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Partha's Management Algorithms in Pediatric and Adolescent Practice

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2 CHAPTER

Growth and Development

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- **Evaluation of an Obese Adolescent**
- **Evaluation of an Adolescent with Poor School Performance**

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2.1 Approach to a Child with Precocious Puberty

MKC Nair, Deepa Bhaskaran

INTRODUCTION

Precocious puberty refers to development of secondary sexual characters at an age that is more than 2.5 standard deviations (SD) below the population's mean age of pubertal onset. The standard cutoff is that puberty is considered precocious when it occurs before age 8 years in girls and age 9 years in boys.

EVALUATION OF PRECOCIOUS PUBERTY IN A CHILD (FLOWCHARTS 2.1.1 AND 2.1.2)

Common Findings

- *History*: Pubic hair development and genitalia growth at less than 9 years of age.
- *Physical examination*: Accelerated growth.
- Pubic hair TS > II testes may be enlarged (> 4 mL)
- Penis TS > II
- *Labs*: Luteinizing hormone (LH), follicle-stimulating hormone (FSH), and testosterone levels are pubertal. Bone age (BA) is advanced.

Evaluation

A thorough history includes details of pregnancy, birth, gestational age, neonatal course, central nervous system (CNS) insults or infections, medication or radiation exposure, potential exogenous exposure to sex steroids, recent onset visual problems, etc.

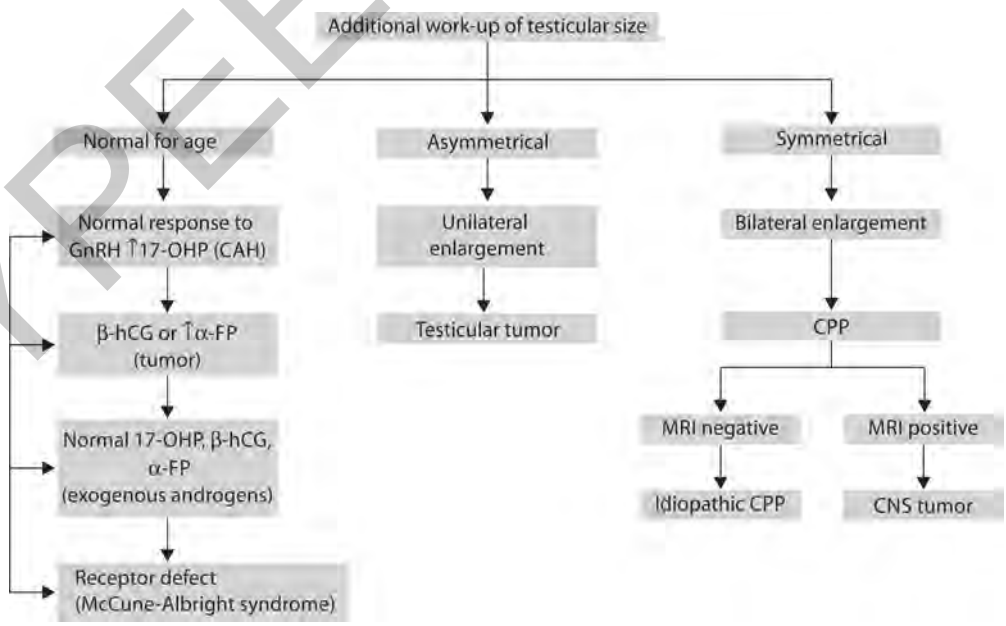
A pedigree chart including details of extended family regarding the occurrence of precocious puberty and parental pubertal milestones should be drawn.

A detailed physical examination including assessment of growth velocity and BA are the initial screening tools.

A detailed neurologic assessment including fundus examination is necessary, along with a thorough dermatologic examination to detect skin lesions such as neurofibromas, hyperpigmented patches, axillary freckling, acanthosis nigricans, and acne. Also rule out persistent headache, seizures, focal deficits, adverse affective emotional states, loss of temporal vision, polyuria, polydipsia, and galactorrhea.

The pubertal stage can be determined by the Tanner method. Pubic hair, apocrine odor, and axillary hair in both boys and girls are typically related to adrenal androgen

Flowchart 2.1.1: Evaluation of precocious puberty in a child.



Abbreviations: CAH, congenital adrenal hyperplasia; PP, precocious puberty; GnRH, gonadotropin-releasing hormone; β-hCG, beta-human chorionic gonadotropin, 17-OHP, 17-hydroxy progesterone; MRI, magnetic resonance imaging; α-FP, alpha fetoprotein; CPP, central precocious puberty

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production (adrenarche). Not only the age of onset but the rate of progression of the pubertal changes is also important.

The abdomen, thyroid, and testis should be examined for the presence of a mass or enlargement.

