
UNIT 3 ASSESSMENT OF ENDOCRINE DISORDERS

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3.0 OBJECTIVES

After going through this chapter, you will be able to :

- Identify symptoms and evaluate an older patient with thyroid disorders
- Identify symptoms and evaluate an older patient with Diabetes
- Able to identify older patients with microvascular and macro vascular complications and referral to concerned specialist

3.1 INTRODUCTION

Thyroid diseases can present in many ways in the elderly. It can present as goitre, hypothyroidism or hyperthyroidism. You have learnt about the thyroid disorders in the unit 5. In this module, you will acquire the clinical skills of examining and diagnosing the thyroid problems in the elderly. The prevalence of diabetes increases with ageing. With ageing, the number of beta cells in the pancreas and the amount of insulin secreted decrease. Increased central adiposity and decreased physical activity associated with ageing increase the insulin resistance in older people. Complications arising due to diabetes are higher in older people when compared to younger people. The assessment and management of diabetes in elderly should be

comprehensive and holistic. In this module, you will acquire the clinical skill of examining an older diabetic patient and the skill of managing the older diabetic patient.

3.2 THYROID

3.2.1 Hypothyroidism

The most common presentation of thyroid disorders in elderly patients is hypothyroidism. Hypothyroidism is characterised by high TSH and low T₄ values. Primary autoimmune disease (Hashimoto thyroiditis) is the commonest cause of hypothyroidism in elderly.

Did You Know?

Hypothyroidism may mimic dementia and depression in elderly

Clinical presentation

Thyroid hormone has widespread effect on multiple organ systems of the body. Hence symptoms and signs of thyroid dysfunction are widespread and multiple. In hypothyroidism, there is generalised slowing of metabolism. The onset of hypothyroidism in elderly is insidious in nature leading to delay in the diagnosis. The classical signs and symptoms of hypothyroidism are lacking in older people. Fatigue and weakness are the common presenting symptoms. In older people, cognitive and functional decline are the late manifestations of hypothyroidism. High index of suspicion is necessary to diagnose hypothyroidism because symptoms such as fatigue, weakness and constipation may occur due to ageing changes, other diseases or due to drugs. When the patient present with one or more features of hypothyroidism, you should evaluate for the same. The symptoms of hypothyroidism in older people are given in the **Box- 3.1**.

Fatigue
Weight gain despite reduction in appetite and reduced food intake
Constipation
Cold intolerance
Dry skin
Thinning of scalp hair and lateral eyebrow
Periorbital puffiness
Hoarseness of voice - due to infiltration of the vocal cords by mucopolysaccharides
Reduced hearing
Snoring
Slow physical activity
Muscle aches, cramps, and weakness
Arthritis or arthralgia
Paraesthesia
Slow mental activity

<p>Depression Cognitive dysfunction Psychosis – Myxoedema madness Worsening of cardiac failure or angina</p>
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Box 3.1 Symptoms of hypothyroidism

As in other diseases or disorders, we should do a systematic examination and look for the signs of hypothyroidism, if the patient is having symptoms suggestive of hypothyroidism. The signs of hypothyroidism are shown in the **Box 3.2**

<p>General appearance Physical sluggishness – Assess ADL using Barthel index Mental sluggishness Obesity Hypothyroid speech – coarse, slow speech</p>
<p>Face Thick, dry, pale, and cool skin Skin may be yellow due to hypercarotenemia Alopecia Periorbital edema Loss or thinning of outer eyebrows- Madarosis Bilateral nerve deafness-- due to mucopolysaccharide infiltration of the VIII cranial nerve</p>
<p>Hands Yellowish discoloration due to hypercarotenemia Cool and dry skin - Extensor surfaces may be covered with scales (Ichthyosis), thickened palms and soles and may be cracked Brittle Nails Puffiness of wrists Test for sensory loss when there is carpal tunnel syndrome</p>
<p>Pulse Slow and small volume pulse- <70/mt</p>
<p>Legs Non pitting edema - myxoedema- infiltration of the dermis by mucopolysaccharides Delayed ankle jerk- Hung- up reflex – normal contraction followed by delayed relaxation on eliciting the ankle jerk Check for proximal myopathy— difficulty in getting up from a chair Check for peripheral neuropathy</p>
<p>Respiratory system Look for pleural effusion</p>
<p>Cardiovascular system Bradycardia</p>

