

PHYSIOLOGY OF REPRODUCTIVE TISSUE AND REPRODUCTION AS PER  
AYURVEDA: A REVIEW

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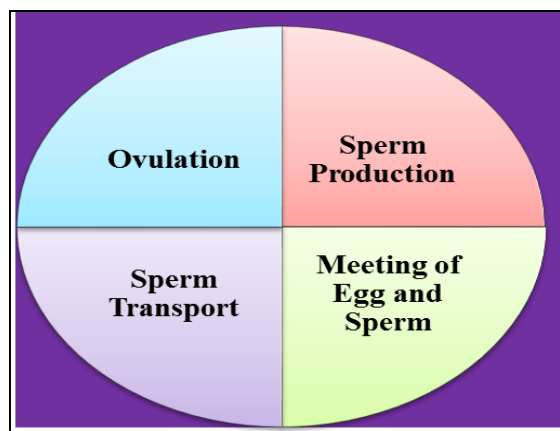
ABSTRACT

The physiology of reproduction and fertilization involves many processes in which reproductive organs play main role. The physiological understating of working of these organs is very important to counteract health issues related to these processes. Both male and female organs involve in the process of reproduction. Artava, Ritu Kala, Shukra, Beejshuddhi, Garbhashaya Srotas and Garbhadhana, etc. Are important aspects associated with the physiology of reproduction. Similarly ovulation, sperm production, sperm transport, meeting of egg and sperm, fusion of genetic material and zygote formation, etc. Are major steps involve in physiological process of reproduction and fertilization. This article highlighted some key aspects of physiology of reproductive tissue and reproduction as per Ayurveda and modern science.

**KEYWORDS:** Ayurveda, Artava, Shukra, Sharirkriya, Reproduction.

INTRODUCTION

In Ayurveda, the process of conception and fertilization is mainly associated with *Doshas* and *Dhatus* as well as *Prakriti* of individual. The entire process of reproduction and fertilization requires balances of *Doshas*, purity of reproductive elements and nourishment of reproductive tissue.<sup>[1-3]</sup> The major process associated with male and female reproductive organs involved in reproduction is depicted in **Figure 1**.



**Figure 1: Process associated with reproductive organs involved in fertilization process.**

Sperm production in males takes places through the spermatozoa in the testes. These sperm further transport as resultant of ejaculation during sexual intercourse, in the vagina. Sperm travel through the cervix and into the uterus, ultimately reaching the fallopian tubes, where the sperm encounters the egg. The sperm must penetrate the protective layers around the egg for fertilization to take place. Once a sperm successfully penetrates the egg, the genetic material (chromosomes) from the sperm fuses with the genetic material of the egg. This fusion results in the formation of a single-cell structure called a zygote. This is considered as initiation of stage of embryo generation. Over subsequent weeks, the embryo undergoes further development, with the formation of tissues, organs, and the establishment of basic body structures.<sup>[4-7]</sup>

**Hormonal regulation**

Hypothalamus secretes Gonadotropin-Releasing Hormone, which is carried by the hypothalamo-hypophysial portal system to the anterior pituitary. In response to GnRH, the anterior pituitary releases Follicle-Stimulating Hormone and Luteinizing Hormone into the bloodstream. These hormones circulate throughout the body, stimulating the ovaries and testicles to produce their own hormones.<sup>[3,4]</sup>

The various steps associated with the process of reproduction and fertilization involves different aspects as follows

- **Artava and Ritu kala:** The menstrual cycle is viewed as a reflection of *Ritu Kala* and release of an egg or known as *Artava*, which signifies a phase conducive to conception.
- **Shukra production:** The production of *Shukra* represents sperm formation, requiring for the process of fertilization.
- **Garbhashaya srotas:** The reproductive channels (*Garbhashaya Srotas*) are considered pathways for the transport of reproductive cells.
- **Beej and Artava:** The meeting of *Beej* and *Artava* governed by the balance of *Doshas* and other reproductive elements.
- **Garbhadhana:** The successful fusion of genetic material is regarded as the commencement of the *Garbhadhana* process, where a zygote is formed. The embryo travels through *Garbhashaya Srotas*, culminating in *Garbhashaya Bhava*, the development within the womb take places. According to Ayurveda the transformation of *Panchamahabhutas* is considered as an integral component for embryonic development.<sup>[5-8]</sup>

