

## Association between Eating Breakfast and Theology Course Grades of High School Students in Tehran

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The impact of having breakfast on the increase of school subject grades is shown in some studies. Despite this, there is not much research done on the impact of breakfast consumption on course scores in Iran. The present study was aimed at evaluating the association between consuming breakfast and snack with religion school subject grade and the level of attention among high school students. This was a descriptive analytical and cross-sectional study conducted on 300 high school students of Tehran (Iran). Simple stratified sampling procedure was used. The data collection tool was a researcher-made questionnaire. Data were analyzed using SPSS (version 20). The mean age of participants was  $16.2 \pm 0.9$  and the means of their GPA (grade point average) and religion course grade were  $17.3 \pm 1.8$  and  $17.6 \pm 2.9$ , respectively. 72.6% of the students had breakfast everyday and 2.1% went to school without having breakfast. 64.6% of the students had snack at school. There was no correlation between breakfast consumption and level of alertness and attention in class and GPA, but religion course grades had a significant correlation with eating breakfast ( $r=0.127$ ,  $p=0.029$ ). No correlation between religion course grades or attention in class and snack consumption was observed ( $p>0.05$ ). There is a significant correlation between breakfast consumption and body mass index ( $p<0.001$ , CI:0.001-0.010). This study showed that consuming breakfast could have a positive impact on the marks of courses that need to be learned by heart, and in particular religion course marks.

**Key words:** Breakfast, Snack, Religion course grade, Body mass index, Student.

During school years the growth of teenagers continues steadily and with the beginning of growth jump this matter becomes very important. Since the amount of energy needed by school teenagers will vary depending on their body size, amount of activity and their growth rate, if this energy is not supplied the consumed protein that must be used for growth and body tissue

regeneration will be used for energy production<sup>1</sup>. One of the ways to supply this energy is breakfast consumption. Besides resulting in an unfit body form and calorie, vitamins and minerals deficiency<sup>2</sup> skipping breakfast could cause a reduction in the amount of nutrients available to brain and in turn a reduction in cognitive performance<sup>4,5</sup>. Also it was observed that behavioural, emotional and educational problems is more significant in children who are hungry and they become more isolated in society (60) and are more likely to be hyperactive<sup>7</sup>. In terms of education, malnourished students have less attention and concentration and therefore higher academic failure rate<sup>8-12</sup>.

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On the other hand, the literature shows that consuming breakfast has a great impact on the body fitness and prevention of obesity among students<sup>3, 13</sup> and helps them have better learning capability at school and be joyful and active<sup>14</sup> and increases their concentration, memory and learning ability<sup>15, 16</sup>. The relative increase in blood sugar following breakfast consumption results in the improvement in brain performance and supplying required energy for daily activities<sup>17</sup>, also students who have a full breakfast in their diet during exam period are less exposed to stress<sup>18</sup>. Students who eat breakfast before attending class everyday outperform their classmates who did not have breakfast in the class. Besides breakfast, consuming snacks leads to improvement in educational goals such as better apprehension, less failure, and reduction in repetition of course material<sup>16</sup> and eliminating temporary hunger at school results in an improvement in the performance of the children<sup>20</sup>. Some studies have been conducted on the impact of breakfast consumption on student grades. In some studies its impact on memory has been demonstrated but based on results it did not have any effect on other student performance related indices<sup>21-24</sup>. Some studies have shown no effect on course grades increase<sup>25</sup>. Some other studies have shown an impact by breakfast consumption on the increase of course grade, in particular on mathematics<sup>13, 26, and 27</sup>. Despite the significant role that eating breakfast and snack have, elimination of breakfast is more common among students than any other daily meals<sup>28-30</sup>. Short-term memory, the level of alertness and attention in class, concentration during study, and grade improvement are among fields that researchers have been focusing on. Despite this, there has been no work done on the impact of breakfast on student's grades in the country. Studies performed in the country mostly investigate the effect of breakfast consumption or the items eaten in breakfast meal on memory score and did this with performing memory-specific tests. Since the impact of breakfast on memory score was demonstrated in these studies, the objective of this research is not examining memory effects but the impact of having breakfast and snack on memory-dependant courses in contrast to abstract courses such as mathematics, and only course grades, which memory is also involved in it, were

surveyed as a benchmark for the impact of breakfast. This research was performed with the objective to study the association of consuming breakfast and snack with course grades of religion - as a memorizing subject - and attention in the class and also the condition of breakfast and snack consumption among high school students in Tehran.

