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Determinants of childhood obesity: ANIBES study

Factores determinantes de la obesidad infantil: a propósito del estudio ANIBES

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Abstract

Obesity is a major public health problem, which is associated with physical, psychological and social problems. The prevalence in children and adolescents has increased dramatically in developed countries and economies in transition in recent decades. It is more common in population groups with lower educational and socioeconomic status. The increase has been attributed to changes in eating habits, with higher consumption of highly processed energy dense foods and low consumption of fruits and vegetables. It has also been associated with low levels of physical activities and with sedentary lifestyles. Some analyses suggest that dietary patterns, physical activity, sedentary lifestyle and sleep time tend to cluster, so that such combinations could increase the risk of overweight and obesity. It is important to consider the different clustering patterns of lifestyles when designing intervention strategies for preventive purposes.

Key words:

Overweight. Obesity. Children. Adolescents. Dietary patterns. Lifestyles.

Resumen

La obesidad es un importante problema de salud pública que se asocia con problemas físicos, psíquicos y sociales. La prevalencia en niños y adolescentes ha aumentado de forma alarmante en los países desarrollados y economías en transición en las últimas décadas. Es más frecuente en los grupos de población con menor nivel educativo y socioeconómico. Se ha atribuido el aumento a cambios en los hábitos alimentarios, con mayores consumos de alimentos muy procesados, de alta densidad calórica y bajos consumos de frutas y verduras; también a bajos niveles de actividad física y estilos de vida sedentarios. Algunos análisis sugieren que se combinan distintos patrones alimentarios, hábitos de actividad física, sedentarismo y sueño, de manera que esta asociación podría aumentar el riesgo de sobrepeso y obesidad. Es importante tener en cuenta los distintos patrones de asociación de estilos de vida al diseñar estrategias de intervención con fines preventivos.

Palabras clave:

Sobrepeso. Obesidad. Niños. Adolescentes. Patrones alimentarios. Estilos de vida.

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INTRODUCTION

Childhood obesity is one of the most serious public health problems of the 21st century. It is a global challenge which is increasingly affecting low- and middle-income countries, especially in urban settings (1). Prevalence rates have increased alarmingly during the last decades and, according to data from the World Health Organization (WHO), in 2010 the number of overweight children in the world was estimated to be 42 million, and 35 million of them were living in developing countries (1,2).

Updated data suggest that this epidemic progression has decreased over the past years. Patterns, however, vary depending on the socioeconomic status as this stabilizing progression is less evident in groups with a lower socioeconomic status (3). Many studies have demonstrated the existence of a global socioeconomic gradient of childhood obesity in modern industrialized countries, with rates tending to decrease progressively as socioeconomic status increases (2,3).

The prevalence of overweight and obesity is high in all age groups in many countries, but it is particularly alarming in children and adolescent in developed countries and economies in transition, and it affects more severely socially disadvantaged population groups (4).

CHILDHOOD OBESITY IN SPAIN

The prevalence of obesity in Spain is among the highest in the OECD: one out of 3 adolescents aged 13 to 14 are overweight (5). Using the cut-off criteria proposed by the International Obesity Task Force (IOTF), and taking into account data recorded from 1998 to 2000, the enKid study reported a prevalence of obesity of 6.3 (7.9 in boys; 4.6 in girls) among children and adolescents in Spain and, overall, 24.4% were affected by obesity and overweight (6). Subsequently, according to data from the PERSEO program, which considered the same age groups (children aged 6 to 12) and geographical areas from 1998-2000 to 2009, prevalence increased by 1.5-4% in all the Spanish autonomous communities, except for the Canary Islands, where rates remained high but stable (21%) (7). Particularly, the PERSEO program yields a prevalence of obesity of 17.1% among children aged 6 to 9 in 2009, a very similar rate to that obtained in 2010-2011 from the ALADINO study, which used the same criteria to evaluate a representative sample of Spanish same-age children (17.6%) (8).

