INFLUENCE OF YOGIC PRACTICES ON STIMULATION OF THYROID GLAND AND ITS SECRETION OF HARMONES IN HYPOTHYROIDISM'

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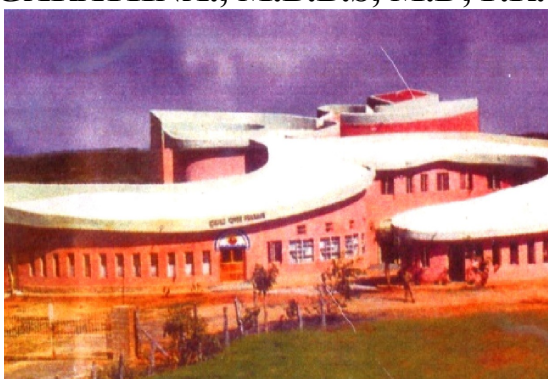

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ABSTRACT

Purnamadah Purnamidam

Purnat Purnamudachyate

Purnasya Purnamadaya

Purnameva Vashsihate

That is whole and this is whole. From the whole the whole becomes manifest.

From the whole when the whole is negated, what remains is again the whole.

The Sanskrit hymn in praise of Lord contemplates the ultimate reality as follows:
Mystic power of the Supreme Lord with His inscribed commandments is the origin of life evolved as a wholesome entity. Life comes from life and is again an absolute entity. In its incorporeal state, life transforms to a different body retaining its self existence. Thus either an addition or subtraction of life remains unaltered.
The script of His instructions is embedded in its physical manifestation as a single and total functional unit called ***Cell*** formed inside the mother's womb contributed by its parents. The single cell multiplies itself into many units by mitosis molding themselves into a living organism, sheds down the depleted cells by apoptosis but retains their uniqueness and take birth into this world.
The newborn grows up in terms of its genetic codification in the given environment and living conditions. Thus life is an ultimate non-material particle and is distinct from molecules or matter and that the supreme lord is the source of both life and matter.
Human race among the living organisms is bestowed with a distinctive feature of intellect to understand this reality. Folks on eastern hemisphere paid their gratitude for His blessing and moved in His directions to solve their social, economic and health problems. Many techniques and therapies were developed. Folks on western hemisphere mistook the bestowed intelligence as their own. They developed a diagnostic method of solving problems in terms of why, what and how? They framed a theory of supplementation and started replacing the worn out materials, altering chemical compositions, reconstruction of organs and their replacements.
In the present scenario east have lost its supreme intellectuals and their works are not fully understood for lack of complete doctrines and necessary peripherals. The western methods found to be remedial for the existing irregularities without correcting the source and sprouting up new problems making the condition worse.
The need of the hour is to synthesize east and west technologies to find a true solution of any problem. In the spectrum of health concern this integrated approach is found fruitful by synchronizing the test results of western technologies with the eastern therapeutic methods. In its simpler version this may be called as "Integrated Approach of Yoga Therapy".
In the orbit of health concern, here the study is confined to know the **Influence of Yogic Practices on stimulation of Thyroid Gland and its Secretion of Hormones in Hypothyroidism.**

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Chapter 1
THYROID GLAND–FUNCTIONS

1.1 Introduction:

Human body is a collective functional unit of different systems working in complete coordination with one another to sustain life and carry on its functions. Each control system of the body is specific and has distinct functions.

ENDOCRINE SYSTEM

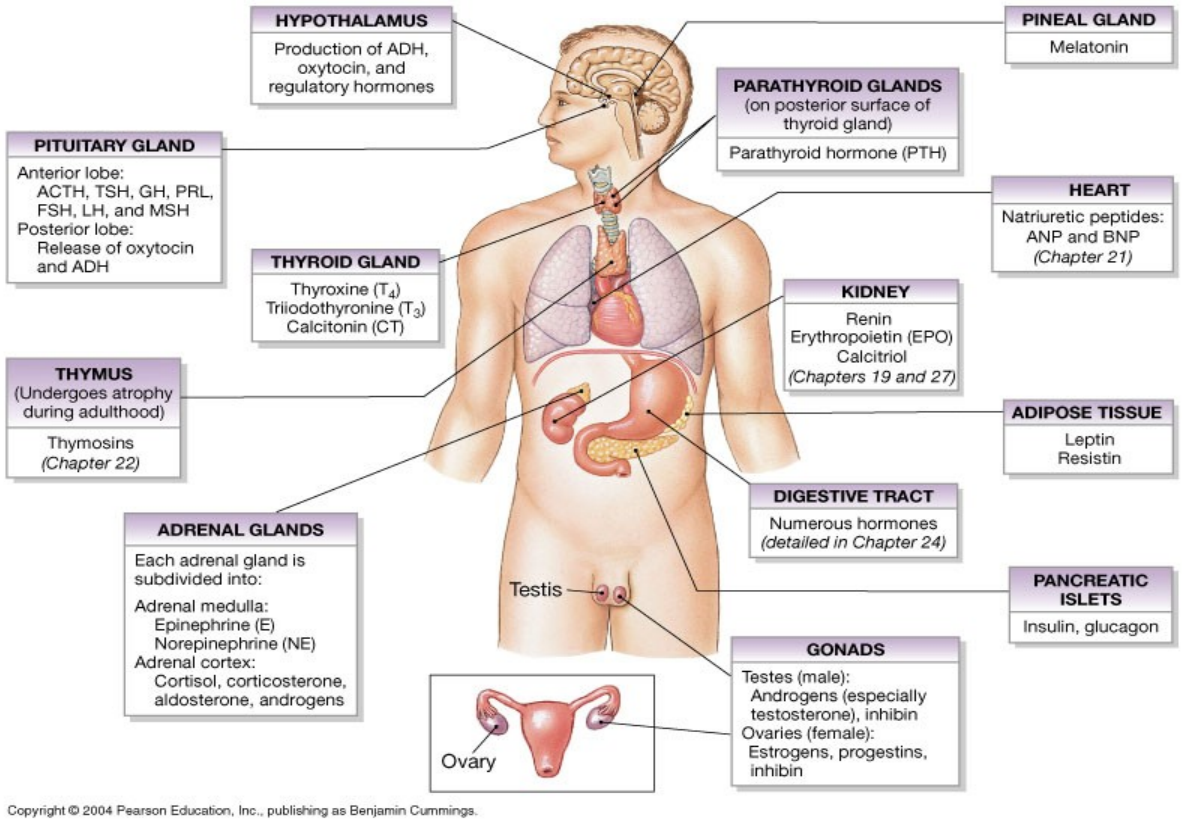

Fig 1

Endocrine System is one such control system of the body having ductless glands, secretes chemical messengers called hormones that circulate within the body via the bloodstream to affect distinct cells within specific organs. Hormones are secreted directly into the blood. Hormones secreted are of two types namely steroidal and non steroidal or protein based hormones.

The endocrine system provides an electrochemical connection from the hypothalamus of the brain to all the organs that control the body metabolism, growth, development, and reproduction.

Like endocrine, Nervous system also controls and coordinates functions throughout the body and responds to internal and external stimuli. Hypothalamus located in the brain controls the release of hormones from the pituitary gland. It is an important link between the endocrine and nervous systems.

Both the systems work together to receive and send sensory information to coordinate with body response. So it is called as neuro-endocrine system.

1.2 Thyroid Gland

Thyroid Gland is one of the largest glands of the endocrine system. It is a

butterfly-shaped gland made up of two lobes separated by tissue called the isthmus.

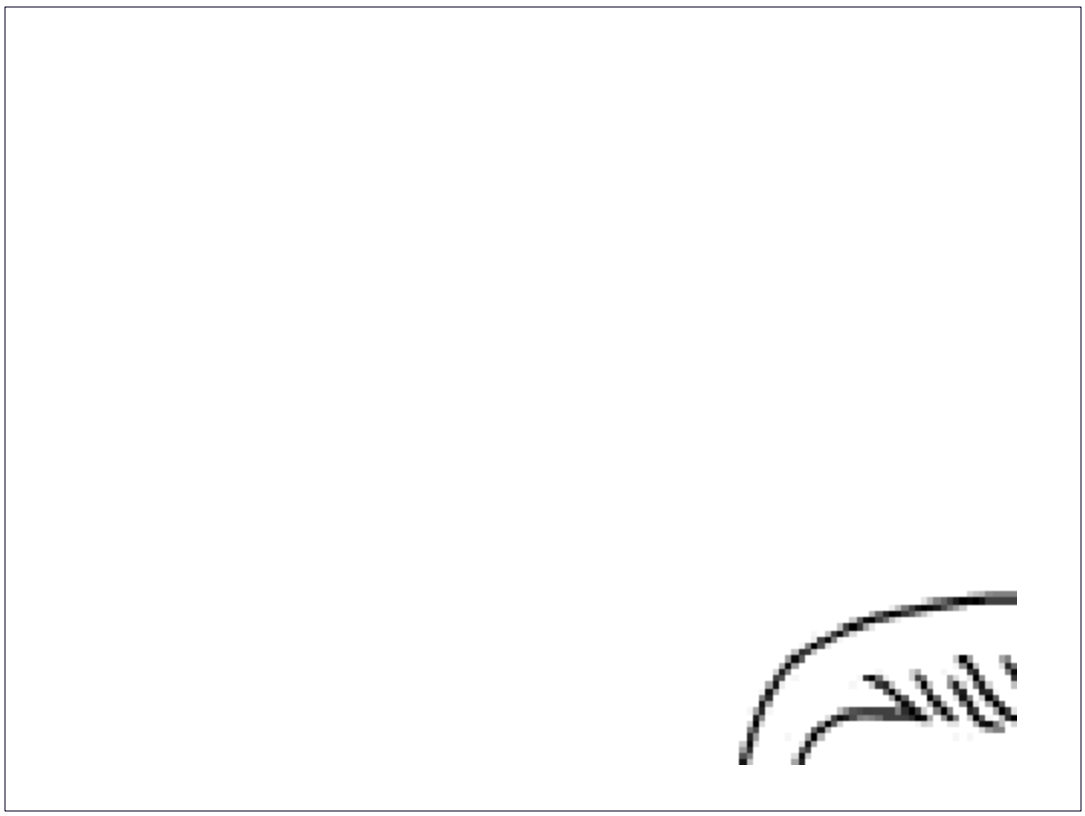

Fig 2

1.2.1 Anatomy:

- Thyroid Gland weighs approximately 1 ounce (28 g).
- Each lobe of the thyroid gland wraps around and is affixed by fibrous tissue to one side of the trachea. A narrow projection of thyroid tissue, called the pyramidal lobe, is often present and originates at the isthmus and extends up to and lays on the surface of the thyroid cartilage (Adam's apple).
- The upper projections of the right and left lobes are called the upper poles of the gland while the lower projections of the lobes are called the lower poles. The lobes of the thyroid lie between the larynx and trachea.
- The thyroid gland can be felt through palpitation of the neck, unless the neck is very thick and short.
- A thin capsule of connective tissue surrounds the thyroid and divides it into a cluster of globular sacks called follicles. The gland does not, however, have

any true subdivisions, and the follicles are packed together like a bag of berries as shown in fig below:

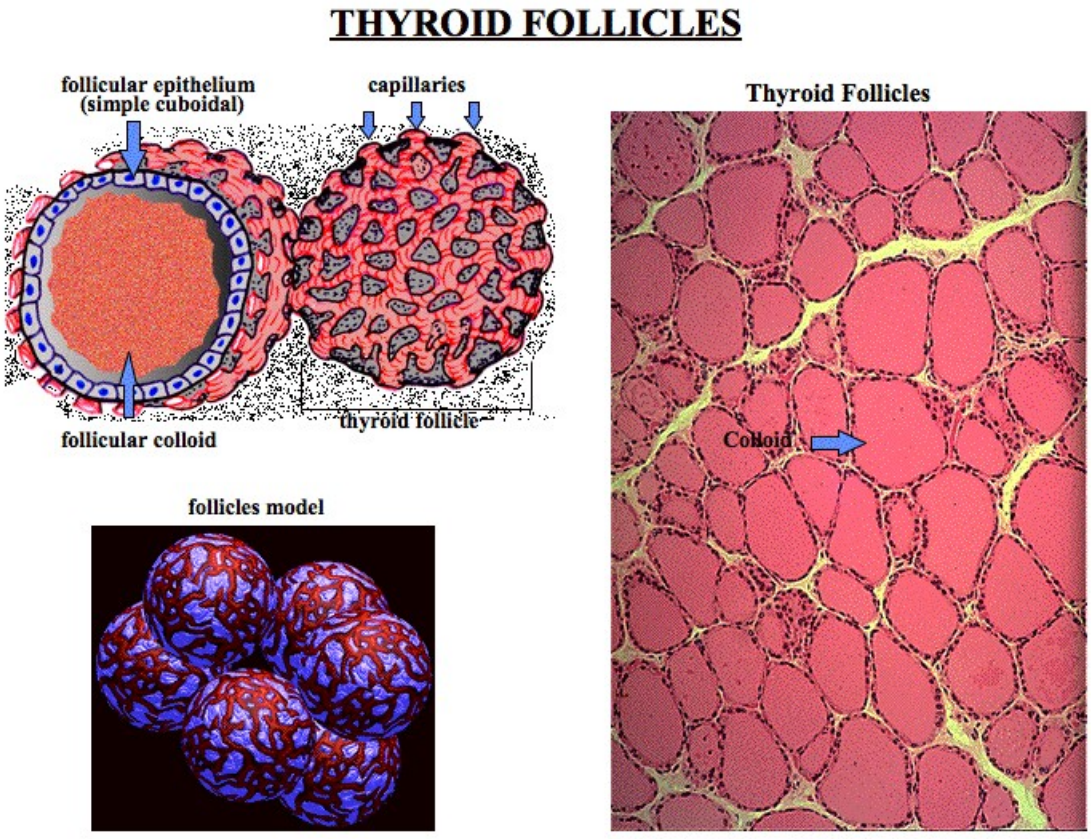

Fig 3

1.2.2 Physiology:

- The follicles are lined with follicular cells that secrete hormones called thyroxine (T4) and triiodothyronine (T3) and enclose a glutinous material called colloid.
- Colloid is primarily made of a protein called thyroglobulin that is involved in the formation of T4 and T3.
- Cells called parafollicluar cells or C-cells, which secrete the hormone calcitonin, are found between the follicles.

