PREVENTION of INFANT-JUVENILE OBESITY PROTOCOL

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ABSTRACT: The aim of this document is to design a new strategy of approaching infant-juvenile obesity with its own set of tools and procedures and organised around an action protocol. Data is supported throughout the experience of Paediatric and obesity offices and throughout the practice of Paediatricians, Endocrinologists, Family Doctors, Nutritionists, Psychologists, Educators and Food Technology professionals.

The reason of this initiative relies on the importance of obesity being a pathology that comes with a high disabling capacity in patients and also, with high economic costs in health systems of developed and developing countries. Likewise, its main mortality and morbidity factor, the Cardiovascular Risk, has been taken into account.

Actions in different spheres (family, school, Physical Education, doctor's surgery and society) have been examined and the need to implement and manage a global prevention strategy has been noted to approach the epidemic. The prevention strategy mentioned is patient-centred being the paediatrician the main consultant of the former's health.

There is an agreement in the need that the global strategy and its protocols rely on the Public Health System with its economic and human resources. The conclusion of the document is the writing of a specific proposal to approach the epidemic.

KEY WORDS: Obesity, protocol, prevention, infant-juvenile, behavioural conduct, strategy, cardiovascular pathology.

PREVIOUS THOUGHTS

When we were asked to prepare a protocol about the prevention of infant-juvenile obesity, we considered that, apart from being based on the latest bibliography, it was necessary to focus on the experience of multidisciplinary professional teams from Grupo Pontesano (Pontesano Group) and Asociación Pontesano contra la Obesidad (Pontesano Association against Obesity).

The Grupo Pontesano (Pontesano Group) is the result of the effort of professionals from different medical sciences whose common aim is the prevention and treatment of infant-juvenile obesity. These researchers have been working during the 90s in projects and renowned research networks in different institutions (University of Cantabria, The Spanish National Research Council (CSIC), Institute of Health Carlos III, Institute of Training and Research Valdecilla, The Public Health Observatory from Cantabria, The Marqués de Valdecilla University Hospital, The Spanish Society for Adolescence Health and Medicine). Their publications are models in the different fields of infant-juvenile obesity.

In this context, in 2012, we thought appropriate to form Asociación Pontesano (Pontesano Association), to prevent and treat obesity, with the aim of obtaining a general orientation of practical and community aspects of the treatment and prevention of obesity (schools, family, disabled, media, etc.)

1. INTRODUCTION

The WHO defines obesity as the silent epidemic of the 21st century, being in developed and developing countries the main evitable cause of children and adolescents health damage. Preventing obesity has become a main objective of these countries for different reasons because the consequences of suffering this condition are very harmful for the individual, society and health systems.

Preventing efforts have focused on a number of campaigns, activities and strategies addressed to the general population. However, results have been scarce, partial or both. Campaigns to promote different healthy food, activities to train parents and students in nutrition in schools, programs to promote physical activity, strategies to promote healthy lifestyles, etc. had not been able to stop the increase of obesity in most part of the developed and developing worlds and the initiatives have hardly moderate the growth curve.

Until today, the results obtained in fighting this epidemic are scarce, among other reasons, because we are dealing with a multifactorial disease with different elements intervening individually or as a group favouring the appearance of overweight in the first place and obesity later. Because of that, all preventive measures should address the first stages of the disease being the paediatrician, specially from Primary Health Care, the one that, because is close and follows the patient, perceives the patient's overweight and tries to guess the factor or factor that are acting and favouring the first signs of obesity. Another main participant is the teacher, close to the patient and with much more objectiveness than the family, the one that can perceive changes in

physical appearance as well as daily tasks. He or she can detect more tiredness and less movement than usual in the child or adolescent.

2. BASIC CONCEPTS

We are going to consider this initial question: If a group of factors such as the increase and variety of food available, advances in the treatment of certain diseases, the universality of health care, the increase of opportunities to practice sports and the improvement of the population's cultural level that, in four generations, have increased Spanish life expectancy from 34.76 years in 1901 to 50.19 in 1941, 72.36 in 1971 and 79.44 in 2005. Regarding average male height, it has increased in 11 cm between 1910 and 1995. Taken these data into account, why has this epidemic appeared, if the increase in life expectancy and average height are simultaneous with factors that normally generate a good state of health in the population? No doubt that some of these specific aspects have been the cause of nowadays weight status of the population in developed and developing countries. The cause of the problem and its quantification will be crucial to rationalize future actions to fight the epidemic.

