IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

Managing Childhood Overweight: Behavioural, Family'- Based Pharmacological and Bariatric Intrventions

Prof. Pallavi T. Jadhav, Dr. Abhishek Kumar Sen, Siya Sunil Gaikwad
Pratibhatai Pawar College of Pharmacy, Shrirampur, Ahilyanagar, Maharashtra, India

Abstract: *In the modern era of global connectivity, ports and harbors serve as the primary conduits of international commerce, facilitating the massive exchange of goods that fuels global economies. Despite their importance, the operational backbone of many maritime hubs still rests on antiquated, paper-heavy systems that invite human error, document loss, and significant logistical bottlenecks. This paper presents a comprehensive Port / Harbour Cargo Inspection & Management System, a web-centric solution designed to bridge the gap between traditional manual oversight and modern digital efficiency.*
By leveraging a centralized digital environment, the system creates a seamless workflow between three primary stakeholders: Administrators, Staff, and Inspection Officers. Staff members are empowered to digitize cargo declarations at the source, while Inspection Officers can perform real-time verifications to ensure regulatory compliance. Simultaneously, Administrators gain a "bird's-eye view" of the entire port's pulse through an integrated data dashboard. Built on the robust MERN stack (MongoDB, Express.js, React.js, and Node.js), the platform prioritizes scalability and security. Ultimately, this research demonstrates that moving away from disconnected physical processes toward a unified digital ecosystem not only reduces administrative fatigue but also fosters a culture of transparency and speed within the maritime industry..

Keywords: Port Management System, Digital Logistics, Cargo Verification, Role-Based Access

I. INTRODUCTION

Childhood overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. Unlike adults, children's growth and development vary by age and sex, so the assessment relies on age and sex-specific Body Mass Index (BMI) percentiles or z-scores. According to the World Health Organization (WHO), Overweight in children aged 5-19 years is defined as BMI for-age greater than +1 standard deviation (SD), and Obesity is defined as BMI-for-age greater than +2 SD above the WHO growth reference median.(1) The U.S. Centers for Disease Control and Prevention (CDC) uses percentile based cut offs,

Children with BMI ⩾85th percentile and <95th percentile are classified as overweight, and those with BMI ⩾95th percentile are considered obese. These percentile charts help clinicians identify risk early, guide interventions, and track treatment outcomes. Additionally, the Indian Academy of Pediatrics (IAP) recommends using age and gender specific BMI percentiles for Indian children, adjusted for regional growth variations and dietary patterns.(2) The prevalence of childhood obesity has increased dramatically over the past three decades, becoming one of the most pressing global public health challenges. According to the World

Health Organization's 2024 Global Obesity Report, an estimated 340 million children and adolescents (aged 5-19 years) were overweight or obese worldwide, a nearly tenfold increase since 1975. In high-income countries, obesity rates have plateaued but remain high, whereas in low and middle income countries (LMICs), particularly in Asia and the Middle East rates are rising rapidly due to urbanization, sedentary lifestyles, and shifts toward calorie-dense, processed diets.(3) In India, data from the National Family Health Survey (NFHS-5, 2019-21) show that nearly 4-6% of

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

children aged 5-9 years are overweight or obese, with higher rates in urban areas (8-10%). Studies from major cities such as Delhi, Mumbai, and Chennai report adolescent obesity prevalence ranging from 12% to 18%, reflecting major dietary and lifestyle transitions. Socioeconomic disparities, limited awareness, and aggressive marketing of ultra processed foods contribute to this trend. If unaddressed, India is projected to have 27 million obese children by 2030 (World Obesity Atlas, 2022).(4) Childhood obesity is associated with both immediate and long-term health risks. In the short term, overweight children are more likely to develop, Insulin resistance and Type 2 diabetes, Dyslipidemia and hypertension, Non-alcoholic fatty liver disease (NAFLD), Obstructive sleep apnea, and Orthopedic problems such as slipped capital femoral epiphysis. In the long term, obese children are far more likely to become obese adults, with increased risk of cardiovascular disease, metabolic syndrome, infertility, and certain cancers.(5) This review aims to provide a comprehensive overview of current strategies used to manage childhood overweight and obesity, focusing on Behavioural and lifestyle interventions as the foundation of management, the role of family-based and community approaches, the growing evidence for pharmacological therapy (such as GLP-1 receptor agonists), and the indications, outcomes, and ethical considerations surrounding bariatric surgery in adolescents.(6) The review integrates global and India-specific data and discusses emerging therapies and digital innovations shaping the future of pediatric obesity management.

By highlighting current evidence, practice guidelines, and gaps in implementation, this review seeks to guide clinicians, researchers, and policymakers toward effective, equitable, and sustainable interventions for childhood obesity.(7)

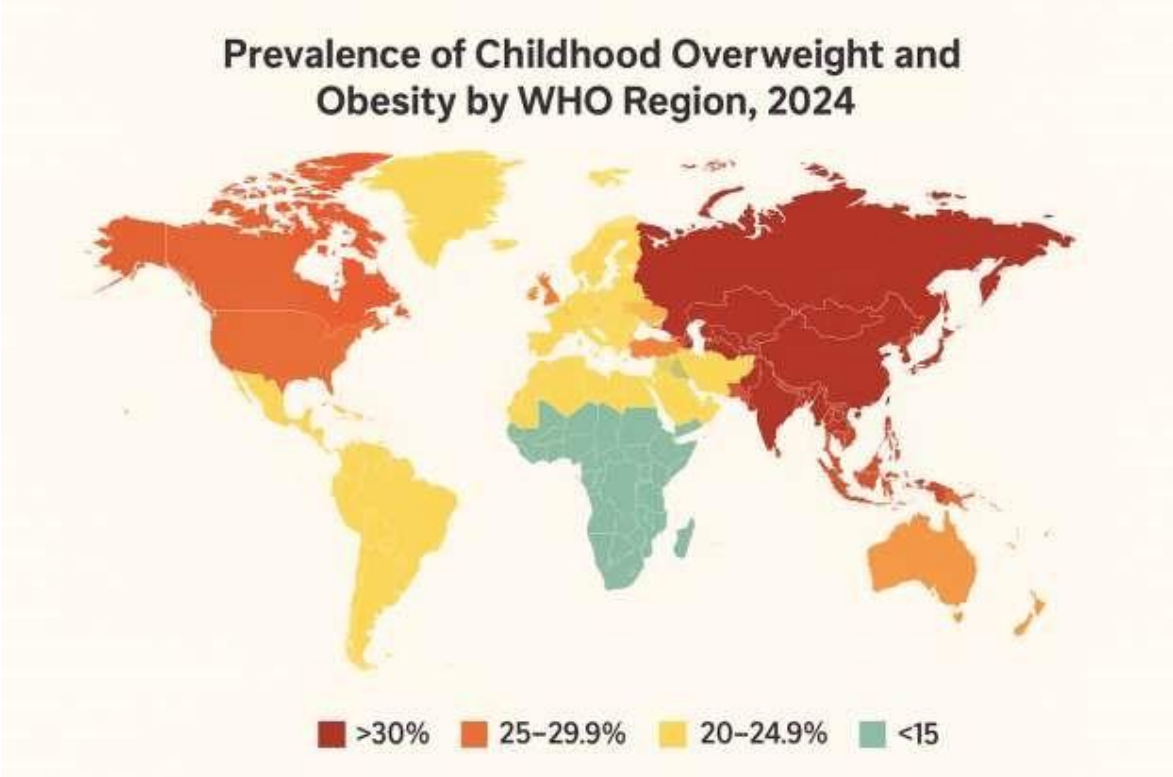


Figure 1. Global map showing prevalence of childhood overweight and obesity (WHO regions, 2024).