The laboratory and radiologic studies are chosen based on the patient's age, gender, growth velocity, and whether the patient has both breast and pubic hair development or just one secondary sexual characteristic.

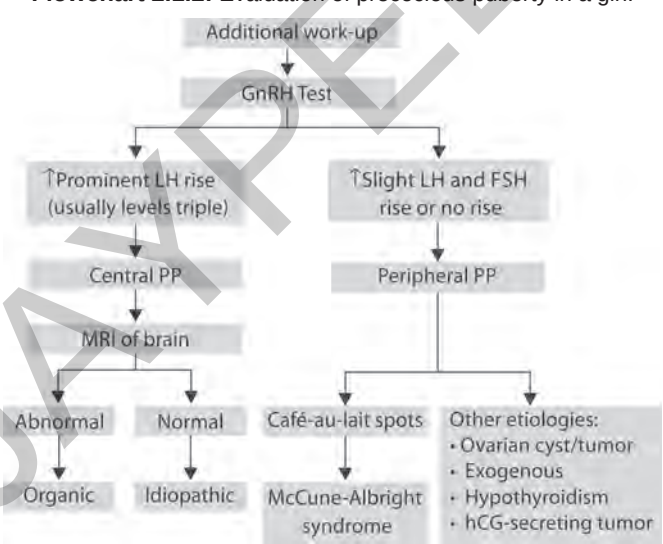
Investigations are done:

- In a boy who is younger than age 9 years with the onset of any secondary sexual characteristics (like testes size ≥ 4 mL, appearance of pubic/axillary hair).
- In a girl younger than 8 years old with breast stage 2 and/or pubic hair development.

The basic investigation is BA. BA indicates skeletal maturation and is an important marker of hypothalamic maturation. If the BA is advanced as compared to chronological age (CA), especially if by more than two SD, then a thorough evaluation must ensue to determine the etiology. If BA is not advanced or significantly delayed, then no further evaluation is needed. The affected child must be frequently followed up for accelerated growth and pubertal signs, dermatologic changes, and neurologic deficits.

Radiological investigations include MRI of the brain to rule out CNS pathologies. Other investigations include pelvic ultrasound and abdominal ultrasound, computed tomography scan or MRI of abdomen and pelvis to assess the size and condition of the reproductive organs and to exclude an adrenal mass.

Flowchart 2.1.2: Evaluation of precocious puberty in a girl.



Abbreviations: GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone; FSH, follicle-stimulating hormone; PP, precocious puberty; hCG, human chorionic gonadotropin; MRI, magnetic resonance imaging

The basic hormonal studies include basal serum levels of LH, FSH, and the sex steroids (estradiol or testosterone). Gonadotropin-releasing hormone (GnRH) analog stimulation test is done in cases of suspected central precocious puberty (CPP). Other necessary hormonal studies include thyroid studies, androstenedione, and human chorionic gonadotropin levels.

If signs of androgen excess are evident, electrolytes, dehydroepiandrosterone sulfate (DHEA-S), plasma 17-hydroxy progesterone and urinary ketosteroids are of importance. An adrenocorticotropic hormone (ACTH) stimulation test may be required if congenital adrenal hyperplasia (CAH) is suspected.

PREMATURE THELARCHE (TABLE 2.1.1)

This is referred to the appearance of palpable glandular tissue in girls aged between birth and 6 months of age (maternal hormonal effect). The problem can also occur up to 2 years without progressive growth—the etiology is unclear, but may be caused by small ovarian cysts that produce small, transient amounts of estrogen. Hormonal testing and pelvic ultrasound with additional intervention

TABLE 2.1.1: Evaluation of precocious puberty.

Evaluation premature thelarche	
History	Onset of breast development: Birth—2 years
Physical examination	• Only breast development • Normal height, no accelerated growth
Labs	• Estradiol: Prepubertal, might be slightly elevated • Bone age: Chronological age
Evaluation of premature adrenarche	
History	Onset of age: 4–8 years
Physical examination	• Pubic hair ±, axillary hair development • No breast development or testicular enlargement • Normal height, growth velocity can be slightly increased but normal for pubic hair, Tanner stage on the growth velocity charts
Labs	• Luteinizing hormone (LH)/follicle-stimulating hormone (FSH): Prepubertal • Bone age slightly advanced but equal to height age

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should be done only in cases where breast size increases over a 4–6-month period or is accompanied by rapid growth. Maintaining a proper growth chart and close follow-up to look for any new sign of puberty appearing is very important in the management of such children.

In premature thelarche, palpate the breast and rule out whether it is breast tissue which is firm to palpation or adipose tissue (lipomastia) which is soft to palpation. Lipomastia can occur as a manifestation of obesity in children.

Treatment

If there is a definitive etiology, then treatment can be focused on that. If BA is significantly more advanced than the CA and the predicted adult height falls below the 5th percentile and predicted adult height is more than 5 cm below the midparental height, then pubertal suppression should be considered.

