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Original research article

The impact of skipping breakfast on young adults' sleep, brain function, and blood sugar levels: An observational study

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Abstract

Introduction and Background: Omitting breakfast occurs when you don't eat it at least three times a week. Eating breakfast is recommended as part of a balanced diet since it is linked to getting enough macro and micronutrients and keeping your body mass index where it should be.

Material and Methods: The study was an observational one done at the Department of Physiology, Father Colombo Institute of Medical Sciences, Warangal, Telangana, India. The Physiology lab was responsible for recording physiological indicators, conducting clinical examinations, and conducting mental tasks. Blood glucose levels were measured before and after eating in the Department of Physiology. Research was performed from June 2023 to November 2023.

Results: We found that among the people who admitted to skipping breakfast at random, more women than men participated. Numerous studies have found that men and women eat breakfast differently. Our research confirms that women are more likely than males to forgo breakfast. Girls may be more likely to skip breakfast than boys because of the widespread belief that doing so will help them lose weight. This finding suggests that efforts to improve breakfast consumption should concentrate on women.

Conclusion: Skipping breakfast is connected with poor performance in the digit span task. Blood sugar levels were found to be inversely related to the number of hours spent sleeping. In breakfast skippers, a low blood sugar level was correlated with poor performance on a digit span test.

Keywords: Skipping breakfast, sleep, brain function, and blood sugar levels

Introduction

The term "breakfast" is often used to refer to the first meal of the day, which is normally consumed within two hours of waking up and either immediately before or immediately after the start of one's daily activities. The standard advice is to eat breakfast before 10 a.m. The average person's daily energy needs are between 2000 and 3500 calories, and breakfast is responsible for providing between 20% and 35% of that amount [1, 2].

Breakfast omission is defined as the practice of regularly (at least three times per week) deciding to forego eating breakfast. Intake of enough macro-and micronutrients, as well as the maintenance of a healthy body mass index (BMI), have all been linked to the habit of eating breakfast. Therefore, breakfast should be part of a healthy eating plan. Despite the widespread belief that eating breakfast daily is a good habit, the number of breakfasts eaten by children, teenagers, and adults has been steadily declining over the past few decades [3, 4].

There is some evidence linking eating breakfast to better health, but it is not conclusive. Studies have shown that skipping breakfast has an indirect effect on glucose homeostasis, leading to higher 24-hour blood glucose levels. Breakfast eaters in the United States have been found to have a lower risk of acquiring abdominal obesity, metabolic syndrome, hypertension, and type 2 diabetes. The effect of skipping breakfast on glucose regulation in the Indian population has not been conclusively shown in the extant literature [5, 6].

Regular breakfast consumption has been linked to enhanced brain function and academic success in kids. Because of this, public health groups are pushing to have breakfast programs in schools. The digit 9. The act of eating breakfast has been linked to positive effects on cognitive functioning, according to previous studies [7]. However, the study did not investigate whether or whether eating breakfast affected other cognitive abilities, such as attention or problem-solving [8]. Eating breakfast has been linked to better sleep maintenance, more regular morning diurnal cycles, and enhanced mental health. In contrast, research has shown that skipping breakfast leads to less restful sleep for college students. None of the aforementioned studies aimed to determine whether or not skipping breakfast affected nighttime sleep

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patterns in adults, and all of those that did focused on children and adolescents. This study was therefore designed to investigate whether or not skipping breakfast has any effect on cognitive performance, sleep hygiene, and glucose homeostasis in a group of young adults from India [9, 10].
This study set out to examine how skipping breakfast affected the glucose homeostasis, cognition, and sleep patterns of a group of young adults. The participants in this study, both habitual breakfast eaters and those who skip it, will be compared on a variety of anthropometric variables. The purpose of this research is to compare and contrast people's blood glucose levels depending on whether or not they eat breakfast.

