

Various Mode of Physical Exercise and Diet Management Implemented for Obesity

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Abstract

Obesity is a global health concern characterized by excessive body fat accumulation, leading to increased risks of chronic diseases such as diabetes, cardiovascular disorders, and certain cancers. Effective management of obesity necessitates a comprehensive approach, integrating physical exercise and diet management strategies. This research confirms various modes of physical exercise—including aerobic, resistance, high-intensity interval training (HIIT), and flexibility exercises—and their impact on weight loss and metabolic health. Additionally, the role of diet management techniques such as calorie restriction, macronutrient manipulation, intermittent fasting, and balanced nutrition is examined. Combining exercise and diet has been shown to enhance weight loss outcomes, improve insulin sensitivity, and reduce inflammation. The synergistic effects of personalized exercise regimens and dietary interventions are highlighted, emphasizing the importance of adherence and sustainability. Furthermore, the review over Obesity discusses behavioral factors and the influence of lifestyle modifications on maintaining long-term weight loss. Understanding the efficacy of different exercise and diet strategies can aid in designing tailored interventions for obesity management. Future research should focus on optimizing these strategies based on individual variability in response to exercise and diet.

Keywords: Obesity management, physical exercise, diet management, weight loss, aerobic exercise, resistance training, intermittent fasting, personalized interventions.

Introduction

Obesity has emerged as one of the most significant public health challenges of the 21st century, affecting millions of individuals worldwide. Characterized by an excessive accumulation of body fat, this complex condition transcends the realm of individual health, weaving itself into the social, economic, and cultural fabric of societies. Over the past few decades, the prevalence of obesity has soared at an alarming rate, transforming it from a concern predominantly observed in high-income countries to a global epidemic that spares no region, age group, or socioeconomic class. The World Health Organization (WHO) has frequently underscored the urgency of addressing obesity, recognizing it as a major risk factor for a range of chronic diseases and a substantial burden on healthcare systems globally.

The obesity crisis extends beyond its direct impact on physical health, permeating into the psychological and emotional well-being of individuals. Societal perceptions and stigmatization associated with obesity often lead to diminished self-esteem, discrimination, and social isolation, creating a vicious cycle that further complicates the challenge of managing this condition. The economic implications are equally

daunting, with obesity-related healthcare expenditures and productivity losses imposing a heavy strain on both national economies and household budgets. Governments, healthcare providers, and communities are increasingly grappling with the multifaceted consequences of obesity, striving to develop and implement effective strategies to curb its rise.

Historical perspectives on obesity reveal a dynamic shift in its societal interpretation. In ancient cultures, body fat was often associated with prosperity and health, symbolizing wealth and fertility. However, as medical understanding evolved, the perception of obesity transitioned to that of a medical and public health concern. This evolution reflects broader transformations in lifestyle, technology, and the global food environment, underscoring the intricate interplay between human biology and societal progress. The rapid urbanization and technological advancements witnessed in recent decades have significantly altered traditional patterns of living, reshaping dietary habits and levels of physical activity on an unprecedented scale.

The media and popular culture also play a pivotal role in shaping public perceptions of obesity. The portrayal of body image in advertisements, films, and social media often oscillates between unrealistic ideals of thinness and the normalization of unhealthy lifestyles. Furthermore, the commercialization of weight loss solutions, dietary supplements, and fitness regimes underscores the economic dimensions of obesity.

Integrating comprehensive health education, promoting physical activity, and ensuring access to nutritious meals are vital components of combating obesity from an early age. Community-based initiatives, including urban planning that promotes active living and the establishment of farmers' markets to counteract food deserts, further illustrate the importance of environmental modifications in addressing obesity.

Public policy plays an indispensable role in shaping the structural determinants of health. Regulatory measures such as nutrition labeling, advertising restrictions for unhealthy foods targeted at children, and taxes on sugar-sweetened beverages reflect a growing recognition of the need for systemic interventions. The effectiveness of these policies, however, is often contingent upon political will, public acceptance, and the ability to navigate the complex interests of the food and beverage industries.

Research on obesity also underscores the importance of a life-course approach that considers the impact of early-life exposures and experiences on long-term health outcomes. Maternal nutrition, early childhood feeding practices, and the obesogenic environments in which children are raised are pivotal in shaping lifelong risks of Obesity.

The interplay between obesity and other public health challenges, such as diabetes, cardiovascular diseases, and certain forms of cancer, further amplifies the urgency of addressing this condition. Addressing obesity, therefore, necessitates a broader commitment to reducing health inequities and ensuring that preventive and treatment services are accessible to all segments of the population.

In conclusion, the challenge of obesity extends far beyond individual lifestyle choices, reflecting a complex interaction of biological, environmental, economic, and societal factors. The rising prevalence of obesity demands a comprehensive and multi-sectoral response that balances immediate interventions with long-term strategies aimed at transforming the environments in which people live, learn, and work.

The different types of obesity, categorized based on various criteria:

Based on Fat Distribution

- **Android Obesity (Central Obesity):** Fat accumulation around the abdomen and upper body (apple-shaped).

- **Gynoid Obesity (Peripheral Obesity):** Fat accumulation around the hips, thighs, and buttocks (pear-shaped).

Based on Metabolic Function

- **Metabolically Healthy Obesity (MHO):** Excess body fat without significant metabolic dysfunctions.
- **Metabolically Unhealthy Obesity (MUO):** Excess body fat with metabolic impairments such as insulin resistance and inflammation.

Based on Body Composition

- **Sarcopenic Obesity:** Excess body fat with reduced muscle mass and strength.
- **Visceral Obesity:** Excess fat around internal organs, especially in the abdominal cavity.
- **Subcutaneous Obesity:** Fat stored under the skin, less associated with metabolic risks.

Based on Etiology and Phenotypes

- **Hyperplastic Obesity:** Increase in the number of fat cells (adipocytes).
- **Hypertrophic Obesity:** Increase in the size of fat cells.

Based on Regional Fat Accumulation

- **Truncal Obesity:** Fat accumulation primarily in the trunk and abdomen.
- **Limb Obesity:** Fat accumulation in the arms and legs.
- **Gluteofemoral Obesity:** Fat accumulation in the hips, buttocks, and thighs.

Based on BMI Classification (Body Mass Index)

- **Class 1 (Moderate Obesity):** BMI 30–34.9
- **Class 2 (Severe Obesity):** BMI 35–39.9
- **Class 3 (Morbid or Extreme Obesity):** BMI ≥ 40

Other Classifications

- **Abdominal Obesity:** Defined by waist circumference rather than overall body fat.
- **Obesity Without Comorbidities:** Excess body fat without associated diseases.
- **Obesity with Comorbidities:** Excess body fat with associated diseases like diabetes or hypertension.

