

Association Between Breakfast Consumption and Math Scores of High School Students in Tehran

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ABSTRACT

Contrast to the impact of breakfast consumption on student's scores success; it has not been investigated in Iran. Assess the association between breakfast and snack consumption with math score and attention in class among high school students in Tehran had importance. In a cross-sectional study with descriptive-analytic aspects, 300 high school students in Tehran were studied. Sampling was done as a simple stratified method. Data were collected by a researcher made questionnaire and were analyzed with SPSS software. The mean age of participants was 16.2 ± 0.9 . Average of tuition and math score were 17.3 ± 1.8 and 15.6 ± 3.8 . 72.6% of students take breakfast every day and only 2.1% went to school without it. 64.6% ate snack every day. There was no correlation between taking of breakfast with the level of attention in class and tuition, but the math score was correlated with breakfast ($p=0.045$, $r=0.107$). There wasn't any association between math scores and level of attention with consumption of snacks ($p>0.05$). There is a significant relationship between taking of breakfast with BMI ($p<0.001$, [CI:0.001-0.010]). Eating breakfast can have a positive impact on scores of subjects, especially math score. It is essential to perform studies with control groups to achieve more accurate results.

Key word: Breakfast, Snack, Math score, Body mass index, Student.

INTRODUCTION

Breakfast is considered to be the most important meal in a day because it is eaten after the longest hungry period and its omission can reduce the nutritive quantity in the brain and ultimately subsides the cognitive function^{1,2}. This main meal must provide 20 percent of adolescents' daily energy demand³ and its consumption is important for their health and development⁴. In school's age, the infant's development equally continues and with the growth mutation, this matter becomes extremely important. For the reason that necessary energy level of school infants would be different because of their body size,

motion level and growth rate; if the necessary energy could not be provided, the protein for development and regeneration body tissues would be spent on producing energy⁵. Behavioral, emotional and scholastic problems in the hungry infants are more in comparison with other infants and they are isolated in the society⁶ and have more possibility of hyperactivity⁷. Students suffering from malnutrition have less attention and concentration, thus have more educational slowdown⁸⁻¹². Persistent refraining from eating breakfast as a habit, results in deficiency of the body's absorption of necessary nutritious substances. This matter results in deficiency of calories, vitamins and salts^{13, 14}.

On the other hand, researches have shown that eating breakfast helps infants to have a better learning experience in the school¹⁵ and causes them to be more happy and active and to enhance their concentration, memory and learning^{16, 17}. The proportional increase in blood sugar after eating breakfast results in improving brain function and providing necessary for daily activities¹⁸. Moreover, eating breakfast has a significant on preventing students' obesity^{14, 19}. The students who eat a full breakfast in their diet suffer less stress²⁰.

The students who ate breakfast every day and attended in the class activities, took the lead over their classmates who did not eat breakfast in learning their lessons; these students in the physical education hours and recreational activities have more energy as compared with other students²¹.

Nutrition in the form of snacks results in decreasing students' absence, extending their attendance in the school, improving educational goals such as a better comprehension, less rejection and reducing scholastic matters' repetition, releasing energy, improving infants' health status²² and satisfying their short-term hunger leads to have a better performance²³. Some studies about the impact of eating breakfast on scholastic scores particularly on math scores have been conducted in the world. This impact can be analyzed in two areas. The first one is on the memorizing lessons like English language and abstract ones like math. Some of the studies did not show increase in scholastic scores²⁴. In some studies, its impact on memory has been obvious, but has not had impact on the students' performance indicators²⁵⁻²⁸. Some other studies have shown eating breakfast's positive impact on the scores especially on the math scores^{19, 29, 30}. In spite of the fact that eating breakfast and snacks is extremely important, omission of these meals in relation to other meals is more in the students³¹⁻³³. Short-term memory, awareness and attention level in the class, concentration in studying lessons and increasing scholastic scores are of those areas, which have captured researchers' attention. In our country, the analysis of eating breakfast's impact on scholastic scores has been of little importance. This research conducted with the aim of analyzing the relationship of eating breakfast and snack with math score and awareness level in high school students in Tehran.

