Original article

Breakfast skipping and its association with other unhealthy food habits among Greek high school adolescents

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SUMMARY

Background: Eating breakfast is an important habit for our health. The recognition of high-risk groups for breakfast skipping, especially during the transition period of adolescence, is essential for the prevention of this unhealthy habit. Objective: To determine the prevalence of breakfast skipping in adolescents attending high school, in correlation with nutritional status and socio-demographic factors, and to identify possible association with other unhealthy food habits. Subjects and methods: A sample of 513 high school students was randomly selected from three areas: urban/ higher, urban/medium and urban/lower. All subjects completed a questionnaire concerning various socio-demographic characteristics and food habits. Body height and weight were also measured and body mass index was calculated. Results: The prevalence of breakfast skipping was 29.4%. Breakfast skipping was more prevalent in older adolescents, adolescents with fathers of low educational level, adolescents living in the urban/lower area and of those who were overweight/obese. Breakfast skippers consumed salads, fruit, legumes and fishe less frequently than breakfast eaters. They consumed meat, soft drinks and alcohol more frequently. Also, they reported higher frequency of out-meals. Conclusions: The prevalence of breakfast skipping among Greek adolescents is quite high and it is related to nutritional status and socio-demographic factors. Breakfast skipping is associated with other unhealthy food habits, suggesting a considerable negative influence on the food choices of adolescents.

Key words: Breakfast skipping, food habits, nutritional status, socio-demographic factors, adolescence.

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INTRODUCTION

In the moulding of eating patterns of a given population, the adolescence period, plays an important role in which the adopted food habits are decisive for adult life.[1,2] The adoption of a recommended way of diet requires interventions from this age. One of the more important unhealthy eating habits characterizing the adolescent age is breakfast skipping.

There is a wide amount of evidence attesting to the importance of eating breakfast. In particular, it has been shown that breakfast consumption is an important element in nutritional well-being, influencing the adequacy of total daily energy and nutrient intake, both in children and adults.[3,4] It has also been shown that missing breakfast can negatively interfere with cognition and school performance.[5] On the other hand, eating breakfast has been associated with lower plasma cholesterol levels and improvement of nutritional status, both in children and adolescents.[6] A recent study conducted in Japan claims that breakfast skipping is associated with some cardiovascular risk factors, including smoking, hypertension and hypercholesterolemia.[7]

The objective of this study was to determine the prevalence of breakfast skipping in adolescents attending high school, in relation to their nutritional status and some socio-demographic factors. A second objective was to see if breakfast skipping was associated with other unhealthy food habits.

SUBJECTS AND METHODS

Data collection and participants

Data were collected via a standardized questionnaire completed by Greek students attending high schools from three different areas: an urban/higher, an urban/medium and an urban/lower. We randomly selected 513 individuals, aged 15-18 years, 243 boys (47.5%) and 270 girls (52.5%), after exclusion from analysis of twenty-eight (5%) cases because of nappropriate or false data. Two different schools per area were selected. The sample included 143 students from two high schools of Athens, 172 from the island of Salamis and 198 from the area of Astros. The other demographic characteristics of participants are shown in table 1. The study was conducted on April 2000.

Table 1. Demographic characteristics of high school students participating in the study

	No of participants	Percentage
Age (years)		
15-15.9	198	38.6%
16-16.9	166	32.4%
≥17	149	29.0%
Sex		
Boys	243	47.4%
Girls	270	52.6%
Geographic area		
Athens	143	27.9%
Salamis	172	33.5%
Astros	198	38.6%
Educational level of father*		
Low	240	47.4%
Moderate	146	28.9%
Higher	120	23.9%
Educational level of mother*		
Low	250	50.8%
Moderate	180	36.6%
Higher	62	12.6%
Occupation of father		
Self-employer	215	42.7%
Civil servant	115	22.8%
Private employer	152	30.2%
Pensioner	22	4.4%
Working mother		
Yes	160	31.7%
No	345	68.3%

*Low=Elementary or Secondary School, Moderate=High School, Higher=Technical Education Institute or University

Before the completion of the questionnaire, a brief overview of the research was provided in each class. Protocol included questions concerning regular breakfast consumption, as well as consumption of various snacks in break (time between breakfast and lunch) and weekly consumption of 13 selected food items. The questionnaire also included questions related to socio-demographic characteristics such as age, sex, education and employment status of students' parents.

Prior to its use the questionnaire (attached as Annex), was validated in a pilot study. As is shown the questions were simple and multiple choice. The study protocol was approved by the authorities of the Department of Research Validation, and Educational Technology of the Educational Institute.