1. Obesity Based on Fat Distribution

One of the most common ways to classify obesity is by examining the distribution of body fat. This method emphasizes how fat is stored in the body and highlights two primary types: android (central) obesity and gynoid (peripheral) obesity.

1.1. Android Obesity (Central Obesity)

Android obesity, often referred to as apple-shaped obesity, is characterized by fat accumulation around the abdomen and upper body. Individuals with this type of obesity have a higher waist-to-hip ratio, indicating that fat is primarily stored around the vital organs. Central obesity is particularly concerning due to its strong association with metabolic syndromes and cardiovascular diseases. The visceral fat stored in the abdominal cavity is metabolically active and can influence insulin resistance and inflammation, making this type of obesity a significant risk factor for various health complications.

1.2. Gynoid Obesity (Peripheral Obesity)

In contrast, gynoid obesity, also known as pear-shaped obesity, is characterized by fat accumulation in the lower body, particularly around the hips, thighs, and buttocks. Individuals with this type of obesity tend to have a lower waist-to-hip ratio. Gynoid obesity is generally considered less harmful metabolically compared to android obesity, as subcutaneous fat in these regions is less likely to contribute to insulin

resistance and cardiovascular diseases. However, it can still pose challenges, especially related to mobility and joint health.

2. Obesity Based on Metabolic Function

Another critical way to classify obesity is by assessing metabolic health, which distinguishes between metabolically healthy obesity (MHO) and metabolically unhealthy obesity (MUO). This classification underscores that not all obesity cases lead to metabolic dysfunctions, highlighting the complexity of this condition.

2.1. Metabolically Healthy Obesity (MHO)

Individuals with MHO exhibit excess body fat but maintain a relatively healthy metabolic profile. They tend to have normal insulin sensitivity, lipid levels, and blood pressure, and are at a lower risk of developing type 2 diabetes and cardiovascular diseases compared to their metabolically unhealthy counterparts. While the mechanisms behind MHO are still being studied, factors such as fat distribution and inflammation levels seem to play a role. It is important to note, however, that MHO may not be a permanent state; some individuals may transition to a metabolically unhealthy state over time.

2.2. Metabolically Unhealthy Obesity (MUO)

On the other hand, MUO is characterized by metabolic impairments such as insulin resistance, dyslipidemia, hypertension, and elevated inflammatory markers. Individuals with MUO face a heightened risk of developing type 2 diabetes, cardiovascular diseases, and other obesity-related complications. The presence of visceral fat and chronic low-grade inflammation is commonly observed in MUO, emphasizing the need for timely medical intervention.

3. Obesity Based on Body Composition

Body composition analysis offers another perspective on obesity, focusing on the ratio of fat mass to lean mass. This approach highlights two types: sarcopenic obesity and visceral obesity.

3.1. Sarcopenic Obesity

Sarcopenic obesity is a condition where excess body fat is accompanied by a significant reduction in muscle mass and strength. This type is particularly prevalent among older adults and poses unique challenges, such as increased frailty and a higher risk of falls and disability. The combination of low muscle mass and high fat mass complicates treatment strategies, requiring a focus on both weight management and muscle preservation through resistance training and adequate protein intake.

3.2. Visceral Obesity

Visceral obesity refers to the excessive accumulation of fat around internal organs, particularly in the abdominal cavity. Unlike subcutaneous fat, visceral fat is more metabolically active and has a stronger association with metabolic disturbances such as insulin resistance and systemic inflammation. This type of obesity is considered a major risk factor for metabolic syndrome, type 2 diabetes, and cardiovascular diseases, highlighting the importance of early detection and management.

4. Obesity Based on Etiology and Phenotypes

Emerging research suggests that obesity can also be classified based on underlying biological mechanisms and phenotypes. This approach categorizes obesity into types such as hyperplastic obesity and hypertrophic obesity.

4.1. Hyperplastic Obesity

Hyperplastic obesity is characterized by an increase in the number of adipocytes (fat cells). This type is often seen in individuals who develop obesity at an early age and tends to be more resistant to weight loss efforts. The proliferation of fat cells creates a greater capacity for fat storage, making sustained weight management particularly challenging.

4.2. Hypertrophic Obesity

In contrast, hypertrophic obesity is marked by an increase in the size of adipocytes rather than their number. This type is more common in adults who gain weight later in life. Hypertrophic adipocytes are associated with greater metabolic dysfunction, including insulin resistance and inflammation, due to their limited ability to expand safely.

5. Regional Obesity Types

Regional obesity classifications focus on localized fat accumulation, offering a more granular perspective on obesity. Common types include truncal obesity, limb obesity, and gluteofemoral obesity.

5.1. Truncal Obesity

Truncal obesity involves fat accumulation primarily in the trunk and abdominal area. It is closely linked to metabolic syndromes and presents a higher risk of cardiovascular diseases due to the prevalence of visceral fat.

5.2. Limb Obesity

Limb obesity is characterized by fat accumulation in the arms and legs. While it is less associated with metabolic risks, it can still impair mobility and overall physical function.

5.3. Gluteofemoral Obesity

This type refers to fat accumulation in the hips, buttocks, and thighs. Similar to gynoid obesity, it is often considered less harmful from a metabolic perspective but can impact physical activity and joint health.

6. Obesity Based on BMI Classification

The Body Mass Index (BMI) is a simple and widely used method to classify obesity based on an individual's weight relative to their height. It helps identify the severity of obesity and associated health risks. Here's a brief description of the three main classes:

6.1. Class 1 (Moderate Obesity): BMI 30–34.9

This category includes individuals with a BMI ranging from 30 to 34.9. Moderate obesity indicates an excess of body fat that can increase the risk of developing certain health conditions, such as hypertension and type 2 diabetes. However, the risks are relatively lower compared to higher obesity classes. Early intervention, including lifestyle changes like a balanced diet and regular exercise, can significantly improve health outcomes for individuals in this category.

6.2. Class 2 (Severe Obesity): BMI 35–39.9

Severe obesity is defined by a BMI of 35 to 39.9 and represents a higher level of health risk. Individuals in this category are more likely to experience serious medical conditions such as obstructive sleep apnea, cardiovascular diseases, and insulin resistance. Managing severe obesity often requires a combination of lifestyle modifications, medical interventions, and sometimes pharmacotherapy to reduce the associated health risks effectively.

6.3. Class 3 (Morbid or Extreme Obesity): BMI ≥ 40

Morbid or extreme obesity is characterized by a BMI of 40 or higher. This class is associated with the

most significant health risks, including an increased likelihood of life-threatening conditions such as heart disease, severe diabetes, certain cancers, and reduced life expectancy. Treatment for extreme obesity typically involves comprehensive approaches, including lifestyle changes, medical therapies, and potentially bariatric surgery to achieve substantial and sustained weight loss.

