Indian Academy of Pediatrics (IAP)

STANDARD TREATMENT GUIDELINES 2022

Childhood Obesity

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Introduction

Childhood obesity has a significant short- and long-term impact. The key to management lies in avoiding unnecessary work-up with physiological causes while not missing pathological causes.

Diagnostic Criteria

- ☑ *Body mass index (after 2 years of age):* Weight (kg)/height (m^2)
  - *IAP 2015 charts* derived from backtracking of adult body mass index (BMI) Indian cutoffs for overweight (23 kg/m^2) and obesity (27 kg/m^2).
  - *Extreme obesity:* BMI ≥ 120% of the 95th percentile or ≥ 35 kg/m^2.
  - *Limitations:*
    - Ethnic differences in the proportion of body fat at the same BMI.
    - Lower reliability in pubertal age (pubertal children and adolescents are more likely to be classified as obese than those who are of the same age but prepubertal).
    - Erroneous diagnosis of obesity in short and muscular individuals.
- ☑ *Weight for height (weight for length):* Till 2 years of age (>97.7th percentile suggest obesity).

Causes

Majority (~98%) do not have a pathological cause (exogenous or constitutional obesity).

- ☑ *Exogenous obesity:* Normal growth, development, and puberty are suggestive.
- ☑ *Monogenic obesity:* Early-onset obesity (before 5 years of age) with extreme hyperphagia (food-seeking behavior-stealing food, eating food leftover by others; impaired satiety).
- ☑ *Obesity syndromes:* Distinct features (abnormal facies, digits, vision) and systemic involvement, with hyperphagia.
- ☑ *Hypothalamic obesity:* Neurological features (headache, irritability, seizures) and/or neurological insult with rapid weight gain, hyperphagia. Neuroimaging is essential to identify a hypothalamic lesion.
- ☑ *Drug-induced obesity:* Associated with glucocorticoids, antipsychotics (risperidone and olanzapine), and antiepileptic drugs (valproate and carbamazepine).
- ☑ *Endocrine causes (hypothyroidism, Cushing syndrome, pseudohypoparathyroidism):* Commonly over-diagnosed due to confounding effects, but otherwise rare. Associated short stature is the hallmark of underlying endocrine cause. Obesity causes mild elevation of thyroid-stimulating hormone (TSH) that is usually its effect and not the cause.

Assessment

Key aspects include differentiation of physiological and pathological causes, identification of a cause, and assessment of complications.

Is it Pathological?

Any of the following suggest a pathological cause:

- ☑ Delay in growth, puberty, or development
- ☑ Dysmorphism
- ☑ Hyperphagia
- ☑ Early-onset
- ☑ Visual symptoms
- ☑ Neurological features.

What is the Cause?

- ☑ Birth weight, lifestyle, dietary intake, screen time, and physical activity.
- ☑ Family history of obesity, hypertension, and dyslipidemia.
- ☑ Onset and progression.
- ☑ Pubertal staging (including measurement of stretched penile length in boys).
- ☑ Treatment history for drugs causing obesity.
- ☑ Assessment of pointers and features of syndromic obesity **(Tables 1 and 2)**.
- ☑ *Waist circumference:* Marker of abdominal (regional) adiposity and a risk factor for metabolic syndrome.

TABLE 1: Pointers to cause of obesity.

Features	***Likely disorders***
Delayed puberty	Bardet–Biedl, Prader–Willi
Retinitis pigmentosa, polydactyly	Alstrom, Bardet–Biedl
Short hands and feet	Prader–Willi syndrome
Buffalo hump, striae, plethora, hypertension	Cushing syndrome
Short fourth metacarpal	Pseudohypoparathyroidism
Developmental delay	Prader–Willi, hypothyroidism, pseudohypo-parathyroidism (PHP)

TABLE 2: Features of common causes of syndromic obesity.

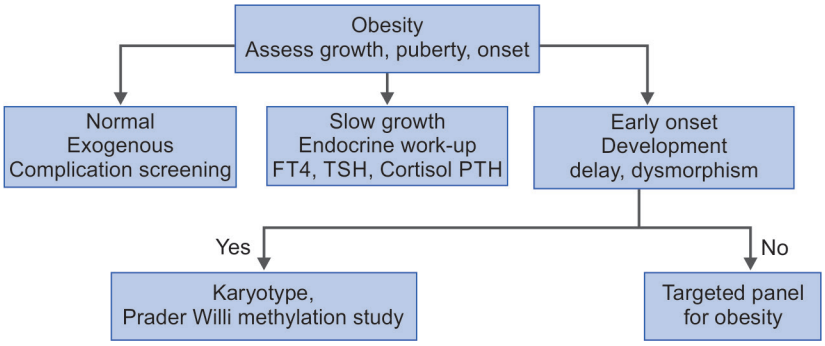
Disorders	***Features***	***Diagnostic test***
Prader–Willi	☑ Infantile hypotonia and failure to thrive followed by rapid weight gain after two years ☑ Almond-shaped eyes, prominent philtrum ☑ Acromicria, hypogonadism ☑ Hyperphagia, behavioral abnormalities	Methylation-sensitive polymerase chain reaction (PCR) for chromosome 15 (imprinting disorder)
Bardet–Biedl	☑ Polydactyly, retinitis pigmentosa ☑ Developmental delay, polyphagia ☑ Renal abnormalities	Next generation sequencing (NGS) (Oligogenic chromosome 11)
Alstrom	Dilated cardiomyopathy, type 2 diabetes, progressive loss of vision and hearing	NGS (*ALMS1* gene mutation)