It is clear that obesity is a physical state of a multifactorial aetiology, whose first sign is an accumulation of fat in certain parts of the body that will cause multiple problems at a later date. Likewise, it is clear that the first origin is the positive energy balance obtained between caloric intake and energy consumption and that this result is modulated by different factors among which genetic inheritance, some aspects related to endocrinology, the obesogenic environment, nowadays sedentary lifestyles, some factors related to the environment (family, location, etc.) and some psychological aspects stand out. About these facts, agreement in the field is broad. However, we cannot deny that there is a wide diversity on the anthropometric expression of nutritional results on each individual.

Energy balance, in a complex interaction with those endogenous and exogenous factors, offers a vast number of answers in which the slightest change in one of the factors, produces out of proportion effects and even catastrophic in the last assessment if there is a chaotic environment. Today, it is not possible to say that the same intakes and energy consumptions produce the same metabolic balances and same results of fat storage. This remark allows us to conclude that tools to fight against obesity are a necessity for future research in this field.

3. PREVENTION

Prevention is, probably, the best and cheapest way to approach the epidemic. In this work, we deal with three prevention levels. Quaternary prevention (relapse prevention) is not included.

3.1 PRIMARY PREVENTION, directed to avoid the appearance of overweight and obesity, should accomplish the following conditions:

a) It will be part of state health plans and it will be addressed to educative, social and medical stratums.

b) The applied programs will work on the improvement of life quality and life expectancy as well as the health state in general. Likewise, they will work on reducing health costs associated to this disease.

c) The training of the main participants (paediatricians, nurses, educators, PE teachers, etc.) will receive special attention because they can have an impact on the diagnosis of the first symptoms and also help in preventive processes or treatments, depending on the situation.

Two aspects stand out because of their importance in primary prevention:

Physical activity, exercise and sports as organized activities are agreed to help in preventing overweight and obesity in individuals that practice them. The most important aspects are the following:

1. They have healthy and positive effects on general health. However, its practise should adapt to the individual and the group.
2. Before the starting of the program and foreseeing its long duration, it is necessary to know their original weight and height.
3. So that children and teenagers participate in these sport activities, they need to know that sedentary lifestyle is not positive and that they can develop a health issue. In the future, they should like what they do and, considering the spectrum of possible activities, we have to find one that they are happy with, even if they have problems deciding at first.
4. An appropriate environment has to be found where there is no danger to practice the activity. If activities are done as a family, it helps to improve family relationships.
5. They will be considered as another activity of the daily life with all their importance. They should be done under all health states and it can be adapted to personal circumstances. Authorities should revise urban areas so they have public spaces that allow games, safe journeys and daily playful activities of children and teenagers.
6. Water, especially if it is hot, needs to be guaranteed.
7. There are methods to help children and/or adolescents overcoming any reluctance to practice sports such as appliances that measure distances or the number of calories burned (even mobile phones can be incorporated), if there is trekking, observation and photography of nature, etc..
8. It is basic to obtain social esteem of physical activity and sports. If they are practiced regularly, they have a healthy effect on lipoprotein profile, aerobic capacity, anti-inflammatory activity, etc. obtaining an improvement in HDL values. Although its influence on cholesterol levels is not clear.

The importance of a balanced diet. Families should teach children from the moment they are born as it follows:

1. The example of parents during meal times is important because children imitate their parents. Overweight starts during the first years of life when the child depends completely on parents whom, very often, undervalue their children's overweight.

2. The paediatrician has an important role because he/she is the main referent regarding information/education, advice and help for families and the patient. Because of that, since the child is born, the paediatrician should include some general advice and stress on specific advice when there are problems to keep an appropriate size according to age.
3. Explanations of qualities, advantages and disadvantages of different food considering age. A varied diet, with low saturated fats and caloric values appropriate for height and age should be part of the general messages.
4. The importance of the school refectory as the place where children learn healthy eating habits. Although it is known that school refectories are used by a small proportion of students, that employees nutritional knowledge could be improved and that the qualities of some of the foods are questionable (reducing fried food is recommended.)

3.2 SECONDARY PREVENTION that sought to detect the disease during the early stages under the following principles:

a) It is addressed to children and teenagers that are predisposed to suffer from obesity since they are born because of genetic reasons or because the family has a tendency to suffer it, etc. or because the individual is under a treatment that produces an excessive weight increase.
b) Special attention will be directed to critical periods that predispose future obesity: overweight at birth, when the individual is one year old, between 5 and 7 and between 10 and 12. In these cases and with individuals that have risk factors, it is necessary to do a follow up with a yearly BMI study or similar measure. Some authors also add Rorher index or ponderal index because the BMI cannot precise whether weight gaining is because of fat or muscle. Also, it is not reliable with extreme heights. The Rorher index or ponderal index corresponds with fat and does not correlate with height because of that, it is more appropriate for children and adolescents.

