



PG Residency Pediatrics

Endocrinology

Smart Notes. Better Scores.



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Pediatric Obesity: Assessment & Growth Charts

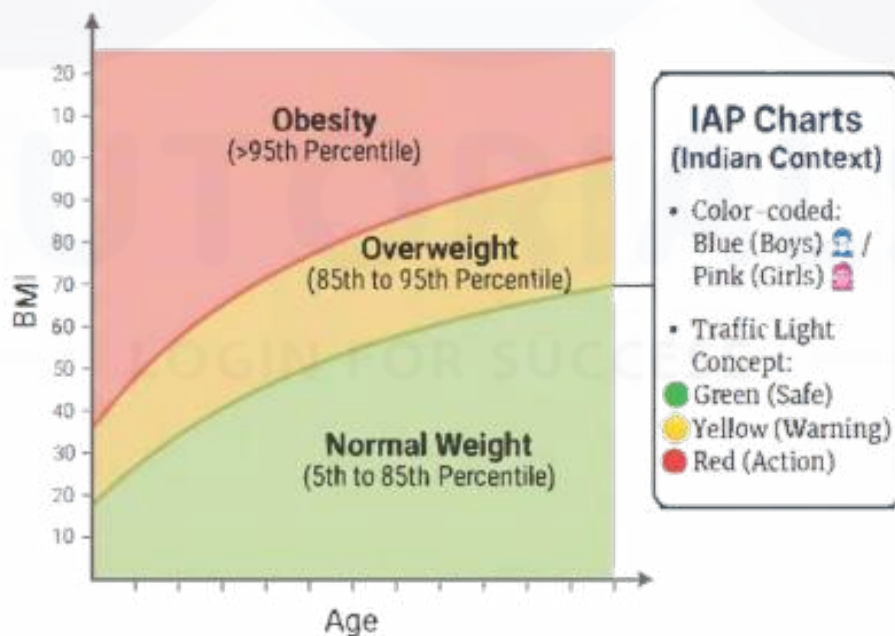
Clinical definition, measurement tools, and percentile classifications

Clinical Assessment

- **Definition:** Metabolic disorder where energy intake exceeds energy expenditure.
- **Primary Tool:** Body Mass Index (BMI).

$$\text{BMI} = \frac{\text{Weight (Kg)}}{\text{Height}^2 (\text{m}^2)}$$
Limitations: Cannot differentiate muscle from fat (overestimates in muscular children, underestimates in tall/lean children). **Surrogate Markers:**
 - **Waist-to-Hip Ratio (WHR):** High cardiovascular risk if >1.0 (Men) or >0.85 (Women).
 - **Skinfold Thickness:** Measures subcutaneous fat via Vernier Calipers (Triceps, Subscapular).