Hypertension – increased peripheral vascular resistance Look for pericardial effusion
Central nervous system Delayed ankle jerk Entrapment neuropathies due to myxedema – carpal tunnel and tarsal tunnel syndrome Proximal myopathy Peripheral neuropathy Impaired cognition- screening by MMSE, Mini -cog method
Psychiatric Apathy Depression – assess with Geriatric Depression Scale (GDS)

Box 3.2 Signs of hypothyroidism

3.2.2 Hyperthyroidism

Hyperthyroidism is due to overproduction of thyroid hormones and is characterised by excessive T_3 and/or T_4 and low TSH values. Thyrotoxicosis is a clinical situation due to excess thyroid hormones. Causes of hyperthyroidism include Grave's disease, multi nodular goitre and toxic nodular adenoma.

Clinical presentation

In older people, the classical symptoms of hyperthyroidism are lacking. The hyperadrenergic symptoms seen in hyperthyroidism is less in older people due to age related changes in the sympathetic nervous system or due to the use of beta blockers for the treatment of other comorbidities. Symptoms such as apathy and anorexia are common in older people with hyperthyroidism. It is referred to as apathetic hyperthyroidism. You should have a high index of suspicion when the following symptoms are present. The symptom of hyperthyroidism is shown in the **Box 3.3**.

Did You Know?

In hyperthyroidism in elderly, Constipation is more common than diarrhea

Weight loss despite normal or increased appetite due to increased metabolic rate Heat intolerance Palpitations Nervousness Tremor Increased sweating Anorexia

<p>Fatigue Apathy Lethargy Muscle weakness Depression Insomnia Diarrhoea Constipation Worsening of cardiac failure</p>
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Box 3.3 Symptoms of hyperthyroidism

As in other diseases or disorders, we should do a systematic examination and look for the signs of hyperthyroidism, if the patient is having symptoms suggestive of hyperthyroidism. The “NO SPECS” system is used to score the ophthalmopathy.

NO SPECS

N- No eye signs

O- Only sign seen in upper eyelid

S- Soft tissue involvement

P- Proptosis

E- Extraocular muscles affected

C- Corneal involvement

S- Sight loss

If the Grave’s eye disease is severe and active, refer the patient to ophthalmologist at the earliest. Otherwise, the patient will lose vision permanently. The signs of hyperthyroidism are shown in the **Box 3.4**.

<p>General appearance Anxiety Frightened face Weight loss</p>
<p>Skin Warm and moist skin due to vasodilatation Thyroid dermopathy Pretibial myxedema Thyroid acropachy – a form of clubbing</p>
<p>Eyes Exophthalmos/ Proptosis– visualisation of the sclera between lower border</p>

<p>of the iris and lower eye lid Lid retraction– upper sclera is exposed - due to sympathetic overactivity Lid lag Ophthalmoplegia– extra ocular Chemosis Conjunctivitis Corneal ulcer Increased intraocular tension</p>
<p>Neck Thyroid enlargement- 60-90% of Grave’s disease Thyroid bruit</p>
<p>Hands Warm and moist Fine tremor Onycholysis</p>
<p>Pulse Tachycardia - ≥ 90/mt Bounding pulse due to increased cardiac output Atrial fibrillation – irregularly irregular pulse</p>
<p>Respiratory system Bilateral basal crepitations when there is worsening of cardiac failure</p>
<p>Cardiovascular system Systolic flow murmur</p>
<p>Legs Pretibial myxedema Hyperreflexia Proximal myopathy</p>
<p>Psychiatric Apathy Depression Irritability</p>

Box 3.4 Signs of hyperthyroidism

3.2.3 Thyroid Swelling

Clinical presentation

The patient may present primarily with a neck swelling or the swelling may be found while evaluating a patient presenting with features of thyroid dysfunction. In case, the patient presents with a neck swelling, we should enquire about

- When was it first noticed?
- How and by whom was it first noticed?
- Whether any increase in size after noticing and if so, how rapidly it is increasing in size?
- Is it painful or tender?
- Any redness or warmth?
- Does it cause any difficulty in swallowing, breathing, or speaking?