Hormones thyroxin (T4) and triiodothyronine (T3) are derived by modification of Tyrosine as shown in fig below. Approximately 99.98% of T4 is bound to 3 serum proteins Thyroid Binding Globulin (TBG), Thyroid binding Pre Albumin (TBPA) and Albumin. Only <0.02% of the total T4 in blood is unbound or free. Only <0.4% of Total T3 in blood is free.

Thyroid Hormones

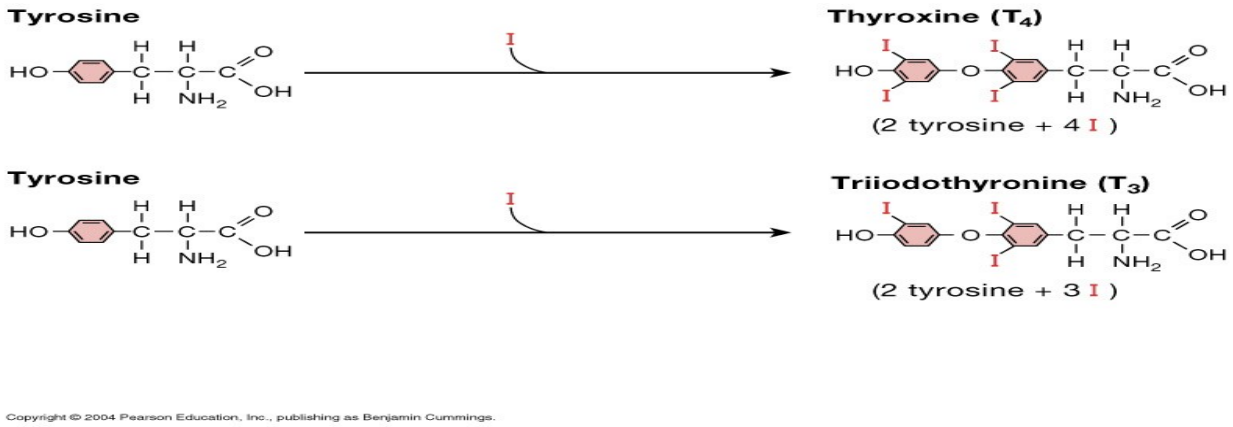

Fig 4

These hormones

- are requirement for GH and prolactin production, secretion and action.
- increases intestinal glucose reabsorption (glucose transporter)
- increases mitochondrial oxidative phosphorylation (ATP production)
- increases activity of adrenal medulla (sympathetic; glucose production)
- induces enzyme synthesis
- increases heat production (calorigenic effect)
- help immune regulation in the intestine

These hormones also have Specific Actions:
Metabolic:

i) Regulates Basal Metabolic Rate (BMR).

ii) Increases Oxygen consumption in target tissues.

iii) Increases sensitivity of target tissues thereby elevating Lipolysis glycogenolysis and gluconeogenesis.

Developmental:

i) Is critical for normal development of the skeletal system and musculature.

ii) Is also essential for normal brain development and regulates synaptogenesis, neuronal integration and cell migration.

1.3 Thyroid Hormone Synthesis:

STEP 1:

1.3.1 Uptake of Iodide by Thyroid Gland:

Let us first consider the need and availability of iodine before we discuss about its uptake by thyroid gland.

1.3.1.1 Need of Iodine:

Iodine is detected in every organ and tissue in the body. It is found in high levels in the thyroid, breast, stomach, saliva, ovaries, liver, lung, heart, and adrenals. It is essential in pregnancy.

Iodine and the Thyroid:

Iodine is essential for the formation of thyroid hormones and the thyroid hormones affect every cell of the body. The primary thyroid hormones are T3 and T4, named for the number of iodine atoms contained. For example, T3 contains three iodine atoms and T4 contains four iodine atoms. Recent research indicates that T2 and T1 are also important hormones.

Many studies have been done on the metabolism of iodine by the thyroid. The NIS (Sodium/Iodide Symporter) allows iodide to be taken into the thyroid cells at levels of concentration much higher than the levels in the blood. Once the iodide is in the cell, it undergoes a complex metabolic process as it gets transformed into the thyroid hormones.

Iodine and the Breast:

The breast contains NIS receptors and is known to concentrate iodine in the excreted milk. The specific form of molecular iodine (I2) (versus iodide, I-) is considered to be essential for a proper structure and healthy breast.

Research on iodine and the breast focuses on (1) fibrocystic breast disease, (2) breast cancer, (3) iodine metabolism and (4) relationships between thyroid issues and the breast.

Iodine and the Brain (CNS):

Iodine is known to be essential for the development of the brain. Cretinism, a severe form of mental retardation with physical difficulties as well, is caused by severe iodine deficiency in the mother during pregnancy. It is the best known of the Iodine Deficiency Diseases and is still a problem in much of the world. Many suspect that lesser forms of mental retardation are also caused by iodine deficiency.

Iodine and the Heart:

Iodine is essential for the heart. The thyroid hormones (which are molecules containing iodine) have major effects on the heart and circulatory system.

Iodine and the Immune System:

Iodine is accumulated by the immune system, especially by neutrophils during phagocytosis (engulfing of bacteria and other foreign bodies). A potent antimicrobial system is created with a peroxidase, hydrogen peroxide, and a halide. This system is highly effective against bacteria, viruses, fungi, and other micro-organisms. During this process, iodoproteins such as monoiodotyrosine (T1) are created.

Iodine and the Gastrointestinal System:

Iodine is concentrated in the stomach and is being studied in relationship to stomach cancer. Iodine is also important in the production of stomach acidity, bowel movements, and candida.

Iodine and the Skin:

Much of the body's iodine is found in the skin. Moreover, iodine can be absorbed through the skin. Exactly what the iodine is doing in the skin and the various factors that affect transdermal absorption are not yet clear.

Iodine and Hormones:

In addition to thyroid hormones, iodine also affects other hormones. Iodine affects estrogen metabolism, reported to transform estrone and estradiol to estriol. Iodine affects the ovarian production of estrogen and also affects estrogen receptors (at least in the breast).

Iodine and the Ovaries:

Ovaries concentrate iodine and have NIS Symporter. Ovarian iodide uptake varies with sexual activities and is enhanced by estrogens. Iodine deficiency is related to ovarian cysts and ovarian cancer.

Iodine and the Lungs:

There is a long history of the therapeutic use of iodine for lung issues. It has been used in asthma, bronchitis, and emphysema. It is presently being studied in lung cancer.

Iodine and the Eyes:

Iodine occurs in large quantities in the ciliary body and lachrymal glands of the eye. It has been related to cataract formation and glaucoma, and is seen as useful in treating eye infections. Iodide has been found to be protective against UVB radiation.

Iodine and the Mouth:

The salivary gland concentrate iodine 20 to 100 times serum levels. The function of the iodine in the saliva is not yet clear. Povidone-iodine is used as a disinfectant in dentistry for periodontal issues.

Iodine and Bones:

Several studies have shown a relationship between iodine and bones.

Iodine and the Blood:

Iodine has been studied as an antioxidant in human blood and has been found to be as powerful as Vitamin C.

1.3.1.2 Availability of Iodine:

i) Iodized salt, sea salt and salty foods

ii) All dairy products(milk, sour cream, cheese, cream, yogurt, butter and ice cream)
iii) Margarine
iv) Egg yolks
v) Sea food (fish, shellfish, seaweed, kelp)
vi) Foods that contain carrageen, algin – all are made from seaweed
vii) Many prepared meats (ham, bacon, sausage, corned beef etc)
viii) Fresh chicken and turkey with broth or additives injected
ix) Dried fruit
x) Canned Vegetables
xi) Commercial bakery products
xii) Chocolate
xiii) Molasses
xiv) Soy products (soy sauce, soy milk, tofu)
xv) Any vitamins or supplements that contain iodine

1.3.1.3 Uptake:

NIS mediated uptake of iodide into follicular cells of the thyroid gland is the first step in the synthesis of thyroid hormone.
Thyroid cells extract and concentrate iodide from plasma, shortly after administration radio iodide is taken up from the blood and accumulates within thyroid follicular cells.

About 20% of the iodide perfusing the thyroid is removed at each passage through the gland. The normal thyroid maintains a concentration of free iodide 20 to 50 times higher than that of plasma depending on the amount of available iodine and the activity of the gland.

STEP 2:

1.3.2 Synthesis of Thyroid Hormones:

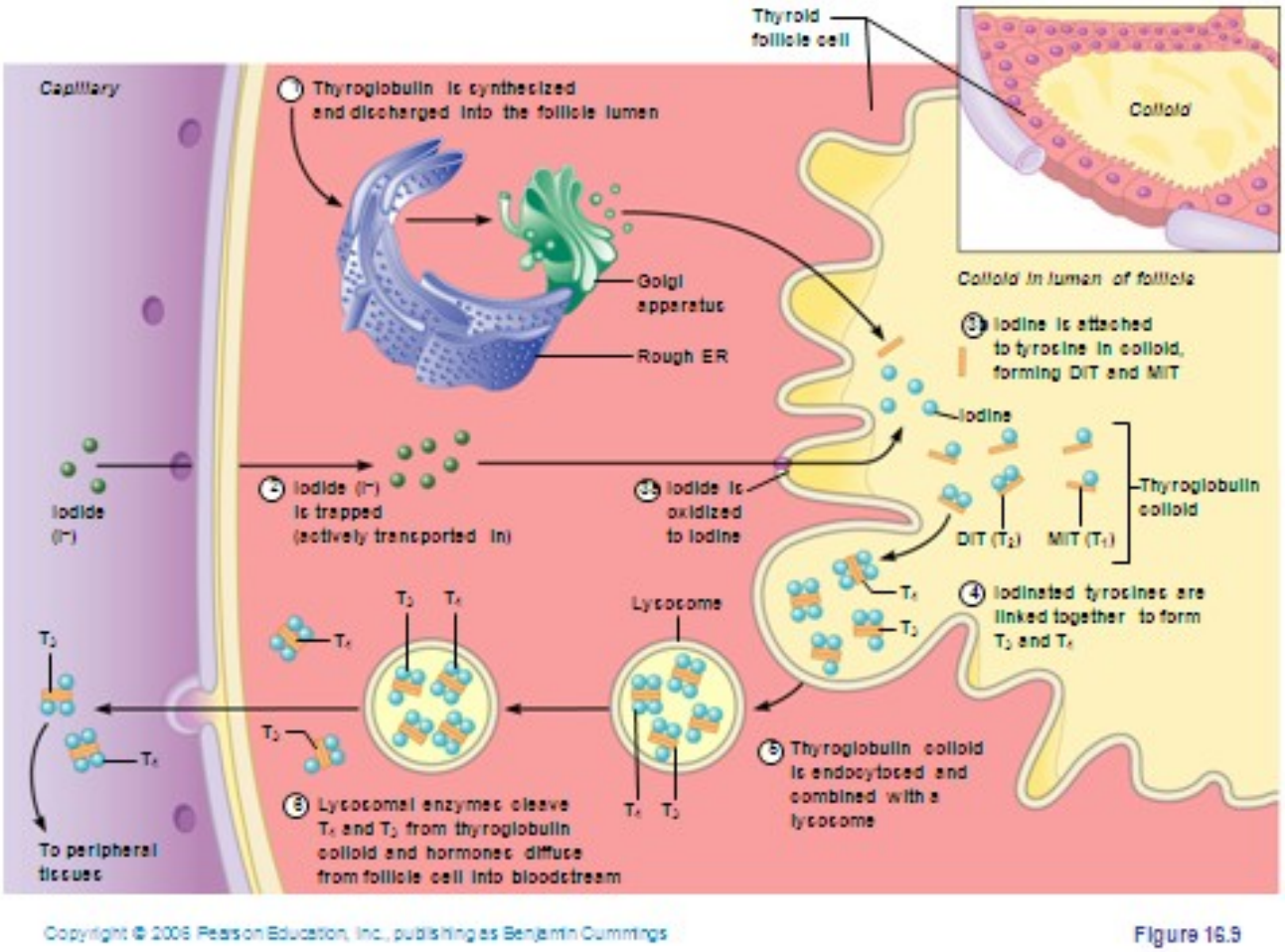

Fig 5

Oxidation, Organification and coupling:

1.3.2.1 Oxidation of Iodide Ion:

The first essential step in the formation of the thyroid hormones is conversion of the iodide ions to an oxidized form of iodine that is then capable of combining directly with the amino acid tyrosine. This oxidation of iodine is promoted by the enzyme peroxidase and its accompanying hydrogen peroxide, which provide a potent system capable of oxidizing iodides. The peroxidase is either located in the apical membrane of the cell or attached to it thus providing the oxidized iodine at exactly the point in the cell where the thyroglobulin molecule issues forth from the Golgi apparatus and through the cell membrane into the stored thyroid gland colloid. When the peroxidase

system is blocked or when it is hereditarily absent from the cells, the rate of formation of thyroid hormones falls to zero.

1.3.2.2 Organification of Thyroglobulin:

The binding of iodine with the thyroglobulin molecule is called organification of the thyroglobulin. Oxidized iodine even in the molecular form will bind directly but very slowly with the amino acid tyrosine. In the thyroid cells, however, the oxidized iodine is associated with an iodinase enzyme that causes the process to occur within seconds or minutes. Therefore, almost as rapidly as the thyroglobulin molecule is released from the Golgi apparatus or as it is secreted through the apical cell membrane into the follicle, iodine binds with the tyrosine amino acids within the thyroglobulin molecule.

