



SHUKRA DHATU OF AYURVEDA AND ITS AFFILIATES IN MODERN PERSPECTIVE: A REVIEW

Rakesh Roushan*, Mula Ram Suthar

Dept of Kriya Sharir, Ch. Brahm Prakash Ayurved Charak Sansthan, New Delhi, India

*Corresponding author: rakesh3151@gmail.com

ABSTRACT

Ayurveda has described three basic physiological constituents of human body, viz., *dosha*, *dhatu* and *mala*. Human physique is made up of seven *dhatu*s (seven categories of tissues). *Shukra* is the seventh and last (ending) *Dhatu* in the *Dhatu*s formation cycle. *Shukra* is white, pure, exquisite *Dhatu*, which is considered as best among all seven *Dhatu*s. Sperm along with spermatid fluid and male sex hormones are also one part of *Shukra dhatu*. *Anu Shukra dhatu* (primordial germ cell) essential for the *Shukra dhatu* (Testosterone, Estrogen). It takes about one month to synthesize *shukra dhatu* from *rasa dhatu*. *Acharya Charaka* classified *Shukra* under *pitruja bhava*. *Acharya Vagbhata* has considered *Shukra* as *ashraya sthan* of *kapha dosha*. The quantity of *Shukra dhatu* is half *Anjali* in our body. In this article we are intended to make a correlation of *shukra dhatu* with modern prospective to have a clearer view about the *shukradhatu*. For which the basic materials have been collected from the ayurvedic classics with the available commentaries, as well as text books of contemporary modern medical science have been referred for better understanding of the concept and its comparison with contemporary science.

Keywords: Estrogen, *Shukra dhatu*, Spermatogenesis, *Stree Shukra*, Testosterone

1. INTRODUCTION

In ayurveda health is a state where the *dosha*, *agni*, *dhatu*, *mala*, all the physiological process are in homeostatic state and soul, sense organ and mind are in a state of total wellbeing. *Dhatu*s are seven in number, hence called as 'Saptadhatu'. These are *rasa* (plasma), *Rakta* (formed blood cells), *Mamsa* (muscle tissues), *Meda* (fatty tissues), *Asthi* (bone tissue), *Majja* (bone marrow and nervous tissues) and *Shukra* (reproductive tissues).

The *Shukra dhatu* present all over the body since childhood when the person gets puberty then only *shukra dhatu* appears. Pubic hairs and other secondary sexual characters in women become manifest as they come of age [1] and perform the function of conception. Leydig cells are well-nigh non-existent in the testes during childhood when the testes secrete almost no testosterone, but they are several in the new born male infant for the first few months of life and in the adult male any time after puberty; at both these times the testes secrete large amount of testosterone like as an unblossomed bud does not possess fragrance but fragrance appears when it blossoms.

Likewise, the entire sugar cane plant is full of its juice within it; ghee is present in all parts of the curd, oil in sesame seed. Similarly, *shukra dhatu* pervades in the

entire body which has the sensation of touch. *Shukra dhatu* is not present in Hair, Nail, *Mala*, *Mutra* etc where blood supply is absent. From the different descriptions given regarding *shukra*, its structure and functional identity can be understood in a broader sense. The term *shukra* represents androgens, semen and sperm itself according to the suitability of the contexts. In the above context the seat of *shukra* has been told as whole body so it can be taken as gonadotrophic hormone. It has been clarified that semen exists in whole and it comes out after sexual arousal. The main object and mean of sexual arousal are tactile stimulation, seeing, remembering, hearing the voice, necking with the desired woman. *Shukra* pervades all over the body seated on the *sparshanendriya* (tactile sensorium). The mind has inseparable union with *tvak*. According to *Gangadhara* the *shukra* present in the *tvak* (*Tvaggatam Shukram*) by continuous erotic stimulation gets ejaculated. *Susruta* explained the same phenomena in *nidana sthana* which can be compared with ejaculatory physiology and lactation since both are deeply associated with psychological factors [2]. *Susruta* explains the physiology of ejaculation as a combined activity of *vata* which is heightened by the heat generated in the act of copulation as a result of the

rubbing of female and male genital organs which dispels the *shukra*.

