ORIGINAL ARTICLE

Breakfast habits of 1,202 Northern italian children admitted to a summer sport school. Breakfast skipping is associated with overweight and obesity

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Abstract. Very little is known about the differences in breakfast of children performing physical activity in the morning.This paper analyzed the breakfast habits of 747 boys and 455 girls, distributed in 2 homogeneous age groups, 6-10 and 11-14 year-old, participating in a Summer Sport School. Children were asked whether, when, where, how and with whom they consumed breakfast; who prepared meals; what they ate and drank; what they did during breakfast. Weight, height and BMI were recorded. Seventy-eight percent of children usually had breakfast, but 22% reported skipping breakfast. In the non-breakfast consumer subjects, 27.5% were overweight and 9.6% obese vs 9.1 and 4.5% respectively in breakfast eaters. Bakery products (76%) and milk (71%) were the most frequently consumed foods. Only 15% of parents encouraged their children to consume additional foods at breakfast before exercising, and 42 % of children believed that this extra nutrition was unnecessary. In 80% of cases, the chief decision-maker for breakfast was the mother, the father played little part (1%). During breakfast, 48% of children ate and drank in silence, 26% played with brothers and sisters, 18% watched television and only 8% talked with parents. A high prevalence of overweight and obesity was found among non-breakfast consumer children. Breakfast omission in children exercising conflicts with their increased energy requirements and may be connected to the trend of parents and children to under-estimate the importance of breakfast for nutritional balance and for environment promotion of physical performance.

Key words: Breakfast, nutrition, child-nutrition, exercise, obesity

Introduction

Starting each day with breakfast is considered an important habit for health and development in children and adolescents. Nevertheless several schoolchildren are used to skipping breakfast, thus failing to meet the recommended dietary allowances, i.e. for vitamins A, B-6 and D, calcium, magnesium, riboflavin, zinc, phosphorus and iron (1, 2). Cross-sectional studies have consistently reported positive association between adiposity in children and skipping breakfast (3, 4).

Dietary omission in the morning has been associated with decreased daily total energy intake and poor school performance (5, 6) . Children with low caloric consumption showed higher rates of school absenteeism and more psychological problems compared to children with more adequate dietary intakes (1). A study documented the link between hunger and health problems during childhood (7).

In comparison with numerous studies about student meals before going to school, very little is known about the differences in breakfast of children performing physical activity in the morning. The aim of this survey was to analyze the breakfast habits of a large number of children from the same urban area participating in a Summer Sport School.

Methods

Subjects

Data for the current analyses came from the participants in "Giocampus Barilla", a Summer Sport School for children, aged 6 to 14 years, which took place in the Campus sport area of the University of Parma from 15th June to 15th September 2003, in collaboration with Barilla Group, Postgraduate Medical School of Paediatrics, and the Graduate School of Sport and Exercise Sciences of the University of Parma. Two hundred children at a time were admitted to the Summer Sport School for a period of time lasting 15 days, spending 8 hours per day (9 a.m. to 5 p.m., Monday to Friday) in physical activities (i.e. soccer, volleyball, basketball, artistic dance, tennis, fencing and athletics) under the supervision of professional instructors. During this time, snacks, lunch and beverage were regularly distributed. Breakfast was not included. Parents of participants were asked to pay an entrance fee of € 200.00 and to exhibit a medical declaration about health and nutrition of their children.

Informed consent and assent for participation in the survey were obtained from parents and children respectively. For privacy reasons, family socio-economic status was not recorded . The survey was approved by the Ethical Committee of the University of Parma.

Procedure of Interview and Growth evaluation

On the 7th school day, all the participants were requested to answer a questionnaire on their breakfast habits, developed by the students of the Pediatric School of the University of Parma. The questionnaire included 12 questions with multiple responses (Appendix B) and was completed before beginning any exercise with instructors. The instructors had been previously trained to establish a relationship with each child, and to explain clearly that there were no "right" or "wrong" responses to questions. Children were divided into 2 homogeneous age groups, 6-10 and 11-14 year-old.

Children were asked whether, when, where, how and with whom they consumed breakfast during weekdays and at the weekend; who prepared meals; what they ate and drank; what they did during breakfast. For the purpose of this survey, breakfast was defined as any intake of food or beverage between 6 and 8 a.m. before going to the Summer Sport School. Reported as not eating a morning meal at home, or breakfast, fewer than three times per week were defined: "Skip breakfast". The energy content of breakfast was not determined because the previous feasibility study highlighted several mistakes in weighing and recording food at home, and some children who never ate at breakfast reported eating normally. This procedure of collecting data was considered unreliable to calculate the effective energy amount taken at breakfast and so it was avoided for this survey.

