

Obesity nutritional aspects and life style from a survey on a sample of primary school pupils in the Pavia province (Northern Italy)

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Abstract

Background: The increased risk of chronic diseases requires effective strategies to promote health, facilitating the adoption of proper life styles from childhood. In order to do that, the local health authority in Pavia has undertaken a pilot study with the aim of estimating the level of overweight and obese children in primary schools and of identifying the life styles that entail health risks.

Methods: A cross-sectional study based on a sample of 460 children in their last year of primary school in the Province of Pavia was performed. Pupils were classified by Body Mass Index, and a face-to-face questionnaire about children's use of time was administered. A multiple logistic regression analysis has been applied in order to identify risks or preventive health factors linked to physical activity and eating habits.

Results: 12.6% of the children were obese and 26.3% overweight, with the percentage of obesity nearly double in those who do not practice organized sports activities at least once a week, in those who don't have breakfast in the morning and in those who don't spend their free time in movement games.

From a multiple logistic regression it results that the risk of being obese is twice and three times higher for the children living respectively in medium and small towns than for the ones living in large towns.

Conclusions: In the Province of Pavia the prevalence of overweight and obese 10-year-old children exceed the data reported in recent studies all over Italy.

The life styles that entail obesity risks are significantly linked both to eating habits and to physical activity: living in middle- and small-sized towns and not having breakfast before going to school emerge as risk factors, while practicing movement games in the free time after school appears to be a protecting factor.

Key words: overweight, obesity, life styles, risk and preventive factors

Introduction

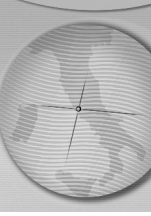
Since the beginning of the 80's, in many western countries an almost pandemic increase of obesity has taken place. The adult population of richest countries is estimated to be affected by extreme overweight and obesity conditions in a percentage ranging from 20 to 30 %. [1, 2]

Similar figures are reported also for children of both school age and below school age. This phenomenon results in higher values of the so called "dysmetabolic syndrome" which includes arterial hypertension, glycidic dyismetabolism or conclamate diabetes, iperlypidemia and precocious atherosclerosis capable to increase

child morbidity and the resulting adult mortality rate. [3, 4]

It is widely acknowledged that the causes of obesity are multi-factorial, but those mainly responsible for such an increase are associated with certain modifications of life style, such as sedentary habits and decrease of physical activity, associated with higher and unbalanced food consumption.

This is particularly true for young people who, even if the number of hours of organized physical activity dedicated to them is increased, have practically zeroed their spontaneous physical activity transforming it in time spent watching tv,



playing computer or videogames. The seriousness of this phenomenon has been pointed out by several surveys carried out in the last years.

In Europe the data collected by the International Obesity Task Force (IOFT), in collaboration with the European Childhood Obesity Group, suggest that childhood obesity has increased steadily over the past two or three decades; furthermore children in northern Europe regions have lower overweight prevalence rates (10-20%) than the ones in southern Europe regions (20-35%) [5, 6, 7]

In 2000, 2003, 2005 a series of surveys aimed to detect the prevalence of overweight and obesity in children of 9 years of age have been conducted in many regions of Italy, such as Toscana, Emilia Romagna, Campania, Puglia and Calabria. [8],

The results published report percentages of overweight between 12.6 % and 28.4 % and between 16.8 % and 34.2 % respectively for males and females; while percentages of obesity are between 4.7 % and 22.3 % among males and between 5.9 % and 17.9 % for females.

A national study of ISTAT shows that 20% of Italian children between 6 and 10 years old are overweight and 4 % obese. [9]

In Italy the INRAN (National Institute of Feeding) is engaged in carrying on surveillance activities among different classes of population. [8]

In order to afford this emerging problem, the National Health Plan 2002-2004 highlighted the need of urgently acting a network of epidemiological surveillance on nutrition with the aim of proposing uniform strategies and objectives in the Country.

In February 2007, European Program "Gain in health" was approved by the Italian Ministries Council. This program plans a strong alliance between food companies, schools, tobacconist, liquor and wine producers, restaurant industry, in order to promote healthier choices among consumers also through information campaigns. [10]

In the National Health Plan 2006-2008 the Minister of Health, in accordance with regional governments indicated promotion of healthy life styles as a priority. Lombardia Region has pointed out to Local Health Authorities (ASL) the importance of realising specific effective activities of health promotion information and education to promote locally healthy lifestyles in the population.