Idiopathic CPP is currently treated with GnRH agonists to suppress the hypothalamo-pituitary-gonadal or adrenal axis. One of the most widely used drugs to treat CPP is intramuscular or subcutaneous leuprolide. GnRH agonists are effective at improving final adult height, especially in younger children with precocious puberty and may improve psychosocial functioning. Following treatment, regression of pubertal development occurs within the first 6 months.

One of the benign variants of early pubertal development is premature adrenarche (PA), which is associated with an increase in the secretion of DHEA and DHEA-S. This can result in the appearance of pubic hair, axillary hair, body odor, and mild acne. If these signs are seen in association with normal growth rates, and there is no evidence of genital enlargement, the diagnosis is generally PA. In such cases, DHEA-S levels are typically increased for age, usually in the range of 30–150 µg/dL. Since there is no activation of the hypothalamic-pituitary-gonadal (HPG) axis, FSH, LH, and estradiol or testosterone concentrations will be at prepubertal levels.

Indications for suppression of precocious puberty are:

- Age less than 7 years for girls and less than 8 years for boys.
- Bone age more than two SD beyond CA.
- Predicted adult height more than two SD (or 10 cm) below genetic potential (less than 150 cm).
- Rapid progression of growth or pubertal signs and severe psychosocial disturbances.

Height, weight and pubertal staging should be monitored every 3 months for the untreated children.

Treated children should be monitored every few months. Their height, weight, and pubertal staging and interval pelvic ultrasounds, GnRH stimulation tests, hormonal studies and BA assessments should be done. Adjuvant treatments of precocious puberty include growth hormone and cyproterone acetate. Before the introduction of gonadotropic analogs, cyproterone acetate was used orally for its effect on pituitary gonadotropin secretions for the treatment of CPP.

Acknowledgments: Dr Riaz I, Assistant Professor, Department of Pediatrics, SAT Hospital, Government Medical College, Thiruvananthapuram.

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2.2 Evaluation of a Toddler with Speech Delay

MKC Nair, Deepa Bhaskaran

INTRODUCTION

Speech is the motor act of communicating by articulating verbal expression, whereas language is the knowledge of a symbol system used for interpersonal communication. In general, a child is considered to have speech delay if the child's speech development is significantly below the normal for children of the same age. The speech-delayed child's skills are acquired in a normal sequence, but at a slower-than-normal rate. The prerequisites for normal development of speech and language are normal hearing, ability to perceive sounds of speech, normal fine motor development of larynx, lips, tongue, jaw, and palate. Moreover, they should have a mental representation of objects and activities which are important to them. Thus, in the process of language development, the domains

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of cognition, social adaptation, and perceptual motor functions interact with each other, influencing and enhancing the growth.

Delayed onset of speech may be accompanied by a number of developmental problems (Flowchart 2.2.1). Speech delay has a significant impact on personal, social, academic, and later vocational life. Early identification and appropriate intervention may reduce the emotional, social and cognitive deficits of this disability and may improve the outcome.

PROCESS OF EVALUATION

Developmental History

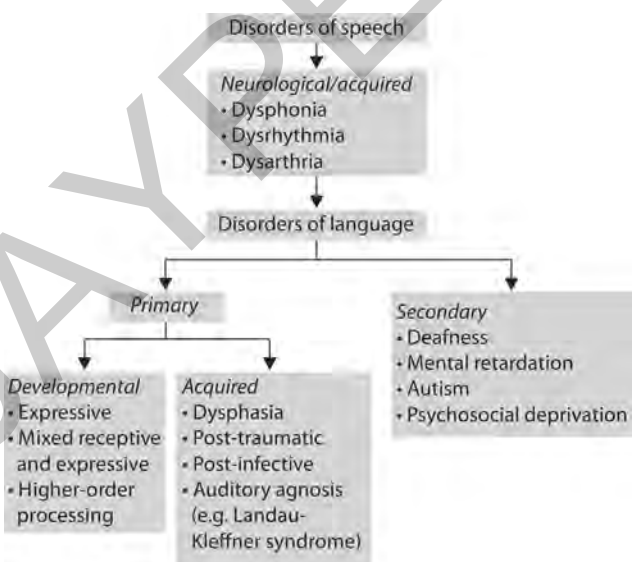
A detailed developmental history should be elicited to rule out primarily a disorder affecting language and speech or a global delay. A detailed feeding history provides early indications of neuromotor deficits which can lead on to developmental verbal apraxia. History regarding previous otitis media or central nervous system (CNS) infections should be elicited. Family history of delayed speech is often present in children with developmental language disorders (DLD). Since children with speech delay have difficulty in communicating, they have a high frequency of behavioral problems. A history of behavioral problems should also be sought.