Overweight and obese children tend to stay obese into adulthood and are more likely to develop noncommunicable diseases like diabetes and cardiovascular conditions at a younger age (9). The follow-up of the Bogalusa Study, carried out in the US, showed that 35.2% of children shifted from normal weight in childhood to overweight in adulthood. This rate increased to 61.9% for those participants presenting a high body mass index (BMI) in childhood and school-age. Besides, according to this study overweight adolescents were more likely to present cardiovascular risk factors. Up to 70% of obese adolescents presented at least one cardiovascular risk factor, and a high BMI value in childhood was considered as a predictor for being in top quartile of carotid intima-media thickness in adulthood (10,11). Apart from conditioning children's health when adults, it affects their physical, emotional and social health during childhood (9,12).

FACTORS CONTRIBUTING TO OBESITY INCREASE

Factors influencing prevalence of overweight and obesity have been analyzed in different studies. With regard to socio-demographic factors, the enKid study, which was conducted within a representative sample of Spanish population aged 2 to 24 years, showed higher prevalence of overweight and obesity in males aged 6 to 13, in the south region and the Canary Islands, and it was inversely associated with the maternal educational level and the socioeconomic family status. This profile coincides with findings from most studies in children and adolescents (6).

As for factors related to early childhood, the enKid study associates birth weight over 3.5 kg and absence of breastfeeding with a higher risk for obesity. Different studies provide evidence of the protective effect of breastfeeding (9,13) in children under 6 years of age. On the other hand, low birth weight was associated with a higher risk for overweight, but an increased risk has been observed as well in children with birth weight over 3.5 kg, as shown in the enKid study (6,9,14). A possible relation between intrauterine environment and overweight in childhood has been suggested, and the mechanisms by which intrauterine life factors may produce heritable changes in adiposity may derive from DNA methylation or histone modification in gene regulatory regions, although evidence from studies in humans is scarce (9). In populations with a high risk of obesity and diabetes, such as the Pima Indians, exposure to gestational diabetes is linked to a higher risk for obesity in childhood and young adulthood in children, but evidence is significantly limited in other populations (9,14,15).

LIFESTYLES AND RISK FOR OBESITY

Over the last years, many studies have researched the potential associations between overweight and the intake of certain nutrients such as fats and sugar, the consumption of specific food and drinks, alimentary habits like eating between meals or breakfast skipping, scarce physical activity, or sedentary behaviors (6,9).

Over the second half of the 20th century, and at a faster pace since the 80's, relevant social changes have occurred. These changes have significantly affected the organization of family life around dietary habits and influenced the usual pattern of food and drinks intake (16). Some outstanding characteristics are, among others, a considerably increased consumption of processed food and foods high in calorie density, fats, free sugars or salt. On the contrary, the consumption of unprocessed foods has decreased, which means lower intake of legumes, vegetables and, to a lesser extent, fruits (17,18). Less time is spent on buying, preparing and consuming food, and the frequency of family meals is lower.

A high protein intake has been observed to lead to an early peak adipose increase in infancy (19) and, accordingly, to obesity in childhood and adulthood (20).

The enKid study reported that a high intake of fats, as well as frequent consumption of pastries, cold meats and sugar-sweetened drinks or low consumption of fruits and vegetables, was linked to a higher risk for obesity. In addition, overweight was more frequent in those who spent 3 or more hours per day in screen time or did not practice any sports (6).

It has been suggested that one of the main determinants of the epidemic of childhood obesity throughout different countries is overweight in the father and/or mother, and this factor is unrelated to socioeconomic status (9). When at least one parent is obese, children have a three- or four-fold greater risk for being obese. Even though this influence has a genetic component, family environment and parents' physical activity and dietary habits are closely linked to those of their children (21).

The increase in the prevalence of obesity has been attributed to environmental changes that promote excessive food intake and sedentary behaviors while not fostering physical activity. Some structural factors in cities and neighborhoods, probably related with socioeconomic status, affect physical activity and dietary habits by creating obesogenic environments (2,21). For example, lack of safe pedestrian areas or spaces suitable for leisure-time physical activity, reduced access to retail venues where affordable fruits, vegetables and other fresh product can be acquired, and greater accessibility to cheaper energy-dense products (2).

School environment has also a major role in the development of children's habits. Firstly, this influence comes from offers and experiences related to consumption of food and drinks both at the school cafeteria and in different school-related events (22), such as birthday parties, special celebrations at school, incentives and sanctions systems, etc., apart from the available infrastructure and possibilities for practicing physical activities through games and sports. Secondly, the implementation by the educational center of programs associated with the promotion of healthier physical activity and dietary habits, as well as the experiences shared with teachers and other pupils and groups also play an important role (22).

