

جامعة بغداد-كلية التمريض

Anatomy & Physiology of the
Male &Female Reproductive
System

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Anatomy & Physiology of the Male & Female Reproductive System

Learning objectives:

1. Describe anatomy and physiology pertinent to reproductive and sexual health.
2. Formulate nursing diagnoses related to reproductive and sexual
3. Plan nursing care related to anatomic and physiologic readiness for childbearing or sexual health, such as helping adolescents discuss concerns in these areas.
4. Implement nursing care related to reproductive and sexual health, such as educating middle school children about menstruation.
5. Evaluate expected outcomes for achievement and effectiveness of care health.

Content of the Literature:

1. Reproductive Development
2. Anatomy and Physiology of the Reproductive System
3. The Female Reproductive System
4. The Male Reproductive System
5. Nursing Process Overview for the Promotion of Reproductive and Sexual Health

Reproductive Development

Reproductive development and change begin at the moment

of conception and continue throughout life.

Intrauterine Development

The sex of an individual is determined at the moment of conception by the chromosome information supplied by the particular ovum and sperm that joined to create the new life.

A gonad is a body organ that produces the cells necessary for reproduction (the ovary in females, the testis in males). At approximately week 5 of intrauterine life, primitive gonadal tissue is already formed. In both sexes, two undifferentiated ducts, the mesonephric (wolffian) and paramesonephric (müllerian) ducts, are present. By week 7 or 8, in chromosomal males, this early gonadal tissue differentiates into primitive testes and begins formation of testosterone. Under the influence of testosterone, the mesonephric duct begins to develop into the male reproductive organs, and the paramesonephric duct regresses. If testosterone is not present by week 10, the gonadal tissue differentiates into ovaries, and the paramesonephric duct develops into female reproductive organs. All of the oocytes (cells that will develop into eggs throughout the woman's mature years) are already formed in ovaries at this stage.

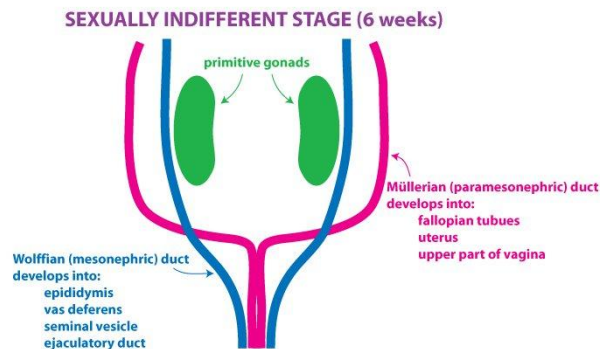


Figure (1) Intrauterine sexual Development

At about week 12, the external genitals develop. In males, under the influence of testosterone, penile tissue elongates and the urogenital fold on the ventral surface of the penis closes to form the urethra; in females, with no testosterone present, the urogenital fold remains open to form the labia minora; what would be formed as scrotal tissue in the male become the labia majora in the female. If, for some reason, testosterone secretion is halted in utero, a chromosomal male could be born with female-appearing genitalia.

Pubertal Development

Puberty is the stage of life at which secondary sex changes begin. These changes are stimulated when the hypothalamus synthesizes and releases gonadotropin-releasing hormone (GnRH), which in turn triggers the anterior pituitary to begin the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH). FSH and LH initiate the production of androgen and estrogen, which in turn initiate secondary sex characteristics, the visible signs of maturity. Girls are beginning dramatic development and maturation of reproductive organs at earlier ages than ever before (9 to 12 years). The phenomenon of why puberty occurs is even less well understood in boys.

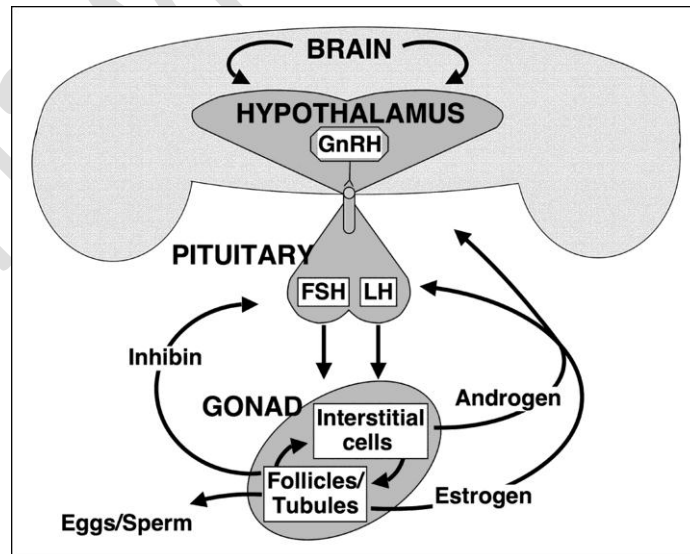


Figure (2) Pubertal Development

Role of Androgen

Androgenic hormones are the hormones responsible for muscular development, physical growth, and the increase in sebaceous gland secretions that causes typical acne in both boys and girls. In males, androgenic hormones are produced by the adrenal cortex and the testes; in females, by the adrenal cortex and the ovaries. The level of the primary androgenic hormone, testosterone, is low in males until puberty (approximately age 12 to 14 years). At that time, testosterone levels rise to influence the further development of the testes, scrotum, penis, prostate, and seminal vesicles; the appearance of male pubic, axillary, and facial hair; laryngeal enlargement and its accompanying voice change; maturation of spermatozoa; and closure of growth in long bones. In girls, testosterone influences enlargement of the labia majora and clitoris and formation of axillary and pubic hair. This development of pubic and axillary hair because of androgen stimulation is termed adrenarche.