Practical aspects of secondary prevention in children and teenagers are:

- Skinfold test reflect in a better way fat percentage than BMI and they inform about subcutaneous fat very well. Tricipital skin fold in adolescents can be a better parameter that BMI. Other appropriate skin folds are biceps, subescapular, and suprailiac skindfold that are related to visceral fat, cardiovascular risk factors and type II diabetes. The study of cutaneous skinflods contribute with extra data to adiposity analysis.
- Waist perimeter measure is an important data in adults but not so much in children.
- A simple index that should be applied in all offices, and allow us to know the subject's cardiometabolic risk, is the waist to height ratio. To calculate this ratio, the waist perimeter is measured and then divided into height in centimetres. It is an easy measure that correlates well with abdominal fat. That is why it has been considered a good predictor of cardiovascular risk.

WTHr = Waist perimeter (cm)/ Height (cm)

a) The WTHr has been revealed as an important tool to diagnose Metabolic Syndrome, especially in adults. Figures bigger than 0.50 are associated with high levels of triglycerides, cholesterol and blood sugar as well as hypertension both in males and females from different ethnic origins.
b) There are more precise techniques to measure fat in different parts of the body that are not normally used with children and teenagers such as the bioimpedance analysis or more complex techniques such as image techniques, for example, DEXA scans (Dual energy X-ray absorptriometry scan) that seem the best index to measure total body fat. However, these techniques are not the object of this protocol.

3.3 TERTIARY PREVENTION is centred in treatments and rehabilitation of patients as well as with diseases associated with obesity. The main guidelines are the following:

a) Cardiovascular prevention will be developed as it is well known that it is related to obesity.
b) Cognitive therapy to modify habits should be considered as the most viable strategy. This therapeutic option is having the most success in fighting obesity. It should be included in the first steps to approach overweight patients and also in more advanced stages in Primary Health care and in Specialized Health care.

Cardiovascular risk factors in the paediatric stage. Cardiovascular conditions are the most important cause of mortality and morbidity in adults in developed and developing countries. Primary prevention of cardiovascular risk factors and secondary prevention of the serious complications should start during paediatric age coordinated by professionals in charge of health care and education.

During the last decades, there has been an exponential increase of cardiovascular risk factors coinciding with an increase of unhealthy diets and physical activity habits. Table I shows a list of cardiovascular risk factors that can appear during paediatric age. Overweight is the most common one, appearing in 30% of Spanish teenagers. Other common risk factors in developed countries are smoking, hypertension and since a few years ago, there has been also an increase of diabetes II.

Table I. Cardiovascular Risk Factors:

- Family History
- Low physical activity
- Exposure to smoke
- High blood presure
- Atherogenic lipid profile
- Overweight / obesity
- Diabetes mellitus
- Metabolic syndrome
- Inflammatory markers
- Perinatal markers

Detection of cardiovascular risk factors (CVF). To prevent cardiovascular diseases, the first measure is to detect factors which it is not a difficult task. Anamnesis, blood pressure or somatometric measurements will detect immediately risk factors. Health check-ups during paediatric age will alert paediatricians about risk factors. These check-ups are done regularly in Primary Health care centres which are excellent places to research these factors. One of the commonest issues is that from puberty on health check-ups are less frequent and some risk factors may be undetected.

Follow ups of factors in children and adolescents with CVR factors. Once a factor is detected, a strategy has to be planned. This strategy will vary depending on the factor. Patients with some factors (diabetes, metabolic syndrome, hypertension) should be controlled from Primary Health Care offices through strategies to create healthy habits and especially habits that increase the practice of sport activities.

Measures to consider when facing cardiovascular risks are varied and will depend on the factor. For instance in the case of diabetes, insulin should be administered. Another example: in the case of family hypercholesterolemia, a hypolipidemic diet has to be established. These are measures that should be established by specialists and this protocol will not deal with them. In this section, we refer exclusively to lifestyle measures (diet and physical activity). The application of these measures is of interest in all type of risk factors and they are important to avoid complications and prolong life expectancy. These measures can be applied and controlled in Primary Health care.

