

Fighting obesity in children from European World Health Organization member states. Epidemiological data, medical-social aspects, and prevention programs

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Abstract

Childhood obesity is one of the most serious public health challenges of this century. Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases like diabetes and cardiovascular diseases at a younger age.

In the WHO European Region one child out of 3, is overweight or obese. Over 60% of children who are overweight before puberty will be overweight in early adulthood. Children and adolescents, aged 5-19 have shown rising obesity rates in almost all nations, including where the situation was far from alarming 40 years ago. Several nations have seen the prevalence almost double: Israel has gone from 5.8% in 1975 to 11.9% in 2016, Andorra from 6.2% to 12.8%, and Malta from 7.4% to 13.4%.

Analyzing overweight and obesity, we can see that they follow similar trends and patterns. In 1975 the majority of European countries had a prevalence less than 10% and obesity less than 5%, while no European country had overweight prevalence higher than 30% and obesity higher than 10%. In 2016 the trend reversed, showing a worrying increase in the number of European countries with a high prevalence of overweight (over 30%) and obesity (over 10%) (Fig. 1)(29).

Starting from the analysis of epidemiological data on obesity in the WHO European Region, the paper analyzes the adopted prevention programs in order to assess their effectiveness and figure out the best strategies to reduce the prevalence of overweight and obesity.

Introduction

Growing overweight and obesity rates increasingly represent a growing problem in the World Health Organization (WHO) European region, despite actions developed to reverse the rising trend. Since the 1980s the prevalence of obesity has more than tripled in many European countries, with a concomitant increase in rates of non-communicable diseases (NCDs). Each year large part of the National health expenditure is due to diseases related to obesity, like diabetes, hypertension, cardiovascular diseases (CVDs), metabolic syndrome (MetS), etc.: these are leading causes of disability and death, together accounting for 77% of the

The WHO European Childhood Obesity Surveillance Initiative reported that children tend to overeat and not to do enough physical exercise.

Different preventive programs have identified different areas of action and corresponding measures: consumption of healthy foods, physical exercise, care before conception and during pregnancy, early childhood, school age children, weight management, monitoring and evaluation.

Primary prevention is essential to reduce obesity incidence: it is easier to act on the adoption of healthy eating habits than intervene with diets on children who already have weight issues. Working on prevention programs represents an investment for the future of children's health. By simply acting on prevention, particularly on body weight reduction, it could be possible to tackle the spreading of correlated diseases. Therefore, prevention programs ought to be prioritized priority at a national and international level. *Clin Ter 2019; 170(3):e223-230. doi: 10.7417/CT.2019.2137*

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burden of disease and almost 86% of premature mortality. In addition, there are important indirect sanitary and social costs due, for example, to absence from work for illness with a consequent loss of productivity (1-10).

A strong correlation has been demonstrated between obesity, NCDs and incorrect lifestyles (tobacco and alcohol use, drug abuse), unhealthy diets, sedentary habits. Several researchers have pointed out (11-12) that compulsive eating habits and drug abuse induce similar neuroadaptive responses in brain reward circuits, since the same brain cells are associated both with binge-eating and conducts unrelated to food, but involving drugs of abuse such as cocaine, heroine, stimulants, hallucinogens, and ensuing complica-

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tions (13-16). Plus, in alcohol abusers, the administration of pain relievers, such as paracetamol, may give rise to a greater risk of hepatotoxicity, especially with pre-existing liver disorders (17).

In fact, both obesity and drug addiction have been linked to a dysfunction in the brain's reward system. In both cases overconsumption can trigger a gradual increase in the reward threshold — requiring more and more palatable high-fat foods or reinforcing drug to satisfy the craving over time. The motivation to eat, like the motivation to take addictive drugs, activates the forebrain dopamine systems (18). Despite the remarkably high level of public awareness of the noxious influence of overweight and obesity on human health, the prevalence of these risk factors has reached an alarming level, which leads to the conclusion that obesity has reached epidemic proportions in Europe (19-26).

