



Childhood Obesity: Causes, Complications and Preventive Strategies

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Abstract

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Obesity has become more prevalent in the recent decades and is expected to become one of the most significant public health challenges of the 21st century, especially in low- and middle-income countries. According to UNICEF and WHO estimates, in 2000, about 30 million children under the age of 5 were overweight or obese, and this number rising significantly to 37 million children in 2022. Obesity rates among children and adolescents aged 5-19 years also increased 10-fold between 1975 and 2022. In 2022, 159 million (65 million girls and 94 million boys) were obese, compared to 11 million (5 million girls and 6 million boys) in 1975. In Iraq, the number of children and adolescents aged 5-19 years who are overweight reached 5 564 610 in 2020, and the number is expected to rise to about 9 472 248 in 2035, which puts them at constant risk of complications of obesity, which is expected to reduce the average lifespan of children by half in the future.

Objectives of this study:

1. Definition of overweight and obesity in children and knowledge of the causes and risk factors leading to obesity and its consequences on children's physical and psychological health and its negative effects on family and community.
2. Providing recommendations and proposals that include health and nutritional awareness programs for children, parents, health center workers, educational process managers in the schools and kindergartens, and local governments to combat obesity and detect it in its early stages and develop treatment plans to control excess weight.

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1. Introduction:

Childhood obesity is one of the serious problems that developing and developed countries suffer from. It is very worrying because it puts children on the way to several health problems that were previously considered as specific to adults. childhood obesity usually continues into advanced age of life, especially in children between the ages of 6-12 years and it is difficult to get rid of it when they grow up ⁽¹⁾.

Definition of obesity and overweight and methods of detecting them in children and adolescents:

Obesity means the accumulation of excess fat in the body ⁽⁵⁾.

- 1) **Children aged between 2-20 years:** Obesity and overweight are detected using their body mass index (BMI) percentiles. BMI is defined as a person's weight in kilograms divided by the square of his height in meters [BMI = weight (kg) \ height 2 (meter)].

The BMI percentiles were determined using growth charts from the Centers for Disease Control and Prevention and the National Center for Health Statistics (CDC and NCHS growth charts). According to the BMI, overweight and obesity are defined as follows: A percentage greater than or equal to the 95th on the growth chart indicates that the child is obese.

A percentage between the 85th and 95th on the growth chart indicates that the child is overweight ⁽⁵⁾.

- 2) **Children under 2 years of age:** Weight for height Z-scores are used according to the World Health Organization (WHO) growth charts.

The criterion for obesity is that the weight for height is greater than the average normal weight by three degrees ($>3SD$), and overweight is when the weight for height is greater than the average normal weight by two degrees ($>2SD$) ⁽⁶⁾.

2. Causes and potential risk factors for obesity in children

1. Unhealthy diet: Imbalance between calories consumed and energy expended by eating large amounts of foods rich in saturated fats and simple carbohydrates with low nutritional value such as fast food instead of healthy foods such as vegetables, fruits and meat, and there are no restrictions on access to these foods in school cafeterias. Increased consumption of sweetened beverages, including soft drinks and processed juices, in addition to increased consumption of snacks between the meals, easy access to fast food by increased number of restaurants and eating unhealthy foods outside instead of cooking them at home ^(7,8,9,10).
2. Formula-fed babies gain more weight than breastfed babies ^(5,11).
3. Parents' bad eating habits may be a reason for their children's obesity, as some parents who suffer from obesity are less concerned and interested in their children's weight gain compared to those who have a healthy weight. The educational level of the parents also affects their children's weight gain. Children of uneducated mothers have higher risk of obesity than those of educated mothers, because of their poor knowledge about healthy diet and impact of excess weight on children health ^(8,9).
4. Lack of physical activity: Lack of exercise and sedentary behaviors such as spending many hours in front of TV screens, smartphones, and computers. Studies have also found that children who eat while watching screens eat 15% more food because they are not aware of how much they are eating. In addition, TV programs often include advertisements for unhealthy foods. The increasing reliance on transportation such as cars and their use to transport students to schools has contributed to the decrease in the level of physical activity. We also notice the lack of classes that focus on physical activity in schools and replacement of physical education class with other class. In addition to the lack of parks and playgrounds ^(5,7).
5. Inadequate sleep: Nowadays, using smartphones and watching TV for long time are the most common causes of sleep disturbance in children. This is because the blue light emitted from the phone inhibits the secretion of melatonin, which is responsible for the child feeling sleepy. Therefore, staying up late makes them consume high calories as a result of changes in the levels of satiety and hunger hormones in their bodies ^(5,8).
6. Increase in the number of dual-income families and spending longer time at work has made it difficult to follow a healthy diet, which has made children more independent in choosing what to eat, with unavailability of healthy home-prepared food. In addition to the limited number of fresh food markets, and the availability of processed foods that cause obesity at prices suitable for many low-income families ^(1,8,10).
7. Family problems: The socio-economic status of the family plays a major role in food choices. It has been observed that obesity is more prevalent among children from middle- and low-income families due to inability to afford healthy food, join sports clubs, or go to places for exercise. Family problems such as divorce also play a role in the occurrence of obesity, as children compensate for their emotional needs by eating more unhealthy and fast food, in the absence of parental supervision ^(1,7,8).
8. Genetic factors: Genetic factors play a major role in the occurrence of obesity. If both parents are obese, the probability that their children will be obese is 90%, while this percentage becomes 60% if one of the parents suffers from obesity ⁽⁵⁾.
9. Endocrine diseases: hormonal imbalances may contribute to obesity, such as hypothyroidism and Cushing's syndrome ^(5,8).
10. Long-term use of some medications, such as corticosteroids, Antihistamines, and anticonvulsant drugs ^(7,8).

