

“GIOCAMPUS” - An effective school-based intervention for breakfast promotion and overweight risk reduction

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Abstract. The aim of this study was to evaluate the efficacy of a campaign promoting breakfast in primary school-children from the city of Parma, Italy, where 22 % of peer school-children had reported in 2005 to skip breakfast. Two groups of children were interviewed by a multiple choice questionnaire on their breakfast habits. Group 1 counted only the children who underwent the intensive campaign (n. 341), and Group 2 a number of matched peers who did not attend any breakfast-promoting program (n. 291). Children who did not eat breakfast were found to be more numerous in Group 2 (17.5 %) than in Group 1 (8.0 %; $p=0.0001$). In the Group 2 the percentage of overweight (18.4 %) was higher compared to Group 1 patients (11.7 %; $p=0.022$). No significant difference in obesity percentage (8.9 vs 5.0 %; $p=0.071$). Seventy five percent of children in Group I and the 25% of children in Group 2 ($p=0.031$) had one or two parents who had reported to skip routinely breakfast. Children with one or both parents used to skip breakfast had a greater odds ratio of 3.04 and 3 respectively of skipping breakfast compared to the children with parents who had regularly breakfast ($p=0.0002$). Compared to the children tested in 2005, children admitted to the Giocampus program showed: a significant decrease in breakfasting (22 vs 8 %; $p=0.0001$), a significant decrease in overweight (18.5 vs 11.7 %; $p=0.003$) but not in obesity (7.5 vs 5.0 %; $p=0.138$) status; a significant increase in consumption of cereals ($p=0.0001$) and fruit ($p=0.0001$). In conclusion, an intensive breakfast-centred strategy seems to be effective in breakfast promotion and in overweight risk decrease. (www.actabiomedica.it)

Key words: Breakfast skipping, obesity, overweight, food, nutrition

Introduction

Overweight and obesity prevalence among children and adolescents is a pressing health emergency in both developed and developing countries (1-3). It has been estimated that this phenomenon concerns 20% of European young people (2) with Italy leading at around 30% (4). According to the National Health Ministry some Italian southern regions reach a cumu-

lative prevalence of 49% (4). These epidemiological data place Italy near the top position in the world for overweight and obese children.

Several studies have documented that obesity is associated with chronic co-morbidities such as type 2 diabetes, cardiovascular diseases, hypertension, and low self-esteem already in childhood (5-7). In order to better understand this condition, several studies have investigated the potential obesity causes, and the main

risk factors generally reported are an increased food intake associated with a decreased energy expenditure (2,3).

Breakfast skipping has also been linked to the risk of developing overweight and obesity in children (9-11). In a previous study we have shown that skipping breakfast more than 3 times per week was associated with greater body mass index (BMI) in a group of schoolchildren participating to a summer sport school (10). Despite these data, the debate is still open on the relationship between breakfast omission and obesity (12).

Parents are in general prone to underestimate the importance that a school-aged child should start each day with a breakfast. Children reported as “skippers” usually explain their habitual breakfast omission because of lack of time in the morning, and not being hungry upon waking (10). Several studies have documented that dietary omission in the morning is associated with poor cognitive performance too (9, 13).

Due to the previous observation that in the Parma area, Italy, breakfast skipping was significantly common among overweight and obese school-children than in normal-weight youths (10), we promoted in the primary schools of the same area a three-year-campaign centred on the benefits of having a breakfast before going to school.

The aim of the present study was to explore whether this campaign was able to improve breakfast consumption and to modify the relationship between skipping breakfast and obesity.

Material and methods

Data were randomly collected from prepubertal school-children participating at the Summer Sport School (SSS)-2011 edition, the same camp where historic breakfast habits of school children from Parma, Italy, were analysed in 2005 (10). Recruited children (9 to 11 year olds) were distributed in two groups. Group 1 included only the school-children who came from the city of Parma and who had participated from 2008 to 2011 to an intensive campaign for breakfast promotion at school and family. Group 1 children were compared with matched peer participants at the

same SSS-2011 edition who came from the Parma district and did not attend any program for breakfast promotion at school (Group 2). The actual participation or non attendance at the campaign was checked by a written statement from the parents.