Physical measures

The height and body weight were measured in light clothing and without shoes, after questionnaire. Body Mass Index (BMI) was calculated as weight (kg) divided by height squared (m^2). Adolescents with BMI ≥85th percentile for age, sex and white race, were classified as overweight/obese, while those with BMI<85th percentile as normal.[8]

Statistic analysis

All data were analyzed using the SPSS program. The Pearson chi-square test (and t-test when appropriate) was used to determine the factors related to breakfast skipping and to assess differences in the frequencies of food consumption between the main study groups (breakfast skippers versus breakfast eaters). In order to clearly identify factors independently related with breakfast skipping, logistic regression analysis was applied, using significant variables on univariate analysis as independent variables. Results are presented by Odds Ratios (ORs) and 95% Confidence Intervals. Statistical significance was defined as P<0.05.

RESULTS

Seventy-four adolescents (14.4%) were classified as overweight/obese (BMI ≥85th percentile). Fifty-four of them where boys (22.2%) and twenty girls (7.4%) (p<0.0001).

One hundred and fifty one adolescents (29.4%) reported that they do not eat breakfast. No differences between the two sexes were observed (table 2). Among breakfast eaters, 70.6% reported consumption of milk, with a preference for chocolate milk. Only 17% of them

included in their breakfast foods such as cereals, eggs or yogurt.

The proportion of breakfast skippers was higher among older adolescents as compared with younger ones. With regard to fathers' education, the prevalence was statistically significantly higher among those with fathers of low educational level compared with those with fathers higher of a higher educational level (Table 2). The status of employment of both parents was not related to skipping breakfast. As is shown in Table 2, the proportion of breakfast skippers was significantly higher among adolescents living in the urban/lower area of Astros compared with adolescents living in the metropolitan area of Athens.

Mean BMI was significantly higher in breakfast skippers than eaters (22.6±3 vs 21.4±2.8, P=0.008). Explicit differences in the percentage of breakfast skippers were also found between overweight/obese and normal adolescents (table 2).

The results of logistic regression analysis showed that independent factors related to breakfast skipping were age (older age), father's education (low educational level), area of residence (urban/lower area) and

nutritional status (overweight/obese) (Table 2).

In the question why they do not eat breakfast, 46% of adolescents claimed that simply they do not have time for breakfast, 42% because they are not hungry in the morning, 7% because they follow a non-ordinary diet (in order to lose weight) and 5% because breakfast is not ready.

Seventy-eight percent reported that they consume various snacks during break: In more details, 31.6% consume sandwiches, 17.7% cheese pies, 8.8% croissants, and 15.4% various other snacks. We did not found any relationship between breakfast skipping and snack consumption during break. Moreover, no significant correlation between snack consumption and BMI was found.

Table 3 shows differences in the frequency of consumption of some selected foods, between breakfast skippers and breakfast eaters. As shown in this Table, the percentage of adolescents consuming fruit and vegetables/salads daily was considerably higher among breakfast eaters compared with breakfast skippers. Breakfast eaters reported more frequent consumption of legumes and fish. They eat less bread than breakfast

Table 2. Factors related with breakfast skipping in high school adolescents

| | Breakfast skippers | | Adjusted Odds Ratio | | |
	(%)	$P(\chi^2)$	OR 95%	CI	P
Sex					
Male*	29.2		—		
Female	29.6	0.9	1.13	0.76-1.68	NS
Age (years)					
15-15,9*	25.3		—		
16-16,9	29.0		1.32	0.81-2.14	NS
≥17	35.5	0.047	1.69	1.06-2.69	0.026
Educational level of father					
Higher*	21.7		—		
Moderate	27.4		1.28	0.71-2.28	NS
Low	35.0	0.026	1.87	1.12-3.13	0.017
Area					
Urban/higher*	21.0		—		
Urban/medium	29.7		1.62	0.96-2.76	NS
Urban/lower	35.4	0.016	2.16	1.30-3.59	0.003
Overweight/obese					
No	27.3		—		
Yes	41.9	0.011	1.90	1.12-2.88	0.015

*Referent group, NS=Non Significant

Table 3. Differences between breakfast eaters and breakfast skippers in the frequency of food consumption (times per week)

