

# Effect of Breakfast Skipping on Cognitive Performance of Girls of Age 14-16 years

<sup>1</sup> **Mahnaz Nasir Khan**

Head of Food Science & Human Nutrition Department, Kinnaird College for Women, Lahore

<sup>2</sup> **Memoona Khalid**

Lecturer Food Science & Human Nutrition Department, Kinnaird College for Women, Lahore

<sup>3</sup> **Nasreen Kausar**

Lecturer Food Science & Human Nutrition Department, Kinnaird College for Women, Lahore

<sup>4</sup> **Samia Khalid**

Lecturer Food Science & Human Nutrition Department, Kinnaird College for Women, Lahore

## Corresponding Author:

**Mahnaz Nasir Khan,**

Head of Food Science & Human Nutrition Department Kinnaird College,  
93 Jail Road Lahore

E-mail [fshnkinnaird@gamil.com](mailto:fshnkinnaird@gamil.com)

## Abstract:

### **Objective:**

*The objectives of the proposed study are to study the effect of breakfast skipping on cognitive performance and to explore various factors relating to breakfast skipping and cognitive performance.*

### **Subjects/Methods:**

*The study was a non-randomized controlled clinical trial on 56 participants in total which were divided into two groups of 28 participants each. The total number of respondents selected was 63 but incomplete data was omitted. Cognitive Ability (CogAt) Test was used to determine cognitive ability of the respondents and experimental and effect was measured in experimental and control groups. Data was collected after 60 minutes of administration of breakfast.*

### **Results:**

*Verbal classification section has shown that breakfast skipping affects cognitive performance of girls and it has p value of 0.049. Other sections have insignificant values.*

### **Conclusions:**

*The study has shown insignificant response to breakfast skipping and hypothesis has been rejected. Further research in the area is required for enhancing the scope of the study.*

**Keywords:** Breakfast, breakfast skipping, cognitive performance

**Introduction:**

Breakfast is the first meal of the day and is considered most important for actively performing various tasks. Breakfast consumption is defined as the consumption of food, beverage, or both between 0500 and 1000 kilocalories (Siega-Riz, *et al.*, 1998). Healthy breakfast is a nutritious meal rich in complex carbohydrate including fiber, moderate in protein and low in fat, salt and sugar (sucrose). Fresh fruit juice with whole grain bread or cereal and low fat or skim milk, cheese or low sugar yogurt is an ideal breakfast (Rubin, 2003). Breakfast cereals is a good choice to start the day with as they provide us complex carbohydrates and are nutritionally dense and low in fat. Nutrients are obtained from them and this may be the reason that body mass index of regular breakfast cereal eaters is lower (Gibson & O'Sullivan, 1995). It is considered as important meal for the development and growth of the children and adolescents. Eating breakfast was one of the "seven healthy habits" and those who ate breakfast almost every day (did not eat between meals) reported slightly but significantly better physical health than skippers (Shaw, 1998). Five percent children in primary school and 13% children in secondary school skip breakfast and this ratio is more dominant for girls than for boys (Brugman, *et al.*, 1998). Every person needs energy and nutritional boost in the morning to work through all day (CLF, 1997). The ratio of skipping breakfast is more in women than in men. The individual choice has linear relationship with breakfast skipping. The factors prevalent in skipping of breakfast are lack of time and no hunger in the morning (Shaw, 1998). The market is providing a large variety of breakfast items but the percentage of breakfast skipping has increased in the last decade in the United States (Siega-Riz, *et al.*, 1998). The rate of breakfast skipping is estimated to be 4% for ages 9-19 years (Resnicow, 1991), 11% for grades 1-12 (Gleason, 1995), and 18% for grades 7 to 8 (Singleton & Rhoads, 1982).

