

## RESEARCH ARTICLE

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# The Effect of High Glycemic Modified Breakfast Menu on Increasing Learning Concentration of Junior High School Students Insan Cendekia Mandiri (ICM) Sarirogo – Sidoarjo

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**ABSTRACT** The nutritional adequacy of the Insan Cendekia Mandiri (ICM) junior high school students is obtained from the provision of food in the dormitory. One way to increase the acceptance of food intake organized by the boarding institution at the Insan Cendekia Mandiri Junior High School (ICM) is to modify the food menu. The provision of food doesn't escape the standard portion for each individual so takes a portion of food that is by the RDA, so that it can be seen whether the individual needs of junior high school students have been met or not. This study aims to analyze the effect of modifying menu of a high-glycemic meal on the acceptability and increase in learning concentration in students of SMP Insan Cendekia Mandiri in Sarirogo, Sidoarjo. This research method uses a pre-experimental design with a one-group pretest-posttest to determine the quality of the modification of the high-glycemic plate menu through the level of preference, acceptance of the increase in learning concentration of junior high school students at Insan Cendekia Mandiri (ICM) Sarirogo, Sidoarjo. The research sample was 37 junior high school students taken by simple random sampling using a formula to meet the inclusion and exclusion criteria. The variables in this study consisted of independent variables, namely modification of high glycemic prescriptions, the dependent variable was acceptance and learning concentration. The research instrument used is a 7-day menu cycle using organoleptic tests by conducting pre and posttest. The results is The breakfast menu from ICM has a lower glycemic index than the modified menu because the ingredients used. There is a difference in the average energy value in the modified menu, which is 102.5 kcal compared to the breakfast menu from ICM, 2,94 grams of protein average higher than breakfast menu on ICM, 10,9 grams of fat higher than breakfast menu on ICM and then 10,76 grams of carbohydrate average lowe than breakfast menu on ICM, and student concentration has increased because of the modified menu which has a high glycemic index.

**INDEX TERMS** Acceptance, Concentration of learning, Modification of high glycemic menu, Insan Scholar Mandiri (ICM) junior high school students

## I. INTRODUCTION

Nutritional needs of school children are very important. Students who have malnutrition often feel weak and tired easily, they frequently absent for class and have many difficulties for understanding the lessons and they have to study over again. These were serious problems of our national education. Supplementary food for school children is one of intervention which were held every year for improving students nutrition. It considered as a very effective way for increasing the efficiency of education in

poor schools in developing countries. Improving the quality of human resources is the main key to the long-term success of national development. Nutritional needs for students are very important, if students experience malnutrition at school, it causes them to become weak, tired quickly, and sickly so they are often absent and have difficulty receiving and understanding lessons well. Many ways that can be done to improve nutrition in students, one of which is nutrition interventions that can be carried out every year to improve learning abilities through the

program of providing breakfast in schools which is considered very effective to improve the efficiency of education in poor schools in developing countries. [1]

The nutritional intake of breakfast for students is a source of energy for activities and learning at school. With the intake of breakfast, the stomach will get nutrients again after fasting due to a night's sleep, so that glucose levels in the blood increase. Food for school-age children must be following the child's growth and development level by the conditions, socio-cultural economy, and religion of the family and balanced (the nutritional value must be in accordance with the needs based on age and type of food ingredients such as carbohydrates, proteins and fats). [2]

According to the Basic Health Research (Riskesdas) in 2010 about 70% of school-age children received less energy consumption and 80% did not get the required protein consumption, 26.8% of school-age children only had breakfast with drinking water and 44.6% received less energy intake. than 15% of daily nutritional requirements. Meanwhile, according to the 2012 Nestle Indonesia research, four out of ten children in Indonesia eat a non-nutritious breakfast [3]. There are still many Indonesians who don't usually eat breakfast, while most of the people who eat breakfast have low breakfast quality. Based on the results of the 2010 Riskesdas conducted on food consumption in 35,000 elementary school children, 26.1% of children only eat breakfast with drinking (tea, water, and milk). And 44.6% of children who eat breakfast only get energy intake of less than 15% of the RDA (Nutrition Adequacy Rate) [4]. This is supported by research conducted by Anjar Pujiayu, regarding the habit of breakfast with learning concentration in grades 5-6 at Manduro Kabuh Elementary School, it was found that 27.3% of students had negative breakfast habits and have very less concentration too. [5]

