Textbook of Pharmacology, Pathology & Genetics for NURSES–II

As per the Revised INC Syllabus for BSc Nursing

Suresh Sharma

2nd Edition

JAYPEE

Textbook of
Pharmacology, Pathology and Genetics for Nurses–II

As per the Revised INC Syllabus for BSc Nursing

SECOND EDITION

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CHAPTER

4

Drugs Used for Hormonal Disorders and Supplementation, Contraception and Medical Termination of Pregnancy

Prasuna Jelly, Hemlata, Suresh Sharma

ESTROGEN AND PROGESTERONE

Hypothalamus releases gonadotropin-releasing hormone (GnRH). This stimulates the anterior pituitary to release FSH and LH. FSH stimulates maturation of primary oocyte in an immature follicle. Follicle produces estrogen. Estrogen builds the uterine wall (the endometrium) and inhibits secretion of FSH. High levels of estrogen further stimulate secretion of LH by anterior pituitary. This plus FSH also causes ovulation of the secondary oocyte—leaving follicle without egg (the corpus luteum).

Corpus luteum secretes estrogen and progesterone. This maintains the endometrium for 15–16 days and inhibits LH (if oocyte is not fertilized and implanted in the uterine wall). The corpus degenerates (to corpus albicans) and stops producing estrogen and progesterone. Without estrogen and progesterone, endometrium breaks down—menstruation occurs. Menstruation is the sloughing off of the enlarged endometrial wall along with blood and mucus. This decrease in progesterone and LH. Low LH causes secretion of FSH by pituitary again. The cycle repeats.

Estrogen

A group of steroid hormones/female sex hormone that readily diffuse across the cell membrane. Inside the cell, they interact with estrogen receptors.

Natural Estrogens

Estradiol is the major estrogen secreted by ovary. It is synthesized in Graafian follicle, corpus luteum and placenta from cholesterol. Oxidized in the liver to weak estrogens like estrone, estriol.

Synthetic Estrogens

- To overcome the shortcomings of natural estrogens
- Steroidal—ethinyl estradiol, mestranol, tibolone
- Nonsteroidal—diethylstilbestrol, hexestrol, dienestrol

Estrogen Synthesis (Fig. 4.1)

- Estrogen is produced primarily by developing follicles in the ovaries, the corpus luteum, and the placenta
- The most abundant estrogen secreted by ovaries is estradiol
- The FSH and LH stimulate the production of estrogen in the ovaries
- Some estrogens are also produced in smaller amounts by other tissues such as the liver, adrenal glands and the breasts.

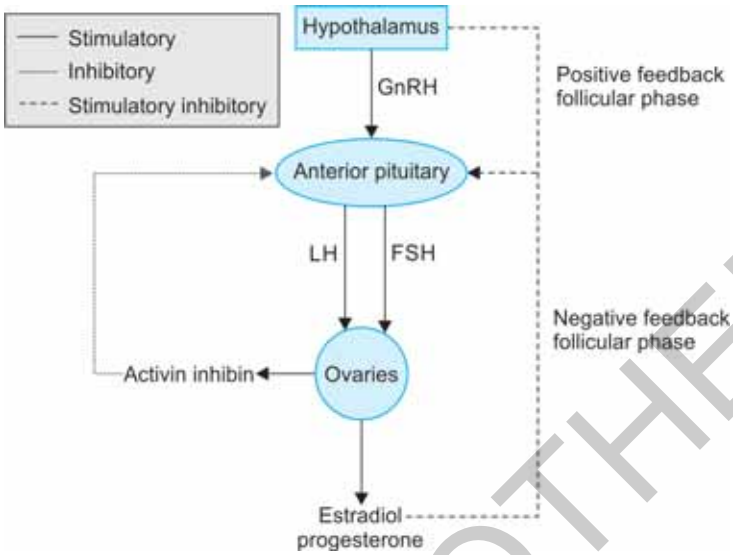


Fig. 4.1: Synthesis of estrogen and progesterone.