Breakfast affects children's health in a positive way. Children who consistently take breakfast have better nutritional profiles than their peers who skip breakfast (Rampersaud, *et al.*, 2005). As breakfast provides nutritional benefits to children and adolescents therefore, United States government established a program for School Breakfast Program. Children show better cognitive performance and visual processing after consuming breakfast (Mahoney, *et al.*, 2005). Evidence suggests that breakfast consumption may improve cognitive function related to memory, test grades, and school attendance but this function of breakfast needs further research (Rampersaud, *et al.*, 2005). Increased student attention, fewer behavioral problems and visits to the nurse, and a general increase in math and reading scores were attributed to the intake of healthy breakfast (Miller, *et al.*, 1998). Overnight and morning fast has adverse effects on children's vigilance and short-term working abilities especially cognition. The memory of the individuals is not fully functioning if they are subjected to fast even in the morning after spending long night (Pollitt, 1995). The availability of glucose and nutrients for the brain becomes low after fasting overnight and hence breakfast skipping poses long term risks to memory status of children. The term breakfast refers to "breaking the fast" of the night which if skippers not break can have adverse effects (Worobey, & Worobey, 1999). Skipping breakfast can affect the brain functionality especially of school going children which is why the idea has been molded into a research for studying the actual effect of breakfast skipping. The aim of the proposed study is to study the effect of breakfast skipping on cognitive performance and to explore various factors relating to breakfast skipping and cognitive performance.

**Materials and Methods:**

The study was conducted on 14-16 years old girls with an average result of 60 to 75%. The total participants were selected and divided into control and experimental groups. The participants were selected from 9<sup>th</sup> and 10<sup>th</sup> grades using cluster sampling and divided into two groups. Data collection for the respective non-randomized clinical trial with control group was carried out in The Punjab School where each group was

allotted separate rooms. The groups have been evaluated for the effect of independent variable, breakfast, on dependent variable, cognitive ability, using CogAt (Cognitive Ability) Test. The CogAt Test has been retrieved from the internet and three of the six sections were being modified according to the need of the study. It was validated through a pilot study on 20 respondents. Permission was taken from ethical committee of the institution for the conduction of study and written informed consent was taken from the respondents and their parents prior to study. Rapport was build with the participants prior to final collection of data and they were asked to skip breakfast on the day of study.

### Procedure:

The two groups in which the respondents were assorted are as under:

**Group 1:** This group was asked to skip breakfast and then they were asked to fill the questionnaires.

**Group 2:** This group will be provided breakfast by the researcher and then the respondents were asked to fill the questionnaires. The questionnaires were filled 60 minutes after the consumption of breakfast.

Incomplete questionnaires were omitted from the study and the results were compiled for only 28 complete questionnaires. Breakfast provided to the respondents has the following composition in order to gain maximum benefits in terms of effectiveness of cognitive ability as this is the healthy recommended levels of nutrients in breakfast (Condon, *et al.*, 2009).

**Table 1: Composition of Breakfast for Subjects**

Food	Serving	Carbohydrates	Proteins	Fats	Calories
1/2 Cup Milk	1/2	6	4	3	75
20 grams Corn flakes	1/2	17.62	1.3	-	77
3/4 Cup Strawberries	1/2	7.5	-	-	30
<b>Total</b>		<b>31.12</b>	<b>5.3</b>	<b>3</b>	<b>182</b>

### Results:

The main objective of the study was to show the effect of breakfast skipping on cognitive performance of girls as females have shown to be affected more than males. CogAt Test has been divided into 6 sub-sections namely; verbal classification, sentence completion, verbal analogies, quantitative relations, figure classification, and matching abilities. This test has been implied as it is the best rated test for measuring cognitive ability of 12 to 19 years old. The collected data was analyzed with the application of Chi-square test on all the sections of the CogAt Test for comparison between the control and experimental group. The scores were analyzed on the basis of the division in four rating scale of all the sections as: exceptional (Score=5), excellent (Score=4), good (Score=3), and poor (Score=0-2).