	Daily		3-5 /week		2 /week		1 /week		Often		Rarely-Never		
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	$P(\chi^2)$
	%	%	%	%	%	%	%	%	%	%	%	%	
Vegetables/salads	27.9	16.0	43.4	50.0	—		—		—		28.7	34	0.017
Fruits	63.3	52.0	24.6	34.7	—		—		—		12.1	13.3	0.043
Legumes	—		—		39.0	32.0	36.5	32.7	—		24.5	35.3	0.044
Meat	2.5	8.6	40.1	41.1	53.3	42.4	—		—		4.1	7.9	0.002
Fish	—		—		27.9	24.5	42.8	29.8	—		29.3	45.7	0.001
Sausages	13.3	18.5	—		23.2	24.5	21.5	19.9	—		42.0	37.1	NS
Soft drinks	19.9	34.4	—		—		—		44.6	39.1	35.5	26.5	0.002
Sweets	27.4	34.0	—		—		—		50.2	47.3	22.4	18.7	NS
Alcohol	3.0	12.6	—		—		—		23.8	30.4	73.2	57.0	0.000

NS = Non Significant

YES: Breakfast eaters (n=362)

NO: Breakfast skippers (n=151)

skippers (1.7±0.8 vs 1.9±0.8 slices per meal, P=0.01) but no significant differences concerning preferences of bread type (white, village bread or the so-called black bread) were observed. However, those who omit breakfast consume meat more often and surpass breakfast eaters in the consumption of alcoholic and soft drinks. Interestingly, a significant difference in the consumption of olive oil between breakfast eaters and breakfast skippers (94.3% vs 83.9%, P<0.0001) was noticed. It appears, that breakfast skippers consume sweets more often than breakfast eaters, although differences were not statistically significant. No significant differences, concerning consumption of sausages and spices, were found.

To the question as to whether they have a regular time for food, the answer "yes" was reported by 55.4% of breakfast eaters compared with 44.6% of breakfast skippers (P=0.002). Breakfast skippers eat out of home more often than breakfast eaters: [15.6% of breakfast skippers reported out meals (≥3 times/week) compared with 8% of breakfast eaters (p=0.035)]. Overall, 60.3% of adolescents reported that they do not prefer their meals to be baked, 33.2% preferred the meals to be fried and 5.7% boiled. No significant differences between breakfast skippers and breakfast eaters were found.

DISCUSSION

The results of the present study showed that a significant proportion of Greek adolescents attending high school (29.4%) omit breakfast, despite the fact that breakfast is the first meal of the day. This proportion is among the highest reported in developed countries in which frequencies of less than 30% (15-30%) in this particular group age have been reported.[9-12] Moreover, the majority of breakfast eaters (70.6%) reported only consumption of milk, with a preference for chocolate milk – an industrialized product with preservatives. These findings indicate that the problem of breakfast skipping among Greek adolescents is both quantitative.

The socio-demographic characteristics of breakfast skippers were also investigated. The results of our study indicated that skipping breakfast increases with age. This is in accordance with results of other studies conducted in other developed countries.[9,12-14] In Greece breakfast skipping appears to become more prevalent in older ages, since in a study of students aged 19-23 years only 29% of them reported regular breakfast consumption.[15]

In our study, breakfast skipping was more prevalent in adolescents having fathers of a low educational level, an indicator of poor socio-economic status. This is in agreement with the findings of other studies concerning children, adolescents[14,16] and adults.[17]

We also found that the level of urbanisation was inversely related with breakfast skipping. In contrast, in a study conducted in the Netherlands concerning children of 4-15 years, breakfast skipping was found to be more prevalent in urban areas than rural ones.[14] To determine the real influence of the level of urbanization for breakfast skipping in high school adolescents further investigation in different countries is needed.

Breakfast skipping has been related to increased risk of obesity in children and adolescents.[12] This relationship was also detected in our study, emphasizing again the particularly important role of breakfast.

So far, few studies have investigated the question whether breakfast skipping is associated with other unhealthy food habits, and the existing data are not consistent. Cavadini et al[18] found that breakfast skipping is not statistically linked to all other eating habits in adolescents aged 11-15 years. On the contrary, Brugman et al[14] found that the consumption of bread, milk, vegetables, meat, fruit and sweets was more often reported by children who were breakfast eaters. Children, who did not have breakfast on the day before the study, consumed salty snacks and soft drinks more frequently, although the consumption of other foods such as fish and pulses was not significantly different. Our results showed that breakfast skipping is statistically linked to the frequency of consumption of some basic foods. In particular, adolescents consuming breakfast appear to adopt healthier food habits, such as daily consumption of fruit and vegetables and more frequent consumption of legumes. On the contrary, breakfast skippers were more prone to adopt unhealthy food habits such as frequent consumption of meat (with less consumption of fish), alcohol and soft drinks. Also, breakfast skipping appears to be associated with other unhealthy habits such as unstable hours for dinner and frequent consumption of out-meals. Perhaps these differences in the eating choices explain in someway why breakfast consumers have more balanced and more suitable energy intake compared with breakfast skippers, a finding that was ascertain in a recent study.[19]