## MATERIALS AND METHODS

This was a descriptive analytical and cross-sectional study conducted on 300 high school students of Tehran (Iran). The study was aimed to survey the impact of breakfast and snack consumption on the performance of students regarding attention in the religion course class and the grades of this course. The research population of the study included students from Tehran's schools located in the district eight. Simple stratified sampling procedure was used. A sample size of 291 was determined for a confidence level of 95% with a margin of 0.5% which for the increase in the precision of sampling more samples were chosen and 300 individuals entered the survey. The sample selection method was single-stage probability sampling and of simple stratified type so that 100 individuals were chosen from first grade, 100 from second grade and 100 from third grade of high school students. Criteria for entering the study were being 18 years of age and younger and having a GPA of at least 10. Criterion for being eliminated from the study was unwillingness in answering survey questions. To prevent the influence of such factors as sex and age on the impact of breakfast and snack on religion course grade, all students were chosen from a boy's school and the impact was evaluated separately for each grade in order for the condition of students to be as similar as possible.

A researcher-made questionnaire consisting of two sections was used to collect data. The first section included questions regarding demographic and background information such as age, height, level of education, mother's profession, age and number of children, and in the second section questions such as the amount of consumed breakfast and snack, attention in religion class, and also the grade of religion subject course and GPA were asked. The questionnaire was given to a

few experts to verify its validity and after getting comments and performing modifications it was given to 30 students as a pilot study and the final questionnaire was prepared. Test-retest method was used to ensure the reliability of the questionnaire.

Before distributing questionnaires necessary explanations about filling them in and information confidentiality was given and verbal consent was acquired and after the completion of questionnaires, their contained information was coded and entered into SPSS package (version 17) and after testing for normality of data distribution using Kolmogorov-Smirnov (K-S) test, in descriptive analysis of the study used the central, percentage, and mean statistical indices. In analytical part Pearson statistical and variance analysis tests were used and finally, from data analysis using the statistical program, tables and figures for frequency distribution were obtained.

## RESULTS

Of the studied population, 100 participants attended first grade, 100 in second grade and 100 in third grade; mean age for individuals was 16.2 with a variance of 0.9 (minimum 14 and maximum 18). Mean GPA of all students in previous semester was  $17.3 \pm 1.8$ . From total participating individuals in this study the GPA of 77.7% of them was above 16; the mean of the grade of religion course of all students was  $17.6 \pm 2.9$ . The means of GPA and religion course grade of students in each grade is shown in table 1. Regarding consciousness and attention to the teacher in religion class 59.3% were excellent, 27.7% average and 13% weak. The mean of the number of the number of children in the family was  $2.6 \pm 1$ , regarding weight "over 90 kg" had the lowest frequency among individuals participating in this study and highest frequency belonged to weights "from 51 to 70". The mean of body mass index (BMI) was  $21.2 \pm 3.7$ . In 66.8% of students BMI was in normal range and 10.9% of cases were overweight (Table 2)

The highest percentage for the level of education for the fathers of the students under study belonged to high school level (47.5%) and the lowest percentage (0.4%) of the fathers of the individuals participating in the study were illiterate

(Fig. 1). In addition, mothers' education with highest percentage (57.9%) is high school diploma and there was no mother at PhD level (Fig. 2)

Regarding occupation 38.2 percent of the fathers of the participants in this study were self-employed and 0.7 of them stated their fathers' employment as labourer. The highest percentage of mothers (64.2%) was housewives and after that they were mostly employed in education sector.

Based on the results, about 72.6% of students had breakfast everyday and then went to school and only 6 of the individuals under study (2.1%) went to school without having breakfast. In general the mean of the number of breakfasts eaten during the week turned out to be  $5.9 \pm 1.9$ . The highest number of individuals (70.8%) stated they consume bread as breakfast "every day". 59.1% mentioned sugar and 66.7% mentioned tea in subsequent orders. Based on the results about 64.4% of students had snack at school every day and 29 of the individuals under study (10.1%) did not consume any kind of food as snack in school at all. Generally, the mean of the number of consumed snacks per week was found to be  $5.4 \pm 2.4$ . Among the individuals who had snack during recess, 14.8% had the sandwich they bought from school buffet as snack. 12.4%, 12%, 10%, and 7.9% used tea, fruits, bread-and-cheese and home-made sandwiches as snack, respectively.

Based on the variance analysis test no correlation ( $P > 0.05$ ) between the number of times breakfast was consumed and consciousness level and attention in class was found. Based on Pearson test the grade of religion course had a significant correlation ( $r = 0.127$ ,  $p = 0.29$ ) with the number of breakfast consumption times. No significant correlation ( $P > 0.05$ ) between religion course grade or the level of consciousness in religion class and the number of times that snack was eaten was obtained. Analysis at each of educational grades showed no correlation between religion course grade and eating breakfast.