Scientific evidences remark the importance of enforcing preventive educational interventions since childhood.

Following the strength of this knowledge and the information coming from first data, which confirm the worrying diffusion of not correct life styles and nutritional habits among young people, and following the Regional law D.G.R.N. VII/1534 of 22/12/2005 that regulates Surveillance and Prevention of obesity in Lombardia, the University of Pavia, Hygiene and Preventive Medicine Department and Local Health Authority of Pavia have undertaken a survey on 10 years old children resident in the Pavia province.

Methods

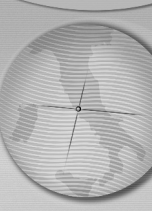
The aims of the study are to estimate the prevalence of overweight and obese children attending the last year of primary school in the Province of Pavia and to identify risks and protective factors linkable to this (un)health outcome.

A cross-sectional study adopting a two-stage proportional stratified sampling procedure was carried out. The first stage of the sampling was the selection of the school. To enhance sampling efficiency, a stratification of the schools was performed. Strata were determined by geographical areas of the Province of Pavia (North - South - West) and population size of the county they belonged to. Three strata have been considered: "large town" (30,000-80,000 inhabitants), "medium town" (5,000-30,000 inhabitants), "small town" (less than 5,000 inhabitants). 24 schools were selected from the strata; then, one class for each school was selected and all its children were interviewed.

Eventually, a sample of 460 10 years old children of a total of 4,000 children attending the last year of primary school in the Province of Pavia has been drawn. The sample drawn was representative of the Pavia province 10-years old population.

All school principals were personally contacted and informed about the aims of the survey in order to have their collaboration. A written parents' agreement has been asked for every child selected. Privacy norms and ethical aspects have been considered and fulfilled assuring an absolute anonymity of the results of the interviews and measurements.

Acknowledging well-known cognitive problems that suggest the impossibility of collecting information through standard questionnaire on children under 12 years old, we we have tried to combine objective measurements of physical data with nutritional and physical activities information gathered through a face-to-face interview based on a time-use approach. Reconstructing, with the help of the interviewer,



the previous 24 hours, it has been possible to collect information about: food/nutrition habits, sport and other playing activities, way of transfer to school and other post-school activity structures. This reconstruction have been made recording answers to simple questions such as "What have you eaten for breakfast?", "After breakfast, have you eaten anything else before lunch?"; or, for physical activity, "how have you come at school today? How long was your walking to come to school?" or "After school what have you done? What kind of playing?". The 'free' answers given by the children were coded by the interviewers and, on the site of the interview immediately recorded in a data base built to facilitate data collection and subsequently elaborate data. An Access data base was chosen because of its easy use, diffusion and flexibility. Given the sensitive task of interpretation and coding of the answers only trained medical personals have been involved as interviewers. The staff (residents in Hygiene and Public Health, nutritionists, nurses and post graduate students in motor sciences) attended a full day training course in order to correctly administer the questionnaire and measure BMI.

Acknowledging cognitive difficulties that 10-years old children could have with standard questionnaires, we have applied a time-use approach registering children's answers in a semi-structured questionnaire.

While the construct validity of such approach already shown in the literature [11], and internal validity has been proved, at least in a qualitative way, in the pre-testing of the questionnaire from which we had positive feedback, external validity has not been addressed in the first study. Since the relative novelty of the approach to measure health behaviours among children, we were more concentrate on the feasibility and capability of the time-use approach to really capture what we were interested in. From this point of view the richness of the results support the approach, and also its generalization, although to prove this further studies are needed.

To detect anthropometrical measures (weight and height) two portable scales with statimeter were used.

In this first analysis the significance of association among variables has been tested through usual chi-square test.

Then a multiple logistic regression model was applied in order to detect and evaluate most important significant environmental and behavioural variables that produce effects on obesity.

Given the use of standardized approach and of skilled staff, we believe that the physical measurement obtained (BMI) are unbiased.