Warning Signs of Speech Delay

In each well-baby visit, look for warning signs of speech and language impairment.

- No words at 18 months.
- Not putting two words together at 2 years
- Not making sentences at 3 years
- Unintelligible speech at 3 years
- Absence of imitative and symbolic play at 2 years.

Flowchart 2.2.1: Classification of speech and language disorders.



Physical Examination

Physical examination should include anthropometric measurements, such as weight, height and head circumference. A complete general and systemic examination should be done. Look for cutaneous stigmata of tuberous sclerosis like ash leaf macule and café au lait spots. External ear anomalies may indicate underlying hearing impairment. A neurological examination should be done including assessment of movements of tongue, lips, and soft palate. The child should be asked to imitate movements of the lips, and tongue. Rule out the presence of soft neurological signs such as left–right discrimination, fine motor clumsiness and oculomotor disorders.

Development Assessment

Development screening should be done using Trivandrum Developmental Screening Chart (TDSC: 0–6 years) or Denver Developmental Screening Chart (DDST-II). The speech and language should be screened using Language Evaluation Screening Test (LEST: 0–6 years). Confirmation of the speech delay and categorization into expressive or combined delay can be done using Receptive Expressive Emergent Language Scale (REELS). IQ can be assessed in children above 3 years of age so that isolated DLD can be differentiated from the delay in speech and communication that occurs as part of developmental delay.

Investigations

Hearing assessment should be done in all children with speech delay even if they appear to have intact hearing. In a male child with autism or intellectual developmental disability, fragile X syndrome should be ruled out. In children with isolated language disorder or acquired aphasia, an electroencephalogram (EEG) should be done to exclude subclinical seizures. If the child has associated neurological deficits, seizures, micro- or macrocephaly, they may need evaluation with CT scan or MRI.

Disorders of Speech

Voice disorders may be due to congenital malformations of larynx like stenosis, web or cleft, or due to abnormal neuromuscular control of larynx. Neuromotor dysfunction is the most common cause of speech abnormalities in children. These include dysarthria associated with cerebral palsy, dysfluency disorders, e.g. stuttering. The dysarthria in

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a child with cerebral palsy is often associated with drooling and swallowing difficulties, besides other sensory and motor deficits which can coexist in such children.

Stuttering is a disorder of speech rhythm. A transient dysfluency is common between 3–4 years of age. Persistent and worsening stuttering beyond age of 4 years and presence of grimacing with blocking of speech are to be taken seriously. Even though the child can formulate language, he is unable to say it because of involuntary, repetitive prolongation or cessation of a sound. The exact cause is unknown, but a genetic predisposition has been observed.

Developmental Language Disorders

Developmental language disorder is a very common developmental disorder in children and affects approximately 5% children. DLD is defined as failure to acquire language in absence of hearing loss, brain injury or other medical conditions, and in presence of verbal skills two standard deviations below nonverbal skills.

Failure to develop normal expressive language at 3 years should be considered pathological. DLD can be classified into three broad types: (1) expressive only, (2) mixed receptive-expressive, and (3) higher-order processing type. Expressive and mixed receptive-expressive disorders involve phonology and phonology-syntax aspects of language, respectively. Higher-order processing disorders mainly affect semantic and pragmatic aspects of language. Combined receptive–expressive DLD are the most common type of DLD in children.

Secondary Language Disorders

- *Hearing impairment:* Approximately one child per 1,000 is thought to suffer from sensorineural hearing loss with consequent impairment of language development. Children can have intermittent hearing loss as in conductive deafness due to glue ear. In them there maybe delay in language development but not a language disorder. Infants with cleft lip and palate, even those with submucosal cleft, have greater susceptibility to otitis media.

  If hearing loss is acquired after development of language, the effect on verbal skills is less. There is difficulty in understanding spoken language in these children. In contrast, prelingual deafness has profound effect on development of language, even if diagnosed early and is characterized by limited vocabulary and sentence structure.
- *Autism spectrum disorder:* In children with autism spectrum disorder (ASD), language acquisition is delayed or, in some cases, there is regression of early language development. The diagnosis of autism is based on two criteria as per Diagnostic and Statistical Manual V (DSM-V): (1) persistent deficits in social communication and social interaction across contexts not accounted for by general developmental delay; (2) restricted, repetitive patterns of behavior, interests, or activities.