Furthermore, the situation is exacerbated by excessive body weight, excessive caloric intake, saturated and trans fats, sugar and salt (as well as low consumption of vegetables, fruits and whole grains) that represent leading risk factors and priority concerns (27).

Overweight and obesity are noticeable among adults of the WHO European region, but are also highly prevalent among children and adolescents (28).

In the WHO European Region one child out of 3 (11-years old), is overweight or obese. Over 60% of children who are overweight before puberty will be overweight in early adulthood (29-34). Some authors have stressed that by simply acting on prevention - particularly on body weight reduction - it could be possible to control diseases related to overweight and obesity (35, 36).

The aim of this paper is to analyze the prevalence of obesity among childhood, the prevention programs adopted by WHO European countries, and the effectiveness of these programs in identifying the best strategies to tackle overweight and obesity.

Epidemiological data

As for the prevalence of obesity among children and adolescents, ages 5-19, it is possible to observe that obesity is rising in almost all countries, also in countries where the situation was not worrying 40 years ago. In different countries the prevalence has almost doubled: for example Israel with prevalence 5.8% in 1975 and 11.9% in 2016, Andorra from 6.2% to 12.8%, and Malta that passed from 7.4% to 13.4%.

Analyzing overweight and obesity, we can see that the trend is similar. In 1975 the majority of European countries had a prevalence less than 10% and obesity less than 5%, while no European country had overweight prevalence higher than 30% and obesity higher than 10%. In 2016 the trend reversed, showing a worrying increase in the number of European countries with a high prevalence of overweight (over 30%) and obesity (over 10%) (Fig. 1)(37).

In 2016 many countries have reached high levels of overweight prevalence (Greece 37.3%, Italy 36.8%, Malta 36.7%, Andorra 35.8%, Israel 35%, Spain 34.1%, Cyprus

33.1%, Portugal 32.4%, UK 31.1%, Ireland 31%, France 30%). Most of these countries show high levels of obesity

Table 1. Countries with obesity prevalence % ≥ 10 among children in 2016 (in ascending order). Comparison with the adults' situation in the same countries

Country	children	adults
United Kingdom	10.2	27.8
Portugal	10.4	20.8
Bulgaria	10.8	25.0
Spain	10.8	23.8
Croatia	10.9	24.4
Hungary	11.1	26.4
Turkey	11.5	32.1
Israel	11.9	26.1
Cyprus	12.2	21.8
Italy	12.5	19.9
Andorra	12.8	25.6
Malta	13.4	28.9
Greece	13.8	24.9

The data are expressed in percentage

prevalence (Greece 13.8%, Malta 13.4%, Andorra 12.8%, Italy 12.5%, Cyprus 12.2%, Israel 11.9%, Turkey 11.5%, Hungary 11.1%, Croatia 10.9%, Spain 10.8%, Bulgaria 10.8%, Portugal 10.4%, UK 10.2%).

This situation allows us to hypothesize that, without preventive actions, the prevalence will increase again in the future (Table 1) (38).

Table 1 highlights that in 2016 countries, which show high levels of obesity prevalence among children, also reached high percentages in adults. From this observation, it is possible to argue that this situation is linked to wrong lifestyles shared between the two age groups, and to ineffective prevention programs.

Preventive programs

Given the rather alarming data, and of the incentive of the European WHO Region, it is necessary to examine the interventions that the various countries adopted to face the problem.

In 2007 the WHO European Childhood Obesity Surveillance Initiative (COSI) began to monitor, every three years, the trend of overweight and obesity among children (6-9 years old) attending primary schools, by physical measurements (39).

Analyzing the report referring to the period 2015-2017, we noticed that more or less all the children in the various countries eat every day little fruit and vegetables, consume snacks and soft drinks containing sugar, don't practice any sports and spend a lot of time in sedentary activities, like watching TV and using electronic devices. From these data, highlighted by COSI surveillance, it can be assumed that children with such habits in the future will be likely to grow into overweight and obese adults. Everything suggests that, even in countries that currently have a low to medium prevalence situation, there will be an increase in the obesity problem in the future.