Preventive intervention in paediatric population with CVR factors: Healthy diet and physical activity. In several sections of this work there is reference to the importance of primary prevention to establish a healthy diet which is a varied diet with low saturated fats and an appropriate caloric intake to avoid weight gain. We consider that these preventive measures have been explained in other sections so we now move on to physical activity and its relation with CVR. Recommendations and medical prescriptions should be improved in Primary Health care.

Considering the classical recommendations about physical exercise for teenagers and according to regular standards, it is normally advised to be physically active daily (or almost daily), participate in games, sports, physical education, work, recreation in family, school or in the community. Teenagers have to spend at least 20 minutes in activities with moderate or vigorous physical activity three or more days a week. Recent recommendations are stricter suggesting at least 30 minutes a day most days of the week. This is not accomplished by most teenagers.

Benefits of physical activity related with cardiovascular risk. Exercise causes more caloric burnt and an improvement of the physical condition. That is why it is a really important tool when preventing cardiovascular risk because it acts in favour of the connection between hypertension and obesity. This is due to the direct connection on the decrease of adipose tissue and also indirect connection on the metabolic level, decreasing both obesity risk and its associated comorbidities. It has

been observed that kids and teenagers that exercise several hours per week after school have less fat than sedentary ones. Those adolescents who do not exercise regularly increase the risk of suffering from overweight and cardiovascular conditions during adulthood.

The effect of exercise on lean body mass in teenagers and children has also been studied. This effect causes muscle hypertrophy and an increase of oxygen and energy consumption. All this is associated with a lower risk of suffering cardiovascular conditions. Practising exercise regularly while growing up has a double effect on the body composition: a direct effect in decreasing body fat and increase of bone and lean. An indirect effect is the gaininig of muscle mass which is connected with hormonal production, appetite control and energy consumption.

The improvement of physical condition because of an increase of exercise is also important in those adolescents that normally, or because of health issues, have had a long period of sedentary lifestyle. Some of them reduce the degree of exercise because of a mental or emotional state, indifference or ineptitude towards sports, sedentary habits, bad body image, overweight or other pathologies (asthma, chronic conditions, malnutrition, etc.). The improvement of physical condition through exercise can improve cardiovascular risks and bone health, favouring at the same time self-confidence, social integration, a positive state of mind and management of the main disease.

Cognitive and behavioural therapy. In the youngest, physical activity can be encouraged through educational measures with the families' help. In adolescents, it is difficult to increase exercise simply through educational measures. In these cases, behavioural sessions need to be planned and this is rarely done in Primary Health care because of a lack of time or a lack of training of health professionals, and therefore, a lack of motivation for a task that has been recently proposed.

Table II shows some general recommendations that should be taken into account in order to do cognitive and behavioural treatments. From our experience in treating obese or overweight adolescents, behavioural recommendations to increase physical activity are an educational strategy that can be applied with no difficulties by the sanitary staff at health centres. Next, we briefly describe the procedures, adding some comments to recommendations gathered in table II.

Table II. Behavioural treatment recommendations:

- The main aim is to create healthy habits and remove the unhealthy ones.
- Provide achievable guidelines.
- Make good use of and potentiate the family involvement.
- The therapist should be motivated to do his/ her and transmit that motivation to the adolescent and his/ her family.
- Acknowledge the patient and family's efforts.
- Positive attitude: focus on the things that are done right. Recognise the flaws and pact possible solutions with the patient and the family.
- Always encourage and never discourage.
- Highlight the patient's role and the successes.
- Emphasize with patients and families, acknowledging the difficulties.
- Prevent relapses by monitoring the patient.
- Trust the patient and transmit that patient to them.

From our experience, better results are obtained through individual sessions than through group meetings. This is because bonds of trust can be established better between the adolescent, the family member that participates and the therapist. This is very important in long term follow ups. After the first meeting, in which the therapist shows the advantages of exercise, usually, there are not many problems to start the treatment. From this acceptance on, and before the patient has received any recommendations, he/ she should write down a diary of the following days and register all the activities done. With this information, behavioural recommendations can start and they are adapted to the patient's activity which helps comprehension. In short, recommendations should focus on facets of the patient's activity that should be modified. Ways to improve should be agreed between the young person and the family member that goes with him/ her.

Meetings, approximately half an hour, should repeat periodically to check objectives. Then, they can be spaced out up to twelve meetings during six months.