**Table 2: Comparison of Effect of Breakfast Intake on Cognitive Ability**

Sections of Cog At Test	Intake of Breakfast	Exceptional (Score 5)	Excellent (Score 4)	Good (Score 3)	Poor (Score 0-2)	p-value
Section 1: Verbal Classification	Yes	3.6%	7%	53.6%	35.7%	0.049
	No	0%	11%	75%	68%	
Section 2: Sentence Completion	Yes	7%	28.6%	50%	14%	0.802
	No	14%	25%	43%	18%	
Section 3: Verbal Analogies	Yes	0%	0%	21%	78.6%	0.580
	No	0%	3.6%	18%	78.6%	
Section 4: Quantitative Relations	Yes	0%	0%	14%	86%	0.233
	No	0%	3.6%	28.6%	68%	
Section 5: Figure Classification	Yes	0%	3.6%	21%	75%	0.362
	No	3.6%	0%	11%	86%	
Section 6: Matching Abilities	Yes	0%	18%	53.6%	28.6%	0.249
	No	0%	21%	32%	46%	

**Discussion:**

The current data does not support the relationship between cognitive performance and breakfast consumption. The limitations may be the fact due to which the data is inconsistent with the previous researches. Previous researches define a strong relationship between breakfast skipping and cognitive abilities and omitting breakfast interferes with cognition and learning, an effect that is more pronounced in nutritionally at-risk children than in well-nourished children. The results of the study indicate that only Section 1 (Verbal Classification Performance Analysis) has significant results and breakfast skipping affects the cognition. Other sections did not show significant effect on cognitive performance. Confounding variables may also be related to the negative correlation in subjects who consumed breakfast and these confounding factors were not always included as an adjustment factor in the statistical analyses. The confounding factor included in the research is the previous nutritional status of the respondents. The cognitive performance analysis showed that the respondents without breakfast consumption are good at various sections although the overall performance was poor in the intelligence test. Their abilities may be varied and subjects not good at figure classifications showed exceptional behavior in verbal classification. Negative effects of breakfast skipping are not known to majority of the students who skip breakfast. Breakfast is considered an important meal of the day because of the positive contributions to health it makes. Overnight fast can deprive body and brain of glucose needed for performing the activities of next day. When there is no consumption of breakfast then it would make it difficult for the body and brain to actively perform tasks. Glucose, the source of energy for brain, comes from food. This is why the respondents who did not consume breakfast did not score well in Intelligence test (Table 2). It is not necessary that breakfast

should provide some additional supplementation. Breakfast, with or without any kind of supplementation is necessary for improving the nutritional quality of diets in teenagers (Nicklas, *et al.*, 2000). Therefore, the consumption of breakfast should be encouraged by parents and awareness about healthy eating patterns should be spread among teenagers.

The study revealed that consumption of breakfast is a significant factor for brain performance. Therefore, there should be emphasis for its regular consumption. The eating behavior and content of breakfast can be determined using food record or providing the students with a food diary. The benefit of the food diary is that the students would write the name and quantity of the food they consume in breakfast. In this way the quantity and quality of breakfast can be assumed. The effect on cognitive performance is a crucial one and initiative from the school can be taken for improving the health status of their students. In this regard certain steps could be taken. School can start a breakfast program in which healthy foods can be made available to students for the purpose of achieving excellent academic performance. Nominal amount from their monthly dues can be deducted and healthy food containing all the nutrients can be provided to the students. School can take a step to introduce programs relating to the awareness of various healthy foods. In this regard, food eating competitions, fruit days and skits and plays delivering health messages can be an effective approach. Parents and peers are the most influencing bodies in the adoption of healthy eating behaviors. Therefore, parents should be made aware of the importance of breakfast for their children so they can encourage their children to consume healthy foods.

Nutrition education is a powerful tool that can be effective at community level and schools are a dominant community where children spend most of their time. This is why initiative should be taken from school level in order to bring change. Like other researches, this study is also not without limitations. The research was concise due to the limited time frame for the researcher. The research aims to investigate the relationship of breakfast skipping and cognitive performance in girls of age 14 to 16 years. The results are not in conjunction with the hypothesis but breakfast is the source of energy for the performance of all activities throughout the day and its consumption is significant.

