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FEMALE REPRODUCTIVE PHYSIOLOGY

 1)Briefly discuss the cyclic changes in any of the following;

* Cervix
* Vagina
* Breasts.

BREASTS

The breasts are specialized mammary organs. The primary function of the female breast is to produce milk for nutrition of the infant and baby. There are lots of glans in the breast which grows and develop during puberty and maturation. Lying in a superficial layer of the skin above the chest muscles, the mammary glands in the breast drain via many ducts to the nipples. The dark circular layer around the nipple is called the “areola”. Breast tissue is responsive to hormonal changes. Female hormones such as estrogen and progesterone are important in promoting growth and changes that occur in the breasts especially during pregnancy and the menstrual cycle.

EFFECTS OF ESTROGENS ON THE BREASTS

1. It causes the development of stromal tissues of the breasts.
2. It causes the growth of an extensive ductile system.
3. It causes the deposition of fat in the breasts.

The lobules and alveoli of the breast develop to a slight extent under the influence of estrogens.

EFFECTS OF PROGESTERONE ON THE BREASTS

Progesterone promotes the development of the lobules and alveoli of the breasts, causing the alveolar cells to proliferate, enlarge, and become secretory in nature. However, progesterone does not cause the alveoli to secrete milk; milk is only secreted after the prepared breasts is further stimulated by prolactin from the anterior pituitary gland.

Progesterone also causes the breasts to swell.

DEVELOPMENT OF THE BREAST

Breasts begin to form while the unborn baby is still growing in the mother’s uterus. This starts with a thickening in the chest area called the mammary ridge or milk line. By the time a baby girl is born, nipples and the beginning of the milk-duct system have formed.

Breast changes continue to happen over a woman’s life. The first thing to develop are the “lobes”, or small subdivision of breast tissue. Mammary glands develop next and consist of 15 to 24 lobes. Mammary glands are influenced by hormones activated at puberty. Shrinkage of the milk ducts is the final major change that happens in the breast tissue. The mammary glands slowly start to shrink. This often starts around age 35.

CYCLIC CHANGES IN THE BREASTS

Each month, women go through changes in the hormones that make up the normal menstrual cycle. The hormone estrogen is produced by the ovaries in the first half of the menstrual cycle. The increasing level of estrogen leads to ovulation halfway through the cycle. Next, the hormone progesterone takes over in the second half of the cycle. It stimulates the formation of the milk glands. These hormones are believed to be responsible for the cyclic changes in the breast during menstruation, these changes include;

\*swelling

\*pain

\*soreness

During menstruation, many women also have changes in breast texture. Their breasts may feel very lumpy. This is because the glands in the breast are enlarging to get ready for a possible pregnancy. If there is no pregnancy, the breasts go back to normal size. Once the menstruation starts, the cycle begins again.

VAGINA

The vagina is a muscular, hollow tube that extends from the vaginal opening to the cervix of the uterus. It is situated between the urinary bladder and the rectum. The muscular walls allow the vagina to expand and contract. The muscular walls are lined with mucous membranes, which keep it protected and moist. A thin sheet of tissue with one or more holes in it, called the hymen, partially covers the opening of the vagina. The vagina is made up of three layers, an inner mucosal layer, a middle muscularis layer, and an outer fibrous layer. The inner layer is made of vaginal rugae that stretch and allow penetration to occur. The outer mucosal layer is especially important with delivery of a fetus and placenta.

The vagina performs the following purposes;

1. It serves as a pathway through a woman’s body for the baby during childbirth.
2. It provides the route for the menstrual blood from the uterus to leave the body.
3. It may hold forms of birth control such as a diaphragm, FemCap, etc.

The vaginal changes that occur during menstrual cycle occurs during the proliferative phase and the secretory phase.

Proliferative phase; in this phase, the epithelial cells of vagina are cornified. Estrogen is responsible for this.

Secretory phase; vaginal epithelium proliferates due to the actions of progesterone. It is also infiltrated with leukocytes. These two changes increase the resistance of vagina for infection.

2) Explicate any one of the following;

-menstrual cycle

-hormonal regulation of the menstrual cycle.

HORMONAL REGULATION OF MENSTRUAL CYCLE

Menstrual cycle is divided as cyclic events that take place in rhythmic way during the reproductive period of a woman’s life. Menstrual cycle starts around the age of 12 to 15 years, which marks the onset of puberty. The commencement of menstrual cycle is called menarche. Permanent cessation of menstrual cycle in old age is called menopause.

REGULATION OF MENSTRUAL CYCLE

Regulation of menstrual cycle is a complex process that is carried out by the organized and coordinated functions of the hypothalamus, anterior pituitary, ovaries with its growing follicle and endometrium. (the growing follicle has a vital role to play).