Role of Estrogen

When triggered at puberty by FSH, ovarian follicles in females begin to excrete a high level of the hormone estrogen. This hormone is actually not one substance but three compounds (estrone [E1], estradiol [E2], and estriol [E3]). It can be considered a single substance, however, in terms of action. The increase in estrogen levels in the female at puberty influences the development of the uterus, fallopian tubes, and vagina; typical female fat distribution and hair patterns; breast development; and an end to growth because it closes the epiphyses of long bones. The beginning of breast development is termed thelarche.

Secondary Sex Characteristics in Girls:

1. Growth spurt
2. Increase in the transverse diameter of the pelvis
3. Breast development

4. Growth of pubic hair
5. Onset of menstruation
6. Growth of axillary hair
7. Vaginal secretions

Secondary Sex Characteristics in Boys:

1. Increase in weight
2. Growth of testes
3. Growth of face, axillary, and pubic hair
4. Voice changes
5. Penile growth
6. Increase in height
7. Spermatogenesis (production of sperm)

Reproductive System

Human reproduction is a complex and fascinating process .The male and female reproductive system functioning together produce a new life.

Female Reproductive System

External Genitalia:

1. Vulva

The female external reproductive organs consist of the mons pubic, which is covered with pubic hair; two folds of tissue, called the labia majora and labia minora , which surround a space called vestibule .

2. Mons Pubis

The mons pubis is formed at the upper margin of the symphysis pubis and is shaped like an inverted triangle. It is located over the two pubic bones of the pelvic. This structure is composed of fatty tissue lying beneath the skin and from puberty on, is covered with varying amount of hair. The mons pubis surrounds delicate tissue and protects it from injury.

3. Labia Majora and Labia Minora

The labia majora : are two folds of fatty tissue that form the lateral boundaries of the vulva. They are covered with coarse skin and pubic hair on the outer aspect and are smooth and moist on the inner aspect , where the openings of numerous small glands are found.

The labia minora :are soft folds of skin that are rich in sebaceous glands. The labia minora are moist and are composed of erectile tissue containing loose connective tissue , blood vessels, and involuntary muscles. The functions of the labia minora are to lubricant and waterproof the vulvar skin and to provide bactericidal secretion that help prevent infections.

4. Clitoris

The clitoris is a small, sensitive structure that, like the penis, is composed of erectile tissue, nerves, and blood vessels; it is covered at the tip with very sensitive tissue. It exists primarily for female sexual enjoyment.

5. Vaginal Vestibule

The vaginal vestibule is a boat shaped depression enclosed by the labia minora and is visible when the labia minora are separated. The vestibule contains the vaginal opening (introitus) , which is located between the external and internal genitalia. The vestibule contains the openings of five structures that drain into it the ureteral meatus, skene's ducts, and the ducts from Bartholin;s glands that are located on each side of the vagina. The vestibule ends with the formation of the fourchette.

6. Urethra

The opening to the urethra is just below the clitoris. Although it is not related to sex or reproduction, it is included in the vulva. The urethra is actually used for the passage of urine. The urethra is connected to the bladder. In females the urethra is 1.5 inches long, compared to males whose urethra is 8 inches long.

7. Hymen

The hymen is a thin, elastic, mucous membrane that partially covers the vagina in young females. Does not seem to have a specific physiological function or purpose. Many shapes are possible. Normal variations of the hymen range from thin and stretchy to thick and somewhat rigid; or it may also be completely absent

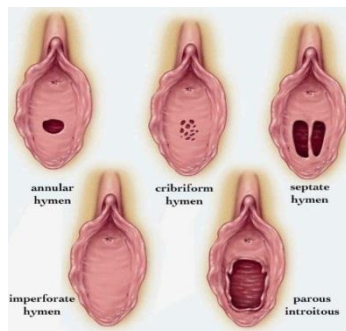


Figure (3) Types of hymen

8. Perineum

The perineum is the short stretch of skin starting at the bottom of the vulva and extending to the anus. It is a diamond shaped area between the symphysis pubis and the coccyx. This area forms the floor of the pelvis and contains the external sex organs and the anal opening. The perineum in some women may tear during the birth of an infant and this is apparently natural. Some physicians may cut the perineum preemptively on the grounds that the "tearing" may be more harmful than a precise cut by a scalpel. If a physician decides the cut is necessary, they will perform it. The cut is called an episiotomy.

