

Prevention of childhood obesity from a bioethical perspective Prevención de la obesidad infantil desde una perspectiva bioética

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Abstract:

Childhood obesity is recognized as a global public health problem, so it is important to explore potential solutions from a different perspective, one that includes the ethics of treating children and the involuntary neglect of care by primary caregivers, which is often due to lack of knowledge. Therefore, the present study aims to analyze recent evidence on the prevention of childhood obesity and discuss its implications from a bioethical perspective. A narrative review was conducted in PubMed and ProQuest using MeSH terms related to pediatric obesity, prevention, and interventions, filtering the last five years. Clinical trials, systematic reviews, and epidemiological data, as well as national surveys (ENSANUT 2022), were included.

Among the initial results, they report that childhood obesity is a multifactorial disease with metabolic, cardiovascular, musculoskeletal, hepatic, and psychosocial consequences. Interventions based on early nutritional education, family support, motivational interviewing, and school-based programs have proven effective in reducing prevalence and promoting healthy habits. However, they have limitations in long-term follow-up and adherence. Preventing childhood obesity requires multidisciplinary, sustainable interventions grounded in the bioethical principles of beneficence, nonmaleficence, autonomy, and justice. These interventions must protect the child's overall well-being, avoid stigmatization, and ensure equity, while actively involving caregivers to achieve a lasting impact.

Keywords: *Childhood obesity, prevention, bioethics, public health, interventions*

Resumen:

La obesidad infantil, es reconocida como un problema mundial de salud pública por lo que es importante tener las posibles soluciones desde una perspectiva diferente en donde se incluye la ética en el trato del menor y la no atención involuntaria realizó el cuidador primario, que en muchas veces es por desconocimiento, por tanto, el presente estudio, tiene como objetivo, analizar la evidencia reciente sobre la prevención de la obesidad infantil y discutir sus implicaciones desde una perspectiva bioética.

Se realizó una revisión narrativa en PubMed y ProQuest utilizando términos MeSH relacionados con obesidad pediátrica, prevención e intervenciones, filtrando los últimos cinco años. Se incluyeron ensayos clínicos, revisiones sistemáticas y datos epidemiológicos, así como encuestas nacionales (ENSANUT 2022).

Dentro de los primeros resultados, refieren que la obesidad infantil es una enfermedad multifactorial con consecuencias metabólicas, cardiovasculares, musculoesqueléticas, hepáticas y psicosociales. Las intervenciones basadas en educación nutricional temprana, acompañamiento familiar, entrevistas motivacionales y programas escolares han mostrado eficacia en la reducción de la prevalencia y la promoción de hábitos saludables. No obstante, presentan limitaciones en el seguimiento a largo plazo y la adherencia. La prevención de la obesidad infantil requiere intervenciones multidisciplinarias, sostenibles y fundamentadas en principios bioéticos de beneficencia, no maleficencia, autonomía y justicia. Estas deben proteger el bienestar integral del niño, evitar la estigmatización y garantizar la equidad, involucrando activamente a los cuidadores para lograr un impacto duradero.

Palabras Clave: *Obesidad infantil, Prevención, Bioética, Salud pública, Intervenciones*

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INTRODUCTION

Obesity is a complex chronic disease characterized by excessive or abnormal adipose tissue that is associated with an increased health risk. It begins with the alteration of the normal regulation of the body's fat mass, is influenced by endogenous and exogenous factors, with profound ramifications for clinical practice, public health and society. Its cause is multifactorial and is not yet fully understood, it can be classified as preclinical obesity, which is characterized by excess adiposity and preserved organ function, and as clinical obesity, which causes a chronic systemic disease by inducing alterations in organs and/or systems with specific signs and symptoms. (1,2).

It is currently considered a public health problem associated with the increase in premature morbidity and in adult life. In this way, a child living with obesity tends to be an adult with this condition, increasing the risk of diabetes and heart problems at an early age, with the prevention of obesity in children being a priority. (3). Obesity is not the result of "lack of will", but the set of genetic, environmental and neuroendocrine factors.

In Mexico, the prevalence of overweight and obesity in school children is 36.5%, that is, 1 in 3 children is overweight or obese, this figure has been increasing in recent years, mainly in urbanized areas. Some associated factors are attributed such as low consumption of fruits and vegetables, high consumption of added sugars, obesogenic environments, availability of ultra-processed foods, physical inactivity, junk food advertising and lack of access to healthy foods. (4,5).