Optimal growth and development of school-age children can be determined by providing nutrition and the formation of properly balanced nutrients. Energy functions as an energy substance for metabolism, growth, temperature regulation and physical activity. [6] The provision of food in the dormitory does not escape the standard portion of each individual according to the Nutrition Adequacy Ratio (RDA). Insan Cendekia Mandiri Junior High School is a school that is intended for a prospective leader, which all students from elementary, middle, high school, and university are male students. This school belongs to the Yatim Mandiri foundation that located in Sarirogo area, Sidoarjo city. The excellence of this school, it prioritize moral values and memorizing the Qur'an. Adequacy of nutrients is obtained from food intake which can affect the nutritional status of students' food intake. The nutritional adequacy of the Insan Cendekia Mandiri Middle School students is obtained from the provision of food in the dormitory. One way to increase the acceptance of food intake held by boarding institutions at the Insan Cendekia Mandiri Junior High School is to modify the food menu.

The aim of this research to determine the quality of the modification of the breakfast menu with a high glycemic plate, on the acceptability, and the increase in learning concentration of ICMBS Middle School students in Sidoarjo.

## II. METHODS

This research was conducted at the food service provided by the caterer in the dormitory kitchen of SMP Insan Cendekia Mandiri Sarirogo (ICM) Sidoarjo. Recipe modification is changing or improving an existing menu that is less interested into a new menu that is more attractive and increases its nutritional value without changing the ingredients. The sample of this study was 37 students with the sample criteria is Willing to be a sample in research, 13-15 years old, Can be invited to communicate and Not sick. This study used 2 groups of subjects, namely the control group and the intervention group. The control group is students at SMP Insan Cendekia Mandiri Sidoarjo – Sidoarjo and consumed food from the dormitory without being observed for 14 days. And then the intervention group was students at SMP Insan Cendekia Mandiri Sidoarjo – Sidoarjo and consumed food from the dormitory with a plate menu for 14 consecutive days. The study was conducted from April to October 2021. Independent Variable is Modification of the breakfast menu with a high glycemic plate, acceptance and increased concentration in learning, Bound Variable consist of Insan Cendekia Mandiri Junior High School Student Sarirogo Sidoarjo. Variable Operational Definition consists of Acceptability which is likelihood test or hedonic test for analyze the level of liking and acceptance of the product including texture, color, aroma and taste. A measurement method in which students will directly assess the breakfast menu with a high glycemic plate with the senses of sight, smell and taste. Rating: 1. Very Like 2. Like 3. Neutral 4. Dislike, Learning Concentration which is focusing on one thing by putting aside other things that are not related. A measurement method in which students are given a questionnaire and take a concentration test.

Data were taken by observation and interviews techniques including name, age, gender, activity factors, and the results of concentration tests. Anthropometric measurements are measurements of height and weight. And the the Data were analyzed by SPSS 16. All numbers will be displayed as the mean (mean) and standard deviation (SD). The data normality test was conducted to determine the distribution of the data using the Shapiro-Wilk formula test because the number of samples was <50 people ( $p>0.05$ ) and if there was a significant difference, it was continued with the Mann Whitney test. Paired t-test (Paired t-test) was used to determine the significant difference between the control and intervention groups on the modification of the breakfast menu with a high glycemic plate, acceptance and increase in learning concentration before and after the intervention with a 95% confidence degree ( $\alpha= 0, 05$ ) and if the data are not normally distributed using the Wilcoxon test.