Harpenden stadiometers were used for height, and every child was measured according to the standard technique elsewhere described (8). Body weight was measured in minimal clothes on portable and calibrated scales. Body mass index (BMI) was calculated using the formula: weight (kg)/height (m^2). Overweight and obesity were defined according to the international cut off points for body mass index for overweight and obesity proposed by Cole et al. (9).

Statistical analyses

The data collected were analyzed using SPSS for Windows and expressed as mean ± SD. Numerical differences were calculated by Student's t-test. The χ^2 test was used to study the differences between proportions. Differences were considered significant if $p<0.05$.

Results

The initially collected questionnaires were 1,215; however, 1,202 (98,9%) had complete data. These ap-

propriate data concerned 747 boys and 455 girls, average age 9.2±2.2 years (range, 6-14 years).

The grand mean of BMI was 18.6±6.0. In 323 boys and 188 girls 6-10 year old, mean BMI was 18.1±2.8 and 17.9±3.1; and in 424 boys and 267 girls 11-14 year old was 19.5±4.2 and 18.6±5.1 respectively. Seventy six per cent of all subjects were normal-weight, 18% overweight and 6.0% obese. Overweight and obesity were homogeneously distributed in the two age-groups (χ^2=1.46, p=0.22 and χ^2=3.85, p=0.05 respectively).

Seventy-eight percent of the tested children referred to have usually breakfast. The highest proportion of breakfast consumers (77%) was observed in the age-group 11-14 year old. Twenty-two percent of children reported skipping breakfast five times per week. Pubertal females (28%) skipped breakfast more frequently than boys (12%). The omissions were attributed to the lack of time (62%) and not being hungry (38%) upon waking. During weekends the percentage of breakfast skippers decreased to 13.8%.

In the subjects who did not have breakfast, the percentage of overweight (27.5%) and obese (9.6%) children was significantly higher (p=0.01 and p=0.04 respectively) than in the children who ate breakfast (9.1 and 4.5% respectively).

Bakery products were the most frequently consumed breakfast foods in both age-groups (77% and 71% respectively) while fruit was sporadically eaten (4 and 5%). Biscuits, snack cakes, cereals and crackers, in descending order, were scored as highly preferred foods for breakfast (Table 1). Milk was the most popular breakfast drink (70%), and it was chosen more frequently by younger than older children (73 vs 66%, χ^2=4.54; p=0.03). Tea, fruit-juices and hot chocolate were much less consumed drinks (15, 13 and 2% respectively). Children aged 11-14 were inclined to change daily breakfast beverage more than younger children (32% vs 18%, χ^2=19.52; p=0.0001). A small number of parents (15%) were reported as keeping check of the portions actually eaten and to encourage their children to consume additional foods at breakfast before going to the Summer Sport School, and 42% of children believed that this extra nutrition was unnecessary.

As concerns the choice of menu at breakfast, the chief decision-maker was the mother in 80% of cases, the father played a little part (1%) in selecting food. Three percent of children referred to personally chose the breakfast menu, but 70% claimed to have more influence on their own meal choices. Sixteen percent of subjects (aged more than 10 years) reported to be responsible for their own meal preparation and to be inclined (27%) to skip breakfast.

Table 1. Frequency of daily consumption of different foods and drinks at breakfast in the two different age-groups of children

Foods and *drinks*	Children 6-10 years old		Children 11-14 years old	
	Boys %	Girls %	Boys %	Girls %
Biscuits	36	30	29	30
Snack cakes	24	19	18	17
Cereals	14	17	18	16
Crackers	8	11	10	8
Cakes	5	7	9	11
Bread	5	5	5	6
Butter and marmalade	4	7	7	6
Fruit	*4*	*4*	*4*	*6*
Milk	*58*	*49*	*43*	*44*
Milk and cocoe	*20*	*20*	*23*	*22*
Tea	*10*	*16*	*16*	*19*
Fruit juices	*10*	*13*	*15*	*13*
Hot chocolate	*2*	*2*	*3*	*2*

Breakfast was eaten by 97% of children at home with at least one (65%) or both (25%) parents during weekdays. At weekends the percentage of children having breakfast with both parents increased to 45%. During breakfast, 48% of children reported eating and drinking in silence, 26 percent played with brothers and sisters, 18% watched television and only 8% talked with parents.