Giocampus description

The campaign started in all schools of city of Parma the first school-day in 2008 and ended on the last school day in 2011. The campaign was part of a larger primary schools-targeted nutrition and sport educational program called GIOCAMPUS (the initial GIO- standing for “gioco”, which means “play” in Italian), supported by the Town Council, the School Inspectorate, the University of Parma, the Local Sport Clubs, and the Barilla Food Company based in Parma. The programme globally involved more than 10,000 school children attending 3rd to 5th grades of the primary school (aged 8 to 11 years) in Parma town. The Giocampus protocol has been elsewhere summarized (14).

SSS-2011 edition took place by tradition in the Campus sport area of the University of Parma. An average of three thousand children were globally admitted from June to September 2011 to this SSS for a period of time up to 15 days per child, spending 8 hours per day in up to 40 physical activities (i.e. soccer, volleyball, basketball, artistic dance, tennis, fencing, athletics...) under the supervision of professional instructors. All participating children consumed every day snacks and lunch in the same area according to a menu specifically proposed by Pediatricians and dieticians.

Campaign for breakfast

Breakfast consumption campaign was promoted at different level by specific actions:

School: the importance of consuming breakfast at home every day and its role in improving cognitive, learning and exercising skills were weekly remembered in the classrooms by teachers, supported in this action by specifically trained undergraduates of the Nutritional Sciences course of the University of Parma, called the “Taste teachers”. These students ran specific classroom breakfast-centred activities and games

that enabled children to "learn by playing" that a correct continental breakfast should include a cup of milk, bread or cereal products, and fruit. At the beginning of every school year, nutritional and educational training courses for teachers were organized. Some of discussed themes were: "How to promote breakfast", "The 5 colors of fruit and vegetables", "The importance of water", "The importance of carbohydrates", "The importance of dietary fiber", "The double pyramid", "The nutrition label", "How to promote physical activity", "Children's eating disorders", and "Psychological aspects of child eating".

Family: a booklet titled "Alarm obesity", edited by one the Authors of the present study (M.V.) and available at his address, was distributed to all families involved in campaign program. One chapter of this booklet was devoted to the breakfast and to the relationship between skipping breakfast and risk for obesity. A weekly plan of breakfast was added too, e.g: 1) appetizing breakfast (milk/yoghurt, cereals, fruit); 2) Fragrant breakfast (milk/yoghurt, shortbread, orange juice); 3) Tempting breakfast (milk/yoghurt, bread and chocolate cream, fruit); 4) Classic breakfast (milk/yoghurt, bread and jam, orange juice); 5) Crunchy breakfast (milk/yoghurt, crisp biscuits); 6) Titbit breakfast (milk/yoghurt, cereal bar, fruit); 7) Salty breakfast (tea, loaf slices, Parma ham and cheese, fruit). The benefits deriving from breakfast such as improvements in school and physical performance were highlighted and discussed with the children. Four-hour-practical cookery classes for parents were carried out in the Barilla Food Academy, where first class Chefs demonstrated how it is possible and easy to prepare healthy breakfasts, snacks and other meals at home. At these meetings healthy eating topics were also discussed by nutritionists, pediatricians, and psychologists. Video-tapes of these courses were also published on Giocampus web-site (www.giocampus.it).

Pediatricians: Paediatricians of the Parma city were informed about the three-year-campaign for breakfast promotion in schools and families and were asked to collaborate in spreading the information about campaign purposes to families. In this action, they were equipped with a kit including both a poster to be displayed in their offices and a large number of leaflets showing the same weekly breakfasts plan to be

distributed to the parents. The Paediatricians were updated on campaign actions and progress by a monthly newsletter published also on the Giocampus website.

Summer Sport School: all children admitted to the two-week SSS spend eight hours each day engaged in various sports and physical activities under the supervision of professional instructors. The young campers ate snacks and lunch together always under supervision and following a menu suggested by pediatricians and dieticians. Sport champions of different disciplines who were visiting the SSS as testimonial were invited to stress the importance of having a regular breakfast to win a game. Posters displaying the question "Did you skip breakfast? These are options for tomorrow morning... (three examples were displayed). Start the day as a champion!" welcomed all participants at the entrance of the SSS and were distributed all along the Campus sport area.