With regard to the reasons why some adolescents were breakfast skippers, our study confirmed the conclusion derived from other studies, according to which breakfast skipping is a matter of individual choice.[20] This finding, in association with those mentioned above, indicates the importance of intervention at this early phase of life in order to prevent the adoption of unhealthy food habits in later life.

In conclusion, the prevalence of breakfast skipping among Greek adolescents attending high school is quite high and increases with age. It is inversely related to the educational level of father and the level of urbanization. The strong relation with nutritional status indicates the importance of this meal in the later course of an adolescent's health. Breakfast skipping is associated with other poor nutritional habits suggesting that it does not constitute only a strong indicator of unhealthy diet but

probably has a considerably negative influence on the food choices of adolescents. Health education programmes are therefore needed to encourage breakfast eating, targeting special groups at risk.

REFERENCES

1. Perry CL, Griffin G, Murray DM. Assessing needs for youth health promotion. Prev Med 1985; 14: 379-393.
2. Baranowski T, Cullen KW, Basen-Engquist K, Wetter DW, Cummings S, Martineau DS, Prokhorov AV, Chorley J, Beech B, Hergenroeder AC. Transitions out of high school: time of increased cancer risk? Prev Med 1997; 26: 694-703.
3. Nicklas TA, Bao W, Webber LA, Berenson GS. Breakfast consumption affects adequacy of total daily intake in children. J Am Diet Assoc 1993; 93: 886-891.
4. Morgan KJ, Zabik ME, Stampley GL. The role in diet adequacy of the U.S. adult population. J Am Coll Nutr 1986; 5: 551-563.
5. Pollitt E,. Mathews R. Breakfast and cognition: an integrative summary. Am J Clin Nutr 1998; 67(4): 804S-813S.
6. Resnicow K. The relationship between breakfast habits and plasma cholesterol levels in schoolchildren. J School Health 1991; 61: 81-85.
7. Sakata K, Matumura Y, Yoshimura N, Tamaki J, Hashimoto T, Oguri S, Okayama A, Yanagawa H. Relationship between skipping breakfast and cardiovascular disease risk factors in the national nutrition survey data. Nippon Koshu Eisei Zassshi 2001; 48: 837-841.
8. Rosner B, Prineas R, Loggie J, Daniels SR. Percentiles for body mass index in U.S. children 5 to 17 years of age. J Pediatr 1998; 132: 211-222.
9. Murata M. Secular trends in growth and changes in eating patterns of Japanese children. Am J Clin Nutr 2000; 72(suppl): 1379S-1383S.
10. Rolland-Cachera MF, Bellisle F, Deheeger M. Nutritional status and food intake in adolescents living in Western Europe. Eur J Clin Nutr 2000; 54(suppl 1): S41-S46.
11. Samuelson G. Dietary habits and nutritional status in adolescents over Europe. An overview of current studies in the Nordic countries. Eur J Clin Nutr 2000; 54(suppl 1): S21-S28.
12. Siega-Riz AM, Popkin BM, Carson T. Trends in breakfast consumption for children in the United States from 1965 to 1991. Am J Clin Nutr 1998; 67(suppl): 748S-56S.
13. Andersen LF, Nes M, Sandstad B, Bjorneboe G-EA, Drevon CA. Dietary intake among Norwegian adolescents. Eur J Clin Nutr 1995; 49: 555-564.
14. Brugman E, Meulmeester JF, Van Der Wekke S, Verloove-Vanhorick SP. Breakfast-skipping in children and young adolescents in The Netherlands. Eur J Publ Health 1998; 8: 325-328.
15. Papaefstathiou A, Vassilakou T, Gnardellis C, Trichopoulou A. Nutritional knowledge and attitudes of students at the Athens Technological Education Institute. *Iatriki* 1999; 75: 232-237.

16. Cornelius LJ. Health habits of school-age children. J Health Care Poor Underserved 1991; 2: 374-395.

17. Hulshof KF, Lowik MR, Kok FJ, Wedel,M, Brants HA, Hermus RJ, ten Hoor F. Diet and other life-style factors in high and low socio-economic groups (Dutch Nutrition Surveillance System). Eur J Clin Nutr 1991; 45: 441-450.