1.3.2.3 Coupling of Iodinated Tyrosine:

Tyrosine is first iodized to monoiodotyrosine and then to diiodotyrosine. Then, during the next few minutes, hours, and even days, more and more of the iodotyrosine residues become coupled with one another. The major hormonal product of the coupling reaction is the molecule thyroxine remains part of the thyroglobulin molecule.

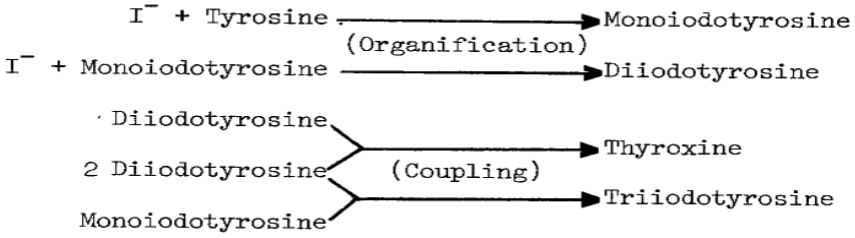

Fig 6

STEP 3:

1.3.3 Secretion of Thyroid Hormones:

Thyroid hormones are excised from their thyroglobulin scaffold by digestion in lysosomes of thyroid epithelial cells. This final act in thyroid hormone synthesis proceeds in the following steps:

- Thyroid epithelial cells ingest colloid by endocytosis from their apical borders - that colloid contains thyroglobulin decorated with thyroid hormone.
- Colloid-laden endosomes fuse with lysosomes, which contain hydrolytic enzymes that digest thyroglobluin, thereby liberating free thyroid hormones.
- Finally, free thyroid hormones apparently diffuse out of lysosomes, through the basal plasma membrane of the cell, and into blood where they quickly bind to carrier proteins for transport to target cells.

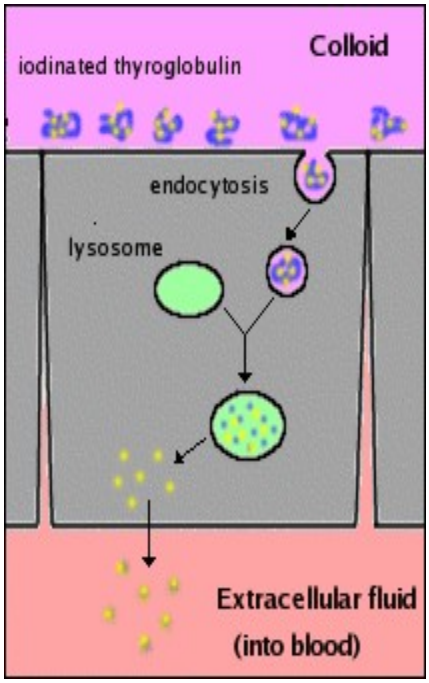

Fig 7

1.4 Thyroid Hormone Storage and Transport:

1.4.1Storage

The thyroid gland is unusual among the endocrine glands in its ability to store large amounts of hormone. After synthesis of the thyroid hormones has run its course, each thyroglobulin molecule contains up to 30 thyroxine molecules and a few triiodothyronine molecules. In this form the thyroid hormones are stored in the follicles to supply the body with its normal requirements of thyroid hormones for 2 to 3 months. Therefore, when synthesis of thyroid hormone ceases, the physiologic effects of deficiency are not observed for several months.

1.4.2 Transport

- The thyroid hormones circulate bound to plasma proteins produced in the liver which protects the hormones from enzymic attack.
- Only 0.1% of T4 and 1% of T3 are carried unbound—it is this free (unbound) fraction that is responsible for their hormonal activities.
- Both T3 and T4 can cross cell membranes, though a carrier transport may be involved.

- The concentration of circulating T4 is much higher than that of T3 (50:1). There are two reasons for this:
    - The thyroid secretes more T4 than T3.
    - T4 has a longer half-life (7 days vs 1 day).

1.5 Thyroid Regulation

Organs of the Endocrine system signals with each other in sequence and are usually referred to as an axis. Hypothalamus-pituitary-thyroid axis is one such axis meant for regulation of Metabolism.

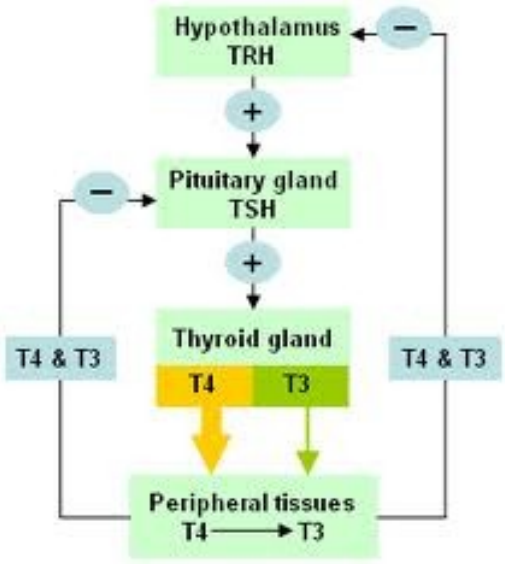

Fig 8

The production of T4 and T3 in the thyroid gland is regulated by the hypothalamus and pituitary gland. To ensure stable levels of thyroid hormones, the hypothalamus monitors circulating thyroid hormone levels and responds to low levels by releasing thyrotropin-releasing hormone (TRH). This TRH then stimulates the pituitary to release thyroid stimulating hormone (TSH).When thyroid hormone levels increase, production of TSH decreases, which in turn slows the release of new hormone from the thyroid gland.

Chapter 2
THYROID CODITIONS

2.1 Introduction:

In chapter 1 we have seen how a Thyroid Gland functions (EUTHYROID) and what are its hormones. Here we see its dysfunction and its condition at various

levels of hormone secretions with specific reference to Low secretion of gland referred as Hypothyroid and the condition as **HYPOTHYROIDISM.**

Level of secretion	**Name of the Thyroid**
High	HYPERTHYROID
Normal	EUTHYROID
Low	HYPOTHYROID

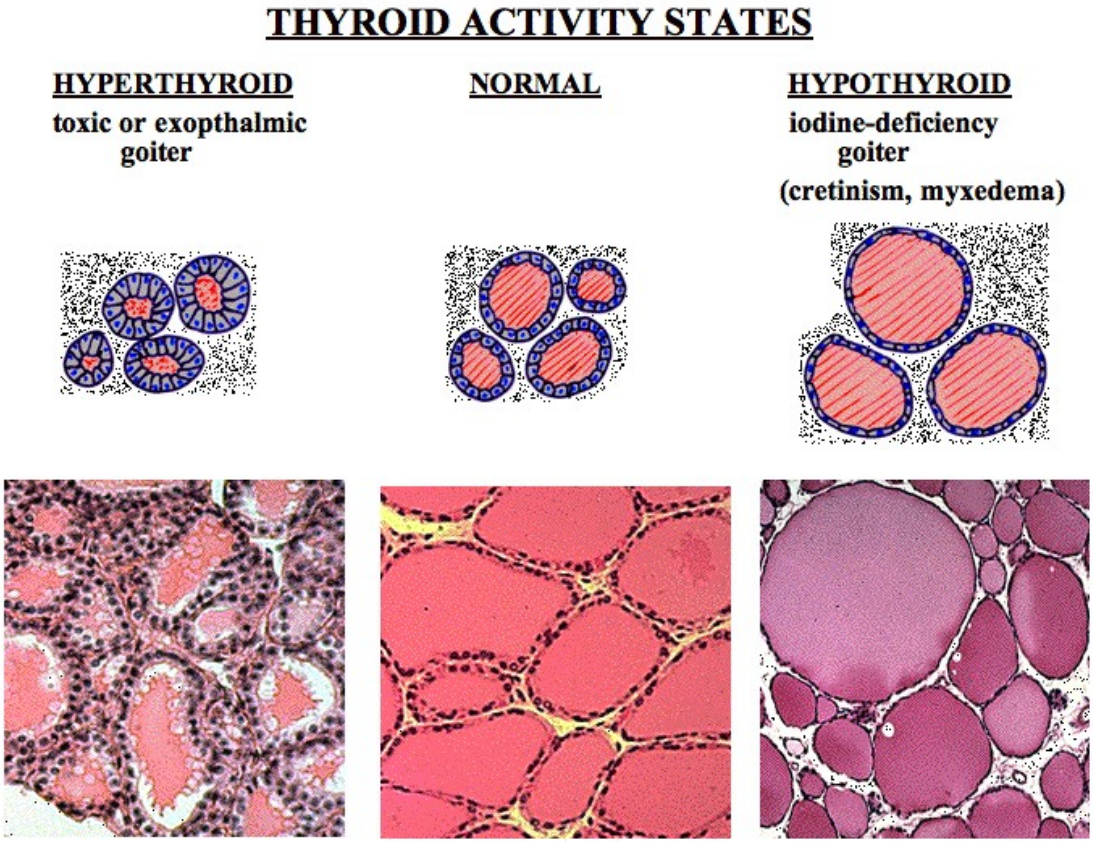

Fig 9

2.2 Hypothyroidism:

Hypothyroidism was first diagnosed in the late nineteenth century when doctors observed that surgical removal of the thyroid resulted in the swelling of the hands, face, feet, and tissues around the eyes. They named this syndrome *myxedema* and correctly concluded that it was the outcome of the absence of thyroid hormones (called thyroxine or T4) normally produced by the thyroid gland.

2.2.1 Symptoms:

Early Symptoms:

Early symptoms of hypothyroidism are subtle and, in older people, can be easily mistaken for symptoms of stress or aging. They include:

- Chronic fatigue
- Difficulty concentrating
- Sensitivity to cold
- Headache
- Muscle and joint aches
- Weight gain, despite diminished appetite
- Constipation
- Dry skin
- Early puberty
- Menstrual irregularities (either heavier-than-normal or lighter-than-normal bleeding)
- Milky discharge from the breasts (galactorrhea)

Later Symptoms:

As free thyroxine levels fall over the following months, other symptoms may develop:

- Impaired mental activity, including problems with concentration and memory, particularly in the elderly.
- Depression. Some doctors believe that even mild thyroid failure may increase susceptibility to major depression.
- Muscle weakness, numbness, pain, and cramps. This can cause an unsteady gait. Muscle cramps are common and carpal tunnel syndrome or symptoms similar to arthritis sometimes develop. In some cases, the arms and legs may feel numb.
- Numbness in the fingers.
- Hearing loss.
- Husky voice.
- Continuing weight gain and possible obesity, in spite of low appetite.
- Some people experience less sweating, and their skin becomes pale.
- Skin and hair changes. Skin becomes pale, rough, and dry. Patients may sweat less. Hair coarsens and even falls out. Nails become brittle.
- Snoring and obstructive sleep apnea (a condition in which in the soft palate in the throat collapses at intervals during sleep), thereby blocking the passage of air).

Symptoms in Infants and Children:

All babies are now screened for hypothyroidism in order to prevent retardation that can occur if treatment is delayed. Symptoms of hypothyroidism in children vary depending on when the problem first develops.

- Most children who are born with a defect that causes congenital hypothyroidism have no obvious symptoms. Symptoms that do appear in newborns may include jaundice (yellowish skin), noisy breathing, and an enlarged tongue.
- Early symptoms of undetected and untreated hypothyroidism in infants include feeding problems, failure to thrive, constipation, hoarseness, and sleepiness.
- Later on, symptoms in untreated children include protruding abdomens; rough dry skin; and delayed teething. Rarely, in advanced cases, yellow raised bumps (called *xanthomas*) may appear under the skin, the result of cholesterol build-up.
- If they do not receive proper treatment in time, children with hypothyroidism may be extremely short for their age, have a puffy, bloated appearance, and have below-normal intelligence. Any child whose growth is abnormally slow should be examined for hypothyroidism.

2.2.2 Classification:

Many permanent or temporary conditions can reduce thyroid hormone secretion and cause hypothyroidism. About 95% of hypothyroidism cases occur from problems that start in the thyroid gland. Disorders caused by problems of

Thyroid Gland - ***primary hypothyroidism***
Pituitary Gland - ***Secondary hypothyroidism***
Hypothalamus - ***Tertiary hypothyroidism***

2.2.3 Causes of Hypothyroidism:

2.2.3.1 Autoimmune diseases:

These conditions occur when the body's autoimmune system attacks the body's own healthy cells. These diseases are classified as Hashimoto's thyroiditis, Atrophic thyroiditis, Postpartum thyroiditis, Riedel's thyroiditis and Autoimmune Thyroiditis due to Pregnancy

All forms of thyroid autoimmunity typically start with T and B cells:

- Important immune factors called T and B cells infiltrate the thyroid gland in equal numbers. These white blood cells are the primary infection-fighting immune cells. T cells identify invasive molecules, such as viral proteins, and

help B cells to produce antibodies that are designed specifically to attack these invaders.

- In cases of autoimmunity, T cells are tricked into classifying molecules on the body's own cells as invaders. In such cases, B cells then produce antibodies, called *auto antibodies,* which attack those cells.
- In most cases of thyroid autoimmunity, the auto antibodies launch an attack on a thyroid protein called *thyroid peroxidase* to destroy thyroid cells.

Among the autoimmunity diseases specific variations appear as follows:

Hashimoto's Thyroiditis:

A genetic disease named after the Japanese doctor who first described thyroid inflammation. It occurs in about 0.3 - 5 people per 1,000 per year and women are 15 - 20 times more likely than men to develop this disease. An enlargement of the thyroid gland called a *goiter* is almost always present and may appear as a cyst-like or fibrous growth in the neck.

Hashimoto's thyroiditis is permanent and requires lifelong treatment. Both genetic and environmental factors appear to play a role in its development. Smoking significantly increases risk for this condition. Smoking also increases the negative effects of hypothyroidism, notably on the arteries and heart.