2. SPERMATOGENESIS IN AYURVEDA

Ayurveda postulates in continuation of sequential *dhatu* formation *Medas* gives rise to *asthi* (bone) which then forms *majja* (bone marrow); from *majja*, *shukra dhatu* is formed. *Acharya Dalhana* has commented *anu shukra* is also formed when *majja dhatu* is formed [3]. *Shukragni* acts on *anushukra* and major *shukra dhatu* is formed. Since *majja dhatu* is present in the large bones (*mahatasthisu*). *Acharya charak* has explained the *sneha* (fatty) portion of *majja* produces *shukra*. The porosity in the *asthi* is produced because of the factors such as *vata* and *akasha*. *Shukra* comes out of *asthi* through these pores just as the water comes out of a new earthen vessel. Through the channels known as *shukravaha srotamsi*, this channel spreads *shukra* all over the body and remains present all over the body. During development of the embryo, the primordial germ cells transmigrate into the testes and become immature germ cells called spermatogonia which lie in two or three layers of the inner surfaces of the seminiferous tubules. The spermatogonia begin to undergo mitotic division, beginning at puberty, and constantly proliferate and differentiate through final stages of evolution to form sperm. The total period of spermatogenesis, from spermatogonia to spermatozoa, takes about 74 days [4].

3. CONCEPT OF SHUKRA IN WOMEN

Seven *dhatu*s are present in human beings irrespective of sex. *Acharya Susruta* and *Vagbhata* has explained the concept of *stree shukra* [3]. *Shukra* is seventh *dhatu*. It is present in whole body. It becomes active after the age of sixteen years, even though it is present since birth in dormant state. Concept of *stree shukra* is discussed in classics, *Susruta* has mentioned that when sexual activities happens in two sexually excited women, they secrete *shukra* within each other, due to which there is formation of foetus without bones. *Acharya Vagbhata* has clarified that even though woman secrete *shukra* during coitus, it doesn't participate in fertilization [5] and embryo formation. All *dhatu*s have their definite locations in the body; they are present in every cell in subtle form. *Stree shukra* secreted during coitus is nothing but the secretions of Bartholin's, cervical and endometrial glands emergence at the end of orgasm [4]. Therefore, the female *Shukra* have role in sexual act rather than conception.

4. CONCEPT OF SHONITA AND ARTAVA

The *Shukra* and *shonit* are implant in uterus combined together with *atma* (soul), *ashta prakriti* and sixteen *vikritiis* called *Grabha* (embryo) [6]. *Shukra* of male and *shonita* of female is essential for conception. Thus, the *shonit* and *shukra* is responsible for *garbhotapatti* and *prakriti* determination. The term *artava* is a broad term and used by *Acharyas* in different context. *Artava* (menstrual blood) is *upadhatu* of *rasadhatu*, appears red in colour like *gunja* fruit, red lotus flower or *mahavara* or red as *indragopaka* insect, such *artava* is considered as normal menstrual blood. It secreted for three or five days through vagina every month during menstrual cycle [7]. This *artava* does not participate in fertilization. *Shonita* is responsible for fertilization and embryo formation. This *shonita* is considered as ovum. *Acharyas* believes after fertilization *artava* (menstrual cycle) becomes stopped due to obstruction in *artava srotas*. Because even though the *artava vaha srotas* are present, these get obstructed by the presence of *garbha*. Due to obstruction *artava* goes up and form the *apara* (placenta) and residual portion of *artava* going up and nourish the breast and prepare for milk production. This *Artava* is responsible for maintenance of conception, organogenesis and development of breast [8].

After fertilization with the development of the trophoblast cells from the early fertilized ovum, the hormone human chorionic gonadotropins secreted by the syncytial trophoblast cells into the fluids of the mother. HCG causes the corpus luteum to secrete even larger quantities of its sex hormones-progesterone and estrogens-for the next few months. These sex hormones prevent menstruation and cause the endometrium to continue to grow and store large amount of nutrients. These hormones are representing the upward moving *artava*.