MATERIALS AND METHODS

This study was a cross-sectional study with descriptive-analytic aspects that its aim was to analyze the impact of eating breakfast and snacks on students' performance from the viewpoint of awareness in the class and math scores was designed and conducted. The studying statistical community was the studying students in the eighth educational area of Tehran. Sample size was determined 291 people with 95% of confidence limits and 5% of error which in order to improve the accuracy, 300 people were included in the study. The sampling was done in probable one-step of simple stratified method in a way that 100 people of them were of grade one, 100 people of grade two and other 100 people were of grade three in high school. The criterion to be selected for the study was reaching the maximum age of 18 and not having the average score below 10 marks. The criterion for exiting from the study was dissatisfaction with answering the questions. In order to prevent from the impact of factors such as gender and age on the impact of eating breakfast and snack on math scores, all of the students were selected from male school and this impact was assessed in each scholastic grade for equalizing students' circumstances as far as possible.

A researcher-made questionnaire in two parts was used to collect data. The first part included questions about demographic data and a background of age, height, educational levels, mothers and their husbands' job and child numbers and in the second part questions about breakfast and snack consumption level, awareness in the math class and score and grade average of math were asked. For making the questionnaire admissible, it was given to several clear-sighted persons. After receiving comments and revisions, a pilot study carried out in the east schools of Tehran and the final questionnaire was designed. For making the questionnaire permanent, the test-retest method was used.

Before administering the questionnaire, necessary explanations for filling the questionnaire and confidential information were given and the participants' satisfaction was gained orally. After filling the questionnaires, its existing information

was encoded and was put on SPSS version 17. After testing the distribution normality of data by Kolmogorov-smirnovtest in the descriptive analysis of central indices, percentage and average were used. In the analytical section of the study, Pearson statistical and the variance analysis tests were conducted and finally the tables and frequency distribution charts were produced from analyzing data by the statistical software.

RESULTS

The average age of the participated people was 16.2 with criterion deviation of 0.9 (the minimum 14 and maximum 18 years). The average

scholastic score of the all students in the last term was 17.3 ± 1.8 . Of all the participants in the study the average 77.7% of them was more than 16; the average score of all the students' math was 15.6 ± 3.8 . The students' average grade and score of math in each scholastic grade is shown in the table 1. From the viewpoint of awareness in the math class and attention to the teachers, 49.3% of them were excellent, 35.3% middle and 15.3% of them were poor. The average of the family child number was 2.6 ± 1 . From the viewpoint of weight, the weight of more than 90 kilograms was the lowest frequency and the highest frequency was of 51 to 70 kilograms in the study. The average of body mass index was 21.1 ± 3.7 . In 66.8% of students, body mass index

Table 1: The average and math score average of the students in each scholastic grade

	Grade one	Grade two	Grade three
The average	9.1±6.17	7.1±4.17	6.1±0.17
Math score average	8.3±8.15	8.3±3.15	0.4±6.15

Table 2: The distribution of body mass index based on the standard distribution

Body mass index limits	Frequency	Frequency percentage
Thin	19.9	
Normal	194	66.8
Overweight	32	10.9
Fat	7	2.4
Total	291	100