7. Other Classifications

7.1. Abdominal Obesity

Abdominal obesity is characterized by excessive fat accumulation around the abdomen, often measured by waist circumference rather than overall body weight or BMI. It is commonly referred to as **central obesity** or **visceral obesity** due to the presence of visceral fat surrounding internal organs. This type of obesity is associated with a higher risk of **metabolic syndrome**, **type 2 diabetes**, and **cardiovascular diseases** due to the metabolically active nature of visceral fat, which can promote inflammation and insulin resistance. A waist circumference above **40 inches (102 cm)** for men and **35 inches (88 cm)** for women is typically used as a threshold for defining abdominal obesity.

7.2. Obesity Without Comorbidities

Obesity without comorbidities refers to cases where an individual has excess body fat (classified by BMI or body fat percentage) but does not present with common obesity-related diseases or metabolic disorders such as diabetes, hypertension, dyslipidemia, or cardiovascular conditions. This condition is sometimes described as Metabolically Healthy Obesity (MHO), where individuals maintain normal blood pressure, lipid profiles, and insulin sensitivity despite being overweight. While considered less immediately harmful, this state is often temporary as many individuals may eventually develop comorbidities over time.

7.3. Obesity with Comorbidities

Obesity with comorbidities describes a situation where excess body fat is accompanied by one or more obesity-related health conditions. These comorbidities can include type 2 diabetes, hypertension, heart disease, dyslipidemia, obstructive sleep apnea, osteoarthritis, and non-alcoholic fatty liver disease (NAFLD). This type of obesity is also referred to as Metabolically Unhealthy Obesity (MUO) and poses a significantly higher risk for morbidity and mortality. Managing this form of obesity typically requires a combination of weight reduction strategies, medical treatments, and lifestyle modifications to address both weight and associated health risks effectively.

Causes and Reasons of Obesity

Obesity is a complex condition resulting from a combination of genetic, environmental, behavioral, metabolic, and psychological factors. Here are the key causes and reasons for obesity, presented point-wise:

- **Genetic Factors**

Family History: Obesity can run in families due to inherited genes that influence fat storage and metabolism.

Genetic Mutations: Specific gene mutations (e.g., **MC4R**, **FTO**) can increase appetite and the likelihood of obesity.

Epigenetics: Environmental factors can modify gene expression without altering the DNA sequence, influencing obesity risk.

- **Environmental Factors**

Sedentary Lifestyle: Increased screen time and reduced physical activity contribute to weight gain.

Urbanization: Limited access to parks and recreational areas discourages exercise.

Food Environment: Availability of high-calorie, processed foods and sugary beverages promotes overeating.

- **Behavioral Factors**

Overeating: Consuming more calories than the body needs, especially high-fat and high-sugar foods.

Emotional Eating: Stress, anxiety, and depression can lead to overeating as a coping mechanism.

Eating Patterns: Irregular meal timings and frequent snacking contribute to weight gain.

- **Dietary Factors**

High-Calorie Diet: Diets rich in fast food, sugary drinks, and snacks lead to excessive calorie intake.

Low Fiber Intake: Insufficient fiber can impact satiety and promote overeating.

Portion Sizes: Increasing portion sizes contribute to higher calorie consumption.

- **Metabolic Factors**

Slow Metabolism: Some individuals naturally burn fewer calories at rest.

Insulin Resistance: Inefficiency in using glucose for energy leads to fat storage.

Hormonal Imbalance: Conditions like **hypothyroidism** and **Cushing's syndrome** can slow metabolism.

- **Medical Conditions**

Hypothyroidism: Underactive thyroid reduces metabolic rate, causing weight gain.

Polycystic Ovary Syndrome (PCOS): Hormonal imbalance linked to weight gain in women.

Prader-Willi Syndrome: A rare genetic disorder that increases hunger and obesity risk.

- **Medications**

Antidepressants: Some antidepressants can increase appetite and cause weight gain.

Corticosteroids: Long-term use can promote fat accumulation.

Antipsychotics: Medications like **clozapine** and **olanzapine** are associated with weight gain.

- **Psychological Factors**

Stress and Anxiety: Chronic stress triggers the release of **cortisol**, leading to increased appetite.

Depression: Can lead to emotional eating and inactivity.

Low Self-Esteem: Can discourage physical activity and promote unhealthy eating habits.

- **Socioeconomic Factors**

Income Level: Low-income groups may have limited access to healthy foods and exercise facilities.

Education: Lack of awareness about nutrition and exercise contributes to obesity.

Occupational Factors: Sedentary jobs reduce physical activity.

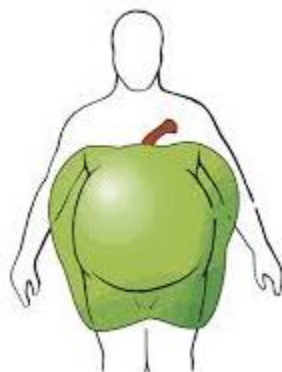
- **Lifestyle Factors**

Lack of Sleep: Insufficient sleep disrupts hunger-regulating hormones (**ghrelin** and **leptin**).

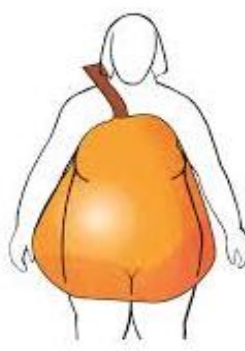
Alcohol Consumption: Alcohol is calorie-dense and can promote weight gain.

Smoking Cessation: Weight gain is a common side effect after quitting smoking.