Estrogens cause (1) growth of the stromal tissues of the breasts, (2) maturing of an extensive ductile system, and (3) deposition of fat in the breasts. The lobules and alveoli of the breast develop to a slight extent under the influence of estrogen alone, but it is progesterone and prolactin that cause the ultimate determinative growth and function of these structures. Thus, functions of estrogen, progesterone and prolactin come under the function of *artava* formed after fertilization.

5. FUNCTIONS OF SHUKRADHATU

Shukra dhatu is present in both male and female. The function of *shukra dhatu* mentioned by *Acharya Susruta*; *Dhairya* (courage), *Chayvanam* (ejaculation), *Priti*

(affection), *Dehabala* (body strength), *Harsh* (exhilaration), *Bijarth* (procreation) [9]. In modern medical science, *Shukra dhatu* cannot be correlated with a single entity, however on the basis of its functions described in *ayurveda*, few structure and chemicals (hormone) can be correlated on the basis of similar functions. In intra uterine life, primordial cells are formed and migrate into the testes and become immature germ cells called spermatogonia. At puberty, these spermatogonia undergo meiotic division and develop to form sperm. Ayurveda is a science based on the functional understanding of body, by considering its functions, the entities in the body representing same functions can be correlated with *shukra*.

6. DHAIRYA(COURAGE)

Dhairya is the quality of *Satvika prakriti* people [10]. *Dhairya* is the controlling power of mind, firmness, stability and attachment by which one follows the good and avoids the bad. Commentator *Dalhan* described *dhairya* provides the courage to fight against any condition and related to the physical and mental strength and alertness [9]. A person devoid of *dhairya* is one of the underlying causes of mental disorders. *Acharya Dalhan* further explained *Dhairya* as *shoorata*, which means courage or manfully. That's why he also explained *napunsaka* (neuter) is *Adhira* in nature because they have low level of *shukra*. The potential role for gonadal hormones in the etiology of anxiety and depressive disorders. In fact, studies have revealed that women are more likely to experience mood disturbances, anxiety, and depression during times of hormonal flux, such as puberty, menopause, perimenstrual and post-partum periods [11, 12]. While hormonal flux in females appears to increase the likelihood of experiencing mood disturbances, clinical and preclinical studies in males suggest that testosterone yields protective benefits against anxiety and depression. These beneficial effects may stem from both organizational and activation effects of testosterone. Women treated with testosterone display a suppressed stress response compared to controls [13]. In addition, testosterone can counteract the effects of early-life stress, and it provides *dhairya*. So, *Dhairya* functions of *shukra dhatu* have resembles with that of testosterone (in male) and estrogens (in female).

7. CHAYVANAM (EJACULATION)

Acharya Dalhan described it is the ejaculation of semen [9]. The timing of ejaculation depends on *Dhairya*. As water comes out of a wet cloth when squeezed, similarly,

the semen tickles out from its site during copulation between man and woman, eight factors which are involved in ejaculation process. It is stimulating pleasure to initiate the sexual act by psychological means.

Eight factors help in ejaculation of *shukra* these factors- *harsha* (excitement), *tarsha* (excessive desire), *Sara* (fluidity), *Picchilata* (viscosity), *Gurutva* (heaviness), *anubhava* (atomicity) and *pravanabhava* (the tendency to flow out) and *durtmaruta* (the speedy motion of *vata*). *Harsha* is the desire produced from *Sankalpa* (determination) leading to erection and ejaculation.