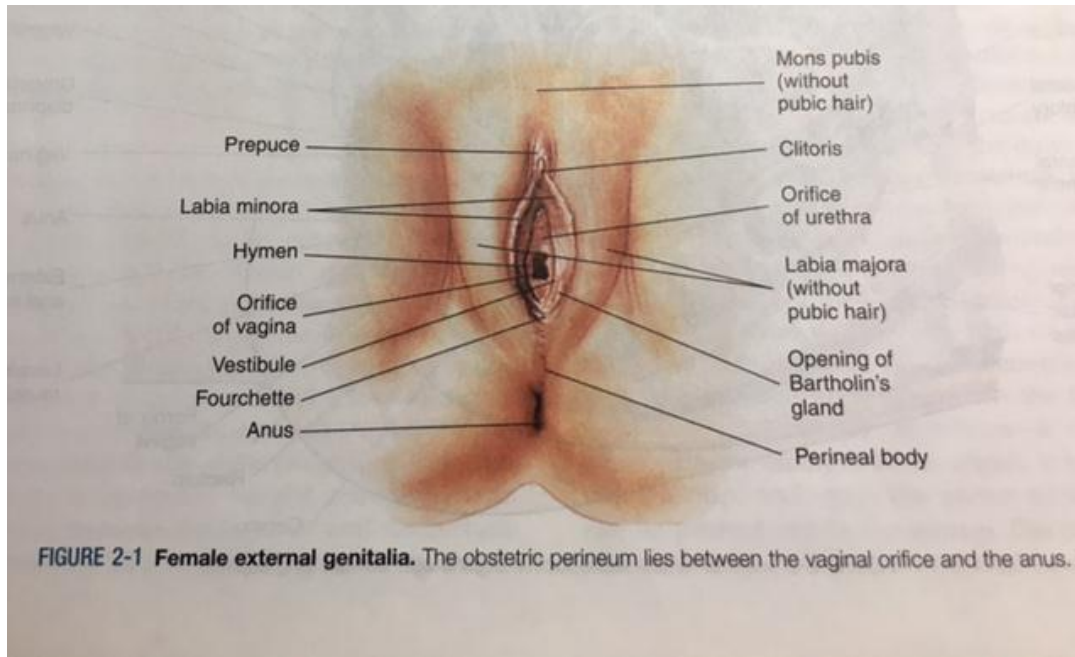


Figure (4) female external genitalia

Internal Reproductive Organs

1. Vagina

The vagina is a curved tube leading from the uterus to the external opening at the vestibule. It lies between the urinary bladder and the rectum. Because it meets at a right angle with the cervix, the interior wall is about 2.5cm(1inch) shorter than posterior wall, which varies from 7-10cm (approximately 2.8 to 4 inches).it consist of muscle and connective tissue and is lined with epithelial tissue , which contains folds called rugae. These folds allow the vagina to stretch considerably during childbirth. The epithelial cells lining the vagina show cyclic changes related to estrogens, progestins, and androgens. Doderlein's bacilli, which are normally present in the vagina, act on glycogen from the epithelial cells to produce lactic acid. This maintains the acidity of the vagina and is the reason that the vagina is resistant to most infection .a change in the PH of the vagina , which can be caused by frequent douching , antimicrobial therapy, or deodorant tampons, can increase the vagina's susceptibility to invading pathogens.

Purposes of the Vagina

- Receives a male's erect penis and semen during sexual intercourse.
- Pathway through a woman's body for the baby to take during childbirth.
- Provides the route for the menstrual blood (menses) from the uterus, to leave the body.
- May hold forms of birth control, such as a diaphragm or female condom.

2. Cervix

The cervix consists of a cervical canal with an internal opening near the uterine corpus called the internal os and an opening into the vagina called external os. The mucosal lining of the cervix has four functions:

1. Providing lubrication for the vagina
2. Acting as bacteriostatic agent
3. Providing an alkaline environment to shelter the sperm from the acidic vagina
4. Producing a mucous plug in the cervical canal during pregnancy

3. Uterus

The uterus (womb) is a hollow, pear-shaped, muscular organ. It is approximately 2.5 cm (1 inch) thick, 5cm (2inch) wide, and 7.5cm (3inch) long. During pregnancy, the uterus can stretch and enlarge considerably. The weight of the non-pregnant uterus is approximately 75g ; it increases to approximately 907 g during pregnancy, the uterus increases in vascularity , which allows sufficient blood supply for its growth , and can stretch and enlarge to a considerable size . After pregnancy, it returns almost entirely to its former weight, size, and shape. The uterus lies between the bladder and the rectum. It is supported by two important pairs of ligaments, the round and broad ligaments. The uterus is divided into three parts : fundus (upper portion) , the corpus (body), the cervix . The uterus has three layers (perimetrium , myometrium , endometrium).

