

THYROID DISORDERS



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

By
Ms. RUPALI RUPASMITA ROUT
ASSISTANT PROFESSOR

INTRODUCTION:

Thyroid disorders are conditions that affect the function of the thyroid gland. Thyroid gland is a small butterfly-shaped gland located in the neck that produces hormones that regulate metabolism.

TYPES:

There are several types of thyroid disorders, including:

Hypothyroidism: This is a condition in which the thyroid gland does not produce enough thyroid hormone, which can result in a slower metabolism, fatigue, weight gain, and other symptoms.

Hyperthyroidism: This is a condition in which the thyroid gland produces too much thyroid hormone, which can lead to a faster metabolism, weight loss, and other symptoms.

Goiter: This is a swelling of the thyroid gland, often caused by iodine deficiency, which can cause difficulty swallowing, coughing, or breathing.

Thyroid nodules: These are lumps or growths in the thyroid gland that may be benign or cancerous.

Thyroid cancer: This is a rare but serious condition that occurs when abnormal cells grow in the thyroid gland and can spread to other parts of the body.

HYPOTHYROIDISM:

CAUSES/ETIOLOGY:

Autoimmune thyroiditis: This is an autoimmune disorder in which the body's immune system attacks the thyroid gland, leading to inflammation and damage to the thyroid tissue.

Iodine deficiency: Iodine is an essential mineral that the body needs to produce thyroid hormone. If there is a lack of iodine in the diet, the thyroid gland may not be able to produce enough thyroid hormone.

Radiation therapy: Radiation therapy to the neck or head for cancer treatment can damage the thyroid gland, leading to hypothyroidism.

Surgical removal of the thyroid gland: If the thyroid gland is removed due to cancer or other reasons, the person will need to take thyroid hormone replacement therapy to avoid hypothyroidism.

Congenital hypothyroidism: This is a rare condition in which a baby is born without a fully developed thyroid gland or with a thyroid gland that does not function properly.

Certain medications: Some medications, such as lithium and amiodarone, can interfere with thyroid hormone production and lead to hypothyroidism.

Aging: As people age, the thyroid gland may not function as well as it did in younger years, leading to hypothyroidism.

Pituitary gland problems: In some cases, hypothyroidism can be caused by a problem with the pituitary gland, which produces a hormone that stimulates the thyroid gland to produce thyroid hormone.

PATHOPHYSIOLOGY:

Hypothyroidism develops when the thyroid gland does not produce enough thyroid hormone, which is essential for many bodily functions, including

metabolism, energy production, and growth and development. There are several ways in which hypothyroidism can develop in the body, including:

- **Autoimmune disease:** The most common cause of hypothyroidism is an autoimmune disease called Hashimoto's thyroiditis, in which the body's immune system attacks and damages the thyroid gland, leading to a decrease in thyroid hormone production.
- **Iodine deficiency:** The thyroid gland needs iodine to produce thyroid hormones. If there is a lack of iodine in the diet, the thyroid gland may not be able to produce enough thyroid hormone, leading to hypothyroidism.
- **Radiation therapy:** Radiation therapy to the neck or head for cancer treatment can damage the thyroid gland, leading to hypothyroidism.
- **Thyroid surgery:** If the thyroid gland is surgically removed due to cancer or other reasons, the person will need to take thyroid hormone replacement therapy to avoid hypothyroidism.
- **Medications:** Certain medications, such as lithium and amiodarone, can interfere with thyroid hormone production and lead to hypothyroidism.
- **Congenital hypothyroidism:** This is a rare condition in which a baby is born without a fully developed thyroid gland or with a thyroid gland that does not function properly.
- **Pituitary gland problems:** In some cases, hypothyroidism can be caused by a problem with the pituitary gland, which produces a hormone that stimulates the thyroid gland to produce thyroid hormone.

SIGN & SYMPTOMS/CLINICAL MANIFESTATION:

- Fatigue and weakness
- Weight gain or difficulty losing weight
- Cold intolerance

- Dry skin and hair
- Constipation
- Depression and mood swings
- Memory problems
- Muscle aches, tenderness, and stiffness
- Joint pain and stiffness
- Slowed heart rate
- Heavy or irregular menstrual periods
- Infertility or low libido

DIAGNOSIS:

Thyroid-stimulating hormone (TSH) test: This is the most common test used to diagnose hypothyroidism. The TSH test measures the level of TSH in the blood, which is produced by the pituitary gland to stimulate the thyroid gland to produce thyroid hormones. In hypothyroidism, the TSH level is usually elevated because the pituitary gland is trying to stimulate the thyroid gland to produce more thyroid hormones.