### Physiology of female reproductive organs

The female reproductive system encompasses organs; ovaries, uterine tubes, uterus, vagina and vulva, etc. Ovaries serve as paired glands, generate gametes and produce hormones such as progesterone and estrogens, etc. Uterine tubes comprise three layers: mucosa, muscularis and serosa. The mucosa facilitating the movement of fertilized ovum towards the uterus, secrete nourishing fluid for the ovum. The muscularis facilitate peristaltic contractions to propel fertilized ovum towards the uterus. The outer serosa, acts as layer or membrane that hold and protect inner content.

The uterus functions as a pathway for sperm to reach the uterine tubes, also serve as site for implantation and fetal development, etc. The mucosa of the cervix secretes cervical mucus, comprising enzymes, salts and water, etc. The cervical mucus is more conducive to sperm thus facilitate process of fertilization and meeting of sperm and ovum. The vagina serves as the receptacle for the penis during sexual intercourse and functions as a passage for childbirth.

### Physiology

Menstruation is one of the important aspects related to the physiology of female reproductive system. Menstrual blood described as *Raja* that derives from *Rasa*. In Ayurveda *Artava* can be correlated to the menstrual fluid or female reproductive fluid that is responsible for embryo production. *Artava* or ovum enters the uterus and vagina and this process is governed by *Vata*.

Ovulation is primary step of fertilization and reproduction process. In females, the menstrual cycle

involves the release of an egg from one of the ovaries. Ovulation typically occurs about midway through the menstrual cycle. For conception to occur, sexual intercourse must take place during the woman's fertile window, which includes the days leading up to ovulation and the day of ovulation itself.

The ovum transportation and menstrual discharge also play key role in the process of reproduction and fertilization. The process involves the movement of the ovum through the fallopian tube into the uterus.

The formation of breast milk is facilitated by *Rasa Dhatu*, the release of oxytocin causes the contraction of epithelial cells, resulting in a squeezing effect that allows milk to flow. Oxytocin stored in the posterior pituitary by the hypothalamus and helps in the formation and secretion of milk.<sup>[1-4,6,7]</sup>

### Physiology of male reproductive organs

*Sukravaha Srotas* involving circulatory roots and channels associated with testicles and penis. Testicles are responsible for hormone testosterone and also serve as the sites for spermatogenesis. The penis functions as the male copulatory organ, facilitating the deposition of seminal fluid into the female reproductive tract. The *Sukra* play key role in the formation of embryo, *Sukra* is distributed throughout the body, the fatty portion of *Majja* forms *Sukra*, created by the *Vayu* and *Akasa Mahabhitas*. Similarly semen is involved in the process of fertilization possessing *Snigdha Guna*, dense, non-irritating and slimy characteristics.

Ejaculation is one of the major processes associated with reproduction and mainly possesses involvement of male sexual organs. Sexual excitement leads to the release of *Sukra* through the urethra during ejaculation. This process is resultant of the heat generated during copulation. Ejaculation is dependent on sympathetic stimulation, specifically by *Apana Vata*.<sup>[3,8-10]</sup>

### CONCLUSION

Reproduction and fertilization involve complex physiological processes, wherein reproductive organs play a crucial role. Both male and female reproductive organs contribute to the overall process, encompassing aspects such as *Artava*, *Ritu Kala*, *Shukra*, *Beejshuddhi*, *Garbhashaya Srotas* and *Garbhadhana*. The physiological journey of reproduction includes significant steps like ovulation, sperm production, sperm transport, the meeting of egg and sperm, fusion of genetic material, and zygote formation. In males, sperm production occurs within the testes through the generation of spermatozoa. These sperm are subsequently transported through ejaculation during sexual intercourse, entering the vagina. The journey continues as sperm travel through the cervix, uterus, and eventually reach the fallopian tubes, where they encounter the egg and this way process of fertilization get completed.

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