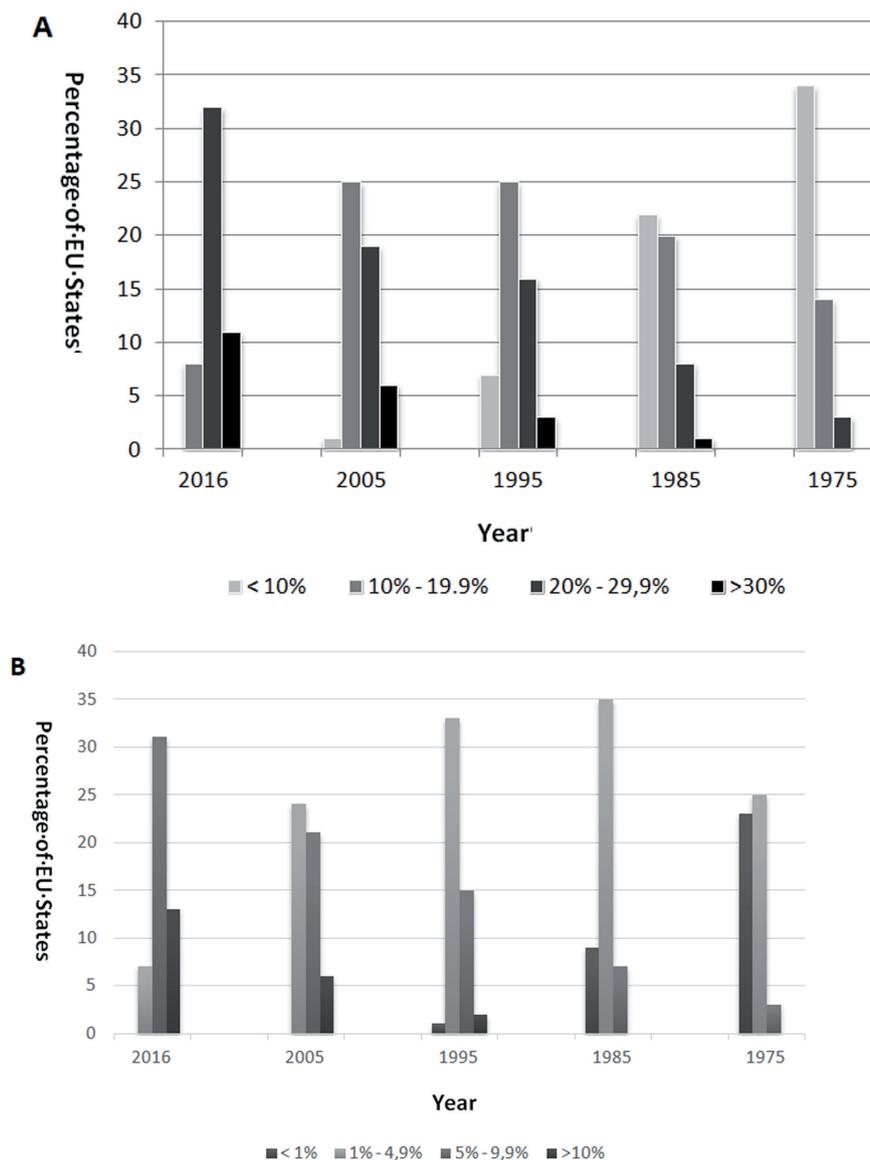


Fig.1. Percentage of EU states with varying overweight (A) and obesity (B) rates among children and adolescents

Taking into account this evidence, Italy has turned its attention not only to monitoring, but also to the population approach, using media, brochures, and education in schools and in health care facilities. These actions are part of the Italian Health Plan on Prevention. One of the objectives of this program is to reduce the preventable and avoidable burden of morbidity, mortality and disability of non-communicable diseases (40). Another initiative adopted in Italy is the program named “OKKIO alla Salute”, launched in 2007. This program is part of the COSI WHO initiative, and its aim is to monitor overweight, obesity, and their related risk factors among children of 6-10 years (34,36).