Materials and Methods
The study was an observational one done at the Department of Physiology, Father Colombo Institute of Medical Sciences, Warangal, Telangana, India. The Physiology lab was responsible for recording physiological indicators, conducting clinical examinations, and conducting mental tasks. Blood glucose levels were measured before and after eating in the Department of Physiology. Research was performed from June 2023 to November 2023.

Inclusion Criteria
- Young patients.
- Both male and female.
- Person taking breakfast regularly.

Exclusion Criteria
- Color blindness
- Sleep disorder.
- Drug therapy patient.
- Smokers.

Methodology
Before beginning, we sought approval from the Department of Physiology, institutional ethics committee. After subjects were screened for eligibility, the investigator took a detailed history of their breakfast habits in order to categorize them as either breakfast eaters or breakfast skippers. All participants were given a thorough explanation of the study's procedure in their native language, and written informed consent was obtained. And then we got started with the study.

Results
The study had a cohort of 100 participants. Among the sample population, there are 50 individuals who adhere to a regular breakfast consumption routine, whereas the remaining 50 individuals abstain from consuming breakfast altogether.

Table 1: Patient Age

Group	Mean Age	95% CI
Breakfast Taker	25.00	-0.401 to 2.147
Breakfast skippers	23.21	

Table 1 presents the average age of individuals who consume breakfast as 25.00 years, with the youngest participant being 18 years old and the oldest participant being 35 years old. In contrast, the average age of individuals who do not consume breakfast is 23.21 years, with the youngest participant also being 18 years old and the oldest participant being 34 years old. There was no statistically significant difference in age between the two groups.

Table 2: Gender wise distribution

Group	Gender					
	Male		Female		Total	
B-Taker	15	50.0%	35	50.0%	50	50.0%
B-Skipper	15	50.0%	35	50.0%	50	50.0%
Total	30	100.0%	70	100.0%	100	100.0%

Table 2 illustrates the participation of 50 individuals in both groups, with 30 identified as male and 70 identified as female in each respective group.

Table 3: Breakfast skippers group members

Gender	Number	Mean	S.D.

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Male	15	20.30	3.147
Female	35	22.61	4.047

Table 3 presents the distribution of subjects who willingly chose to participate in the study group, revealing that 66% of the participants were female, while 34% were male. However, it is important to note that the observed difference in gender distribution did not reach statistical significance. Therefore, our study group exhibited a higher prevalence of female breakfast skippers compared to male breakfast skippers.

Table 4: Body Weight

Group	Mean weight	95% CI
Breakfast eaters	68.134	4.4789 to 15.4569
Breakfast skippers	55.347	

The average weight of individuals who consumed breakfast was found to be 68.134, while the average weight of those who skipped breakfast was 55.347. The disparity in weight between these two groups was shown to be statistically significant, as indicated in Table 4.

Table 5: Patients BMI

Group	Mean BMI	95% CI
Breakfast eaters	25.4789	1.24578 to 3.89745
Breakfast skippers	22.5478	

Participants who consumed breakfast had a mean body mass index (BMI) of 25.4789, which was shown to be significantly higher than the mean BMI of individuals who skipped breakfast (22.5478), as indicated in Table 5.

Table 6: Making a test task-b

Group	Mean TM-B score	95% CI
Breakfast eaters	65.24	-12.234 to 1.327
Breakfast skippers	71.31	

Those who ate breakfast took an average of 65.24 seconds to complete trial creating task B, whereas those who didn't clocked in at 71.31 seconds, yielding a 95% CI in the unpaired comparison shown in Table 6. Trial making tasks A and B were completed more quickly by breakfast eaters than by breakfast skippers, although the difference was not statistically significant.

Table 7: Assignment to cancel letters

Group	Mean LCT score (SD)	95% CI
Breakfast eaters	57.08	-4.524 to 4.358
Breakfast skippers	58.85	

The duration of time required for individuals who consumed breakfast to complete the LCT task was seen to be longer compared to those who skipped breakfast. However, the disparity in the time necessary to complete the LCT task between the two groups did not yield statistically significant results, as indicated in Table 7.