Pediatric Classification

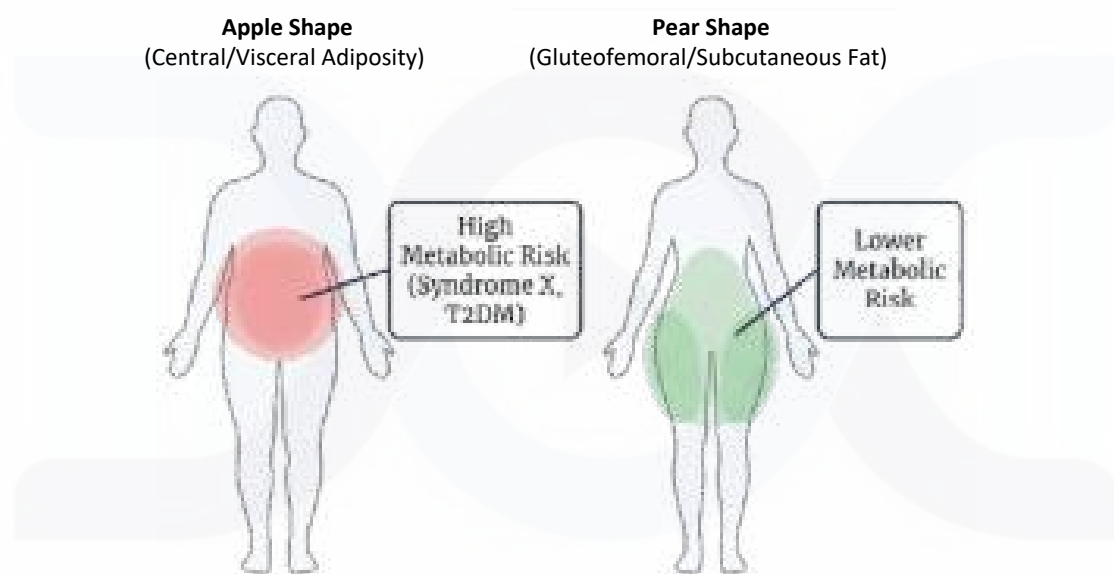


Epidemiology, Etiology & Obesity Types

India ranks 3rd globally in pediatric obesity prevalence (after USA and China).

Morphology

Fat Distribution Morphology (Visual Comparison)



Morphology

Etiological Classification

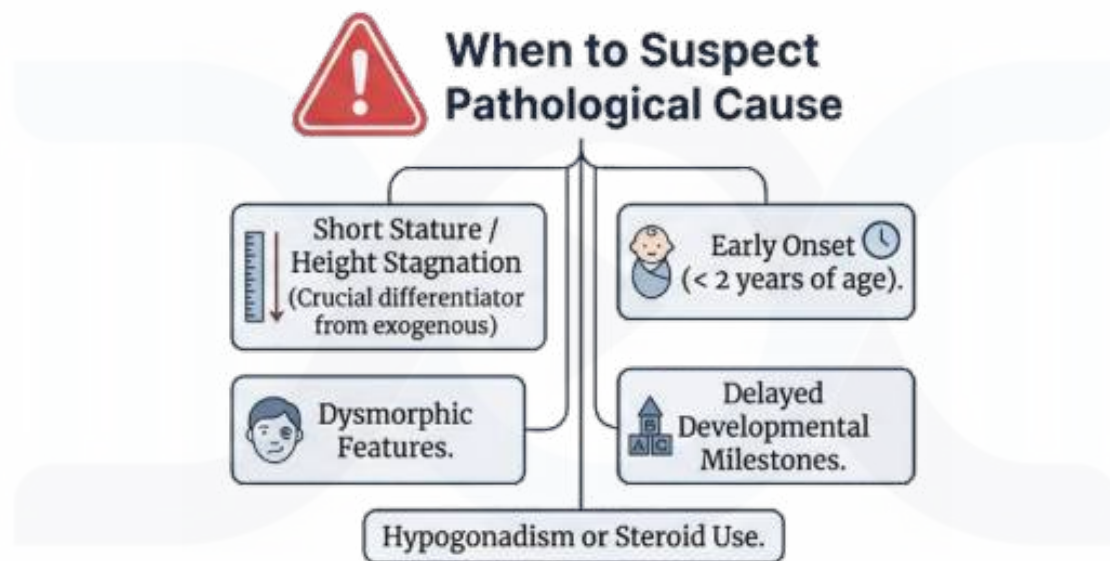
- **Exogenous (90%):** Lifestyle-driven (Diet, Inactivity, Screen time).
- **Endogenous (10%):** Hormonal or Syndromic.
 - **Hypothyroidism:** Low Basal Metabolic Rate (BMR).
 - **Cushing's Syndrome:** Hypercortisolism (Central obesity).
 - **Hypothalamic:** Damage to satiety center.
 - **GH Deficiency:** High fat mass / Low lean mass.

Syndromic Obesity & Red Flags

Differentiating pathological causes from lifestyle obesity.