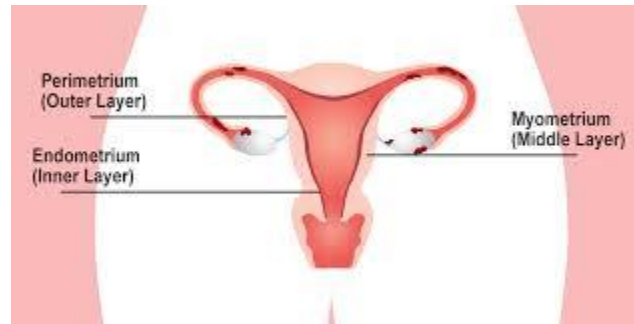


Figure (5) layers of the uterus

The following three functions of the uterus:

1. Menstruation: the uterus sloughs off of the endometrium or lining of the uterus.
2. Pregnancy: the uterus supports the fetus and allows fetus to grow.
3. Labor and birth: the uterine muscle contract and the cervix dilates during labor to expel the fetus

4. Fallopian Tube

The fallopian tubes extend laterally from the uterus, one to each ovary. They are small, narrow and approximately 10cm (4inch) long. The tubes carry the ovum from the ovary to the uterus by the contraction of the cilia: hair like projections found in the lining of the tubes. Extending from the ends of the fallopian tubes are small, fingerlike projection called fimbriae. Their movement sweeps the ovum in to the tube, after which the ovum travels to the uterus. It takes approximately 5 days for the ovum to travel the 10cm from the ovary to the uterus. Fertilization of the ovum with sperm normally takes place in the outer third of the fallopian tube.

The four functions of the fallopian tube:

1. A passageway in which sperm meet the ovum
2. A site of fertilization
3. A safe nourishing environment for the ovum or zygote (fertilized ovum)
4. A means of transport ting the ovum or zygotes to the corpus of the uterus

5. Ovaries

The ovaries in the female and the testes in the male are similar in embryologic origin. The ovaries are two small, almond shaped organs located on each gland. Approximately 2 million ova are present at birth. Many ova degenerate until puberty, when a few thousand remain. During the course of a women's reproductive life, only about 400 ova mature enough to be fertilized. During each menstrual cycle one follicle matures into what is called a graafin follicle, which contains the ovum that is released each month during ovulation. Estrogen released by the ovary stimulates the development of secondary sexual characteristics such as the breasts. Progesterone is responsible for preparing and maintaining the lining of the uterus for implantation of the ovum.

The ovaries have two functions:

1. The development and maturation of and later expulsion of the ovum (ovulation)
2. The secretion of hormones (estrogen & progesterone)

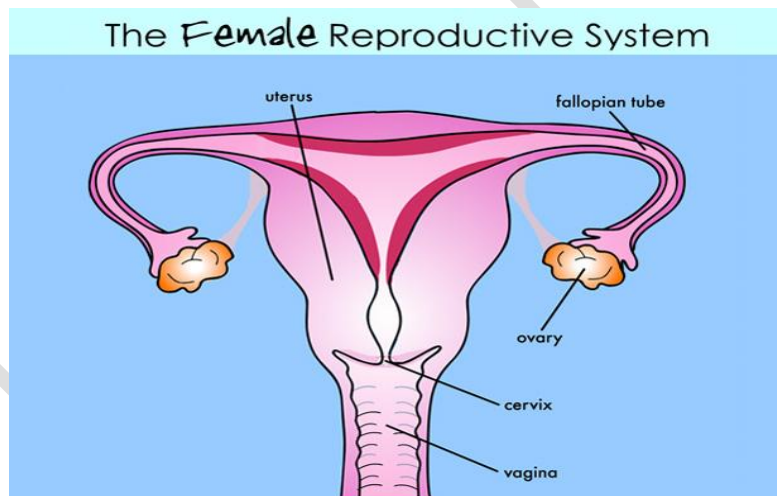


Figure (6) female internal reproductive organs

The Normal Menstrual Cycle

A menstrual cycle (a female reproductive cycle) is episodic uterine bleeding in response to cyclic hormonal changes. The purpose of a menstrual cycle is to bring an ovum to maturity and renew a uterine tissue bed that will be responsible for the ova's growth should it be fertilized. It is the process that allows for conception

and implantation of a new life. Because menarche may occur as early as 9 years of age, it is good to include health teaching information on menstruation to both school age children and their parents as early as fourth grade as part of routine care. It is a poor introduction to sexuality and womanhood for a girl to begin menstruation unwarned and unprepared for the important internal function it represents. The length of menstrual cycles differs from woman to woman, but the average length is 28 days (from the beginning of one menstrual flow to the beginning of the next). It is not unusual for cycles to be as short as 23 days or as long as 35 days. The length of the average menstrual flow (termed menses) is 4 to 6 days, although women may have periods as short as 2 days or as long as 7 days (MacKay, 2009). Because there is such variation in length, frequency, and amount of menstrual flow and such variation in the onset of menarche, many women have questions about what is considered normal. Contact with health care personnel during a yearly health examination or prenatal visit may be their first opportunity to ask questions they have had for some time.