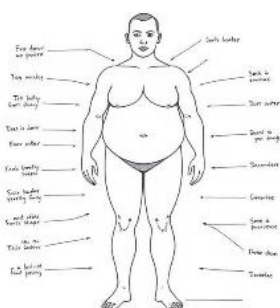
Diagrams of some types of obesities



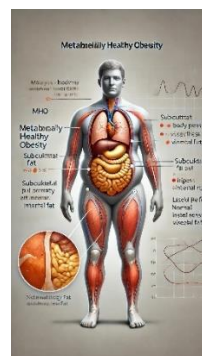
Android Obesity



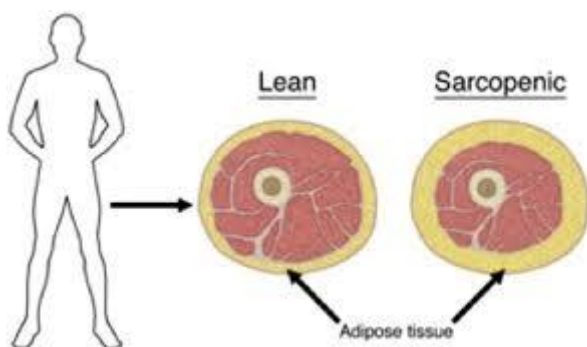
Gynoid Obesity



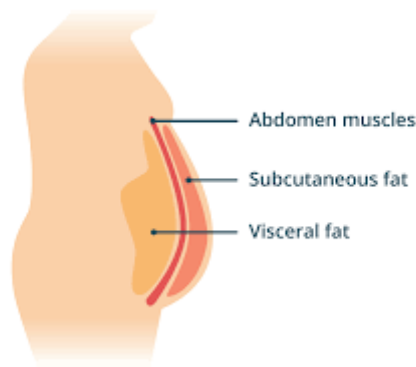
Metabolically Unhealthy Obesity



Metabolically Healthy Obesity



Sarcopenic Obesity



Visceral Obesity

Treatment Profile

Table no. 1 Therapies

S. No.	Therapy	Mode of Action	Duration	Precautions	Site Referral
1	Cognitive Behavioral Therapy (CBT)	Modifies unhealthy eating patterns and behaviors.	12–24 weeks	Monitor for emotional triggers.	www.nationaleatingdisorders.org

S. No.	Therapy	Mode of Action	Duration	Precautions	Site Referral
2	Intermittent Fasting	Alternates between fasting and eating to improve insulin sensitivity.	8–12 weeks	Ensure adequate nutrient intake.	www.healthline.com
3	Low-Carb Diet (Ketogenic)	Reduces carbohydrate intake to trigger ketosis for fat loss.	6–12 months	Monitor electrolyte levels.	www.dietdoctor.com
4	Bariatric Surgery	Physically restricts stomach size or absorption capabilities.	Permanent	Lifelong vitamin supplementation required.	www.asmb.org
5	Pharmacotherapy (Orlistat)	Inhibits fat absorption in the intestines.	6–12 months	Monitor for gastrointestinal effects.	www.rxlist.com
6	High-Protein Diet	Increases satiety and thermogenesis.	6–12 months	Monitor kidney function in susceptible individuals.	www.webmd.com
7	Exercise Therapy	Enhances calorie expenditure and metabolic rate.	Ongoing	Avoid overtraining.	www.acefitness.org
8	Behavioral Weight Loss Therapy	Focuses on goal setting and self-monitoring.	6–12 months	Ensure realistic goals.	www.obesityaction.org
9	Meal Replacement Therapy	Controls portion sizes and calorie intake.	12–24 weeks	Avoid prolonged use without supervision.	www.optifast.com

S. No.	Therapy	Mode of Action	Duration	Precautions	Site Referral
10	Mindful Eating Therapy	Enhances awareness of hunger and fullness cues.	8–12 weeks	Monitor emotional eating triggers.	www.eatingmindfully.com
11	Acupuncture	Modulates appetite hormones and improves digestion.	8–12 weeks	Verify practitioner credentials.	www.acufinder.com
12	Probiotic Therapy	Modifies gut microbiota to improve metabolism.	6–12 months	Select strains with proven efficacy.	www.gutmicrobiotaforhealth.com
13	Hypnotherapy	Alters subconscious patterns related to eating.	4–8 weeks	Ensure certified hypnotherapist.	www.hypnotherapy-directory.org.uk
14	Anti-Inflammatory Diet	Reduces systemic inflammation linked to obesity.	6–12 months	Monitor for food allergies.	www.drweil.com
15	Cold Exposure Therapy	Activates brown fat to increase calorie burn.	4–8 weeks	Avoid for individuals with cardiovascular risks.	www.coldadaptation.org

Medicaments Profile

Table no. 2, Ayurvedic medicaments

Ayurvedic Medicine	Composition	Mode of Action	Main Active Component	Biological Family	Plant Name	Common Name	Site Address
Triphala	Amalaki, Bibhitaki, Haritaki	Enhances digestion and detoxification.	Tannins	Phyllanthaceae	<i>Embolica officinalis</i>	Indian Gooseberry	www.banyanbotanicals.com

Ayurvedic Medicine	Composition	Mode of Action	Main Active Component	Biological Family	Plant Name	Common Name	Site Address
Guggul	Resin of Commiphora mukul	Promotes fat metabolism and thyroid function.	Guggulsterone	Burseraceae	<i>Commiphora mukul</i>	Indian Bdellium	www.ayurtimes.com
Punarnava	Extract of <i>Boerhavia diffusa</i>	Diuretic action to reduce water retention.	Boeravinone	Nyctaginaceae	<i>Boerhavia diffusa</i>	Spreading Hogweed	www.planetayurveda.com
Trikatu	Black Pepper, Long Pepper, Ginger	Enhances metabolism and digestion.	Piperine	Piperaceae	<i>Piper nigrum</i>	Black Pepper	www.ayurvedabay.com
Garcinia Cambogia	Extract of <i>Garcinia cambogia</i>	Inhibits fat storage by blocking citrate lyase.	Hydroxycitric Acid (HCA)	Clusiaceae	<i>Garcinia cambogia</i>	Malabar Tamarind	www.drvikram.com
Ashwagandha	Root extract of <i>Withania somnifera</i>	Reduces stress-induced weight gain.	Withanolides	Solanaceae	<i>Withania somnifera</i>	Winter Cherry	www.baidyanath.co.in
Aloe Vera	Gel extract of <i>Aloe barbadensis</i>	Improves digestion and detoxification.	Aloin	Asphodelaceae	<i>Aloe barbadensis</i>	Aloe	www.patanjaliayurved.net
Methi	Seeds of <i>Trigonella foenum-graecum</i>	Reduces appetite and enhances insulin sensitivity.	Saponins	Fabaceae	<i>Trigonella foenum-graecum</i>	Fenugreek	www.keralaayurveda.biz

Ayurvedic Medicine	Composition	Mode of Action	Main Active Component	Biological Family	Plant Name	Common Name	Site Address
Kalonji	Seeds of <i>Nigella sativa</i>	Antioxidant and anti-inflammatory actions.	Thymoquinone	Ranunculaceae	<i>Nigella sativa</i>	Black Cumin	www.jiva.com
Gudmar	Leaves of <i>Gymnema sylvestre</i>	Reduces sugar absorption in intestines.	Gymnemic Acid	Apocynaceae	<i>Gymnema sylvestre</i>	Gurmar	www.sitaramayurveda.com