All the palpable thyroid abnormalities and those thyroid enlargements found during imaging need evaluation in older people. As the age increases, the prevalence of thyroid nodules and thyroid cancer increase.

Examination of the thyroid gland

The patient should be asked to sit with the head in the neutral position, looking forward.

Inspection

You should stand in front of the patient, at the same level as the patient, and inspect the neck while it is in a neutral position. This gives an idea about any visible thyromegaly, nodules in the thyroid gland and any overlying redness. Ask the patient to take sips of water. Watch the swelling carefully. The thyroid swelling or the thyroglossal cyst move with swallowing.

Palpation

The thyroid gland should be palpated while standing behind the patient. Ask the patient to slightly flex the neck to relax the sternomastoid muscle. The fingers should be brought around to the front of the neck. The pulp of the fingers is placed over the glands. Feel both the lobes and isthmus. The palpation of thyroid gland will be difficult when there is an associated kyphosis or respiratory problem in the elderly. While palpating the thyroid, we should assess the following

Size

Only an approximate estimation of size can be done. Try to palpate the lower border of the thyroid. If it is not palpable, it indicates retrosternal extension of thyroid.

Shape

Look for

- Whether uniformly enlarged? – indicates autoimmune thyroiditis
- Any nodules present? Single or multiple? Location, size, consistency?—single, focal nodule may be due to cyst, adenoma or carcinoma

Consistency

- Firm
- Hard - Malignancy

Pressure effects

- Dysphonia from recurrent laryngeal nerve involvement

Bruit

- Indicates increased vascularity – seen in Grave’s disease

Lymph nodes – cervical region

- Indicates malignancy

3.2.4 Investigations

Thyroid hormone assay

Whenever thyroid dysfunction is suspected clinically, we must confirm it by thyroid hormone assay. We have to measure TSH, free T₃ and free T₄ levels. The interpretation of thyroid assay is given in the **Fig. 3.1**