Media: The campaign benefited also of a widespread and incessant promotion through local radio, TV and newspapers. Pediatricians, Nutritionists and Dieticians were weekly interviewed early in the morning on nutritional, cognitive and exercise benefits from breakfast.

The campaign was supported by the same Giocampus steering committee of scientists, nutritionists, pediatricians, teachers, psychologists, pedagogues, public administrators, food factory managers, experts on communication which closely monitored all aspects of the intervention.

Questionnaire

All the children enrolled into this study were requested on the 1st SSS day to answer a questionnaire on their breakfast habits, which had previously been used in 2005. The questionnaire included questions with multiple answers 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" answers to questions. Children were asked to record whether, when, where, how and with whom they consumed breakfast, and what they did during breakfast, throughout the most recent consecutive one weekday before attending SSS (10).

For the purpose of this study, breakfast was defined as any intake of food or beverage between 6 and 8 a.m.. Reports of not eating a morning meal at home, or breakfast, fewer than three times per week were defined as "Skip breakfast".

Physical parameters

Portable Harpenden stadiometers were used for height, and every child was measured by specially trained staff according to the standard technique elsewhere described (15). Body weight was measured in minimal clothes on portable and calibrated scales. Body mass index (BMI) was calculated using the formula: weight (kg)/height (m²). 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. (16). Pubertal development was clinically assessed on the basis of Tanner stage.

Informed consent and assent for participation in the survey were obtained from parents or guardians, and children respectively. For privacy reasons, family socio-economic status was not recorded. Information on family members (traditional or single parent family) was obtained from the admission forms to SSS. The protocol study was approved by the Ethical Committee of the University of Parma.

Statistical analysis

The data collected were analyzed using SPSS for Windows. Descriptive data were presented as means \pm SD or count and percentages. Chi-square tests were used to assess statistical differences in categorical answers to study items. Odds ratio test was used to evaluate the risk to skip breakfast in children with one or both parents who routinely skipped breakfast. Numerical differences were calculated by Student's t-test. Differences were considered significant if $p < 0.05$.

Results

The initially collected questionnaires were 815, but 632 (77.5%) had complete data. Of these appropriate questionnaires 341 came from the Group 1 and

291 from the Group 2 subjects. Baseline characteristics of 632 children finally enrolled into the study were summarised in Table 1.

Breakfast

Children who did not eat breakfast were found to be more numerous (n.51) in Group 2 (17.5 %) than in Group 1 (n. 27; 8.0 %; $\chi^2 = 12.52$; $p = 0.0001$). Breakfast omissions were attributed in both Groups to the lack time (53%) and not being hungry upon waking (40%).

At weekend the percentage of breakfast skippers decreased to 5.2% in Group 1 and 14.5% in Group 2.

Bakery products and milk were the most popular breakfast foods in both Groups (Table 2). The only observed difference in the Groups concerned fruit consumption: children from Group 1 resulted eating fruit more frequently (21.1%) than peers from Group 2 (6.1%; $\chi^2 = 27.44$; $p = 0.0001$).

Table 1. Baseline characteristics of the participants at the study

Characteristics	Total	Group 1	Group 2	p
n. of children (% within group)	632	341 (53.9)	291 (46.0)	0.914
Age (yr)	9.9 \pm 1.9	9.7 \pm 1.4	9.8 \pm 1.6	0.266
Male gender (%)	65.2	65.8	66.1	0.884

Table 2. Frequency of daily consumption of food and drinks at breakfast in the 2 Groups on children tested on 2011. M= Male; F =Female. (* $p = 0.0001$)

Foods and drinks	2011			
	Group 1		Group 2 (% children)	
	M	F	M	F
Biscuits	34	32	30	28
Cereals	22	31	19	25
Crackers	10	13	14	16
Cakes	6	3	10	5
Bread	5	7	6	4
Fruit	21*	28*	6	5
Milk	54	45	54	44
Tea	13	18	17	18

Breakfasting and body weight

No difference on BMI grand mean between Group 1 (17.6±2.9) and Group 2 (17.8±3.3; t= -1.039, p=0.299) was observed. In the Group 2 the percentage of overweight (18.4 %) was higher compared to Group 1 patients (11.7 %; $\chi^2= 5,26$; p=0.022). No significant difference was found in obesity percentage (8.9 vs 5.0 %; $\chi^2= 3.26$; p=0.071).