One theory proposes that Hashimoto's thyroiditis and Graves' disease (a form of *hyper*thyroidism) are caused by a similar immunologic dysfunction. Similar immune system substances called antibodies are present in both diseases, and some researchers believe that the predominance of one or another antibody determines which of the diseases become manifest. The two diseases, then, are essentially two sides of a single coin.

Atrophic Thyroiditis:

This is similar to Hashimoto's thyroiditis except a goiter is not present.

Postpartum Thyroiditis:

This autoimmune condition occurs in up to 10% of pregnant women and tends to develop between 4 - 12 months after delivery. In most cases, a woman develops a small, painless goiter. It is generally self-limiting and requires no therapy unless the hypothyroid phase is prolonged. If so, therapy may be thyroxine replacement for a few months. A doctor will prescribe beta-blockers if the hyperthyroid phase needs treatment. Some evidence suggests that half of women with this condition develop permanent hypothyroidism within 7 years. Women who have had recurrent episodes after previous pregnancies and women who have other autoimmune disorders are at higher risk for this form of thyroiditis.

Riedel's Thyroiditis:

This is a rare autoimmune disorder in which scar tissue progresses in the thyroid until it produces a hard stony mass that suggests cancer. Hypothyroidism develops as the scar tissue replaces healthy tissue. Surgery is usually required, although early stages may be treated with corticosteroids or other immunosuppressive drugs.

Autoimmune Thyroiditis Due to Pregnancy:

Hypothyroidism may also occur in women who develop antibodies to their own thyroid during pregnancy, causing an inflammation of the thyroid after delivery.

2.2.3.2 Post-Treatment of Hyperthyroidism:

Up to half or more of patients who receive radioactive iodine treatments for an overactive thyroid develop permanent hypothyroidism within a year of therapy. This is the standard treatment for Graves' disease which is the most common form of *hyper*thyroidism. Such patients need to take thyroid hormones for the rest of their lives. Other forms of treatment for overactive thyroid glands using either antithyroid drugs or surgery may also result in hypothyroidism.

2.2.3.3 Hypothyroidism in Infants:

Hypothyroidism in newborns (known as *congenital* hypothyroidism) occurs in one in every 3,000 - 4,000 births, making it the most common hormonal disorder in infants. In 90% of these cases, it persists throughout life.

Permanent Congenital Hypothyroidism:

In up to 85% of permanent congenital hypothyroidism cases, the thyroid gland is missing, underdeveloped, or not properly located. In most cases the cause or causes of these conditions are unknown. In about 10 - 15% of cases, processes involved in hormone production are impaired, most likely because of genetic abnormalities. In less than 5% of cases, the pituitary or hypothalamus functions abnormally.

Temporary Hypothyroidism in Infants:

Temporary hypothyroidism can also occur in infants. In about 20% of cases, the cause remains unknown. The known causes stem from various immunologic, environmental, and genetic factors, including those in the mother:

- Women who have an underactive thyroid, including those who develop the problem during pregnancy, are at increased risk for delivering babies with congenital (newborn) hypothyroidism. Maternal hypothyroidism can also cause premature delivery and low-birth weight.

- Some of the drugs used to treat hyperthyroidism (overactive thyroid) block the production of thyroid hormone. These same drugs can also cross the placenta and cause hypothyroidism in the infant.
- If a pregnant woman has untreated hyperthyroidism, her newborn infant may be hypothyroid for a short period of time. This is because the excess thyroid hormone in the women's blood crosses the placenta and signals the fetus not to produce as much of its own thyroid hormone.
- Iodine deficiency. This may cause temporary hypothyroidism. (Exposure to too much iodine immediately after birth, for example, from iodine-containing disinfectants or medicines, can also cause thyroid dysfunction.)
- Premature birth. Temporary hypothyroidism in infants can occur in premature babies.
- The central nervous system connections between the hypothalamus and pituitary gland may mature late; this condition generally resolves 4 - 16 weeks after birth.

Children with temporary congenital hypothyroidism should be followed-up regularly during adolescence and adulthood for possible thyroid problems. The risk for further thyroid problems is highest in these adult women during pregnancy. Newborn siblings of these children should also be screened for possible thyroid defects.

2.2.3.4 Hypothyroidism with Genetic Defects

Genetics plays a role in many cases of underactive and overactive thyroid. The genetics involved with hypothyroidism are complicated, however. Certain genetic features, for example, appear to play a role in Hashimoto's thyroiditis and postpartum thyroiditis in Caucasians, but others affect different ethnic groups. Thyroid disease will often skip generations. For example, someone with an underactive thyroid may have healthy parents but have grandparents who had thyroid troubles. Some people inherit a tendency for thyroid problems but never become ill, while others become very sick.

Many drugs affect the thyroid, so anyone being treated for a chronic disease, taking thyroid medication, and those at risk for a thyroid disorder should discuss the impact these drugs may have on their thyroid.

2.2.3.5 Hypothyroidism with Associated Medical Conditions:

People with certain medical conditions have a higher risk for hypothyroidism. These conditions include:

- Autoimmune diseases. People with many autoimmune diseases have a higher risk for hypothyroidism. Type 1 (insulin-dependent) diabetes poses a higher risk and is a special problem since hypothyroidism can affect insulin

requirements. Women with other autoimmune diseases, including systemic lupus erythematosus, pernicious anemia, and rheumatoid arthritis, are also at higher risk for hypothyroidism. Pregnant women with autoimmune conditions have a 25% risk for hypothyroidism during gestation.

- Gout. Hypothyroidism and gout often coexist and may have biologic mechanisms in common.
- Addison's disease.
- Myasthenia gravis.
- Polycystic ovarian syndrome.
- Anorexia or bulimia. People with eating disorders are at risk for hypothyroidism. In these patients, however, reduced thyroid function may be an adaptation to malnutrition and, therefore, some experts think that only the eating disorder should be treated, not hypothyroidism.

Turner syndrome: As many as half of patients with Turner syndrome have hypothyroidism, usually in the form of Hashimoto's thyroiditis. This inherited condition is one of the most common genetic diseases in women

2.2.3.6 Causes of Secondary Hypothyroidism

In rare instances, usually due to a tumor, the pituitary gland will fail to produce thyrotropin (TSH), the hormone that stimulates the thyroid to produce its hormones. In such cases, the thyroid gland withers. When this happens, secondary hypothyroidism occurs.

2.2.3.7 Causes of Tertiary Hypothyroidism

Tertiary hypothyroidism is one entity that is caused by a failure in production and / or release of thyrotropin releasing hormone (TRH) in the hypothalamus. The hypothalamic-pituitary-thyroid axis as its name suggests has the hypothalamus as the first element in its structure and function. Thyrotropin releasing hormone (TRH) is released from one part of the hypothalamus called the median eminence to a system of blood vessels known as hypophyseal portal system. But in the tertiary hypothyroidism, there is simply a reduction or even a total lack in the production of thyrotropin-releasing hormone (TRH) in the hypothalamus and thus does not start the activation of the thyrotropes to produce TSH, and therefore neither stimulates the thyroid gland to produce T3 and T4.

2.2.4 Effects of Hypothyroidism

2.2.4.1 on Heart

Thyroid hormones, notably triiodothyronine (T3), affect the heart directly and indirectly. They are closely linked with heart rate and heart output. T3 provides particular benefits by relaxing the smooth muscles of blood vessels. This helps keep the blood vessels open so that blood flows smoothly through them.

Hypothyroidism is associated with:

- *Unhealthy cholesterol levels*. Hypothyroidism raises levels of total cholesterol, LDL (the so-called bad cholesterol), triglycerides, and other lipids (fat molecules) associated with heart disease. Treating the thyroid condition with thyroid replacement therapy can significantly reduce these levels.
- *Mild high blood pressure*. Hypothyroidism may slow the heart rate to less than 60 beats per minute, reduce the heart's pumping capacity, and increase the stiffness of blood vessel walls. All of these effects may lead to high blood pressure. Indeed, patients with hypothyroidism have tripled risk of developing hypertension. All patients with chronic hypothyroidism, especially pregnant women, should have their blood pressure checked regularly.
- *Heart failure*. Hypothyroidism can affect the heart muscle contraction and increase the risk of heart failure in people with heart disease.

The evidence for subclinical hypothyroidism and heart disease is mixed. Some studies suggest that subclinical hypothyroidism increases the risks for coronary artery disease and heart failure.

2.2.4.2 on Mind

Depression:

Depression is common in hypothyroidism and can be severe. Hypothyroidism should be considered as a possible cause of any chronic depression particularly in older women.

Mental and Behavioral Impairment:

Untreated hypothyroidism can over time, cause mental and behavioral impairment and eventually even dementia. Whether treatment can completely reverse problems in memory and concentration is uncertain, although many doctors believe that only mental impairment in hypothyroidism that occurs at birth is permanent.

2.2.4.3 on Infertility and Pregnancy

A woman with hypothyroidism especially when it is left undiagnosed, untreated, or uncontrolled can cause cysts on the ovaries. These cysts can

keep eggs from being released to be fertilized by the sperm. Without an egg there is no chance of having a pregnancy because there is nothing for the sperm to fertilize.

Women who have hypothyroidism near the time of delivery are in danger of developing high blood pressure and premature delivery. They are also prone to postpartum thyroiditis, which may be a contributor to postpartum depression.

Hypothyroidism in a pregnant woman can affect normal fetal development.

Hypothyroidism can also cause infertility problems by causing a woman to have irregular periods or to have her regular periods but not ovulating.

2.2.4.4 on Pregnancy in Pre menopausal women

In premenopausal women, early symptoms of hypothyroidism can interfere with fertility. A history of miscarriage may be a sign of impending hypothyroidism. (A pregnant woman with hypothyroidism has a fourfold risk for miscarriage.) Studies suggest that even if thyroid levels are normal, women who have a history of miscarriages often have antithyroid antibodies during early pregnancy and are at risk for developing autoimmune thyroiditis over time.

2.2.4.5 on Infants and Children

Children of Untreated Mothers:

Children born to untreated pregnant women with hypothyroidism are at risk for impaired mental performance, including attention problems and verbal impairment. Studies of children of women with subclinical hypothyroidism are less clear, with some reporting lower IQs in such children and others reporting no significant problems.

Effects of Hypothyroidism during Infancy:

Transient hypothyroidism is common among premature infants. Although temporary, severe cases can cause difficulties in neurologic and mental development.

Infants born with permanent congenital (inborn) hypothyroidism need to receive treatment as soon as possible after birth to prevent mental retardation, stunted growth, and other aspects of abnormal development (a syndrome referred to as cretinism). Untreated infants can lose up to three to five IQ points per month during the first year. An early start of lifelong treatment avoids or minimizes this damage. Even with early treatment, however, mild problems in memory, attention, and mental processing may persist into adolescence and adulthood.

Effects of Childhood-Onset Hypothyroidism:

If hypothyroidism develops in children older than 2 years, mental retardation is not a danger, but physical growth may be slowed and new teeth delayed. If treatment is delayed, adult growth could be affected. Even with treatment, some children with severe hypothyroidism may have attention problems and hyperactivity.

2.2.4.6 on Childhood X-Ray Treatments

Two million Americans, mostly children, received x-ray treatments to the head or neck between 1920 - 1960 for acne, enlarged thymus gland, recurrent tonsillitis, or chronic ear infections. The risk of developing thyroid nodules and thyroid cancers is increased in these individuals, especially if they have hypothyroidism. Cancer can develop as late as 40 years after the original treatment. Everyone who has had head and neck radiation should have their thyroid glands examined regularly.

2.2.4.7 on other Health Conditions

The following medical conditions have been associated with hypothyroidism. Often the causal relationship is not clear in such cases:

- Iron deficiency anemia.
- Respiratory problems.
- Kidney function.
- Glaucoma. (Some research has associated hypothyroidism with an increased risk for glaucoma.)
- Headache. (Hypothyroidism may worsen headaches in people predisposed to them.)
- Thyroid lymphoma. (Patients with Hashimoto's thyroiditis are at higher risk for this rare form of cancer.
- Women with hypothyroidism may actually have fewer problems with joint stiffness than women with normal thyroid.

2.2.5 Diagnosis:

Doctors diagnose hypothyroidism after completing a history and physical exam of the patient and performing sensitive laboratory tests on the patient's blood. Because symptoms of hypothyroidism can mimic those of many other conditions, blood tests for measuring levels of thyroid stimulating hormone (TSH) and free thyroxine (T4) are the only definitive ways to diagnose hypothyroidism.

2.2.5.1 Physical Examination

The doctor will check the heart, eyes, hair, skin, and reflexes for signs of hypothyroidism. The presence of a goiter (an enlarged thyroid), especially a

rubbery, painless one, may be an indication of Hashimoto's disease. If the thyroid is tender and enlarged but not necessarily symmetrical, the doctor may suspect subacute thyroiditis. A diffusely enlarged gland may occur in hereditary hypothyroidism, in postpartum patients, or from use of iodides or lithium. Goiters may also develop in people with iodide deficiency.

2.2.5.2 Thyroid Hormone Tests

In diagnosing hypothyroidism, blood tests measuring hormone levels are needed to make a correct diagnosis.

Thyroxine (T4):

Hypothyroidism is a condition marked by low thyroxine (T4) hormone levels in the blood. Measuring thyroxine is usually performed using a process called a T3 resin uptake to correct for the presence of medications (such as birth control pills, aspirin, and others) that could distort the results

Thyrotropin (Thyroid-Stimulating Hormone or TSH):

Measuring TSH is the most sensitive indicator of hypothyroidism. The results indicate the following:

- TSH levels over 10mU/L. This is a clear indicator of hypothyroidism if T4 levels are low -- and, in most cases, even if they are normal. Patients usually need thyroxine (T4) replacement therapy. They should also be tested for high cholesterol levels and antithyroid antibodies.
- Levels between 4.5 - 10 mU/L. Patients with signs and symptoms of hypothyroidism usually need thyroxine replacement therapy. Patients without symptoms have *subclinical hypothyroidism* and should be rechecked every 6 - 12 months. Antibody tests may also be performed.
- TSH levels between 0.45 - 4.5 mU/L. These indicate normal thyroid function. (Abnormally low levels suggest *hyper*thyroidism, which is overactive thyroid.)
- Specific TSH measurement -- even if it is significantly higher than10 mU/L-- is not associated with the *severity* of the condition.