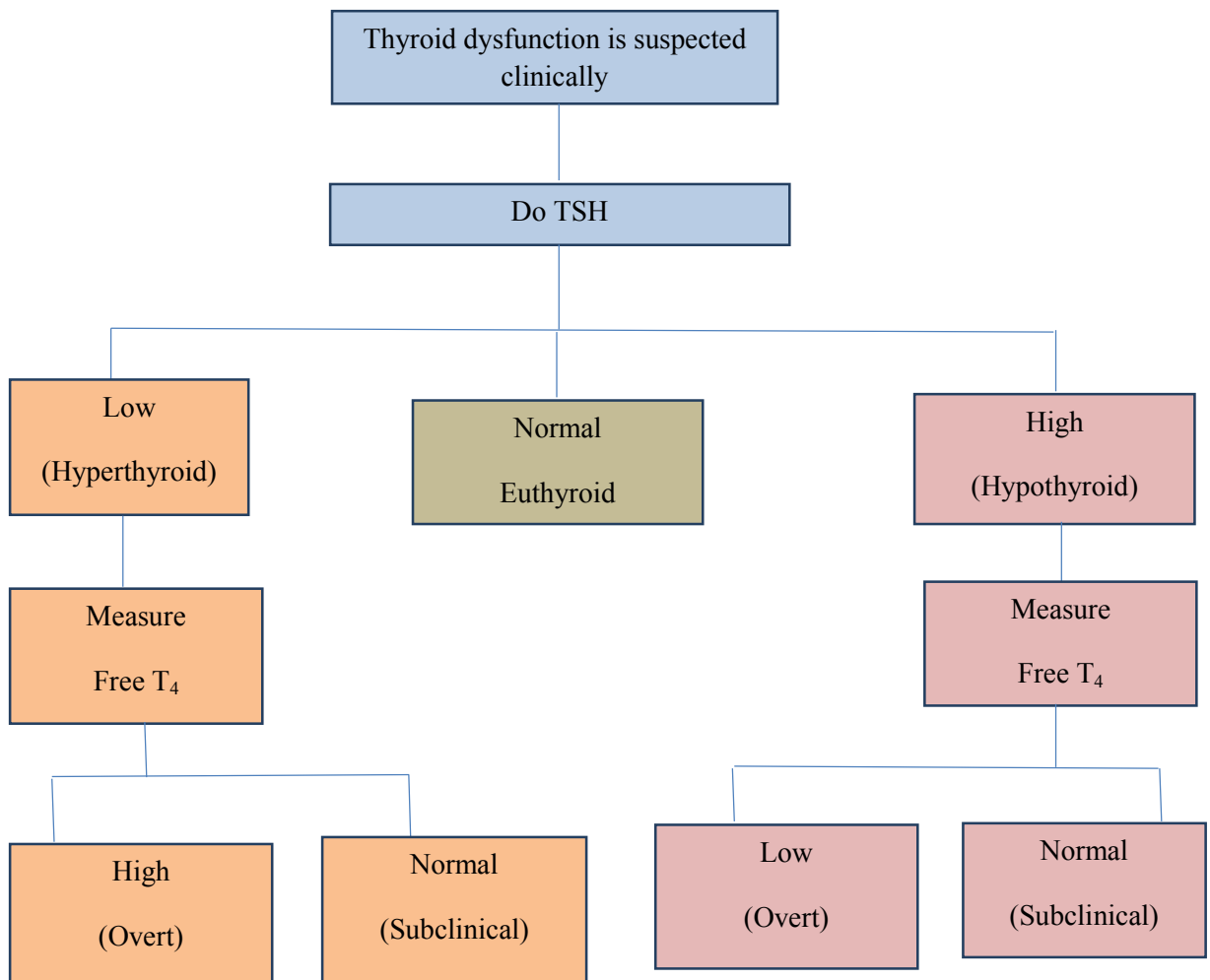


Fig. 3.1 Approach to thyroid dysfunction

Thyroid ultrasound

As we already saw, any thyroid enlargement, needs an evaluation. In ultrasound we have to look for the following

- Size of the thyroid gland in three dimensions
- Cystic or solid lesion
- Presence of nodule – single or multiple
- Hypoechoic nodule
- Margins of the nodule
- Vascularity of the nodule
- Calcifications in the nodule

Fine needle aspiration cytology (FNAC)

Under ultrasound guidance, we have to do a fine needle aspiration in the following situations

- Solid and hypoechoic or microcalcification in a nodule of 1 cm size or greater
- Not hypoechoic nodule of size 1-1.5 cm or greater
- Mixed cystic and solid nodule of size 1.5-2 cm greater
- Nodule with abnormal cervical lymph nodes

The ultrasound guided fine needle aspiration is shown in **Fig. 3.2**



Fig. 3.2 Ultrasound guided fine needle aspiration

Radio iodine uptake and thyroid scanning

Measures the isotope trapped in the whole gland. In grave's disease the uptake is more and is homogenous. In toxic adenoma, focal areas of

increased uptake will be there. In multinodular goitre areas of increased and decreased uptake will be there. In viral thyroiditis, the uptake will be low.

Other lab abnormalities in thyroid dysfunction

In addition to thyroid assay, we have to do complete blood count, hemoglobin, peripheral smear, blood sugar, renal function test, liver function test and lipid profile. ECG will reveal low voltage Complexes, sinus bradycardia, atrial fibrillation, or ischemic changes if present.