In 2014 the EU Action Plan on Childhood Obesity 2014-2020 was launched, with the aim of fighting the worrying growth of overweight and obesity levels among children and young people (0-18 years) by 2020. This plan provides guidelines to Member States to develop a policy on childhood obesity by proposing eight key areas for action: support a healthy start in life; promote healthier environments, especially in schools and preschools; make the healthy option the easier option; restrict marketing and advertising to children;

inform and empower families; encourage physical activity; monitor and evaluate; increase research (41).

Another project – the Joint Action on Nutrition and Physical Activity (JANPA) - was proposed as a contribution to the EU Action plan on childhood obesity 2014-2020, with a focus on specific outcomes that can contribute effectively to nutritional and physical activity policies dedicated to childhood. The objectives of the JANPA project are the following: a) economic evaluation of the cost of overweight and obesity in children with the aim to encourage public actions; b) promoting healthy nutrition and physical activity to pregnant women and families with young children, through the identification of the successful multi-component interventions for different settings; c) promoting healthier environments in schools and pre-schools; d) actions at a local or at a national level regarding nutrition and physical activities; e) promoting healthy eating and drinking practices and improving at national level the information addressed to consumer. The project is organized in 7 work packages (WP), each one linked to specific objectives and activities (coordination; dissemination; evaluation; cost of childhood

obesity; nutritional information; healthy environments; early interventions) (37). It is worth noting that according to a pooled analysis of 2416 population-based measurement studies, in eastern Europe no change was observed in age-standardised mean BMI in girls from 1975 to 2016 (-0.01 kg/m² per decade; 95% credible interval -0.42 to 0.39 , posterior probability [PP] of the observed decrease being a true decrease= 0.5098), whereas an almost irrelevant increase of 0.09 kg/m² per decade (-0.33 to 0.49 , PP= 0.6926) was registered in boys. A flattening in trends of average BMI has been recently observed in northwestern and southwestern Europe for males, and the same development, with trends tending to flatten, has been found in northwestern Europe for both sexes, and in southwestern Europe for boys (43).

A new WHO Europe document takes stock of the most appropriate strategies to reduce the incidence of childhood obesity in Poland through the development of an integrated action plan based on the most recent evidence of efficacy and experiences in other countries, including Italy.

In particular, seven areas of action were identified: a) consumption of healthy foods, b) physical activity, c) care before conception and during pregnancy, d) early childhood, school age children, f) weight management, g) monitoring and evaluation. For each area specific suggestions were made: the first step consists of soft interventions (e.g.: reducing the availability of sugary drinks in schools), while the second one is focused on wider interventions (eg: discouraging the consumption of sugary drinks between children and adolescents through fiscal interventions).

Table 2 shows a summary of examples of case studies that have already proved their effectiveness in some European countries. Complete data and information are in the document "Reducing childhood obesity in Poland by effective policies" (44).

Table 2 shows the 7 areas of action mentioned above. As can be seen, the various countries intervened only in some of them. In most cases, the examples show the main area of action on which the countries focused their intervention. As shown in Table 2, many countries with obesity prevalence higher than 10%, or very close to that value, have implemented action plans, which have been put in place by countries with lower rates as well, demonstrating a real interest in this growing problem, mainly from a preventive point of view.

Research experience in european countries

In addition to preventive programs created by countries at a national level, other intervention protocols were created and experimented by researchers in many European countries in order to find and suggest effective solutions. In some cases, these actions have obtained positive results. Different approaches were employed: questionnaires, parents consultation, training for teachers, food education activities at school, physical activity promotion, etc. Analyzing these researches, it emerges that conclusive results will be available mainly in the medium-long period (Table 3).