2. ETIOLOGY AND CONTRIBUTING FACTORS

Childhood overweight and obesity arise from a complex interaction of genetic, environmental, behavioral, and sociocultural factors rather than any single cause. Genetic predisposition plays a key role children with one or both obese parents have a two- to threefold higher risk of becoming obese, partly due to inherited variations in genes

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

regulating appetite, metabolism, and fat storage, such as FTO and MC4R. However, genetics alone cannot explain the rapid rise in obesity, environmental and socioeconomic factors such as urbanization, sedentary lifestyles, easy access to high calorie processed foods, and limited opportunities for outdoor play are major drivers.(8) Dietary patterns characterized by increased consumption of sugary beverages, fast foods, and snacks, coupled with low physical activity and excessive screen time, further promote positive energy balance. Psychological influences, including stress, emotional eating, low selfe-steem, and exposure to digital media advertising, can reinforce unhealthy eating behaviors.(9) Moreover, family and cultural dynamics strongly shape children's habits parental feeding practices, role modeling, shared meals, and cultural perceptions of body weight all influence dietary intake and activity levels. In societies where chubbiness is equated with good health, early recognition and intervention are often delayed. Collectively, these interrelated factors highlight the need for a multilevel approach targeting individual behavior, family practices, and broader community environments to effectively prevent and manage childhood obesity. Beyond the factors already discussed, prenatal and early life influences have gained significant attention. Maternal obesity, excessive gestational weight gain, and gestational diabetes increase the likelihood of childhood obesity by altering fetal metabolic programming.(10) Infants born large for gestational age or exposed to formula feeding instead of exclusive breastfeeding during the first six months have a greater risk of developing obesity later in life due to differences in hormonal regulation of appetite and fat deposition. Early introduction of energy dense foods and lack of structured feeding routines can further accelerate unhealthy weight gain. Endocrine disruptors are another emerging contributor. Chemicals such as bisphenol A and phthalates, commonly found in plastics and food packaging, may interfere with hormonal and metabolic processes and promote adipogenesis even at low exposure levels. (11)

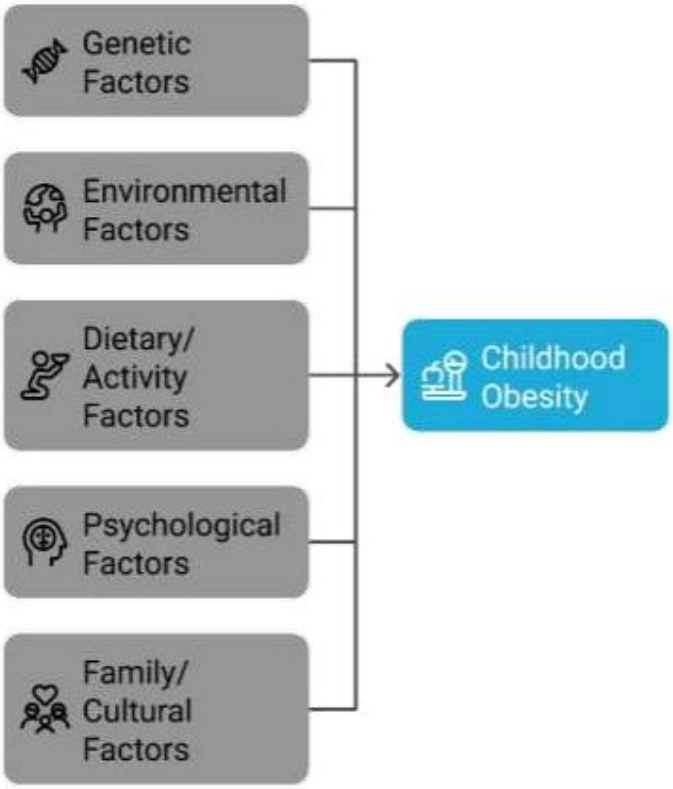


Figure 2. Multifactorial model illustrating the genetic, environmental, psychological, and sociocultural determinants contributing to childhood overweight and obesity.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

Urban neighborhoods with limited access to fresh fruits and vegetables, unsafe play areas, and heavy marketing of unhealthy foods create obesogenic environments that disproportionately affect lower income communities. Sleep duration and quality also play a crucial role. Short sleep has been linked to altered levels of appetite regulating hormones such as leptin and ghrelin, increasing cravings for high calorie foods and reducing energy expenditure. Additionally, poor sleep is associated with fatigue related inactivity and increased screen exposure at night.(12) School environments are equally important contributors. Limited physical education classes, competitive academic pressure, and widespread availability of processed snacks in cafeterias restrict opportunities for healthy behavior. Policies around school meal standards, nutrition education, and daily physical activity can significantly influence weight outcomes. Finally, the global shift toward digital lifestyles has intensified sedentary behavior.(13) Increased use of smartphones, gaming devices, and online entertainment replaces active play and is strongly associated with snacking and irregular eating patterns. As a result, interventions must integrate technology based solutions, including digital coaching and activity tracking, to reshape behavior in modern settings.(14)

3. BEHAVIORAL AND LIFESTYLE INTERVENTIONS

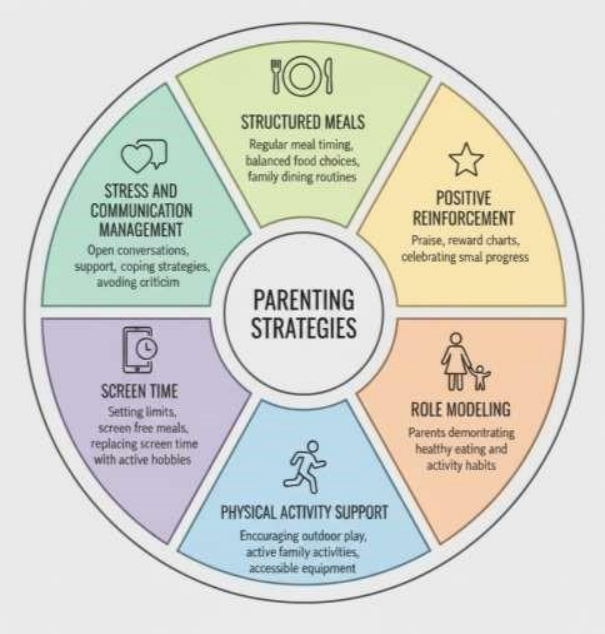
Behavioral and lifestyle interventions form the cornerstone of childhood obesity management and are the first line approach recommended by all major pediatric health organizations. These interventions are based on principles of behavioral modification, including selfmonitoring (tracking food intake and activity), goal setting (achievable, measurable objectives), and positive reinforcement (rewarding healthy behaviors). The aim is to empower children and families to gradually adopt healthier lifestyles rather than rely on restrictive or short term diets.(15) Dietary interventions emphasize balanced meals rich in fruits, vegetables, whole grains, and lean proteins while limiting sugar sweetened beverages, processed foods, and saturated fats. Education on portion control and mindful eating helps prevent overconsumption. Physical activity is equally critical children should engage in at least 60 minutes of moderate to vigorous activity daily, combining aerobic, strength, and flexibility exercises. Structured routines, reduced screen time (<2 hours/day), and active family participation are encouraged to sustain engagement.(16) School based and community programs play a vital role by integrating health education, improving canteen food quality, and promoting active transport. Successful examples include the “Fit India School Initiative” and WHO’s “Health Promoting Schools” framework. Despite their proven short term effectiveness in reducing BMI and improving metabolic health, these interventions often face challenges related to adherence, limited parental involvement, socioeconomic barriers, and lack of long term sustainability. Therefore, multidisciplinary, family centered, and culturally tailored behavioral programs remain essential for lasting impact.(17) Beyond traditional lifestyle strategies, innovative behavioral approaches have emerged to enhance long term adherence and effectiveness. Family based therapy has shown significant success, where parents are trained to model healthy habits, establish supportive home environments, and use consistent behavior shaping techniques. Research shows that interventions involving at least one actively engaged parent significantly improve outcomes compared to child only programs, because family eating patterns, grocery choices, and daily routines strongly influence children’s behavior.(18) Motivational interviewing is another widely used counseling technique that helps children explore personal motivations, overcome ambivalence, and develop self driven goals rather than externally imposed rules. This approach encourages gradual behavioral change and increases long term commitment. Digital health tools, including mobile apps, wearable activity trackers, and telehealth coaching, have become valuable in monitoring progress and reinforcing motivation in real time. These tools support self monitoring, provide feedback, and incorporate features like gamification to make behavior change more engaging.(19)