Physiology of Menstruation

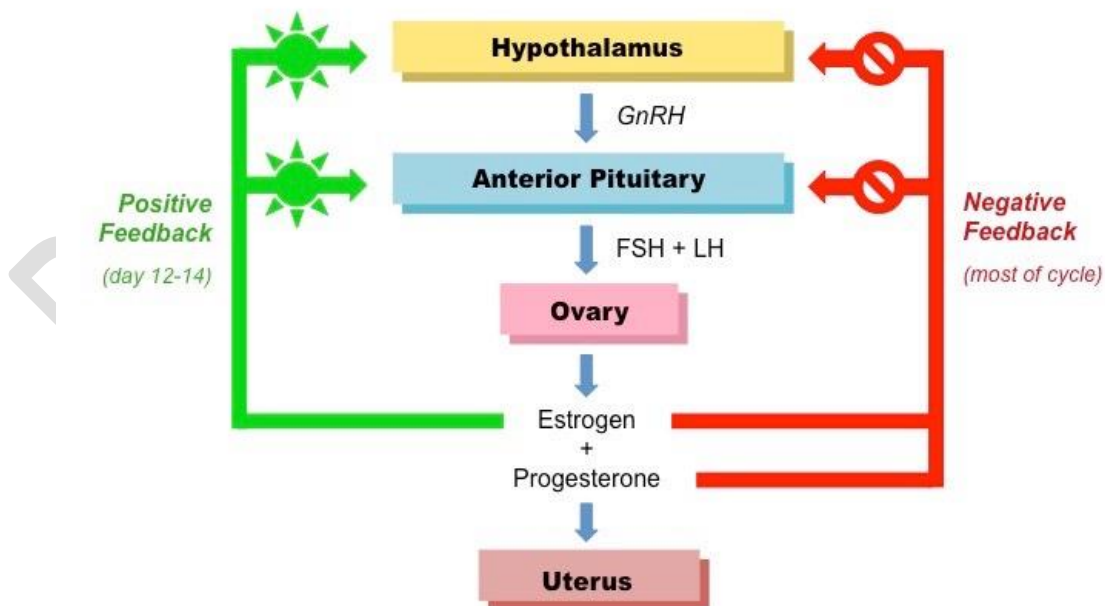


Figure (7) Physiology of Menstruation

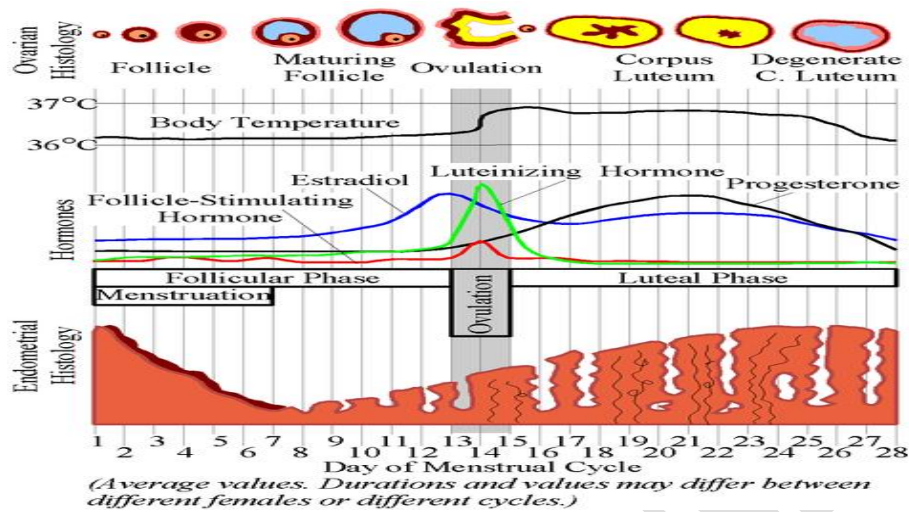


Figure (8) menstrual cycle

Breasts

The breast is composed of glandular, ductal, connective, and adipose tissue. Embedded in the fibrous tissue are fat and lobules which make up the mammary glands, accessories to reproduction in women, but rudimentary and functionless in men. In men, little fat is present in the breast, and the glandular system normally does not develop. In women, the breasts are the most prominent superficial structure on the anterior thoracic wall, and the amount of fat in the glandular tissue determines the size of the breasts. A small part of the mammary gland often extends into the axilla, forming the axillary tail of Spence.

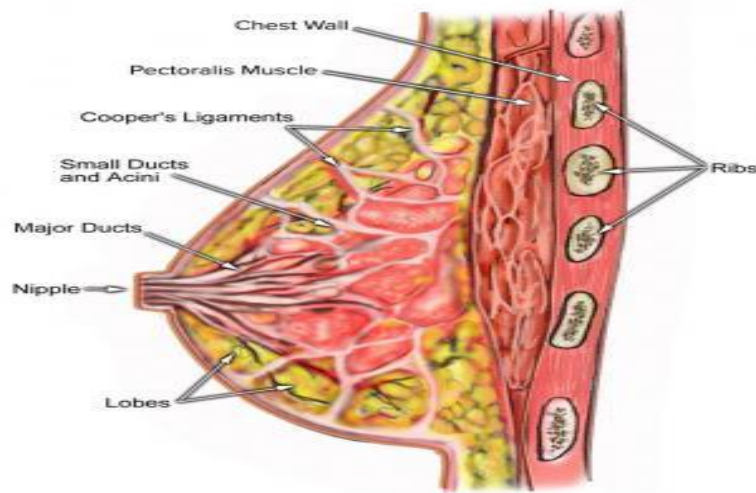


Figure (9) female breast

The mammary glands are modified sweat glands and are composed of 15-20 lobules, each drained by a lactiferous duct. Each lactiferous duct independently drains on the nipple and is preceded by a small dilated portion known as the lactiferous sinus. It is in the sinus that milk collects during nursing and is "let down" by the suckling action of the infant the process is called lactation the nipple in the center of breasts is surrounding by pigmented areola, which darkens during pregnancy . Each breast consists of 10-20 lobes each lobe divided in to 20-40 lobules each lobule divided into 20-80 alveoli.