  In children with ASD, verbal and nonverbal communication skills are affected. All children with autism have language deficit, however, the extent of this deficit and handicap is variable. The term "semantic pragmatic disorder" is reserved for children with social and communication problems but without any restricted, repetitive behavior (RRB).
- *Acquired epileptic aphasia:* Acquired epileptic aphasia (Landau–Kleffner syndrome) is an acquired aphasia. This is seen in association with an abnormal EEG characterized by spikes, sharp waves or spike and wave discharge, which is usually bilateral and occurring predominantly over the temporal and parietal region. There may not be clinical seizures in up to a quarter of the patients. The language development is normal prior to the onset of seizure or the onset of aphasia. The peak age of symptoms is between 5 years and 7 years. These children tend to have severe receptive and expressive deficit amounting to verbal auditory agnosia. The prognosis of seizure control and normalization of EEG is good but recovery of language is variable. Corticosteroids and sodium valproate have been shown to be somewhat effective.

REMEDIAL THERAPY

Remediation is done after assessment by the psychologist and speech and language pathologist. The psychologist should assess the intelligence, memory, attention as well as learning style. The family members of children with DLD are taught language stimulation techniques so that they can perform intervention at home. If there is impairment in receptive skills, visual symbols can be taught to the child for communication. Sign language or use of gestures may be taught to facilitate communication.

PROGNOSIS

A good response to speech therapy is seen in pure articulation disorders. Correction of conductive hearing loss may result in normal language development if done early. If a child suffers recurrent ear disease during the first 3 years, their speech and language skills may show a lag in the long

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term. In patients with sensorineural hearing loss, prognosis is variable. Most patients with DLD, except for severe verbal dyspraxia and verbal auditory agnosia, will learn to speak reasonably well by school age. Important prognostic factors are IQ and associated deficits. There is a causal relationship between DLDs and reading disabilities.

Acknowledgments: Ms Indulekha G, Speech Pathologist and Audiologist, Child Development Centre, Medical College, Thiruvananthapuram.

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2.3 Evaluation of an Obese Adolescent

MKC Nair, Deepa Bhaskaran

INTRODUCTION

Assessment of a child or adolescent with overweight or obesity has been shown in Flowchart 2.3.1 as well as described in the following six points.

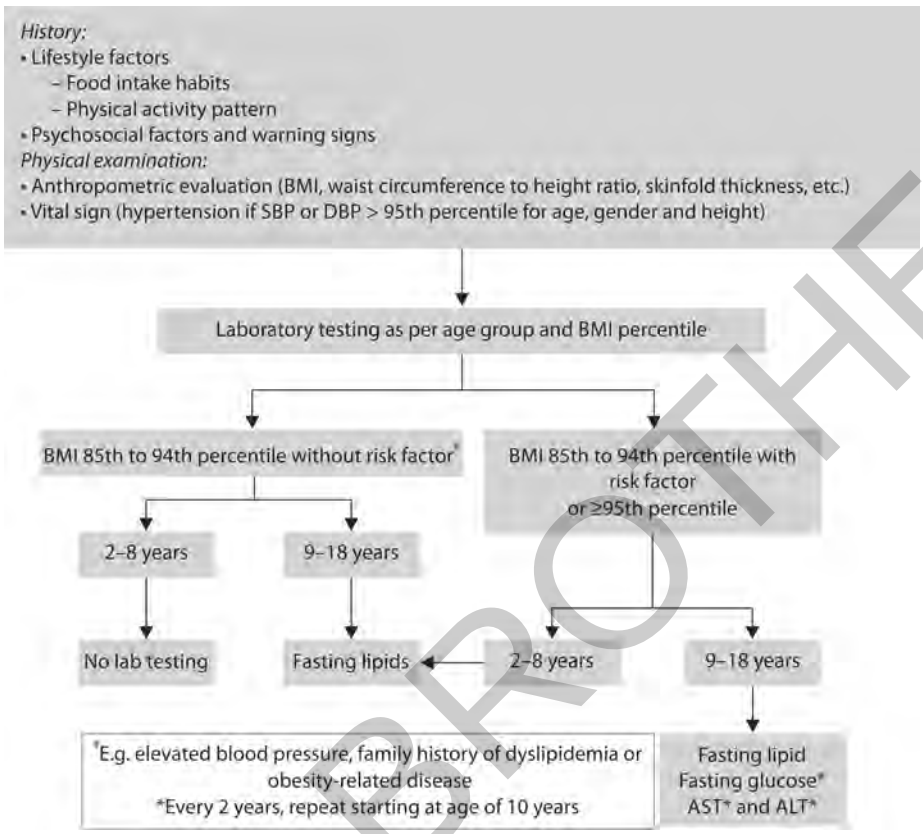
1. *Diagnosis:* "Obesity" is defined as body mass index (BMI) at or above the 95th percentile and "overweight" is defined as BMI between 85th and 94th percentile for gender and age. BMI above the 99th percentile is the cutoff point for "severe obesity".
2. *Detailed history:* A detailed clinical history should be taken to assess the adolescent's health status. Lifestyle factors should be analyzed so as to understand the energy need and energy expenditure. The food intake history should be taken in detail including snacking habits. The level of physical activity including both organized sports and daily activities such as walking to school, helping with chores, and playing should be assessed. The screen time spent by a child watching television and using computers or smartphones should be regarded as an independent risk factor for childhood obesity and a detailed inventory should be taken.