Breakfast and family habits

The proportions of children skipping breakfast in both Groups did not change with family characteristics, i.e. no significant differences were found between children coming from single-parent families (13.4 %) and those from traditional families (14.3 %).

Seventeen percent of children in Group 1 and the 25% of children in Group 2 had one or two parents who had reported to skip routinely breakfast ($\chi^2= 4.66$; p=0.031). Children with one or both parents used to skip breakfast had a greater odds ratio of 3.04 (95% CI: 1.73-5.34) and 3.14 (95% CI: 1.79-5.53) respectively of skipping breakfast compared to the children with parents who have regularly breakfast (p=0.0002)

The total percentage of children who had breakfast alone was 33%. These children had a mean BMI higher than those who were used having breakfast with their parents (19.09 ± 3.4 vs 17.94 ± 2.78, t = 2.286, p = 0.023). The number of children who reported to prepare breakfast themselves (n. 18) had also a higher mean BMI in comparison with children who consumed breakfast prepared by parents (19.39 ± 2.92 vs 17.95 ± 2.95, t = 2.695, p = 0.008). Twenty-five percent of total children reported to watch TV during breakfast.

Comparison with the study performed in 2005

Children who participated at Giocampus program showed:

- a significant decrease in breakfasting (22 vs 8 %; $\chi^2 =33.17$; p=0.0001),
- a significant decrease in overweight (18.5 vs 11.7 %; $\chi^2 =8.85$; p=0.003) but not in obesity (7.5 vs 5.0 %; $\chi^2 =2.20$; p=0.138) status

- a significant increase in consumption of cereals ($\chi^2 =66,95$; p=0.0001) and fruit ($\chi^2 =38.8$; p=0.0001) (Table 3);
- an increase in habit to watch TV during breakfast (25 vs 18%; $\chi^2 = 3.58$, p = 0.05)
- a significant increase in having (33 vs 10%; $\chi^2 = 375.49$, p = 0.0001) and preparing (18 % vs 3 %; $\chi^2 =122.8$ p=0.0001) breakfast without parents .

Discussion

The main objective of the present research was to investigate the effectiveness of a three-year-educational campaign to improve breakfast consumption, and to modify the relationship between skipping breakfast and adiposity in a large cohort of school-children, living in a town area where in 2005 the 22% of interviewed peer people reported breakfasting (10).

At the end of a three year intervention in Parma schools and families, a significant reduction in breakfast omission was observed in children who participated at the present breakfast promotion-based study compared with children who did not. The same result was found when the comparison was made with the data attained in the 2005-study. This goal was associated with a partial fall in adiposity prevalence, being

Table 3. Frequency of daily consumption of food and drinks at breakfast in the 1 Groups of children tested on 2011 compared with those tested on 2005 (10). M= Male; F =Female (*p=0.0001)

Year of the test	2011		2005	
Foods and drinks daily consumption				
Gender	M	F	M	F
	(% Children)			
Biscuits	34	32	36	30
Cereals	22*	31*	14	17
Crackers	10	13	8	11
Cakes	6	3	5	7
Bread	5	7	5	5
Fruit	21*	28*	4	4
Milk	54	45	58	49
Tea	13	18	10	16

more evident in overweight than in obesity status. Other school-based interventions reported similar results, in general limited to girls (18,19). Overweight children could have benefited better than obese peers from a however modest change in daily food habits such as an improvement in breakfast consumption. It was well documented that eating breakfast helps to reduce dietary fat intake, minimizes impulsive snacking and lower energy intake at lunch time, and therefore this behavior modification could play an important role in BMI control (20, 21)

A few studies have related weight change to breakfast intake (22, 23). This relationship was reported as more evident when a physical activity program was added to an obesity-prevention project (17, 24, 25). Long term breakfast promotion in Parma was really part of a larger nutrition educational protocol ("Giocampus") where 60 hours physical activity per year were introduced into the school curriculum, completed with a Summer Sport School at the end of each year-school. This professionally guided program of physical education in the primary school showed to be able to lead to a significant progress in the development of conditional and coordinative abilities in a large number of school-children as previously reported (26), and the Summer Sport School has most likely contributed to promote breakfast daily consumption in the herein studied population.

