## 1b). CYCLIC CHANGES IN THE BREAST

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. It stimulates the growth of milk ducts in the breasts. 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 cyclical changes that many women feel in their breasts just before menstruation. These include swelling, pain, and 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 pregnancy does not happen, the breasts go back to normal size. Once menstruation starts, the cycle begins again.

## 1c). CYCLIC CHANGES IN THE VAGINA

In the course of the reproductive cycle, the vaginal epithelium is subject to normal, cyclic changes, that are influenced by estrogen: with increasing circulating levels of the hormone, there is proliferation of epithelial cells along with an increase in the number of cell layers. As cells proliferate and mature, they undergo partial cornification. Although hormone induced changes occur in the other tissues and organs of the female reproductive system, the vaginal epithelium is more sensitive and its structure is an indicator of estrogen levels

During the luteal and follicular phases of the oestrous cycle the structure of the vaginal epithelium varies. The number of cell layers vary during the days of the oestrous cycle:

Day 10, 22 layers

Days 12-14, 46 layers

Day 19, 32 layers

Day 24, 24 layers

The glycogen levels in the cells is at its highest immediately before ovulation.

**PHASES OF THE VAGINAL CHANGES DURING MENSTRUAL CYCLE**

**Proliferative Phase**

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.

**2b). HORMONES INVOLVED IN REGULATION**

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

Hormones involved in the regulation of menstrual cycle are:

1. Hypothalamic hormone: GnRH

2. Anterior pituitary hormones: 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 upon two factors:

I. External factors like psychosocial events, which act on hypothalamus via cortex and many other brain centres

II. 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 follicle and corpus luteum, show many activities during menstrual cycle. Ovarian follicle secretes large quantity of estrogen and corpus luteum secretes large quantity of progesterone. Estrogen secretion reaches the peak twice in each cycle; once during follicular phase just before ovulation and another one during luteal phase. On the other hand, progesterone is virtually absent during follicular phase till prior to ovulation. But it plays a critical role during luteal phase. Estrogen is responsible for the growth of follicles. Both the steroids act together to produce the changes in uterus, cervix and vagina. Both the ovarian hormones are under the influence of GnRH, which acts via FSH and LH. In addition, the secretion of GnRH, FSH and LH is regulated by ovarian hormones.