Hypothyroidism

- Normocytic or macrocytic anemia
- Raised cholesterol and triglycerides
- Increased creatine phosphokinase

Hyperthyroidism

- Raised bilirubin
- Raised liver enzymes

Check Your Progress 1

1. Subclinical hypothyroidism is diagnosed when there is
 - a. High TSH, Low free T₄
 - b. High TSH, Normal free T₄
 - c. Low TSH, Low free T₄
 - d. Low TSH, Normal free T₄
2. What is apathetic hyperthyroidism?
3. Enumerate any five symptoms of hypothyroidism and hyperthyroidism

3.3 DIABETES

We shall discuss about history taking and examination in a patient of diabetes.

3.3.1 History Taking

Symptoms of diabetes

Nearly 50% of the older diabetics are asymptomatic at the time of diagnosis. The classical symptoms of polyuria, polydipsia and polyphagia are absent in older people. So, we must screen all older people for the presence of diabetes. Nocturia and urinary incontinence may be present. Lethargy and fatigue may be the presenting symptoms. Weight loss may be there. We have

to R/o any underlying malignancy and hyperthyroidism when there is weight loss. Diabetes can manifest in many ways

Dermatological manifestations

Patients with diabetes may present with

- Boils, carbuncles, or abscesses
- Oral candidiasis
- Genital candidiasis
- Balanoposthitis in men
- Non healing ulcer/wound

Visual disturbance

Blurred vision may be due to hyperglycaemia per se, cataract,retinopathy

Symptoms of complications

Older people may present with complications of diabetes. Complications of diabetes are classified as macrovascular and microvascular

Symptoms of macrovascular complications

- Features of ischemic heart disease. The typical Symptom of angina is usually absent in diabetics and older people.
- Peripheral vascular disease presents with claudication.Peripheral vascular disease along with peripheral neuropathy in a patient with diabetes can present with a foot ulcer
- Cerebral vascular disease presents with TIA or stroke

Symptoms of microvascular disease

- Diabetic retinopathy- Asymptomatic until visual loss occurs. Enquire about vision.
- Diabetic nephropathy – Asymptomatic until overt renal dysfunction occurs
- Diabetic neuropathy- Usually symptomatic.
 - Pins and needles in the palms and soles in a glove and stocking pattern- small fibre neuropathy
 - Pain and paraesthesias in the anterior thigh with weakness and wasting of quadriceps muscle. Usually unilateral- Proximal motor neuropathy or Femoral amyotrophy

- Carpel or tarsal tunnel syndrome – Mononeuropathy
- III, IV and VII cranial nerves can be involved leading to blurred vision, diplopia and LMN type of facial palsy- Cranial mononeuropathy
- Impotence, gustatory sweating, postural hypotension, urinary incontinence or retention, diarrhoea or constipation- Autonomic neuropathy

Patients with diabetes may present as an acute emergency as

- Diabetic ketoacidosis
- Hyperosmolar nonketotic coma
- Hypoglycaemia in those who are on oral hypoglycaemic agents or insulin

After eliciting the symptoms, we should enquire about

Family history

H/o Diabetes in the first-degree relatives

H/o Premature cardiovascular disease

Dietary and lifestyle history

H/o diet

- Quantity and quality of meals – Three meals per day is advised, food rich in sugar, saturated fat should be avoided.
- Regularity should be maintained. Meals should be taken in the scheduled time.
- Snacks can be taken 2 times a day

H/o lifestyle

- H/o Smoking
- H/o Alcohol intake
- H/o Physical activity – type, duration of exercise

Comorbidities

- Hypertension
- Dyslipidemia
- Coronary artery disease

Drug history

Polypharmacy is common among older people as they have multiple comorbidities.

- What are the drugs they are taking
- Frequency
- Compliance

H/o Insulin injection

- Injection by self/ caregiver
- Delivery device
- Site of injection
- Any problem encountered with injection

H/o Home glucose monitoring

In patients with diabetes, we should enquire, how they are monitoring their glucose levels.

