

# WELCOME

TO



This is an Education Platform

We Provide PDF Notes for Pharmacy Students

Web Site <http://www.fdspharmacy.in/>

You tube <https://www.youtube.com/c/FDSpharmacy>

Telegram <https://t.me/Fdspharmacy>

App <https://play.google.com/store/apps/details?id=com.FDSPharmacyMedia.FDSPharmacy>

E-mail [fdsparmacyinfo@gmail.com](mailto:fdsparmacyinfo@gmail.com)

## **Bachelor of Pharmacy Human Anatomy and Physiology II**

### **NOTES**

- ✓ Unit 1 **All Unit**
- ✓ Unit 2 **in**
- ✓ Unit 3 **One PDF**
- ✓ Unit 4
- ✓ Unit 5

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## **Bachelor of Pharmacy Environmental Sciences**

### **NOTES**

- ✓ Unit 1 **All Unit**
- ✓ Unit 2 **in**
- ✓ Unit 3 **One PDF**
- ✓ Unit 4
- ✓ Unit 5

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## **Bachelor of Pharmacy Pharmaceutical Organic Chemistry I**

### **NOTES**

- ✓ Unit 1 **All Unit**
- ✓ Unit 2 **in**
- ✓ Unit 3 **One PDF**
- ✓ Unit 4
- ✓ Unit 5

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## **Bachelor of Pharmacy Computer Applications in Pharmacy**

### **NOTES**

- ✓ Unit 1 **All Unit**
- ✓ Unit 2 **in**
- ✓ Unit 3 **One PDF**
- ✓ Unit 4
- ✓ Unit 5

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## **Bachelor of Pharmacy Pathophysiology**

### **NOTES**

- ✓ Unit 1 **All Unit**
- ✓ Unit 2 **in**
- ✓ Unit 3 **One PDF**
- ✓ Unit 4
- ✓ Unit 5

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## **Bachelor of Pharmacy Biochemistry**

### **NOTES**

- ✓ Unit 1 **All Unit**
- ✓ Unit 2 **in**
- ✓ Unit 3 **One PDF**
- ✓ Unit 4
- ✓ Unit 5

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)





# FDPharmacy

.....



Diploma in Pharmacy

Download



Bachelor of Pharmacy

Download

## D.Pharma B.Pharma

- 👉 PDF Notes
- 👉 Practical Manual
- 👉 Important Questions
- 👉 Assignment etc



Download Now



# www.fdpharmacy.in

# PATHOPHYSIOLOGY

## UNIT 3

TOPIC :

- **Endocrine system** : Diabetes, thyroid diseases, disorders of sex hormones



# Endocrine system

## Diabetes

- Diabetes Mellitus is a inherited or acquired disease occurs due to defect in insulin secretion or insulin action or both , in which blood sugar level is high for long time.
- It is also called Hyperglycemia.
- Diabetes means pass through , and mellitus means sweet,
- So we can say abnormal passing of sugar through blood or urine is called Diabetes mellitus.



Normal range of blood sugar level

	normal people	diabetes patients target
Before meals	72-99 mg/dl	80-130mg /dl
2 hours after meals	less than 140/ mg/dl	less than 180mg/dl

## Types of Diabetes

- **Type 1 Diabetes :** This type of diabetes occurs due to severe reduction in production of Insulin because of autoimmune destruction of beta cells of Pancreas . This occurs in younger age usually . ( before 35-40 years )
- **Type 2 diabetes :** This type of diabetes occurs due to the resistances to the action of Insulin . Or cells do not respond to insulin . This occurs in older age usually .
- **Gestational Diabetes :** During pregnancy , placenta generate hormones that alter the function of insulin.

## Etiology

### 1) Type 1 Diabetes :

- Autoimmune destruction of beta cells of pancreas.
- Any disease in pancreas
- Age
- Genetic factors
- Beta blockers and Thiazide drugs if used for long term

### 2) Type 2 Diabetes

- Insulin does not function properly.
- Resistances to insulin function
- Obesity.
- lack of physical activity
- Genetic factors

## Pathogenesis

Type 1 diabetes	Type 2 Diabetes
Immune attack on beta cells ↓	Poor response of cells to insulin ↓
Severe decrease in insulin production ↓	Decrease function of Insulin ↓
Increase blood sugar level ↓	Increase blood sugar level ↓
Type 1 Diabetes Mellitus	Type 2 Diabetes Mellitus

## Clinical Manifestations

- Presence of sugar in urine
- Increase thirst
- Increase frequency of urination
- Extreme hunger
- Fatigue
- Blurred vision
- Headache
- Frequent infection
- Delay in healing of cuts and wounds
- Itchy skins

## Non Pharmacological managements

- ❖ Physical Activity
- ❖ Diet ( should avoid carbohydrates , salt in excess amount)
- ❖ Should avoid Sweats

## Pharmacological managements

❖ **Type 1 diabetes** : It is insulin dependent , insulin is administered to treat this type of diabetes .