During pregnancy high level of estrogen and progesterone produced by the placenta inhibit milk secretion after the expulsion of the placenta there is abrupt change in estrogen and progesterone levels. This allows a hormone called prolactin to be released from the anterior pituitary gland when the infant sucks. Prolactin stimulate produce the milk infant sucking also stimulate releasing oxytocin hormone from the posterior pituitary gland that causes eject the milk from the alveoli in to the ductal system. The size of breast depends on the amount of fatty tissue in the breast.

Pelvis

The composition of hip bone

The hip bone is made up of the three parts – the ilium, pubis and ischium. The superior part of the hip bone is formed by the ilium, the widest and largest of the three parts. The pubis is the most anterior portion of the hip bone. The posteroinferior part of the hip bone is formed by the ischium. The pelvic cavity is divided into sections, the false and true pelvis, the two ilia form the upper part of the pelvic known as the false pelvis. The ischial spines sharp projections that form the posterior border of the ischium are important landmarks and represent the shortest distance of the pelvic cavity. The true pelvis (lower part) consist of inlet, pelvic cavity and outlet and is most important during birth.

Pelvic measurements

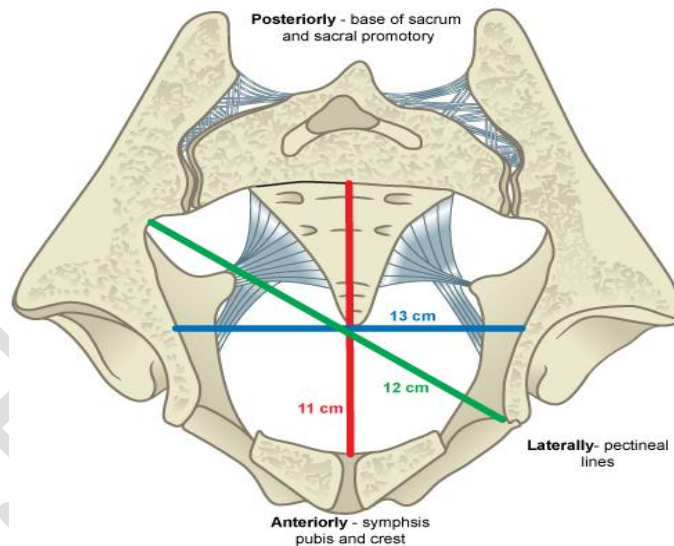


Figure (10) measurement of the pelvis

Types of the pelvic

The pelvic is divided into four types:

1. Gynaecoid (50%) : normal female –type pelvic which is round
2. Anthropoid (20%) : which has a long anteroposterior outlet
3. Android (20%) : male –type pelvic which has heart shaped outlet
4. Platypelloid (5%): which has a wide transvers outlet and not favorable to a vaginal delivery.

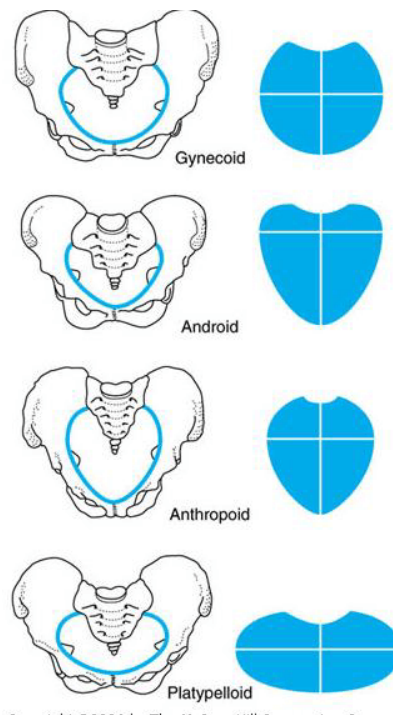


Figure (11) types of the pelvic

Male reproductive system

External male Genitalia

1. Penis

The penis is the male organ for sexual intercourse. It has three parts: the root, which attaches to the wall of the abdomen; the body, or shaft; and the glans, which is the cone-shaped end of the penis. The glans, which also is called the head of the penis, is covered with a loose layer of skin called foreskin. (This skin is

sometimes removed in a procedure called circumcision.) The opening of the urethra, the tube that transports semen and urine, is at the tip of the glans penis. The penis also contains a number of sensitive nerve endings. The body of the penis is cylindrical in shape and consists of three internal chambers. These chambers are made up of special, sponge-like erectile tissue. This tissue contains thousands of large spaces that fill with blood when the man is sexually aroused. As the penis fills with blood, it becomes rigid and erect, which allows for penetration during sexual intercourse. The skin of the penis is loose and elastic to allow for changes in penis size during an erection.