ASSOCIATION BETWEEN LIFESTYLE PATTERNS AND OVERWEIGHT

Weight gain has been associated with different behaviors related to diet, sedentary lifestyle and physical activity (2,6,9). The ANIBES study has recently evaluated dietary patterns and their possible clustering with physical activity, sedentary behavior and sleep time in children and adolescents from a random sample of Spanish population. Four dietary patterns were identified in this group: one showing a profile closer to the traditional Mediterranean diet; a second pattern called "sandwich dietary pattern"; a third one labeled as "pasta dietary pattern", and the fourth one, "milk-sugary foods dietary pattern" (24).

Clustering of these four dietary patterns and physical activity, sedentary behaviors and sleep duration on weekdays allowed for the identification of two different groups. One of them was characterized by low physical activity, poorer diet and shorter sleep duration (unhealthier pattern), and included a higher proportion of girls. The other group was characterized by high physical activity, lower sedentary behavior, longer sleep duration and healthier dietary pattern (Figs. 1 and 2). The unhealthier lifestyle pattern included a higher proportion of children and adolescents from families with a low socioeconomic status and was associated with lower levels of parental education.

According to this study, the risk of prevalence of overweight was not significantly higher across both lifestyle patterns, although it was > 1 for children and adolescents in the "unhealthier" group.

The results from the ANIBES study are consistent with those referred by other authors who have observed patterns favoring a healthier energy balance by combining healthier dietary habits and increased levels of physical activity and less sedentary time in

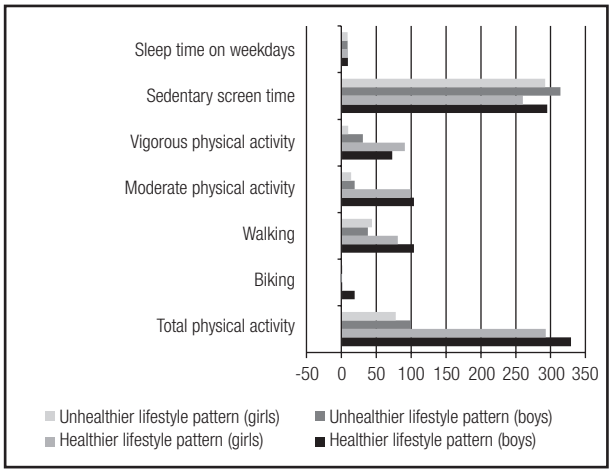

Figure 1.

Characteristics of lifestyle patterns in boys and girls identified in the ANIBES study: physical activity, sedentary behavior and sleep time on weekdays.

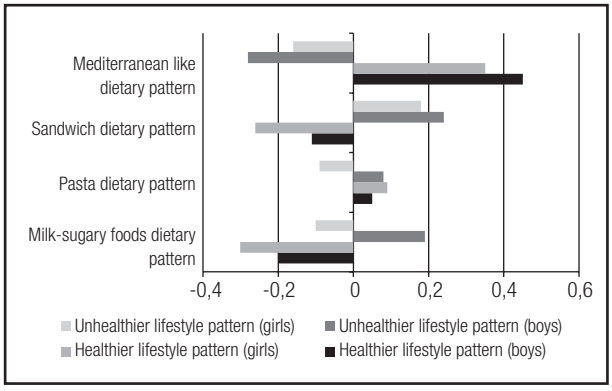

Figure 2.

Characteristics of lifestyle patterns in boys and girls identified in the ANIBES study: dietary patterns.

children and adolescents from different countries (25-28). Several studies have also reported a combination of sedentary lifestyle and healthy dietary habits (27,28). In a systematic revision of studies analyzing the combination of these lifestyles in schoolchildren and young people aged 9 to 21, authors observed that, with the exception of a study carried out in children aged 5 to 12 years, most children and young people combined one or more healthy behaviors with one or more unhealthy habits (29).

Long-term follow-up of large enough samples should be considered to evaluate changes in different lifestyle patterns and their possible association with overweight. This type of analysis is also useful to develop intervention strategies which are consistent with the characteristics of each population group. There is evidence that population-level intervention strategies help to prevent premature death and improve quality of life.

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