❖ **Type 2 diabetes**

➤ **Hypoglycemic agents**

- Sulfonylurea : they stimulate the release of insulin from pancreas , : Tolbutamide ,chlorpropamide , glibenclamide
- Biguanides : prevent liver from production of glucose , : metformin , phenformin
- $\alpha$  Glucosidaese Inhibitors : it prevent the absorption of carbohydrates form intestine : Acarbos , miglitol

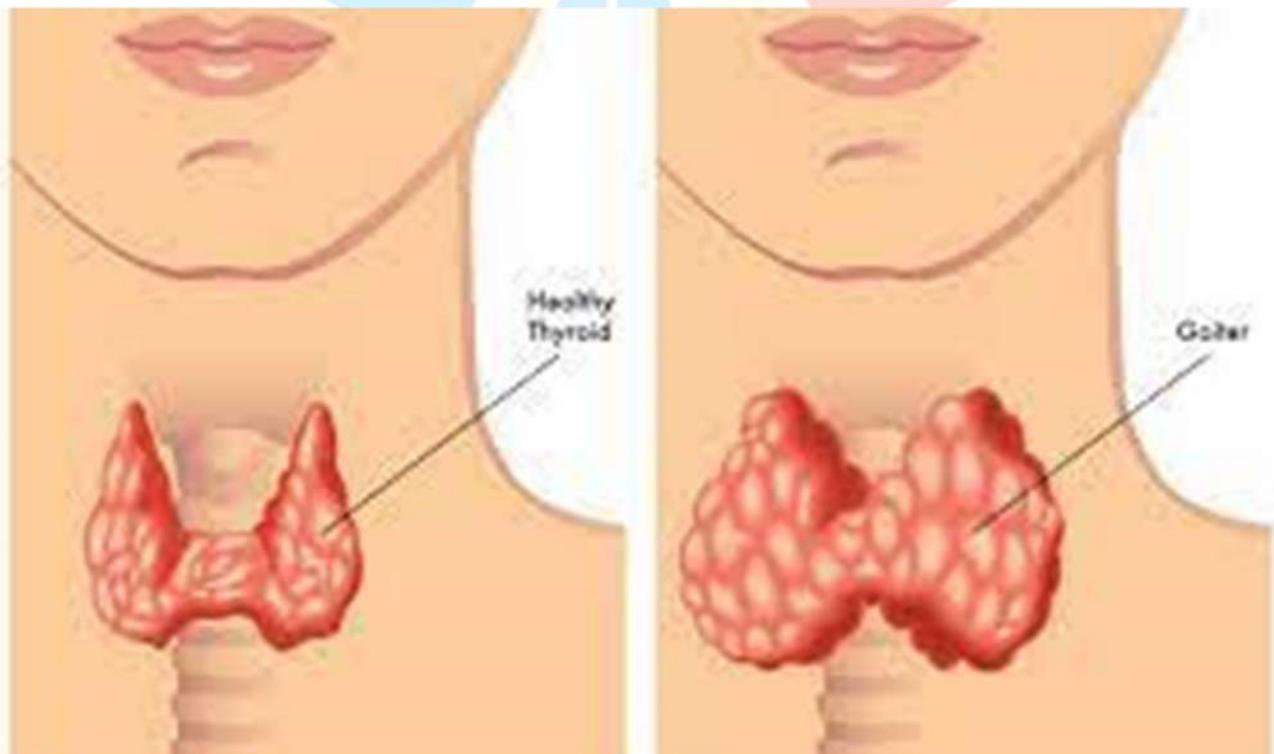
**FDSPharmacy**  
Learn and Educate

## Thyroid Disorder ( Hypo and hyperthyroidism )

- The thyroid gland, usually located below and anterior to the larynx, consists of two bulky lateral lobes connected by a relatively thin isthmus.
- The thyroid is divided by thin fibrous septae into lobules composed of about 20 to 40 evenly dispersed follicles, lined by a cuboidal to low columnar epithelium.

### Hypothyroidism

- Lack of Thyroid Hormones ( TH ) in blood circulation about 20% to 40 % which slow down the metabolism is called Hypothyroidism.



