B-ICON Proceeding

ANALYSIS OF URINARY GLUCOSE IN ELEMENTARY SCHOOL STUDENTS WHO CONSUME JUNK FOOD IN BENGKULU CITY

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Abstract

Urine glucose, or glycosuria, occurs when glucose appears in urine due to impaired kidney filtration or insufficient insulin activity. Junk food contains excessive sugar and low nutritional value, triggering uncontrolled metabolism. The pancreas secretes higher insulin levels to balance glucose, but frequent junk food consumption may lead to sudden fluctuations and increase the risk of degenerative diseases such as diabetes mellitus. This study aimed to describe urine glucose levels among elementary school students consuming junk food in Bengkulu City in 2024. This descriptive study involved 38 respondents selected purposively. Urine glucose was tested using the Verify™ U120 Smart analyzer and dipstick strips. Most respondents showed negative urine glucose levels (97.3%), while 2.7% showed positive results. Nearly all students consuming junk food had negative urine glucose results. Students with positive urine glucose are advised to reduce junk food intake to prevent childhood-onset diabetes.

Keywords: Urinary Glucose, Junk Food, Students, Bengkulu

INTRODUCTION

Glucose urine is a condition where glucose is found in the urine after passing through the digpotent process, caused by high levels of glucose in the blood (hyperglycemia), which leads to a glucoccyria (an excessive amount of sugar in the urine). Glukosuria occur if the glucose concentration exceeds the absorbed lal threshold. (Wahdaniya, 2021)In normal urine no glucose is found because in the kidney tubulus the process of reabsorption of glucose molecules to return to blood circulation (Novrilia, 2019).

Urine glucose, or glycosuria, occurs when glucose appears in urine due to inadequate renal filtration or insufficient insulin function required to convert glucose into glycogen. Urine glucose testing is a basic routine laboratory examination to detect glucose presence in urine. Patients undergoing urine glucose analysis should avoid food substances that may interfere with results, such as high-dose vitamin C (Sulfia et al., 2018).

The World Health Organization (WHO) classifies diabetes mellitus (DM) as a chronic metabolic disorder

influenced by multiple factors. It is characterized by elevated blood glucose levels and abnormalities in carbohydrate, lipid, and protein metabolism. Insulin deficiency may arise due to insufficient production by pancreatic β-cells or resistance of tissues to insulin action (Putri, 2019).

Maintaining normal glucose levels between ages 5–18 is critical, as diabetes is no longer limited to adults but also affects children and adolescents. The most vulnerable group is children aged 9–12 years, with risk factors including dietary habits, age, sex, obesity, and other metabolic determinants (Pibriyanti & Hidayati, 2018). In a cross-sectional study of 706 primary school children aged 5-12 years, urine dipstick testing detected glucose among other abnormal findings, showing that even apparently healthy young children may present urinary glucose abnormalities (El-Abden et al., 2013).

According to Bengkulu City Health Office data (2022), 3,087 residents were diagnosed with DM, with the highest prevalence in the Teluk Segara district. At Pasar Ikan Public Health Center, 492 cases were recorded (183 male, 309 female), while Kampung Bali Public Health Center documented 120 cases (23 male, 97 female). Based on Bengkulu City Education Office data (2023), Teluk Segara district has nine public elementary schools, including SD Negeri 01 with 447 students (223 boys, 224 girls), SD Negeri 04 with 272 students, and several others.

Frequent fast-food consumption in adolescents is associated with higher prevalence of elevated fasting glucose and other metabolic risk factors, supporting concern that habitual junk-food intake in schoolchildren may increase glycosuria risk detectable by urine screening (Li et al., 2020). Junk food is identical to food with limited nutrition. A lot of junk food consists of foods that are high in salt, sugar, fat and calories, but their nutritional value is low (Dewi et al., 2023). Junk food, which generally contains high glycemic index ingredients but low nutritional value, is a growing concern. Examples include fried snacks, instant noodles, burgers, fried chicken, ice cream, fatty meats, processed foods, and carbonated drinks. Continuous consumption can cause obesity and diabetes (Paramesthi Sani Purnomowati & Handayani, 2021).

Junk food is a food that lacks important nutrients, such as fiber, vitamins, minerals and fat double despause that cause this important nutritional deficiency in the body (Mushtaq et al., 2018). Excessive sugar intake from junk food can trigger abnormal metabolic processes. Overconsumption causes the pancreas to produce higher insulin levels, which may eventually drop suddenly, increasing the risk of degenerative diseases such as DM (Patel & Goyena, 2019).

Junk food consumption patterns are influenced by lifestyle changes, increased purchasing power, and the influence of peers. Because of poor nutrition, junk food can leave the body rapidly exhausted and deprived of energy (Nikmah, 2024). The increasing prevalence of junk food consumption among children is also linked to limited parental time for preparing healthy meals. As a result, children often consume food with poor nutritional quality. Over 200 million children under five in developing countries face nutrition-related

health problems. Studies in Indonesia have shown that junk food is a major contributor to obesity and diabetes in children (Pibriyanti & Hidayati, 2018).