Chakrapani described *tarsha* as *vanitanamabhilasha* i.e. desire of female partner. The word *tarsha* is also used to denote *trasha* so it can be described as strong desire to have female partner. Both the *harsha* and *tarsha* are psychological entities. According to *Hemadri*, the substance which is having the potency of *prerana* (stimulation) is called *sara*. So, *sara* is the natural quality of *shukra* and so it flows without retention. *Picchilata* refers to sliminess and so it helps in smooth ejaculation. *Gurutva* helps in falling of semen. *Anu* refers to small so due to *anu bhava* semen comes out quickly. *Chakrapani* comments that due to *pravanabhava* *shukra* has tendency to come out. The factors *sara*, *paicchilya*, *guru*, *anupravanabhava* are the physical properties of *shukra* which helps in ejaculation. The degree of erection is proportional to the degree of stimulation, whether psychic or physical. Erection is caused by parasympathetic caprice that passes from the sacral portion of the spinal cord through the pelvic nerves to the penis. Emission and ejaculation are the zenith of the male sexual act. When the sexual stimulus becomes enormously vivid, the reflex centers of the spinal cord begin to emanate sympathetic caprices that leave the cord at T-12 to L-2 and pass to the genital organs through the hypogastric and pelvic sympathetic nerve plexuses to originate emission, the forerunner of ejaculation. This total period of emission and ejaculation is called the male orgasm. At its resultant, the male sexual excitement disappears almost entirely within 1 to 2 minutes and erection ceases, a process called resolution [4].

8. PRITI(AFFECTION)

Acharya Dalhan described it as love/ inclination towards the opposite sex [9]. There are three phases of *priti*- lust phase, attraction phase and attachment phase. Testosterone and estrogen secretion are dominant during lust phase. Secretion of adrenaline, dopamine and serotonin are dominant during attraction phase.

Vasopressin and oxytocin are dominant secretion during attachment phase and causes long term bonding. This affection is caused by the hormones especially phenylethylamine and oxytocin.

- Phenylethylamine: It is the brain's best-known love chemical. It helps in the feelings we get in the early stages of a relationship.
- Oxytocin: Oxytocin is the "love" hormone. It is released by physical contact. During Intercourse and childbirth. Oxytocin provides feelings of love and trust.

Appropriate psychic stimuli can greatly raise the ability of a person to perform the sexual act. Simply thinking sexual thoughts or even dreaming that the act of intercourse is being performed can originate the male act, culminating in ejaculation. The male sexual act outcomes from innate reflex mechanics cohesive in the sacral and lumbar spinal cord, and these mechanisms can be originated by either psychic stimulation from the brain or actual sexual stimulation from the sex organs, but usually it is a amalgamation of both [4]. So, the functions of Phenylethylamine and oxytocin comes under the functions of *shukradhatu*.

9. DEHABALA (BODY STRENGTH)

Acharya Dalhan described it is *Deha Upachaya* i.e. physical fitness and *Utsaha* i.e. enthusiasm [9]. Unique of the most significant male characteristics is development of increasing musculature after adolescence, averaging approximately a 50 percent increase in muscle mass over that in the female. Because of the smashing impression that testosterone and other androgens have on the body musculature, artificial androgens are generally used by athletes to improve their muscular performance. Testosterone or synthetic androgens are also rarely used in old age as a "youth hormone" to improve muscle strength and vigor, but with uncertain results. Some athletes use anabolic androgenic steroid to increase their muscle mass and strength which contain testosterone. In male, the functions of testosterone are to development of increasing musculature after puberty, averaging about a 50 per cent increase in muscle mass over that in the female. Several of the changes in the skin are due to deposition of proteins in the skin, and the changes in the voice also effect partly from this protein anabolic function of testosterone. Testosterone increases the whole quantity of bone matrix and causes calcium retention. The increase in bone matrix is considered to result from the general protein anabolic role of

testosterone plus deposition of calcium salts in response to the increased protein. This estrogen deficiency leads to (1) growth osteoclastic activity in the bones, (2) reduced bone matrix, and (3) diminished deposition of bone calcium and phosphate. In female, the function of estrogens is to inhibit osteoclastic activity in the bones and therefore stimulate bone growth. Osteoporosis of bones is caused by estrogen deficiency in old age. Estrogens cause a slight increase in total body protein, which is evidenced by a slight positive nitrogen balance when estrogens are administered. Thus, *dehabala* function of *shukra dhatu* comes under the functions of testosterone in male and estrogen in female.