### III. RESULT

Junior high school students who live in dormitories need to pay attention to their nutritional intake, namely through the provision of meals held in school dormitories. The nutritional status of junior high school dormitory students needs to get attention considering the condition of students who are far from their parents and busy activities, especially the lack of health checks by the dormitory. The adequacy of energy obtained from boarding food intake can also affect the nutritional status of students from student food intake by providing food in the dormitory kitchen. This agrees with the statement from Safitri (2011) that an imbalance between the food consumed and the needs of adolescents will lead to malnutrition and overnutrition problems, while malnutrition in adolescents will result in a decrease in body resistance to disease. [7]

Insan Cendekia Mandiri Junior High School is a formal education located on Jl. Sarirogo No.1, Sari Rogo, Kec. Sidoarjo, Sidoarjo Regency, East Java 61234. ICM is a junior high school that has a dormitory and food service in it. The provision of food in the dormitory for students is managed by a caterer belonging to the Insan Cendekia Foundation itself, being one management, this makes it easier to manage and control both the daily menu and its finances. The menu at ICM uses a 7 day menu cycle. Researchers tried to observe and observe the morning/breakfast menu, the breakfast menu is very influential on the students so it must be in accordance with balanced nutrition guidelines. Increasing student concentration is very effective if it is supported by the provision of foods that have a high glycemic index content, because it can help improve students memory, making it easier to concentrate. [8] Recipe modification is changing or improving an existing menu that is less desirable into a new menu that is more interesting and increases its nutritional value by not changing food ingredients, aiming to increase one's intake. [9]

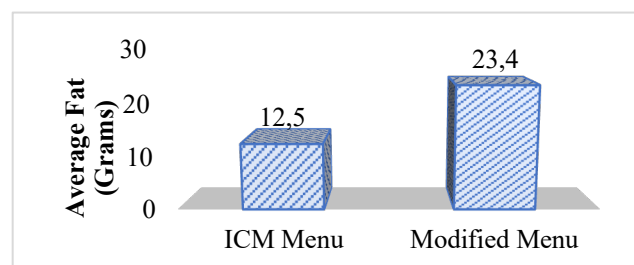
On this research, acceptability which is likelihood test or hedonic test for analyze the level of liking and acceptance of the product including texture, color, aroma and taste. A measurement method in which students will directly assess the breakfast menu with a high glycemic plate with the senses of sight, smell and taste.

Table 1

The quality of the modification of the high-glycemic plate breakfast menu on the acceptability

No	Indicator	Average	Information
1.	Color	3.8	Like
2.	Aroma	4.2	Really like
3.	Texture	3.9	Like
4.	Flavor	4.4	Really like

Based on the table above, to determine the quality of the modification of the breakfast menu with a high glycemic plate on average acceptance, they really like the modified menu because the modified menu follows the current trend.



This study also look at the comparison of nutrients (energy, protein, fat, carbohydrate) in the ICM menu and the modified menu.

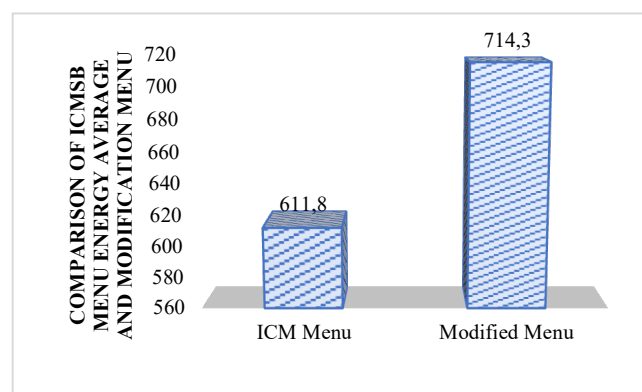
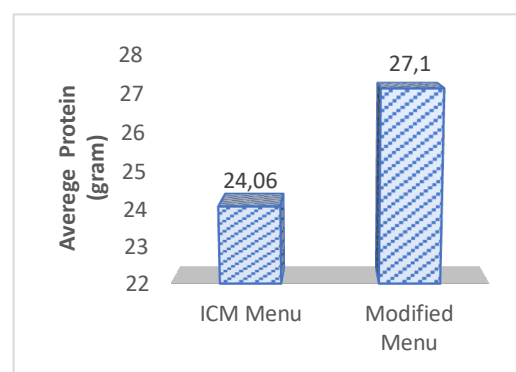


Figure 1. Comparison of the Average Energy of ICM Menu and the Modified Menu

The breakfast menu from ICMBS has a lower energy value compared to the modified menu because the menu at



ICMBS has a higher carbohydrate value, students can take a lot of rice and crackers freely.