- Capillary blood testing by a glucometer. Now a days, many patients own a glucometer
- Urine testing for glycosuria

3.3.2 Examination of a Diabetic Patient

1. **Check for height and weight-** calculate BMI. The Asia- Pacific Classification of BMI is given in the **Table 3.1**

Table – 3.1 Asia–Pacific classification of BMI

Underweight	< 18.5
Normal BMI	18.5-22.9
Overweight	23-24.9
Obese	≥ 25

2. Skin & Nail

- Acanthosis nigricans –dark velvety appearance in the neck and axilla. It indicates insulin resistance
- Xanthomas and xanthelasma – suggest dyslipidemia and are often associated with diabetes
- Look for fungal infections in the nails and in between the toes and fingers

3. Eyes

Examination of eyes is mandatory in diabetic patients.

- Acuity of vision- check using Snellen's chart
- Look for cataract
- Fundus examination- vitreous and retina are examined carefully. All the patients with diabetes should have a fundal photography annually if possible. Diabetic retinopathy is shown in **Fig. 3.3**

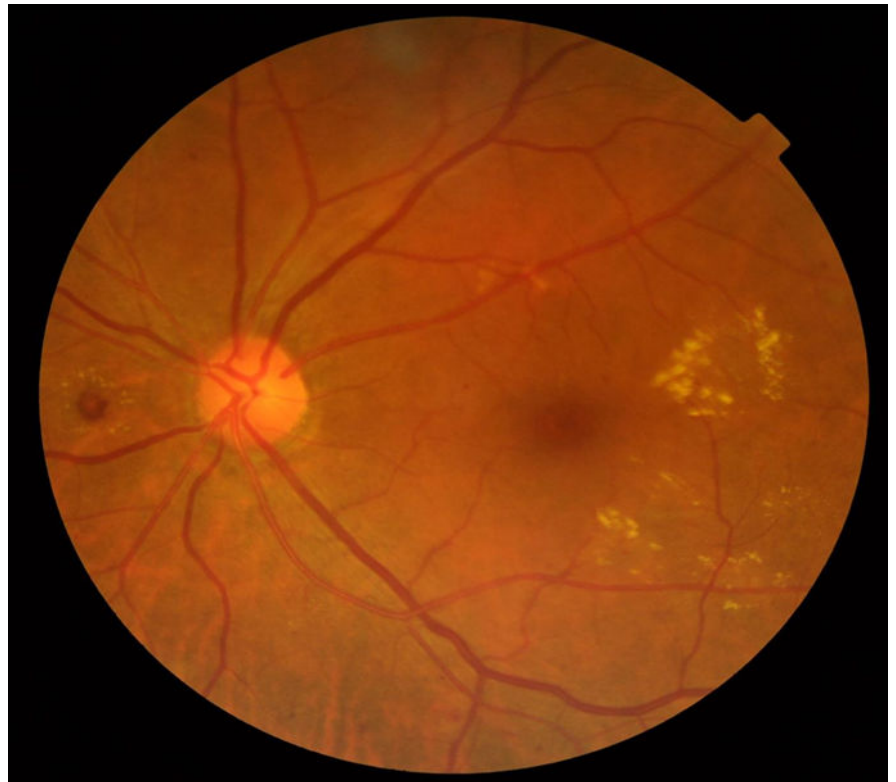


Fig. 3.3: Diabetic Retinopathy

4. Cardiovascular system

- Check for peripheral pulses
- Look for carotid bruit
- Ankle brachial index
- Blood pressure – look for hypertension that is often associated with diabetes. Check for postural hypotension when autonomic neuropathy is suspected

5. Foot

Annual examination of the foot should be done.