18. Cavadini C, Decarli B, Grin J, Narring F, Michaud P-A. Food habits and sport during adolescence: differences between athletic and non-athletic teenagers in Switzerland. Eur J Clin Nutr 2000; 54(Suppl 1): S16-S20.

19. Nicklas TA, Reger C, Myers L, O'Neil C. Breakfast consumption with and without vitamin-mineral supplement use favorable impacts daily nutrient intake of ninth-grade students. J Adolesc Health 2000; 27: 314-321.

20. Shaw ME. Adolescent breakfast skipping: an Australian study. Adolescence 1998; 33: 851-861.

QUESTIONNAIRE CONCERNING FOOD HABITS AMONG HIGH SCHOOL STUDENTS

BOY ❑   GIRL ❑   AGE: .... CLASS: ....

EDUCATION OF FATHER: Elementary ❑   Secondary (3-classes) ❑   High School ❑

Technological Education Institute ❑   University ❑

EDUCATION OF MOTHER: Elementary ❑   Secondary (3-classes) ❑   High School ❑

Technological Education Institute ❑   University ❑

PROFESSION OF FATHER: .... PROFESSION OF MOTHER: ....

WHAT DO YOU EAT FOR BREAKFAST?   a) Milk ❑

b) Milk-Cereal-Egg-Yogurt ❑

c) I do not eat breakfast ❑

HOW DO YOU PREFER THE MILK?   a) Sugarless ❑   b) With sugar ❑

c) Chocolate ❑   d) I do not drink milk ❑

WHAT DO YOU EAT FOR BREAK?   a) Cheese pie ❑   b) Croissant ❑   c) Sandwich ❑

d) Fried potatos ❑   e)Fruit ❑   f) Soft drink or coffee ❑

g) Nothing ❑

DO YOU EAT VEGETABLES OR SALADS? a) Every day ❑   b) Three-five times per week ❑

c) Rarely ❑   d) Never ❑

DO YOU EAT FRUIT?   a) Every day ❑   b) Three-five times per week ❑

c) Rarely ❑   d) Never ❑

HOW MUCH BREAD DO YOU EAT?   a) One slice per meal ❑   b) Two slices per meal ❑

c) Three or more slices per meal ❑

HOW OFTEN DO YOU EAT LEGUMES? a) Two times per week ❑   b) One time per week ❑

c) One time per 15 days ❑   d) Never ❑

WHAT KIND OF BREAD DO YOU PREFER? a) White ❑   b) Village bread ❑

c) Black bread ❑

DO YOU EAT MEAT?   a) Every day ❑   b) Three-five times/week ❑

c) Two times/week ❑   d) Rarely ❑   e) Never ❑

DO YOU EAT FISH?   a) Two times per week ❑   b) One time per week ❑

c) Rarely ❑   d) Never ❑

QUESTIONNAIRE CONCERNING FOOD HABITS AMONG HIGH SCHOOL STUDENTS

HOW OFTEN DO YOU EAT SAUSAGES?	a) Every day ❑	b) Two times/week ❑	
	c) One time per week ❑	d) Rarely ❑	e) Never ❑
HOW DO YOU PREFER MEALS?	a) Fried ❑	b) Baked ❑	c) Boiled ❑
DO YOU CONSUME MEALS WITH SPICES (salt, pepper, sauces)?	a) Every day ❑	b) Often ❑	c) Rarely ❑
DO YOU CONSUME SOFT DRINKS?	a) Every day ❑	b) Often ❑	
	c) Rarely ❑	d) Never ❑	
DO YOU DRINK ALCOHOLIC BEVERAGES?	a) Every day ❑	b) Often ❑	
	c) Rarely ❑	d) Never ❑	
DO YOU CONSUME SUGAR AND SWEETS?	a) Every day ❑	b) Often ❑	
	c) Rarely ❑	d) Never ❑	
DURING THE PREPARATION OF A MEAL DO YOU USE?	a) Olive oil ❑	b) Butter ❑	c) Seed oil ❑
DO YOU HAVE REGULAR HOURS FOR MEALS?	a) Yes ❑	b) No ❑	
HOW OFTEN DO YOU HAVE OUT MEALS?	a) Every day ❑	b) Three-five times/week ❑	
	c) During weekend ❑	d) Rarely ❑ Never ❑	