Pointers to Complications

- ☑ Headache (benign intracranial hypertension, hypertension)
- ☑ Limp or leg pain (slipped capital femoral epiphysis)
- ☑ Day time somnolence (sleep apnea)
- ☑ Abdominal pain (gallstone disease and steatohepatitis) and polyuria (type 2 Diabetes).
- ☑ Cutaneous acanthosis.
- ☑ *Overdiagnosis:* Following conditions may be overdiagnosed in obese children.
  - Small phallic size due to buried penis.
  - Precocious puberty in girls with lipomastia.
  - Rickets in children with genu valgum.

Work-up (Flowchart 1)

Flowchart 1: Approach to obesity.



- ☑ *Complication assessment* ***(Table 3)****:* Key investigations include oral glucose tolerance test, ALT, and lipid profile. A sleep study may be considered with headache, daytime somnolence, and lethargy.
- ☑ *Endocrine work-up:* Only in children with short stature.
  - Morning cortisol and overnight dexamethasone suppression.
  - FT4, TSH.
  - Calcium, phosphorus, parathyroid hormone (PTH).
- ☑ *Targeted panel for monogenic causes:* Before 5 years with severe hyperphagia, delayed development.

Assessment

TABLE 3: Pediatric cut-offs for metabolic complications.

Investigation	*Level of concern*	*Pathological level*
Blood sugar fasting	100–125 mg/dL	> 126 mg/dL
Blood sugar 2 hours after glucose*	140–199 mg/dL	> 200 mg/dL
Hemoglobin A1c (HbA1c)	5.7–6.4%	> 6.5%
Total cholesterol	170–199 mg/dL	> 200 mg/dL
Low-density lipoprotein (LDL) cholesterol	90–129 mg/dL	> 130 mg/dL
Triglyceride	90–129 mg/dL	> 130 mg/dL
High-density lipoprotein (HDL) cholesterol	40–45 mg/dL	< 40 mg/dL
Alanine aminotransferase (ALT)	> 25 IU/L (boys) > 22 IU/L (girls)	> 60 IU/L

*1.75 g/kg of glucose, to a maximum of 75 g—oral glucose tolerance test (OGTT).

Prevention and Management

Preventive Measures

- ☑ Exclusive breastfeeding till 6 months of age.
- ☑ Regular meal timings, including breakfast.
- ☑ At-least 7–8 hours of sleep daily at night.
- ☑ Lifestyle intervention should precede and should be maintained during pharmacotherapy.
- ☑ Obesity prevention guidelines from American Academy of Pediatrics recommend Fight Childhood Obesity by *'5-2-1-0' rule* **(Fig. 1)**. Accordingly, children can consume above 5 servings of fruits and vegetables, screen time below 2 hours, participate in one hour of physical activity, and consume 0 sugar-sweetened beverages daily.

Fig. 1: Prevention of childhood obesity "Let's Go: 5-2-1-0 Rule".

Considerations for Specialist Referral

- ☑ Early-onset obesity (before 5 years).
- ☑ Rapid progression.
- ☑ Delayed development, growth, and puberty.
- ☑ Neurological features
- ☑ Abnormal metabolic workup.

Targets

- ☑ Gradual and sustained loss.
- ☑ Body mass index (BMI) SD score (SDS) reduction of 5% roughly translating to 7–10% weight loss over 6 months.
- ☑ Avoid loss over 1.5 kg per month.

Management

General Measures

- ☑ Regular meals, including breakfast.
- ☑ 45 minutes of regular moderate to vigorous physical activity and screen time below 1 hour daily.
- ☑ Avoidance of snacking, inactivity, and screen exposure while eating.
- ☑ Avoid rigorous dieting.
- ☑ Identify red flag signs for psychosocial impact (school absenteeism, body shaming or teasing by peers regarding weight/appearance, persistent anxiety, depression or self-harm, anger outbursts, substance abuse, eating disorders) and family stressors.
- ☑ Specialist referral in the presence of complications.

Medical Management

- ☑ *Metformin:* Approved in Type 2 DM after 8 years of age. May consider in causes related to antipsychotic medication, polycystic ovarian disease, and steatohepatitis.
- ☑ *Orlistat:* Gastric lipase inhibitor that decreases fat absorption. Approved after 12 years of age.

Bariatric Surgery

- ☑ Should be discouraged as it carries more significant complications than adults.
- ☑ Indicated only with severe obesity (BMI >40 kg/m^2 or >35 kg/m^2 with complications) and only after completion of linear growth.
- ☑ A multidisciplinary obesity team with long-term follow-up is essential to maintain compliance with nutritional recommendations.
- ☑ Extreme motivation, strict diet, and activity schedule must be maintained after surgery.

Further Reading

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