4. FAMILY-BASED INTERVENTIONS

Family based interventions are a cornerstone of successful childhood obesity management because children’s eating and activity behaviors are strongly influenced by their home environment. Parents and caregivers play a vital role in shaping daily habits through food choices, meal routines, and attitudes toward physical activity. Effective programs emphasize family counseling and education, where parents learn to provide structured meal plans, limit unhealthy

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

snacks, and encourage outdoor play and positive reinforcement rather than punishment.(20) Healthy role modelling parents demonstrating balanced eating, regular exercise, and reduced screen time has been shown to significantly improve adherence and long-term outcomes in children. Studies reveal that parent-focused interventions often produce greater and more sustained improvements in children's BMI and lifestyle behaviors than those targeting only the child, since parents control food availability, schedule, and motivation.(21) However, successful implementation requires addressing barriers such as time constraints, socioeconomic challenges, low health literacy, and cultural beliefs that may normalize higher body weight. Integrating family sessions into school or community programs, offering culturally adapted materials, and using digital or telehealth platforms can enhance participation and adherence. Ultimately, engaging the entire family unit creates a supportive environment that reinforces behavior change, promotes accountability, and fosters sustainable weight management in children.(22) Social support within extended family networks also plays an important role. In many households, grandparents or relatives share caregiving responsibilities, and their beliefs about food and body size significantly affect parenting efforts. Engaging these family members in intervention programs increases consistency and reduces conflicting messages. Community based family workshops and peer support groups offer opportunities for families to share experiences, build confidence, and maintain motivation over time.(23) Technology enhanced family interventions are gaining popularity, using online modules, video sessions, and shared progress dashboards to help families set goals, monitor behavior, and communicate with healthcare professionals. These digital platforms improve accessibility for working parents and those in rural regions with limited specialized care. Incorporating culturally relevant foods, language adaptations, and flexible scheduling increases participation and respects diverse family practices. By combining emotional support, skill building, and practical tools, modern family centered approaches strengthen long term success in managing childhood obesity and help create healthier family systems that persist into adulthood.(24) Recent research highlights the importance of strengthening parenting skills related to communication, problem solving, and shared decision making. Families that openly discuss goals, challenges, and emotions tend to have higher motivation and better adherence to treatment plans. Structured family routines, such as eating meals together, scheduling regular physical activity, and maintaining consistent sleep patterns, are strongly associated with improved weight outcomes and healthier behaviors in children. Establishing predictable routines helps reduce impulsive eating, emotional snacking, and excessive screen use.(25)



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 7, March 2026 Impact Factor: 8.2

Figure 3. Wheel Diagram of Parenting Strategies in Childhood Obesity Management Another emerging strategy involves applying behavioral techniques such as motivational interviewing, which helps parents and children explore personal motivations for change and overcome resistance. This collaborative method empowers families to identify realistic goals, take ownership of progress, and build confidence in their ability to sustain improvement. Parenting programs that emphasize positive discipline and encourage supportive, non judgmental communication have been shown to reduce conflict and enhance family cohesion during lifestyle transitions. The involvement of school systems and community partners further strengthens family based interventions. Coordinated efforts between teachers, school nutrition services, sports coaches, and parents lead to more consistent health messages and opportunities for active participation. Family health events, nutrition demonstrations, and community exercise challenges help reinforce learning and create shared experiences that motivate children.(26) Longer term follow up is critical. Regular booster sessions, periodic progress review, and ongoing family engagement help prevent relapse as children grow and face new social or developmental pressures. Monitoring progress through home tracking tools such as food logs, step counters, or family activity calendars increases accountability and keeps families focused on long term goals rather than short term weight changes. Future directions aim to integrate personalized strategies based on family structure, cultural background, and psychological needs. Tailoring interventions to individual family dynamics, including single-parent households, joint custody arrangements, or families with chronic illness, may improve equity and accessibility. Research continues to explore the role of preventive family programs initiated during early childhood or even prenatal periods, highlighting the importance of addressing obesity risk before unhealthy habits become established.(27)

5. PHARMACOLOGICAL INTERVENTIONS

Pharmacological therapy serves as a second-line treatment for managing childhood and adolescent obesity when behavioral and lifestyle modifications fail to achieve sufficient weight reduction. These interventions are typically reserved for children aged 12 years and older with severe obesity (BMI ⩾95th percentile with comorbidities) or BMI ⩾120% of the 95th percentile without adequate response to non-pharmacologic measures. Among available agents, orlistat, a gastrointestinal lipase inhibitor, is the only drug approved by both the U.S.

FDA and EMA for use in adolescents aged ⩾12 years. It works by reducing fat absorption by approximately 30%, though its use is often limited by gastrointestinal side effects such as oily stools and cramps.(28) Metformin, while not officially approved for obesity treatment, is widely prescribed off label to improve insulin sensitivity, particularly in obese children with insulin resistance or early type 2 diabetes. More recently, GLP-1 receptor agonists, including liraglutide and semaglutide, have shown promising results in clinical trials, demonstrating significant BMI reductions and improved cardiometabolic profiles with manageable side effects like nausea and vomiting.(29) The STEP TEENS trial (2022) confirmed semaglutide's efficacy in adolescents, marking a breakthrough in pharmacological management. However, long term safety data, high cost, and limited access especially in low- and middle income countries like India remain barriers to widespread use. Pharmacologic therapy should always be integrated into a multidisciplinary program that includes behavioral support, nutritional guidance, and regular monitoring, ensuring treatment remains safe, effective, and sustainable for pediatric patients.(30)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

