

## TÜRK ÖĞRENCİLERİN GÜNLÜK KAHVALTI TÜKETİMİNİN BÜYÜME ÜZERİNE ETKİSİ

### THE EFFECTS OF DAILY BREAKFAST CONSUMPTION ON GROWTH IN TURKISH STUDENTS

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#### ÖZET

**AMAÇ:** Kahvaltı, günün en önemli öğünü olarak tanımlanmış, günlük besin alımı ve enerji gereksinimlerine önemli ölçüde katkıda bulunmuştur. Kahvaltının büyüme ve gelişme üzerine etkisi ve önemi bilinmektedir. Bu çalışmada, ilk ve orta öğretim okul öğrencilerinin kahvaltıda yeterli ve dengeli besin alıp almadıklarının saptanması, aldıkları besin ve enerji değerlerinin yeterliliğinin değerlendirilmesi amaçlanmıştır.

**GEREÇ VE YÖNTEM:** Ankara'nın 3 farklı bölgesinde yaşayan 105 öğrenci 31 Ocak 2018 - 31 Temmuz 2018 tarihleri arasında çalışma grubuna dahil edilerek izlendi. Çalışmaya dahil edilen öğrencilerin yaş aralığı 6 - 15 olarak belirlendi. BEBİS (Beslenme Bilgi Sistemi) programı öğrencilerin kahvaltı tüketimi, tüketilenlerin miktarlarının ve içeriklerinin değerlendirilmesi için kullanıldı.

**BULGULAR:** Çalışmaya katılan 105 öğrencinin (52 kız, 53 erkek) ortalama yaşı 11.5 (6 - 15), ortalama vücut kitle indeksi (VKİ) 19.17 (14.11 - 29.14) olarak bulunmuştur. Öğrencilerin kahvaltı öğünü ile hafta içi aldıkları ortalama enerji  $378.96 \pm 131.64$  kcal, hafta sonu aldıkları ortalama enerji  $625.68 \pm 162.12$  kcal olarak belirlendi. Öğrencilerin değerlendirilen enerji ve besin öğelerinin tamamında hafta sonu alınan miktar, hafta içi alınana kıyasla daha fazla olarak saptandı.

**SONUÇ:** Günlük besin ve enerji ihtiyaçlarının karşılanmasında ve fiziksel büyüme üzerinde kahvaltının önemli olduğunu vurguladık.

**ANAHTAR KELİMELE:** Beslenme alışkanlığı, Enerji alımı, Kahvaltı, Öğrenci

#### ABSTRACT

**OBJECTIVE:** Breakfast, defined as the most important meal of the day, contributed significantly to the daily nutrient intake and energy requirements. The importance of breakfast on growth is known. In this study, we aimed to determine whether primary and secondary school children receive adequate and balanced nutrition at breakfast, to assess the adequacy of their nutritional and energy values in their breakfast.

**MATERIAL AND METHODS:** We prospectively reviewed the data of 105 students who were followed up between 31 January 2018 and 31 July 2018 in 3 different districts of Ankara. Children aged between 6-15 years were evaluated in the study. BEBİS (Beslenme Bilgi Sistemi) was used for food consumption, amount and content of the nutrients that students received at breakfast.

**RESULTS:** A total of 105 students' (52 girls, 53 boys) a mean age of 11.5 (range, 6 - 15) years and with a mean Body Mass Index (BMI) of 19.17 (range 14.11 - 29.14) were determined. Average energy intake during the weekdays was  $378.96 \pm 131.64$  kcal for weekdays, while average energy intake during the weekends was  $625.68 \pm 162.12$  kcal. At the weekends, the amount of energy and nutrients intake of the students were found to be higher than on weekdays.

**CONCLUSIONS:** We emphasized that breakfast is important to supply daily food and energy needs and it is important for physical growth.