Accommodations also affect choice of foods, such as in rural areas where there is less junk food than in cities that include junk food consumption. People in urban areas are more accustomed to junk food because geographic locations contribute to food costs and availability (Kustin, 2019).

The impact of junk food that has glimek index is high, some of which contain carbohydrates are stored as glycogen and the rest of which is fat, the protein is formed as body protein and the rest is fat, the energy source used comes from a glycogen of carbohydrate deposits so that the fat is accumulate to be unused (Pebriani et al., 2022).

Excessive consumption of junk food can lead to health problems, such as obesity, diabetes, hypertension, clogged arteries and coronary heart disease. Junk food is a food that lacks important nutrients, such as fiber, vitamins, minerals and fat double despause that cause this important nutritional deficiency in the body (Misbar et al., 2024).

Junk food includes risky foods that can result in a noncommunicable risk of disease because of high levels of sugar, salt, and fat. High levels of sugar, salt, and fat consumed continuously can increase the risk of metabolic syndrome by raising levels of triglycerides, glucose and the occurrence of obesity. Glucose levels of those taking fast food in large quantities are higher than those doing lower (Katherine Jayanti et al., 2021).

MATERIALS AND METHODS

This study employed a descriptive research design aimed at providing an overview of urine glucose levels among elementary school students consuming junk food in Bengkulu City in 2024. Descriptive studies are used to describe or explain the characteristics of the subject under investigation without testing hypotheses

Population and Sample

The study population comprised elementary school students in Bengkulu City. According to Arikunto (2015), if the total population is fewer than 100, the entire population can be used as the sample, while for larger populations, 10–25% can be selected. Based on this guideline, the sample size in this study was 38 students.

Sampling Technique

A purposive sampling method was employed, selecting respondents who met specific criteria relevant to the study objectives. In this study, “frequently consume junk food” was operationally defined as consuming junk food at least four times per week. Foods categorized as junk food included fried snacks, instant

noodles, fast foods, sweetened beverages, packaged snacks, and other processed foods. Students who reported consuming any of these items ≥4 times weekly met the inclusion criteria.

Data Collection

Urine samples were collected and examined using the Verify™ U120 Smart urine analyzer and dipstick strips. The measurement focused on the presence of urine glucose, categorized as either negative or positive.

RESULTS AND DISCUSSION

Table 1. Distribution of Urine Glucose Levels Among Students Consuming Junk Food in Bengkulu City

Urine Glucose Level	Frequency (n)	Percentage (%)
Negative (-)	37	97,3
Positive (1+)	1	2,7
Total	**38**	**100**

Junk food typically contains high levels of salt, artificial sweeteners, preservatives, colorants, and flavor enhancers. Excessive consumption of such foods can elevate blood glucose levels and contribute to the development of diabetes mellitus (Hidajahturrokhmah et al., 2018)

Table 1 shows that 97.3% of students had negative urine glucose levels, while 2.7% showed positive results. Although all respondents were categorized as frequent junk-food consumers, most students with negative results also had several protective characteristics. Based on interviews, they were generally active in daily physical activities, such as outdoor play or sports, and many had a normal BMI. Several students also reported reducing sugary drinks and limiting sweet snacks. These factors may help maintain normal glucose metabolism despite their junk-food intake.

Junk food contains high levels of sugar, fat, salt, and additives that can increase glycemic load and long-term risk of diabetes (Hidajahturrokhmah et al., 2018)). However, in this study, protective behaviors such as physical activity and healthier eating patterns may have prevented early glucose elevation in most respondents. Childhood is also a period with naturally higher physical activity, which increases glucose utilization and supports insulin sensitivity (Azizah et al., 2021)

The only student who tested positive for urine glucose reported frequent consumption of high-sugar foods, low physical activity, and increased urination. These conditions are consistent with early signs of glucose intolerance. This finding reinforces that unhealthy dietary patterns combined with sedentary behavior contribute to the risk of glycosuria. Gender-related risk differences noted in previous studies also indicate

that boys tend to accumulate more abdominal fat, which reduces insulin sensitivity (Pibriyanti & Hidayati, 2018). Although both sexes were included in this study, most respondents maintained a normal BMI, which may explain the predominance of negative results.

These results are consistent with other studies showing that frequent junk-food consumption especially more than 4–6 times per week can increase long-term risks such as obesity, hypertension, and diabetes mellitus (Laksono et al., 2022). Even though most students have not yet shown signs of glycosuria, health education on balanced nutrition and regular physical activity remains important to prevent metabolic disorders later in life.

The researchers acknowledge that, given the small and relatively homogeneous sample size, the findings of this study can be interpreted as preliminary. Urine glucose testing provides an initial overview of glucose abnormalities, but is not sensitive enough to detect early metabolic changes. Therefore, future research is recommended to use an analytical study design that includes more sensitive screening parameters, such as Fasting Blood Glucose (FBS) and/or Body Mass Index (BMI), to better identify risk factors associated with early glucose intolerance in school-aged children.

CONCLUSION

This study revealed that 97.3% of elementary school students consuming junk food in Bengkulu City had negative urine glucose levels, while 2.7% showed positive results. Preventive strategies to reduce junk food intake are essential to lower the risk of early-onset diabetes mellitus.

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Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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