Variance analysis also showed that there is no correlation between breakfast consumption and education level of parents ( $P > 0.05$ ). After categorizing body mass index (BMI) in four groups of underweight, normal, overweight and obese based on standard classifications, variance analysis test showed there is a significant correlation ( $p < 0.001$ , [CI:0.001-0.010]) between the

number of times breakfast consumed and the body mass index. Pearson test showed there is no correlation between the number of breakfasts or snacks and the number of children, age, height and weight ( $p>0.05$ ).

## DISCUSSION

This study was conducted with the goal to investigate the association between the consumption of breakfast and snack, and religion course grade and level of consciousness in class and also the condition of consuming breakfast and snack by students in one of the high schools in Tehran. The results of this study showed the majority of students under study had breakfast every day and very few of them went to school without having breakfast. Other studies performed on this field show the majority of students eat their breakfast before going to school this represents that families care for the health and growth of their children during their growth period which could guarantee their health in later stages of their lives and provide a healthy human capital in the future. Studies performed by Chauillac at schools in Paris showed that about 5.9% of teenagers never had breakfast before going to school<sup>31</sup>. Graham's study also showed about 10% of students did not have breakfast<sup>32</sup>. In another study conducted on middle school students in Tehran it was found that about 14% of female students at middle school level do not eat breakfast<sup>33</sup>. In another study conducted by Anderson in Norway it was specified that about 13.4% of students consume breakfast twice a week or less<sup>34</sup>. The study by Nemati in Ardabil showed 16.5% of students did not eat breakfast<sup>15</sup>. An economic study performed on female middle school students in Tabriz showed 25.3% of students under study did not consume breakfast<sup>35</sup>. Murata's study in Japan<sup>29</sup> and Bozorgmehr's study in Tehran on breakfast consumption among children aged 9-12 in Tehran schools<sup>30</sup> also show that breakfast is skipped more frequently compared to other meals.

**Table 1.** Means of GPA and religion course marks

	First grade	Second grade	Third grade
GPA mean	1.9±6.17	1.7±17.4	1.6±17.0
Religion course mark mean	3.4±16.9	2.5±16.9	2.2±18.7

Considering the fact that on one hand this study was performed more recently compared to above studies, and on the other hand by the expansion of public media and the increase in the level of education, the awareness in families about the importance of breakfast as a decisive factor on the increase of body strength and improvement in students' intelligence and attention and the fitness of their bodies has increased in recent years, therefore attention to the subject of nutrition and breakfast in particular has increased in families, for this reason regular consumption of breakfast in this study, compared to other studies, has showed an increase. Of course, the statistics obtained is very close to the ones from developed countries like France and Norway that were mentioned before and this represents a closing gap with global standards.

In addition, our findings showed a small percentage of students that abstained from having breakfast and majority of them had snack. In general there are very few studies done in this field. The crucial problem here is that human body is active all day round and in order for cells to be able to do their activities in proper and desired conditions they need energy, minerals, vitamins and protein. Therefore, nutrients needed by body need to be divided in proper intervals. For this reason, besides three main courses, two to three snacks in the morning, afternoon and after dinner could provide the much necessary nutrients for body<sup>36</sup>. In recent years due to the expansion of public media and an increase in education level, the awareness in families about the important benefits of eating between meals on body strength and improvement of intelligence and attention of students and the fitness of their bodies has increased, therefore the attention of families towards the topic of nutrition specially breakfast and snack has increased.

**Table 2.** Classification of body mass index based on standard classification

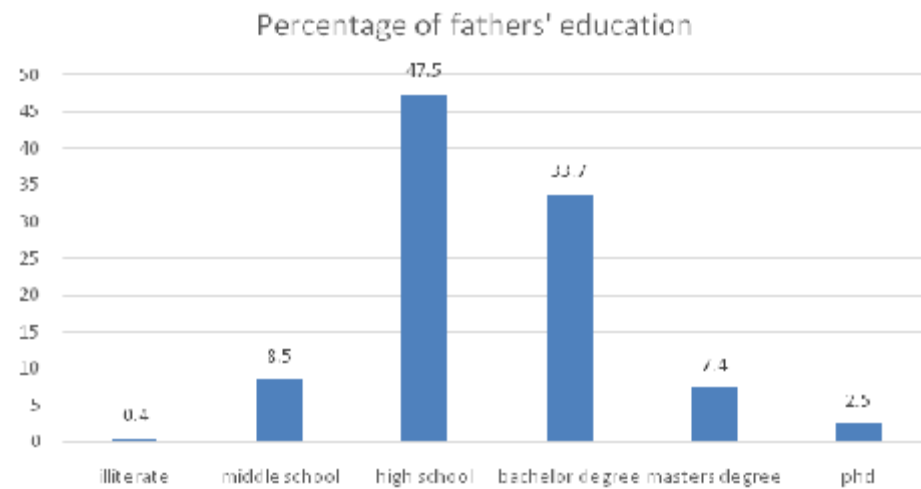
Percentage frequency	Frequency	Body mass index range
19.9	58	Underweight
66.8	194	Normal
10.9	32	Overweight
2.4	77	Obese
100	291	Sum total