Even though behavioural treatment of a specific patient is not complex, because it is reduced to provide logical and appropriate recommendations to unhealthy behaviours, it requires time to attend the meetings. At the same time, it is essential that the therapist is motivated to do the meetings. It is important that the paediatrician is sure that there are many possibilities for the treatment to be good and he/she transmits it with his/her attitude and words to the patients and families. Because of that, we should reject some opinions that say that it is frustrating to treat adolescent obesity. When things are done right, interventions are not frustrating but in turn, extremely gratifying.

4. PREVENTION: GATHERED EXPERIENCED.

The number of published research by the scientific community is numerous as well as the effort of different managers of the activities implemented to fight obesity. That increases the feeling of discouragement and makes even clearer that the guidelines to approach the epidemic should change substantially based on the gathered experience.

Prediction in the first life stages (including intrauterine) and prevention during the previous stages of physiological maturity can be strategies clinically efficient and socially profitable. This appreciation can be refuted by the fact that the number of interventions done in the last years has been numerous but there are no results. However, it is necessary to say that efforts have focused on some risk factors and agents implied in the epidemic as well as independent activities with scarce coordination.

Campaigns designed to promote healthy eating (frequently connected with legitimate corporate interests), it seems clear that not even promoters were aiming for small success against obesity. Campaigns such as 'bread everyday', 'five a day', etc. were aiming for an increase of these healthy foods instead of on changing the tendency of the pathology. We have to remark that economic resources were modest although some of them were importantly financed; for example, 'five a day' had €14,2 millions in three years.

Among the numerous projects developed in school settings, we can mention two in the United Kingdom because they addressed key aspects in preventing obesity. On the one hand, at Christchurch Schools (CHOPPS), they focused on the decrease of sugar and sugar drinks consumption promoting fruit sweetness. On the other hand, the Active Program Promoting Lifestyle in Schools, APPLES, in Leeds, where parents and educators took part on programs of nutritional education and physical activity that ended with the activity 'movement is fun.'

Textbooks and guides are a tool whose efficiency is yet to quantify. However, there is research that recommends increasing the rigor of students' knowledge. This is based on V. Gavidia Catalan's study: from the 297 text books from Primary and Secondary education that were analyzed by the author, he concludes that they do not develop the topics so that students have a proper health knowledge and they are not also a good guide for teachers. Same conclusions were reached by a study about text books in the Autonomous Community of Granada. According to the authors, the books contained many messages related to health in general and diet. However, the information was not always according to what paediatricians recommended. Furthermore, information about obesity was almost always omitted.

Family and schools refectories are places where the value of examples can have more promising results. Development of taste, appetite control, number of meals, portion size, etc. should generate healthy habits in children and teenagers and promote a balanced diet and healthy diet habits which are two basic parameters to base nutritional education on.

Physical activity and passive free time, on the other hand, have been subject of plenty of activities, some of them multitudinous. There is agreement on the importance of physical activity in the energetic balance and consequently the importance of people in charge: PE teachers. Therefore it seems normal that the Health Department from the United States situated it as a priority objective in 2010. Moreover, Passive Free Time seems to have a strong correlation with some cardiovascular risk factors during the first years of age. The following lines summarize some of the preventing programs and studies done in Europe.

- **NAOS STRATEGY** (Nutrition, physical activity and obesity) 2005. It was developed by the Spanish Ministry of Health and it was addressed to schools to inform about obesity prevention.
- **PERSEO** (Educative program model of health, physical activity and against obesity). It was developed in Spain after the first results of NAOS.
- **EVASYON**. A study conducted in Spain and addressed to adolescents suffering from overweight and obesity.
- **PAOS.** It is an ethical code addressed to children under the age of 12 in Spain to protect them from the pressure of food and drink advertisement.
- **HELENA** (Healthy lifestyle in Europe by Nutrition in Adolescence). It is a programme that started in 2005 and ended in 2008 financed by the European Commission and it had the aim of valuing the nutritional state of European adolescents.
- **HSBC** (Health Behaviour in School-aged children). It was promoted by the WHO to study healthy behaviours.

Three first considerations seem in order: firstly, it is impossible to accomplish any success if no measures are taken even though there is no initial success. Secondly, regarding formative activities with children/teenagers and their families, we consider that specific knowledge about nutrition does not guarantee an improvement of obesity figures. However, without an educated population with a minimum of knowledge about obesity, getting better results would be much more complicated. Finally, it is true that without all the activities done, obesity's figures would be even bigger.

That is why the main aspects are the following: What new guidelines should be incorporated? What type of measures should be implemented, considering nowadays situation? What is the strategy that optimizes the limited resources we have? What to do to face the unstoppable increase of the epidemic?