The pulsatile secretion of gonadotrophin-releasing hormone from the hypothalamus stimulates the anterior pituitary to secrete follicle-stimulating hormone(FSH) and luteinizing hormone(LH), which in turn stimulates the development of ovarian follicles and the production of ovarian steroids. A negative feedback mechanism is crucial for its control and regulation.

Hormones involved in regulation

The regulatory system functions through the hormones of hypothalamo-pituitary-ovarian axis.

Hormones involved in the regulation of the menstrual cycle are;

1. Hypothalamic hormone: GnRH
2. Anterior pituitary hormone: FSH and LH
3. Ovarian hormones: estrogen and progesterone.

Hypothalamic hormone-GnRH

GnRH triggers the cyclic changes during menstrual cycle by stimulating secretion of FSH and LH from anterior pituitary. GnRH secretion depends on;

* External factors like psychosocial events, which act on hypothalamus via cortex and many other brain centers.
* Feedback effects of ovarian changes via ovarian hormones.

Anterior pituitary hormones-FSH and LH

FSH and LH modulate the ovarian and uterine changes by acting directly and/or indirectly via ovarian hormones.

FSH stimulates the recruitment and growth of immature ovarian follicles.

 LH triggers ovulation and sustains corpus luteum.

Secretion of FSH and LH is under the influence of GnRH.

Ovarian hormones-estrogen and progesterone

Estrogen and progesterone which are secreted by the follicle and corpus luteum, show many activities during the menstrual cycle. Ovarian follicles secrete large quantity of estrogen and corpus luteum secretes large quantity of progesterone.

Estrogen secretion reaches its peak twice in each cycle; once during follicular phase just before ovulation and the other one during the luteal phase.

REGULATION OF OVARIAN CHANGES

Follicular phase

During this phase, the recruited follicle prepares for ovulation.

1. The biological clock responsible to trigger the cyclic events is the pulsatile secretion of GnRH, at about every 2hours.
2. Pulsatile release of GnRH stimulates the secretion of FSH and LH from the anterior pituitary.
3. LH induces the synthesis of androgens from theca cells of growing follicle.
4. FSH promotes aromatase activity in granulosa cells of the follicle, resulting in the conversion of androgens into estrogen.
5. Estrogen is responsible for development and growth of graafian follicle. It also stimulates the secretory activities of theca cells.
6. Estrogen also exerts a double feeback control on GnRH
7. Estrogen also increases the number of FSH and LH receptors on the granulosa cells of follicles and increases the sensitivity of these cells for FSH and LH
8. LH helps to provide the final touches for the growth of graafian follicle. It stimulates the secretion of estrogen. At the same time, it stimulates the theca cells to secrete progesterone.

ovulation

LH is important for ovulation. Without LH, ovulation does not occur even with a large quantity of FSH. The need for excessive secretion of LH for ovulation is known as ovulatory surge for LH or luteal surge.

Luteal phase

Ovarian changes during luteal phase depend mainly on LH

ROLE OF LH (LUTEINIZING HORMONE)

* It induces development of corpus luteum from the follicle (devoid of ovum) by converting the granulosa cells into lutein cells.
* LH is necessary for the maintenance of corpus luteum.

ROLE OF FSH (FOLLICLE-STIMULATING HORMONE)

* It stimulates lutein cells to secrete inhibin, which in turn inhibits FSH secretion.
* It maintains the secretory activity of corpus luteum

EFFECTS OF CHANGE IN HORMONAL LEVELS IN CORPUS LUTEUM

If the ovum is not fertilized, some changes occur in the hormonal level and the ways in which it affects the corpus luteum are;

* In the absence of FSH and LH, the corpus luteum becomes inactive
* Absence of progesterone and estrogen induces the secretion of GnRH from hypothalamus.
* Progesterone and estrogen secreted from corpus luteum inhibit the secretion of FSH and LH from anterior pituitary by negative feedback mechanism.
* FSH and LH stimulate the new immature follicles, resulting in commencement of next cycle.

Note; the follicular and luteal phases correspond to the proliferative and secretory phases of the endometrium, which develops during the proliferative phase and is maintained during the secretory phase to prepare for implantation of the fertilized embryo.

REGULATION OF UTERINE CHANGES

Uterine changes during menstrual cycle are influenced by estrogen and progesterone. This changes occur in three stages namely;

* Proliferative phase
* Secretory phase
* Menstrual phase

In the proliferative phase; the repair of the damaged endometrium occurs mainly by estrogen. Estrogen also stimulates the proliferation of cells in endometrial stroma.

In the secretory phase; Progesterone and estrogen are responsible for endometrial changes in this phase. The structure, blood flow and secretory functions of uterus are influenced by the estrogen and progesterone.

In the menstrual phase; this phase occurs if pregnancy does not occur. The lack of ovarian hormones causes the release of gonadotropins from the anterior pituitary and it results in the onset of development of new follicles in the ovary and the cycle repeats.