Discussion

The percentage of individuals consuming breakfast here presented agrees with other published results concerning schoolchildren and adolescents (10-13), but two data overall arise from the findings of this survey. First of all, the significant number of active children skipping breakfast almost every day, and secondly the high prevalence of overweight and obesity among children who did not regularly have breakfast.

Different proportions of children and adolescents attending school with no breakfast were reported in European countries (10, 14, 15) and in USA (12). A pan-European study showed that almost one in five schoolchildren in Italy (19%) did not eat anything for breakfast, a percentage much higher than in UK (9%), France (5%) and Germany (1%) (14).

The studies of breakfast habits in children attending well structured sport activities are not frequent (11). The present study may be considered as the first nutritional breakfast-restricted survey carried out in a large and homogeneous sample of young Northern Italian people, admitted to a Summer Sport School. In these active children the proportion of non-consumers of breakfast (22% on average) was similar to that previously reported in peer schoolchildren (10, 12-14). Among non-consumers of breakfast we found that adolescent girls are prevalent, in agreement with some Authors (16) and in disagreement with others (17). Skipping breakfast in females may be interpreted as a chosen method of weight control, and it has been, in some adolescents, associated with body dissatisfaction, dieting and eating disorders (18).

Breakfast omission in children exercising conflicts with their increased energy requirements. Energy intake at breakfast is important in children exercising because the reserves of glucose in their body are low upon waking, and the demand by the central nervous system and for muscular activity is high; hence, an overnight and morning fasting might result in low levels of physical activity early and late in the morning (19). Nevertheless, parents and children in this survey were inclined to under-estimate the importance of breakfast for nutritional balance and for environment promotion of physical performance. The parents participation during meals has been identified as a key factor to extend meal duration and to increase energy intake in their children (20, 21), but other factors may influence children's habits, such as food preferences, eating behaviours and family organization (22, 23).

A high percentage of children explained that they skipped breakfast because of lack of time (62%) and not being hungry (38%) upon waking. These reports are consistent with those previously described in an Australian study (18), and might be related to the habit of Italian children of going to bed late and having a snack at bed time. According to national data , 70% of primary and 41% of secondary Italian schoolchildren are accustomed to going to bed at 9:30 and 10:30 p.m respectively, and having a snack (36%) at bed time (Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (INRAN), Rome, Italy, unpublished data). These habits might cause children to wake up late without appetite, and to skip breakfast in order to be on time for school.

The proof that lack of time may be a factor determining breakfast skipping comes from the finding that, during weekends, when parents and children are not in a hurry or stressed to reach the work place or school on time, the percentage of breakfast eaters increases as well as the number of children consuming breakfast with both parents. Parental influences have been reported as important determinants of breakfast eating in children, thus, getting parents to have breakfast as regularly as possible and together with offspring could be a step toward getting their children to eat breakfast habitually as well (24).

Earlier studies reported that overweight/obese children are inclined to have breakfast less frequently than normal weight children (17, 25). Children who omit breakfast seem to be used to a higher daily percentage intake of energy from fat/sugar and to consume frequent snacks (26, 27). Thus, it might be assumed that in normal weight children skipping breakfast might lead to excessive weight gains (28). Our data confirmed that among normal weight children there is a statistically significant prevalence of overweight/obesity after skipping breakfast. Conversely, eating breakfast has been shown to reduce dietary fat and to minimize impulsive snacking (29).

Breakfast in 72% of tested children consisted mostly of bakery products and milk, typical foods of the Mediterranean diet. These findings agree with those found in other young European people who, like their Italian peers, favour carbohydrate-rich foods and milk for breakfast (11, 14). In Northern-Italian children, as well as in peer children of some European countries (10, 14, 30), USA (31) and Australia (32), fruit was not reported as a frequent breakfast choice, although 85% of children rated fruit as very good food for their health (14). This lack of fruit at breakfast is usually offset in Italian children by fruit consumption at lun-

ch, dinner and snacks which is much higher compared with German and English peers who conversely consume fruit more frequently at breakfast (14).

The decision-maker for breakfast is normally the mother, who makes choices on behalf of the majority of children both during the week and at weekends. Findings from this survey suggested that fathers play little or no part in selecting food for their children. Despite this maternal dominance, 70% of children expressed a preference to be independent on the choice of menu at breakfast. This request deserves attention and has to be prudently encouraged because when no parent was available at home to prepare breakfast – this happened in one-quarter of children herein tested – the child who was responsible for preparing his own meal was frequently inclined to skip breakfast

Breakfast is eaten with the family more frequently at weekends, and three-quarters of our children reported to eat with one or both parents during the week. Despite this parental participation in children's breakfast, the dialogue with parents seems to be anecdotal, and in one-quarter of children herein studied it was replaced by television programmes. This finding is particularly worrying, given the relationship between high energy intake and TV viewing in promoting overweight and obesity (33, 34).