## Etiology :

- There are two types of etiology of Hypothyroidism , primary ( Problem in thyroid gland ) , secondary ( problem in Pituitary gland )

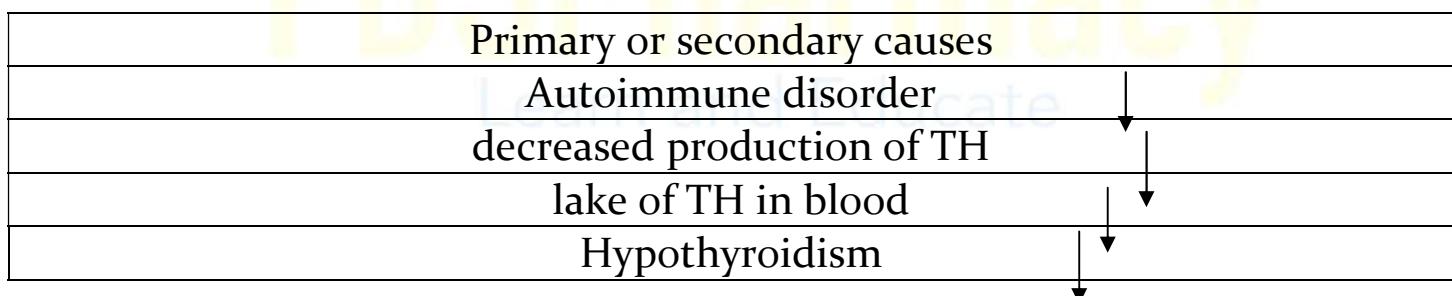
### Primary :

- Autoimmune disorder
- Dietary iodide deficiency.
- Anti-thyroid drugs
- Lithium therapy
- Radioactive iodine ( RAI) uses.

### Secondary :

- low secretion of TSH.
- Damage of pituitary gland.

## Pathogenesis of Hypothyroidism



## Clinical manifestation

- ✚ Constipation
- ✚ Depression
- ✚ Feeling tiredness
- ✚ high blood cholesterol level
- ✚ Dry skin
- ✚ Excessive forgetfulness

- Heavy and frequent menstrual cycle
- Tingling in hands
- Loss of sexual desire
- Gaining weight

## Non Pharmacological Management

- Exercise
- Stress management
- Diet ( Increase intake of foods , fruits , vegetables are rich in iodine , zinc , iron copper selenium , Vitamin A , D.

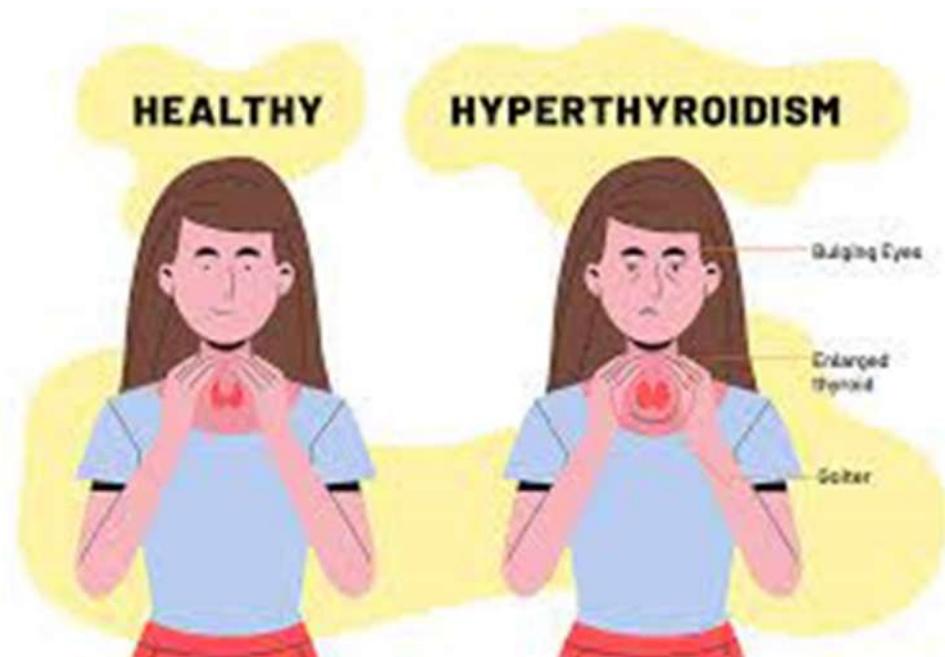
## Pharmacological Management

- Levothyroxine ( T<sub>4</sub> )
- Liothyronine ( T<sub>3</sub> )
- Combination Of T<sub>4</sub> and T<sub>3</sub>