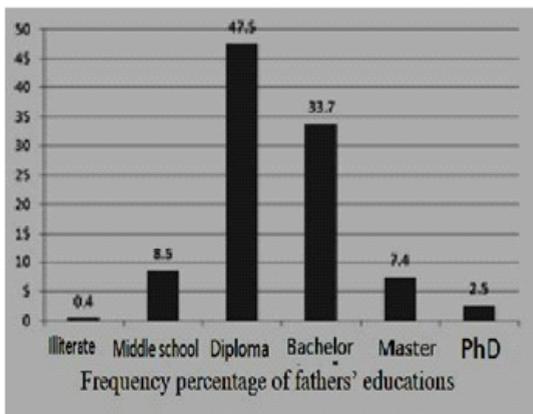


Fig. 1: Frequency percentage of fathers' educations

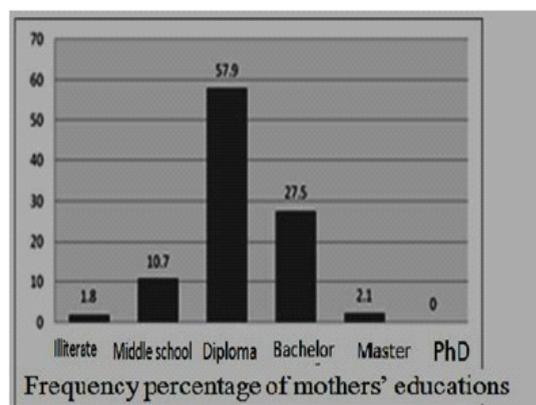


Fig. 2: Frequency percentage of mothers' educations

(MBI) was in normal range and 10.9% of them were overweight (table 2).

As table 1 shows, the highest frequency of the fathers' educational degree of the study was of diploma certificate (47.5%) and the lowest one (0.4%) was of illiterate fathers. The highest frequency of the mothers' educational degree was of (57.9%) diploma degree (chart 2). From the viewpoint of job, 38.2 percent of the participated fathers in the study had freelance jobs and 7 % of the students' fathers were worker. The highest percentages of mothers were housekeeper and after that, most of them had educational jobs. Based on the results, about 72.6% of the students ate breakfast everyday and then went to school; 13.2% of them ate breakfast about four or six times in a week, 12.1% of the studying students ate breakfast one or three times in a week before going to school. Only 6 people of the study (2.1%) went to school without eating breakfast. Overall, the average breakfast meal in a week was 5.9 ± 1.9 . It became evident that most of the students mentioned getting up late as a reason for not eating breakfast. After that, 29 people stated that they had not appetite for eating breakfast and 12 people of the sample did not like to eat breakfast; the others mentioned that their main reason for not eating breakfast was that in the time of going to school, breakfast was not served. Based on the results about 64.6% of the students eat snacks every day. 13.2% of them ate snacks about four to six times in a week, 12.2% of the students ate snacks about one to three times in a week and 29 people (10.1%) did not eat snacks at all. Overall, the average of eating snacks in a week was 5.4 ± 2.4 .

Based on Pearson test there was no relation between eating breakfast with awareness and attention level, but math score had a significant relationship with eating breakfast ($r=107\%$, $p=045\%$). There was no significant relationship between math score and awareness level in the class with eating snack ($P>0.05$). The analysis test in each scholastic grade showed no relationship between math score and eating breakfast.

Based on Pearson test, there was no relationship between eating breakfast and the average score of students ($P>0.05$). Moreover, the variance analysis showed that there was no relation between eating breakfast and parents' educational

level ($P>0.05$). After that body mass index (MBI) was considered based on the standard distributions in four groups of thin, normal, overweight and fat, the variance analysis test showed a significant relationship between eating and not eating breakfast with body mass index ($p<0.001$, [CI:0.001-0.010]), but there was no relationship between eating snacks and body mass index ($P>0.05$). Pearson test showed that there was no relation between breakfast meals in a week and snacks with the number of child, age, height and weight ($P>0.05$).