Parents can also have a role in increasing the appetite of their children and their desire for breakfast and snack consumption through diversifying the ingredient foods in the breakfast and snack. However, some of the teenagers' favourite items are less consumed due to the high prices of these products and many families do not have the financial capability to buy these items.

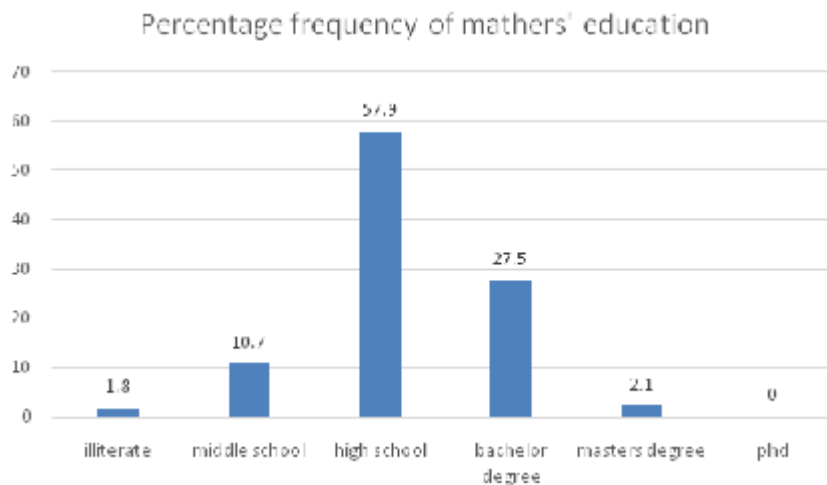
Based on the results obtained in this study there was a significant correlation between the consumption of breakfast and the body mass index (BMI), so that BMI was lower among people who consumed breakfast. Some studies performed on this topic confirm this finding. In a research conducted by Summerbell *et al.* it was concluded

that enough amount of breakfast consumed by teenagers has a correlation with low amounts of BMI<sup>37</sup>.

Based on the results of this study no correlation was observed between breakfast consumption and the level and attention and consciousness in class. On the contrary the literature searched by the author showed a correlation between attention and concentration and breakfast consumption; among them we can refer to the following studies: Alaimo (8), Pollitt (9), Sohrabi (10), Niklas (11), and Gold (12). This problem could rise due to the fact that in the above mentioned studies the level of attention was investigated quantitatively and by scoring and



**Fig. 1.** Percentage frequency of fathers' education



**Fig. 2.** Percentage frequency of mothers' education



evaluating the effective factors on it and the total score obtained was considered as the measure of the level of attention and consciousness. While, in this study the level of consciousness and attention in class was evaluated qualitatively.

Also in our study the religion course grade had a significant correlation with breakfast consumption. Studies conducted globally evaluate the association between breakfast consumption and memory improvement. In some of these studies the grades for English as a memory-dependant subject have been used as benchmark. The findings of Staub (21), Baghdadchi (22), Benton (23), Worobey (24), the school breakfast program project (26) and GAJRE (27) are in consistent with our findings indicating a significant correlation between breakfast consumption and the increase in memory score and grades of memorizing courses. Of course it is necessary to investigate the impact of the ingredients of the consumed food on the increase of the grades of memory-dependant courses by performing further research.

The findings of this study showed that the condition of eating breakfast and snack in Tehran, compared to previous years, has reached a favourable status and by comparing the results with other countries we can say it has become closer to standard levels in developing countries which is due to the increase in awareness among families about the importance of breakfast and snacks. It seems that families can help with the increase in the appetite of their children for breakfast and snack by increasing the ingredient diversity of meals and adjusting their children's bed time, in order for them to receive enough energy, protein, fats, and carbohydrates in one hand and on the other hand for their attention and concentration in classroom to increase which its consequence will be an increase in their grades and therefore an improvement in the quality of education.

#### Research Limitations

To study the correlation between eating breakfast and school grades it is more convenient to have a control group as well, in order to be able to compare the results obtained with it and by performing breakfast program at school to put students under similar diet, which we had restrictions in performing them in our research.

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