3. Complications and health consequences of obesity:

Complications of obesity occur during childhood and adolescence and continue into adulthood. These complications affect the child's physical, social and psychological state and increase risk of diseases and early death. They include:

1. Joint pain especially the knee joint, and deformity in the leg bones due to excess weight that exerts pressure on the growing bones, causing what is known as Blount's disease. It also causes arthritis and ligament tears ⁽¹⁰⁾.
2. Type 2 diabetes mellitus and insulin resistance ⁽¹⁰⁾.

3. Children with obesity are at risk for asthma, and in those with asthma, obesity increases the severity of the disease with poor control of their asthma symptoms ⁽¹²⁾.
4. Obstructive Sleep Apnea: Excess weight causes fat to accumulate in the pharynx and upper respiratory tract, applying pressure on the trachea, especially when the muscles relax during sleep, causing interrupted breathing, frequent awakenings, and increased daytime sleepiness, which negatively affects the child's ability to concentrate and learn ^(10,12).
5. High blood pressure and increase level of lipid such as cholesterol and triglycerides ⁽¹⁰⁾.
6. Gallstones resulting from the accumulation of large amounts of bile inside the gallbladder as a result of obesity ^(1,10).
7. Fatty liver disease: result from accumulation of fat in the liver and can lead to liver cirrhosis later on ⁽¹⁰⁾.
8. Early puberty in girls, irregular menstrual cycles and polycystic ovary syndrome. In boys, low testosterone level, short penis, and increase in breast size due to accumulation of adipose tissue ^(8,10).
9. Recent studies have shown that overweight in childhood negatively affects brain growth and cognitive development until adolescence as a result of changes in the white matter responsible for sending nerve signals, which causes poor cognitive performance, especially in the field of study or the tasks assigned to the child ⁽¹³⁾.
10. Increase risk of many malignant tumors, mainly breast cancer, colon and rectal cancers ⁽¹⁴⁾.
11. An obese child may be bullying by his schoolmates or other children and relatives, which has negative effects on the child's psyche, leading to a lack of self-confidence and self-respect that may lead to stress and depression ⁽⁵⁾.
12. Obesity also has economic impacts on the individual and on the country's health care system due to the costs of health care to treat diseases caused by obesity ^(1,7).
4. **Recommendations:**
Depending on what mention above, a number of recommendations and proposals have been developed that can effectively contribute to reducing the risk of obesity, its prevention, and treatment, which should be start from the pre-natal period and continue throughout the various stages of growth. These include:
 1. Encourage mothers to eat healthy food before and during pregnancy and to do exercise regularly as tolerated to maintain the body mass index within normal, as following a healthy diet for pregnant women reduce the risk of obesity in children after birth. Mothers should also be encouraged to breastfeed their infants exclusively during the first six months of the child's life and to continue breastfeeding with food later, until the child reaches the age of two years ^(7,11).
 2. Avoid eating foods rich in saturated fats and high sodium concentration such as (fast food, potato chips, soft drinks and sweetened juices) and replace them with healthy foods (such as vegetables, fruits, legumes, nuts, meat and fish) that will meet their nutritional needs without consuming high calories. Also, advice to eat only when feel hungry, and making sure that parents do not use food as a reward for good behavior.
 3. Encourage your child to drink a lot of water instead of sugar-sweetened beverages, as drinking water will increase the metabolic rates, burning calories, and reducing feelings of hunger.
 4. Educating parents to enhance children's self-confidence and self-esteem and making them aware of how to confront bullies by emphasizing their positive characters and strengths. Encouraging them to socialize, make friends and participate in social activities.
 5. Limit screen time to no more than two hours a day for children older than two years, while children below 2 years completely prohibited from sitting in front of screens. Also, avoid eating while watching TV ⁽¹⁵⁾.
 6. The child should get enough regular healthy sleep and stop using the phone at least two hours before bedtime. Exercising five hours before bedtime also helps in deep sleep. Children should not sleep less than eight hours per day ^(15,16).
 7. Requiring health standards for foods and beverages sold in schools by providing healthy foods appropriate for all students and avoiding the sale of high-calorie foods that rich in saturated fats and sugars. In addition to providing safe drinking water in the schools.
 8. Incorporating healthy nutrition and physical activity programs into the curriculum of schools and child care centers.
 9. Paying attention to physical education classes and increasing their number, and organize different sport activities and competitions in the schools. It is recommended for children with obesity to walk for 30-60 minutes daily, 5 times a week ⁽¹⁷⁾.

10. Formation of health teams through the school health service and conducting field visits to schools to follow up the students' health and detect cases of overweight and obesity by measuring the weight, height and body mass index of students in the public and private schools and taking the necessary action according to the results.
11. Increase public parks and safe play facilities for children to engage in sports activities such as walking and cycling, and reducing the use of elevators and moving stairs.
12. Print posters that include an easy diet for children by classifying foods according to the colors of traffic lights (Traffic light diet) to understand the foods that should be eaten or avoided to maintain a normal weight. The green color indicates low-calorie foods that can be eaten freely, the yellow color includes moderate-calorie foods that can be eaten from time to time, while the red color indicates high-calorie foods that should be avoided. These posters are affix in places where children can see them inside the home and school. They can also be followed in many applications on smartphones ⁽¹⁸⁾.
13. Activating the role of the media by implementing awareness campaigns via social media, television and radio programs aimed to increasing the community awareness about risk of obesity and its effect on health of children and adolescents and using modern and innovative methods such as animation to communicating information and learn children about healthy diet in a way that is fun and simplified for children and families.

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