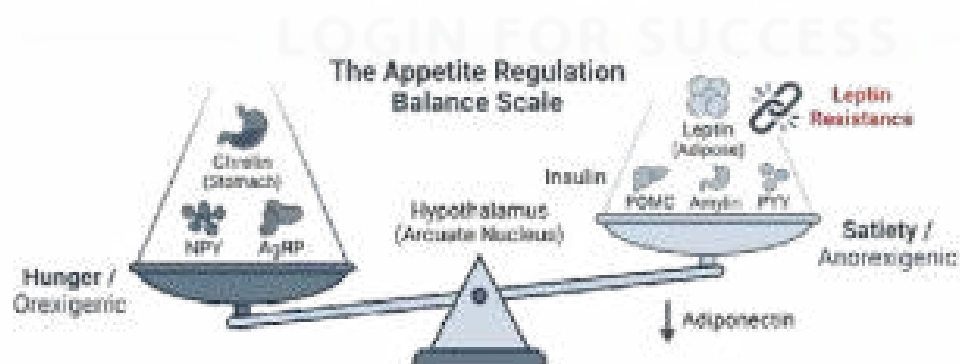
Syndromic Obesity

- **Prader-Willi Syndrome:** Hypotonia, almond-shaped eyes, hyperphagia, small hands/feet
- **Bardet-Biedl Syndrome:** Retinal dystrophy, polydactyly, obesity.
- **Alström Syndrome:** Vision/hearing loss, cardiomyopathy.
- **Barker Hypothesis:** "The First 1000 Days" (conception to 2 years) are critical. Poor intrauterine nutrition alters metabolic programming.



Pathogenesis & Neuro-Hormonal Regulation

Sustained positive energy balance (Intake > Output) → Adipose saturation → Visceral spillover (Liver, Heart, Pancreas).



This neuro-hormonal imbalance, characterized by increased hunger signals (Orexigenic) and compromised satiety signals (Anorexigenic), particularly Leptin Resistance, drives chronic overeating and persistent fat accumulation, leading to systemic metabolic consequences.

Complications: Metabolic & Endocrine

BMI > 25 (adult equivalent) correlates with a steep rise in morbidity.



Complications: Systemic & Psychosocial

Mechanical, organic, and behavioral consequences.

The Psychosocial "Vicious Cycle"



Systemic Impact

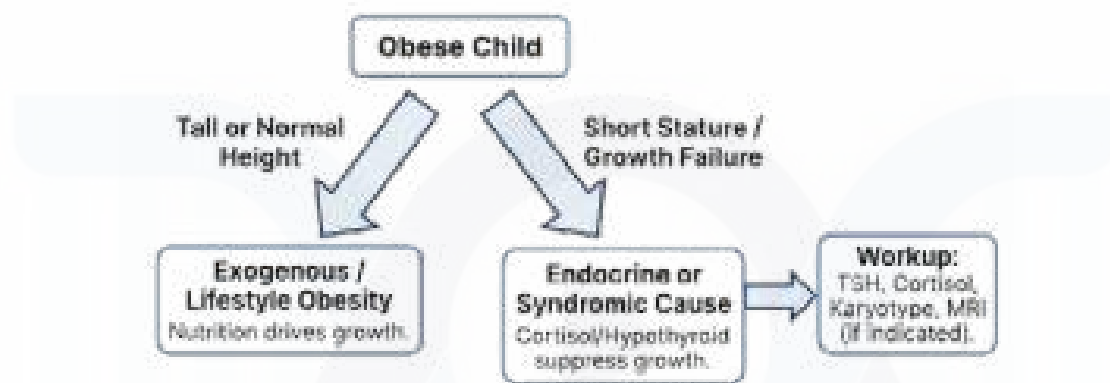
- **Mechanical / MSK:** Osteoarthritis, Gout.
- **Respiratory:** Obstructive Sleep Apnea (OSA), Pickwickian syndrome.
- **Gastrointestinal:**
 - NAFLD → NASH → Hepatocellular carcinoma.
 - Gallstones, GERD.
- **Malignancy Risks:**
 - **Female:** Breast, Endometrium, Ovary.
 - **Male:** GI tract, Prostate, Liver.