   A psychosocial history taking and assessment are essential to rule out psychological disturbances like depression, body dissatisfaction, loss-of-control eating, unhealthy and extreme weight control behaviors, impaired social relationships, and decreased health-related quality of life.
3. A thorough physical examination should be done with special focus on findings suggestive of endocrine, developmental or genetic causes. Blood pressure should be recorded. Hypertension is diagnosed if systolic or diastolic blood pressure falls over 95th percentile for age, gender, and height after recording on three different occasions. General examination should rule out goiter which may indicate an underlying hypothyroidism, acanthosis nigricans which may indicate insulin resistance, hirsutism, excessive acne which are suggestive of polycystic ovary syndrome, violaceous striae, moon face which may indicate Cushing syndrome.

   Tanner staging should be done to assess reproductive maturity. Premature puberty (age < 8 years in girls, and age < 9 years in boys), apparent micropenis (stretched penile length may be normal), undescended testis/micropenis (Prader–Willi syndrome), etc. must be evaluated. If the adolescent has headache, optic disks should be examined for optic edema due to pseudotumor cerebri. Respiratory system should be examined to rule out respiratory problems like asthma

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Flowchart 2.3.1: Assessment of a child or adolescent with overweight or obesity.



Abbreviations: AST, aspartate aminotransferase; ALT, alanine aminotransferase; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure

and sleep apnea. Hepatomegaly should be looked for, to rule out nonalcoholic fatty liver. Musculoskeletal problems, such as slipped capital femoral epiphysis and Blount disease should be ruled out. In spite of all this, the cause of obesity is idiopathic in 95% of cases.

Anthropometric measurements form the most important part of investigation in a case of obesity. Baseline values should be recorded in the first visit and it should be repeated in follow-up visits to evaluate the effectiveness of the treatment. BMI (weight/height^2) is the preferred index for routine clinical measurement of overweight and obesity in children and adolescents over 2 years of age since it correlates closely with total body adiposity. Other measurement devices such as bioelectrical bioimpedance analysis could be used for detection of obesity instead of BMI.

Central fat distribution is associated with increased cardiometabolic risk in children as in adults. Central adiposity is measured by the waist circumference to height ratio. A ratio of more than 0.5 is linked with cardiovascular and metabolic risk in normal and overweight or obese school-aged children.

Skinfold thickness measurements can also be used to measure body fat. They should be measured accurately. The measurement should be compared with age and gender-specific norms.

A single anthropometric measurement index may not produce accurate classification in obese and overweight children. Hence multiple indices may have to be measured.

4. *Lab testing:* Laboratory tests are done only in children above 2 years with obesity and that too depending on BMI and other risk factors. According to the 2007 US Expert Committee's recommendation, overweight children (BMI 85–94th percentile) should have a fasting lipid-screening test. If risk factors coexist, fasting glucose, alanine aminotransferase (ALT), and aspartate aminotransferase (AST) should be tested every 2 years. High levels of ALT and AST are indicative of nonalcoholic fatty liver disease. The risk factors include hypertension, dyslipidemia, family history of diabetes and history of coronary artery disease (CAD)/angiogram/angioplasty/coronary artery bypass graft surgery (CABG) in first-degree relatives of the child.

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In children who are obese (BMI ≥ 95th percentile) serum levels of fasting lipids, glucose, ALT, and AST should be measured every 2 years, regardless of risk factors. However, Institute for Clinical Systems Improvement (ICSI) guideline in 2013, based on Krebs et al. study, reported that children 2–6 years of age without risk factors do not need laboratory tests.

Interpretation: If the fasting glucose screen test is more than 126 mg/dL, counseling and repeating test are indicated.

Lipid profile may be abnormal in obese children. If total cholesterol level is on the borderline (170–200 mg/dL), the screen test should be repeated after 1 year and if it is elevated (≥ 200 mg/dL), cardiac referral may be needed.

Measurement of blood urea nitrogen and creatinine levels for those who are obese (BMI ≥ 95th percentile) is recommended by some expert committees so as to detect renal dysfunction.

Hypothyroidism may be associated with pediatric obesity. Routine screening for thyroid hormones is not recommended for obese or overweight children.

Recent studies suggest that obesity can be one of the risk factors for vitamin D deficiency and an increase in risk for type 2 diabetes is associated with decreased 25-OH-vitamin D serum level in obese children.

5. *Targets for obesity treatment:* For overweight adolescents in the age group of 12–18 years, weight maintenance is adequate. For obese adolescents in the same group, a moderate weight loss not more than 1 kg/week may be attempted.