10. HARSH (FREQUENT SEXUAL DESIRE)

Harsha in relation to sexual act may be termed *Utkantha Jananam* (desire) with regard to sex. *Harsha* is termed as stimulating pleasure to initiate the sexual act by psychological means. *Harsha* can be explained as the desire produced from *Samkalpa* (fantasy) leading to erection and ejaculation [14]. *Harsha* means psychological process developed from the enjoyment of different sensorium leading to the arousal and alteration of consciousness which is gradually developing. The glans contains a particularly sensitive sensory end organ system that transmits into the central nervous system that special modality of sensation called sexual sensation. Sexual sensation signals in the anterolateral system, immediately after entering the spinal cord from the dorsal spinal nerve roots, synapse in the dorsal horns of the spinal gray matter, then cross to the opposite side of the cord and ascend through the anterior and lateral white columns of the cord. They adjourn at all levels of the lower brain stem and in the thalamus. The last order neuron adjourns on the sensory cortex. This causes frequent sexual desire.

11. BIJARTH (PROCREATION)

Acharya Susruta explained that main function of *Shukra* is *Bejartham*, means for production of progeny [15]. The main function of *Shukra* besides other important functions is *Garbhajanana*. There are various parameters for normal *shukra*. Beside physical parameters, the main criteria of normal *shukra* is that it should be able to procreate progeny. During meiotic division of spermatogenesis, the male Y chromosome goes to one spermatid that then convert a male sperm and the female X chromosome goes to another spermatid that convert a female sperm. The sex of the ensuing offspring is determined by which of these two types of sperm fertilizes the ovum. *Shukra dhatu* are responsible for

spermatogenesis and oogenesis and expression of both primary and secondary sexual characteristics.

12. SHUKRADHATWAGNI

Dhatwagni are of seven types which are responsible for synthesis of the *dhatu*. *Majjagani* (one type of *Dhatwagni*) act upon *anumajja* (substance) and convert into three part

i.e. *Sthula* part i.e., *Majja dhatu* itself, *Anu* part (*Shukra dhatu*) and *Mala* (*Sneha* of *Akshivitta* and *Tvchavitta*). After that *shukra Dhatwagni* act upon *anu* part of *shukra dhatu* and convert into *shukra dhatu* (male reproductive element).

Table 1: Correlation of Structure or entities as per Ayurvedic text with modern physiology

Structure or entities as per Ayurvedic text	Correlation of structure or entities as per modern physiology on the basis of its functions
<i>Shukra Dhatwagni</i>	Gonadotropic releasing hormone (GnRH), Follicular stimulation hormone (FSH) and Luteinizing hormone (LH)
<i>Shukra dhatu</i> in men	In Men: - Sperm, Testosterone, Phenylethylamine Dihydrotestosterone, and Androstenedione, adrenaline, Dopamine, serotonin etc.
<i>Stree Shukra</i> in women	Secretions of Bartholin's, Cervical and Endometrial glands.
<i>Artava</i>	Menstrual blood.
After fertilization portion of <i>artava</i> moving in upward direction.	Estrogen, Progesterone, Oxytocin and human chorionic gonadotropic hormone.
<i>Stree shonita</i>	Ovum

13. HORMONAL FACTORS THAT STIMULATE SPERMATOGENESIS

There are several hormones play essential roles in spermatogenesis. Some of these are as follows:

1. Testosterone, secreted by the *Leydig cells* located in the interstitium of the testis, is indispensable for growth and division of the testicular germinal cells, which is the first stage in forming sperm.
2. Luteinizing hormone, release by the anterior pituitary gland, stimulates the Leydig cells to release testosterone. Stimulates testosterone production by the testis.
3. Follicle-stimulating hormone, too secreted by the anterior pituitary gland, stimulates the Sertoli cells; without this stimulation, the conversion of the spermatids to sperm will not occur. Stimulates development of ovarian follicles; regulates spermatogenesis in the testis.
4. Estrogens, formed from testosterone by the Sertoli cells when they are stimulated by follicle stimulating hormone, are probably also important for spermiogenesis.
5. Growth hormone is essential for controlling background metabolic functions of the testes. Growth hormone especially promotes initial division of the spermatogonia themselves; in its

nonappearance, as in pituitary dwarfs, spermatogenesis is gravely lacking or absent, thus causing infertility.