It is reasonable to speculate that an additional role in breakfast promotion for Parma school-children has to be ascribed to the uninterrupted advertising campaign spread by radio, television and newspapers, and capillary information given to the families by the use of booklets and leaflets in collaboration with local pediatricians. It was the first time that a similar community mobilization was promoted and carried out in an Italian city for a campaign oriented to promote breakfast consumption at home.

A number of studies have achieved similar goals in children who participated in programs offering the change to have breakfast at school (27, 28). Several Authors suggested that these children showed greater cognitive achievements and fewer disciplinary problems (9, 29-31). According to a number of Authors, some results obtained by these school breakfast programs are usually short term being restricted to one

year-school duration and influenced by the socioeconomic family status (32). The results herein reported seem to be more long lasting because the Giocampus-program focused the school nutrition intervention not to induce a common change in breakfast habits, but to provide more simply a healthy breakfast at home.

An important change in children's habits was observed at the end of three year intervention and this concerned a significant improvement in fruit consumption. A macroscopic fruit deficiency in breakfast was previously found in children from the Parma area (10) which reached the top percentage reported when compared to European school-children (33). The attained results in the present study still continue anyway to be far from the European standards, and this means that a longer and more persisting action is needed to change a nutritional habit involving families as well.

Family participation in a nutritional education program is crucial (34). Most mistakes in nutritional habits observed in children generally origin from the family (35). A lot of parents omit having breakfast every day with their children or are not available at home to prepare breakfast or delegate children to prepare their own meal (10). All these situations encourage skipping breakfast, as herein showed. On the contrary, when parents are available at home and usually have breakfast with their children, e.g. during weekend as reported in the present study, children who are prone to skipping breakfast are stimulated to consume this important meal. This observation highlights that when a campaign for breakfast promotion in children at school involve also the family better outcomes may be obtained.

An unexpected result was found in this research: the number of children used to watch TV during breakfast has significantly increased in a few years. There may be a number of factors influencing this results, however we might reasonably speculate that the absence of parents at breakfast-time at home has implied a substitution of their figure with television. A further explanation may results from a report of the Italian National Static Institute (ISTAT): in the period of present study ISTAT reported an increased number of mothers forced to leave home to find a

work to contribute towards the family budget because of a critical economic situation (36). This growing phenomenon deserves a peculiar attention, and targeted interventions are warranted to encourage children to have breakfast together with the parents and with TV switched off.

We are finally aware that the present study has some limitations. Firstly, the energy content of breakfast was not determined because in the feasibility edition of the study we observed 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 study. Secondly, the questionnaire has been self-administered by the children attending the SSS without any possibility of control on their answers. Finally, this study is not a longitudinal study, and it is only a representative sample of the global Giocampus programme. In our opinion these weak points did not lessen the impact that Giocampus programme has produced on the nutrition habits of school-children in Parma area as well the hard work of hundred of people involved in this project. Our aim was in fact to explore the changes in the breakfast habits in a young population in a similar background used for the previous study edited in 2005, and after a three-year breakfast promotion campaign.

In conclusion, an intensive breakfast-centred strategy seems to have been effective in breakfast promotion and in the decrease of the overweight risk among breakfast skippers. However much is still to be done as to register the percentage of children eating alone and watching TV.

These unhealthy habits increase the risk of breakfast skipping and weight gain and must be tackled. Parental model is considered as an important factor that stimulates children to have breakfast and helps to decrease unhealthy breakfast habits. On the basis of these considerations future breakfast promotion projects should be thus designed to improve family participation and parental knowledge about the importance of breakfast.

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