Effects of estrogen at various sites in the body

- Female reproductive system:
  - Fallopian tubes, uterus, vagina—pubertal growth and development. Thickening of vaginal epithelium
  - Mammary glands—proliferations of ducts and stroma
  - Uterine endometrium—proliferation
  - Cervix—watery secretion to facilitate sperm penetration
- CNS:
  - FSH/LH secretion—feedback control
  - Nausea and vomiting
- Blood:
  - Coagulation factors—decreased antithrombin III. Increasing circulating levels of factors II, VII, IX and X
  - Lipid profile—increase in HDL, decrease in LDL, increase in triglycerides
- Metabolic effects:
  - Anabolic effects
  - Glucose intolerance
  - Sodium and water retention
  - Maintain bone mass and decrease in bone resorption.
- Other effects:
  - Growth of hair, fat deposition, pigmentation on nipples
  - Gallbladder stones, cholestatic jaundice
  - Increased circulating level of proteins, hepatic adenoma on prolonged use.

Pharmacokinetics

Absorption

Natural estrogens are orally inactive; synthetics estrogens are well absorbed orally and transdermally, estrogen ester in the form of IM injections are slowly absorbed and have prolonged effect.

Metabolism

Estradiol is converted reversibly to estrone and both can be converted to estriol, which is the major urinary metabolite. Estrogens also undergo enterohepatic recirculation via sulfate and glucuronide conjugation in the liver, biliary secretion of conjugates into the intestine, and hydrolysis in the gut followed by reabsorption.

Excretion

Estradiol, estrone and estriol are excreted in the urine along with glucuronide and sulfate conjugates.

Preparations and Doses

The preparations and doses of estrogen along with their routes of administration has been presented in **Table 4.1.**

Indications

- **Hormonal replacement therapy:** It includes administrations of estrogen and progesterone combinations. Due to cessation of ovarian function at menopause women suffer a number of physical, psychological and emotional consequences..
- Acne and hirsutism—estrogen benefits by suppressing ovarian production of androgen by inhibiting gonadotropins released from pituitary.

Table 4.1: Estrogen preparations with doses and routes of administration.

Drug	Dose	Route
Natural steroidal estrogen: Estradiol benzoate, cypionate, enanthate	2.5–10 mg	IM
Conjugated estrogen	0.625–1.25 mg/day	Oral
Ethinylestradiol	0.02–0.2 mg/day	Oral
Mestranol	0.1–0.2 mg/day	Oral
Estriol succinate	4–8 mg/tds	Oral, cream tds
Dienestrol	0.01%	Topically in vagina
Transdermal estradiol: Estraderm-MX	25, 50,100 µg/24 h for 3–4 day	Apply to non-hairy skin below the waist, oral progestin is added
Gel formulations: Oestrogel	3 mg/5 g in 80 g tube	Applied over the arms once daily for hormonal replacement therapy (HRT)

- Dysmenorrhea—estrogen therapy benefits by inhibiting ovulation (anovulatory cycles) and decreasing prostaglandins secretions in endometrium.
- Carcinoma prostate—acts by suppressing the androgen production through pituitary.
- Senile vaginitis—effective in preventing as well as treating atrophic vaginitis that occurs in elderly women. An antibacterial may be combine.
- Delayed puberty in girls—Turner's syndrome or hypopituitarism.
- Dysfunctional uterine bleeding—this type of bleeding can result from the following three reasons:
  i. Estrogen withdrawal bleeding occurs when the estrogen given to postmenopausal women
  ii. Estrogen break through bleeding that occurs when there is a continuous stimulation of endometrium not interrupted by progesterone secretion, e.g. polycystic ovarian syndrome
  iii. Progesterone break through bleeding that occurs in presence of abnormally high progesterone, e.g. in women using low dose oral contraceptives.

Contraindications

- Pregnancy
- Thromboembolic disorders
- Diabetes
- Hepatic failure
- Estrogen dependent carcinoma of breast
- Endometrial carcinoma
- Endometriosis and undiagnosed genital bleeding.

Side Effects

- In males— gynecomastia, feminisation and decreased libido
- In females—breast tenderness, migraine, nausea, withdrawal bleeding, amenorrhea, endometrial hyperplasia, increased risk of vaginal and cervical adenocarcinoma
- In both sexes—gallstones and gallbladder, hepatic dysfunction, predisposition to thromboembolic disorders, precipitation of diabetes and fluid retention
- Fusion of epiphyses and reduction of adult stature when given to children.