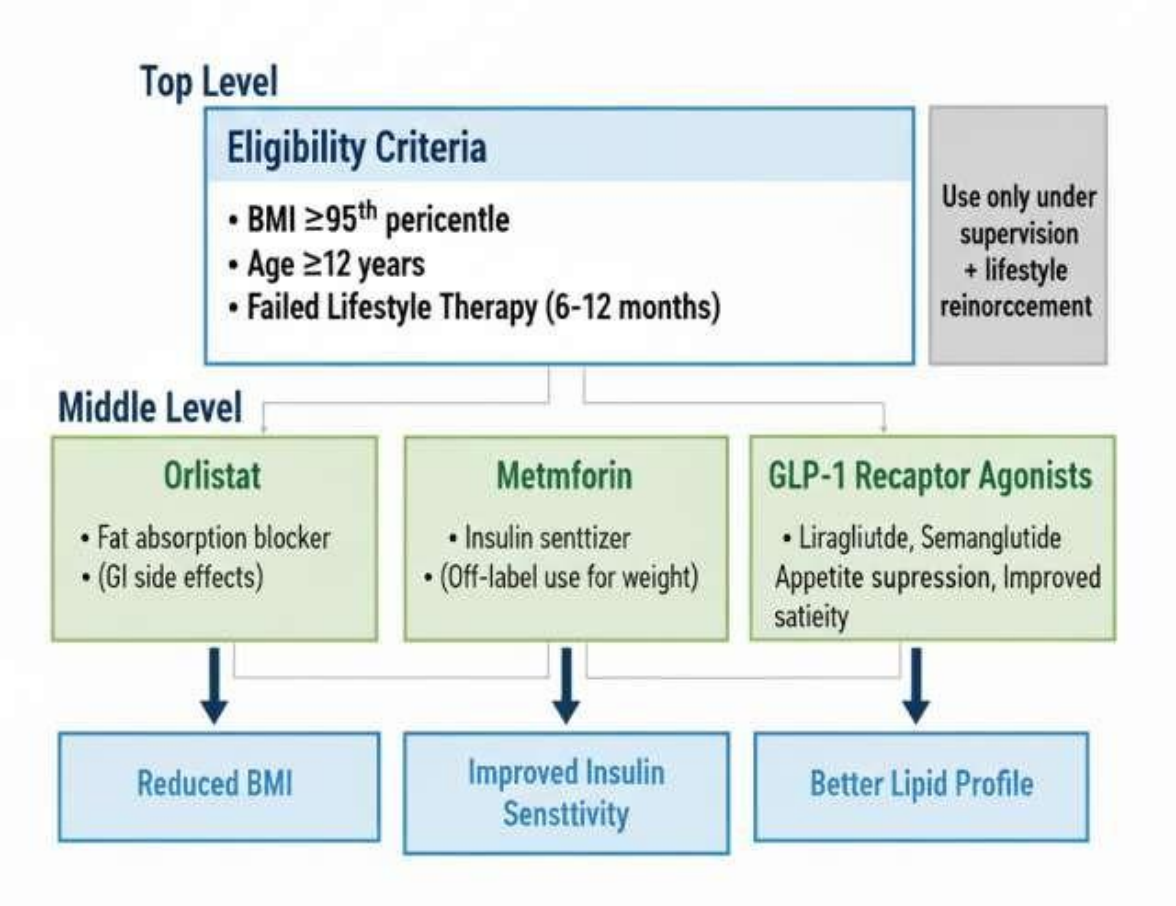


Figure 4. Overview of approved and emerging pharmacologic therapies for pediatric obesity, including mechanisms, age criteria, and key outcomes.

Ongoing research is actively exploring next generation therapeutics that aim to fine tune appetite control, enhance energy use, and more effectively influence key metabolic pathways beyond the medications currently available. Tirzepatide, a dual GIP and GLP 1 receptor agonist, has demonstrated significant weight reduction in adults and is currently being evaluated for use in adolescent populations. Other emerging therapies, such as setmelanotide which targets the melanocortin 4 receptor pathway, have shown substantial benefits in treating rare genetic obesity syndromes including POMC and LEPR deficiencies. These developments highlight the potential for personalized treatment approaches for individuals with monogenic forms of obesity. Pharmacogenomics is gaining growing importance through research aimed at identifying genetic predictors of treatment response and susceptibility to adverse effects.(31) Understanding biomarker profiles may enable clinicians to customize drug therapy more effectively and avoid unnecessary exposure to medications that are unlikely to benefit specific patients. Combination therapy strategies, where pharmacologic agents are used alongside structured lifestyle interventions or in combination with drugs that act through complementary mechanisms, are also being explored to improve treatment outcomes while reducing side effects. Future accessibility to pharmacologic therapy will depend heavily on public health policies and healthcare infrastructure. Expanded insurance coverage, availability of lower cost generic formulations, and the development of national obesity treatment guidelines will be critical for equitable access, particularly in low and middle income countries. Ultimately, pharmacologic treatment should be used selectively and always integrated within a multidisciplinary, individualized care plan rather than functioning as an isolated solution for pediatric obesity.(32)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

Table No. 1: Approved and Investigational Agents

Drug	Mechanism of Action	Approved Age (Years)	Common Adverse Effects
Orlistat	Gastrointestinal lipase inhibitor; reduces fat absorption by ~30%	≥12	Flatulence, steatorrhea, fatsoluble vitamin deficiency
Metformin	Improves insulin sensitivity; reduces hepatic glucose production	Off-label (≥10)	GI upset, lactic acidosis (rare)
Liraglutide (GLP-1 RA)	Increases satiety; delays gastric emptying	≥12	Nausea, vomiting, gallbladder issues
Semaglutide (GLP-1 RA)	Similar to liraglutide, once-weekly injection	≥12 (FDA, 2022)	Nausea, diarrhea, thyroid tumor risk (preclinical)
Phentermine/Topiramate ER	Sympathomimetic + antiepileptic combination	≥16 (limited data)	Insomnia, paresthesia, teratogenicity
Setmelanotide	MC4R agonist; used in rare genetic obesity	≥6	Skin hyperpigmentation, headache

6. BARIATRIC SURGERY INTERVENTIONS

Bariatric surgery has emerged as a third-line option for managing severe obesity in adolescents when comprehensive lifestyle and pharmacologic interventions fail to achieve adequate weight loss or prevent obesity related complications. According to the American Society for Metabolic and Bariatric Surgery (ASMBS) and the American Academy of Pediatrics (AAP), adolescents may be considered for surgery if they have a BMI ⩾120% of the 95th percentile (or BMI ⩾35 kg/m²) with major comorbidities such as type 2 diabetes, severe sleep apnea, or hypertension, or a BMI ⩾140% of the 95th percentile (or BMI ⩾40 kg/m²) with minor comorbidities.(33) Eligibility also requires skeletal maturity, the ability to adhere to postoperative regimens, and a supportive family environment. The most commonly performed procedures include Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy (SG), and, less frequently, adjustable gastric banding (AGB). Among these, sleeve gastrectomy has become the preferred technique in adolescents because it is less invasive, avoids intestinal rerouting, and offers comparable weight loss outcomes. Preoperative evaluation is multidisciplinary and involves pediatricians, bariatric surgeons, dietitians, psychologists, and endocrinologists. A detailed psychological assessment ensures that candidates understand the lifestyle changes required, have realistic expectations, and receive adequate emotional support.(34) Postoperative outcomes are generally favourable, with most adolescents achieving sustained BMI reductions of 25-35% and significant improvement or remission of comorbidities such as type 2 diabetes, dyslipidemia, and obstructive sleep apnea within 1-2 years. Nutritional counselling and lifelong follow-up are essential to prevent micronutrient deficiencies (e.g., iron, vitamin B12, and calcium), monitor growth, and maintain weight stability. However, risks and complications include surgical site infection, anastomotic leakage, gastroesophageal reflux, nutritional deficiencies, and, rarely, weight regain or eating disorders.(35) Long-term data also highlight the importance of ongoing psychological monitoring, as rapid body changes can affect self-image and mental well-being. Ethical concerns such as the permanence of anatomical alteration in a still developing adolescent underscore the need for thorough informed consent and family counselling. Overall, when performed in specialized centers with structured pre- and postoperative programs, bariatric surgery can be a safe, effective, and life changing intervention for selected adolescents with severe obesity.(36)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

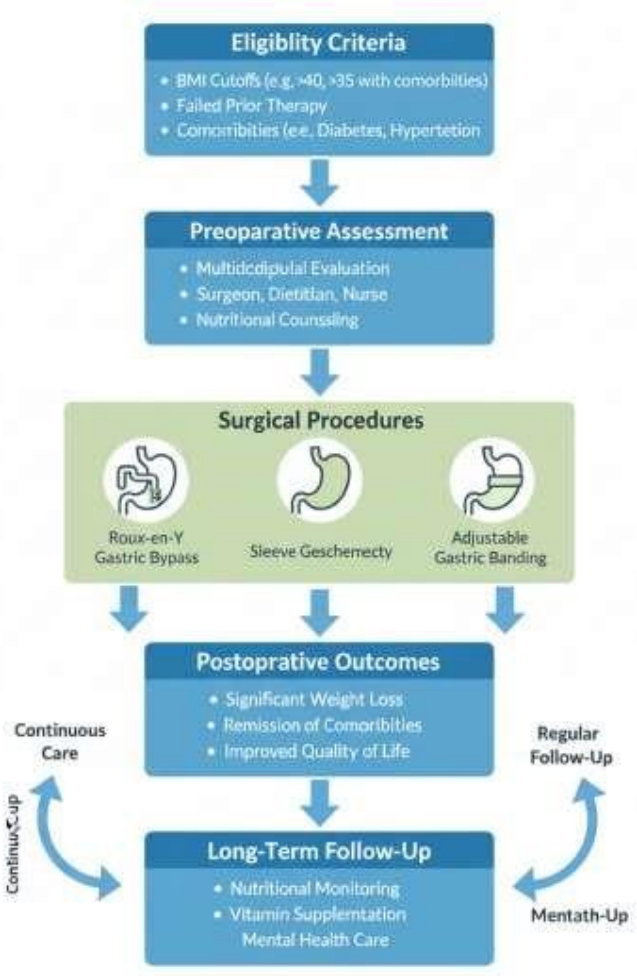


Figure 5. Clinical pathway of bariatric surgery in adolescents, illustrating eligibility, surgical options, outcomes, and long-term monitoring.