Evaluation Strategy & Diagnostic Algorithm

Differentiating etiology based on growth velocity.

Investigation Indications:

- Evaluate if: Obesity + Comorbidities OR
 - Red Flag Signs.
- Panel: Metabolic (Glucose, Lipids, LFT), Hormonal (TSH, Cortisol, LH/FSH), Imaging (DEXA, MRI).



Treatment Need Matrix (Bottom):

Age Group	Action
2-7 yrs	Weight maintenance (unless BMI >95th).
>7 yrs	Weight loss advised if BMI >95th or complications present.

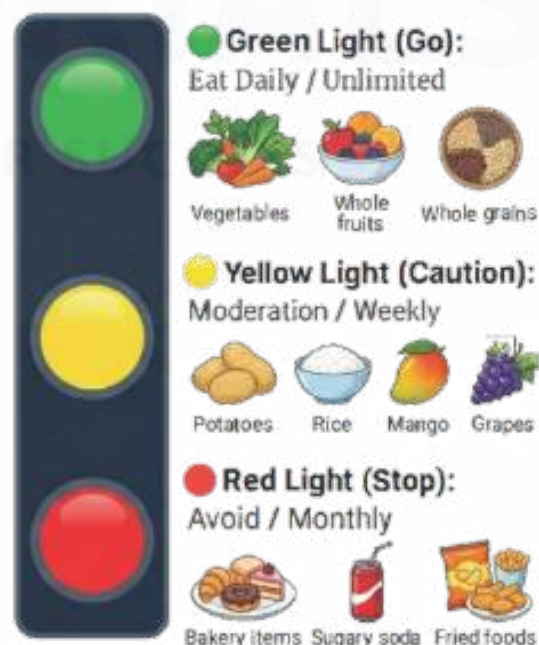
Management: Diet & Nutrition

Team:

- Pediatrician, Dietician, Psychologist, Physiotherapist.

Dietary Composition:

- Carbs:** 45-60% | **Protein:** 10-20% |
- Fat:** <30% (saturated fats <10%).
- Behaviors:** "Rainbow Diet," No screens during meals, Heavy breakfast / Light dinner.



Activity, Prevention & The "0-1-2-5-10" Rule

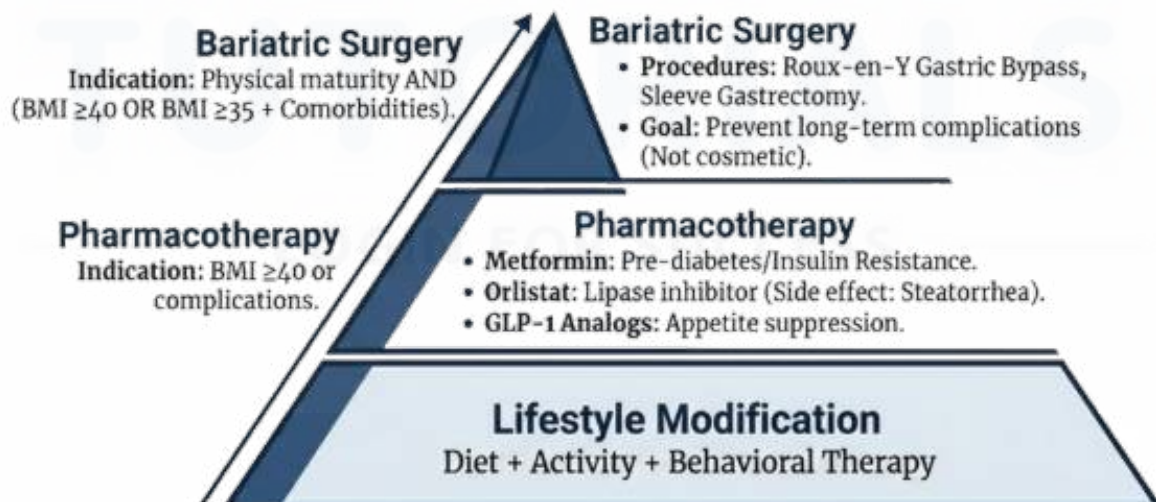
- **Target:** ≥ 60 mins/day of physical activity (AHA).
- **Type:** Aerobic (Walking/Running), School sports.
- **Screen Limits:** < 2 yrs: Zero | 2-6 yrs: < 1 hr/day | > 6 yrs: < 2 hrs/day.