The practice of clinical ethics is based on four basic principles, applicable to the treatment of childhood obesity. The first principle, beneficence, seeks the well-being and improvement of the health status of the pediatric patient. The second principle, nonmaleficence, aims to avoid harm, justifying actions and preventing those that may worsen the patient's physical and emotional situation. Autonomy, the third principle, allows the paediatric patient to perceive his situation and his guardians to choose the best option for him. The last principle, justice, seeks to treat the school child fairly and equally, without discriminating against him or her because of his or her physical condition.

Today, philosophy's influence on medicine is based on values such as rationality, agency, self-determination, and individualism. These values are more relevant in adults than in children, since decision-making (individualism and autonomy) is required, something that children do not usually do as they depend on their parents and have decisions influenced by social relationships. In this sense, a global bioethics is necessary that achieves a balance between moral relativism and social

imperialism, recognizing cultural diversity and collective moral progress. (6,7).

METHODOLOGY

A PubMed search was performed with the MESH term "Pediatric Obesity" and "Physiology" with the Boolean operator "AND". The filter of "last 5 years", "Systematic Review" and "Books and Documents" was used, so that 132 results were obtained. Those that concisely and clearly explain obesity and its physiological mechanisms were selected.

In a second search in PubMed, the terms "Pediatric Obesity", "Prevention" and "Intervention" were used with the use of the Boolean operator "AND". These results were filtered with "5 years", "Clinical Trial", "Randomized Controlled Trial". From this, 26 results were obtained.

A third search was conducted in ProQuest Central, where the terms "Intervention" and "Childhood Obesity" were used. We filtered results with publication date of "last five years", document types "Main article", a maximum of five years old, and journal articles. We obtained 101 search results.

RESULT

The journal *The Lancet Diabetes and Endocrinology* published an article on the definition and critical diagnosis of clinical obesity. It discusses the difference between clinical obesity and preclinical obesity. Clinical obesity is considered a chronic disease caused by excess body fat that alters the functionality of organs and tissues, causing symptoms or limitations in daily life, such as sleep apnea, hypertension, chronic joint pain, type 2 diabetes, fatty liver, among others. On the other hand, preclinical obesity is characterized by excess body fat without functional alterations in the organs, but with the risk of evolving into clinical obesity (8).

Currently, the Body Mass Index (BMI) is used as a tool to diagnose obesity. However, it is not enough, as it does not distinguish between fat and muscle, nor does it assess metabolic health (8).

The new criteria for diagnosis include two components: anthropometric and clinical. In the anthropometric component, BMI should continue to be used as a screening measure, but it is necessary to include another measurement, such as waist circumference, waist-to-height ratio, among others.

The clinical component involves the presence of at least one symptom of organ dysfunction or some limitation in daily activities. Clinical implications vary. In clinical obesity, medical treatment (drugs and/or surgeries) is required to improve symptoms and prevent complications. Instead, treatment in preclinical obesity focuses on prevention through lifestyle changes and constant monitoring. In addition, it is recommended that public policies seek to guarantee the

treatment of clinical obesity and combat the stigma that surrounds it, recognizing obesity as a specific disease, not just as a lack of will. It is also essential to promote evidence-based education; Therefore, future research should study the progress from preclinical to clinical obesity, as well as the development of more accurate biomarkers (8).

Childhood obesity has short- and long-term health consequences, and lays the groundwork for the development of noncommunicable diseases such as type 2 diabetes, hypertension, coronary heart disease, stroke, cancers, kidney and lung disease. The higher the body mass index (BMI), the greater the risk of chronic degenerative diseases (8).

Existen diversas manifestaciones clínicas en órganos y sistemas derivadas de la obesidad infantil. En el sistema musculoesquelético, se incrementa el riesgo de hiperlordosis lumbar, genu valgo, pie plano u otras alteraciones posturales, así como mayor riesgo de fracturas y mayor predisposición a la osteoporosis en la vida adulta. A nivel del sistema respiratorio, se observa mayor riesgo de asma y apnea obstructiva del sueño asociada a la obesidad infantil. En el sistema cardiovascular, existe un factor de riesgo vascular del 70% en casos de ≥ 1 factor y del 39% en casos de ≥ 2 factores (8).

In metabolic terms, prediabetes is present in 14-25% of children and adolescents living with overweight or obesity, while 75% of children diagnosed with type 2 diabetes live with obesity. Dyslipidemia characterized by elevated triglycerides and reduced HDL cholesterol is often observed in severe obesity. In the reproductive system, girls with obesity present with early puberty, hyperandrogenism, menstrual irregularities, polycystic ovary syndrome (PCOS), or dysmenorrhea. In the liver, childhood obesity is the leading cause of fatty liver disease associated with metabolic dysfunction, which can progress from steatosis to cirrhosis. At the renal and urinary level, children may present glomerulopathy or nocturnal enuresis associated with obesity. In the central nervous system, idiopathic intracranial hypertension with headache, blurred vision, or diplopia may occur. (8).

