

Physiological And Anatomical Changes During And After Pregnancy

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During the process of pregnancy, which is called gestation, the body goes through numerous physiological and anatomical changes to permit an appropriate environment for the development of the fetus. These changes occur early in the first trimester, usually peaking at the time of labour to cater to the increased level of metabolic needs and also to prepare a woman's body for childbirth (Heidemann and McClure, 2003). This essay addresses the salient anatomical and physiological changes of the mother and the fetus during the pregnancy at gross and histological levels, similarities and differences in Spermatogenesis and Oogenesis, and how hormones regulate the ovarian cycle.

Developmental Changes in Mother and the Developing Human

Developmental changes during the gestational period in the mother and fetus are discussed in reference to anatomical and physiological changes; the phenomenon is curated below:

Anatomical and Physiological Changes During Gestational Process

To accommodate the gestational process inside the womb, several anatomical changes occur in the pregnant mother for the growth of the fetus, which is attributed to the pregnancy hormones due to the enlarging uterus. First, physiological changes occur in the breasts and reproductive organs. Second, to meet the metabolic needs of the fetus, metabolic functions are increased to provide enough nutrients to the fetus. Third, the placenta secretes its hormones, which have different effects on the mother and on the developing human inside the womb (Bhatia and Chhabra, 2018). The changes include enlargement of the uterus along with an increase in the size of the breast, weight gain, change in position of the uterus, strengthening of the muscular wall, which makes it more elastic, and many other postural changes. At the beginning of the sixth week during pregnancy, softening of the cervical tip and thickening of the vaginal mucosa are also observed to prepare themselves for stretching during childbirth. The cardiac output of a pregnant woman increases from 30% to 50%, and all the body systems, such as cardiovascular, renal, respiratory, etc., adapt themselves to meet the fetal needs (Heidemann and McClure, 2003).

Stages of Physiological and Anatomical Changes

Physiological and anatomical changes that occur at the gross and histological levels include different stages listed below, as described by Bhatia and Chhabra (2018), in order to develop a new human being.

Fertilization

The process of fertilization occurs when the nuclei of the reproductive cells, such as an oocyte or an egg and a sperm, fuse with each other in the ampullary region of the uterine tube. Each cell from two homologous organs of both the human being is the haploid cell that contains half of the genetic material, and when combined, they form a diploid cell that collectively forms a human being. The new single cell produces a human being called a zygote, subsequently taking half of the genetic material from the father and half from the mother.

Embryonic Development

Embryo, a developing human, undergoes various anatomical and physiological changes at the histological level during the 9 weeks of fetus development. The period is marked by continued cell development, which leads to the development of the structure and functions of the embryo. Immature organ systems have developed, resulting in a newborn after the completion of the development stage of the fetus during the embryonic period (Heidemann and McClure, 2003). After embryonic development, the newborn survives outside the mother's womb but is still immature in various structural and functional developmental stages.

Birth

The physiological changes in the maternal organism involve the ripening and shortening of the cervix, which the female genital tract adapts to deliver the baby, and later, it recovers itself for the next pregnancy. A segment is made in the lower uterine cavity to allow the baby to fit into the maternal pelvis in a proper manner and also prepare the house for the born-to-be baby's head. To increase the ability to contract during labour, myometrium sensitivity is also increased to hormonal stimuli that begin enough uterine contractions for the mother's body to expel the baby out of the pelvis (Heidemann and McClure, 2003).

Postpartum Period

The postpartum physiological and anatomical changes are basically attributed to returning of the mother's body to the pre-pregnant state after the delivery of the conceptus (the embryo in the

uterus). These changes are frequently normal, but some women may develop complications such as engorged breasts and postpartum infections that sometimes lead to severe bleeding (Bhatia and Chhabra, 2018).

Hormonal Changes

Hormonal changes during pregnancy and post-partum involve:

Regulation of Ovarian Cycle

The ovarian cycle is responsible for regulating a woman's fertility through a hormone called Gonadotropin-releasing Hormone (GnRH) that is secreted by the hypothalamus. During and after pregnancy, the GnRH hormone plays a key role in maintaining the lining of the uterus while triggering significant changes in the pregnant mother and the fetus (Findlay et al., 2007). These hormones also determine the timing of the birth during pregnancy and prevent menstruation post-partum.

Uterus Development

During the gestation period, the uterus of the pregnant mother grows exponentially, even out of the maternal pelvis, due to certain hormone secretions. During the first week, the uterus gradually softens, and by the 14th week of gestation, the organ becomes obsolete spheroid and is flattened to allow the maternal pelvis to expel the baby. After birth, the uterus goes back to its normal position inside the pelvis, and the process of returning the organ to its original shape takes around 6 weeks postpartum, which is known as involution (Findlay et al., 2007).

Childbirth

Postpartum involves different hormonal changes after childbirth, such as the Prolactin hormone remaining in the body during pregnancy, and as long as the mother breastfeeds the child after that, it has no functioning in the maternal body. It stimulates milk production in the pregnant mother and after childbirth for approximately two years, influencing the immune system, behaviour, fluid regulation, metabolism, and water retention in the maternal body during and after pregnancy (Findlay et al., 2007).

Oogenesis vs. Spermatogenesis

Oogenesis and Spermatogenesis are the processes where male and female gametes are formed through the fertilization of ova and sperm, leading to the zygote formation, which further develops into an embryo. Spermatogenesis is the process in which a haploid sperm is formed from the stem of

a diploid cell inside the seminiferous tubules that are present in the testis. The process is called Spermatogonium. On the other hand, oogenesis helps in the formation of the ovum in the ovaries of the female. In a nutshell, spermatogenesis is the process that takes about 70 days and leads to the formation of sperm, whereas oogenesis is all about the formation of the ovum.

In conclusion, the female reproductive system during and after the gestational period experiences many developmental changes, including physiological and anatomical changes from the fertilization process of conception to birth. However, these changes are normal and the same for every woman going through the phases of conception to labour to provide a suitable environment for the fetus's development.

References

- Bhatia, P., & Chhabra, S. (2018). Physiological and anatomical changes of pregnancy: Implications for anesthesia. *Indian journal of anesthesia*, 62(9), 651.
- Heidemann, B. H., & McClure, J. H. (2003). Changes in maternal physiology during pregnancy. *BJA CEPD Reviews*, 3(3), 65-68.
- Findlay, J. K., Gear, M. L., Illingworth, P. J., Junk, S. M., Kay, G., Mackerras, A. H., ... & Wilton, L. (2007). Human embryo: a biological definition. *Human Reproduction*, 22(4), 905-911.