   A multidisciplinary approach is needed for the treatment of overweight and obesity in children and adolescents. The team should include a pediatrician, dietician, physical instructor, behavioral therapist and a social worker in addition to a motivated team of parents, caretakers, teachers, and policy makers. The first and foremost goal is to bring down the rate of weight gain. The next step is weight maintenance and finally weight reduction to improve BMI. The long-term goal is to improve quality of life and bring down morbidity as well as mortality associated with overweight and obesity.
6. *Components and phases of obesity treatment:* The different components of overweight and obesity treatment are dietary management, physical activity enhancement and restriction of sedentary behavior, pharmacotherapy and bariatric surgery.

DIETARY MANAGEMENT

The aim is weight maintenance or weight loss without compromising appropriate calorie intake and normal nutrition. Healthy eating patterns should be emphasized and maintained. The recommended fat intake is 25–35% in children in the age group of 4–18 years; carbohydrate intake of 45–65% kcal in all children and adults; and protein intake of 10–30% kcal in children in the age group of 4–18 years.

As per the Dietary Intervention Study in Children (DISC), intervention diet can be introduced in obese children who are 8 years or older, without compromising growth, development and pubertal maturity. In this diet, 58% of total calorie intake is provided by carbohydrates, 28% by fats and 14% by protein. Of the 28% calories from fats, 11% should be from monounsaturates, 9% from polyunsaturates and less than 8% from saturates. Cholesterol intake must be less than 75 mg/1000 kcal. It should not exceed 150 mg/day. Encourage age-appropriate serving sizes including five or more servings of fruit and vegetables, three or more servings of low fat milk or dairy products and six or more servings of whole-grain and grain products per day. Make sure to provide adequate amounts of dietary fiber (age in year + 5 g/d). Reduction of eat-outs should be emphasized. Healthy snacks, balanced diet, adequate intake of fruits and vegetables, adequate fiber content of diet and avoidance of high calorie/high fat foods should be insisted upon.

Sugar-sweetened soft drinks and fruit juices have been identified as one of the dietary contributors to overweight and obesity (Joint WHO/FAO Expert Consultation 2003). This report stated that each can of soft drink consumed per day increases the risk of being obese by 60%. Other public health organizations have acknowledged the link between the consumption of sugar-sweetened beverages and obesity and have advised a reduction in intake of such beverages to help to prevent weight gain (Joint WHO/FAO Expert Consultation 2003; Committee on Prevention of Obesity in Children and Youth 2004; Murray et al. 2004; Dietary Guidelines Advisory Committee 2005). Other sugary beverages such as cordials, fruit drinks, fruit juices, energy drinks, and sports drinks can also contribute to an energy imbalance.

PHYSICAL ACTIVITY ENHANCEMENT

For preventing overweight and obesity as well as for the treatment, moderately intense regular physical activity is essential. Children and adolescents should engage in not less than 60 minutes of moderate to vigorous physical activity per day to achieve optimum cardiovascular health. For children and young people, physical activity includes play, games, sports, transportation, chores, recreation, physical education, or planned exercise, in the context of family, school, and community activities. The recommendations to improve cardiorespiratory and muscular fitness, bone health, and cardiovascular and metabolic health, the biomarkers are:

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- Children and youth aged 5–17 years should engage in at least 60 minutes of moderate to vigorous intensity physical activity daily.
- Amounts of physical activity greater than 60 minutes provide additional health benefits.
- Most of the daily physical activity should be aerobic. Vigorous intensity activities should be incorporated, including those that strengthen muscle and bone, at least three times per week.

Higher target levels should be set for overweight and obese children to achieve similar results. In order to burn body fat, longer periods of moderate intensity exercises like brisk walking, are more efficient. Children should get involved in physical activity that is safe, developmentally appropriate, interesting, practical, and preferably with a social element. Other members of the family should also be involved in the exercise program. The activities should be supervised on a regular basis as this will improve compliance. Exercise training also brings about beneficial changes in fat and lean body mass, cardiovascular fitness, muscular strength, endothelial function and glucose metabolism, all of which significantly reduce the morbidity associated with excess weight.

RESTRICTION OF SEDENTARY BEHAVIOR

Sedentary activities indulged by children and adolescents include watching TV, nonacademic use of computers and smartphones and playing video games. Every hour of sedentary activity not only increases the chance of obesity but also contributes to failure of many weight reduction attempts in adolescents and children. Screen time should be restricted to less than 2 hours per day in adolescents. Because of excessive TV viewing, children tend to consume larger amounts of energy, fat, sweet, and salty snacks and carbonated beverages. This, in turn, leads to reduced consumption of fruits and vegetables. Hence restricting sedentary behavior will complement dietary management.

PHARMACOLOGICAL TREATMENT

There is very limited data supporting the use of pharmacological therapy for pediatric obesity. The drugs sibutramine, orlistat and metformin are currently in use among obese children and adolescents with varying results.