**Figure 2. Comparison of the Average Protein of ICM Menu and the Modified Menu**

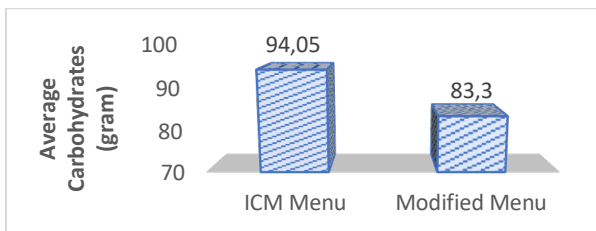
The breakfast menu from ICM has lower protein content compared to the modified menu because the portion of animal side dishes provided is limited in type and processing. Most of menus that are served contains carbohydrates sources for example menu on first week, on Wednesday simple stir-fried Pakcoy with tofu, on Thursday stir-fried green beans and carrot, on Sunday only sauted chicory without protein at all.

### Fat Calculation Results between the ICM Menu and the Modified Menu

**Figure 3. Comparison of the Average Fat of ICM Menu and the Modified Menu**

The breakfast menu from ICMBS has lower fat content compared to the modified menu, due to limited ingredients and processing methods.. This was not about the most cooking process is steaming, but it because of lack quantity and frequency of animal proteins in the diet compared to the student needs.

### Carbohydrate Calculation Results between the ICM Menu and the Modified Menu



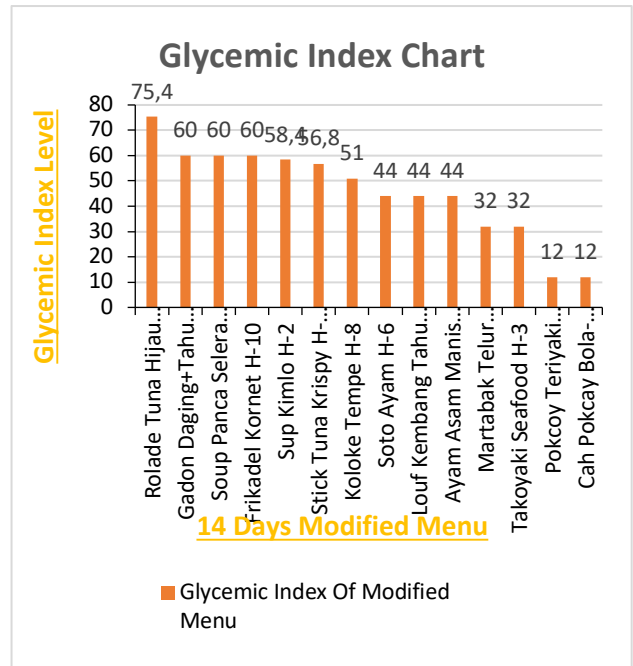
**Figure 4. Comparison of the Average Carbohydrate of ICM Menu and the Modified Menu**

The breakfast menu from ICM has a higher carbohydrate content compared to the modified menu because the portions of rice and crackers are taken at will by students.

In the modification of the breakfast menu that is made to pay attention to the glycemic index. The following is the glycemic index chart in the modified menu that was made:

**Figure 5. Glycemic Index Chart**

The breakfast menu from ICM contains a lower glycemic index compared to the modified menu because the ingredients used do not pay attention to the source material of the glycemic index because they do not know



what the glycemic index is. Selama penelitian menu tertinggi indeks glikemik pada menu rolade tuna hijau dan indeks glikemik terndah pada pokcay bola bola daginnng

### Calculation Results Concentration (t-test)

**Table 1. Paired T-Test**

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
preka	340	2.105882	.0348752	.6430666	2.037283	2.174481
postka	340	2.217647	.0335703	.619006	2.151615	2.283679
diff	340	-	.0171126	.3155411	-.145425	-.0781044

The difference between pre test and post test is significant. Where the results of this concentration indicate a significant difference during the study. Increasing student concentration is very effective if it is supported by the provision of foods that have a high glycemic index content, because it can help improve students' memory, making it easier to concentrate.