The findings of this survey provide a representative picture of breakfast-related habits of children exercising, and represent a basis for designing and implementing appropriate measures in order to promote dietary education and health in children approaching an organized physical activity. The high percentage of children skipping breakfast before exercising as well as the association between skipping breakfast and overweight/obesity should lead the organizers of sport activities to stress that nutritional intake with breakfast contributes to create a favourable nutritional environment for physical performance and adiposity prevention.

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References

1. Kleinman RE, Hall S, Green H, et al. Diet, breakfast, and academic performance in children. *Ann Nutr Metab* 2002; 46 (Suppl 1): 24-30.
2. Reddam J, Wahlstrom K, Reicks M. Children's perceived benefits and barriers in relation to eating breakfast in schools with or without Universal School Breakfast. *J Nutr Educ Behav* 2002; 34: 47-52.
3. Pollitt E. Does breakfast make a difference in school? *J Am Diet Assoc* 1995; 95: 1134-9.
4. Summerbell CD, Moody RC, Shanks J, Stock MJ, Geisser C. Relationship between feeding patterns and BMI in 220 free-living people in four age groups. *Eur J Clin Nutr* 1996; 50: 513-9.
5. Pastore DR, Fisher M, Friedman SB. Abnormalities in weight status, eating attitudes, and eating behaviours among urban high school students: correlation with self-esteem and anxiety. *J Adolesc Health* 1996; 18: 312-9.
6. Wesnes KA, Pincock C, Richardson D, Helm G, Hails S. Breakfast reduces declines in attention and memory over the morning in schoolchildren. *Appetite* 2000; 41: 329-31.
7. Smith A. Meals, mood and mental performance. *Br Food J* 1993; 95: 16-8.
8. Cameron M. The methods of auxological anthropometry. In Falkner F, Tanner JM eds: Human Growth. A Comprehensive Treatise, 2nd ed. Plenum Press, New York, 1986: 3-46.
9. Cole TG, Bellizzi MC, Flegal KM, Dietz WH. Establishing standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000; 320: 1-6.
10. Aranceta J, Serra-Majem L, Ribas L, Pérez-Rodrigo C. Breakfast consumption in Spanish children and young people. *Public Health Nutrition* 2000; 4 (6A): 1439-44.
11. Cavadini C, Decarli B, Grin J, Narring F, Michaud P-A. Food habits and sport activity during adolescence: differences between athletic and non-athletic teenagers in Switzerland. *Eur J Clin Nutr* 2000: 54, Suppl. 1, S16-S20.
12. Gross S, Bronner Y, Welch C, Dewberry-Moore N, Paige DM. Breakfast and Lunch meal skipping patterns among fourth-grade children from selected public schools in urban, suburban, and rural Maryland. *J Am Diet Assoc* 2004; 104: 420-3.
13. Lytle LA, Seifert S, Greenstein J, McGovern P. How do children's eating patterns and food choices change over time? Results from a cohort study. *Am J Health Promot* 2000; 14: 222-8.
14. EUFIC, European Food Information Council (1995) Children's view on food and nutrition: a pan-European survey. Performed by Children's Research Unit, London, UK, www.eufic.org/site_child_nutrition/index/html
15. Wyon DP, Abrahamsson L, Jarrtelius M, Fletcher RJ. An experimental study of the effect of energy intake at breakfast on the test performance at 10-year-old children in school. *Int J Food Sci Nutr* 1997; 48: 5-12.
16. Isralowitz RE, Troster N. Substance use: toward an under-