Drug Interactions

- Need to increase the dose of warfarin, oral hypoglycemic or insulin
- Barbiturates, phenytoin, carbamazepine and rifampicin may decrease the effectiveness of estrogen
- Most antibiotics reduce the microbial flora of GIT, which retards the enterohepatic circulation of estrogens.

Nursing Responsibilities

- Assess BP prior to and periodically during use
- Monthly breast self-exam and annual mammograms are recommended
- In clients with breast cancer and bone metastasis, severe hypercalcemia may be caused by this therapy
- Nausea frequently occurs in morning, but disappears after 1–2 weeks of treatment.

Patient Education

- Teach client the correct dosage and amount and route of administration
- Advise client to take medicine with food, if nausea occurs
- Inform client that cigarette smoking can increase the risk of thrombus formation
- Advise client to report the signs of fluid retention
- Inform client that when cyclically taken vaginal bleeding will occur during the week each month when estrogen is withheld
- Instruct client to remain in lying down position for 30 minutes after administration of vaginal creams
- Instruct client to report positive Homan's sign
- Instruct client to take medication exactly as prescribed.

Antiestrogens and Selective Estrogen Receptor Modulators (SERM)

- **Antiestrogens:**
  - Pure antagonists
  - Clomiphene is for treatment of infertility in anovulatory women 50 mg OD for 5 days starting from 5th day of menstrual cycle.
  - Systemic inquiry (S/E) ovarian tumor, polycystic ovaries and gastric upset
  - Fulvestrant is used for the treatment of breast cancer
- **Selective estrogen receptor modulators (SERMs):**
  - Compounds with tissue-selective actions
  - The goal of these drugs is to produce beneficial estrogenic actions in certain tissues (e.g. brain, bone, liver) during postmenopausal hormone therapy
  - Antiestrogenic action is due to inhibition of human breast cancer cells
  - Tamoxifen(10–20 mg bd), raloxifene, toremifene.

Progesterone

- Progesterone is one of the steroid hormones
- It is secreted by the corpus luteum and by the placenta, and is responsible for preparing the body for pregnancy and, if pregnancy occurs, maintaining it until birth
- C21 steroid hormone—involved in the female menstrual cycle, pregnancy and embryogenesis
- Progesterone belongs to a class of hormones called progestogens and is the major naturally occurring human progestogen
- Progesterone should not be confused with progestins, which are synthetically produced progestogens
- **Synthetic progestogens:** Two classes of progestins are derivatives of either C21 or C19 steroid compounds:
  - **The C21 derivatives** are almost pure progestins, have weaker antiovulatory action and are used primarily as an adjuvant to estrogens for HRT, e.g. **medroxyprogesterone, dydrogesterone**
  - **The C19 nortestosterone derivatives** are having most potent antiovulatory action and more androgenic activity used in combined contraceptive pills, e.g. **norethisterone, levonorgestrel, desogestrel**

Synthesis

- Synthesized from pregnenolone, a derivative of cholesterol
- The precursor of the mineralocorticoid aldosterone
- Conversion to 17-hydroxyprogesterone of cortisol and androstenedione
- Androstenedione can be converted to testosterone, estrone and estradiol.

Sources

- Progesterone is produced in the adrenal glands, gonads, brain, and during pregnancy, in the placenta
- Increasing amounts are produced during pregnancy:
  - Initially, the source is the corpus luteum
  - After the 8th week production of progesterone shifts over to the placenta
  - The placenta utilizes maternal cholesterol as the initial substrate
  - Most of the produced progesterone enters the maternal circulation
  - Some is picked up by the fetal circulation and is used as substrate for fetal corticosteroids
  - At term the placenta produces about 250 mg progesterone per day

Mechanism of Action

- The progesterone receptor (PR) has a limited distribution in the body; confined mainly to female genital tract, breast, CNS and pituitary
- Since the ligand-binding domains of the two PR isoforms are identical, there is no difference in ligand binding
- However, the biological activities of PR-A and PR-B are distinct, and depend on the target gene in question:
  - PR-B mediates the stimulatory activities of progesterone
  - PR-A strongly inhibits this action of PR-B.
- Upon binding progesterone, the heat shock proteins dissociate, and the receptors are phosphorylated and that bind with high selectivity to progesterone response elements located on target genes and regulates transcription.