Recent evidence also highlights the broader psychosocial and developmental benefits associated with bariatric surgery in adolescents. Improvements in self esteem, social participation, and overall quality of life have been frequently reported, suggesting that the impact extends beyond physical health outcomes. Schools often observe better academic performance and increased physical activity engagement following substantial weight loss, which further supports the holistic value of the procedure. In addition, there is growing emphasis on integrating family based behavioral therapy before and after surgery, since family involvement significantly improves adherence to nutritional guidelines and physical activity routines. Emerging research is examining the role of metabolic and hormonal shifts following procedures such as sleeve gastrectomy, which appear to influence gut hormones related to satiety and glucose control, including GLP 1 and ghrelin.(37) This metabolic rebalancing contributes to rapid improvement in insulin sensitivity and may explain why remission of type 2 diabetes often occurs even before significant weight loss is achieved. To ensure long term success, adolescent bariatric programs now commonly incorporate digital health tools like telemonitoring, smartphone based nutritional tracking, and virtual psychological counseling. These technologies support continuous follow up, early detection of complications, and ongoing motivation during the transitional phases of adolescence and young adulthood. Future directions include more personalized surgical decision making models

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

using predictive analytics to identify which patients will benefit most from each procedure type and to minimize the risk of postoperative relapse or weight regain.(38)

Table No. 2: Common Procedures and Mechanisms

Procedure	Description	Advantages	Limitations/Complications
Sleeve Gastrectomy (SG)	Removes ~80% of stomach	Fewer nutritional deficiencies, rapid recovery	GERD, micronutrient deficiency
Roux-en-Y Gastric Bypass (RYGB)	Creates small pouch and bypasses small intestine	Greater long-term weight loss	Dumping syndrome, internal hernia
Adjustable Gastric Banding (AGB)	Inflatable band restricts stomach	Reversible, minimal invasiveness	Less effective, band slippage
Biliopancreatic Diversion (BPD)	Reduces absorption significantly	Maximum weight loss	Severe malnutrition risk

7. INTEGRATED AND MULTIDISCIPLINARY APPROACHES

Managing childhood obesity works best when different treatment methods are combined rather than used alone. A multidisciplinary approach brings together experts from various fields, including pediatricians, dietitians, psychologists, physical activity specialists, and bariatric surgeons to create a personalised care plan for each child. The goal is to combine behavioral changes (like healthy eating and exercise habits), pharmacological therapy (for older children or those with severe obesity), and, in some cases, bariatric surgery (for adolescents with serious weight-related health problems).(39) Early screening and assessment are essential so that risk factors such as unhealthy eating patterns, low physical activity, or emotional distress can be identified and treated before obesity becomes severe. Every child's situation is unique, so treatment must be personalised according to age, health status, family environment, and motivation level. Regular communication between healthcare professionals and families ensures that progress is tracked, challenges are addressed, and lifestyle changes become long term habits.(40) This integrated model improves not only weight management but also mental well being, confidence, and quality of life. An integrated care model also emphasizes family involvement, since parents and caregivers play a central role in shaping eating patterns, physical activity, and emotional support. Family based counseling has been shown to significantly improve treatment adherence and long term weight control by creating a home environment that supports healthy choices consistently rather than temporarily. Schools and community based programs are increasingly recognized as key partners in multidisciplinary obesity management. Initiatives such as structured physical education, school meal improvements, and mental health support services help reinforce the strategies developed in clinical settings.(41) Community resources, including recreational sports centers, youth wellness programs, and nutrition workshops, extend support beyond the hospital environment and reduce barriers related to cost or accessibility. Technology enhanced health solutions are also becoming integral components of multidisciplinary care. Tools like mobile health apps, fitness trackers, telehealth sessions, and artificial intelligence driven progress monitoring systems allow clinicians to personalize interventions, provide real time feedback, and maintain continuous engagement with children and families.(42) These digital platforms help identify early signs of treatment difficulty and offer timely adjustments, ultimately improving outcomes. Research increasingly supports the effectiveness of multidisciplinary programs in producing sustained weight reduction, improving metabolic markers, and reducing the risk of long term diseases such as type 2 diabetes and cardiovascular disorders. Beyond physical health, integrated approaches have shown meaningful benefits in reducing anxiety, depression, and social withdrawal, helping children build stronger self image and resilience.(43)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

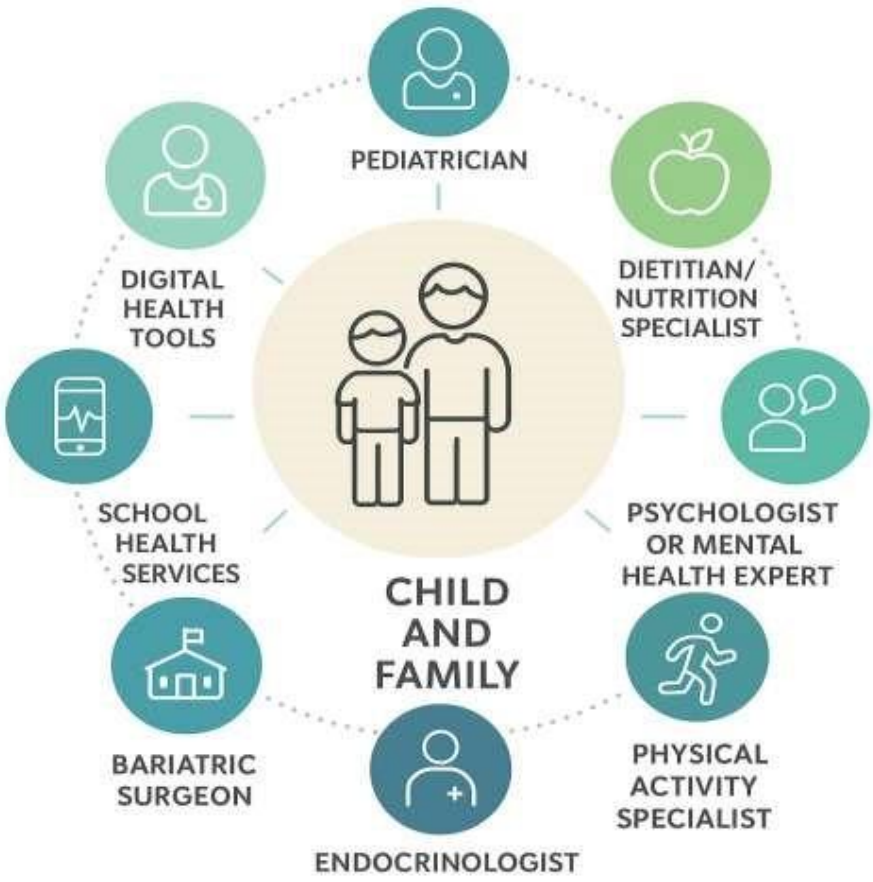


Figure 6. Multidisciplinary Care Model for Childhood Obesity

Beyond clinical collaboration, successful multidisciplinary care depends on coordinated communication systems, shared electronic health records, and standardized follow up pathways that allow all professionals involved to track progress and adjust strategies as needed. Case review meetings and joint decision making help ensure that treatment plans remain consistent and aligned with patient goals. This coordinated structure reduces fragmentation of care and strengthens continuity across different stages of growth and development.(44) Another important component is training healthcare providers to understand cultural influences on food practices, family dynamics, and perceptions of body weight. Cultural sensitivity improves trust, encourages open communication, and increases acceptance of recommended lifestyle changes. Programs that adapt interventions to regional language, food habits, and socioeconomic situations have been shown to significantly improve participation and outcomes. In addition, policy level support plays a critical role. Government initiatives aimed at improving access to healthy foods, expanding physical activity spaces, regulating marketing of high sugar products to children, and integrating obesity prevention into school curricula reinforce clinical efforts.(45) Partnerships between healthcare systems, local authorities, and community organizations create a stronger environment for prevention and long term management. Increasing research attention is being directed toward evaluating long term outcomes of multidisciplinary care models. Evidence suggests that children engaged in integrated programs demonstrate lower risk of obesity relapse, better metabolic markers, and improved emotional resilience compared to those receiving isolated interventions. Future models aim to incorporate personalized predictive tools powered by artificial intelligence to tailor interventions based on behavioral patterns,