**KEYWORDS:** Breakfast, Energy intake, Nutrient habits, Student

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## INTRODUCTION

Healthy nutrition may be defined as taking sufficient and balanced nutrients at regular intervals (main meals and snacks) in terms of content and quantity, and it is the most important factor that allows children to grow and develop normally. Main meals are served as breakfast, lunch and dinner. Breakfast, defined as the most important meal of the day, contributes significantly to daily food intake and energy requirements (1). Breakfast consumption for children has been associated with increased learning speed and better performance at schools. Researchers have stated that there was a significant difference in cognitive effects among students who skipped breakfast (2 - 4). Theoretically, there are international guidelines for school breakfast programs, which indicate how much food should be taken and how to keep a student's physical and cognitive functions optimal during the morning school hours (5). In practice, there are deficiencies in implementation and supervision of the quality of nutrition provided by school breakfast programs. There are articles which report the importance of breakfast on growth and development (2, 6). However, there is no adequate article which covers Turkey and reports the effects of skipping or dropping breakfast on growth. Children who have regular and adequate breakfasts receive higher levels of nutrients, thus reducing the amount of energy to be obtained from fat and increasing the amount of pulp intake (6). Additionally, breakfast has been reported to strengthen memory (7).

The objective of this study was to determine whether or not primary and secondary school children had adequate and balanced nutrition and energy intake at breakfast.

## MATERIAL AND METHODS

### Participants and Procedure

We prospectively evaluated the data of students who were followed up between January 31, 2018 and July 31, 2018. We included 105 healthy children who lived in 3 different districts of Ankara and went to school in the same areas. The demographic data (students' height

and weight, education levels of the parents, working status of the parents, the family type of the students and the family's monthly income) of the children and their parents, the children's feeding patterns, the variety and amount of nutrients taken at breakfast for the weekdays and weekends were collected in a form that was prepared in advance. The amount and content of the food at breakfast were determined for three non-consecutive weekdays and three non-consecutive weekends separately. Weekdays and holidays were selected randomly. In order to determine the amount and content of the foods correctly, a standardized food catalog, which was developed by a pediatric dietitian, was shown to the families on the day of the parents' meetings at the schools. Nutritional consumption was recorded on the forms by the parents with a pediatric dietitian. The amount of essential nutrients included in the 'table of nutritional requirements and recommended daily energy and nutrient requirements for children of preschool and school age' (8) was calculated separately for each child on weekdays and weekends. The data on food consumption cards were recorded by the BEBIS 8 (Beslenme ve Bilgi Sistemi [Nutritional Information System]) program (9). Physical growth refers to an increase in body size (length or height and weight) and in the size of organs. Trained staff conducted the anthropometric measurements of the children according to the ISAK standards to assess physical growth (10). Students' heights were measured to the closest 0.1 cm, and their body weights were measured to the closest 0.1 kg using calibrated and balanced portable digital scales (Seca®, Germany). Students' BMI values were calculated as weight divided by height squared ( $\text{kg}/\text{m}^2$ ). Excess weight and obesity were defined at or above the 90th and 97th age- and sex-specific BMI percentiles and stunted according to the growth references of the World Health Organization (WHO) (11). Patients with neurological diseases, growth retardation, known cardiac or renal diseases, malabsorption disorders, chronic metabolic diseases and those who studied at private schools, received systemic antibiotics therapy in the last 4 weeks or had undergone gastrointestinal surgery were not included in the study.

## Statistical Analysis

These analyses were carried out using the statistical software packages IBM SPSS 22.0 for Windows (SPSS Inc, Chicago, IL, USA). Categorical variables were given as frequency and percentage, continuous variables were given as mean  $\pm$  standard deviation. For comparison of categorical variables, Chi-Square test was used to test the independent groups. The significance level was set at  $p=0.05$  for two-sided tests.

## Ethical Committee

This prospective and descriptive study was approved by the Ethics Committee and Medical Specialization Education Board of University of Health Sciences, Gulhane Training and Research Hospital and Ankara Provincial Directorate of National Education and performed in accordance with the Declaration of Helsinki (06.02.2018-18/1).

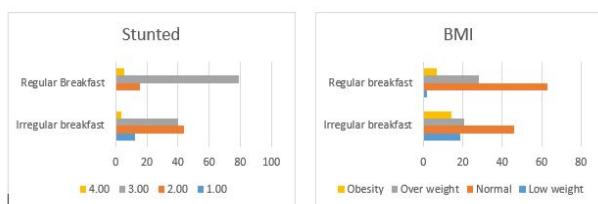
## RESULTS

The school children who took part in this study had a mean age of  $11.52 \pm 2.59$  years, and 50.4% ( $n=53$ ) of them were boys, 49.6% ( $n=52$ ) of them were girls. **Table 1** shows the baseline characteristics of the students.