Pharmacokinetics

- **Absorption:** Progesterone undergoes high first pass metabolism. Therefore synthetic preparations are more commonly used
- Progesterone esters in oily solution for IM administration
- t½ is 5–7 minutes
- t½ of synthetic progestins is 8–24 hours
- **Metabolism:** By liver enzymes
- Excretion by urine after conjugation.

Effects of Progesterone

Reproductive System

- Fallopian tubes—growth and development, inhibition of uterine contraction during pregnancy and of immunologic rejection of fetus
- Uterine endometrium—induction of secretory phase in estrogen primed endometrium
- Mammary glands—development of secretory system for lactation

- Cervix—viscous, scanty mucus secretion as barrier to sperm penetration.
- **CNS—**body temperature increases, depressant effect and feedback control.
- **Metabolic effects—**increases basal insulin levels, increased appetite, fat deposition increases, decrease in HDL and catabolic action.

Preparations and Doses

The preparations and doses of progesterone along with their routes of administration has been presented in **Table 4.2**.

Indications

- As contraceptive
- Hormone replacement therapy
- Dysfunctional uterine bleeding
- To treat endometriosis—long-term therapy with progestins may be used as the progestin can inhibit estrogen-dependent growth of ectopic endometrial tissue
- Premenstrual syndrome/tension
- Threatened abortion—occurs in progesterone deficiency; pure progestins are used
- Endometrial carcinoma—repress the metastatic endometrial mass.

Contraindications

- In patients with hepatic disease or dysfunction
- Incomplete abortion, suspected pregnancy or undiagnosed vaginal bleeding
- Relatively contraindicated in patients with hyperlipidemia, thromboembolic disease (especially in smokers)
- Caution is appropriate in patients with heart disease due to increased fluid retention and edema.

Side Effects

- Breast engorgement, headache, rise in body temperature, edema, acne and mood swings may occur
- Irregular bleeding and amenorrhea can occur

Table 4.2: Preparation and doses of progesterone.

Drug	Dose	Route
Progesterone	10–100 mg,100–400 mg	IM, oral
Hydroxyprogesterone	250–500 mg	IM
Medroxyprogesterone acetate	5–20 mg, 50–150 mg	Oral, IM
Dihydrogesterone	5–10 mg	Oral
Norethisterone	5–10 mg	Oral
Levonorgestrel	0.1–0.5 mg/day	Oral
Lynestrenol	5–10 mg	Oral
Allylestrenol	10–40 mg/day	Oral
Desogestrel	150 µg	Oral

- The 19-nortestosterone derivatives can lower plasma HDL levels—may promote atherogenesis
- Long-term use may increase the risk of breast cancer
- Blood sugar may rise and diabetes can be precipitated.

Nursing Responsibilities

- Prior to administration in clients with current H/o depression, make a plan to deal with worsening or recurrent depressive symptoms
- A thorough physical examination should be done with special attention to pelvic organs, breasts and hepatic function
- A Papanicolaou (Pap) test should be done prior to initiation of therapy and every 6–12 months while client is taking medicines
- Monitor vital signs including BP
- Monitor I/O

Patient Education

- Instruct client about dosing and timing of the medication
- Warn client about possible side effects
- Inform postmenopausal women of possibility of resumption of cyclical vaginal bleeding
- Instruct client to monitor BP and I/O
- Caution client to exposure to UV lights
- Instruct client to monitor the glucose level closely
- Instruct client to take medication with food

Antiprogestins

- Antiprogestin, first discovered in 1981, is mifepristone, used to terminate pregnancy
- In the presence of progesterone, mifepristone acts as a competitive receptor antagonist for both progesterone receptors
- When administered in the early stages of pregnancy, mifepristone causes decidual breakdown by blocking uterine progesterone receptors, which leads to detachment of the blastocyst, decreasing hCG production.

ORAL CONTRACEPTIVE AND HORMONE REPLACEMENT THERAPY

Hormonal Contraceptives

These are hormonal preparations used for suppression of fertility. The word 'contraception' means interception in the birth process at any stage ranging from ovulations to ovum implantation.

Definition

These are the birth control methods that act on the endocrine system. Hormonal contraceptives when properly used are the most effective spacing method contraception. Hormonal contraceptive may be estrogen, progesterone or testosterone.