Free thyroxine (T4) test: This test measures the level of free T4, which is the active form of thyroid hormone in the blood. In hypothyroidism, the free T4 level is usually low because the thyroid gland is not producing enough thyroid hormones.

Total T4 test: This test measures the total amount of T4 in the blood, including both free T4 and T4 bound to proteins. This test is less sensitive than the free T4 test, but it may be useful in certain situations.

Thyroid antibody tests: These tests measure the presence of antibodies that attack the thyroid gland, which can help diagnose autoimmune thyroiditis (Hashimoto's thyroiditis), the most common cause of hypothyroidism.

Ultrasound: An ultrasound of the thyroid gland can help detect abnormalities, such as nodules or inflammation, which may be causing hypothyroidism.

PHARMACOLOGICAL MANAGEMENT:

Levothyroxine and Liothyronine

Surgery:

- **Thyroid removal:** Surgical removal of all or part of the thyroid gland
- **Partial thyroidectomy:** Surgical removal of part of the thyroid.

NON PHARMACOLOGICAL MANAGEMENT/PREVENTION:

Get regular thyroid function tests: Regular testing of thyroid hormone levels can help detect and monitor any changes in thyroid function, allowing for early intervention if necessary.

Maintain a healthy diet: Eating a balanced diet that includes iodine-rich foods such as seafood, dairy products, and iodized salt can help support healthy thyroid function.

Manage stress: **Stress** can affect thyroid function, so managing stress through techniques such as meditation, yoga, or exercise can help support healthy thyroid function.

Avoid exposure to radiation: Radiation exposure, such as through medical procedures or environmental sources, can damage the thyroid gland and lead to hypothyroidism.

Consult with a healthcare professional: If you have a family history of thyroid disease or are experiencing symptoms such as fatigue, weight gain, or sensitivity

to cold, it is important to consult with a healthcare professional who can help diagnose and manage any thyroid conditions.

HYPERTHYROIDISM:

CAUSES/ETIOLOGY:

Thyroid nodules or goiter: A nodule or enlarged thyroid gland can produce excess thyroid hormone.

Thyroiditis: Inflammation of the thyroid gland, which can occur due to infection or an autoimmune disorder, can cause excess thyroid hormone release.

Excessive iodine intake: Iodine is necessary for thyroid hormone production, but excessive intake through diet or supplements can lead to hyperthyroidism.

Certain medications: Medications such as amiodarone, lithium, and interferon-alpha can interfere with thyroid hormone production and cause hyperthyroidism.

Pituitary gland dysfunction: Rarely, hyperthyroidism can occur due to a malfunction of the pituitary gland, which produces thyroid-stimulating hormone (TSH) that regulates thyroid hormone production.

Thyroid cancer: In rare cases, thyroid cancer can produce excess thyroid hormone.

PATHOPHYSIOLOGY:

- Hyperthyroidism develops in the body when there is an excessive amount of thyroid hormone circulating in the bloodstream.

- The thyroid gland, located in the neck, produces two hormones: thyroxine (T4) and triiodothyronine (T3), which regulate metabolism and energy levels throughout the body.
- The most common cause of hyperthyroidism is Graves' disease, an autoimmune disorder that causes the body to produce antibodies that stimulate the thyroid gland to produce excess hormone.
- In Graves' disease, the antibodies attach to the thyroid gland cells and cause them to produce too much hormone. This overproduction of hormone can lead to an enlarged thyroid gland, known as a goiter, as well as other symptoms such as weight loss, rapid heartbeat, anxiety, and tremors.
- Overproduction of these hormones speeds up the body's metabolism and leading to various symptoms of hyperthyroidism.

SIGN & SYMPTOMS:

- **Weight loss:** Hyperthyroidism can cause a significant and unexplained weight loss, despite an increased appetite.
- **Rapid heartbeat:** An overactive thyroid can cause the heart to beat faster, resulting in palpitations or irregular heartbeat.
- **Anxiety and irritability:** Excess thyroid hormone can cause anxiety, irritability, and nervousness.
- **Tremors:** Hyperthyroidism can cause fine tremors in the hands and fingers.
- **Heat intolerance:** People with hyperthyroidism may be more sensitive to heat and may sweat excessively.