Table 8: The task of pair cancellation

Group	Mean PCT score (SD)	95% CI
Breakfast eaters	72.21	-7.357 to 4.987
Breakfast skipper	72.74	

The duration of the postprandial cognitive task (PCT) was found to be shorter for individuals who consumed breakfast compared to those who skipped breakfast. However, the observed difference in PCT duration between the two groups was not deemed statistically significant, as indicated in Table 8.

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Discussion

The women in our study outnumbered the males by a 2:1 ratio, suggesting that women were more likely to skip breakfast than men were in our study's random sample. Previous studies have shown that men and women have different breakfast habits. Our results corroborate previous studies showing that females, in general, are less likely to have breakfast than their male counterparts. Girls may be more likely to skip breakfast because they believe a common myth that eating in the morning helps with weight loss. This indicates that the promotion of better breakfast behaviors should have a greater emphasis on the female population [11, 12].

The average height of those who have breakfast every day is higher than the average height of people who skip breakfast on a daily basis, although this difference is not statistically significant. The claim is further supported by research conducted by the same authors as well as others [13]. After providing breakfast for a year, the researcher saw a considerable increase in children's height. Since eating breakfast has been shown to improve nutritional status, it follows that doing so is beneficial. Our study found that those who eat breakfast every day are more likely to be overweight than those who skip breakfast at least three times per week when comparing body mass index (BMI), waist circumference (WC), and hip circumference. This result runs counter to the findings of a research by Stalo Papoutsou *et al*., which found an inverse relationship between breakfast consumption and BMI. Girls whose breakfast consumption was more consistent had a lower mean body mass index than those whose breakfast consumption was more sporadic [14-16].

Nafis *et al*. did a study to determine whether or not skipping breakfast contributes to obesity. The results showed that people whose breakfast habits were inconsistent had a higher frequency of overweight and obesity. This result contradicts the findings of our investigation. The authors *et al*. did a systematic review to investigate the effect of skipping breakfast on weight. In total, 16 studies were included in the analysis. Thirteen out of sixteen studies have found a beneficial correlation between having breakfast and reducing the risk of obesity. Only one study out of sixteen found that men fared better than women at keeping their weight stable after eating breakfast. Consuming breakfast has been hypothesized to have a weight-reducing effect because of the physiological processes of increased fullness and better blood sugar regulation [17-19].

Hanna Isaksson's research also shows that even small changes in nutrition can affect feelings of hunger and fullness, which in turn affects calorie intake and, eventually, body weight. Whole grain rye foods, such as breads and porridges, have been shown to increase satiety when compared to an isocaloric alternative of wheat bread. This shows that the type of food eaten directly affects how full one feels [20-22].

This finding suggests there is a difference in how breakfast affects weight gain or loss depending on a person's gender. Our findings, in line with previous research, suggest that the effect of breakfast intake behavior on BMI is less significant when there is a higher proportion of female participants. Previous studies have shown that the aforementioned effects depend on the type of food that is consumed. One possible explanation for the existence of contradictory results is a lack of information about the food's precise composition [23-25].

Those who ate breakfast were shown to have lower body mass index, waist circumference, and hip circumference than those who didn't. Despite this, a statistically significant difference between breakfast eaters and breakfast skippers was not seen in the waist-hip ratio. Our research shows that those who regularly eat breakfast are more likely to be overweight than those who skip this meal. We used the Pittsburgh Sleep Quality Index (PSQI) to analyze sleep duration and quality. There was a statistically significant difference between those who ate breakfast and those who didn't, with those who skipped breakfast having a higher mean PSQI score. This suggests that people who skip breakfast have poorer quality sleep than those who eat breakfast [26-28].