- Look for deformity, callus, fungal infection of nails, fungal infection in between the toes and any ulcer or gangrene. Any loss of toe indicates the underlying peripheral vascular disease

- Peripheral pulses should be assessed
- Vibration sense should be assessed using the tuning fork of frequency 128 in the great toe, malleoli and knee – loss indicates sensory neuropathy
- Fine touch should be assessed using the 10g monofilament in the toes, metatarsal heads, heel and dorsum of foot
- Look for charcot joints, a complication of diabetic neuropathy. It presents as a painless, swollen, red, hot joint with progressive deformity. It usually affects the ankle joint

The diabetic foot is shown in **Fig. 3.4**



Fig. 3.4 Diabetic ulcer in the foot

6. Comprehensive geriatric assessment

- Cognitive impairment – is common in diabetics than age matched nondiabetics. Assessed by MMSE, Montreal cognitive assessment – will affect the compliance to drugs. Overdosage is also common, and it will lead to hypoglycemia in such patients.
- Functional impairment – by Barthel index, Katz index – will affect the ability to perform glucose monitoring, insulin administration, compliance to treatment and self-care
- Vision – Snellen's chart
- Hearing – whisper voice test
- Urinary incontinence – due to uncontrolled hyperglycaemia, frequent UTI associated with diabetes. Enquire about incontinence using the 3-item questionnaire

- Fall risk assessment - due to peripheral neuropathy, foot problems, hypoglycemia. Assessed by Timed up and go test, functional reach test
- Depression- assessed using Geriatric depression scale
- Polypharmacy - is common in older people because of the associated multimorbidity. Adverse drug reactions are common. Diabetes needs long term treatment. So, while prescribing drugs, we should consider the availability and affordability of drugs. When the target blood sugar level is not achieved in an older diabetic in spite of treatment, check the adherence or compliance to treatment before increasing the dose or adding one more drug.

3.3.3 Investigations

All diabetic patients must have routine biochemical workup in addition to fasting and postprandial blood glucose and glycosylated hemoglobin.

Criteria for diagnosis of prediabetes and diabetes

The diagnosis of diabetes is based on the blood glucose levels. Diabetes is diagnosed when the fasting blood glucose is ≥ 126 mg/dl or the post glucose load is ≥ 200 mg/dl or random blood sugar is ≥ 200 mg with classical symptoms of diabetes. Older people tend to have normal fasting blood glucose and elevated postprandial glucose. The diagnosis of diabetes will be missed or delayed if we check fasting glucose only in elderly. The diagnostic criteria of diabetes are the same for both young and old. The American diabetes association criteria for the diagnosis of diabetes is given in the **Table- 3.2**

Table 3.2 American diabetes association criteria for the diagnosis of diabetes

Test	Normal	Prediabetes	Diabetes
Fasting plasma glucose in mg/dl	≤ 99	100-125	≥ 126
Oral Glucose Tolerance Test in mg/dl	≤ 139	140-199	≥ 200
Random plasma glucose in mg/dl	-	-	≥ 200
HbA _{1c} in %	5.6	5.7-6.4	>6.5

Urine microalbumin

Renal function test

Lipid profile

ECG

When treating the older people with diabetes, we should consider their functional status, cognition, associated comorbidities and the life expectancy. The goals for glycemic control in older people depend on all these factors. For older people with intact cognition and function with significant life expectancy, the treatment goals are same as that of younger adults. The targets are

- Fasting glucose – 70-130 mg/dl
- Postprandial glucose - <180 mg/dl
- HbA_{1C} - <6.5%
- LDL cholesterol - <100 mg/dl
- Triglycerides - <150 mg/dl
- HDL cholesterol - >40mg/dl in men and >50 mg/dl in women
- Blood pressure - <130/80 mmHg

Less stringent targets to be followed for older people with cognitive and functional impairment and those with limited life expectancy. The American diabetes association target for glycemic control in older people depending on their health status is given in the **Table - 3.3**.