Table 2. Synthesis of examples of case studies from Europe

Country	Intake of healthy foods	Physical activity	Care before conception and during pregnancy	Early childhood	School-age children	Weight management	Monitoring and evaluation
ALBANIA			v				
ANDORRA						v	
AUSTRIA				v			
CROATIA				v			
DENMARK	v				v		
ESTONIA	v						
FINLAND	v	v		v	v	v	v
FRANCE	v				v	v	
GERMANY		v					
GREECE					v		
HUNGARY	v				v		
IRELAND						v	
ITALY		v					v
LATVIA					v		
MALTA				v	v		
NETHERLAND					v		
NORWAY	v		v				
PORTUGAL	v						
SLOVAKIA					v		
SLOVENIA					v		v
SWEDEN	v						
TURKEY				v			
UNITED KINGDOM	v	v		v	v	v	v

Table 3. Examples of research experience in European countries

Country (Reference)	Age	Sample size	Instruments	Results
Belgium, Cyprus, Estonia, Germany, Hungary, Italy, Spain, Sweden (IDEFICS study) (45)	2-9.9	16,228	Questionnaire to parents to measure children's eating habits and physical activities behaviors, at baseline and follow-up 2 years later.	Positive intervention effects were only found for sport club participation in Swedish boys, for screen time in weekends for Spanish boys and for TV viewing in Belgian girls.
Belgium, Bulgaria, Germany, Greece, Poland, Spain (ToyBox-study) (46)	4-6	2,438	Measurement of children steps per day. Implementation of physical activity in kindergarten for six weeks. Newsletters, posters and tip cards to parents.	The physical activity component of the ToyBox-intervention had no overall effect on 4-6 year-old children' steps per day.
Italy (The ZOOM8 Study) (47)	8-9	1,740	Anthropometric measures, dietary assessment, assessment of Mediterranean Diet (MD) patterns, lifestyles assessment.	Only 5.0% of the children resulted "high" adherers of MD. The adherence rates did not differ significantly with BMI and gender. The results highlighted the importance to improve family food habits and dietary knowledge.
Italy (participation to Italian national FV scheme Strategy) (48)	8-10	494	Evaluation of nutrition education program, led by trained teachers, on children's adherence to the Mediterranean diet (MD).	In the intervention group, the proportion of children with high adherence to the MD significantly increased.
Israel (49)	7-10	45	3-month combined dietary, behavioral, and exercise program for the treatment of childhood obesity	Significant differences in changes in body weight, BMI, sum skinfolds, total habitual physical activity and fitness in the intervention vs. control participants.
Turkey (50)	9-10	81	Training sessions with children, and trainings and consultancy with parents.	The Body Mass Indices of the intervention group at the third measurement had decreased significantly when compared to the control group.
UK (WAVES Study) (51)	5-6	1,392	Encouraged healthy eating and physical activity, including a daily additional school time physical activity.	The mean BMI z score was non-significantly lower in the intervention group compared with the control group at 15 months
Sweden (MINISTOP) (52)	4-5	315	Information on healthy eating and physical activity in preschool-aged children, delivered to parents via smartphone application.	No difference between the intervention and control group for Fat Mass Index (FMI)
Poland (53)	7-11	5,293	Participation in extra physical activities	The risk of overweight/obesity has not changed after one year of extra physical activities and engagement in health-oriented education program
Norway (54)	6-12 months	718	Recruitment of parents. Monthly emails with links to an age-appropriate web-site	Data-collection is ongoing
Spain (INFADIMED) (55)	3-7	1,199	Use of INFADIMED nutrition and education programme	In the INFADIMED group, healthy diet increased, while unhealthy diet decreased.
Spain (EdAI study) (56)	13-15	503	4-year follow-up study after the end of a school-based randomized controlled intervention in adolescents.	Reduced BMI z-scores and childhood obesity from baseline
Spain (Thao-Child Health Program) (57)	8-10	2,250	Physical activity and adherence to the Mediterranean diet were measured with validated questionnaires	No significant effect on the BMI z-score, incidence of general and abdominal obesity, Mediterranean diet adherence, and physical activity.
Portugal (POZ) (58)	6-10	266	Parents and children attended four individual nutrition and physical activity counselling sessions, a one-day healthy cooking workshop and two school extracurricular sessions of nutrition education.	Reduction in waist circumference and BMI, higher fibre consumption, improvements in physical activity at six months.