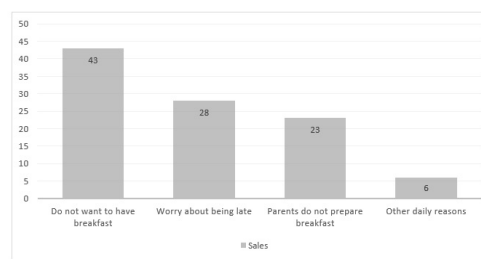
**Table 1:** Baseline characteristics of students

Anthropometric measurements	Age (mean)	Standart deviation	Minimum	Maximum
Age (year)	11.52	2.59	6.00	15.00
Height (cm)	147.19	15.65	115	181
Weight (kg)	42.87	13.75	20	79
BMI (kg/m <sup>2</sup> )	19.17	2.69	14.11	29.14

Among the participants, 54.3% had regular breakfast, while 45.7% did not. **Fig 1a** and **Fig 1b** show distributions of stunting and BMI levels of students. **Fig 2** shows the students' reasons for skipping breakfast among those who did not have regular breakfast.



**Figure 1a)** Stunted characteristics **b)** BMI characteristics



**Figure 2:** Reasons for skipping breakfast of students who do not have regular breakfast

The distribution of the students who did or did not have regular breakfast was evaluated based on their BMI. Our results established that 1.8% of the students who have regular breakfast, while 18.7% of the students who have irregular breakfast was considered underweight ( $BMI < 18.5$ ).

Likewise, 7% of the students who have regular breakfast while 14.6% of the students who have irregular breakfast was considered obese ( $BMI > 30$ ). We found this relationship significant (**Table 2**).

**Table 2:** Distribution of BMI of students who have regular or irregular breakfast

BMI	Students	
	Regular breakfast % (n)	Irregular breakfast % (n)
Underweight	1.8 (1)	18.7 (9)
Normal weight	63.2 (36)	45.9 (22)
Overweight	28 (16)	20.9 (10)
Obese	7 (4)	14.5 (7)
<b>Total</b>	<b>100 (57)</b>	<b>100 (48)</b>
<b>p</b>	<b>0.021</b>	

\* - significance comparing groups

Socioeconomic characteristics of families were evaluated by parents' education, occupation, family income, and family structure Table 3. Our results showed that mothers of 59.7% of the students who have regular breakfast, had education levels of over 11 years, while 60.4% of the students whose mothers had education levels of 11 years or less did not have regular breakfast. Likewise, 66.7% of the students whose fathers had education levels of over 11 years had regular breakfast, while 58.3% of the students whose fathers had education levels of 11 years or less did not have regular breakfast. The differences between the groups formed based on the educational levels of both parents were statistically significant Table 3. The distribution of the students who did or did not have regular

breakfast was evaluated based on their mothers' employment status. 40.3% of the mothers of the students who had regular breakfast were working as salaried employees, 21.2% were self-employed at their own jobs, and 38.5% were housewives. When we examined this issue for the fathers, it was seen that 49.1% of the fathers of the students who had regular breakfast were working as salaried employees, while 50.9% were self-employed at their own jobs. There was no statistically significant difference between the groups of parents Table 3. The distribution of the students who did or did not have regular breakfast was evaluated based on their family type. Among the students, 59% of those who had a nuclear family and 45% of those with an extended family structure had regular breakfast. None of the students who had a single-parent family structure had regular breakfast Table 3. The relationship between the students' breakfast habits and monthly income levels of their families was evaluated. Family income was recorded into four categories (<1500 TL, 1500 - 3000TL, 3000 - 6000TL, >6000TL). We found this relationship insignificant (Table 3).