14. TIME REQUIRED FOR PRODUCTION OF SHUKRADHATU

The *rasa* remains in each and every *dhatu*(tissues) for a duration of three thousand and fifteen *kalas* about five days. In this way it takes one month for the *rasa* to get converted into the *Shukra* (sperm) in men or the ovum in women. This is quoted here: in this way eighteen thousand and ninety *kalas* are required in all the *dhatu* (for *Rasa* to traverse the *Shukra*) [16].The continuity of evolution of *dhatu*s is because of the intimate interrelationship (between the preceding and the succeeding *dhatu*). Some (authorities) say, that the food gets converted to *Shukra dhatu* (last *dhatu*) in one day; some say, after six days; and yet others, after one month, after undergoing series of *paka* (digestion and transformation). The transformation of *bhojya dhatu*s (nutrient tissues, small quantities of essence of the preceding tissue) goes on uninterrupted like the (movement of) wheel [17]. The effect of virilific and the like substance is promoting the strength quickly. Some are of opinion that it takes for their full assimilation a period of six days and nights; but the truth is there is continual circulation of the food-essence like a wheel [18].

15. PHYSICAL CHARACTERISTICS OF SHUDDHASHUKRADHATU

Acharya Charaka, Susruta and Vagbhatt described the physical characteristics of *Shuddha Shukradhatu*. The colour of pure and the healthy *Shukra* can be compared with the colour of crystal (milky white), liquid just like viscid jelly, sticky, slightly sweet in taste, does not create burning sensation, more in quantity, *madhugandhi* (smelling like honey), *taila-Ksaudra-nidha* (colour like oil, honey), *avisram* (without any putrid smell). Lastly it has *phalvata* property i.e., progenerating capacity [19]. Correlation of properties of *shukra dhatu* is given below [4]:

- *Sphatikabha* (crystalline)- The seminal vesicle and mucous glands gives the semen a mucoid consistency.
- *Shukla* (white in colour)- The prostatic fluid gives the semen a milky appearance.
- *Drava* (liquid), *Snigdha* (unctuous), *Picchila* (viscid)- Semen is composed of the fluid and sperm from the vas deference (about 10% of the total), fluid from the seminal vesicle (almost 60%), fluid from prostate gland (about 30%) and small amounts from the mucous gland, especially the bulbourethral glands.
- *Madhura* (sweet)- Each seminal vesicle secretes a mucoid entity containing a copiousness of fructose, citric acid and other nutrient substance, as well as large amounts of prostaglandins and fibrinogen. The normal fructose content of semen is 2-7mg/mL.
- *Avidahi* (not produces burning sensation)- Despite the slight acidic of prostate fluid, Semen has a slight alkaline, pH of 7.2-7.7 (~7.5), due to higher pH and larger volume of fluid from the seminal vesicle.
- *Bahu* (abundant in quantity)- volume ~3.5mL (1-6.5mL), Number of sperms ~35-200million/mL (>15million is normal).
- *Ghana* (dense), *Bahal* (thick), *Guru* (heavy)- Each spermatozoon is composed of a head and a tail. On the outside of the anterior two-thirds of head is a cap called the acrosome. The tail of the sperm called flagellum.
- *Phalavata* (invariably helps in procreation)- due to testosterone, a main character may be property to viability, motility, no. of sperms and normal morphology of semen.

• Composition of Semen-

Appearance- translucent, thick, with a whitish tint

Volume- ~3.5mL (1-6.5mL)

pH- ~7.5

Number of sperms- ~35-200million/mL (>15million is normal)

percent of motile sperms- >50, measured within 60 minutes of collection of the sample

Contribution by- Vas deference ~10%, Seminal vesicle ~60%, Prostate ~30%, Bulbourethral gland-minimal ~1%

16. DISCUSSION

Dosha, dhatu and *mala* are the root of life [20]. These are the biological forces which work through the medium of *dhatu*s and *malas*. *Dhatu*s and *malas* are the structural units and the *doshas* are the functional unit. Hence the *doshas* are called as *asrayees* and *dhatu*s called as *asrayaas* of *dosha*. *AnuShukra dhatu* (primordial germ cell) essential for the *Shukra dhatu* (Testosterone, Estrogen and sperm) formation. *Shukra* is seventh *dhatu*. *Shukra dhatu* is present in both male and female. *Rasa dhatu* takes about one month to synthesize *shukra dhatu* in men or the ovum in women. *Shukra* of male and *shonita* of female is essential for conception. Thus, the *shonit* and *shukra* is responsible for *garbhotapatti* and *prakriti* determination.

