

Acute Effect of Breakfast on Cognitive Performance in Young Adults

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Abstract: The present study aims to assess the cognitive performance before and after breakfast in healthy young adults (males). This effect may help in understanding the importance of breakfast on academic performance alertness, concentration etc. 30 healthy young males with normal BMI within the age of 20-35 years served as subjects for this study. The Arrow Flanker test (congruent and incongruent stimuli) is administered to assess the cognitive performance before and after the breakfast along with the estimation of blood sugar levels pre and post breakfast. Paired t test was performed to find the statistical significance for the reaction time in response to the stimuli pre and post breakfast. Paired t test applied for reaction time for congruent stimuli was found to be statistically significant ($p=0.04$). Paired t test applied for reaction time for incongruent stimuli was not found to be statistically significant ($p=0.253$). Paired t test for the average reaction time of both the stimuli was found to be statistically significant ($p=0.010$).

Keywords: Breakfast, congruent stimuli, incongruent stimuli, reaction time, Arrow flanker test.

INTRODUCTION

Breakfast is an important part of the healthy diet as it is associated with the supply of macro and micro nutrients, necessary for the daily activities. Breakfast is also widely promoted in children to improve cognitive function and academic performance, which has led to the provision of breakfast initiatives by the public health bodies.

Tasks requiring attention, executive function and memory were facilitated more reliably by breakfast consumption relative to fasting, the effects are more pronounced in undernourished children. Consuming breakfast also has a role in maintaining BMI within the normal limits.

Breakfast not only meets the needs of the body but also decreases the risk of diseases like Diabetes mellitus, Cardio vascular diseases, cerebrovascular diseases and many chronic diseases as per the previous studies. Research findings have demonstrated that people who eat breakfast everyday have lower risk of obesity, and Diabetes mellitus than their counterparts who do not eat breakfast regularly [1]. Another study revealed that skipping of breakfast has a negative effect on cognitive function and is also associated with unhealthy lifestyles, alcohol, tobacco and substance

abuse [2]. Glucose is the main energy supplying ingredient for the brain; it works best when the glucose concentration is between 80-120mg/dl. Several experimental studies have suggested that both in adults and children, behaviour and cognitive performance is improved after consumption of breakfast compared to omission of breakfast. Studies. Has shown that breakfast is associated with short term improvements to memory [3]. Some studies reported no benefit of breakfast consumption over breakfast omission [4]. Breakfast omission or consumption may not have a significant effect on low cognitive loads task involving mostly information processing, high cognitive load tasks require an increase in the metabolic resources to successfully complete the task [5]. The importance of breakfast for academic achievement is reflected on cognitive performance [6]. Research also suggests that skipping breakfast detrimentally affects problem

solving [10], short term memory [7], attention and episodic memory [8] in children. When children consume breakfast performance is enhanced on measures of vigilance attention, arithmetic [9], problem solving tasks and logical reasoning. This study is to investigate the effects of breakfast on cognitive function among the students in Andhra University Law College, Visakhapatnam. The results of the study provide evidence on the effect of breakfast on cognitive function which helps in good academic performance and promoting a healthy life style.

MATERIALS AND METHODS

Thirty male healthy law students in the age group of 20-35 years volunteered to participate in the study. Clearance from the Institutional Ethical Committee was obtained before undertaking the study. This study was conducted in the law college hostel of Andhra University, Visakhapatnam. The study was conducted during the morning hours and commenced with the measurement of fasting blood sugar and are subjected to the Arrow Flanker test ,where the congruent and incongruent stimuli are present and the reaction time was recorded. The average reaction time for both the stimuli is also noted. Height, weight and body mass index of the subjects was recorded .Height were measured in centimetres without footwear using a vertically movable scale .Weight was measured to the nearest 100 grams by using a digital scale. Body mass index was derived by Queenlet Index.