**Table 3:** Socio-economic characteristics of families and students

	Mother		Father		p
	Regular breakfast % (n)	Irregular breakfast % (n)	Regular breakfast % (n)	Irregular breakfast % (n)	
<b>Education</b>					
<11 years	40.3 (23)	60.4 (29)	33.3 (19)	58.3 (28)	
>11 years	59.7 (34)	39.6 (19)	66.7 (36)	41.7 (20)	
<b>Total</b>	100 (57)	100 (48)	100 (57)	100 (48)	
<b>p</b>	0.041		0.01		
<b>Working status</b>					
Salaried employee	40.3 (23)	31.2 (15)	49.1 (26)	41.6 (20)	
Own job worker	21.2 (12)	20.8 (10)	50.9 (29)	58.4 (28)	
Housewife/unemployed	38.5 (22)	48 (23)	-	-	
<b>Total</b>	100 (57)	100 (48)	100 (57)	100 (48)	
<b>p</b>	0.577		0.22		
	Student				
	Regular breakfast % (n)	Irregular breakfast % (n)			
<b>Family income*</b>					
<1500 TL	3.5 (2)	6.2 (3)			
1500-3000 TL	14 (9)	20.8 (10)			
3000-6000 TL	31.6 (18)	31.3 (15)			
>6000TL	50.9 (29)	41.7 (20)			
<b>Total</b>	100 (57)	100 (48)			
<b>p</b>	0.662				
<b>Family structure</b>					
Nuclear family	91.2 (52)	77 (37)			
Extended family	8.8 (5)	12.5 (6)			
Single-parent family	-	10.5 (5)			
<b>Total</b>	100 (57)	100 (48)			

\* p - significance comparing groups

\* Income limits were determined by Turkish Statistical Institute, low/high-income households limits for 2018 (www.turkstat.gov.tr/PekiHaberBulteni.do?G=30584)

Energy intake based on sex was evaluated for weekdays and weekends. It was determined that, for breakfast, 86.6% of the female students and 85% of the male students could not access the required energy intake for weekdays, while 21.2% of the female students and 43.3% of the male students could not take the required energy at weekends Table 4. The energy levels taken in breakfast by the students were compared for

weekdays and weekends. The mean energy level was  $378.96 \pm 131.64$  kcal in weekdays and  $625.68 \pm 162.12$  kcal at weekends. There was a statistically significant difference between the students' energy intake levels on weekdays and weekends ( $p=0.000$ ) (Table 4).

**Table 4:** Mean energy intake levels of students

	Students			Energy intake (gender free) Mean $\pm$ standard deviation
	Sufficient energy intake % (n)	Insufficient energy intake % (n)	Total % (n)	
<b>Weekdays</b>				$378.96 \pm 131.64$ kcal
Female	13.4 (7)	86.6 (45)	100 (52)	
Male	15 (8)	85 (45)	100 (53)	
<b>Weekends</b>				$625.68 \pm 162.12$ kcal
Female	78.8 (41)	21.2 (11)	100 (52)	
Male	56.7 (30)	43.3 (23)	100 (53)	

An analysis was conducted between the energy and nutrient intakes of the students with breakfast on weekdays and weekends. The related contents were obtained, and comparisons were based on according to Türkiye Beslenme Rehberi [Nutrition Guide for Turkey] (7). The total amount of energy and nutrient intake of the students was found to be much higher at weekends than on weekdays.

## DISCUSSION

Breakfast, defined as the most important meal of the day, contributes significantly to daily food intake and energy requirements (1, 12).

We aimed to determine whether primary and secondary school children take adequate and balanced food at breakfast and define whether the values of their nutritional and energy intake at breakfast meet their daily needs. There is not a sufficient article which covers Turkey and reports the effects of skipping breakfast on growth.

Tuncay et al. (13) found that 60.7% of students had regular breakfast, and 39.3% did not have breakfast at all. Budak et al. (14) reported that 43.4% of students, Mazıcioğlu et al. (15) said 61% of students were found to have breakfast regularly. Lazzeri et al. (16) included 455,391 adolescents from 31 countries in their study. Daily regular breakfast consumption in Slovenia was the lowest by 37.8%, while the highest was found in the Netherlands by 72.6%. In our study, 54.3% of the students had regular breakfast. Based on these results, studies conducted in Turkey and those conducted in developed countries were similar.