Table 3.3 Target for diabetes management depending on the health status

Health status	Fasting or pre-prandial glucose (mg/dl)	Bedtime glucose (mg/dl)	Hb A _{1C} goal
Healthy (few coexisting chronic illnesses, intact cognitive and functional status)	90-130	90-150	7.5%
Complex/intermediate (multiple coexisting chronic illnesses or 2+ instrumental ADL impairments or mild to moderate cognitive impairment)	90-150	100-180	8.0%
Very complex/poor health (long term care or end stage chronic illnesses or 2+ ADL dependencies or moderate to severe cognitive impairment)	100-180	110-200	8.5%

Follow up

The older diabetics should be assessed periodically for their glycemic status and for the microvascular and macrovascular complications. The recommended follow up protocol is shown in **Table 3.4**

Table 3.4 Protocol for follow up of diabetic patients

Tests	Time to do
Blood glucose	Every 3 months when it is under control
HbA _{1C}	6 months to 1 year
Tests for neuropathy	
Monofilament	Annual
Foot examination	Once in 3 months by health care provider Daily by the patient
Test for retinopathy	
Fundus examination	Annual. If retinopathy is present, follow up every 3-6 months
Tests for Nephropathy	
Urine microalbumin	Annual
Serum creatinine	Annual
ECG	Annual
Lipid profile	Annual

Check Your Progress 2

- How will you perform a foot examination in a diabetic elderly?
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.....
.....
- What is the ADA criteria for diagnosing diabetes in the elderly?
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.....
.....
- A 80-year-old female who is a known diabetic for 10 years on oral hypoglycemic agents, who has moderate cognitive impairment and is dependent on care givers for feeding and taking bath is referred to you for the management of diabetes. What is the target sugar level you aim for?
.....
.....
.....

3.4 LET US SUM UP

You have learnt about the clinical presentation of hypothyroidism and hyperthyroidism in older adults. You have learnt about the clinical examination and approach to thyroid dysfunction in older people. You must remember that symptoms and signs of thyroid disorders are not very specific and confirmatory investigations are mandatory.

You have learnt about the clinical presentation and complications of diabetes in older people. You have learnt about the clinical examination and approach to diabetes in older people. A comprehensive geriatric assessment and a holistic management is essential in older diabetics. Periodic follow up is essential for diabetic patients. It is also important that you should educate and counsel the patient and caregivers about the disease, complications, diet, physical activity, compliance to treatment, self-monitoring of blood glucose and foot care.

3.5 GLOSSARY

TSH	Thyroid stimulating hormone
Subclinical hypothyroidism	↑ TSH and normal T ₄
Subclinical hyperthyroidism	↓ TSH and normal T ₄
HbA _{1C}	Glycosylated hemoglobin

3.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. High TSH, Normal T₄
2. In older people, apathy and anorexia are common manifestations of hyperthyroidism. It is referred to as apathetic hyperthyroidism.
3. Any five symptoms of hypothyroidism and hyperthyroidism are

S.No	Hypothyroidism	Hyperthyroidism
1.	Weight gain	Weight loss
2.	Cold intolerance	Hot intolerance
3.	Dry skin	Tremor
4.	Fatigue	Palpitations
5.	Hoarseness of voice	Fatigue

Check Your Progress 2

1. Look for deformity, callus, fungal infection of nails and any ulcer or gangrene, loss of toe and charcot joints. Peripheral pulses should be

assessed to rule out peripheral vascular disease. Fine touch and Vibration sense should be assessed to rule out sensory neuropathy.

2. The diagnostic criteria of diabetes are the same for both young and old. The American diabetes association criteria for the diagnosis of diabetes is

Test	Normal	Prediabetes	Diabetes
Fasting plasma glucose in mg/dl	≤99	100-125	≥126
Oral Glucose Tolerance Test in mg/dl	≤139	140-199	≥200
Random plasma glucose in mg/dl	-	-	≥200
HbA _{1c}	5.6	5.7-6.4	>6.5

3. As the patient is having moderate cognitive impairment and she is dependent on two activities of daily living (ADL), the glycemic target should be fasting blood glucose of 100-180mg/dl, bedtime blood glucose of 110-200 mg/dl and HbA_{1c} of 8.5%.

3.7 REFERENCES AND FURTHER READINGS

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