It should be remembered that this matter does not allow any further delays to obtain real results. Firstly, because of patients' life expectancy and life quality are socially unacceptable. Secondly, because there is agreement in the fact that even the slightest improvements on weight status of obese patients will be a major relief for them both physically and emotionally. Thirdly, because the moment the increase of this pathology is stopped, the economic cost of pathologies associated with obesity that public health systems have to endure, because of the affected population, will be economically unbearable.

In no way economical matters should remain outside this analysis. We consider the caring part and also medical leaves. The costs of these, published by each country, have significant differences that can be explained because of the structural differences of each country health care systems. The most common figure is 7% of the total health expense without including medical leaves. This makes unnecessary the analysis about its importance. The OECD gives a global vision: The organization quantifies economic costs in 36% more in health care and 77% more in medication for obese patients compared to those with normal weight. (OECD, 2005)

Costs in life quality of these patients need to be quantified from different social and psychological parameters, including physical performance. The study of a group of

patients with an average BMI of 34.7, published in 2003 by Schwimmer JB et al., concluded by stating that in 65.1% of cases, individuals presented at least one of the following pathologies: hyperinsulinaemia, dyslipedemia, fatty liver disease, sleep apnoea, diabetes and polycystic ovary syndrome. We must add that mental disorders in these patients are above average and that absenteeism was clearly superior in obese kids (4.2 days/month against 0.7 in the healthy group)

However, even considering the seriousness of the problem, a good number of parents still do not have a clear perception of the issues obesity implies and they do not seek for help or change their family lifestyle. The seriousness of the consequences and the decrease of life expectancy of people suffering from obesity are ignored by some part of the population that belongs to social exclusion risk groups and families with lower economic and cultural levels.

D. Lopez de Lara and colleagues conducted a study in 2010 with 6,463 participants aged between 3 and 24 (3,055 female and 3,408 male). They concluded that BMC values were no different in 2008. However, these values were clearly higher than 20 yeas ago. This suggests that it is necessary to take measures to stop the situation.

Because of that, intervention in the first stages of the development of the pathology can be the most viable solution from medical, social and economic perceptions. Obesity multifactorial aetiology makes essential the participation from many different specialists, being a key one the paediatrician because he/she is the basic piece in children and adolescents' health. Apart from his/her high technical qualifications, he/she is in touch with the family and therefore, he/she occupies a privileged position to detect overweight prematurely and intervenes in nutritional aspects and also in those related with physical activity. These preventive measures should be integrated in a global plan to fight obesity and its implementation should be treated as a priority because the long period of reversion of the pathologies will survive

5. INTERVENTION AREAS

The current state of the pathology seems evident because the attempts to approach it partially, only provide non significant results that are overcame by the power of obesogenic environmental factors until they are non perceptible. This has created a frustration feeling that has taken us to generalize the thought that medical advances and their translation to lifestyle improvements and life expectancy can be cancelled by sequels of nowadays epidemic of obesity.

In order to face this situation, a global preventing strategy seems in order and it seems that it may have some possibilities to succeed when one sees that the solutions proposed until now have failed to stop the persistent increase of the pathology showed by the statistics. The issue is not to regret the limited success of the measures taken so far, but to learn from the experiences and, above all, to create guidelines and decisions that will promote a new strategy to approach the pathology. One these basic guidelines would be that the activities can focus on specific aspects and scopes but always as part of a global strategy, because one-time activities limited in scope have provided very little results.

The scopes in which is urgent to act are: sanitary, family, school and social.

5.1 FAMILY PREVENTION.

Healthy eating habits:

a) **Breakfast:** it is important to remark the importance of a good breakfast, because after 8-10 hours of sleep, it is necessary to provide energy to start the school activity. The menu has to be integrated by: dairy (milk, yoghurt, cheese, milkshakes, etc.), cereals (whole-wheat cereals, bread, whole-wheat bread, cookies, etc.), fruits (better the whole piece than in juice because of the fibre they have, after they have been cleaned appropriately) and vegetables (carrot, raw or in a milkshake, tomato in a juice, spread for bread or raw). Cold meats (optional, low fat and low salt) and factory-baked goods should be avoided.
b) **Rest of meals:** have five meals a day. Every day have: 3 fruits and two portions of vegetables, 2-4 portions of milk and derivatives, non-fat meat 3 times a week, 3-4 eggs per week; fish 3-4 days per week; nuts (walnuts, almonds, hazelnuts) everyday; use olive oil to cook and season and drink plenty of water, at least one litre per day.
c) **Avoid:** Cold meats that have salt and fat, fats and snacking; sugary drinks, butter, margarine, oils with saturated fats such as palm and coconut oils.
d) **Physical activity:** families should promote physical activity (with no rules) and sport (with rules).Everyday, one hour of physical activity has to be done, of which 20 minutes have to be intense.

