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The Effect of Breakfast and Skipping Breakfast on Random Blood Glucose Levels in Construction Workers After 4 Hours of Work

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ABSTRACT

Background: The energy sufficiency of heavy physical workers, like construction laborers, really depends on stable blood glucose levels. Having the habit of eating breakfast plays an important role in providing an initial energy supply after the fasting period during the night. **Objective:** Analyzing the differences in blood glucose concentration between construction workers who ate breakfast and those who didn't after performing work activities for 4 hours. **Research Methods:** This analytical observational study with a cross-sectional design involved 24 workers in the Selaparang District who were chosen using purposive sampling (12 breakfast subjects and 12 no-breakfast subjects). Peripheral blood sugar levels were measured using a Point-of-Care Testing (POCT) device, and then analyzed using an Independent T-Test. **Research Results**: The group that had breakfast recorded an average blood sugar of 112 mg/dL, while the group without breakfast had about 101 mg/dL. Comparative analysis showed a statistically significant difference (p=0.001). **Conclusion**: Breakfast intake has a real impact on maintaining blood sugar levels in construction workers after 4 hours of physical activity.

Keywords: Blood glucose, Breakfast, Construction workers

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Introduction

Maintaining a stable blood sugar concentration is crucial as the main source of energy for the body's cellular metabolism. Carbohydrates from food intake are processed into circulating glucose and glycogen reserves to support muscle work and nerve function. Lack of intake of these macronutrients can trigger physical fatigue faster and lower concentration levels.

Eating food in the morning serves to restore the body's energy after passing the nocturnal catabolism period. Skipping breakfast risks lowering blood sugar levels to below normal limits, which ultimately interferes with the effectiveness and performance of daily work.

Strenuous physical activity in construction workers triggers a much higher energy requirement. Intense motor activity forces the muscles to constantly absorb blood glucose to be converted into energy. If this increase in glucose demand is not offset by adequate nutrient intake in the morning, the body's glycogen reserves will be rapidly reduced, triggering a relative risk of hypoglycemia. Based on this phenomenon, the crucial time to observe blood glucose fluctuations is after the duration of work ±4 hours, where the transition in muscle energy metabolism is most evident. This study was specifically designed to analyze the effect of breakfast and not breakfast on blood glucose levels in the construction worker group with an intensive physical workload.

Research Methods

This research uses a cross-sectional analytical observational method. The determination of subjects relies on purposive sampling techniques that are adjusted to certain qualification criteria, such as health status, participation commitment, and adherence to breakfast control after a four-hour work duration. This study adopts an analytical observational approach with a cross-sectional design in the Selaparang area in the period from April to May 2026. The target population in this study is active construction workers in the local area. Referring to the calculation of the Lemeshow formula, this research involves a minimum of 24 field participants who are grouped in a balanced manner.

The independent variable in this study was breakfast habits (category: breakfast rice menu / not breakfast rice menu). The variable was bound in the form of blood glucose levels as expressed in mg/dL. Primary data collection began with filling out the Pre-Approval Explanatory Sheet (PSP) and *Informed Consent*. The breakfast group was given standardization of food portions before work, while the non-breakfast group was only allowed to consume water without calories.

After completing the four-hour physical activity, peripheral blood sampling was carried out via skin puncture on the distal part of the finger. The initial drops of the specimen were rubbed using a liquid gauze/cotton to dispel interstitial fluid contamination. After that, the determination of GDS levels was executed in real-time using biosensor strips on digital POCT instruments.

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Research and Discussion Results

Data on blood sugar measurement (GDS) in both groups of subjects after completing the phase of strenuous physical activity for 4 hours are presented in Table 1 below:

Table 4.1. Distribution of Subjects' GDS Scores by Intake Group

Sample No.	Current Blood Glucose Level (mg/dL)	Sample No.	Current Blood Glucose Level (mg/dL)
	Breakfast		**No Breakfast**
1	108	13	109
2	118	14	113
3	124	15	102
4	112	16	104
5	113	17	97
6	103	18	101
7	116	19	95
8	96	20	103
9	121	21	99
10	110	22	98
11	107	23	96
12	115	24	100
Rerata	112	Rerata	101

Results Based on the data exposure in Table 4.1, although the overall GDS value range of the subjects was within the normal physiological threshold corridor (70–140 mg/dL), there was a striking disparity in mean values. The group of subjects who received breakfast intake showed an average GDS concentration of 112 mg/dL. On the other hand, the group of workers who skipped breakfast showed a lower average GDS value of 101 mg/dL.

Before the application of the parametric test, an assessment of the distribution of data through *the Shapiro-Wilk normality test* was carried out as follows:

Table 4.2. Evaluation of Data Distribution Using the Shapiro-Wilk Method

Tests of Normality			
	Shapiro-Wilk		
	Statistic	df	Sig.
Breakfast	.984	12	.995
No Breakfast	.921	12	.293

The p-value of the two datasets exceeded the alpha limit of 0.05 (0.995 and 0.293 respectively), indicating the fulfillment of the assumption of distribution normality. Therefore, comparative testing was continued using the parametric computing of the Free Sample T-Test (Independent T-Test)

Table 4.3. Comparative Analysis of GDS Levels with *Independent T-Test*

Independent Samples Test				
		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
GDS up to	Equal variances assumed	3.854	22	.001
	Equal variances not assumed	3.854	19.409	.001

The comparative execution of the Independent T-Test yielded a significance value of p=0.001 (p < 0.05), confirming a statistically significant difference. The presence of an exogenous carbohydrate supply in the breakfast group maintained circulatory glucose stability, while the non-breakfast group relied on the hepatic glycogenolysis mechanism to compensate for muscle workload.

These findings prove the important role of breakfast in maintaining blood glucose balance during strenuous physical activity. The group of workers who ate breakfast were able to maintain a stable GDS level at an average of 112 mg/dL thanks to the availability of a supply of exogenous carbohydrates that were broken down gradually. In contrast, for workers who skipped breakfast, the body was forced to compensate for energy through the glycogenolysis process stimulated by the hormone glucagon to meet the needs of muscle contraction, which was shown by the decrease in the average GDS level to 101 mg/dL.

During strenuous motor activity walking, skeletal muscle adopts glucose as the main biological phosphorylation fuel. Increased glucose utilization that is not balanced by food intake triggers a decrease in blood circulatory energy supply. The selection of the duration of the 4-hour post-work check time is considered very representative because the daily carbohydrate reserves in the morning generally begin to be depleted in this phase of time. The acquisition of a degree of significance of p=0.001 substantively confirms the findings of previous studies, where neglect of morning nutrient consumption is directly proportional to the impairment of circulatory blood sugar stability, which has the potential to trigger earlier muscle fatigue as well as decreased productivity in rough industrial workers.

Conclusion

A. Conclusion

Based on the results of data analysis and experimental discussions, it can be concluded that:

1. Construction workers who ate breakfast recorded an average GDS level of 112 mg/dL after 4 hours of work.
2. Construction workers who skipped breakfast showed an average decrease in GDS levels of up to 101 mg/dL at the same work duration.
3. The habit of eating breakfast was shown to have a significant effect on the stability of blood glucose levels while in physical workers (p=0.001).

B. Suggestions

1. For follow-up research, it is expected to develop similar research by expanding the sample population and adding parameters for pre-activity blood glucose level examination (initial condition before work) as basic comparative data.
2. These field findings are projected to be a supporting reference and an empirical source of reference for the development of occupational physiology and occupational health studies.
3. The wider community, especially builders or groups of field workers with heavy physical activity loads, are encouraged to get used to eating breakfast before starting their work routine to maintain energy stability and body performance

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