standing of its relation to nutrition-related attitudes and behaviour among Israeli high school youth. *J Adolesc Health* 1997; 19: 184-9.
17. Monneuse MO, Bellisle F & Koppert G. Eating, food and health related attitudes and beliefs reported by French students. *Eur J Clin Nutr* 1997; 51: 46-53.
18. Shaw ME. Adolescents breakfast skipping: an Australian study. *Adolescence* 1998; 33: 851-61.
19. Vermorel M, Bitarnet J, Verdier E, Coudert J. The extent to which breakfast covers the morning energy expediure of adolescents with varying levels of physical activity. *Eur J Clin Nutr* 2003; 57: 310-5.
20. Feunekes GI, de Graaf F, van Staveren WA. Social facilitation of food intake is mediated by meal duration. *Physiol Behav* 1995; 58: 551-8.
21. Vaurhier JM, Luch A, Lecomte E, Artur Y, Berbeth B. Family resemblance in energy and macronutrient intakes: the Stanislas Family Study. *Int J Epidemiol* 1996; 25: 1030-7.
22. Hertzler AA . Children's food patterns. *J Am Diet Assoc* 1983; 83: 55-560.
23. Pliner P, Pelchat ML. Similarities in food preferences between children and their siblings and parents. Appetite 1986; 7: 333-42.
24. Keski-Rahkonen A, Kaprio J, Rissanen A, Virkkunen M, Rose J. Breakfast skipping and health-compromising behaviors in adolescents and adults. Eur J Clin Nutr 2003; 57: 842-53.
25. Ortega RM, Requejo AM, Lopez-Sobaler AM et al. Difference in the breakfast habits of overweight/obese and normal weight schoolchildren. *Int J Vitam Nutr Res* 1998; 68: 125-32.
26. Nicklas TA, Reger C, Myers L, O'Neil C. Breakfast consumption with and without vitamin-mineral supplement use favourably impacts daily nutrient intake of ninth-grade students. *J Adolesc Health* 2000; 27: 314-21.
27. Resnicow K. The relationship between breakfast habits and plasma cholesterol levels in schoolchildren. *J School Health* 1991; 61: 81-5.
28. Berkey CS, Rochett HRH, Gillman MW, Field AE, Colditz GA. Longitudinal study of skipping breakfast and weight change in adolescents. *Int J Obes* 2003; 27: 1258-66.
29. Schlundt DG, Hill JO, Sbrocco T, Pope-Cordle J, Sharp T. The role of breakfast in the treatment of obesity: a randomized clinical trial. *Am J Clin Nutr* 1992; 55: 645-51.
30. 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.
31. Neumark Sztainer D, Story M, Resnick M, Blum R. Correlates of inadequate fruit and vegetable consumption among adolescents. *Prev Med* 1996; 25: 497-505.
32. Nowak M, Speare R. Gender differences in food related concerns beliefs and behaviours of North Queensland adolescents. *J Paediatr Child Health* 1996; 32: 424-7.
33. Robinson TN, Hammer LD, Killen JD, et al. Does television viewing increase obesity and reduce physical activity? Cross-sectional and longitudinal analyses among adolescents girls. *Paediatrics* 1993; 91: 273-80.
34. Birch LL, Fisher JO. Development of eating behaviours among children and adolescents. Paediatrics 1998; 101: 539-49.

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APPENDIX

A) List of Students of the Post-Graduate School of Paediatrics, University of Parma, Italy, who actively participated in this survey: Daniela Davoli, Giorgia Fragni, Lucia Grassi, Sabrina Moretti, Monica Nitsch, Candida Tripodi, Alessandro Ubaldi.

B) Interview questions:

1. Do you have breakfast in the morning?
   – always, every morning
   – almost every morning
   – only on Sunday and on holidays
   – never
2. If you don't have breakfast could you tell us why?
   – I'm in a hurry and I haven't got time
   – in the morning I'm not hungry
   – I don't like having breakfast in the morning
   – my family is not used to do it
3. If you have breakfast where do you have it?
   – at home
   – in a bar
   – on the road
   – at school
4. How do you have breakfast?
   – on a laid table
   –standing in the kitchen
   – in bed
   – standing before leaving
5. With whom do you have breakfast?
   – with my parents
   – alone
   – with all the family
6. Who prepares breakfast?
   – my mother
   – my father
   – my brother or my sister or grandparents
   – I prepare it
7. When do you have breakfast?
   – when I wake up
   – after I washed myself
   – immediately before leaving
8. Do you always eat the same things?
   – yes
   – no
   – it depends
   – it depends if it is a holydays
9. What do you eat for breakfast ?
   – biscuits
   – butter and jam
   – cake
   – snack
   – fruit
   – bread
   – french toast
   – other things (what……..)
10. What do you drink for breakfast?
    – milk
    – milk and chocolate
    – hot chocolate
    – tea
    – fruit juice
11. Are drinks hot or cold?
    – hot
    – cold
    – hot and cold
12. What do you do when do you have breakfast?
    – eat and drink
    – speak with my parents
    – watch TV
    – play with my brothers
    – study or brush up