Table no. 3 Allopathic drugs

Generic Name	Brand Name	Composition	Mechanism of Action	Dosage	Site Address
Orlistat	Xenical, Alli	Lipase inhibitor (120 mg per capsule)	Inhibits pancreatic lipase to reduce fat absorption.	120 mg three times daily (Rx) or 60 mg three times daily (OTC)	www.rxlist.com
Phentermine	Adipex-P	Sympathomimetic amine (37.5 mg per tablet)	Suppresses appetite via central nervous system stimulation.	15-37.5 mg once daily (before breakfast or 1-2 hours after)	www.webmd.com
Liraglutide	Saxenda	GLP-1 receptor agonist (3 mg/pen)	Increases satiety and slows gastric emptying.	Start at 0.6 mg subcutaneousl y once daily , increase weekly to max 3 mg/day	www.drugs.com
Naltrexone-Bupropion	Contrave	Opioid antagonist + dopamine reuptake inhibitor	Reduces appetite and reward-driven eating.	Titrated over 4 weeks to 32 mg naltrexone / 360 mg bupropion daily (divided into 2 doses)	www.contrave.com

Generic Name	Brand Name	Composition	Mechanism of Action	Dosage	Site Address
Phentermine-Topiramate	Qsymia	Sympathomimetic + anticonvulsant	Suppresses appetite and increases satiety.	Start at 3.75 mg/23 mg once daily , increase to 7.5 mg/46 mg; max dose: 15 mg/92 mg	www.qsymia.com
Semaglutide	Wegovy	GLP-1 analog (2.4 mg/pen)	Enhances insulin secretion and reduces appetite.	Start at 0.25 mg subcutaneouslly once weekly , increase to max 2.4 mg/week	www.novo-pi.com
Lorcaserin	Belviq	Serotonin 2C receptor agonist (10 mg/tablet)	Promotes satiety through serotonin activation.	10 mg twice daily or 20 mg once daily (ER)	www.fda.gov
Metformin	Glucophage	Biguanide (500-1000 mg/tablet)	Reduces hepatic glucose production and improves insulin sensitivity.	500 mg twice daily , max 2000-2500 mg/day	www.diabetes.org
Bupropion	Wellbutrin	Norepinephrine-dopamine reuptake inhibitor (NDRI)	Reduces appetite by modulating neurotransmitters.	150-300 mg once daily (ER form preferred)	www.mayoclinic.org
Diethylpropion	Tenuate	Sympathomimetic amine (25 mg/tablet)	Suppresses appetite by stimulating norepinephrine release.	25 mg three times daily (before meals) or 75 mg once daily (ER)	www.medlineplus.gov

Table no. 4 Diet management

Diet Name	Mode of Action	Duration	Precautions	Site Address
Ketogenic Diet	Reduces carbs to induce ketosis for fat burning.	6–12 months	Monitor electrolyte balance.	www.dietdoctor.com
Intermittent Fasting	Alternates fasting and eating to improve insulin sensitivity.	8–12 weeks	Avoid for those with eating disorders.	www.healthline.com

Diet Name	Mode of Action	Duration	Precautions	Site Address
Paleo Diet	Focuses on whole foods and excludes processed items.	6–12 months	Ensure adequate calcium intake.	www.thepaleodiet.com
Mediterranean Diet	High in healthy fats, promotes cardiovascular health.	Ongoing	Limit red meat and processed foods.	www.mediterraneandiet.com
Low-Carb Diet	Restricts carbs to lower insulin levels.	6–12 months	Monitor fiber intake to prevent constipation.	www.atkins.com
Vegan Diet	Excludes animal products, focuses on plant-based foods.	Ongoing	Ensure vitamin B12 and iron intake.	www.vegansociety.com
DASH Diet	Reduces sodium for blood pressure control.	Ongoing	Limit processed foods.	www.nhlbi.nih.gov
Low-Fat Diet	Limits fat intake to reduce calorie density.	6–12 months	Ensure adequate healthy fats.	www.webmd.com
Zone Diet	Balances carbs, protein, and fats in 40:30:30 ratio.	6–12 months	Monitor for adequate fiber intake.	www.zonediet.com
Flexitarian Diet	Mainly vegetarian with occasional meat.	Ongoing	Ensure enough protein.	www.eatright.org
Carnivore Diet	Focuses exclusively on animal products.	4–8 weeks	Monitor for nutrient deficiencies.	www.carnivoremd.com
Anti-Inflammatory Diet	Reduces inflammatory foods like sugar and processed items.	Ongoing	Monitor balanced nutrient intake.	www.drweil.com
Mindful Eating Diet	Focuses on hunger cues and portion control.	8–12 weeks	Avoid distractions during meals.	www.eatingmindfully.com
Gluten-Free Diet	Eliminates gluten to reduce inflammation and digestive issues.	Ongoing	Ensure adequate fiber intake.	www.celiac.org
Raw Food Diet	Emphasizes uncooked, unprocessed foods.	4–8 weeks	Risk of nutrient deficiencies if unbalanced.	www.rawfoodlife.com

Diet Chart – By Dr. Vijay Nigam

Apathya (Don'ts)

Cereals: New Rice/Wheat

Pulses: Horsegram (kulath), Split Black gram (Urad Dal), kidney Beans, chickpea (Chhole).

Fruits & Vegetable: Brinjal, Arabi, Jackfruit broccoli, cabbage, cauliflower, ladyfinger

Other: Avoid Pickles, Cheese, Chutneys, Butter, Cold drinks, Soft drinks, Canned foods, Junk foods, Milk products, Oily & Spicy diet, Bakery products, and Sweets.

Yoga Pranayam and Meditation: As per doctors advise.

Asanas: As per doctors advise

Advice : 1 Cup Herbal Tea, Patanjali is issued or consumed by patients, in case if he/she is habitual of tea and coffee (It is substitute for it).

Do as regular : THANKS TO GOD FOR FOOD

1. Get up with the sunrise [5:30-6:30 AM]
2. Brush the teeth twice a day in the morning and before going to bed.
3. Scrape the tongue daily.
4. Meditate and do yoga.
5. Eat fresh light warm food slowly, in peaceful place with silent, positive and happy mind.
6. Eat 3-4 times at regular time in a day. Don't skip meals & avoid overeating. Fast once in a week.
7. Eat leaving 1/3rd or 1/4th of stomach empty (full satisfaction of meal can be considered as one's khuchi/stomach).
8. Chew food properly and slowly.
9. Walk 3-5 minutes after taking food.
10. Take a short walk after meal and sleep at proper time in night [9-10 PM].

Diet Chart for Obesity (Sthoulya)

Early Morning: Drink Lukewarm water 1-2 glass on an empty stomach, before brushing teeth. Drink Amla + Aloe vera juice before breakfast.