Visual: Healthy Living Mnemonic



Pharmacotherapy & Bariatric Surgery

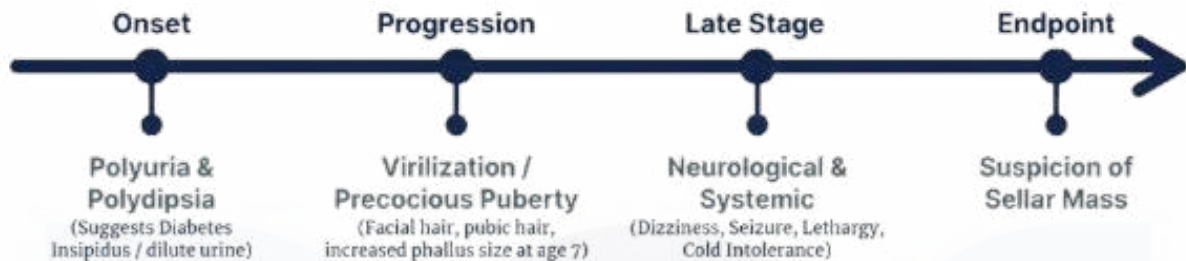
Escalation of care for severe and morbid obesity.



Case Study: Pituitary Mass Lesion

- **Patient:** 7-year-old boy, history of consanguinity.
- **Initial Misstep:** Treated for seizure/giddiness without endocrine workup at primary center.

Visual: Symptom Progression Timeline



Examination Findings: Eyes & Skin

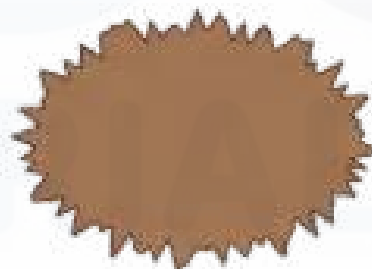
Physical Findings:

- **Vision:** Asymmetric vision loss (Right: Counting fingers; Left: 6/24).
- **Fundus:** Normal (Indicates retrobulbar/chiasmal pathology).

Visual: Differential Diagnosis of Cafe-au-lait Macules



Graphic A
Neurofibromatosis 1 (NF1)
Coast of California (Smooth)