A study by Virtanen et al. (17) found that fast food habits were the most common cause of skipping breakfast meals, and especially the number of fast-food restaurants in the vicinity of the schools and the diversity of the products at these places were highlighted. In two previous studies, it was emphasized that snacks were the most significant and influential factor on students who had no regular breakfast habits (18, 19). On the other hand, we obtained completely different results as reasons for skipping breakfast as seen in Fig 2. Considering scientific knowledge, it is expected that breakfast should have a low glycemic index and high fiber content (20). Jeans et al. (21) indicate that skipping breakfast was associated with lower dietary quality; higher daily fat intake; and lower daily protein intake. One of the most significant results of our study was that there was significant and positive correlation between regular breakfast habits and body mass index. We established the same findings as those in previous studies, as a negative correlation was found between breakfast habits and obesity (22 - 24).

According to family type, regular breakfast habits were evaluated, and 59% of the students with nuclear families had regular breakfast. On the other hand, 100% of the students with single-parent families did not have regular breakfast. Adolphus et al. (25) reported that nuclear families have more regular breakfasts and higher academic performance. Timlin et al. (26) reported that children who had nuclear families had more regular breakfast than children with a single parent or extended family. We described a similar result to studies conducted in other countries that children who had nuclear families had more regular breakfast.

In a study conducted by Van Ansem et al. (27), as the mother's level of education increased, the daily breakfast habits of the child were more regular, and the number of fruits and vegetables increased as we described. The parents were classified based on their jobs, and we showed that there was no significant relationship between parents' jobs and the students' breakfast habits. In two multicenter studies, the breakfast habits of European adolescents were compared based on the variety of foods at bre-

akfast and their families' occupational groups and socio-economic statuses. Socio-economic status, health concerns, higher education level and traditional family life were reported to have significant roles in the variety of foods consumed and regular breakfast habits, and there was no significant difference based on occupational groups (28, 29).

The Helena Study, one of the largest studies on families' monthly income (economic) status, reported a significant increase in breakfast habits and breakfast variety when the socio-economic status of the family increased (28). A study conducted in Lithuania by Petrauskiene et al. and a study by Lawman et al. reported the same findings as that the most significant factor in determining breakfast habits was socio-economic status, and children whose parents had high income and high level of education had more regular breakfast (30, 31). Unlike other studies, we found that there was no significant relationship between the economic level of the family and the children's habits of having breakfast regularly. This is considered as a positive result in terms of the possibility that students of any income level can have breakfast in Turkey.

Unlike other studies, the energy intake levels on weekdays and weekends were evaluated. 86.7% of the students could meet the recommended daily energy amounts during the weekdays. For the weekend, 67.3% of the students could get the recommended daily energy amount, while 32.7% could not reach it. The nutrients they received were compared for weekdays and weekends separately. All students took the following at breakfast; energy, protein, fat, carbohydrate, fiber, cholesterol, vitamin A, vitamin E, vitamin B1, vitamin B2, vitamin B6, folate, niacin, vitamin C, sodium, potassium, magnesium, calcium, vitamin B12, phosphorus, iron, zinc, SFA (saturated fatty acid), MUFA (monounsaturated fatty acid), PUFA (polyunsaturated fatty acid), N3 and N6, and the amounts of these were evaluated. All nutrients and energy items which were taken at weekends were found to be much higher than those on weekdays. There was a statistically significant difference between the participants' weekday and weekend intakes.

### Strengths and Limitations

In this study, only students whose teachers agreed for them to participate were involved. Moreover, due to the voluntary nature of participation, only 54% of the parents of eligible children gave their consent. Thus, data from more or less a half of eligible children could not have been collected. It may be assumed that there are differences between children who participated in our study and those who did not. We were only able to get permission for 3 different schools from 3 different districts. Although the results were not representative for the entirety of Turkey, according to the COSI-TUR 2016 research (32), children in urban and rural areas have similar habits of having breakfast. Therefore, by increasing the number of children participating, countrywide results may be found. The response rates from the participating parents at the baseline were substantially high. The study thus provides a valuable contribution for exploring the determinants in prevention of skipping breakfast among students.

In conclusion, we emphasized the importance of breakfast for taking daily food and energy needs among students. Breakfast is significantly influential on physical growth. When we compared their daily energy and nutrient requirements, it was seen that the students could not get the required nutrients and energy amounts during the weekdays, while at weekends, they similarly could not meet these requirements completely, but we found a significant number of students who could. We established that students with regular breakfast habits have healthier body weights and body mass indices than those without regular breakfast habits. We believe that more comprehensive studies are needed to obtain more detailed information.

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