DIAGNOSIS OF CHILDHOOD OBESITY

Para su diagnóstico se recurre frecuentemente al Índice de Masa Corporal (IMC), se pueden ocupar cortes percentilares para niños: 85-95=sobrepeso, ≥ 95 = obesidad (clase 1) y ≥ 120 = obesidad severa. Sin embargo, el IMC no refleja directamente la masa grasa, siendo necesarias otras medidas antropométricas u otra medición directa de grasa, lo que puede ser la circunferencia de cintura, que es un indicador de grasa abdominal capaz de medir riesgo de enfermedad cardiovascular y/o cardiovascular (1,3, 9).

RECENT CHILDHOOD OBESITY PREVENTION INTERVENTIONS

In the United States of America, a randomized clinical trial was conducted in primary care clinics, funded by the National Heart Lung and Blood Institute (NHLBI). The intervention was based on motivational interviewing and involved children aged 3 to 11 years with a Body Mass Index (BMI) higher than the 85th percentile. The study had two groups: one control and one that received the intervention. In the intervention group, children living with overweight or obesity were trained to provide motivational interviewing, behavioral therapy, and coding for weight management. In this way, parents received 10 motivational interviews over two years, 4 face-to-face sessions, up to 6 telephone sessions with personalized dietitians, messages to reinforce behavior changes, reminders to complete their sessions and access to web portals with educational materials and sessions to monitor the process. On the other hand, the control group only received usual care, that is, they had no subsequent contact with the parents or structured intervention. After two years of intervention, a negative deviation of the mean BMI for age and sex was obtained, indicating an improvement in BMI reduction. However, its limitation lies in the generalization of the software used for clinical practice and the impossibility of using other biomarkers. Despite this, this study offers potential evidence on how pediatricians and dietitians can collaborate with families to address this public health problem (10).

In another randomized clinical trial conducted in the United States, the intervention consisted of prenatal and postpartum counseling with support groups. The control group received standard care, including childbirth or breastfeeding classes and pediatric visits. On the other hand, the intervention group participated in the "Starting Early Program" (STEP), which included prenatal and postpartum counseling, as well as support groups for parenting and nutrition. The study only accepted women in their third trimester of pregnancy and the child was followed up until age 3. This intervention focused on the family and cognitive-social theory, with the aim of promoting healthy habits. Two antenatal sessions were conducted that assessed feeding intentions, barriers, and breastfeeding. During parenting, 13 sessions were held in the first three years, in which topics related to food, physical activity, parenting and family food were addressed. As a result, using nonparametric regression techniques, a significant reduction in weight-for-age Z-score was obtained at 18 months of follow-up. However, no significant difference was observed at three years. A dose-response effect was revealed, i.e., the intervention does reduce the prevalence of obesity in the short term (11).

In the province of Malaga, Spain, a randomized clinical trial was conducted with the parents of 261 preschool students aged 3 to 4 years (122 in the intervention group and 139 in the control

group) for two years. In this study, the intervention group, made up of parents of children aged 3 to 4 years, received six two-hour sessions, with a follow-up the following year of reinforcement lasting three hours, on topics such as: introduction to nutrition, healthy eating habits, design of healthy menus, physical activity and food labelling. The control group did not receive any intervention. A decrease in the BMI Z-score was observed at the end of the first year; This decline was maintained during the second year, indicating that the intervention was successful in reducing overweight and obesity. On the other hand, the control group showed a significant increase in the prevalence of overweight and obesity, which could indicate a growing trend in these conditions, making interventions necessary. Despite the limitations in adherence observed in this study, interventions of this type are useful to reduce Body Mass Index (BMI) in school children, therefore, the implementation of nutritional education and physical activity programs in schools from three years of age is recommended (12).