## References

- Brugman, E, Meulmeester, J, Der Wekke, A. & Verloove-Vanhorick, S. (1998). Breakfast-skipping in children and young adolescents in the Netherlands. *European Journal of Public Health*, 8(4), 325-328.
- CLF (1997). *Directory of child nutrition programs*. Canadian Living Foundation, Breakfast for Learning. New York, Ontario.
- Condon, E. M., Crepinsek, M. K., & Fox, M. K. (2009). School meals: Types of foods offered to and consumed by children at lunch and breakfast. *Journal of the American Dietetic Association*, 109(2), S67-S78.
- Gibson, S. A., & O'Sullivan, K. R. (1995). Breakfast cereal consumption patterns and nutrient intakes of British schoolchildren. *Perspectives in Public Health*, 115(6), 366-370.
- Gleason, P.M. (1995). Participation in the National School Lunch Program and the School Breakfast Program. *American Journal of Clinical Nutrition*, 61(S), 213S-2290S.
- Mahoney, C., Taylor, H., Kanarek, R. & Samuel, P (2005). Effect of breakfast composition on cognitive processes in elementary school children. *Physiology & Behavior*, 85(5), 635-645.
- Malinow, M. R., Duell, P. B., Hess, D. L., Anderson, P. H., Kruger, W. D., Phillipson, B. E.,

- Gluckman, R. A., Block, P. C., & Upson, B.M. (1998). Reduction of plasma homocyst(e)ine levels by breakfast cereal fortified with folic acid in patients with coronary heart disease. *The New England Journal of Medicine*, 338, 1009-1015.
- McIntyre, L. (1993). A survey of breakfast-skipping and inadequate breakfast eating among young school children in Nova Scotia. *Canadian Journal of Public Health*, 84, 410-414.
- Miller, G. D., Forgac, T., Cline, T., & McBean, L. D. (1998). Breakfast benefits children in the US and abroad. *Journal of the American College of Nutrition*, 17(1), 4-6.
- Nicklas, T. A., Reger, C., Myers, L., & o'Neil, C. (2000). Breakfast consumption with and without vitamin-mineral supplement use favorably impacts daily nutrient intake of ninth-grade students. *Journal of Adolescent Health*, 27(5), 314-321.
- Pollitt, E. (1995). Does breakfast make a difference in school? *Journal of American Dietetic Association*, 95, 1134-1139.
- Rampersaud, G., Pereira, M., Girard, B., Adams, J & Metz, J. (2005). Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *Journal of the American Dietetic Association*, 105(5), 743-760.
- Resnicow, K. (1991). The relationships between breakfast habits and plasma cholesterol levels in schoolchildren. *Journal of School Health*, 61(2), 81-95.
- Rubin, K.W. (2003). Start the day off right: Healthy breakfast. *Foodservice Director*, 16(8), 38.
- Shaw, M. (1998). Adolescent breakfast skipping: an Australian study. *Adolescence*, 33(132), 851-861.
- Siega-Riz, A., Popkin, B. & Carson, T (1998). Trends in breakfast consumption for children in the United States from 1965-1991. *American Journal of Clinical Nutrition*, 67(1), 748S-756S.
- Singleton, N., & Rhoads, D.S. (1982). Meal and snack patterns of students. *Journal of School Health*, 52, 529-534.
- Tappy, L., Gugolz, E., & Wursch, P. (1996). Effects of breakfast cereals containing various amounts of  $\beta$ -glucan fibers on plasma glucose and insulin responses in NIDDM subjects. *Diabetes Care*, 19(8), 831-834.
- Timlin, M. T., Pereira, M. A., Story, M., & Neumark-Sztainer, D. (2008). Breakfast eating and weight change in a 5-year prospective analysis of adolescents: Project eat (eating among teens). *Pediatrics*, 121(3), e638-e645.
- Worobey, J., & Worobey, H. (1999). The impact of a two-year school breakfast program for preschool aged children on their nutrient intake and pre academic performance. *Child Study Journal*, 29(2).