Diet Plan :

TIMING	DIET PLAN (VEGETARIAN)
Breakfast (9:00-9:30 AM)	One cup of Herbal Tea with a little milk or Fresh vegetables like Tomatoes or Fruits salad or Arogya Daliya
Lunch (1:00 – 2:00 PM)	Two or three small Cucumbers (Kakdi), Sprouts - Chana, Mung or Green Salads / Two small Chapatti with boiled Green Vegetables, Butter Milk , Small bowl of Rice and Dal can be taken.
Snacks (3:30 – 4:00 PM)	Devya Peya - 1 cup + Arogya biscuit () / Vegetable soup / salad
Dinner (7:00 PM-8:00 PM)	Soup (Tomato, Spinach and Sweet Corn) and Papad can be taken and One small bowl of a Vegetable and two Chapatti .

Pathya (Do's)

Cereals: Old rice, wheat bran, Bajara, maize (**Makka**), barley gruel (**Yavagu**), porridge (**Daliya**).

Pulses: Green gram (**moong**), Masoor, chickpea (**chana**), pigeon pea (**arahar**), Horsegram (**kulatha**).

Fruits & Vegetables: Grapes, Orange, Pomegranate, Apple, Papaya, Brinjal, Bitter gourd (**karela**), Drum stick (**shigru**), Bottle gourd (**Lauki**), Ridge gourd (**tori**), Pointed gourd (**Parwal**), Pumpkin (**Kaddu**), Seasonal vegetables (available in your locality), etc.

Others: Light food, Butter milk, Cardamom, Amala, Lukewarm water, Intake of water before meals, Avoid substances with **pungent, bitter, and astringent taste**.

The Importance of Exercise in the Treatment of Obesity

Obesity is a multifaceted health disorder involving excessive accumulation of body fat, which results in higher risks of chronic diseases like diabetes, cardiovascular disease, and some cancers. Although diet change is an important aspect of weight control, exercise is also a very important element in the management of obesity. Physical activity not only helps in weight loss but also enhances metabolic health, improves muscle function, and prevents weight regain.

One of the main advantages of exercise in treating obesity is its capacity to raise energy expenditure. Physical activity in the form of brisk walking, cycling, or strength training results in the burning of calories, thus producing a calorie deficit essential for weight loss. When accompanied by a controlled diet, exercise speeds up fat loss while maintaining lean muscle mass. Muscle mass is metabolically active, that is, it consumes more calories even when the body is resting. Thus, maintaining or gaining muscle mass via resistance training can increase resting metabolic rate (RMR), making it easier to manage weight in the long term.

Exercise also has a profound effect on insulin sensitivity and glucose metabolism, which tend to be impaired in obese people. Aerobic exercise such as running or swimming enhances the body's ability to use insulin properly, lowering blood sugar levels and reducing the risk of type 2 diabetes. Increased insulin sensitivity guarantees that glucose is transported to cells efficiently for energy instead of being stored as fat. In addition, regular physical activity reduces visceral fat—fat stored around organs—strongly associated with metabolic disease.

Another key function of exercise is its impact on appetite control and hormonal balance. Physical activity affects hormones like leptin and ghrelin, which regulate hunger and satiety. Regular exercise can enhance leptin sensitivity, reducing overeating by signaling fullness more effectively. Additionally, it helps decrease levels of cortisol, a stress hormone that can contribute to abdominal fat accumulation when elevated. By regulating these hormones, exercise helps individuals manage their caloric intake more effectively, preventing weight regain.

Mental health benefits also underscore the value of exercise in obesity treatment. Obesity has been linked to depression, anxiety, and low self-esteem, which discourage motivation for weight loss. Exercise induces the release of endorphins and serotonin—neurotransmitters that boost mood and minimize stress. Enhanced mental well-being can promote compliance with weight loss programs, thus making exercise a long-term component of obesity treatment.

Regularity is of key importance to availing benefits from exercise in weight management with obesity. At least 150–300 minutes a week of moderate-intensity activity is the weight loss and weight maintenance prescription put forward by the American College of Sports Medicine (ACSM). A combination of aerobic activity and resistance training maximizes overall benefit, from loss of fat to muscle build-up. Resistance training is also needed to overcome sarcopenia, or muscle wasting, a condition common with those who are obese, particularly with caloric reduction.

Exercise plays a crucial role in treating obesity by burning calories, preserving lean muscle mass, and improving metabolic health. The main types of exercises effective for obesity management include:

1. **Aerobic Exercise:** Also known as cardio, this includes activities like walking, jogging, cycling, swimming, and dancing. Aerobic exercise elevates heart rate, leading to significant calorie expenditure and fat loss. Guidelines suggest at least 150–300 minutes per week for effective weight management.
2. **Resistance Training:** This involves weight lifting, bodyweight exercises (like push-ups and squats), and resistance bands. It helps build lean muscle mass, which increases resting metabolic rate, allowing more calories to be burned at rest. Training 2–3 times per week is recommended for optimal results.
3. **High-Intensity Interval Training (HIIT):** HIIT alternates between short bursts of intense activity (like sprinting or jumping) and rest or low-intensity periods. It efficiently burns calories in a shorter time and boosts post-exercise calorie burn (EPOC effect). 20–30 minutes, 2–3 times per week is effective for fat loss.
4. **Circuit Training:** Combining resistance and aerobic exercises with minimal rest between sets, circuit training maximizes calorie burn and builds endurance. It's efficient for those with limited time and can be adapted to different fitness levels.
5. **Flexibility and Balance Exercises:** Yoga, Pilates, and stretching improve range of motion and prevent injuries. While not calorie-intensive, they complement other exercise types by enhancing muscle recovery and reducing stress, which can aid in weight management.
6. **Lifestyle Activities:** Incorporating more walking, using stairs, and reducing sedentary time contributes to daily calorie expenditure and prevents weight regain.

Different methods to treat obesity offer unique benefits. Yoga enhances flexibility, reduces stress, and improves insulin sensitivity, supporting weight management holistically. Zumba, a dance-based workout, makes cardio enjoyable, boosting calorie burn and adherence. Gym workouts including resistance and cardio training build lean muscle, elevate metabolism, and provide structured progress. Outdoor activities like cycling or hiking add variety, preventing workout boredom. Combining these methods helps address physical, mental, and metabolic aspects of obesity, making weight loss more sustainable and enjoyable. Tailoring a mix of these approaches based on preferences ensures long-term success.

Here are different methods to treat obesity, covering a variety of physical activities, lifestyle changes, medical interventions, and alternative therapies:

1. Gym Workouts:

Cardio: Treadmill, cycling, rowing.

Strength Training: Weight lifting, resistance bands.

HIIT: High-intensity interval training for efficient fat burn.

2. Yoga:

Hatha Yoga: Improves flexibility and burns calories gradually.