Sibutramine is a serotonin non-adrenaline reuptake inhibitor. It enhances satiety and has been shown to be the most effective drug in treating adolescent obesity. The usual side effects are increase in heart rate and blood pressure. Hence, it cannot be used in obese adolescents with high blood pressure.

Orlistat is a pancreatic lipase inhibitor. It reduces fat digestion and acts by increasing fecal fat loss. The side effects are flatulence, diarrhea, gallbladder diseases, and malabsorptive stools. Since fat absorption is affected, fat-soluble vitamin supplementation and monitoring are important. Orlistat is less effective in diets which are low in fats as is the case of many Indian diets.

Metformin is of great use in treating obese adolescents with severe insulin resistance, impaired glucose tolerance or polycystic ovarian syndrome. First-line treatment is always lifestyle interventions. If these fail, pharmacotherapy should be initiated as a second line of management.

Some anti-obesity drugs may not be as effective as behavioral interventions in reducing BMI: a meta-analysis of behavioral interventions in obese adolescents reported an effect of 3.04 kg/m^2 [95% confidence interval (CI) 3.14–2.94] at 6 months, which was maintained at 12 months follow-up. However, since behavioral interventions require a great investment from both the medical staff and the family, it may not be practical in daily life.

Drugs should not be prescribed instead of other treatments but should be, in most cases, a step to discuss before performing bariatric surgery.

SURGICAL TREATMENT

Surgical treatment may be needed in some cases of severe adolescent obesity. Bariatric surgery is indicated in adolescents who are severely obese (defined by BMI of > 40), have attained a majority of skeletal maturity (generally > 13 years of age for girls and > 15 years of age for boys), and have comorbidities related to obesity that might be remedied with durable weight loss. If the BMI is more than 50 kg/m^2, surgery may be indicated even if there are no associated comorbidities. The preferred bariatric procedures in adolescents are Roux-en-Y gastric bypass and adjustable gastric banding. The usual late complications are small-bowel obstruction, incisional hernias, weight regain, as well as vitamin and micronutrient deficiencies. Meticulous, lifelong medical supervision is of prime importance in patients undergoing surgery.

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2.4 Evaluation of an Adolescent with Poor School Performance

MKC Nair, Deepa Bhaskaran

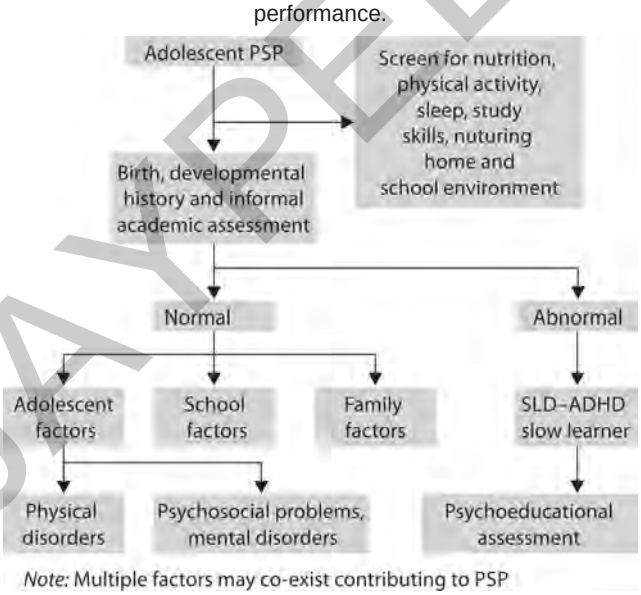
INTRODUCTION

Approach to an adolescent with poor school performance has been described in Flowchart 2.4.1.

DEFINITION

Adolescents are said to be performing poorly in academics, if they fail in one or more subject or class or if their marks are below 10th percentile in a particular class or subject or if they are identified by the parent or teacher as "difficult" to teach.

Flowchart 2.4.1: Approach to an adolescent with poor school performance.



Abbreviations: PSP, poor school performance; SLD, speech and language delay; ADHD, attention-deficit hyperactivity disorder

CAUSES

The predictor variables identified for poor scholastic performance are: (1) not studying daily lessons, (2) poor concentration in studies, (3) lower education status of father, and (4) unhappy family. The causes can be divided into extrinsic (environmental) and intrinsic (individual) factors. The three main factors responsible are: (i) family factors, (ii) school factors, (iii) and adolescent factors.

Family Factors

- Low socioeconomic status
- Low maternal education
- Illiteracy
- Marital discord
- Divorce
- Single parent
- Authoritarian parenting
- Punitive parenting
- High parental expectations
- Violence
- Abuse.

School Factors

- Change of school
- Change in medium of instruction
- Crowded classrooms
- Poor teaching methodology

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