Analyzing the body of research on obesity prevention, as reflected in Table 3, large variability between approaches designed to prevent childhood obesity in the European region was identified. Most of the studies show significant changes in Body Mass Index (BMI), dietary behaviors, physical activities, etc, however some programs were experimented in a short time, and demonstrated a limited effectiveness. This suggests that these programs require longer and long-lasting implementation times so that educational messages can gradually grow effective and enduring. It is well known that assessing national as well as local large-scale obesity programmes is generally quite challenging an endeavor: not all of them, in fact, are grounded on pilot programmes, and a dearth of associated data makes it even harder to figure out what is effective and what is not. That can be observed not only in Europe, but worldwide. It is not yet verified, for instance, whether higher taxation on unhealthy foods could play a role in spawning healthier eating habits, whereas there is evidence of decreased consumption of high-fat, high-sugar foods in Mexico and in Hungary, where a higher degree of awareness seems to have been raised thanks to such policy changes (59). Still, there is as yet no certainty as to the exact impact of taxation on obesity rates (60). Let us take, for instance, Japan's Shokuiku (food and nutrition education) school lunch programme: it was designed to foster well-balanced diets and healthier eating habits, and there seems to be evidence of tangible improvements in that respect, albeit no obesity-related data and findings have been released yet. The pedagogic program is grounded on the reaffirmation of the "Japanese dietary pattern": rice-based meals including dishes cooked using various types of basic staples: fish, meat, milk and dairy products, vegetables, seaweeds, pulses, fruits and tea, and arguably constitutes a healthy regimen with an excellent nutritional balance, coupled with the promotion of consistent physical exercise; a similar set of initiatives has been put in place in Italy, through the program named "giochiAMO", meant to enhance and spread awareness as to healthy eating in children aged 5 to 9, and their parents, in order to foster and advance wholesome habits, in an all too necessary attempt to stem the growth of childhood obesity and weight issues (61, 62).

Conclusions

Some countries in Europe have been undergoing a nutritional and demographic transition, with a rapid acceleration in the rates of overweight, obesity and diet-related NCDs. Indeed, epidemiological data demonstrate an increasing trend in overweight and obesity among children in all European countries. The only strategy to fight this rising trend is to adopt proper behaviours, since an obese child is likely to become an obese adult, which entails pathologies, and consequent social and sanitary costs. Important advice comes from preventive programs adopted by various countries, as shown in Table 2. The results of these programs suggest useful indications on focused and effective prevention actions. As for educational messages, it is clear the importance of involvement not only of children, but also of school, teachers, parents, physicians, etc. These initiatives

cannot be left to individual research groups, but must be included in a regulatory and health framework programs with the support of Government. The central role of policies is crucial. Indeed, the programs and research carried out in this direction show positive results. In other words, it is not enough to raise awareness among children, but it is necessary that they have the support of adults to carry out effectively healthy programs regarding, in particular, physical activity and a balanced diet. These considerations can also be addressed to adults who must change their life style. In fact, it is important to point out in the field preventive interventions also in adult (see comparison adults-children in Table 1). It also emerges that higher rates of obesity among groups of low socioeconomic status may in part result from their greater exposure to environments in which there are barriers to access healthy foods and fewer opportunities to engage in physical activity. Regarding healthy food, the importance of school canteens should not be overlooked, where meals are defined by the nutritionist to offer children suitable food from a nutritional and caloric point of view. That is the only way children can learn to eat properly. Primary prevention is essential to overcome the problem of obesity, because it is easier to act on the adoption of a correct eating behavior than to intervene with diets on children who already have overweight problems. Working on prevention programs represents an investment for the future of children's health. In particular, the validity of epidemiologist Geoffrey Rose's assessments have been acknowledged by the WHO, in a November 2007 bulletin; Rose has observed that when the population average weight goes up, "exceptional" obesity rates disproportionately do too: weight reduction in the entire upper half of the distribution, without any weight loss among those on the "thin side of average", would be extraordinarily beneficial, because of the "J-shaped" relationship between body weight and total mortality. Thus, Rose's advice on the benefits of weight reduction for the upper half of the BMI distribution appears to be backed up by WHO prospective findings, which, however, are based on self-reported data and need replication with more objective standards. Nonetheless, such data confirm the validity of a middle-of-the-road strategy in order to plug the rising incidence of chronic illness associated with increasing BMI (63, 64).

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