Family physical activities are a recommended option because it strengthens relationships and ease sport activities in the long term.

5.2 SCHOOL PREVENTION

a) Training of teaching professionals in general health and specifically nutrition.
b) Acquisition of knowledge about foods included on each years' syllabi.
c) Increase students' awareness about the importance of preventing overweight and obesity.
d) Workshops about:
   - The concept of kilocalorie, calorie consumption, basal energy expenditure (BEE), energy expenditure for activities = energy input-basal energy expenditure.
   - Reading and interpretation of food labels.
   - Types of food and their influence on our health.
   - Importance of water and fibre.
   - Importance of physical activity.

It is useful to conduct a pre-test before the start of the Workshops with kids and adolescents and a post-test at the end to assess the acquisition and assimilation of knowledge and habits related with the topic of the workshop. Both tests are anonymous so they do not seem an exam; on the other hand, we do not want to control the evolution of one specific subject but the group as a whole and its response to the stimuli and messages send during the workshop.

The professionals in charge of preventing obesity at all levels should conduct ***internal assessments*** about the development of the workshops and ***external assessments*** through surveys in order to correct and improve the application.

At schools, information about obesity and the implementation of good healthy habits should be approached transversally taking advantage of the syllabi from subjects such as Biology, Sciences and even Literature (for example, quotations from famous authors can be used).

Changes in Physical Education Classes.

a) One hour per day five days a week. One quarter of it of intense exercise.
b) More attention should be paid to students that have fewer qualities for sports. This group is generally put off in competitive sports for obvious reasons. However, they can join other physical activities with less competitive objectives but with playful goals, based on team work, etc.
c) Those schools that have disabled students will promote physical activity in accordance with their possibilities.

Determine a day per year as "Day against obesity" by organising:

a) Sport activities.
b) A competition of ideas and slogans, "Tell me what you eat and I will tell you what you are", "We are what we eat", "Depending on what you eat during the stage of development, in that way you will be during your aging".
c) Training for families through parents association.

5.3 HEALTH PREVENTION

- Promote the Mediterranean diet, discovered by the North American Ancel Keys in the 1940-1950s. Research conducted allowed to verify that Mediterranean and Japanese (high fish consumption) people suffered less cardiovascular pathologies than other countries.
- Conduct epidemiologic research, if there is not, to discover the current situation.
- Promote research. We have to remember that common obesity is the most frequent type but there are other forms of obesity with at least 20 genes involved.
- Strengthen the overweight diagnosis in Primary Health care as a mean to stop obesity.
- Devote more health resources to prevent obesity.
- Inform children, adolescents and families of the need of practicing sports and physical activities.
- The use of the BMC has to be generalized as well as other indexes that Primary Health Care considers important.
- Monitor children with high weight during certain periods already mentioned because it has been proved that they have a high chance of developing overweight or obesity when they become adults.
- Detect stress or anxiety because 40% of people increase calorie intake when they are stressed as reported by the Obesity Group of the Spanish Association of Endocrinology and Nutrition.

- We must know the sleep of children and adolescents because all the evidences point out that there is an association between less hours of sleep and obesity. Lifestyle in our society nowadays with the exposition to light, including artificial, produces less secretion of melatonin and this influences weight. Furthermore, with less hours of sleep, there are lower levels of leptin that tells the hypothalamus an increase of appetite.
- Anxiety has to be considered as another risk factor, because it has the capacity to generate cortisol in patients with the resulting increase of appetite and also increase of the adipose compartment.
- Preventing overweight and obesity should be considered as a long term activity that promotes health in the population as well as significant economic savings to governments.
- The European Parliament and the Council of the European Union declared 2012 as the European Year for Active Ageing, term that had been already proposed by the World Health Organization (WHO), to the Second United Nations World Assembly held in Madrid in 2002. Maintaining a correct weight has a big importance in adult age pathologies.