Classification (Fig. 4.2)

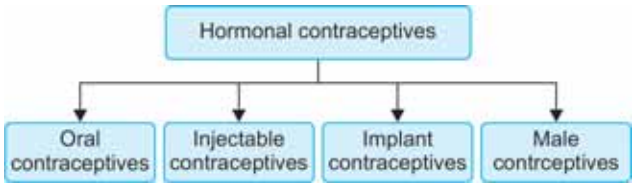


Fig. 4.2: Types of hormonal contraceptives.

Oral Contraceptives

Types of Oral Contraceptive

- Combined pills
- Mini pill (progesterone only pill)
- Post coital pill (emergency contraceptive)
- Centchroman (non-hormonal estrogen receptor antagonists)

Combined Pills

It contains estrogens and progestin. It is the most effective and popular method for contraception with 99%–99.5% success rate.
Combined pills can be:

Monophasic: No phasic increase or decrease in the estrogen, progestin content during 21 days of pill administration.

Biphasic/Triphasic: Level of estrogen remains same, but progestin level are altered.

The goal of these therapies are to minimize the occurrence of irregular bleeding while maintaining the efficacy. One tablet is taken daily for 21 days, starting on 5th day of menstruation. The next course is started after a gap of 7 days in which bleeding occur. Thus a cycle of 28 days is maintained.

Mini Pill (Progestin only Pill/Ezy Pill)

- It has been devised to eliminate the estrogen, because of many long-term risks associated with estrogen
- The efficacy is 96%–98%
- The menstrual cycle tends to become irregular and ovulation occurs in 20%–30% women, but other mechanisms contribute to contraceptive action
- Not associated with deep vein thrombosis (DVT) or heart disease.

Candidate for mini pill

- Cigarette smokers over age 35
- Women with H/O blood clots
- Women with H/O high BP
- Women who experience extreme migraine.

Postcoital Contraceptive (Morning after Pill)

- They are recommended within 48 hours of an unprotected intercourse
- High dose estrogen/progestins are quite effective in emergency contraception, when given immediately after unprotected coitus

- Acts by preventing ovulation and post-fertilization and implantation of blastocyst
- Delay in maturation of endometrium.

The following are the three regimens available:

- Levonorgestrel 0.5 mg + ethinyl estradiol 0.1 mg—taken as early as within 75 hours of unprotected intercourse and repeated after 12 hours. Women usually experience nausea and vomiting
- Levonorgestrel 0.75 mg taken twice with 12 hours:
  - Gap within 72 hours of intercourse. Effective mainly as post-ovulatory methods of fertility control
- Mifepristone 600 mg single dose taken within 72 hours of intercourse have high success rate and fewer side effects:

  Have high failure rate and side effects than oral combined pills.

Centchroman (Ormeloxifene/ Chhaya)

- It is a non-steroidal estrogen antagonist or selective estrogen receptor modulator (SERM) introduced in national family welfare program to be distributed as an oral contraceptive under the brand name Saheli
- Available as a tablet containing 30 mg of centchroman taken twice a week for first 3 months and then once a week subsequently to be continued irrespective of the following menstrual cycle, as long as contraceptive is desired
- The missed tablet should be taken as soon as possible, if the dose is missed for more than 7 days then reinitiate the therapy
- Contraceptive effects usually reversible within 6 months
- Has long plasma t½ about 1 week
- Acts as an anti-implantation agent by inducing embryo-uterine asynchrony, accelerated tubal transport and suppression of deciduation.

Preparation and Doses

Preparations and doses of oral contraceptives is presented in **Table 4.3**.

Advantages

- One of the most effective reversible method for birth control
- Simple and easy to use
- Regulate menstrual cycle
- Decrease acne
- Reduces the risk of ovarian and endometrial cancer
- May reduce perimenopausal symptoms

Disadvantages

- May be taken everyday
- May cause irregular bleeding
- Effectiveness may be reduced by other medication
- Not be used by women over age 35
- Does not protect against sexually transmitted infections (STIs)
- May increase the number of headaches
- May not be suitable for breastfeeding women

Table 4.3: Oral contraceptives with their doses.