Our findings are supported by the research of Juan Sun, who found a strong connection between regular breakfast consumption and better sleep quality. Breakfast with enough tryptophan is turned into serotonin, a potent antidepressant, and helps maintain a morning-oriented diurnal rhythm, which is thought to account for the observed effects. The hormone melatonin, which is recognized for its ability to induce sleep, is synthesized from the neurotransmitter serotonin within the pineal gland during the night. As a result, it aids in producing better sleep at night. The circadian rhythm is mostly influenced by metabolic rate and dietary habits. Skipping breakfast has been linked to disruptions in circadian rhythm [29-31].

Our results corroborate those of previous studies by Lan Wang *et al*., who found that skipping breakfast is correlated with poorer sleep quality. One of the negative outcomes associated with skipping breakfast was found in a study by Nishiyama *et al*., which found that people who regularly skip breakfast have poorer sleep quality. Our research is strengthened by these pieces of evidence. Our investigation's results are supported by a separate study by Cheng *et al*., which used the same PSQI scale as did. Skipping breakfast is strongly linked to poor sleep quality, according to the study's authors [30-32].

Based on the results of the digit span test, our research shows that there is a significant performance gap between those who eat breakfast and those who do not. Breakfast eaters outperformed those who skipped

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it on the Trial Making Tasks A and B, the Pair Cancellation Task, and the Mental Arithmetic Task. No statistically significant difference in efficiency was found, though. It was found that people who ate breakfast performed worse on the letter cancellation test than those who didn't have breakfast [31-33].

Our results showed that having breakfast significantly increased people's working memory capacity. There were also non-statistically significant improvements in the individuals' abilities to focus, scan information quickly, reason in sequences, solve math problems, and process information quickly. When compared to those who skipped breakfast, those who ate breakfast demonstrated less perceptual speed. The results of the current study are consistent with those of a previous study that analyzed data from 319 people. The previous research showed that eating breakfast boosted quick recall within short-term memory but hampered focus [34, 35].

Another study that supports our finding is one by Gajer *et al*., which found that eating breakfast has a positive effect on memory, concentration, and productivity in the classroom. Tanya Zilberter and coworkers conducted a study to determine how adults' mental performance changed depending on whether they ate a high-carb or low-carb breakfast. The study by *et al*. found no evidence that eating breakfast boosts brainpower, in contrast to our findings. One possible explanation for the contradictory results is that study participants had widely varying breakfast habits and glucose tolerance levels. According to the prior article, the provision of blood sugar from breakfast aids in the creation of neurotransmitters like acetylcholine and dopamine. These neurotransmitters have been found to improve several mental processes, including focus, memory, and creativity. Our findings are supported by the fact that eating breakfast has been demonstrated to enhance memory, problem-solving skills, focus, and alertness [34-36].

Those who skip breakfast show a significant link between sleep disruption and performance on the digit span task. This shows that the decline in cognitive performance is proportional to the severity of the sleep disturbance. Alhola *et al*. report that both short-term and long-term sleep loss have detrimental effects on the prefrontal cortex. The evidence that lack of sleep negatively affects attention and memory supports the results of our investigation. Previous research by Gilbert *et al*. supports our findings, showing that poor sleep quality negatively impacts academic performance even in students who do not suffer from depression [37, 38].

Conclusion

Physical characteristics were compared between the two groups, including height, weight, blood glucose levels, and the ages at which individuals reached puberty and menarche. Breakfast eaters were shown to have a greater body mass index, waist circumference, hip circumference, and waist-to-hip ratio than those who skipped breakfast. Breakfast eaters slept significantly better than those who skipped breakfast. Those who ate breakfast outperformed those who skipped it significantly on a digit span task. The blood sugar levels of those who ate breakfast were higher than those who didn't. Breakfast skippers performed worse on a digit span task, which is correlated with how well they slept. The blood sugar level correlated negatively with the number of interrupted nights of sleep. The blood sugar levels of breakfast skippers were inversely related to their performance on the digit span task.

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Conflict of Interest: None.

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