

Hypothyroidism: Clinical Features

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Abstract

Hypothyroidism is a clinical syndrome resulting from deficiency of thyroid hormones in the target tissues, leading to generalized slowing of all metabolic processes. Hypothyroidism in infants and children results in marked slowing of growth and mental development, which may be irreversible if not corrected early. In adults, most of the components of the syndrome is reversible.

INCIDENCE

Primary hypothyroidism is common worldwide especially in iodine deficient areas like India. In non-endemic areas chronic autoimmune thyroidectomy (incidence 3.5/1000 women/ year and destructive treatment of thyrotoxicosis (6.6/1000 women per year) are commoner. Epidemiologic studies like Wickham county study show high prevalence (18/1000) of subclinical hypothyroidism, female preponderance and increasing incidence with age

CLINICAL PRESENTATION

DEPENDS UPON THE AGE OF THE PATIENT

Cretinism (in infants): Newborns suffering from thyroid hormone deficiency (endemic iodine deficiency with goiter/ or aplastic thyroid) present with mental retardation, short stature, deaf mutism, neuro-deficits in addition to symptoms of hypothyroidism. Prolonged neonatal jaundice, poor feeding, hoarseness, umbilical hernia, cyanosis and epiphyseal dysgenesis and additional features of the disorder. Iodide, radioactive iodine or antithyroid drug administration to mother or transplacental crossing of TSH-R blocking antibody in Hashimoto's thyroiditis (athyreotic cretinism) may also lead to athyreotic cretinism. The incidence is 1:500 in white and 1:3200 in blacks in USA. Neonatal screening and early treatment of levothyroxine replacement is great achievement of thyroidology. A TSH of $>30\mu\text{IU/ml}$ with low T4 is taken as indicative of neonatal hypothyroidism.

Children: Hypothyroidism presents with mental retardation, poor linear growth in addition to the usual features. Precocious puberty may occur.

Adults: The findings are suggestive of generalized physical

and mental slowing, although features vary according to severity and the cause of hypothyroidism. Common features are easy fatigability, cold intolerance, weight gain, constipation, menstrual disturbances mainly menorrhagia, dry skin, hoarseness of voice, hair loss, muscle cramps, stiffness and mental slowing, most of which are reversible.

ENERGY AND METABOLISM

BMR and O₂ consumption is reduced leading to hypothermia and increase in body weight. Glucose tolerance curve becomes flatter and protein metabolism is decreased. The latter affects growth and development in children. Cholesterol rises primarily because of LDL rise due to low expression of LDL receptors.

SKIN AND APPENDAGES

Skin is dry, pale, thick, rough and cold because of decreased function of sebaceous and sweat glands. Carotene deposition can lead to yellowish discoloration. There is hair loss at many places and nails may become brittle. The mucopolysaccharide deposition leads to non pitting edema.

NERVOUS SYSTEM

In adults CNS has low voltage EGG, prolonged conduction time and reduced visual evoked response (VER) and somatosensory evoked response (SSER) resulting in hyper somnolence and mental slowing. Depression is common (40%) and rarely agitation and anxiety can occur (myxedema madness). Cerebellar ataxia, carpal tunnel syndrome, various other polyneuropathies may occur.

MUSCULOSKELETAL SYSTEM

Myalgia, stiffness, cramps and weakness are common. Type II white fast fibrin change to type I slow ones. The tendon

jerkers have delayed relaxation. Joint stiffness and arthralgia are common. Bone turnover as indicated by markers is low.

CARDIOVASCULAR SYSTEM

Dynamics indicates increase in peripheral vascular resistance (50-60%) and decrease (30-50%) in cardiac output. Mild diastolic hypertension may occur this. Symptoms and signs are dyspnea, effort, intolerance, bradycardia, weak heart sounds and cardiomegaly (pericardial effusion or cardiomyopathy).

RESPIRATORY SYSTEM

Dyspnoea, and sleep apnea can be due to muscle weakness, respiratory centre depression, pulmonary dysfunction. Reduced drive (34%) may lead to hypoxia and hypercarbia.

UROGENITAL SYSTEM

GFR and free water clearance is decreased in view of altered cardiovascular hemodynamics. Hyponatremia can occur due to low free water clearance and increased AVP levels. Serum creatinine may rise by 10-20%.

Sexual maturation is delayed (rarely precocious puberty due to spill over activity of TRH and TSH) in children. Adult men can have decreased libido and potency but normal semen analysis and normal gonadal axis. In females, ovulatory surge may be affected leading to menorrhagia with anovulatory cycles. Amenorrhoea galactorrhoea syndrome can occur because of elevated prolactin.

Gastrointestinal tract: Due to reduced electrical and motor activity throughout whole gut, transit time is increased leading to constipation or even pseudoobstruction. Absorption remains normal although association with celiac sprue or pernicious anemia occurs in cases of autoimmune etiology.

Hemopoietic system: Normocytic normochromic anaemia with hypoproliferative bone marrow occurs in 30% patients. Microcytic anemia can occur because of menorrhagia leading to iron deficiency. Macrocytic anemia occurs in cases associated with pernicious anemia. Haemostasis is impaired and responds well to vasopressin therapy.

Endocrine system: GH, IGF-I, IGBP-3, but not IGBP-2 are low in hypothyroidism and can cause reversible growth retardation in children. Hyperprolactinemia is reversible and can account for amenorrhoea- galactorrhoea syndrome. Pituitary enlargement mimicking pituitary tumor can occur in severe hypothyroidism. Bone turnover is low. Serum PTH

and 1,25 OH vitamin D are decreased. Cortisol metabolic clearance, and to a lesser extent, production, is decreased. Hypocortisolism indicates associated autoimmune adrenalitis. Lipolysis, glycogenolysis and glycogenesis are impaired.

Accuracy of 12 symptoms and signs in the diagnosis of primary hypothyroidism

Figure 1

Symptoms and signs	Sensitivity (%)	Specificity (%)	Score if present
Symptoms			
Hearing impairment	22	98	1
Diminished sweating	54	86	1
Constipation	48	85	1
Paresthesia	52	83	1
Hoarseness	34	88	1
Weight increased	54	78	1
Dry skin	76	64	1
Physical signs			
Slow movements	36	99	1
Periorbital puffiness	60	96	1
Delayed ankle reflex	77	94	1
Coarse skin	60	81	1
Cold skin	50	80	1
Sum of all symptoms and signs present*			12

* Add 1 point for women younger 55 years

Hypothyroid, ≥ 6 points; intermediate, 3-5 points, euthyroid ≤ 2 points
Zulewski et al (2)

MYXEDEMA COMA

It is the end stage of untreated hypothyroidism and represents decompensated state of the disease. It is characterized by progressive weakness, stupor, hypothermia, hypoventilation, hypoglycemia, hyponatremia, water intoxication, shock and death if not treated. The disease although rare now days has very high mortality.

The medical history reveals gradual onset progressive lethargy, history of thyroid disease (surgery or radioablation). Clinically patient is hypothermic (Temp $< 75^{\circ}\text{F}$), gross features of myxedema and may have signs of precipitating illness. Among precipitating factors infections are most important commonest being respiratory and urinary tract. Other precipitating factors are sedative, sedative drugs, cardiovascular events or cerebrovascular events. Patients may have hypoglycemia, hyponatremia, hypoxia with hypercarbia which can contribute to the comatose state. ECG may show bradycardia with low voltage. Hypothermia may be missed by ordinary thermometer and hence standard lab type thermometer should be used. Mild diastolic hypertension or normal blood pressure may be erroneous due to cutaneous vasoconstriction, and thus rapid warming may lead to severe hypotension.

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