Subjects were asked to have the breakfast which was provided in the hostel regularly (south Indian). After 90 minutes, the post prandial blood sugar was estimated by using a glucometer and again they are

subjected to the Arrow Flanker test [11] and the reaction time was recorded. All the data was presented as a mean and standard deviation. Paired t-test was performed to find statistical significance of reaction time if any for the congruent and incongruent stimuli before and after breakfast and for the average reaction time. The accepted level of significance for differences was equal to or less than 0.05 for all the tests (P value< 0.05).

ARROW FLANKER TEST: [12]

This is a test of attention in the presence of distracting information. You see an array of five symbols. The central symbol is always an arrow, which points to the left or right. If the arrow points to the left, you should press the left arrow key on the computer key board. If it points to the right, press the right arrow key. The four symbols on either side of the central target arrow are called flankers. The flanker symbols can also be arrow, sometimes they point in the same direction as the middle target arrow. Sometimes the flanker point in the opposite direction to the target.

This is a reaction time task, should be responded as quickly as possible, while avoiding errors. Record the reaction times averaged over the test and the total number of errors. Reaction times are recorded separately for each type of stimulus. Reaction to the incongruent stimuli (when the flanker point in the opposite direction to the target) are slower than to congruent stimuli (where target and flankers point in the same direction. This test can be run on a tablet computer or a java enabled mobile phone .The test normally lasts about 3 minutes.





RESULTS

Table: 1

Variables	Mean±Std.Deviation
c1	626.83±127.32
c2	551.06±104.34
ic1	682.95±159.36
ic2	643.78±198.57
a1	651.09±125.84
a2	584.21±136.48

Mean and standard deviation of reaction time for the congruent stimuli before breakfast (c1) is 626.83±127.32. Mean and standard deviation of reaction time for the congruent stimuli after breakfast (c2) is 551.06±104.34. Mean and standard deviation of reaction time for the incongruent stimuli before breakfast (ic1) is 682.95±159.36. Mean and standard deviation of reaction time for the incongruent stimuli after breakfast (ic2) is 643.78±198.57. Mean and standard deviation of average reaction time before breakfast (a1) is 651.09±125.84. Mean and standard deviation of average reaction time after breakfast (a2) is 584.21±136.48.

Table-2: Paired sample status

Paired samples		Mean±Std. Deviation
Pair 1	c1 – c2	75.76±132.64
Pair 2	ic1 – ic2	39.16±184.08
Pair 3	a1 – a2	66.88±132.47

Table-3: Paired Samples Test

	t	P value
Pair 1c1 - c2	3.128	.004
Pair 2ic1 - ic2	1.165	.253
Pair 3a1 - a2	2.765	.010

Paired t-test was performed for the reaction time of the congruent stimuli before and after breakfast and was found to be significant (P value 0.04).

Paired t-test for the reaction time of the incongruent stimuli before and after breakfast was not statistically significant (P value 0.253). Though not significant statistically, there is decreased reaction time. Paired t-test for the average reaction time was statistically significant (P value 0.010).

From the above study it is seen that the effect is more pronounced with the congruent stimuli compared to the incongruent stimuli. But the average reaction time for both the stimuli showed positive results.

DISCUSSION

The present study supports that breakfast has a significant role on cognitive performance in young

adults. Hence it is very important to insist on having breakfast as it helps in better performance. Many research studies have proved that consumption has an edge over skipping breakfast on individual performance which is more pronounced in undernourished children. The benefit of breakfast for learning in children is largely based on the evidence which demonstrated acute effects of breakfast on cognitive performance from laboratory based experimental studies. Studies demonstrated that eating breakfast has positive effect on cognition particularly in the domain of memory and attention. However not all studies show positive effects of breakfast consumption on cognitive behaviour.

CONCLUSION

Consumption of breakfast showed positive effect on cognitive performance of young adults which helps in the improvement of academic performance, concentration and alertness. This study shows that

benefits of eating breakfast are seen not only in children but also in adults.

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