DISCUSSION

This study aimed to analyze the relationship between eating breakfast and snack with awareness level in the students of one of the high schools in Tehran. Based on the study, most of students ate breakfast every day and few of them went to school without eating breakfast. The conducted studies in this area show that most of students eat their breakfast before going to school which this matter shows their families' care for their health and development that can guarantee their health in adulthood and makes them healthy human resources for the future. A conducted study by Chauliac in Paris schools showed that about 5.9% of teenagers never ate breakfast before going to school³⁴. A conducted study by Asfarjani in Tehran indicated that about 35.86% of young girls went to school without eating breakfast³⁵. A study by Graham showed that about 10% of the students did not eat breakfast³⁶. In another study, which was conducted in Tehran on the guidance schools' students indicated that about 14% of girls did not eat breakfast³⁷. In Anderson's study, which was carried out in Norway, indicated that about 13.4% of the students ate breakfast twice in a week or less. In a study conducted by Nemati in Aradabil city indicated that 16.85% of the students did not eat breakfast¹⁶. An economic study on the guidance grade's girls in Tabriz showed that 25.3% of the studying students did not eat breakfast³⁸. In another study conducted by Murata in Japan and in other study by Bozorgmehr in Tehran schools concerning eating breakfast in infants 9 to 12 years showed the omission of breakfast in comparison with other meals.

In respect to this point, on the one hand the latter study is more recent in comparison with other studies and on the other hand because of spreading

mass media and increasing of the educational levels in families regarding importance of breakfast have increased physical strength and enhanced students' intelligence and attention and their physical fitness. As a result, families' attention to eating breakfast has increased and for this reason, breakfast consumption in this study has risen as compared with other studies. The results in the study are more close to the results of developed countries such as France and Norway which were mentioned before; this matter indicates our closeness to the international standard.

Based on this analysis, a small percentage of the students ignore eating snacks and most of them eat their snacks in school. Generally, few studies have been done in this area. The important matter is that human body in a night and day is active, and cells for doing their functions in favorable conditions need to energy, salts, vitamin and protein. Thus, necessary nutritive substances for body must be distributed in suitable intervals. This matter is extremely important for developing infants and teenagers who have more mental activities. For this reason in addition to 3 main meals, 2 or 3 snack meals in the forms of morning, evening and after-dinner meals can provide body these necessary substances³⁹. In recent years because of spreading mass media and increasing of the educational levels in families regarding importance of breakfast have increased physical strength and enhanced students' intelligence and attention and their physical fitness. As a result, families' attention to eating breakfast and snack has increased.

According to the mentioned matters, parents can diversify breakfast foods and snack to increase their own children's appetite. However, the favorable items such as cream, honey, chocolate milk and chocolate are consumed less than other foods because of their high price and most of families cannot afford these items.

Based on the results of this analysis there is a significant relationship between eating breakfast and not eating breakfast with body mass index (BMI) in a way that those who ate breakfast, their body mass index was lower. Some of the conducted studies in this area confirm this matter. In a study conducted by Summerbell *et al.*, indicated that eating

adequate breakfast in teenagers is related to lower body mass index⁴⁰.

Based on the study's results, there is no relationship between eating breakfast and attention level in the class. However, the author's searching studies showed a relationship between concentration level and eating breakfast. These searching studies were conducted by Alaimo⁸, Pollitt⁹, Sohrabi¹⁰, Niklas¹¹ and Gold¹².

In our study there was a significant relationship between math score and eating breakfast, which was in conformity with Morphy¹⁹, Gajre³⁰ and School Breakfast Program. However, in Huang's study²⁴ there was no relationship between math score and eating breakfast.

The results of the study showed that the position of eating breakfast and snack in Tehran in relation with previous years reached to a desirable level and in comparison to other countries' results it can be mentioned that it has been closed to the international standards which has been as result of increasing of the educational levels in families regarding importance of breakfast and snack. It seems that families can increase their own children's appetite for eating breakfast and snack by diversifying foods and adjusting their sleep time at night in order to provide sufficient energy, protein, and fat and carbohydrate level for their bodies. This matter on the one hand leads to have a healthy and fresh body in infants and on the other hand leads to enhance their concentration level that in turn results in achieving better scholastic scores and grades. After all, we will have a more healthy generation physically and mentally.

Research limitations

For analyzing the relationship between eating breakfast and scholastic scores, it is better to run school breakfast program in order to put students under an equal regime that in our study we encountered limitations in running it.

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