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

response trends, and biological markers, potentially transforming childhood obesity care into a more proactive and precise healthcare model.(46)

8. CHALLENGES AND FUTURE DIRECTIONS

Managing childhood obesity continues to be one of the toughest public health challenges worldwide. Even though awareness and research have grown, many barriers still prevent effective prevention and treatment. One of the biggest challenges is socioeconomic inequality children from low income families often cannot access healthy foods, safe play areas, or quality healthcare. In many countries, including India, healthy foods like fruits, vegetables, and dairy products are more expensive than fast foods or packaged snacks. Schools in poorer communities may also lack sports facilities or nutrition education programs. These differences make it difficult for all children to get equal opportunities for healthy growth.(47) Another important challenge is the social stigma linked with obesity. Overweight children often face teasing, bullying, and discrimination from peers or even adults. This can cause emotional distress, low confidence, anxiety, and depression, making it harder for them to stick with healthy behaviors or seek help. Therefore, obesity management must include psychological support and promote a positive, respectful attitude toward body image in schools and families.(48) Looking ahead, emerging therapies and new technologies provide exciting opportunities for better care. Digital health tools, such as mobile apps, wearable fitness trackers, online counselling, and telemedicine platforms, are helping children and families track their diet, physical activity, and progress in real time. These tools make it easier to get professional advice without frequent hospital visits, especially for families living in remote areas. Scientists are also studying gene-based and personalized medicine approaches, where treatments could be tailored to each child's genetic makeup and metabolism. This might help predict which children are most at risk and what type of therapy will work best for them.(49) Despite these advancements, there are still many research gaps. Long term studies are needed to understand how safe and effective new medications (like GLP-1 agonists) and bariatric surgery are for adolescents over several decades. There is also a need to develop culturally appropriate programs that fit local diets, traditions, and social values especially in diverse countries like India. Policymakers must support school based prevention programs, regulate junk food advertising, and make healthy food more affordable and accessible for all families. In the future, the focus should shift from simply treating obesity to preventing it early, by educating parents, promoting active schools, and building supportive communities.(50) Managing childhood obesity effectively will require strong partnerships among families, healthcare workers, educators, and government agencies. Only through combined and sustained efforts can we ensure healthier lives for children and reduce the growing burden of obesity-related diseases in the coming generations. Future progress will depend strongly on long term commitment from policymakers, healthcare professionals, educators, food industry leaders, and families. Governments must introduce supportive public health policies, such as restricting advertisements of unhealthy snacks targeted at children, improving school meal programs, and enforcing clear food labeling.(51) Community level initiatives, including safe walking zones, playgrounds, and affordable sports centers, can create environments that encourage active lifestyles. Schools can play a central role by integrating nutrition education into the curriculum and offering structured physical activities suitable for all fitness levels. Ultimately, the future direction of childhood obesity management should focus on prevention rather than reacting once the problem has already developed. Early intervention during pregnancy and infancy, guidance for new parents, and promotion of healthy routines in preschools and primary schools can make a major difference. When healthcare systems, families, and communities work together, it becomes possible to build a society where healthy habits begin early in life and continue into adulthood.(52)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

Figure 5. Summary of key challenges and future directions in addressing childhood obesity, emphasizing equity, digital innovation, and prevention-focused policy.

II. CONCLUSION

Childhood overweight and obesity have become major global health challenges, with increasing rates in both developed and developing countries, including India. This review highlights that the causes of obesity are multifactorial, involving genetics, environment, lifestyle, and family influences. Effective management requires a multi modal strategy that combines behavioral modification, family participation, pharmacological therapy, and, in severe cases, bariatric surgery. Among these, early prevention and family engagement remain the most powerful tools for sustainable outcomes. Educating parents and children about balanced diets, regular physical activity, and healthy digital habits can help build lifelong positive behaviors. Interventions must be individualized and supported by multidisciplinary teams, including pediatricians, dietitians, psychologists, and surgeons, ensuring holistic care. Pharmacological and surgical treatments can be beneficial for selected adolescents but should always be combined with behavioral and nutritional guidance. Long term success also depends on continuous monitoring and follow up, as maintaining healthy weight and lifestyle habits is a lifelong process. Finally, effective control of childhood obesity will require strong policy level actions such as regulating junk food marketing, improving school nutrition standards, and increasing public access to physical activity facilities. By combining early prevention, family centered care, and supportive health policies, we can significantly reduce the future burden of obesity-related diseases and ensure healthier generations ahead.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 7, March 2026
Impact Factor: 8.2

REFERENCES

1. Weghuber, D., Barrett, T., Barrientos-Pérez, M., Gies, I., Hesse, D., Jeppesen, O. K., Kelly, A. S., Mastrandrea, L. D., Sørrig, R., & Arslanian, S. (2022). Once-Weekly Semaglutide in Adolescents with Obesity. New England Journal of Medicine, 387(24), 2245–2257.

2. Kelly, A. S., Auerbach, P., Barrientos-Perez, M., Gies, I., Hale, P. M., Marcus, C., Mastrandrea, L. D., Prabhu, N., & Arslanian, S. (2020). A Randomized, Controlled Trial of Liraglutide for Adolescents with Obesity. New England Journal of Medicine, 382(22), 2117–2128.

3. Hampl, S. E., Hassink, S. G., Skinner, A. C., Armstrong, S. C., Barlow, S. E., Bolling, C. F., Edwards, K. C. A., Eneli, I., Hamre, R., Joseph, M. M., Lunsford, D., Mendonca, E., Michalsky, M. P., Mirza, N., Ochoa, E. R., Sharifi, M., Staiano, A. E., Weedn, A. E., Flinn, S. K., . . . Okechukwu, K. (2023). Clinical Practice Guideline for the evaluation and Treatment of Children and Adolescents with Obesity. PEDIATRICS, 151(2).

4. Janik, M. R., Clapp, B., Sroczyński, P., & Ghanem, O. (2022). The effect of bariatric surgery on reducing the risk of colorectal cancer: a meta-analysis of 3,233,044 patients. Surgery for Obesity and Related Diseases, 19(4), 328–334.

5. Inge, T. H., Courcoulas, A. P., Jenkins, T. M., Michalsky, M. P., Helmrath, M. A., Brandt, M. L., Harmon, C. M., Zeller, M. H., Chen, M. K., Xanthakos, S. A., Horlick, M., & Buncher, C. R. (2015). Weight Loss and Health Status 3 Years after Bariatric Surgery in Adolescents. New England Journal of Medicine, 374(2), 113–123.

6. Alavi, M. H., & Corcelles, R. (2024). Comment on: Prognostic factors in resolution of nonalcoholic fatty liver disease post bariatric surgery in adolescents. Surgery for Obesity and Related Diseases, 20(6), e1–e2.

7. Styne, D. M., Arslanian, S. A., Connor, E. L., Farooqi, I. S., Murad, M. H., Silverstein, J. H., & Yanovski, J. A. (2017). Pediatric Obesity Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline. The Journal of Clinical Endocrinology & Metabolism, 102(3), 709–757.