Refusals were very low (<3%) and for this reason we are confident that it did not affect neither the precision or the bias of the estimates.

Results

The sample composition was 53.5 % males and 46.5 % females. The sample distribution by town size was: 37.6 % big, 21.7 % medium and 40.7 % small towns.

Children were classified according to their BMI as: Normal weight (BMI <19.84), Overweight (19.84 ≤ BMI ≤ 24.05) and Obese (BMI > 24.05), following Cole's tables [12]. 61.09 % of the children were of normal weight, 12.6 % of the children were obese and 26.3 % overweight.

In terms of sample distribution by sex, we found that 63.6 % were of normal weight, 25.2 % were over weight and 11.2 % were obese among females; 58.9 % were normal weight, 27.2 % were overweight and 13.8 % were obese among males (see Figure 1).

We detected a significant difference in BMI among town of different size.

From our data, there are more obese children in medium and small towns than in large ones (Fig. 2), with the prevalence of obesity almost three times greater in small towns (14.4 % of obese children) than in "big" towns (5.8 %) and almost four times in the "medium - size" town (21 %).

For eating styles, 87.6 % of the children have breakfast regularly while 12.4 % of them don't have any food before going to school. The percentage of obesity is double (22.8 % vs 11.7 %) among those who do not have breakfast in the morning (see Figure 3).

As to the number of meals children have in the day time, we noticed that only 1.1 % have 8 meals, 5.4 % have 7 meals, 27.8 % have 6 meals, 45.5 % 5 have meals, 16.3 % 4 have meals and 3.9 % have 3 meals ("meal" is here defined as any food intake). Regardless, the frequency of meals, does not seem to have a significant effect on BMI ($p > 0.05$).

As to sugared foods and drinks, 3.46 % of the obese children declared to have more than 5 portions during the day, while 43.1 % declared that they had only one (see Figure 4).

As to the consumption of complex carbohydrates, 65.52 % of the interviewed children reported not to eat them, 24.14 % had only one portion, 10.34 % 2 portions during the day and no children reported to consume more than 3 portions during the day time.

With regards to eating fruit, 18.7 % of the

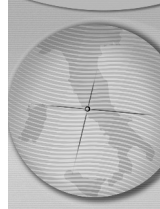


Table 1. Odds Ratio from the Logistic Regression Analysis: obesity BM > 24

Variables	Odds ratio	I. C. 95%	p value
Sex: M vs F	1.36	0.76 - 2.43	0.30
Community: medium vs large	3.56	1.58 - 8.09	0.002
Community: small vs large	2.53	1.17 - 5.47	0.02
Breakfast: no vs yes	1.85	0.87 - 3.92	0.10
Meals: >5 vs <=5	1.08	0.58 - 2.00	0.80
Sports: no vs yes	1.57	0.69 - 2.85	0.13
Movement games: no vs yes	1.95	1.06 - 3.57	0.03

Figure 1. BMI among 9 years old PAVIA

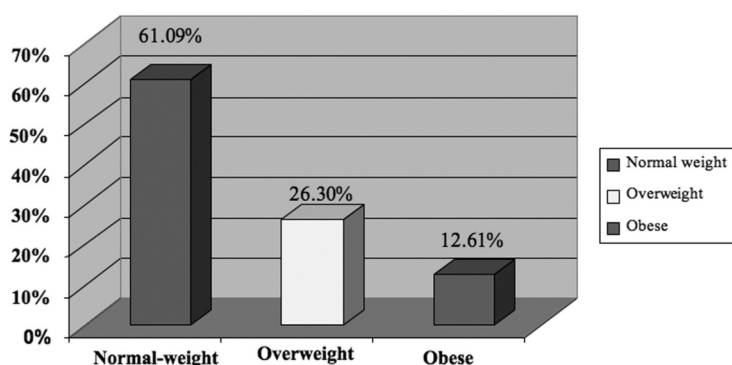
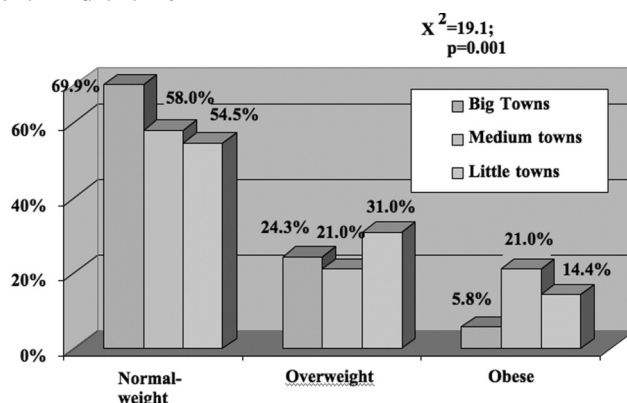