Likewise, the entire sugar cane plant is full of its juice within it; ghee is present in all parts of the curd, oil in sesame seed. Similarly, *shukra dhatu* pervades in the entire body which has the sensation of touch. *Shukra dhatu* is not present in Hair, Nail, *Mala*, *Mutra* etc where blood supply is absent. Since *majja dhatu* is present in the large bones (*mahatasthisu*). Acharya charak has explained the *sneha* (fatty) portion of *majja* produces *shukra*. The porosity in the *asthi* is produced because of the factors such as *vata* and *akasha*. *Shukra* comes out of *asthi* through these pores just as the water comes out of a new earthen vessel. Through the channels known as *shukra vaha srotamsi*, this channel spreads *shukra* all over the body and remain present all over the body. *Shukra dhatu* are responsible for spermatogenesis and oogenesis and expression of both primary and secondary sexual characteristics. *Shukra* becomes active after the age of sixteen years, even though it is present since birth in dormant state. Acharya Vagbhata has clarified that even though woman secrete *shukra* during coitus, it doesn't participate in fertilization and embryo formation. All *dhatu*s have their definite locations in the body; they are present in every cell in subtle form. *Stree shukra* secreted during coitus is nothing but the secretions of Bartholin's, cervical and endometrial glands emergence at the end of orgasm. Therefore, the female *Shukra* have role in sexual act rather than conception.

Artava (menstrual blood) is *upa dhatu* of *rasa dhatu*, this *artava* do not participate in fertilization. *Shonita* is responsible for fertilization and embryo formation. This *shonita* is considered as ovum. *Acharyas* believes after fertilization *artava* (menstrual cycle) becomes stopped due to obstruction in *artava srotas*. Because even though the *artava vaha srotas* are present, these get obstructed by the presence of *garbha*. Due to obstruction *artava* goes up and form the *apara* (placenta) and residual portion of *artava* going up and nourish the breast and prepare for milk production. This *Artava* is responsible for maintenance of conception, organogenesis and development of breast. The functions of estrogen, progesterone and prolactin come under the function of *artava* formed after fertilization. The semen which is thick, sweet, unctuous, without any putrid smell, heavy, viscid, white in color, and abundant in quantity, invariably helps in procreation. The function of *shukra dhatu* mentioned by *Acharya Susruta*; *Dhairya* (courage), *Chayvanam* (ejaculation), *Priti* (affection), *Dehabala* (body strength), *Harsh* (exhilaration), *Bijarth* (procreation).

17. CONCLUSION

The term *shukra* represents androgens, semen and sperm itself according to the suitability of the contexts. In the above context the seat of *shukra* has been told as whole body so it can be taken as gonadotrophic hormone. *Shukra Dhatwagni* is compared with gonadotropic releasing hormone (GnRH), follicular stimulation hormone (FSH) and luteinizing hormone (LH). *Shukra dhatu* in men is compared with sperm, testosterone, phenylethylamine dihydrotestosterone and androstenedione, adrenaline, Dopamine, serotonin etc. *Artava* is compared with menstrual blood. This *artava* do not participate in fertilization. *Shonita* is responsible for fertilization and embryo formation. This *shonita* is considered as ovum. *Streeshukra* secreted during coitus is nothing but the secretions of Bartholin's, cervical and endometrial glands emergence at the end of orgasm.

18. INADEQUACIES:

Across all Ayurvedic textbooks, the following inadequacies are found in relation to reproductive physiology.

- *Acharya* have given their opinion for the time required for production of *Shukra dhatu* which is contradictory to modern medical science.
- Location of *shukra Dhatwagni* is not mentioned.