# Hyperthyroidism

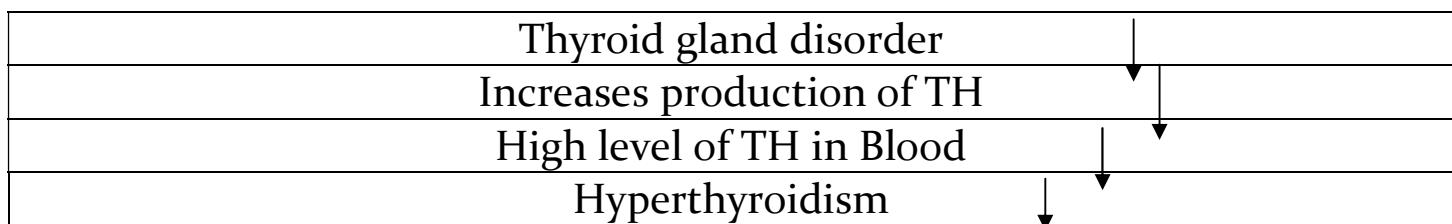
→ A condition in which thyroid gland produces more Thyroid Hormones ( TH ) than requirement of the body is called Hyperthyroidism.



## Etiology

- Graves 's Disease : It is an immune system disorder in which thyroid produce excess amount of Thyroid hormones.
- Infection of Thyroid gland.
- Excess consumption of Iodine
- Pituitary gland disorder

## Pathogenesis of Hyperthyroidism



## Clinical Manifestation

- Weight Loss
- Increased appetite
- Changes in menstrual
- Restless
- Diarrhoea
- Excess sweating
- Sleep problems
- Swollen in thyroid gland etc.

## Non Pharmacological Management

- Exercise
- Stress management
- Diet ( decrease intake of foods , fruits , vegetables are rich in iodine , zinc , iron copper selenium , Vitamin A , D .

## Pharmacological Management

- Hormone Inhibitors** : Methimazole , Propylthiouracil .
- Beta Blockers** : Propranolol ( these drugs provide relief from hyperthyroid symptoms till the anti-thyroid drugs become effective .
- Glucocorticoids** : They inhibit the conversion of T<sub>4</sub> to T<sub>3</sub> ( T<sub>3</sub> is more power full Hormone )
- Radioactive Iodine** : These drugs destroy thyroid cells and control thyroid hormones . the dosage of RAI should be given carefully , otherwise cause hypothyroid .

# Disorders of Sex Hormones

- Sex hormones include androgens (e.g., testosterone) and estrogens and progesterone.
- These hormones regulate reproductive development, sexual function, and secondary sexual characteristics.
- Disorders occur due to hormonal imbalance, gland dysfunction, tumors, genetic defects, or exogenous hormone use.

## Classification of Sex Hormone Disorders

- Sex hormone disorders arise due to excess or deficiency of androgens, estrogens, or progesterone and affect the reproductive, endocrine, and secondary sexual characteristics in both males and females.

### FEMALES

Disorder	Description
<b>1. Polycystic Ovary Syndrome (PCOS)</b>	Hormonal imbalance → ↑ androgens, irregular periods, ovarian cysts, infertility
<b>2. Amenorrhea</b>	Absence of menstruation (primary or secondary); due to hypothalamic, pituitary, or ovarian causes
<b>3. Hirsutism</b>	Excessive hair growth in male-like pattern due to ↑ androgens (as in PCOS or adrenal tumors)
<b>4. Hypogonadism</b>	Deficiency of estrogen and progesterone → delayed puberty, infertility, osteoporosis
<b>5. Premature Ovarian Failure (POF)</b>	Early loss of ovarian function before age 40, leading to menopause-like symptoms
<b>6. Hyperprolactinemia</b>	Excess prolactin inhibits ovulation → infertility, amenorrhea, galactorrhea

## MALES

Disorder	Description
<b>1. Erectile Dysfunction</b>	Inability to achieve or maintain erection sufficient for sexual activity
<b>2. Gynecomastia</b>	Enlargement of male breast tissue due to imbalance between estrogen and testosterone
<b>3. Hypogonadism</b>	Low testosterone levels → ↓ libido, infertility, muscle loss, fatigue
<b>4. Precocious Puberty</b>	Early onset of puberty due to excess androgens or pituitary stimulation
<b>5. Delayed Puberty</b>	Late or absent sexual maturation → often due to hypogonadism
<b>6. Infertility</b>	Low sperm count or impaired sperm function due to hormonal or testicular dysfunction

**FDSPharmacy**  
Learn and Educate

# Erectile Dysfunction (ED)

→ Erectile Dysfunction (ED), also known as impotence, is defined as the persistent inability to achieve or maintain an erection sufficient for satisfactory sexual performance.