A cluster-randomized clinical trial, conducted in Mexico and the United States, included 356 mothers with children aged 3 to 5 years. In this study, the "Healthy Change" intervention was implemented for four weeks to address issues such as understanding overweight and obesity as health problems, child assessment, healthy eating practices, physical activity, and strategies for managing weight-related behaviors. The control group only received a program on hygiene and accident prevention, while the intervention group received the "Healthy Change" program. The maternal perception of the child's weight, the mothers' eating style were measured, and the "Family Nutrition and Physical Activity (FNPA)" tool was used to evaluate family practices related to nutrition and physical activity. For data analysis, changes were compared before and after the intervention between groups. No significant differences were found between the groups in the general perception of weight; However, a sub-analysis revealed that mothers in the intervention group were able to correctly identify overweight in their children at the end of the study (29.8% vs. 10.3% in the control group). Likewise, an increase in the authoritative eating style with a more balanced approach was observed in the intervention group (from 15.5% to 26.4%). A significant increase in family nutrition and physical activity (FNPA) scores was recorded in the intervention group, particularly in eating practices, healthy environment, and physical activity. Consequently, this intervention evidenced positive changes in the maternal perception of their children's weight, in addition to promoting a healthy lifestyle. Its limitations were the brevity of the study (4 weeks), which did not allow changes in BMI to be observed, and the size of the groups, which limits the comparison between countries (Mexico and the USA). (13).

In Germany, a randomized clinical trial was conducted that evaluated the effectiveness of the "Join the Healthy Boat" program. This program focused on promoting healthy lifestyles in elementary school children, with an emphasis on physical activity, nutrition, and reducing screen time in school settings. The objective was to control childhood overweight and obesity, analyzing their relationship with socioeconomic level (high or low). A sample of 1620 children with an average age of 7.1 years was used. Of these, 895 children underwent an intervention, while the rest constituted the control group. The intervention, which lasted one year, included anthropometric measurements (height, weight and BMI percentiles), parental involvement (through letters and family chores) and the promotion of a healthy lifestyle in children (physical activity, diet and reduction of screen time). After analyzing the data using logistic regression models and generalized estimation equations, the results were compared between children of high and low socioeconomic status. The study revealed that the intervention had a positive effect on child health promotion, but its impact varied according to socioeconomic status.

Children with a high socioeconomic status experienced greater benefits, such as improved breakfast habits, while those with a low socioeconomic status had fewer benefits. However, the study requires a longer observation period to determine whether these effects intensify over time (14).

A retrospective cohort study conducted in Chile analyzed data from 55,623 children aged 4 to 10 years. The study examined anthropometric variables (weight, height and age) and sociodemographic variables (educational level and employment status of the mother, relationship with household members, caregivers and number of members in the household). The results indicated that 4-year-olds living with obesity are 5.3 times more likely to be diagnosed by age 10. In addition, boys are 1.74 times more likely to live with obesity at age 10 compared to girls. Children with mothers who are 8 years or less of education are 1.43 times more likely to live with obesity at age 10. These findings suggest that obesity in early childhood (4 years) is a strong predictor of obesity in middle childhood (10 years). In addition, low maternal education is associated with less healthy eating practices, which can contribute to childhood obesity. Therefore, a prevention approach needs to be implemented in 4-year-olds who are already obese (15).

In Malaysia, a cluster-randomized controlled trial was conducted in primary schools to evaluate the impact of the "MyBFF@school" (My Body is Fit and Fabulous at School) program on the body composition of children living with overweight and obesity. This study focused on public primary schools in three regions of Malaysia, where participants were children aged 9 to 11 years with a BMI-for-age greater than +1 SD. The intervention group was composed of 647 children, while the control group, which only followed the standard school curriculum, was made up of 750 children. The

multifaceted "MyBFF@school" program intervention included: physical activity (promotion of moderate to vigorous physical activity), nutrition education (healthy eating habits), and psychological empowerment (self-efficacy and healthy decision-making). Three measurements were made in the study (baseline, at three months, and at six months) of BMI Z-score, waist circumference, body fat percentage, and skeletal muscle mass. A significant increase in skeletal muscle mass and a decrease in hip circumference were observed in the intervention group at three months, compared to the control group. At six months, a significant decrease in body fat percentage was observed in the intervention group; as well as, an increase in skeletal muscle mass. No significant difference was observed in BMI z-score or hip circumference at six months. Therefore, the intervention did not reflect improvements in BMI Z-score, suggesting that it is not a sensitive indicator for assessing changes in body composition in children living with obesity. However, the program was effective in reducing body fat percentage and increasing skeletal muscle mass, which is useful for improving body composition in children living with obesity. Reduced fat percentage is associated with a lower risk of insulin resistance, cardiovascular disease, and other health problems. Increased muscle mass is beneficial for metabolic and bone health, as it is a tissue that is more sensitive to insulin and is related to bone mineral density. This study has limitations in its short intervention period, the absence of a home intervention component, and the influence of pubertal changes on body composition (16).