Figure 2. BMI and Towns



sample declared that they did not have any, often showing disappointment at the question, 26.96 % declared that they had 1 or 2 portions of fruit during the day, 5.65 % 3 portions, 10.43 % 4 portions, 0.87 % 5 and 0.43 % 6 portions.

In terms of physical activity, two-thirds (68.7 %)

of the pupils practice organized sports activities at least once a week while 31.3 % did not. The prevalence of obesity is nearly double in those who do not practice organized sports activities at least once a week and in those who have spent the previous afternoon watching television or playing with robots, dolls or with play-stations (see Figure 5).

In relating BMI and sports practice, we detected that 59.8 % were of normal weight, 30.1 % overweight and 10.1 % obese among those playing sports ; while 63.9 % of normal weight, 18.1 % overweight and 18.1 % obese among those who don't practise any sport.

Moreover nearly half (52.8 %) of the interviewed pupils in the afternoons were involved in movement games near their homes while others (47.2 %) watched television or played with robots, dolls, or with the play station. Relating BMI and the type of games played in their free time, we observed that children who play movement games were accounted for 57.2 % normal weight, 26.3% overweight, 16.5 % obese; while children who did not were 65.4 % of normal weight, 26.3 % overweight and 8.3 % obese.

The multiple logistic regression model applied included variables that seemed representative of the three areas concerned: environmental -

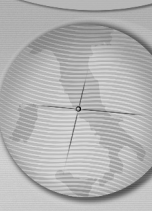


Figure 3. BMI and Breakfast

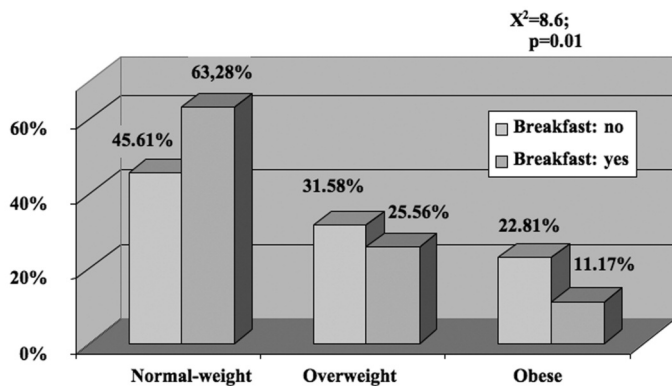


Figure 4. Sugared Food Feeding

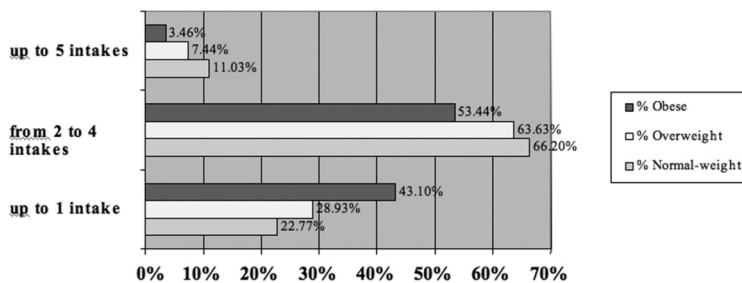
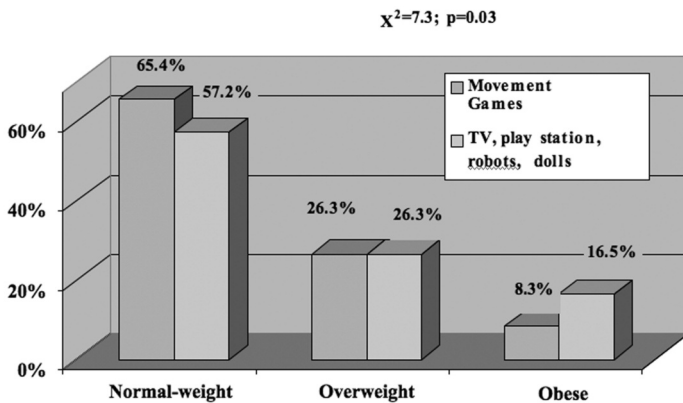