Drug	Dose	
Combined pills		
Norgestrel, ethinyl estradiol	0.3 mg, 30 µg	Mala-D (21 tabs+ 7 ferrous sulfate 60 mg tablet
Levonorgestrel, ethinyl estradiol	0.25 mg, 50 µg	Ovral
Desogestrel, ethinyl estradiol	0.15 mg, 30 µg	Novelon
Desogestrel, ethinyl estradiol	0.15 mg, 20 µg	Femilon
Phased pills		
Levonorgestrel, ethinyl estradiol	50–75–125 mg, 30 µg	Triqular
Norethindrone, ethinyl estradiol	0.5–0.75–1.0 mg, 35 µg	Orthonovum
Postcoital pills		
Levonorgestrel, ethinyl estradiol	0.25 mg, 50 µg	Ovral (2+2)
Levonorgestrel	0.75 mg	Norlevo
Mini pills		
Norethindrone	**0.35 mg**	Nor-qd
Norgestrel	**75** µg	Ovrette

Hormone Replacement Therapy

Hormone replacement therapy is a system of medical treatment for surgical menopausal, perimenopausal and to a lesser extends postmenopausal women. It includes administrations of estrogen and progesterone combinations. Due to cessation of ovarian function at menopause women suffer a number of physical, psychological and emotional consequences. Also aid in prolong life and may reduce incidence of dementia.

The benefits and risks of HRT are considered below:

- Reduction of vasomotor menopausal symptoms and vaginal atrophic changes
- Reduction in risk of osteoporosis and fractures
- Cardiovascular events—improves HDL/LDL RATIO, retard atherogenesis, risk of stroke increase
- Neuroprotective and CNS effects—insomnia and fatigue are reduced, improvement in cognitive abilities
- Cancers—predisposes to endometrial cancer and cause breast cancer. Protective effect on colorectal carcinoma
- Increase the risk of developing gall stones
- Trigger the migraine
- Improvement in quality of life
- Newer benefits:
  - Decreased risk of colorectal cancer by 37%
  - Decreased age-related tooth loss

- Decreased age-related macular degeneration
- Delay of onset and progression of Alzheimer's disease when started early postmenopausal

Indications

- Relief of menopausal symptoms
- Prevention of osteoporosis
- To maintain the quality of life in menopausal years
- **Special group of women to whom HRT should be prescribed:** Premature ovarian failure, Gonadal dysgenesis, Surgical or radiation menopause

Dosage, Route and Indication of HRT (Table 4.4)

Low dose oral conjugated estrogen 0.3 mg daily is effective and has got minimal side effects. Dose interval may be modified as daily for initial 2-3 months then it may be changed to every other day for another 2-3 months and then every third day for the next 2-3 months. It may be stopped thereafter if symptoms are controlled.

Table 4.4: Dosage, route and indication of HRT.

Forms	Indication	Dosage	Route
Oral estrogen regime	Hysterectomy	Estrogen: Conjugated equine estrogen 0.3 mg or 0.625 mg	Orally
Estrogen and cyclic progestin	Intact uterus	Estrogen for 25 days and progesterone is added for last 12-14 days	Orally
Continuous estrogen and progestin therapy	Endometrial hyperplasia Hysterectomy	17 beta estradiol implants 25 mg, 50 mg or 100 mg (for 6 months)	Subdermal implants
	Endometrial hyperplasia	1 g applicator of gel, delivering 1 mg of estradiol daily	Percutaneous estrogen gel over skin and anterior wall of thigh
	Endometrial hyperplasia	3.2 mg of 17 betaestradiol, releasing about 50 ug of estradiol in 24 hours	Transdermal patch applied below the waistline
	Atrophic Vaginitis Urogenital atrophy Contraindicated to systemic HRT	Conjugated equine vaginal estrogen cream 1.25 mg daily	Vaginal cream
	Breast carcinoma Endometrial carcinoma Progestins	Medroxyprogesterone acetate 2.5 – 5 mg/ day	Orally

Contraindication

- Known or suspected pregnancy or breast cancer
- Undiagnosed genital tract bleeding
- Presence estrogen dependent neoplasm in the body
- History of venous thromboembolism
- Active liver disease
- Gallbladder disease

Side Effects

- Fluid retention
- Bloating
- Breast tenderness or swelling
- Headaches
- Indigestion
- Depression
- Acne
- Backache
- Endometrial cancer
- Breast cancer
- Venous thromboembolic (VTE) disease
- Coronary heart disease (CHD)
- Lipid metabolism—increase the cholesterol level
- Dementia, Alzheimer's disease

Nursing Responsibilities (Table 4.5)

Table 4.5: Nursing responsibilities in process of hormone replacement therapy.