- **Changes in bowel movements:** Hyperthyroidism can cause frequent bowel movements or diarrhea.
- **Menstrual changes:** Women with hyperthyroidism may experience changes in their menstrual periods, including lighter or irregular periods.
- **Muscle weakness:** Hyperthyroidism can cause muscle weakness, especially in the arms and thighs.
- **Enlarged thyroid gland:** In some cases, hyperthyroidism can cause an enlarged thyroid gland, also known as a goiter.
- **Eye problems:** Graves' disease, a common cause of hyperthyroidism, can cause eye problems such as bulging eyes, double vision, or vision changes.

DIAGNOSIS:

- **Medical history and family history**
- **Physical examination**
- **Thyroid function tests:** These tests measure levels of thyroid hormones (T3 and T4) and thyroid-stimulating hormone (TSH) in the blood. In hyperthyroidism, levels of T3 and T4 are typically elevated, while TSH levels are low or undetectable.
- **Radioactive iodine uptake test:** This test involves swallowing a small amount of radioactive iodine, which is taken up by the thyroid gland. The amount of radioactive iodine absorbed by the thyroid gland can help determine whether the gland is overactive or not.

- **Thyroid scan:** This test uses a small amount of radioactive material to create an image of the thyroid gland. A thyroid scan can help identify the presence of nodules or other abnormalities in the gland.
- **Antithyroid antibody tests:** In autoimmune disorders such as Graves' disease, the body produces antibodies that stimulate the thyroid gland to produce excess hormone. Blood tests can measure levels of these antibodies, including thyroid-stimulating immunoglobulin (TSI) and thyrotropin receptor antibody (TRAb).

PHARMACOLOGICAL MANAGEMENT:

Antithyroid drugs: These medications, including methimazole and propylthiouracil (PTU), work by blocking the production of thyroid hormones in the thyroid gland. They are typically used to treat Graves' disease and other forms of hyperthyroidism caused by overactivity of the thyroid gland.

Beta-blockers: These medications, including propranolol and atenolol, work by blocking the effects of thyroid hormones on the body's tissues, such as the heart and nervous system. They can help relieve symptoms such as rapid heartbeat, tremors, and anxiety.

Radioactive iodine therapy: This treatment involves swallowing a small amount of radioactive iodine, which is taken up by the thyroid gland and destroys overactive thyroid cells. This treatment is typically used in cases of Graves' disease and other forms of hyperthyroidism that do not respond to other treatments.

Surgery: In some cases, surgery may be recommended to remove part or all of the thyroid gland. This treatment is typically used in cases where other treatments are not effective or are not well tolerated.

NON PHARMACOLOGICAL MANAGEMENT/PREVENTION:

- **Avoiding smoking:** Smoking has been linked to an increased risk of Graves' disease, the most common cause of hyperthyroidism.
- **Managing stress:** Stress can exacerbate symptoms of hyperthyroidism, so managing stress through techniques such as meditation, yoga, or counseling may be helpful.
- **Eating a balanced diet:** A diet rich in nutrients such as iodine, selenium, and zinc may help support thyroid function. However, excessive amounts of iodine can also contribute to the development of hyperthyroidism in some people, so it is important to avoid excessive amounts of iodine supplements or foods high in iodine.
- **Monitoring thyroid function:** Regular thyroid function tests can help detect changes in thyroid function early, allowing for prompt treatment if necessary.
- **Treating underlying conditions:** Certain autoimmune disorders, such as Hashimoto's thyroiditis, can increase the risk of developing hyperthyroidism. Treating these conditions may help reduce the risk of developing hyperthyroidism.

GOITER:

CAUSES/ETIOLOGY:

- **Iodine deficiency:** Iodine is a key nutrient needed for the production of thyroid hormones. In areas where iodine is lacking in the diet, the thyroid gland may become enlarged as it tries to produce more hormones.

- **Hashimoto's thyroiditis:** This is an autoimmune disorder in which the immune system attacks the thyroid gland, leading to inflammation and damage. This can cause the thyroid gland to become enlarged and develop a goiter.
- **Graves' disease:** This is another autoimmune disorder in which the immune system produces antibodies that stimulate the thyroid gland to produce excess hormones. This can cause the thyroid gland to become enlarged and develop a goiter.
- **Thyroid nodules:** These are growths or lumps that develop within the thyroid gland. They can be benign or cancerous and can cause the thyroid gland to become enlarged and develop a goiter.
- **Side effects of medications:** Some medications, such as lithium or amiodarone, can cause the thyroid gland to become enlarged and develop a goiter.
- **Pregnancy:** Changes in hormone levels during pregnancy can cause the thyroid gland to become enlarged and develop a goiter.
- **Inflammation:** Inflammation of the thyroid gland, such as from a viral infection, can cause the gland to become enlarged and develop a goiter.