By measuring the thyroxine levels and evaluating the patient's symptoms the Doctor follows the Algorithm for Hypothyroidism given in Annexure 1 to find the severity of the condition.

2.2.5.3 Thyroid Antibody Test

Antithyroid Antibodies:

If TSH levels suggest hypothyroidism or subclinical hypothyroidism, the doctor may choose to perform a blood test for specific antithyroid antibodies that act against a factor called thyroperoxidase (TPO). Tests can also check for antibodies

to thyroglobulin. Results are particularly helpful in deciding how to treat someone with subclinical hypothyroidism.

2.2.5.4 Imaging Tests

Thyroid Scintigraphy:

Thyroid scintigraphy, or scan, can be used to determine which areas of the thyroid are producing normal amounts of hormone. The patient drinks a small amount of radioactive iodine and waits until the substance has passed through the thyroid. Images of a properly functioning thyroid show uniform levels of absorption throughout the gland. Overactive areas show up white, and underactive areas appear dark. Thyroid scans are more likely to be done to evaluate a goiter (swollen thyroid) or thyroid nodules. They can help identify areas of the gland that may have cancer.

Ultrasound:

Ultrasound has limited value, but it can visualize the thyroid and specific abnormalities, such as nodules.

More Advanced Imaging Tests:

If laboratory tests suggest that a pituitary or hypothalamus problem is causing hypothyroidism, the doctor will usually order brain imaging procedures using computed tomography (CT) scans or magnetic resonance imaging (MRI). MRIs may also be used for determining the extent of thyroid cancers and of goiters. MRIs are also being used for investigating hypothyroidism in infants and for determining widespread effects of autoimmune thyroiditis (such as Hashimoto's hypothyroidism).

2.2.5.5 Needle Aspiration Biopsy

Needle aspiration biopsy is used to obtain thyroid cells for microscopic evaluation. It may be useful to rule out thyroid cancer in patients with thyroid nodules, abnormal findings on a thyroid scan or ultrasound, or those who have a goiter that is large or feels unusual on physical exam. Much like drawing blood, the doctor injects a small needle into the thyroid gland and draws cells from the gland into a syringe. The cells are put onto a slide, stained, and examined under a microscope.

2.2.5.6 Other Blood Tests

Cholesterol levels need to be checked. Other blood tests may be performed to detect levels of calcitonin, calcium, prolactin, and thyroglobulin and to check for anemia and liver function, all of which may be affected by hypothyroidism.

2.2.6 Treatment:

A variety of factors affect the decision of whether to treat a patient for hypothyroidism, which dosage to begin with, and how rapidly treatment should be started or increased:

- First, an elevated TSH (thyrotropin) level should be confirmed and thyroxine (T4) level determined. Other thyroid tests may also be helpful.
- Measuring cholesterol levels is also important.

Doctors should also consider:

- Age of the patient
- Presence of other medical problems that may benefit from thyroid replacement treatment (such as heart failure or depression)
- Presence of other medical problems that thyroid replacement therapy may worsen (such as osteoporosis)

2.2.6.1 Treating Overt Hypothyroidism:

Patients with overt hypothyroidism, indicated by clear symptoms and blood tests that show high TSH (generally 10 mU/L and above) and low thyroxine (T4) levels, must have thyroid replacement therapy.

2.2.6.2 Treating Subclinical or Mild Hypothyroidism:

Considerable debate exists about whether to treat patients with subclinical hypothyroidism (slightly higher than normal TSH levels, normal thyroxine levels, and no obvious symptoms). Some doctors opt for treatment and others opt for simply monitoring patients.

It is not clear if the benefits of treating subclinical hypothyroidism outweigh the risks and potential complications. Doctors who do not advocate treatment argue that thyroid levels can vary widely, and subclinical hypothyroidism may not persist. In such cases, overtreatment leading to hyperthyroidism is a real risk.

There is reasonable evidence and consensus to recommend treatment for subclinical hypothyroidism in the presence of other factors, including:

- High total or LDL cholesterol levels
- Blood tests that show auto antibodies indicating a future risk for Hashimoto's thyroiditis or other forms of other autoimmune hypothyroidism
- Blood tests that show TSH levels greater than 10 mU/L
- Goiter
- Pregnancy
- Female infertility associated with subclinical hypothyroidism

Treatment is optional in patients with subclinical hypothyroidism who have no obvious symptoms and normal cholesterol levels. Some doctors feel that

treating this group of patients will prevent progression to overt hypothyroidism and future heart disease, as well as increase a patient's sense of well-being. However, the evidence to support treatment of this patient group is not nearly as strong. Many doctors recommend against treatment and suggest that these patients should simply have lab tests every 6 - 12 months.

2.2.6.3 Suppressive Thyroid Therapy:

Suppressive thyroid therapy involves taking levothyroxine in doses that are high enough to block the production of natural TSH but too low to cause hyperthyroid symptoms. It may be used for patients with large goiters or thyroid cancer.

Suppressive thyroid therapy places patients, particularly postmenopausal women, at risk for accelerated osteoporosis, a disease that reduces bone mass and increases risk of fractures.

Bone density loss can be reduced or avoided by taking no higher a dose of thyroxine than necessary to restore normal thyroid function. In any case, doses of T4 must be continuously and carefully tailored in all patients to avoid adverse effects on the heart.

2.2.6.4 Treating the Elderly and Patients with Heart Disease:

Thyroid dysfunction is common in elderly patients, with most having subclinical hypothyroidism. There is no evidence that this condition poses any great harm in this population, and most doctors recommend treating only high-risk patients. Elderly patients, particularly people with heart conditions, usually start with very low doses of thyroid replacement, since thyroid hormone may cause angina or even a heart attack. Patients who have heart disease must take lower-than-average maintenance doses. Doctors do not recommend treatment for subclinical hypothyroidism in most elderly patients with heart disease. Such patients should be closely monitored, however.

2.2.6.5 Treating Newborns and Infants with Hypothyroidism:

Babies born with hypothyroidism (congenital hypothyroidism) should be treated with levothyroxine (T4) as soon as possible to prevent complications. Early treatment can help improve IQ and other developmental factors. However, even with early treatment, mild problems in mental functioning may last into adulthood. In general, children born with milder forms of hypothyroidism will fare better than those who have more severe forms.

Oral levothyroxine (T4) can usually restore normal thyroid hormone levels within 1 - 2 weeks. It is critical that normal levels are achieved within a 2-week period. If thyroid function is not normalized within 2 weeks, it can pose greater risks for developmental problems. Infants should continue to be monitored closely to be sure that thyroxine levels remain as consistently close

to normal as possible. These children need to continue lifelong thyroid hormone treatments.

2.2.6.6 Treatment during Pregnancy and for Postpartum Thyroiditis:

Women who have hypothyroidism before becoming pregnant may need to increase their dose of levothyroxine during pregnancy. Women who are first diagnosed with overt hypothyroidism during pregnancy should be treated immediately, with quick acceleration to therapeutic levels. Although not well proven, doctors often recommend treating patients diagnosed with subclinical hypothyroidism while pregnant. There are no risks to the developing baby when the pregnant woman takes appropriate doses of thyroid hormones. The pregnant woman with hypothyroidism should be monitored regularly and doses adjusted as necessary. If postpartum thyroiditis develops after delivery, any thyroid medication should be reduced or temporarily stopped during this period.

2.2.6.7 Treatment of Hypothyroidism and Iodide Deficiency:

People who are iodide deficient may be able to be treated for hypothyroidism simply by using iodized salt. In addition to iodized salt, seafood is a good source. Except for plants grown in iodine-rich soil, most other foods do not contain iodine. The current RDA for iodide is 150 micrograms for both men and women, with an upper limit of 1,100 micrograms to avoid thyroid injury.

Chapter 3

THYROID GLAND – THERAPY

3.1 Introduction:

The eastern intellectuals of ancient times have discovered the cause of disease and disturbances in body and mind. They pronounced that they are the physical manifestation of the misdeeds committed in our past inscribed by the Almighty. They developed the therapeutic procedures which are inclusive of an appeal by the sufferer in praise of Lord to clear his sins and bestow a healthy body and mind.

3.2 Yogic Practices:

Practice of yoga is one such method of therapy. The concept and practice of yoga in its manifold dimensions is a vast subject and I confine here to the techniques and procedures followed in the treatment of Hypothyroidism.

3.2.1 Surya Namaskara

Surya Namaskara is a salutation to Sun God. He is praised by all the four Vedas, Upanishads, Bhagavad-Gita, Purana and Itihasa. His multifaceted expressive importance has to be understood in many ways.

Fig 10

Procedure (12 steps):

1. Stand erect with the legs together and palms together. Take the hands above the head and bend the trunk backwards. Here, inhale fully.

2. Bend the body to the bend and touch the knees by the forehead. Keep the palms on the floor on either side of the legs. Exhale fully.

3. In this stage, kick the right leg back, take the left knee forward, look up and inhale. Touch the thigh with the heel.

4. In the next step, take the left leg also back, resting only on palms and toes; keep the body straight from head to toes inclined to the ground at about 30 degree. Here exhale completely.

5. Now, bend at the knee and rest the knees on the floor without altering the positions of the palms and toes. Rest the forehead on the ground. In this position inhale while moving backwards and then exhale completely.

6. Without moving the hands and toes, come forward on the chest and rest the forehead, chest, hands, knees and legs all the eight organs will be touching the ground. The buttocks will be raised up. Stay in 'Breath-out' condition (Bahyakumbhaka).

7. Inhale, raise the head and trunk making the spine concave upwards without changing the position of the hands and feet. Keep the knees off the ground.

8. Exhale. Raise the buttocks, push the head down and have a complete arch with the heels touching the ground and palms on the floor.

9. Same as in 5thstep. Inhale and exhale.

10. Inhale and bring the right leg in between the two hands and in line with them. Arch the back concave upwards as in step 3.

11. Exhale and bring the left food forward next to the right foot and touch the knees with forehead as in 2.

12. Inhale. Come up, stand erect with hands along the body

Multifaceted Benefits:

A. Physical Fitness

Practice of *Sürya Namaskära* interacts with the physical organs of the body directly by applying pressure, massaging, stretching, toning up and supporting internal tissue structures, helping the excretory functions and impels the nervous energy to sustain body homeostasis. Different systems of the body are benefitted as under:

Respiratory System:

A deep rhythmic breathing process is synchronized with each movement to clear the traces of all stale gases from lungs and refill with fresh, clean and oxygenated air. The increased oxygen content of the blood improves overall vitality, oxygenation of cells and tissue of the body and brain. This helps in the prevention of tuberculosis which develops in the unused stagnant regions of lungs.

Circulatory System:

A regular practice improves flow of blood, speeds up the elimination of morbid matter and introduces fresh oxygen and nutrient to cells. Micro circulation to the heart is increased and reduces the chance of heart attack. The cardiac muscles are strengthened. The circulation of lymph is toned up to combat the infections and increase the ability to heal. Sluggish circulation, cold hands and feet, blood vessel diseases and fatigue are also eliminated.

Digestive System:

The alternate stretching and compressing movements tone up the whole digestive system by massaging all the abdominal viscera. It also helps to increase the digestive fire, promote a healthy appetite, and rapid assimilation of food.

Nervous System:

The spinal column is systematically stretched and compressed to a maximum extent stimulating the circulation in the whole spinal cord and all nerve plexuses. It tones up the nerve flows by stimulating internal organs. It stretches organs. It stretches nerves, works on the spine and activates brain Centers. The whole nervous system is activated and seems to wake up.

Endocrine System:

Endocrine glands play a vital role in the coordination and integration of all physiological process. Hormones are produced and secreted into the bloodstream to reach various organs of the body.

Pituitary Gland

The pituitary gland is master gland of human body. It has many hormonal secretions, which control the body's growth and development. By increasing the flow of blood to the head and through its effects on the nervous system *Sürya Namaskära* stimulates hypothalamus which regulates the pituitary action. The practice of *sürya Namaskära* thereby has a direct and beneficial effect on this vital centre and the whole body

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Pineal Gland

The pineal gland is situated in the brain. Yogic Science states that it has a vital function and acts as connecting link between the different levels of awareness above and beyond the Physical plane. *Sürya Namaskära* plays an ideal role in the maintenance of this important gland.

Pancreas

The Pancreas is located behind the stomach at the level of the solar plexus. Parts of this important gland produce the hormone insulin, which controls the body's ability to store and utilize sugar. *Sürya Namaskära* compresses the abdominal organs, which press onto the pancreas especially during backward bending in Bhujangäsana

Skin

Skin regulates the body temperature, helps to excrete waste matter through perspiration. Piled up of waste matter in the blood circulation becomes poisonous and exhibit in the form of boils, rashes, eczema, pimples etc., *Sun Salutations* speed up the blood circulation and inspires the process of perspiration to eliminate the waste through excretory systems making the skin complexion glow and avoid skin diseases, bad odors. Morning practice facing the rising sun helps the skin to absorb most intensive ultraviolet rays and use for production of vitamin D.

B. Psycho-Physiological effects

Surya Namaskara consists of 12 yoga positions comprised of three elements as form, energy and rhythm. Continuous performance of this generates Prana, the subtle energy activating the physical body and developing flexibility in mind

C. Scientific Significance

Proved facts about the Sun God reveal that:

i) Living Organisms with no exception to human beings need the sun for their survival. The Ecological balance is maintained because of Sun.

ii) The hydrological cycle runs throughout the day and in all seasons make the clouds rain and make the crops grow to feed the entire humanity.

iii) The punctuality of seasons that bring the monsoons nourishes the earth.