Power Yoga: Intense poses to boost metabolism.

Hot Yoga: Enhances calorie burn through heat.

3. Dance-Based Workouts:

Zumba: High-energy Latin-inspired dance for cardio.

Aerobic Dance: Increases heart rate for calorie burn.

Belly Dancing: Focuses on core strength and fat loss.

4. Outdoor Activities:

Walking & Jogging: Simple yet effective for beginners.

Cycling: Boosts endurance and burns fat.

Hiking: Engages multiple muscle groups.

5. Water-Based Activities:

Swimming: Low-impact full-body workout.

Aqua Aerobics: Combines resistance of water with cardio.

6. Martial Arts:

Kickboxing: Intense calorie burn and muscle toning.

Karate & Taekwondo: Enhance agility and strength.

7. Sports:

Tennis, Basketball, Soccer: High-intensity interval nature aids fat loss.

8. At-Home Workouts:

Bodyweight Exercises: Push-ups, squats, lunges.

Fitness Apps: Guided routines for convenience.

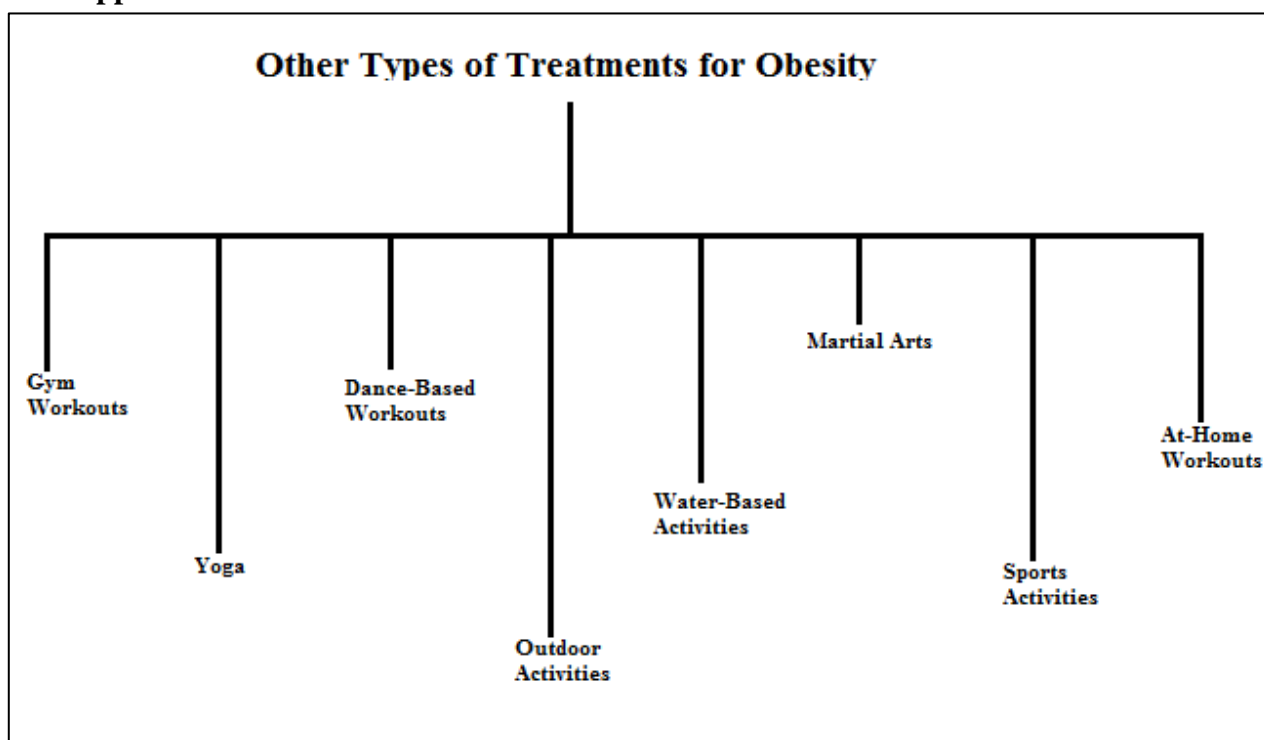


Table no. 5 Exercises used to treat obesity

Exercise Name	Duration	Prescribed or Not Prescribed	Good for Which Age Group	Site Address
Brisk Walking	30–60 minutes daily	Prescribed	All age groups, especially seniors	www.heart.org
Cycling	30–45 minutes, 3–5 times/week	Prescribed	Teens to adults	www.bicycling.com
Swimming	30–60 minutes, 3 times/week	Prescribed	Children to seniors	www.swimming.org

Exercise Name	Duration	Prescribed or Not Prescribed	Good for Which Age Group	Site Address
Zumba	45–60 minutes, 2–3 times/week	Prescribed	Teens to adults	www.zumba.com
Weight Training	30–45 minutes, 2–3 times/week	Prescribed	Adults to seniors (with modifications)	www.bodybuilding.com
Yoga	30–60 minutes daily	Prescribed	All age groups	www.yogajournal.com
High-Intensity Interval Training	20–30 minutes, 2–3 times/week	Prescribed	Young adults to middle-aged adults	www.healthline.com
Jogging	30–40 minutes, 3–4 times/week	Prescribed	Teens to middle-aged adults	www.runnersworld.com
Pilates	30–60 minutes, 2–3 times/week	Prescribed	Adults to seniors	www.pilates.com
Jump Rope	15–20 minutes, 3–4 times/week	Not Prescribed for obese beginners	Teens to young adults	www.acefitness.org

Table no. 6 Zumba or dance exercises used to treat obesity

Dance Exercise Name	Duration	Prescribed or Not Prescribed	Good for Age Group	Site Address
Zumba Fitness	45–60 minutes	Prescribed	18–50 years	www.zumba.com
Zumba Gold	30–45 minutes	Prescribed	50+ years	www.zumba.com
Aqua Zumba	45 minutes	Prescribed	All ages	www.zumba.com
Hip-Hop Dance	30–60 minutes	Prescribed	15–40 years	www.danceplug.com
Salsa Dance	30–45 minutes	Prescribed	20–50 years	www.salsacrazy.com
Bollywood Dance Fitness	45–60 minutes	Prescribed	15–45 years	www.bollyx.com
Belly Dance Fitness	30–45 minutes	Prescribed	18–50 years	www.sharqui.com
Jazzercise	30–60 minutes	Prescribed	20–60 years	www.jazzercise.com
K-Pop Dance Workout	30–45 minutes	Not Prescribed	15–30 years	www.kpopfit.com

Dance Exercise Name	Duration	Prescribed or Not Prescribed	Good for Age Group	Site Address
Latin Dance Cardio	30–60 minutes	Prescribed	20–50 years	www.latindancefitness.com