Prior to administration	• Obtain a complete history including personal or familial history of breast cancer, gallbladder disease, diabetes mellitus, liver or kidney disease. • Obtain a drug history to determine possible drug interactions and allergies. • Assess cardiovascular status including hypertension, history of MI, cerebrovascular accident, or thromboembolic disease.
During HRT	• Monitor for thromboembolic disease. (Estrogen increase risk for thromboembolism). • Monitor for abnormal uterine bleeding. (If undiagnosed tumor is present, these drugs can increase its size and cause uterine bleeding). • Monitor breast health. (Estrogen promote the growth of certain breast cancer). • Monitor for vision changes. (These drugs may worsen myopia or astigmatism and cause intolerance of contact lenses). • Encourage client not to smoke. (Smoking increases risk of cardiovascular disease) • Encourage client to avoid caffeine. (Estrogens and caffeine may lead to increased CNS stimulation). • Monitor glucose levels. (Estrogens may increase blood glucose levels) • Monitor for seizure activity. (Estrogen- induced fluid retention may increases risk of seizures). • Monitor client's understanding and proper self- administration. (Improper administration may incidence of adverse effects).
Evaluation phase	• The client verbalizes relief of unpleasant symptoms of menopause. • The client demonstrates an understanding of the drug's actions by accurately describing drug side effects and precautions. • The client accurately states signs and symptoms to be reported to the healthcare provider.

VAGINAL CONTRACEPTIVES (FIGS. 4.3A TO D)

Vaginal Rings

Vaginal rings containing levonorgestrel have been found to be effective. The hormone is slowly absorbed through vaginal mucosa. The ring is worn in the vagina for 3 weeks and removed for the fourth weeks **(Fig. 4.3A)**.

Female Condom

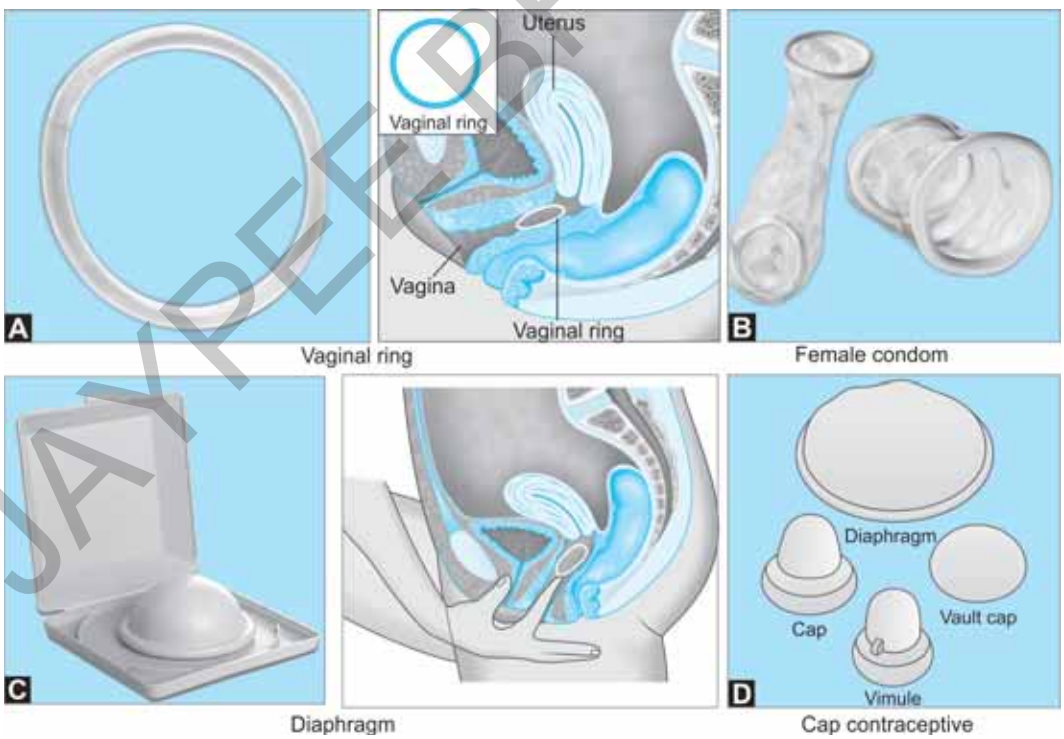
Female condom (FEMIDOM) is also a sheath made up of thin, transparent, soft plastic, closed at smaller end and opened at the wider end. It is of single time usage **(Fig. 4.3B)**.