In order to synthesize the available evidence, *Table 1* comparatively presents the interventions mentioned above. The main characteristics of each study, its target population, the type and duration of the intervention are included; as well as the most relevant results and their limitations.

Country / Study	Population	Type of intervention	Duration	Main results	Limitations
USA (NHLBI, motivational interviewing)	Niños 3–11 años (IMC ≥85 pct)	Motivational Interviewing + Family Support	2 years	Reduction in BMI z-score, greater family involvement	Difficult to generalize, lack of biomarkers
USA (STEP, prenatal and postpartum support)	Pregnant women + children up to 3 years old	Prenatal/postpartum counseling + support groups	3 years	Weight/age reduction at 18 months	No sustained effect at 3 years
Spain (Malaga, parent education)	Parents of children 3–4 years old	6 nutrition education sessions + follow-up	2 years	Sustained decrease in BMI z-score	Low adhesion
Mexico and the U.S. (Healthy Change)	Mothers with children 3–5 years old	Nutrition education + parenting styles	4 weeks	Better maternal perception + changes in family practices	Short period, no change in BMI
Alemania (Join the Healthy Boat)	1,620 children (~7 years old)	School program (food, exercise, screens)	1 year	Improvement of habits (more in high	Unequal impact according to socioeconomic level

				socioeconomic level)	
Chile (cohort 55,623 children)	Children 4–10 years old	Observation of risk factors	6 years	Obesity at age 4 predicts obesity at age 10	Without direct intervention, sociodemographic factors
Malaysia (MyBFF@school)	Children 9–11 years old	Physical activity + nutrition + psychological support	6 months	↓ Body fat percentage, ↑ Muscle mass	No change in BMI, short intervention

Table 1: Comparison of interventions for the prevention of childhood obesity.

ETHICS

Clinical ethics refers to the application of moral principles in the field of health, where professionals usually act intuitively. However, a more explicit and analytical approach is needed, not only reaching what is clinically possible, but also what is morally correct. This is based on the four principles: beneficence, nonmaleficence, autonomy and justice (17).

In the children's sphere, children do not exercise autonomy in the traditional sense. However, professionals should respect their voice and consider their preferences as much as possible, as well as their parents' autonomy. If parental autonomy is limited, there is a risk of serious harm to the child (17).

Likewise, the professional must act in the best interest of the patient, preventing harm and promoting well-being. Although the interests of the child and the parents may diverge and generate ethical dilemmas (17).

With respect to non-maleficence, a well-intentioned intervention can have negative or unwanted effects, despite the fact that it was intended not to cause harm. Every professional must equitably distribute fair treatment to all patients, regardless of their cultural, socioeconomic or racial background. The child must be aware of implicit biases and ensure adequate care (17).

The ethical challenge in children is due to the vulnerability that exists due to their dependence on their caregivers. The physical and emotional state of these must be taken care of, since they have an effect on their decisions and actions that fall directly on children. (17).

CONCLUSIONS

Interventions to prevent childhood obesity should be approached from two perspectives: one directed at the child, respecting their limits and wishes, whether at preschool or school age, and the other focused on their caregivers. The health professional must ensure both the well-being of the child and the adherence of caregivers, promoting healthy, sustainable and

easy-to-adopt lifestyles. In addition, it is crucial that both parties recognize obesity as a disease that requires treatment, avoid stigmatizing it as unwillingness, and that they identify its early signs and symptoms.

It should be remembered that children are especially vulnerable, and any change in their environment can significantly influence their development. Therefore, both the prevention and treatment of obesity must be approached from a multidisciplinary approach, integrating various areas of care.

Likewise, the interventions carried out and reported currently reflect that they can be effective in reducing the prevalence of obesity and overweight in the child population; otherwise, those prevalences would only increase. However, most of the interventions analyzed find limitations in continuous follow-up to evaluate their effectiveness, so it is necessary to adjust them and monitor the child's progress in his personal development and adoption of healthy habits.

Similarly, it can be stated that a good intervention should be followed up for a long time, that takes care of the child's physical and emotional well-being, that does not exceed the child's ethical limits, that approaches prevention as a healthy lifestyle and not as a sacrifice, and that it involves caregivers at all times to reinforce the commitment to the child's well-being. Finally, the integration of a global bioethics is fundamental. Prevention strategies cannot be designed under a homogeneous approach; They must adapt to the cultural, social and economic diversity of populations, recognizing that the values that underpin decisions about infant feeding vary according to the context. Consequently, a comprehensive bioethical approach legitimizes and strengthens the prevention of childhood obesity as a right and not only as a health recommendation.

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