

Efficacy of bariatric techniques in the management of pediatric and adolescent obesity: A Systematic Review Protocol

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ADMINISTRATIVE INFORMATION**Support** - None.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202650119**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 May 2026 and was last updated on 22 May 2026.**INTRODUCTION****Review question / Objective** Population (P): Obese adolescents –ages 12 to 19- of any gender, worldwide, who underwent bariatric surgery.

Interventions (I) : Obese adolescents who underwent bariatric surgery.

Comparisons or control groups (C): Obese adolescents who followed lifestyle and dietary modifications (conservative approach) as management.

Outcomes of interest (O) : The efficacy of bariatric surgical interventions and the factors that affected the decision to proceed with this specific management plan.

Study design (S): observational studies, randomized controlled trials, clinical trials.

Rationale Pediatric and adolescent obesity is a serious global health concern that has reached epidemic proportions in both developed and developing countries. Several studies have reported many short- and long-term comorbidities

associated with childhood obesity, including type 2 diabetes mellitus, hypertension, early onset puberty, menstrual irregularities and polycystic ovary syndrome, asthma, benign intracranial hypertension, musculoskeletal disorders, and mental health issues. Multiple interventions are available to reduce excess body weight in adolescents. Over the past decade, systematic reviews have been conducted to explore various treatment options for childhood and adolescent obesity and to compare their effectiveness in managing this condition. However, reviews on surgical interventions are limited, with most concentrating on comparing different bariatric techniques and their short-term outcomes. The aim of the present study is to examine various bariatric surgical techniques and to assess their safety and effectiveness as treatment options for childhood and adolescent obesity. Additionally, it explores factors influencing the decision to undergo these procedures and evaluates their impact on resolving obesity-related comorbidities.

Condition being studied Pediatric and adolescent obesity is a serious global health concern that has reached epidemic proportions in both developed and developing countries. The prevalence of overweight and obesity among individuals from 5 to 19 years old, has more than doubled over the past 30 years. Childhood obesity is associated with a five-times greater risk of persisting into adulthood and female adolescents appear more susceptible than males. Several studies link pediatric obesity to a wide range of short- and long-term comorbidities, including type 2 diabetes mellitus (T2DM), hypertension, early onset puberty, menstrual irregularities, polycystic ovary syndrome (PCOS), non-alcoholic fatty liver disease, obstructive sleep apnea (OSA), asthma, benign intracranial hypertension, musculoskeletal disorders, psychological conditions and even certain malignancies. Furthermore, obesity-related dyslipidemia and hypertension increase the risk of future adverse cardiovascular events.

METHODS

Search strategy The literature search was conducted in three databases: PUBMED/MEDLINE, Cochrane Central Register, and SCOPUS from January 2005 up until August 2024. The following three term categories were identified and combined using "AND": 1) childhood, puberty, and adolescence, 2) bariatrics and bariatric medicine and 3) obesity. Synonyms and keywords of the terms within each of the three categories were defined by the Medical Subject Headings (MeSH) database and they are combined using "OR." The final search in MEDLINE was formulated in the following way: ("Bariatrics" OR "Bariatric Medicine" OR "bariatric surgery") AND ("child*" OR "adolescen*" OR "pediatr*" OR "paediatr*" OR "pubert*") AND "obes*". A similar search was performed in Cochrane Central Register. An additional forward and backward search was performed in the reference articles of the additional studies for identification of further eligible studies.

Participant or population Obese adolescents – ages 12 to 19- of any gender, worldwide, who underwent bariatric surgery.

Intervention Bariatric surgery is performed to achieve significant weight loss, Body Mass Index (BMI) reduction, and the resolution of major and minor obesity-related comorbidities in pediatric and adolescent patients. In this review, three distinct types of bariatric surgery are evaluated based on their mechanism of action (restrictive, malabsorptive, or a combination of both):

1) Roux-en-Y Gastric Bypass (RYGB): A combined restrictive and malabsorptive procedure, which is widely performed among adolescents. This procedure carries the risk of serious complications, including perioperative mortality, wound dehiscence, bowel obstruction, gastrointestinal bleeding, gallstones, infection, and chronic nutritional deficits. The most frequently reported nutritional deficiencies are vitamin B12, iron, and vitamin D, particularly if daily vitamin supplementation is not consistently followed.

2) Laparoscopic Adjustable Gastric Banding (LAGB): A purely restrictive and entirely reversible technique since no portion of the gastrointestinal tract is altered or divided. It is a technique that potentially has higher complication rates and lower long-term success percentages. High reoperation rates have been reported as well.

3) Laparoscopic Vertical Sleeve Gastrectomy (VSG): A purely restrictive, less anatomically complex procedure with a lower risk of long-term micronutrient deficiencies compared to RYGB, which typically achieves greater weight loss than LAGB.

This systematic review will examine various bariatric surgical techniques, assessing their safety and effectiveness as treatment options for childhood and adolescent obesity. Additionally, it will explore factors influencing the decision to undergo these procedures and evaluate their impact on resolving obesity-related comorbidities.

Comparator 1) Comparison between different bariatric surgical techniques: comparing outcomes between RYGB, VSG and LAGB, as well as their superiority over lifestyle modifications.

2) Comparison with baseline metrics: Evaluating post-operative clinical outcomes against the patients' own pre-operative (baseline) clinical data regarding BMI, weight status, and presence of metabolic comorbidities.