2.Semen

Semen is a fluid which contains sperm, is expelled (ejaculated) through the end of the penis when the man reaches sexual climax (orgasm). When the penis is erect, the flow of urine is blocked from the urethra, allowing only semen to be ejaculated at orgasm.

3.Scrotum

The scrotum is the loose pouch-like sac of skin that hangs behind the penis. It contains the testicles (also called testes), as well as many nerves and blood vessels. The scrotum has a protective function and acts as a climate control system for the testes. For normal sperm development, the testes must be at a temperature slightly cooler than the body temperature. Special muscles in the wall of the scrotum allow it to contract (tighten) and relax, moving the testicles closer to the body for warmth and protection or farther away from the body to cool the temperature.

4.Testicles (testes)

The testes are oval glands about the size of 5cm long and 2.5cm wide that lie in the scrotum, secured at either end by a structure called the spermatic cord. The testes are responsible for making testosterone, the primary male sex hormone, and for producing sperm. Within the testes are coiled masses of tubes called

seminiferous tubules. These tubules are responsible for producing the sperm cells through a process called spermatogenesis.

The internal male reproductive organs (accessory organs)

1. Epididymis

The epididymis is a long, coiled tube that rests on the backside of each testicle. It functions in the carrying and storage of the sperm cells that are produced in the testes. It also is the job of the epididymis to bring the sperm to maturity, since the sperm that emerge from the testes are immature and incapable of fertilization. During sexual arousal, contractions force the sperm into the vas deferens.

3. Vas deferens

The vas deferens is a tube 45cm long, that travels from the epididymis into the pelvic cavity, to just behind the bladder. The vas deferens transports mature sperm to the urethra in preparation for ejaculation.

4. Ejaculatory ducts

These are formed by the fusion of the vas deferens and the seminal vesicles. The ejaculatory ducts empty into the urethra.

5. Urethra

The urethra is the tube that carries urine from the bladder to outside of the body. In males, it has the additional function of expelling (ejaculating) semen when the man reaches orgasm. When the penis is erect during sex, the flow of urine is blocked from the urethra, allowing only semen to be ejaculated at orgasm.

6. Seminal vesicles

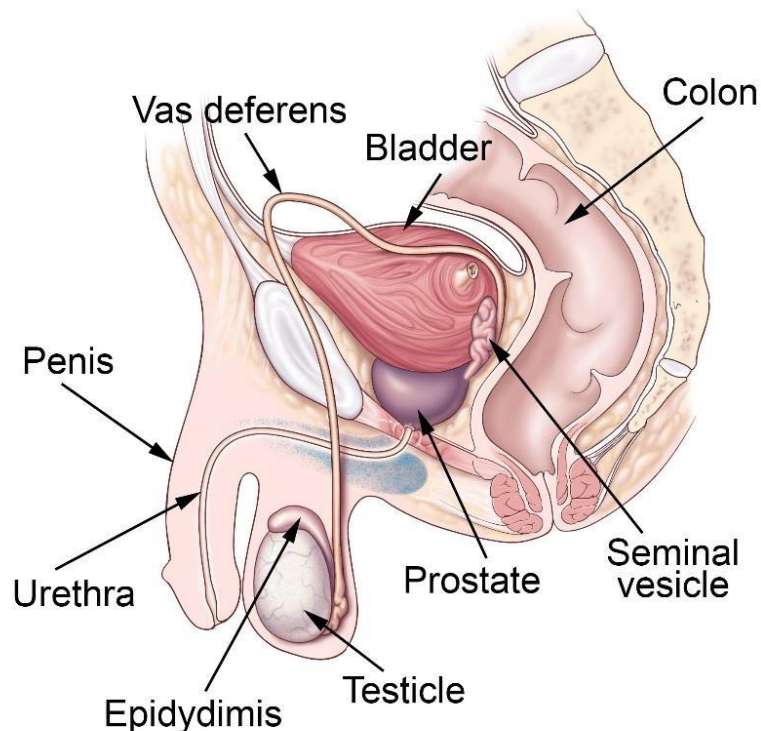
The seminal vesicles are sac-like pouches that attach to the vas deferens near the base of the bladder. The seminal vesicles produce a sugar-rich fluid (fructose) that provides sperm with a source of energy and helps with the sperms' motility (ability to move). The fluid of the seminal vesicles makes up most of the volume of a man's ejaculatory fluid, or ejaculate.

7. Prostate gland

The prostate gland is a walnut-sized structure that is located below the urinary bladder in front of the rectum. The prostate gland contributes additional fluid to the ejaculate. Prostate fluids also help to nourish the sperm. The urethra, which carries the ejaculate to be expelled during orgasm, runs through the center of the prostate gland.