5.4 SOCIAL PREVENTION

- The media has to collaborate in the information about the prevention of overweight and obesity. About this matter we will need to go into detail about because of the high capacity the media has to affect the peoples and its strength in the diffusion of messages and opinions. Advertisement is especially important in these matters.
- The same way that during the year different conditions or social problems are remembered by establishing a specific day, it should be remembered that 12th November is the day of the prevention of obesity.
- Primary prevention has to be universal in all the country and the whole society should be aware of the importance of the problem.
- Find the cooperation of the food industry.Inform the legislator.
- Inform government leaders.
- Participating in the social framework is basic and fundamental as well as coordination.

6. PREVENTION GUIDE.

All this professional knowledge, research results, implemented actions, experience from the paediatrician offices, etc. should be concreted, coordinated and integrated in a global protocol to approach the epidemic that allows an easy and efficient approach to the current problem optimizing the resources available in the system. The core of the strategy should lie on the public health system and it should be integrated by paediatrics care (Offices, paediatricians, nurses and nursing assistants) that conduct the pre-established routine controls (birth, 12 months, 5-7 years an 10-12 years) and on the occasional consultations, a series prearranged measures height, weight, waist circumference, blood pressure and in some cases basal glycaemia, triglycerides and HDLC. These data would be registered in the computer registers of the public health system.

These registers will allow us to obtain valued population data that will permit the assessment of the epidemic state in real time. At the same time, they will make individual follow ups of children and adolescents possible with universal indicators as the BMC, Rorher Index and WTH ratio where an percentage variations could indicate an increase in the risk of suffering from obesity in the near future. Moreover, data about conditions connected with obesity could be extracted.

Weight status evolution of patients with an annual significant increase of the obesity indicators could allow us, in the short term, to define the cut-off points that make possible the referral to obesity consultation to patients that have numbers that exceed the established. A starting cut-off point can be established by children and teenagers with ≥P90 of BMC and an increase of ≥1 point/year on the first indicator. This first risk indicator should be adjusted periodically according to the gathered experience in the offices that receive patients that are initially considered as risk patients.

The rest of registered parameters (basal glycaemia, blood pressure, triglycerides and HDLc) should serve, besides knowing the patients general health state, to start defining precisely the connections between obesity and metabolic syndrome.

The information flow generated by the protocol, with pertinent legal precautions, should be available by the people in charge of fighting the epidemic. In the case of researchers, for example, it should be available by accessing the database of the system. In other cases, through the published annual reports addressed to teachers, parents associations, the food industry, the media, public institutions, etc. Likewise, it would be essential to elaborate a report of the obtained results periodically addressed to the authorities in charge of the public health system and the departments of education and family so they can make note of fundament future decisions.

Besides the health sphere, the protocol covers complete participation of the rest of people involved in fighting the epidemic such as teachers and families. Activities in these spheres should be managed by the competent public departments coordinated with the public health system in an effort to optimize means and resources.

Social Corporative Responsibility as a mean of managing social activity in businesses should be mobilised to obtain economic resources in change of social recognition.

This protocol of prevention and the diverse activities that support it should be managed by the principle of continuous improvement and periodic re-programming.

7. CONCLUSIONS

All the statistical data published about the current state of the epidemic in developed and developing countries advice participant agents to approach the fight without further delay. Taking into account the scarce results obtained by partial campaigns, activities should cover a great number of factors related with obesity already known by published studies and the gathered clinic experience in a coordinated way. These interventions need to be integrated in a strategic global plan to fight obesity. Multidisciplinary team interventions are essential if we take into account the multifactorial nature of obesity.

The strategic plan will consist in actuation protocols in the following spheres: health, educative, familiar and social. Parameters to quantify should be precisely detailed as well as units, tools to measure them, procedures and registers to make.

The coordination centre and director of the strategies should be the public health systems and it will be responsible of maintaining the database that will manage the registers and its interpretation in order to

Make possible important research, decision taken in all ranges of the epidemic and tasks such as the redesign of activities and procedures and continuous improvement of the strategy. All strategic guidelines should be directed to the clinic, social and economic profitability.

The communication of the results should be guaranteed by the agents implied in the strategy. The publication of reports to politicians, citizens, the media, businesses, etc. should be contemplated as part of a global strategy.

The establishment of a Prevention Health Plan and Treatment of Obesity is necessary. This plan has to form paediatricians, nurses and other areas in the convenient and necessary protocols to treat this condition in Primary Health and Obesity Consultations.

Likewise it will be necessary to establish a School Plan to Fight Obesity that covers formation in nutrition for children and teenagers as well as parents and teachers. Disabled people should also be part of this School Plan with a specific section.

Special attention should be directed to sport practice in school and as a family because it is a basic factor for both improving heath in obese people as well as fighting against the epidemic.

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