3) Comparison of decision-making groups: Comparing the characteristics of patients who proceed to bariatric surgery against those who do not, based on the non-clinical factors influencing the decision (including limited insurance coverage, lack of adequate information, socioeconomic/demographic barriers, and the general social stigma associated with these procedures).

Study designs to be included A total of 33 observational studies, 3 randomized controlled trials and 3 clinical trials were analyzed, consisting of a total of 6777 obese children/adolescents.

Eligibility criteria The inclusion criteria were the following :

- i) Population, or participants and conditions of interest: Obese adolescents – ages 12 to 19- of any gender, worldwide, who underwent bariatric surgery.
- ii) Interventions or exposures: Obese adolescents who underwent bariatric surgery.
- iii) Comparisons or control groups: Obese adolescents who followed lifestyle and dietary modifications (conservative approach) as management.
- iv) Outcomes of interest: The efficacy of bariatric surgical interventions and the factors that affected the decision to proceed with this specific management plan.
- v) Setting: Tertiary care.
- vi) Study designs: observational studies, randomized controlled trials, clinical trials.
- Exclusion criteria: children 19 years, solely conservative management of obesity.

Information sources The literature search was conducted in three databases: PUBMED/MEDLINE, Cochrane Central Register, and SCOPUS. An additional forward and backward search was performed in the reference articles of the additional studies for identification of further eligible studies.

Main outcome(s) The following outcomes were extracted and analyzed from the included studies:

- 1) Weight Loss Efficacy: Changes in Body Mass Index (BMI) and absolute weight loss across short-, medium-, and long-term follow-up periods.
- 2) Comorbidity Resolution: clinical remission or improvement in major obesity-related comorbidities across the different surgical techniques (including T2DM, hypertension, dyslipidemia, PCOS, OSA, abnormal kidney function, depression and anxiety).
- 3) Surgical Safety : Early and late post-operative complications, the occurrence of long-term micronutrient deficiencies, and the possibility of reoperation or revision for RYGB, SG, and LAGB.
- 4) Factors influencing the decision-making process: Medical, socioeconomic disparities, geographic availability, financial/insurance parameters, and psychosocial influences that act as barriers or facilitators in the decision-making process for adolescent bariatric surgery.

Quality assessment / Risk of bias analysis The quality assessment of the data was performed by the two authors (MA and GP) separately and blindly using the Newcastle – Ottawa Scale for cohort studies. The evaluation was created through a star-awarding system which categorizes the studies as good, fair, or poor quality. For the assessment of RCTs and clinical trials, the EPHPP

(Effective Public Health Practice Project) tool is used . Any disagreements were discussed to reach a consensus.

Strategy of data synthesis The data extraction was performed by two authors (M.A. and G.P.) working independently, using standardized Excel templates. Any disagreements that occurred were resolved through discussion between the two authors. During this process, the following characteristics were studied, including authors' name, study type, age and number of participants, type of intervention (RYGB, SG, LAGB), preoperative and postoperative mean BMI, procedure outcomes, follow-up time, and complications that occurred. A second table has been created which includes the first author's name, the study type, the number of patients, the mean preoperative BMI, the factors that influenced the choice to proceed to surgery and the outcomes. According to the outcomes, a collective data synthesis was created. A narrative (qualitative) synthesis was used to analyze and combine the findings from the included studies. A meta-analysis was not performed.

A total of 33 observational studies, 3 RCTs and 3 clinical trials were analyzed, consisting of a total of 6777 obese children/adolescents (BMI > 95th percentile cut point for age and gender according to WHO), with ages ranging from 12 to 19 years. The interventions were conducted across multiple countries (USA, UK, Brazil, Germany, Saud Arabia, Sweden, Spain) with a follow-up period ranging from 30 days to 15 years, thus representing variability regarding population and follow-up. The collective data synthesis was organized into two main structured evidence tables. These studies examined primarily the efficacy of bariatric surgery on the management of adolescent obesity, through a comparison of the different techniques (RYGB, LAGB, SG), as well as their superiority over lifestyle modifications. The efficacy depends on various aspects, which are presented on Table 2. A secondary focus of this review is the evaluation of factors influencing the decision-making process regarding bariatric surgery, including limited insurance coverage, lack of adequate information, socioeconomic and demographic factors and a general stigma associated with these procedures (Table 3). Extracted data related to these outcomes are presented in Tables 2 and 3.

Subgroup analysis No formal statistical subgroup analysis was performed. However, we descriptively compared and grouped our findings based on:

- 1) The Type of Surgery (Table 2): Clinical outcomes were compared (weight loss, comorbidity

resolution and post-operative complications) between RYGB, SG, and LAGB.

2) The Decision-Making Factors (Table 3): Findings regarding the clinical necessity of the procedures were grouped and qualitatively contrasted against non-clinical barriers (including limited insurance coverage, socioeconomic/demographic disparities, and social stigma).

Sensitivity analysis No sensitivity analysis was performed, as this systematic review is a qualitative narrative synthesis and does not include a formal statistical meta-analysis.

Country(ies) involved Greece. All authors involved in this systematic review are affiliated with institutions in Greece, and the study was fully conducted within this country.

Keywords Bariatric surgery; Adolescent obesity; Childhood obesity; co-morbidities; effectiveness; decision-making process.

Contributions of each author

Author 1 - Maria Athanasopoulou - Conceptualized the study, outlined the methodology, performed the original systematic search and study selection and performed the original draft preparation.

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Author 2 - George Paltoglou - Conceptualized the study, outlined the methodology, performed the original systematic search and study selection and reviewed and edited the manuscript.

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