D. Spiritual significance

Sun is in the centre of universe and is considered to be the source of life on planet Earth. One cannot imagine his existence at all without Him. From time immemorial, the Sun has been revered as a deity and worshipped. Sürya Namaskära is a salutation to this powerful celestial body around which other planets revolve and take light and heat from it. It is believed that whoever worships Lord Surya is bound to have a dynamic personality as He rejuvenates life and makes one feel young, agile, brilliant and healthy.

3.2.2 Asanas:

Yoga Asanas plays a great role in endorsing health to the endocrine and its constituents. With yoga asanas one can empower his endocrine system and get all the bodily functions carried out normally without any physical, mental and psychological harm to the being.
It has been, and is still being, followed since ages as the word of sages that the contribution of yoga in the improvement of the endocrine functioning is immense. Some asanas of the vast yoga domain like Sarvangasana Matsyasana, Halasana, Supta vajrasana, Viparithkarani, Bhujangasana, Dhanurasana, Nabhiyasana and Sirshasana have been observed to enhance the endocrine health.

Yoga asanas have record breaking histories of treating incurable diseases caused due to the ill- management of the endocrine system and its components. The point is that these asanas of yoga show a direct and pin- point affect on the various glands of the body, among which are the thyroid, the pituitary, parathyroid, adrenal, pancreatic and reproductive glands.

The yogasanas mentioned above are medically prescribed to patients of diseases related to either low or high secretion of hormones from these particular glands so as to restore the natural and healthy balance of the hormones. Even scientific researchers have agreed and proved in numerous papers published worldwide that yoga is an effective and timely healer of any damages to the endocrine system, as well as disabilities of any other part of the precious human body.

Practice:

Regular practice of asanas rejuvenates the affected organ and the entire body. The order of performance is most important to reap more benefits. The following technique explain why the order should be followed.

Broomstick Technique

Original Position	Left Bent position 	Right Bent Position on hold	Regained Position
A	**B**	**C**	**D**

Fig 11

The original position of a broomstick is shown in position A. When we bend the broomstick in its obtuse position and hold the stick for sometime in between our fingers it attains a left bent position as shown

in position B. The same stick when it is bent and hold in between the fingers in its acute position it looks in its right bent position as shown in position C but when it is released it regains its original shape as shown in position D.

The same principle is applied in the order of the performance of yoga asanas. In its application the following order of asanas along with its detailed procedure to be followed in performing the asana and its benefit are given hereunder:

3.2.2.1Sarvangasana

Fig: 12 Sarvangasana

Procedure:

1. Come to sthiti
2. Elevate both the legs up to 45^0 then 90^0
3. Keep both the hands by the side trunk part of the body.

4. Take support of the arms and hands to elevate the trunk part of along with chest up to 90^0 L shaped whole body with neck. Closing the eyes and meditate with deep breathing.
5. Analyze all the Bandhas, Mudras and Chakras step by step and get more benefits.
6. Return to original posture and relax. Do the complimentary.

Benefits:

1. It is known as the queen asana.
2. Specific gravity takes major role in the asana.
3. Position of all the organs altered because of the reverse position. Blood circulation increases to the brain. Brain is going to be purified by getting more blood with deep breathing.
4. Thyroid and Parathyroid glands are toned up and Jalandhara bandhas function can be performed nicely. If you are having mastery over Bandhas there no fear of death. This phenomenon is there in the womb of the mother where all Bhandhas are under lock.
5. Especially pituitary glands will be toned nicely to perform all the activities of the body.
6. Perform the Ashwini Mudra in this asana to get more benefits for lower abdominal organs.

3.2.2.2 Matsyasana

Fig: 13 Matsyasana

Procedure:

1. Come to sthiti
2. In supine position from sthiti perform the Padmasana. Fold the right leg, keep on the left thigh then fold the left leg keep on the right thigh by crossing the right leg. Soles have to face the sky. Adjust comfortably.
3. Take a support of two palms by keeping by the side or head.

4. Elevate the head and extend the neck and keep the head in extended position.
5. Keep both the palms with abhaya hasta on both the thighs and close the eye and meditate with deep breathing.
6. Return to original posture and relax. Do the complimentary.

Benefits:

i) Relieves from constipation and tones up all the areas of the spine including the sex centre.
ii) It is said to be particularly beneficial to women as it normalizes uterine functioning.
iii) It tones up the lungs and muscles of the chest.
iv) It improves the circulation of the throat and tends to reduce tronsils.
v) It is said that those who practice this posture regularly maintain a strong and erect spine even during old age. Even if one has developed a slight stoop, regular practice will help to correct it.
vi) It is also said to help diabetics by improving their general metabolism. People suffering from spinal pain should practice this regularly.

3.2.2.3 Halasana

Fig: 14 Halasana

Procedure:

1. Come to sthiti
2. Slowly elevate both the legs without bending the knees up to 45 Stay for few seconds.
3. Further move both the legs up to 90. Stay in that position for few seconds.
4. Keep both the upper arms by the side of the trunk part of the body and make the trunk part of the body.

5. After that slowly move the feet towards the face to touch the ground with toes. Keeping the knee straight.
6. In this final posture touch the toes with fingers or keep both the hands interlocking the fingers and stretch.
7. Stay for few seconds closing the eyes and meditate upon with deep breathing. Analyze all the chakras (7) step by step.
8. Return to original posture and relax. Do the complimentary

Benefits:

i) It exercises and stretches the posterior muscles of the entire body. It improves the circulation and tone up the whole length of the spinal cord, and at the same time benefits arms and legs.

ii) It tones up the Thyroid gland. It imparts elasticity and pliability to the spinal cord 'oiling' the roots of the bilateral nerve branches of the spinal cord (thirty two pairs in all serving the major part of the body) The stretching involved in this exercise enlarges the passages (vertebral foramina) through which the branches of the spinal cord pass out into the body, thereby raising considerably and sometimes spectacularly the efficiency and performance of the entire spinal nervous system and the areas served by it.

iii) Improves the functioning of the thoracic and abdominal viscera in general. It improves the circulation of the brain, thereby contributing to intelligence, alertness and good harmony.

iv) Tones up the entire pelvic region and activates the gonadal secretions in the male and the female. It exercises the neuro-musculo-circulatory systems and the tissues surrounding and adjoining the sex centre in the spine, thereby substantially improving the sexual efficiency of the individual.

3.2.2.4 Supta Vajrasana

Fig: 15 Supta vajrasana

Procedure:

1. Come to sthiti
2. Fold the right leg sit on the right leg.
3. Then fold the left leg, stand on both knees. Join the heels. Be comfort in that posture.
4. Slowly sit on heels by extending the ankle joints. Sole has to face the sky.
5. Slowly lie down on back taking support of right elbow, holding the right ankle joints first. Then left elbow with the left ankle. Lie on back. Touch the back of the head to the ground..
6. In final posture keep both of the hands on thigh in abhaya hasta or above the head without folding the elbow joints. Both the hands on both the thighs.
7. Stay for few seconds closing the eyes and meditate with deep breathing.
8. Return to original posture and relax. Do the complimentary.

Benefits:

i) Supta Vajrasana exercises the muscles and the blood vessels of the feet, knees, abdomen, ribs, throat and neck, mouth, eyes, and the head and benefits all these parts. The exerciser experiences a stretching sensation along the whole length of the body.

ii) Most of you will feel that the sensation of relaxation experienced while exhaling in this pose and particularly at the end of exhaling is even deeper and more soothing and tranquillizing than that experienced during the savasana (Tranquility Pose).

iii) The stretch on the inguinal muscles and blood vessels exercises a toning effect on the sex organs and the pelvic viscera. It also corrects certain defects on the spine, alleviates backache and tones up both the deep and the superficial muscles of the spine as well as its sex centers.

3.2.2.5 Viparithkarani

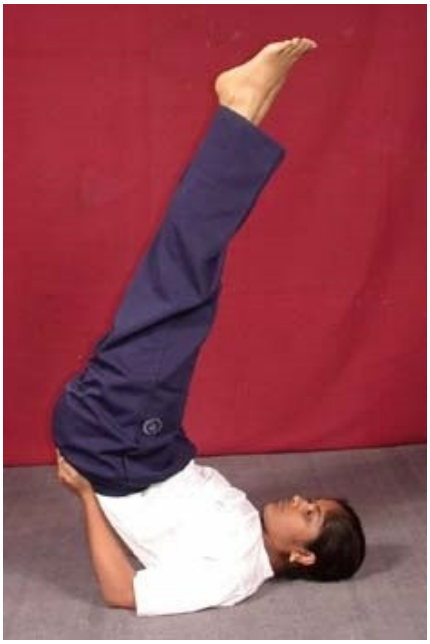

Fig: 16 Viparithkarani

Procedure:

1. Come to sthiti
2. Slowly elevate both the legs up to 45 without bending the knees. Stay for few seconds.
3. Come to 90 and take both the hands nearer to the trunk part of the body.
4. Then lift the trunk part of the body taking a support of arms and keep the lower part s70 to the ground making a straight line from pelvic to toes.
5. Stay for few seconds closing the eyes and meditate with deep breathing.
6. Analyze all the Bhandhas, Mudras and Chakras step by step and get more benefits.
7. Return to original posture and relax. Do the complimentary.

Benefits:

1. It is good asana for all organs in pelvic region and rectum.
2. Ashwini mudra can be performed to increase the tone of the Mula Bandha , bladder and anus activities by stimulating the perineum.
3. Blood flow increase to the brain.
4. Bleeding piles and bladder irregularities are corrected.
5. Strength to lower and pelvic parts.
6. Diaphragm is toned up. All Chakras can be purified as to get more benefits.

3.2.2.6 Bhujangasana

Fig: 17 Bhujangasana

Procedure:

1) Come to sthti
2) Slowly move both hands parallel to the ground towards the shoulder and keep to the level of coastal margin with Abhaya hasta.
3) Elevate the shoulder with the support of the palms and make the elbow perpendicular to the ground.
4) Extend the neck backwards and see the sky with open eyes and perform trataka. Chest and upper abdomen has to come above the ground. Join the feet facing the soles to the sky. Maintain the posture with closing the eyes and meditate with deep breathing.
5) Return to original posture and relax. Do the complimentary asanas.

Benefits:

i) This is an excellent pose for reducing abdominal fat and relieving constipation and flatulence. Ii)

ii) Its contribution to relief from spinal pain is remarkable considering the simplicity of the pose. If practiced patiently and diligently it helps the exerciser to get over spinal pain of long standing even when caused by osteo-arthritic changes in the spine.

iii) Its benefits affect the entire length of the vertebral column, including the cervical, the thoracic, the dorsal and the sacral vertebrae, and the coccyx (these words denote the divisions of the spine into the neck, the upper back, the middle back, the lower back and the tailbone respectively).

iv) It also tones up the muscles, tendons, and ligaments, the nerves of the blood vessels of the spinal region.

v) Since this pose exercises the spinal sex centre it makes a substantial contribution to the effectiveness of the sexual performance of both men and women.

3.2.2.7 Ardha Matsyendrasana

Fig: 18 Ardha Matsyendrasana

Procedure:

1. Come to the sthiti
2. First fold the right knee. Keep the heel near the Moola Bandha (Perineal Area)
3. Then fold the left leg keep the leg on the outer border of the right thigh near the knee joint of the right leg. The sole of the left foot has to touch to the ground. Making a left leg vertical flexing the left hip joint.
4. Make both hands straight – line. Maintain the level of the shoulder.
5. Elevate both the hands in vertical position to the body. Keeping Abhaya hasta. Stretch your body and be comfort by deep breathing.
6. Then cross the right arm over the left knee joint, taking help of a thigh and a leg. Turning the right shoulder 90 and towards the right side along with the head. Observe the right shoulder with eyes open fixing the eyeball stationary this kriya is called trataka) Then close theeyes keeping the mind in brumadhya (Agna chakra) Analyze all the chakras by meditation.
7. Release the hands step by step and relax.
8. Repeat the opposite side.

Benefits:

1. Strengthens the backbone. Stronger the back longer the life.

2. Good for all abdominal, pelvic organs, genital organs and kidneys.
3. Adrenal glands and gonads will become healthy and wealthy.
4. Reduce the fat around the trunk part of the body.

3.2.2.8 Dhanurasana

Fig: 19 Dhanurasana

Procedure:

1. Come to sthiti
2. Hold both the legs below ankle joints with the hands.
3. Slowly elevate the chest and thigh by pulling the legs with stretched hands increase the arch by extending chest and legs. See the sky with open eyes and do trataka. Close the eyes and meditate with deep breathing to get more benefits.
4. Return to original posture step by step and relax. Do the complimentary asana

Benefits:

i) This posture exercises the entire body. It strengthens the deep and the superficial muscles of the entire spine removing rigidity, stiffness,

aches, pains, burning sensations and tenderness of the spine and areas adjacent to it and served by the branches of the spinal cord.

ii) It also strengthens the spinal sex centre and both the male and female gonads thereby improving the sexual performance.

iii) It tones up and develops the muscles of the chest.

iv) It improves the function of the liver, the kidneys, the bladder, the genital organs and other pelvic and abdominal viscera.

v) It is a prophylactic against the formation of stones in the kidney and gall bladder.

vi) It relieves scanty, painful and burning urination. Practiced regularly in middle age it is believed to have a healthy effect on the prostate gland and to protect against enlargement or inflammation of the gland.

vii) It gives relief against piles anorexia (dislike for food) flatulence and halitosis (bad breath) when not caused by pyorrhea.

3.2.3 Pranayama:

Pranayama is a Sanskrit word composed of the words 'prana' meaning vital life force and "ayama" meaning restraint. The word pranayama thus translates as the regulation or control of life-force.

The word prana has been translated as many things including air, breath, spirit, life-force, energy, subtle energy, vital energy, soul and principle of life, all essentially trying to convey the all-pervasiveness and vastness of the life-sustaining energy of the universe which the word prana represents.