8. Zhang, M., Zucatti, K. P., Teixeira, P. P., Correia, P. E., Wayerbacher, L. F., Spiazzi, B. F., Socal, M. P., Boyko, E. J., Colpani, V., & Gerchman, F. (2023). Cancer outcomes among prediabetes and type 2 diabetes populations with dietary and physical activity based lifestyle interventions. The Journal of Clinical Endocrinology & Metabolism, 108(8), 2124–2133.

9. Pulungan, A. B., Puteri, H. A., Ratnasari, A. F., Hoey, H., Utari, A., Darendeliler, F., Al-Zoubi, B., Joel, D., Valiulis, A., Cabana, J., Hasanoglu, E., Thacker, N., & Farmer, M. (2023). Childhood Obesity as a Global Problem: A cross-sectional survey on global awareness and national program implementation. Journal of Clinical Research in Pediatric Endocrinology, 16(1), 31-40.

10. Fox, C. K., Barrientos-Pérez, M., Bomberg, E. M., Dcruz, J., Gies, I., HarderLauridsen, N. M., Jalaludin, M. Y., Sahu, K., Weimers, P., Zueger, T., & Arslanian, S. (2024). Liraglutide for Children 6 to <12 Years of Age with Obesity - A Randomized Trial. New England Journal of Medicine, 392(6), 555–565.

11. Weghuber, D., Boberg, K., Hesse, D., Jeppesen, O. K., Sørrig, R., & Kelly, A. S. (2022). Semaglutide treatment for obesity in teenagers: a plain language summary of the STEP TEENS research study. Journal of Comparative Effectiveness Research, 12(2), e220187.

12. Trends in Motorcycle Fatalities Associated with Alcohol-Impaired Driving-United States, 1983-2003. (2005). JAMA, 293(3), 287.

13. Inge, T. H., Zeller, M. H., Jenkins, T. M., Helmrath, M., Brandt, M. L., Michalsky, M. P., Harmon, C. M., Courcoulas, A., Horlick, M., Xanthakos, S. A., Dolan, L., Mitsnefes, M., Barnett, S. J., & Buncher, R. (2013). Perioperative outcomes of adolescents undergoing bariatric surgery. JAMA Pediatrics, 168(1), 47.

14. Weghuber, D., Kelly, A. S., & Arslanian, S. (2023). Once-Weekly Semaglutide in Adolescents with Obesity. New England Journal of Medicine, 388(12), 1145-1146.

15. De Luca, M., Shikora, S., Eisenberg, D., Angrisani, L., Parmar, C., Alqahtani, A., Aminian, A., Aarts, E., Brown, W., Cohen, R. V., Di Lorenzo, N., Faria, S. L., Goodpaster, K. P. S., Haddad, A., Herrera, M., Rosenthal, R., Himpens,

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 7, March 2026 Impact Factor: 8.2

J., Iossa, A., Kermansaravi, M., . . . Kothari, S. N. (2024). Scientific evidence for the Updated Guidelines on Indications for Metabolic and Bariatric Surgery (IFSO/ASMBS).
Obesity Surgery, 34(11), 3963-4096.
16. Fox, C. K., Barrientos-Pérez, M., Bomberg, E. M., Dcruz, J., Gies, I., HarderLauridsen, N. M., Jalaludin, M. Y., Sahu, K., Weimers, P., Zueger, T., & Arslanian, S. (2024b). Liraglutide for Children 6 to <12 Years of Age with Obesity - A Randomized Trial. New England Journal of Medicine, 392(6), 555–565.
17. Kelly, A. S., Bensignor, M. O., Hsia, D. S., Shoemaker, A. H., Shih, W., Peterson, C., & Varghese, S. T. (2022). Phentermine/Topiramate for the treatment of adolescent obesity. NEJM Evidence, 1(6).
18. Ryder, J. R., Jenkins, T. M., Xie, C., Courcoulas, A. P., Harmon, C. M., Helmrath, M. A., Sisley, S., Michalsky, M. P., Brandt, M., & Inge, T. H. (2024). Ten-Year Outcomes after Bariatric Surgery in Adolescents. New England Journal of Medicine, 391(17), 1656–1658.
19. Hewat, T. I., Laver, T. W., Houghton, J. a. L., Männistö, J. M. E., Alvi, S., Brearey, S.
P., Cody, D., Dastamani, A., De Los Santos La Torre, M., Murphy, N., Rami ‐ Merhar, B., Wefers, B., Huopio, H., Banerjee, I., Johnson, M. B., & Flanagan, S. E. (2022). Increased referrals for congenital hyperinsulinism genetic testing in children with trisomy 21 reflects the high burden of non ‐ genetic risk factors in this group. Pediatric Diabetes, 23(4), 457 ‐ 461.
20. Pulungan, A. B., Puteri, H. A., Ratnasari, A. F., Hoey, H., Utari, A., Darendeliler, F., Al-Zoubi, B., Joel, D., Valiulis, A., Cabana, J., Hasanoglu, E., Thacker, N., & Farmer, M. (2023b). Childhood Obesity as a Global Problem: A cross-sectional survey on global awareness and national program implementation. Journal of Clinical Research in Pediatric Endocrinology, 16(1), 31–40.
21. Midha, T., Nath, B., Kumari, R., Rao, Y. K., & Pandey, U. (2011). Childhood Obesity in India: A Meta-Analysis. The Indian Journal of Pediatrics, 79(7), 945–948.
22. Jacob, J. J. (2024). Tackling the rising tide: Understanding the prevalence of childhood obesity in India. Indian Journal of Endocrinology and Metabolism, 28(2), 101–103.
23. Maffeis, C., Olivieri, F., Valerio, G., Verduci, E., Licenziati, M. R., Calcaterra, V., Pelizzo, G., Salerno, M., Staiano, A., Bernasconi, S., Buganza, R., Crinò, A., Corciulo, N., Corica, D., Destro, F., Di Bonito, P., Di Pietro, M., Di Sessa, A., deSanctis, L., . . . Wasniewska, M. (2023). The treatment of obesity in children and adolescents: consensus position statement of the Italian society of pediatric endocrinology and diabetology, Italian Society of Pediatrics and Italian Society of Pediatric Surgery. ˜ the œItalian Journal of Pediatrics/Italian Journal of Pediatrics, 49(1), 69.
24. Hampl, S. E., Hassink, S. G., Skinner, A. C., Armstrong, S. C., Barlow, S. E., Bolling, C. F., Edwards, K. C. A., Eneli, I., Hamre, R., Joseph, M. M., Lunsford, D.,
Mendonca, E., Michalsky, M. P., Mirza, N., Ochoa, E. R., Sharifi, M., Staiano, A. E., Weedn, A. E., Flinn, S. K., . . . Okechukwu, K. (2023c). Clinical Practice Guideline for the evaluation and Treatment of Children and Adolescents with Obesity. PEDIATRICS, 151(2).
25. Bennett, B. L., Lawson, J. L., Funaro, M. C., & Ivezaj, V. (2022). Examining weight bias before and/or after bariatric surgery: A systematic review. Obesity Reviews, 23(11), e13500.
26. Porter, W. D., Flatt, P. R., Hölscher, C., & Gault, V. A. (2012). Liraglutide improves hippocampal synaptic plasticity associated with increased expression of Mash1 in ob/ob mice. International Journal of Obesity, 37(5), 678-684.
27. Inge, T. H., Zeller, M. H., Jenkins, T. M., Helmrath, M., Brandt, M. L., Michalsky, M. P., Harmon, C. M., Courcoulas, A., Horlick, M., Xanthakos, S. A., Dolan, L., Mitsnefes, M., Barnett, S. J., & Buncher, R. (2013b). Perioperative outcomes of adolescents undergoing bariatric surgery. JAMA Pediatrics, 168(1), 47.
28. Zhang, M., Zucatti, K. P., Teixeira, P. P., Correia, P. E., Wayerbacher, L. F., Spiazzi, B. F., Socal, M. P., Boyko, E. J., Colpani, V., & Gerchman, F. (2023b). Cancer outcomes among prediabetes and type 2 diabetes populations with

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 7, March 2026 Impact Factor: 8.2

dietary and physical activity–based lifestyle interventions. The Journal of Clinical Endocrinology & Metabolism, 108(8), 2124–2133.