PATHOPHYSIOLOGY:

- Goiter develops when the thyroid gland becomes enlarged due to overproduction of thyroid hormones.
- The thyroid gland, located in the neck, produces two hormones: thyroxine (T4) and triiodothyronine (T3), which regulate metabolism and energy levels throughout the body.

- The most common cause is Graves' disease, an autoimmune disorder that causes the body to produce antibodies that stimulate the thyroid gland to produce excess hormone.
- In Graves' disease, the antibodies attach to the thyroid gland cells and cause them to produce too much hormone. This overproduction of hormone can lead to an enlarged thyroid gland, known as a goiter, as well as other symptoms such as weight loss, rapid heartbeat, anxiety, and tremors.

SIGN & SYMPTOMS / CLINICAL MANIFESTATION:

Swelling or lump in the neck: A visible swelling or lump in the neck is the most common symptom of a goiter.

Difficulty swallowing or breathing: If the goiter is large, it may press on the windpipe or esophagus, causing difficulty swallowing or breathing.

Hoarseness or voice changes: A large goiter may also press on the laryngeal nerve, which can cause hoarseness or voice changes.

Coughing or wheezing: If the goiter is causing compression on the airways, it may cause coughing or wheezing.

Neck pain or discomfort: A goiter may cause neck pain or discomfort, especially if it is large or growing quickly.

Thyroid hormone imbalances: Depending on the underlying cause of the goiter, it may be associated with symptoms of hyperthyroidism or hypothyroidism, such as weight changes, fatigue, or changes in heart rate.

DIAGNOSIS:

- **Medical history and family history**
- **Physical examination**
- **Blood tests:** Blood tests can measure the levels of thyroid hormones and thyroid-stimulating hormone (TSH) in the blood. Abnormal levels of these hormones can indicate an underlying thyroid problem.
- **Thyroid ultrasound:** A thyroid ultrasound uses sound waves to create images of the thyroid gland. This can help identify the size and location of any nodules or lumps in the thyroid gland.
- **Radioactive iodine uptake test:** This test measures how much radioactive iodine the thyroid gland absorbs from the bloodstream. This can help determine how active the thyroid gland is and whether it is overactive or underactive.
- **Fine-needle aspiration biopsy:** If a nodule or lump is detected in the thyroid gland, a fine-needle aspiration biopsy may be performed. This involves using a thin needle to remove a small sample of tissue from the thyroid gland, which can be examined under a microscope for signs of cancer or other abnormalities.

PHARMACOLOGICAL MANAGEMENT:

Levothyroxine: This medication is used to treat an underactive thyroid gland (hypothyroidism). It can help regulate the levels of thyroid hormones in the body, which can help reduce the size of a goiter caused by an iodine deficiency or hypothyroidism.

Antithyroid medications: These medications are used to treat an overactive thyroid gland (hyperthyroidism), which can cause goiter. Examples of antithyroid medications include methimazole and propylthiouracil.

Iodine supplements: If a goiter is caused by an iodine deficiency, iodine supplements may be prescribed to help reduce the size of the goiter.

Beta-blockers: Beta-blockers such as propranolol may be prescribed to help relieve symptoms such as rapid heartbeat or tremors associated with an overactive thyroid gland.

NON PHARMACOLOGICAL MANAGEMENT/PREVENTION:

- **Avoiding smoking:** Smoking has been linked to an increased risk of Graves' disease, the most common cause of hyperthyroidism.
- **Managing stress:** Stress can exacerbate symptoms of hyperthyroidism, so managing stress through techniques such as meditation, yoga, or counseling may be helpful.
- **Eating a balanced diet:** A diet rich in nutrients such as iodine, selenium, and zinc may help support thyroid function. However, excessive amounts of iodine can also contribute to the development of hyperthyroidism in some people, so it is important to avoid excessive amounts of iodine supplements or foods high in iodine.
- **Monitoring thyroid function:** Regular thyroid function tests can help detect changes in thyroid function early, allowing for prompt treatment if necessary.
- **Treating underlying conditions:** Certain autoimmune disorders, such as Hashimoto's thyroiditis, can increase the risk of developing hyperthyroidism. Treating these conditions may help reduce the risk of developing hyperthyroidism.