It is a common condition, especially in aging males, and may be a sign of underlying health issues like cardiovascular disease or diabetes.

## Etiology (Causes)

### Physical (Organic) Causes

- **Vascular diseases:** Atherosclerosis, hypertension
- **Neurological disorders:** Spinal cord injury, Parkinson's, multiple sclerosis
- **Endocrine disorders:** Diabetes mellitus, hypogonadism, hyperprolactinemia
- **Medications:** Antihypertensives, antidepressants, antipsychotics
- **Surgery or trauma:** Pelvic surgery, prostatectomy
- **Substance abuse:** Alcohol, smoking, narcotics

### Psychological Causes

- Stress
- Anxiety
- Depression
- Relationship problems
- Performance anxiety

## Pathogenesis

1. **Sexual stimulation** → activates **parasympathetic nerves** → release **nitric oxide (NO)**
2. NO stimulates **cGMP production** → causes **relaxation of smooth muscle** in penile arteries
3. Increased **blood flow into corpora cavernosa** → erection
4. In ED, there is a **failure in this pathway** due to **vascular, neurological, hormonal, or psychological causes**

## Clinical Manifestations

- Inability to **achieve or maintain erection**
- Reduced **sexual desire (libido)**
- Anxiety or depression related to sexual performance
- Relationship problems
- Signs of underlying conditions like **diabetes or heart disease**

## Non-Pharmacological Management

- **Lifestyle changes:**
  - Stop smoking
  - Reduce alcohol intake
  - Lose weight
  - Regular exercise
- **Psychological counseling** for anxiety, depression, or relationship issues
- **Vacuum erection devices (VEDs)**
- **Penile implants** (in severe, unresponsive cases)

## Pharmacological Management

Drug Class	Examples	Mechanism
PDE-5 inhibitors	Sildenafil (Viagra), Tadalafil, Vardenafil	↑ cGMP → vasodilation → erection
Hormonal therapy	Testosterone (if hypogonadism present)	Corrects hormonal imbalance
Prostaglandin analogs	Alprostadil (intracavernosal/intraurethral)	Directly dilates penile arteries
Dopamine agonists	Apomorphine (rarely used)	Stimulates sexual arousal centers in brain

# Gynecomastia

- Gynecomastia is a condition characterized by benign enlargement of male breast tissue, usually due to an imbalance between estrogen and androgen levels.
- It is not breast cancer and commonly occurs during neonatal period, puberty, and old age due to normal hormonal changes.
- It may be unilateral or bilateral and is usually soft and mobile under the nipple.

## Etiology (Causes)

### Physiological Causes

- **Neonatal:** Due to maternal estrogen transfer
- **Pubertal:** Temporary hormonal imbalance
- **Senile (Elderly men):** ↓ testosterone with aging

### Pathological Causes

- **Hormonal imbalance:** ↓ Androgens / ↑ Estrogens
- **Testicular failure:** Klinefelter syndrome, mumps orchitis
- **Liver disease:** Cirrhosis (increased estrogen)
- **Thyroid disorders:** Hyperthyroidism
- **Chronic kidney disease**

### Drug-induced Gynecomastia

- Spironolactone
- Cimetidine
- Ketoconazole
- Anti-androgens (e.g., flutamide)
- Estrogens, anabolic steroids
- Digoxin
- Marijuana, alcohol

## Pathogenesis

- ▲ Normal male breast tissue has low estrogen and high androgen influence
- ▲ In gynecomastia, ↑ estrogen or ↓ testosterone
- ▲ Leads to proliferation of glandular breast tissue
- ▲ Results in visible breast enlargement

## Clinical Manifestations

- ❖ Enlargement of breast tissue (soft, tender mass behind nipple)
- ❖ Bilateral or unilateral
- ❖ Nipple sensitivity or pain
- ❖ Psychological embarrassment or anxiety
- ❖ No signs of malignancy (if symmetrical, mobile, no lymphadenopathy)

## Non-Pharmacological Management

- Reassurance (pubertal gynecomastia resolves in 6–18 months)
- Avoid offending drugs or substances
- Weight loss in obese individuals
- Psychological counseling (for body image issues)
- Surgical treatment:
  - Subcutaneous mastectomy
  - Liposuction (if persistent or severe)

## Pharmacological Management

Drug Class	Examples	Mechanism
<b>Anti-estrogens</b>	Tamoxifen, Clomiphene	Block estrogen receptors
<b>Aromatase inhibitors</b>	Anastrozole, Letrozole	Prevent conversion of androgens → estrogens
<b>Androgens (rarely used)</b>	Testosterone (if deficient)	Restore androgen:estrogen balance