### IV. DISCUSSION

Acceptance of the food menu, including sensory assessment can affect the amount of food consumed by children. The assessment of the menu relates to several characteristics of the menu, namely menu pattern, color and appearance, texture, aroma, cut shape, popularity of food, and serving temperature. In addition, the assessment of food is also influenced by preference. [10]



Food appearance is the first impression seen to determine a quality food by looking at the appearance of food. Appearance of food is the condition of a food when it is served to someone. According to Moehyie, the appearance of food consists of several aspects, namely food color, texture/consistency, portion, shape served and color. Based on several observations, it can be estimated that color can affect a person's physical and psychological assessment of the food itself. The more color variations that are presented in a food, the greater a person's interest in consuming it. the food. Just like the color of food, the shape of the food can affect a person's judgment of a food. [11]

The taste of food is a factor that determines the acceptance of a person's food. The appearance of food can be assessed through the sense of sight while the taste of food is determined through the senses of taste and smell. The taste of food is very difficult to judge than judging the texture or color of food. Food is influenced by several factors such as temperature, seasoning, aroma, and level of doneness. [11]

This study aims to improve the long-term quality of human resources, especially in junior high school students as the next generation of youth which is the main key in the success of long-term national development, while the short-term goal is to analyze the effect of giving a high-glycemic diet menu modification to acceptability and increase learning concentration. in Insan Cendekia Mandiri Junior High School students in Sarirogo, Sidoarjo city. The nutritional adequacy of the Insan Cendekia Mandiri Junior High School students is obtained from the provision of food in the dormitory. One way to increase the acceptance of food intake held by boarding institutions at the Insan Cendekia Mandiri Bording School Junior High School is to modify the food menu. Food preparation does not escape the standard portion of each individual so that the proportion of food that is in accordance with the RDA is needed. Furthermore, it can be seen in the individual needs of junior high school students whether or not their nutritional adequacy has been met.

The quality of the modification of the acceptability of the breakfast menu with a high glycemic plate is very much liked by the ICMBS Middle School students, which is concluded based on the results of a 14 day study on the acceptability and increase in learning concentration of ICMBS Middle School students in Sidoarjo.

In observation for 14 days, there was an increase in the learning concentration of SMP ICMBS Sidoarjo students between control and treatment which was proven by statistical test results.

The weakness in this was that there was no measurement or laboratory examination of the glycemic index content in the breakfast menu giveb by the researchers to the treatment, so that the glycemic index value on the plate breakfast menu could not be seen significantly. Lack of knowledge about foods with a high glycemic index among Foundation managers, catering and students, especially about the importance of a high glycemic index breakfast, is needed especially to support the growth of brain cells for support intelligence and concentration.

This study is expected to provide information regarding the importance of modifying the high glycemic plate breakfast menu in order to fulfill the nutritional needs in adolescents.

## V. CONCLUSION

Based on the results of the study, it was found that the energy, protein, fat, and glycemic index content of the modified menu was higher than the breakfast menu from ICM, but the carbohydrate content of the modified menu was lower compared to the breakfast menu from ICM because the portion of rice and crackers are taken at will by consumer.

It's hoped that the results of this study can provide information regarding the importance of modifying the high-glycemic plate breakfast of the younger generation and can be a reference for further research as an innovative work that is published internationally.

Suggestions that can be given to the future research are to do measurements or laboratory examinations of the glycemic index content on the modified plate breakfast menu, so that the glycemic index value on the menu can be seen significantly. There needs to be education between Foundation managers, catering and students, especially about the importance of breakfast which is very much needed especially to support the growth of brain cells to support intelligence and concentration as well as a variety of balanced nutrition menus according to the nutritional cone and nutritional needs (AKG) with funds that can be adjusted according to budget from the SMP ICMBS Sidoarjo foundation.

Education between Foundation managers, catering and students, especially about the importance of breakfast which are needed especially to support the growth of brain cells, support intelligence and concentration as well as a variety of balanced nutrition menus according to the nutritional cone and recommended dietary allowances (RDA), adjusted to the education budget of ICMBS Sidoarjo foundation.

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