Figure 5. BMI and Games



context variables, nutritional and physical activities ones. Table 1 reports the estimates of the odds-ratio as they result from a first logistic regression model tried on the data. Let's remind ourselves that these indexes measure the "net" association of a variable with BMI, after having considered all the effects of the other variables included in the model.

Discussion

In the Province of Pavia (North Italy) the prevalence of overweight and obese 10-year-old children is respectively 26 % and 13 %; these percentages dovetail the data reported in recent studies in the southern Europe Countries and all

over Italy [7], even though these percentages show strong differences between regions [13]

In this paper we have addressed only a few of the possible explanations for this interesting and worrisome result. There are other possible hypotheses for the observed difference such as the presence of specific health promotion programs (in other regions), contextual aspects, nutritional regional habits that should be further investigated.

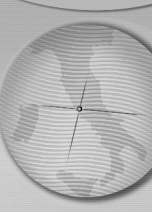
Analysing the sugared food and drink habits, we didn't find a clear relationship between these and children's BMI. Besides the need for a multifactorial approach, this result supports the necessity for better approaches for the measurement of nutritional aspects, particularly among the younger population.

Moreover, exploring the consumption of fruits and vegetables, it should be emphasized the distance between the observed practice and the "5-a-day" WHO recommendation. [14]

The life styles that entail obesity risks seem to be more significantly linked both to life habits / contextual aspects and to physical activity: living in middle and small-sized towns (probably proxy of some social determinants) and having no breakfast before going to school emerged as an important risk factor; while practicing movement games in the free time after school appears to be a protecting factor.

From the multiple logistic regression it turned out that the risk (odd) of being obese is two and three times higher for children living in medium and small towns respectively than for those living in large towns, all other possible conditions (included in the model) considered.

These relevant data can be linked to a series of factors and social determinants that make us suppose that the life styles of the "country" children are worse than the ones of the "city" children. A presumption is that the use of cars differentiates these two groups. Moreover, the "big towns" we consider in the survey aren't metropolises but only relatively bigger: these are towns with not more than 80,000 inhabitants, in



which the use of bicycles and public transports is common. In the small towns, often characterized by an urban sprawl and non organized public transports, parents are frequently forced to use cars to take their children to their various activities. If this hypothesis was confirmed, involvements in promoting health in little and medium urban centres would be dramatically evident. Furthermore, an interesting point is that the odds of being obese increases by 85 % for the children who haven't breakfast compared to those having it, and by 95 % for the children who spend their free time watching TV rather than playing movement games.

So our study based on a relatively small sample, linked to a very specific geographical area of Northern Italy, confirming what has already been presented in the recent literature [9,12] at least suggest two promising path for further study development:

- importance of experimenting with new approaches for interviewing children; giving the known cognitive limits of standards questionnaires approaches such that of time-use that we have experiment in our survey seem feasible and offering interesting results (particularly in combination with physical measures);
- general lifestyle (where children live, how they go to school, what they do for playing) seems much more important explanation of any other possible risk factor for obesity in children; there is therefore the need for suitable measures and standardized approach to study this.

This research is a first trial of measurement modalities to detect risks and protective factors in the pre-teen aged population in the Province of Pavia. It represents the basis to develop an ongoing surveillance survey system carried out at regular intervals, according to the Nation Health Plan (PSN) 2002-2004, in order to make a correct evaluation of the possible actions in the nutritional field in the local settings among this age group.

Aware of the importance of creating a network that involves as many actors as possible (Region, Province, schools, families), we took care to inform every school principal of our results.

Finally, besides providing a means for monitoring the youth population, the study also offers information useful for planning educational strategies to promote healthy life styles and evaluate the effectiveness of ongoing policies and measures.

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