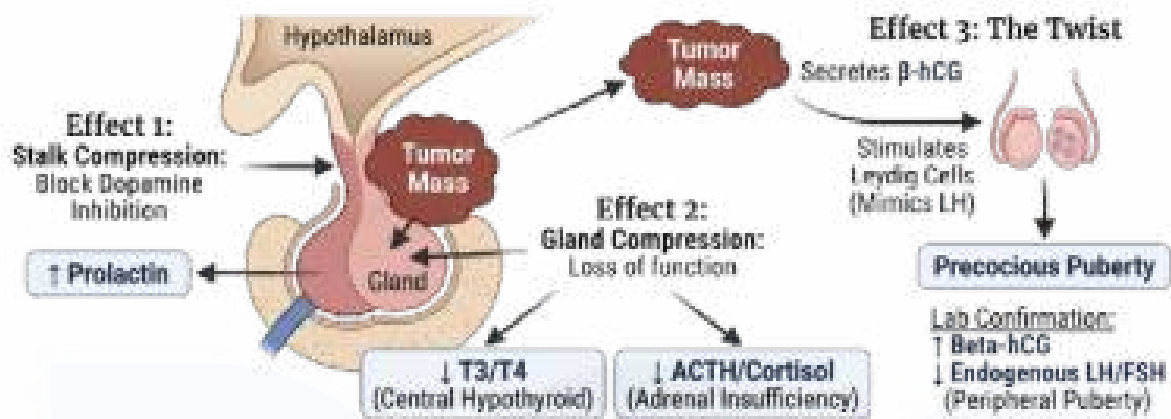


Graphic B
McCune-Albright Syndrome
Coast of Maine (Irregular)

Case Note: Patient had NO cafe-au-lait spots (Rules out NF1 & McCune-Albright).

Endocrine Workup & The "Twist"

Diagnosis: Panhypopituitarism + Peripheral Precocious Puberty



Tumor Markers: ↑ AFP + ↑ Beta-hCG Specific for Non-germinomatous Germ Cell Tumor (NGGCT)

Note: NGGCT is aggressive (Chemo + Surgery). Pure Germinoma is radio-sensitive.

Differential Diagnosis: Suprasellar Masses

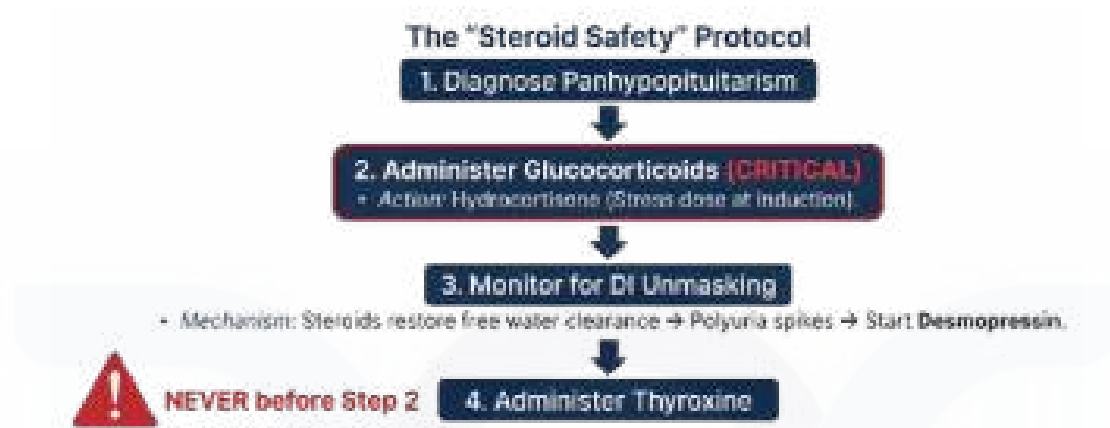
Imaging: Supra-sellar solid-cystic mass with extra-sellar extension.

Feature	Craniopharyngioma	Germinoma (Case Diagnosis)
Age	Common in children (5-14y)	Midline/Suprasellar
Calcification	Present (Common)	Absent
Puberty Impact	Usually Delayed Puberty	Precocious Puberty (if β-hCG secreting)
Visual Field	Inferior field loss (Compressed from above)	Variable
Tumor Markers	None	↑ AFP /↑ β-hCG

Final Diagnosis: Symptoms (DI + Precocious Puberty) + Markers = **Germ Cell Tumor**.

Management Sequence & Safety Rules

Golden Rule: Steroids First, Then Thyroxine. (Thyroxine increases cortisol clearance; giving it first can precipitate adrenal crisis.)



Post-Op Priorities: 1. Hydrocortisone (Life-saving) | 2. Thyroxine | 3. GH/Sex Steroids (Deferred).

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