Prana is a concept central to the practices of yoga where it is believed to flow through channels in the body called nadis. In relation to yogic practices pranayama is usually translated more directly as breath control.

Pranayama channels the prana in the body to calm, rejuvenate and uplift the mind. It serves as an important bridge between the external, active and highly physical practice of yoga asana and the subtle internal practices that lead the yogi into deeper states of meditation.

3.2.3.1Anulom Vilom Pranayama (Alternate Nostril Breathing):

Anulom Vilom is one of the most effective pranayama (breathing exercises) to purify the mind and body. Anulom Vilom offers benefits in curing most of the internal body conditions and is very useful in releasing stress and anxiety.

Fig 20 Anulom Vilom Pranayama

Procedure:

1. Close your eyes and relax. Sit in this position for a couple of minutes till you settle down.
2. Close your right nostril with your right thumb
3. Breathe in from your left nostril. Hold the breath for a couple of seconds.
4. Open right nostril and close left nostril with middle and ring finger
5. Breathe out from right nostril.
6. Breathe in from right nostril, close the right nostril
7. Open left nostril and breathe out.
8. Repeat again, steps 1 through 7.

You can practice this pranayama for bout 5-6 minutes per day.

Benefits:

i) It brings relief to conditions like sinus, respiratory problems, and asthma.

ii) Removes artery blockages and maintains cholesterol levels

iii) Very effective for conditions like constipation, flatulence, diabetes, obesity and weight loss.

iv) Anulom Vilom pranayama is said to have benefited people with Heart ailments, high blood pressure, heart blockages, depression, migraine pain, asthma, sinus and allergy

Precautions:

Performing Anulom Vilom should be avoided by women during pregnancy and periods.

Individuals who suffer from heart troubles should not perform this exercise with too much force and should practice it under the guidance of a qualified instructor

It is important that you breathe deep into your lungs and not into the stomach. Most elements that absorb oxygen are in your lungs.

3.2.3.2 Ujjayi Pranayama:

Fig 21 Ujjayi Pranayama

Procedure:

Ujjayi technique for beginners:

Sit in a comfortable yoga pose like Padmasana or Sukhasana. Take long, deep breath with both nostrils along with contraction inside the throat which makes the breath long and thin. The friction of air should be felt inside the throat when it is contracted and a hissing sound of breath is produced itself. Now exhale out very slowly. Repeat this process three times daily.

After some days of practice:

Three more steps are added to complete Ujjayi Pranayama process. After breathing inside with contraction in throat, try to touch your chin to the upper side of chest (Jalandhar Bandha). Hold the breath inside for maximum 10 seconds (Kumbaka).

Now exhale out slowly with left nostril, by closing right nostril with your right hand thumb. Exhale must be done by left nostril only. This is complete process of Ujjayi.

Initially it should be practiced for 3 times. As practice increases, it can be performed maximum 11 times a day.

Benefits:

The effect of Ujjayi Pranayama in the body is scientifically explained as under:
Ujjayi stretches the breath, warms it before entering into the lungs and helps to build heat in the body. Through this heat internal Agni (fire) is stoked and powerful healing process is unlocked.
Ujjayi Pranayama Benefits and Cures

- Miraculous remedy for thyroid problems.
- Snoring problem is cured.
- Good for heart, asthma, tonsil, cold and cough.
- All throat problems are cured.

Precautions
Beginners should exhale with both nostrils. After few days they should start Jalandhar Bandha and Kumbhaka. It should be performed under supervision of experienced yoga teacher.

3.2.3.3 Kapalabhati Pranayama (Skull Shining Breath):

Fig 22 Kapalabhati Pranayama

Procedure:
1. Sit on flat surface folding your legs. You can sit on soft mat or blanket spread on the ground.
2. Keep your spine straight.
3. Close your eyes.
4. Keep the right palm (Inner surface of your hand starting from wrist) on your right knee
5. Keep your left palm on your left knee while in sitting position.
6. Breathe in normally and breathe out forcefully with all your strength (Exhale with all your force).

7. While exhaling concentrate on your breathe taking away all your diseases.
8. In the process of exhaling the abdominal area also makes inward and outward movements.
9. Do not stress on inhaling process, so breathe in normally after each forceful exhale.
10. Do this Pranayama in a way you clean your nose forcefully.

Benefits:

Respiratory Systems

Beneficial practice for the diseases like common cold, cough, rhinitis, pharyngitis, sinusitis, deviated nasal septum, bronchitis, tuberculosis and emphysema.

Digestive System

Gives good massage to the digestive system and improves the functions like digestion, absorption and peristaltic movement etc. remedy in case of indigestion, gastritis, hyperacidity and constipation.

Circulatory System

There is an increase in red blood cell (RBC), hemoglobin (Hb) and eosinophils in the blood as on effect of Kapalabhati kriya. Increased heart rate, blood circulation and higher concentration of oxygen stimulate whole body activity in greater level.

Kapalabhati can be used to the diseases caused due to slow blood circulation. It is more beneficial to the people having heavy body and feeling exhausted to move their body remedy to those who are suffering from obesity. It reduces the depository fat in the abdomen. Kapalabhati helps for better perfusion and filtration in the kidney.

Endocrine System

Hormones secretion has direct relation with emotion. The effect of emotions on the adrenals produce high blood pressure and increased heart rate, on pancreas will lead to diabetes, on sexual glands produce impotence in males and sudden menstruation in women and on thyroid to produce myxedema.

Kapalabhati helps to stimulate and regulate the glands so that functioning of the glands gets normalized.

Nervous System

The sympathetic nervous system is initially stimulated during the process and by continued practice the sympathetic and parasympathetic balance is well kept.

The brain cells are invigorated continuously during the performance of Kapalabhati. Increased level cleanses and revitalizes the functions of the brain cells. Memory cells and many other cells in the brain are brought into action.

3.2.4 Meditation:

Meditation is mainly concentration of the mind by cutting oneself from the environment completely. In the complex, fast and tension-filled world today, it can play an increasingly important role in regulating the life of the human beings.

Sit in a comfortable meditative pose, keep the spine straight and close the eyes. Step by step follow the instructions given below:

1. Relax your body. Let there be no movement. Moderate your breathing.
2. Keep yourself away from outer noises and draw in.
3. Control your thoughts and let nothing disturb your concentration.
4. Slowly draw attention on your breathing. Think that the oxygen which you are inhaling is purifying your body and mind and is cultivating pure and noble thoughts in you. Think that with the air you are breathing out, you are throwing out the dirt, impurities and bad tendencies of the body and the mind.
5. Keeping all outside thoughts away, fix your attention on your favorite object or symbol which is pure and holy to you. Relax and try to forget the body and mind. You are now fully integrated physically and mentally. Keep yourself in this position and you will feel the bliss- and atmosphere of peace, calm and happiness inside as well as outside.

Benefits:

Meditation not only helps absorb the daily strength derived through Asanas and Pranayama .It also changes the attitude, behavior and actions of the person. It is the best way to reduce tension.

Chapter 4
DISCUSSION

The key factor that could be understood from the review of Thyroid functional mechanism is trapping of Iodine from the blood. The entire mechanism goes well if the required iodine is trapped by the Thyroid Gland. On the other hand when the functional imbalances occur the thyroid gland undergoes different conditions as studied in chapter 2.

Now the question is how far are we successful in restoring thyroid function?

Studies made by universities on treatment and medication for thyroid problems and their effect on health from the under mentioned sources revealed the following:

- www.aace.com -- American Association of Clinical Endocrinologists
- www.thyroid.org -- American Thyroid Association
- www.hormone.org -- Hormone Foundation
- www.endo-society.org -- Endocrine Society

Treatment and Medication:

Thyroid Hormone Replacement with Levothyroxine

The goal of thyroid drug therapy is to provide the body with replacement of thyroid hormone when the gland is not able to produce enough of it.

Levothyroxine

A synthetic thyroid hormone called levothyroxine is the choice treatment for hypothyroidism. This drug is a synthetic derivative of T4 (thyroxine), and it normalizes blood levels of TSH, T4, and T3.

1.Levothyroxine Regimens

Levothyroxine needs to be taken only once a day. It is slowly assimilated by body organs, so it usually takes up to 6 weeks before symptoms improve in adults. Nevertheless, many patients feel better after 2 - 3 weeks of treatment. The speed at which specific symptoms improve varies:

- Weight loss, less puffiness, and improved pulse usually occur early in the treatment.
- Improvements in anemia and skin, hair, and voice tone may take a few months.

- High LDL ("bad cholesterol") levels decline very gradually. HDL ("good cholesterol") levels are not affected by treatment.
- Goiter size declines very slowly, and some patients may need high-dose thyroid hormone (called suppressive thyroid therapy) for a short period.

Levothyroxine reduces blood pressure in about half of hypothyroid patients with hypertension, although blood pressure medications may still be needed.

2. Appropriate Dosage Levels

Initial dosage levels are determined on an individual basis and can vary widely, depending on a person's age, medication condition, other drugs they are taking, and, in women, whether or not they are pregnant. For example, pregnant women with hypothyroidism may need higher than normal doses.

- Starting out. Most people need to build up gradually until they reach a maintenance dose. In uncomplicated cases, the dose typically starts at 50 micrograms per day, which then increases in 3- to 4-week intervals until thyroid hormone levels are normal. Seniors and those with heart disease may start at 12.5 - 25 micrograms per day. On the other hand, young adults with a short history of hypothyroidism might be able to tolerate a full maintenance dosage right away.
- Maintenance dose. Maintenance dose for most patients averages 112 micrograms, but it can vary between 75 - 260 micrograms. If conditions such as pregnancy, surgery, or other drugs alter hormone levels, the patient's thyroid needs will have to be reassessed.

Specific factors, such as changes in health or diet, new medications for other conditions, or simply switching brands, can also cause changes in thyroid hormone levels that require different doses. If patients change dose levels or thyroxine brands, they should be checked again at least 6 weeks later.

Problems Encountered with Levothyroxine Treatment:

1.Symptoms of Under- and Over-Dosing of Levothyroxine

Under-Dosing	Over-Dosing
Sluggishness	Heart symptoms (rapid heartbeat, palpitations, and wide variations in pulse; possible angina or heart failure)
Mental dullness	Agitation (tremor, nervousness, insomnia, excessive sweating)
Feeling cold	Pain (headache and muscle pain)
Muscle cramps	Intestinal and metabolic symptoms (change in appetite,

	diarrhea, weight loss)
	Fever and intolerance to heat

2. No Symptom Improvement When Normal Thyroid Levels Are Reached

Some patients fail to feel significantly better even when their thyroid levels become normal after taking thyroid replacement. Some patients with persistent symptoms may benefit from triiodothyronine (T3), the other important thyroid hormone. In such cases, either a combination of a lower-dose of thyroxine with a small amount of T3 or natural dried thyroid hormone, which contains T3, may be helpful.

3. Side Effects of Overdosing

Overdosing can cause symptoms of hyperthyroidism. A patient with too much thyroid hormone in the blood is at an increased risk for abnormal heart rhythms, rapid heartbeat, heart failure, and possibly a heart attack if the patient has underlying heart disease. Excess thyroid hormone is particularly dangerous in newborns, and their drug levels must be carefully monitored to avoid brain damage.

4. Side Effects of Long-Term Treatment

Patients with hypothyroidism usually receive lifelong levothyroxine therapy. There has been some concern that long-term use will increase the risk of osteoporosis, as suppression therapy does. Studies indicate that postmenopausal women who are taking long-term replacement thyroxine at the appropriate dosage have no significantly increased risk for osteoporosis.

5. Inappropriate Use of Thyroid Hormone

Thyroid replacement hormone is sometimes prescribed inappropriately. It should only be used to treat diagnosed low thyroid. Indiscriminate use of thyroid hormones can weaken muscles and, over the long term, even the heart.

6. Drug Interactions with Levothyroxine

Many drugs interact with levothyroxine and may either enhance or interfere with its absorption. These drugs include:

- Amphetamines
- Anticoagulants (blood thinners)
- Tricyclic antidepressants
- Anti-anxiety drugs
- Arthritis medications
- Aspirin
- Beta blockers

- Insulin
- Oral contraceptives
- Digoxin
- Certain cancer drugs
- Iron replacement therapy (ferrous sulfate)
- Calcium carbonate and aluminum hydroxide
- Anticonvulsants (phenytoin, phenobarbital, carbamazepine)
- Rifampin (antibiotic used to treat or prevent tuberculosis)

Large amounts of dietary fiber may also reduce the drug effectiveness. People whose diets are consistently high in fiber may need larger doses of the drug. Since thyroid hormones regulate the metabolism and can affect the actions of a number of medications, dosages may also need to be adjusted if a patient is being treated for other conditions. Even changing thyroxine brands can have a different effect.

Problems Encountered with other Drugs and Treatments:

Drugs and Medical Treatments that Reduce Thyroid Levels

Lithium:

Lithium, a drug widely used to treat psychiatric disorders, has multiple effects on thyroid hormone synthesis and secretion. Up to 50% of patients who take lithium develop a goiter, with 20% developing symptomatic hypothyroidism, and another 20 - 30% developing hypothyroidism without symptoms.

Amiodarone:

The drug amiodarone (Cordarone), which is used to treat abnormal heart rhythms contains high levels of iodine and can induce hyper- or hypothyroidism particularly in patients with existing thyroid problems.

Other Drugs:

Drugs used for treating epilepsy, such as phenytoin and carbamazepine, can reduce thyroid levels. Certain antidepressants may cause hypothyroidism, although this is rare. Interferons and interleukins are used for treating hepatitis, multiple sclerosis, and other conditions. Evidence suggests that these drugs increase antibodies that put patients at risk for hypo- or hyperthyroidism. Some drugs used in cancer chemotherapy, such as sunitinib (Sunent) or imatinib (Gleevec), can also cause or worsen hypothyroidism.

Radiation Therapy:

High-dose radiation for cancers of the head or neck and for odgkin's disease can also cause hypothyroidism in up to 65% of patients within 10 years after treatment.

