can improve their knowledge after attending education.

The satisfaction survey confirms that the approach taken in this program is in accordance with the needs and expectations of students. A high level of satisfaction indicates that students find the program relevant and beneficial to them. Students who participated in the workshop, where they learned to measure sugar levels in various packaged beverages using a refractometer, gained practical experience that deepened their understanding of the sugar content in everyday products. However, there are several challenges that need to be considered. One of the interesting findings is the low increase in understanding of question number 9, which is related to the condition of low blood sugar levels. This shows that there are some concepts that may require a more in-depth explanation or different teaching methods to make them easier for students to understand.

Overall, the success of the program demonstrates the great potential of an interactive and practical approach to health education. By providing comprehensive and relevant knowledge and engaging students in practical activities, the program not only succeeds in improving understanding but also motivates students to apply that knowledge in their daily lives. Based on the results achieved, similar programs can be implemented in other

schools in the hope of reducing the consumption of MBDK among adolescents and reducing the long-term health risks associated with excess sugar consumption. Documentation of educational activities is shown in Figure 4.



(a) (b) (c) (d) (e) (f)

Figure 4. Documentation of educational activities (a) Presentation of educational materials; (b) Workshop session; (c) Giving prizes to participants who successfully answer questions; (d) Presentation of mementos to Saint Christopher II High School; (e) Group photo session; (f) Delivering of UAJ merchandise

CONCLUSION

Education about the dangers of excessive MBDK consumption at SMA Santo Kristoforus II has succeeded in increasing students' knowledge and awareness about the importance of maintaining sugar intake. The program also inspires students to change their lifestyle to be healthier. Based on the results achieved, the lecture and workshop methods have proven to be effective in providing a deep understanding of this topic. It is

recommended to expand similar educational programs to other schools and involve more participants. Increasing the frequency of education and adding material on nutrition can also be considered. In addition, the existence of policy support from schools to reduce students' access to MBDK can help in reducing excess sugar consumption among adolescents, such as the selection of types of drinks that can be sold in school canteens.

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