Table no. 7 yoga poses (asanas) used to treat obesity

Yoga Pose (Asana)	Advantages	Good for Age Group	Site Address
Surya Namaskar (Sun Salutation)	Full-body workout, improves flexibility and metabolism.	All ages (with modifications)	www.yogajournal.com
Bhujangasana (Cobra Pose)	Strengthens spine, reduces abdominal fat.	Teens to older adults	www.artofliving.org
Dhanurasana (Bow Pose)	Tones back and abdominal muscles, improves digestion.	Teens to 50+	www.yogapedia.com
Trikonasana (Triangle Pose)	Enhances digestion, burns fat at the waist.	All ages	www.yogaalliance.org
Paschimottanasana (Seated Forward Bend)	Stimulates abdominal organs, aids in fat reduction.	Teens to 50+	www.sivananda.org
Naukasana (Boat Pose)	Strengthens core, reduces belly fat.	Teens to middle-aged adults	www.ekhartyoga.com
Utkatasana (Chair Pose)	Tones thighs and core, boosts metabolism.	All ages (with modifications)	www.gaia.com
Virabhadrasana (Warrior Pose)	Enhances stamina, tones legs and arms.	All ages	www.doyouyoga.com
Setu Bandhasana (Bridge Pose)	Strengthens back and glutes, improves digestion.	Teens to older adults	www.yoga.com
Ardha Matsyendrasana (Half Spinal Twist)	Aids digestion, tones waist and abdomen.	Adults to older adults	www.yogabasics.com
Kapalbhati Pranayama	Enhances metabolism, helps in abdominal fat reduction.	Adults to older adults	www.bharatyog.com
Halasana (Plow Pose)	Stimulates thyroid, aids in weight control.	Adults (avoid if spinal issues)	www.yogainternational.com
Balasana (Child's Pose)	Relieves stress, prevents overeating.	All ages	www.yogawithadriene.com

Yoga Pose (Asana)	Advantages	Good for Age Group	Site Address
Tadasana (Mountain Pose)	Improves posture, aids digestion and calorie burning.	All ages	www.yogaoutlet.com
Baddha Konasana (Butterfly Pose)	Improves hip flexibility, aids digestion.	All ages	www.yogaworks.com



Brisk walking



Swimming



Jump rope



Cycling



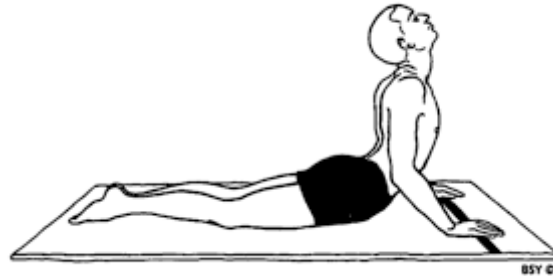
Zumba



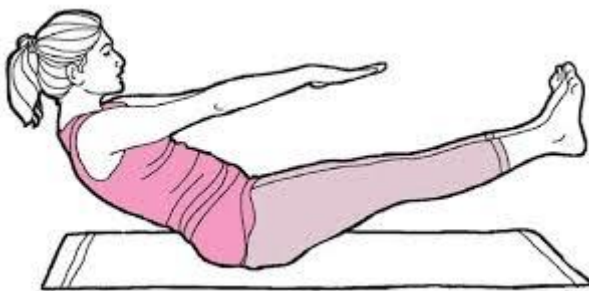
Jazzercise



Surya namaskar



Bhujangasana



Naukasana



Baddha Konasana

Summary

Obesity is a significant public health issue in the 21st century that affects millions around the world. It is characterized by excessive body fat and is influenced by various social and economic factors. The rise in obesity rates has made it a global epidemic impacting all demographics, posing serious risks for chronic diseases and straining healthcare systems.

Obesity affects mental health, leading to low self-esteem and social isolation, while also increasing healthcare costs. Strategies to reduce obesity are urgently needed from governments and communities. Changes in lifestyle and food environments have contributed to this issue, influenced by media portrayals and commercialization. Education and community programs, especially in schools, are essential to promoting healthier habits. Exercise is vital for treating obesity by increasing energy expenditure. Recommended physical activities include walking, cycling, and strength training, with a goal of at least 150-300 minutes weekly for effective weight management.

Obesity has become one of the most critical public health challenges of the 21st century, affecting millions of individuals worldwide. Defined by an excessive accumulation of body fat, obesity is no longer limited to high-income nations but has evolved into a global epidemic, cutting across socio-economic classes, ages, and regions.

The research explores the rapid rise in obesity prevalence over recent decades, attributing it to multiple interwoven factors. Key among them are changes in dietary habits, decreased physical activity, genetic

predisposition, and socio-economic influences. The shift towards processed, calorie-dense foods and sedentary lifestyles has played a major role in escalating obesity rates, particularly in urban environments. Efforts to combat obesity require a multi-faceted approach, integrating public health policies, educational initiatives, and medical interventions. Governments and organizations worldwide have implemented strategies, including taxation on unhealthy foods, urban planning for physical activity, and public awareness campaigns.

Conclusion

In conclusion, tackling obesity necessitates a comprehensive approach that recognizes its complex interplay of biological, social, and environmental factors. As a global epidemic affecting diverse populations and increasing health disparities, it demands collaborative action from stakeholders. Addressing the stigma associated with obesity and promoting education, community engagement, and effective public policies are vital. Strategies focusing on improved diet and physical activity are crucial for enhancing health outcomes. A sustained commitment to equity in health resources and supportive environments is essential for fostering healthier lives for all. Obesity is not just a personal health issue but a global crisis that demands urgent action. As its prevalence continues to rise, so do the associated health risks, economic burdens, and societal consequences. The complexity of obesity requires a multifaceted approach—one that goes beyond individual lifestyle choices and incorporates systemic changes in healthcare, education, food policies, and urban planning.

Addressing obesity effectively requires a shift in both mindset and strategy. Preventative measures such as promoting healthy eating habits, increasing physical activity, and improving access to nutritious food must be prioritized. Governments, healthcare providers, and communities must work together to create environments that support healthy living rather than encourage unhealthy behaviors.

Furthermore, tackling obesity-related stigma is crucial. Obesity should be treated as a medical condition rather than a personal failing, ensuring that individuals receive support rather than judgment. Innovations in medicine, technology, and policy must align to provide sustainable solutions. Ultimately, combating obesity is a shared responsibility. Without coordinated global efforts, the crisis will continue to escalate. By prioritizing prevention, education, and early intervention, societies can work toward a future where healthier lifestyles become the norm rather than the exception.

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