- *Acharya susruta* has not explained how *shukra dhatu* comes out from *asthi dhatu*.
- No separate term is used for *artava* move in upward direction after fertilization.
- Site of spermatogenesis explain in *Ayurveda* do not match with site of spermatogenesis of modern physiology.
- *Ayurveda* opines *shukra dhatu* is present throughout the body as per modern physiology it is present in epididymis and vas deference.

19. REFERENCES

1. Sushrut. Shonita varniya Adhyaya. In: Shastri AD, editors. Susruta Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2016. p. 61-73.
2. Sushrut. Virpanadistanaroganidana Adhyaya. In: Shastri AD, editors. Susruta Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2016. p. 345-350.
3. Dalhan. Sonita varnaniya adhyaya. In: Trikam Y, editors. Nibandha Sangraha on Sushrut Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2009. p. 59-67.
4. Hall JE, Guyton AC. Reproductive Physiology. In: Vaz M, editors. Textbook of medical physiology. 2nd ed. New Delhi (India): Elsevier; 2018. p. 651-696.
5. Vagbhata. Putrakamiya Adhyaya. In: Gupta AD, editors. Astanga Sangraha. Revised edition. Varanasi (India): Chaukhamba Krishnadas Academy; 2016. p. 261-271.
6. Sushrut. Sharirasankhyavyakaransharir Adhyaya. In: Shastri AD, editors. Susruta Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2016. p. 54-67.
7. Chakrapani, Yonivyapchikitsitam adhyaya. In: Kushwaha HC, editors. Ayurveda deepika on Charaka Samhita. Revised edition. Varanasi (India): Chaukhamba Orientalia; 2009. p. 799-850.
8. Sushrut. Garbhavyakaransharir Adhyaya. In: Shastri AD, editors. Susruta Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2016. p. 36-54.
9. Dalhan. Doshadhatumalakshayavradhivigyanaya adhyaya. In: Trikam Y, editors. Nibandha Sangraha on Sushrut Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2009. p. 67-73.

10. Sushrut. Sarvabhutachintasharir Adhyaya. In: Shastri AD, editors. Susruta Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2016. p. 1-11.
11. Parker GB, Brotchie HL. The Journal of Nervous and Mental Disease, 2004; **192(3)**:210-216.
12. Douma SL, Husband C, O'Donnell ME, Barwin BN. et al. Advances in Nursing Science, 2005; **28(4)**:364-375.
13. Hermans EJ, Putman P, Baas JM, Gecks NM, Kenemans JL. et al. Elsevier, 2007; **32(8-10)**:1052-1061.
14. Chakrapani, Pumanjatbaladikam vajikaranpadam adhyaya. In: Kushwaha HC, editors. Ayurveda deepika on Charaka Samhita. Revised edition. Varanasi (India): Chaukhamba Orientalia; 2009. P. 61-68.
15. Sushrut. Doshadhatumalakshayavradhivigyaniya Adhyaya. In: Shastri AD, editors. Susruta Samhita. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2016. p. 73-84.
16. Sushrut. Shonita varniya Adhyaya. In: Singhal GD, editors. Susruta Samhita ancient Indian surgery. Revised edition. Varanasi (India): Chaukhamba Sanskrit Sansthan; 2018. p. 115-126
17. Vagbhata. Angavibhagshariradhyaya. In: Tripathi B, editors. Nirmala' Hindi Commentary on Astanga Hriday of Vagbhata. Revised edition. Varanasi (India): Chaukhamba Krishnadas Academy; 2009. p. 366-387.
18. Chakrapani, Grahanidoshachikitsitam adhyaya. In: Kushwaha HC, editors. Ayurveda deepika on Charaka Samhita. Revised edition. Varanasi (India): Chaukhamba Orientalia; 2009. P. 376-421.
19. Das CR, Shukra dhatu. In: A Textbook of Physiology Shareera Kriya Vijnan. First edition. New Delhi (India): Chaukhamba Sanskrit Pratishthan; 2014. P.69-82.
20. Moharana P, Roushan R. *Int. J. Ayu. Pharm. Chem.*, 2018; **9(1)**: 446-457.