29. De Luca, M., Shikora, S., Eisenberg, D., Angrisani, L., Parmar, C., Alqahtani, A., Aminian, A., Aarts, E., Brown, W., Cohen, R. V., Di Lorenzo, N., Faria, S. L., Goodpaster, K. P. S., Haddad, A., Herrera, M., Rosenthal, R., Himpens, J., Iossa, A., Kermansaravi, M., . . . Kothari, S. N. (2024b). Scientific evidence for the Updated Guidelines on Indications for Metabolic and Bariatric Surgery (IFSO/ASMBS). Obesity Surgery, 34(11), 3963–4096.

30. Kokkorakis, M., Chakhtoura, M., Rhayem, C., Rifai, J. A., Ghezzawi, M., Valenzuela-Vallejo, L., & Mantzoros, C. S. (2024). Emerging pharmacotherapies for obesity: A systematic review. Pharmacological Reviews, 77(1), 100002.

31. Rydin, A. A., Severn, C., Pyle, L., Morelli, N., Shoemaker, A. H., Chung, S. T., Yanovski, J. A., Han, J. C., Higgins, J. A., Nadeau, K. J., Fox, C., Kelly, A. S., & Cree, M. G. (2024). Prediction of resting energy expenditure for adolescents with severe obesity: A multi ‐ centre analysis. Pediatric Obesity, 19(7), e13123.

32. Fox, C. K., Barrientos-Pérez, M., Bomberg, E. M., Dcruz, J., Gies, I., HarderLauridsen, N. M., Jalaludin, M. Y., Sahu, K., Weimers, P., Zueger, T., & Arslanian,
S. (2024c). Liraglutide for Children 6 to <12 Years of Age with Obesity- A Randomized Trial. New England Journal of Medicine, 392(6), 555–565.

33. Chung, S. T., Onuzuruike, A. U., & Magge, S. N. (2018). Cardiometabolic risk in obese children. Annals of the New York Academy of Sciences, 1411(1), 166–183.

34. Simmonds, M., Llewellyn, A., Owen, C. G., & Woolacott, N. (2015). Predicting adult obesity from childhood obesity: a systematic review and meta ‐ analysis. Obesity Reviews, 17(2), 95 ‐ 107.

35. Ahmed, W., Jawed, K., Hussain, K., Barolia, M., Mehdi, S. S., Ahmed, A., Martins, R. S., & Qureshi, F. G. (2025). Outcomes of bariatric surgery in Adolescents: A metaanalysis comparing three surgical techniques. The American Journal of Surgery, 245, 116354.

36. Hsieh, M., Tseng, P., Wu, Y., Tu, Y., Wu, H., Hsu, C., Lei, W., Stubbs, B., Carvalho, A. F., Liang, C., Yeh, T., Chen, T., Chu, C., Li, J., Yu, C., Chen, Y., & Li, D. (2019). Effects of different pharmacologic smoking cessation treatments on body weight changes and success rates in patients with nicotine dependence: A network metaanalysis. Obesity Reviews, 20(6), 895–905.

37. Inge, T. H., Courcoulas, A. P., Jenkins, T. M., Michalsky, M. P., Brandt, M. L., Xanthakos, S. A., Dixon, J. B., Harmon, C. M., Chen, M. K., Xie, C., Evans, M. E., & Helmrath, M. A. (2019). Five-Year Outcomes of Gastric Bypass in Adolescents as Compared with Adults. New England Journal of Medicine, 380(22), 2136–2145.

38. Dulloo, A. G. (2021). Physiology of weight regain: Lessons from the classic Minnesota Starvation Experiment on human body composition regulation. Obesity Reviews, 22(S2).

39. Singh, G., Agrawal, R., Tripathi, N., & Verma, A. (2023). Overweight and obesity, the clock ticking in India? A secondary analysis of trends of prevalence, patterns, and predictors from 2005 to 2020 using the National Family Health Survey. International Journal of Noncommunicable Diseases, 8(1), 31–45.

40. Manapurath, R., Chowdhury, R., Taneja, S., Bhandari, N., & Strand, T. A. (2024). Epidemiology of overweight in under-five children in India: insights from National Family Health Survey. British Journal of Nutrition, 132(5), 607–615.

41. Weghuber, D., Boberg, K., Hesse, D., Jeppesen, O. K., Sørrig, R., & Kelly, A. S. (2022b). Semaglutide treatment for obesity in teenagers: a plain language summary of the STEP TEENS research study. Journal of Comparative Effectiveness Research, 12(2), e220187.

42. Weghuber, D., Kelly, A. S., & Arslanian, S. (2023b). Once-Weekly Semaglutide in Adolescents with Obesity. New England Journal of Medicine, 388(12), 1145-1146.

43. Boles, R. E., & Moore, J. M. (2024). Psychosocial outcomes after adolescent metabolic and bariatric surgery: a narrative review of the literature. Surgery for Obesity and Related Diseases, 21(1), 16-23.

44. Morton, J. (2021). Comment on: Assurance of surgical quality within multicenter randomized, controlled trials for bariatric and metabolic surgery: a systematic review.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 7, March 2026 Impact Factor: 8.2

Surgery for Obesity and Related Diseases, 18(1), 133-134.
45. Ling, Y., Gao, H., Wang, J., Yin, W., Wang, W., Zha, W., Shao, M., & Mu, H. (2020). Effects of dexmedetomidine and ACE genotype on cardiovascular response during the decannulation period of general anesthesia in patients with essential hypertension. Clinical Therapeutics, 42(10), 1992–2000.
46. Warren, A. M., Grossmann, M., Christ-Crain, M., & Russell, N. (2023). Syndrome of Inappropriate antidiuresis: From pathophysiology to management. Endocrine Reviews, 44(5), 819-861.
47. Kumar, V., & Stewart, J. H. (2023). Obesity, bone marrow adiposity, and leukemia: Time to act. Obesity Reviews, 25(3), e13674.
48. Tower-Rader, A., Szpakowski, N., Popovic, Z. B., Bittel, B., Fava, A., Ospina, S., Xu, B., Thamilarasan, M., Mentias, A., Smedira, N. G., & Desai, M. Y. (2023). Patient reported outcomes in obstructive hypertrophic cardiomyopathy undergoing myectomy: Results from SPIRIT-HCM study. Progress in Cardiovascular Diseases, 80, 66–73.
49. Abiri, B., Valizadeh, M., Amini, S., Kelishadi, R., & Hosseinpanah, F. (2023). Risk factors, cutoff points, and definition of metabolically healthy/unhealthy obesity in children and adolescents: A scoping review of the literature. Obesity Reviews, 24(5), e13548.
50. Colquitt, J. L., Loveman, E., O'Malley, C., Azevedo, L. B., Mead, E., Al-Khudairy, L., Ells, L. J., Metzendorf, M., & Rees, K. (2016). Diet, physical activity, and behavioural interventions for the treatment of overweight or obesity in preschool children up to the age of 6 years. Cochrane Database of Systematic Reviews, 2016(3), CD012105.
51. Vine, M., Hargreaves, M. B., Briefel, R. R., & Orfield, C. (2013). Expanding the Role of Primary Care in the Prevention and Treatment of Childhood Obesity: A Review of Clinic- and Community-Based Recommendations and Interventions. Journal of Obesity, 2013, 1-17.
52. Frattolillo, V., Massa, A., Capone, D., Monaco, N., Forcina, G., Di Filippo, P., Marzuillo, P., Del Giudice, E. M., & Di Sessa, A. (2025). Integrating digital health into pediatric obesity management: Current practices and future perspectives. Obesity Pillars, 16, 100189.