Summary:

Summarizing the above observations we may say that Thyroid Hormone Replacement therapy:

i) could only stop the worsening of Thyroid gland making some other ailments to crop up

ii) appropriate dosage levels are to be set up for every change in body condition, aging and in every situation of life. If the level of dosage goes wrong it will have short and long term impact on health.

iii) it is a lifelong synthetic supplementation.

Hence we may conclude that it is only a **partial success of restoration.**

In the given situation is there an alternative method of treatment?

An affirmative answer can be made if we study the thyroid mechanism and let it go in its way. The functioning of thyroid in a normal person is identical to a person with hypothyroid except that level of secretion is low. If we succeed in bringing the secretion of hormones to a normal level the problem is solved. The following experiment enlightens us on the method of achieving the goal.

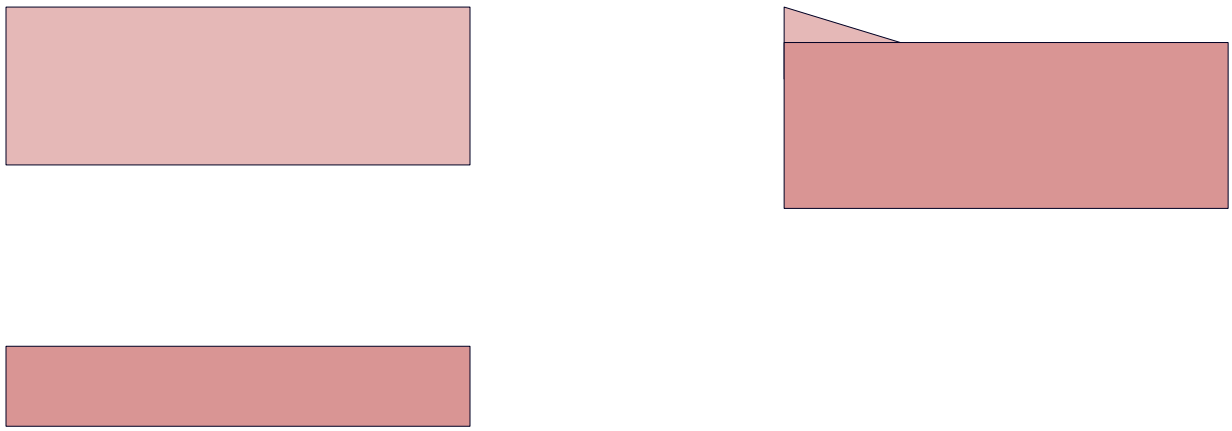

Fig A Fig B

Fig 23 Water Absorption Experiment

From the above figures we observe that the water absorption power of the sponge piece is enhanced by applying pressure on it. Similarly by applying an external force to nourish the thyroid gland it can achieve the required stimulation.

The eastern intellectuals have designed many ways and means to achieve the goal which we have studied in chapter 3. Yogic practices make the body active

and enrich the thyroid gland stimulation. Hence the absorption power of thyroid gland is increased to trap the required iodides from blood and later convert into iodine to produce the required thyroid hormones and maintain the body homeostasis. Hence the alternative method of treating thyroid disorders may prove to be fruitful.

Now the question comes up whether the alternate method of therapy supersedes the technical treatment?

First let us consider both the systems of treatment before deciding upon their superiority. The technical treatment proposes artificial supplementation, suppression of the ailment, removal and replacement of the affected part of the body. The alternate therapy tries to find the cause of affect and paves way for the organ to heal on its own and rejuvenate.

In application of the above systems of treatment for hypothyroidism the following merits and demerits are to be considered:

Merits:

The choice of technical treatment is an artificial supplementation of Levothyroxine, as the thyroid gland could not produce the required hormones on its own, to make up the imbalances corrected instantaneously.

The alternate therapy explains the cause of hormonal imbalances as insufficiency in iodide uptake. The choice of treatment is the practice of yoga to enhance the absorption power of the gland to trap more iodides from the blood and supplement the production of hormones. In the course of time the thyroid gland gets rejuvenated to its normal capacity and maintains the body homeostasis.

In cases where the gland is malfunctioning and making the other disorders to crop up alternate therapies can do better.

Demerits:

The supplementation by way of drug continues for life span as the requirement of thyroid hormones is necessary throughout the life stands as a demerit of technical treatment.

The alternate therapy cannot be adopted in cases where the gland is totally absent, misplaced or becomes totally defective and needs its removal.

In some cases where low secretions are noted at one point of time become high secretions at another time for many reasons. In these cases quantification of secretions are necessary which cannot be fulfilled by the alternate therapy.

After considering the merits and demerits we may understand that it is better not to decide on the superiority of the theories, rather think about the synchronization of both the systems to yield better results.

In the process of synchronizing the western technology with the eastern intellect the concept of **INTEGRATED APPROACH OF YOGA THERAPY** has been evolved to handle the problem in a better way which we study in the next chapter.

Chapter 5
INTEGRATED APPROACH OF YOGA THERAPY

Malfunctioning of an organ in the body is referred as ill health. If we investigate the cause of this affect we may find a short or long term change either in food style, living condition or in the interaction with the society. The concept of disease as defined by Yoga is an imbalance occurred in the Manomaya Kosa which is one among the Pancha Kosas ie the five layered existence of a human being. Likes and dislikes play their role at Manomaya level governing our actions which sometimes may lead us in a wrong direction. Thus going against what are right causes the imbalances which amplify themselves resulting in mental illness called Adhis. At this stage there are no symptoms at the physical level. Prompted by the perpetual growth of desires these mental diseases concealed in us begin to manifest externally and gradually percolate to the physical frame.

The whole concept of illness in theory holds good but in practice the treatment starts on the disease of the participant. This is the point where the western specialists propose the theory of suppression or artificial supplementation in the beginning and advance to the theory of removal or replacement.

In the given situation the therapists are compelled to continue with the synthetic drugs or propose some natural drugs brought up by alternate therapies to hold a break on advancing disorder. Therapists propose their natural method of healing in a phased manner basing on the recovery of the patient.

To remove the anomalies of the traditional systems and reap the benefits of the western technology the concept of Integration of both the systems has been brought up.

The concept of Integrated Approach of Yoga Therapy in the context of hypothyroidism treatment may be summarized as under:

Diagnosis:

A synopsis of diagnosis (Para 2.2.5):

1 At first the doctor conducts a physical examination of the patient.

2 If he suspects a hypothyroidism, a blood test is conducted.

3 The test ranges of TSH, T3 and T4 Hormones are verified with Normal ranges given in Annexure 2.

4 Basing on the test result variances the Doctor classifies the type and severity of the Hypothyroid as shown under and prescribe the medication.

Fig 24 Hypothyroid Classification

Treatment:

A synopsis of treatment (Para 2.2.6):

1 Irrespective of the classification of hypothyroid the treatment starts with the artificial supplementation of Levothyroxine.

2 According to the level of secretion in TSH, T3 and T4 hormones, decisions are taken on the dosage of Levothyroxine to begin with and how rapidly treatment should be started or increased and to repeat the test at different intervals for correction of dosage.

Integrated Approach:

In synchronization of both the systems of treatment:

1) The Therapist makes use of the test results to prescribe the required medication.
2) The participant (patient) is introduced to yoga practices slowly and regularly.
3) Required parameters are taken at regular intervals each day of treatment.
4) Change is brought up in food habits with natural supplementation of Iodine Rich foods. Gradually the insufficient stage of dietary iodine becomes sufficient dietary iodine stage as shown under.

Natural Supplementation

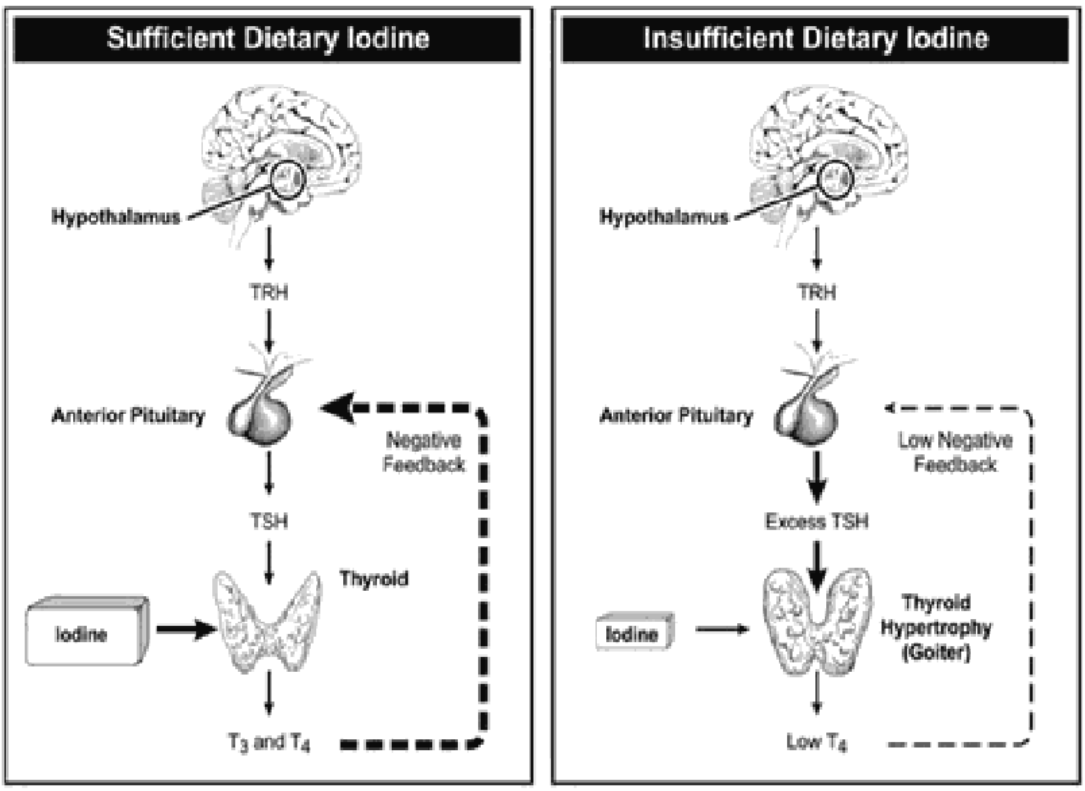

Fig 25 Natural Supplementation

5) Changes are brought up in the living style to cope up the stress.
6) The Thyroid gland is nourished by introducing specific asanas and other practices (Chapter 3).
7) Tests are repeated for quantification of secretion levels and correct the dosage levels.
8) Slowly the participant is introduced to higher level of practices like Pranayama and proceeds to Meditation to make his mental worries and their physical manifestation subside. His mind becomes calm and peaceful.

Conclusion:

Summarizing the study of the **Influence of Yogic Practices on Stimulation of Thyroid Gland and its Secretion of Hormones in Hypothyroidism** it may be concluded as under:

i) Physical examination of the patient and his test reports are considered to quantify the level of secretions and prescribe the medication in the beginning stage of treatment and to check the progress at different intervals of time.

ii) Progressive substitution of medication with yogic practices in course of time, the thyroid gland gets well nourished and attains the capability of trapping more iodides from blood to supplement the production of required hormones and maintain the body homeostasis.

iii) Manifold dimension of integrated therapy engraves the participant's soul and body in a Holistic Way. The holistic living places him well in the society and make him realize the ultimate truth and the essence of life.

iv) The aphorism "Prevention is better than cure" is a dogma of the integrated therapy and recommends the following :

a) *Screening in Older Adults:*

As the thyroid problems are so common in the elderly and thyroid hormone tests are so inexpensive, that blood tests for thyroid function should be made a routine. Undiagnosed hypothyroidism in elderly patients can develop into a serious and even life-threatening situation.

b) *Screening in Pregnant Women:*

Untreated overt hypothyroidism in a pregnant woman, particularly in the first trimester, may cause premature delivery and birth defects. Birth defects can affect a baby's intelligence, mental development, and motor skills.

For women before or during pregnancy in each trimester is based on symptoms or history and that is why screening is recommended. Factors that suggest screening is indicated includes the history of thyroid disease, goiter, type 1 diabetes or other autoimmune illnesses, history of miscarriages, and history of head and neck radiation or surgery.

c) *Screening in Infants:*

It is very difficult to diagnose hypothyroidism in newborns by symptoms alone. All newborns with hypothyroidism can easily be identified after birth through screening program using a thyroid blood test.

Annexure 1

Annexure 2

Normal Ranges of Test Results

Test	Abbreviation	Normal ranges
Serum thyrotropin/thyroid-stimulating hormone	TSH	0.3–3.0 μU/ml
Free thyroxine	FT_4	7–18 ng/l = 0.7–1.8 ng/dl
Serum triiodothyronine	T_3	0.8–1.8 μg/l = 80–180 ng/dl
Radioactive iodine-123 uptake	RAIU	10–30%
Radioiodine scan (gamma camera)	N/A	N/A - thyroid contrasted images
Free thyroxine fraction	FT4F	0.03–0.005%
Serum thyroxine	T_4	46–120 μg/l = 4.6–12.0 μg/dl
Thyroid hormone binding ratio	THBR	0.9–1.1
Free thyroxine index	FT4I	4–11

Free triiodothyronine l	FT_3	230–619 pg/d
Free T3 Index	FT3I	80–180
Thyroxine-binding globulin	TBG	12–20 ug/dl T4 +1.8 µg
TRH stimulation test	Peak TSH	9–30 µIU/ml at 20–30 min.
Serum thyroglobulin l	Tg	0-30 ng/m
Thyroid microsomal antibody titer	TMAb	Varies with method
Thyroglobulin antibody titer	TgAb	Varies with method

- µU/ml = mU/l, microunit per milliliter
- ng/dl, nanograms per deciliter
- µg, micrograms
- pg/d, picograms per day
- µIU/ml = mIU/l, micro-international unit per milliliter

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