8. Bulbourethral glands

The bulbourethral glands, or Cowper's glands, are pea-sized structures located on the sides of the urethra just below the prostate gland. These glands produce a clear, slippery fluid that empties directly into the urethra. This fluid serves to lubricate the urethra and to neutralize any acidity that may be present due to residual drops of urine in the urethra.



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Figure (12) male reproductive system

Endocrine system and male reproduction

The entire male reproductive system is dependent on hormones, which are chemicals that stimulate or regulate the activity of cells or organs. The primary hormones involved in the functioning of the male reproductive system are follicle-stimulating hormone (FSH), luteinizing hormone (LH) and testosterone.

FSH and LH are produced by the pituitary gland located at the base of the brain. FSH is necessary for sperm production (spermatogenesis), and LH stimulates the production of testosterone, which is necessary to continue the process of spermatogenesis. Testosterone also is important in the development of male characteristics, including muscle mass and strength, fat distribution, bone mass and sex drive.

Spermatogenesis

It is the formation of sperm process begins at puberty and continues during the male's life. A sperm's fertile life is 5 days after ejaculation. Sperm are much smaller than ova. Sperm cells resemble tadpoles in shape with oval heads and long tails. During each ejaculation approximately 300 million sperm are deposited in to the vagina .only few reach the ova and just one sperm penetrates and fertilizes the ovum.

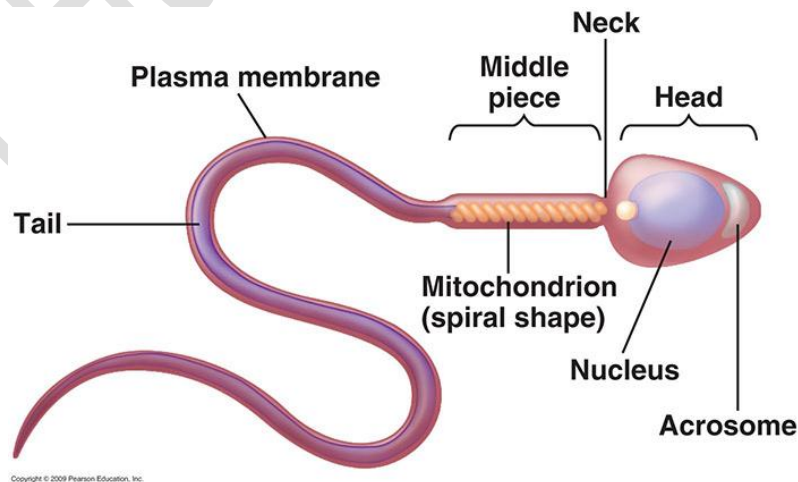


Figure (13) the sperm

Nursing Process Overview for the Promotion of Reproductive and Sexual Health

Assessment

Problems of sexuality or reproductive health may not be evident on first meeting a client, because it may be difficult for a person to bring up the topic until he or she feels more secure. This makes good follow-through and planning important, because a person may find the courage to discuss a problem once but then be unable to do so again. Assessing sexuality may not be appropriate as a routine part of every health assessment. However, it should be included when appropriate, such as when discussing adolescent development or before providing reproductive life planning information, during pregnancy, and after childbirth. Assessment in the area of reproductive health begins with interviewing to determine what a client knows about the reproductive process and STIs. Any concerns they might have about their own reproductive functioning or safer sex practices should be explored. It is important to include in a physical examination observation for normal distribution of body hair such as triangle-shaped pubic hair in women and diamond-shaped pubic hair in men, for normal genital and breast development, and for signs and symptoms of STIs. Many STIs are asymptomatic, so it is important to assess whether the client is at risk for contracting an STI.

Nursing Diagnosis

Common nursing diagnoses used in regard to reproductive health include:

- Health-seeking behaviors related to reproductive functioning
 - Anxiety related to inability to conceive after 6 months without birth control
 - Pain related to uterine cramping from menstruation
 - Disturbance in body image related to early development of secondary sex characteristics
- Diagnoses relevant to sexuality could include:

- Sexual dysfunction related to as-yet-unknown cause
- Altered sexuality patterns related to chronic illness
- Self-esteem disturbance related to recent reproductive tract surgery
- Altered sexuality patterns related to fear of harming the fetus
- Anxiety related to fear of contracting an STI
- Health-seeking behavior related to learning responsible sexual practices

Outcome Identification and Planning

A major part of nursing care in this area is to empower clients to feel control over their bodies. Plan health teaching to provide clients with knowledge about their reproductive system and specific information about ways to alleviate discomfort or prevent reproductive disease. It may also be important to plan interventions to strengthen the person's gender identity or role behavior. It is essential to design care that demonstrates acceptance of all gender-related lifestyles equally.

Implementation

To help clients understand reproductive functioning and sexual health throughout their life, specific teaching might include:

- Encouraging women over 40 to have mammograms
- Explaining to a school-age boy that nocturnal emissions are normal
- Teaching an early adolescent what is normal and abnormal in relation to menstrual function
- Teaching a young adolescent safer sex practices
- Explaining reproductive physiology to a couple who wish to become pregnant

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