Diaphragm (Vaginal Diaphragm and Dough Diaphragm)

Dough cap named after a German physician Dutch Neo Mathusians, 1882. It is a shallow, soft rubber cup, with a stiff but flexible rim, made up of coiled spring, which helps in retention. Size varies from 5 to 10 cm in diameter **(Fig. 4.3C)**.

Cervical Cap

It is thimble-shaped like diaphragm but smaller. It covers the vaginal portion of the cervix, thus acting as a barrier. The woman inserts the cervical cap with spermicidal, in the proper position in the vagina before having sexual intercourse **(Fig. 4.3D)**.



Figs. 4.3A to D: Types of vaginal contraceptives: A: Vaginal ring; B: Female condom; C: Diaphragm; D: Cap contraceptive.

Nursing Responsibilities

- β-**adrenergics:** If client continues on to deliver after receiving uterine relaxant medications, be prepared with oxytocic for treatment of PPH
- Monitor vital signs and I/O
- **Nifedipine:** Avoid grapefruit juice during administration
- Use indomethacin for short period of time
- If mother is using terbutaline during pregnancy, monitor the neonate for hypoglycemia.

MULTIPLE CHOICE QUESTIONS

1. **Which of the following is a non-steroidal form of estrogen?**
   a. Diethylstilbestrol b. Ethinylestradiol
   c. Mestranol d. Tibolone
2. **What is the effect of estrogen on cervix?**
   a. Proliferation b. Thickening
   c. Watery secretion d. Both a and c
3. **Preferred route of administration of estradiol.**
   a. Topical b. Oral
   c. IM d. IV
4. **Clomiphene is used in treatment of:**
   a. Dysmenorrhea b. Infertility
   c. Gynecomastia d. Delayed puberty
5. **Route of administration of progesterone esters.**
   a. Oral b. Topical
   c. IM d. IV

Answer Key

1. a 2. c 3. c 4. b 5. c

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Textbook of
Pharmacology, Pathology and Genetics for Nurses-II

The *Textbook of Pharmacology, Pathology & Genetics for Nurses-II* has been precisely written as per the revised syllabus of Indian Nursing Council for BSc Nursing Program. This textbook is an excellent attempt towards presentation of comprehensive, lucid, illustrative, and example-oriented content of Pharmacology, Pathology and Genetics.

Salient Features

- **Simple and lucid content:** This textbook provides clear concise information about current concepts and principles of pharmacology, pathology and genetics in simple and lucid manner incorporating their applications to healthcare and nursing practices.
- **Easy-to-follow:** This is an applied, user-friendly, and self-explanatory textbook with simple language and presentation for the students.
- **Comprehensive presentations:** The textbook provides in-depth coverage of all aspects of pharmacology, pathology, and genetics in a comprehensive and concise manner.
- **An applied textbook:** This book will equip students to prepare for exams as well as independently apply the knowledge of pharmacology, pathology and genetics into their clinical practices and patient care.
- **An example-oriented book:** This is an example-oriented book where numerous nursing examples are cited throughout the textbook for enriching the understanding about the applicability of pharmacology, pathology and genetics knowledge into nursing practices.
- **Illustrative presentation:** Presentation of content has been supplemented with illustrations to facilitate quick review and recall important concepts.
- **Systemic and logical organization:** Content organized in systemic and logical manner to gain better understanding of the presented content.
- **Revision MCQs:** This textbook covers the MCQs for quick revision of topics.
- **Authentic content:** Content has been contributed and reviewed by a panel of experts in the field of pharmacology, pathology and genetics.

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