

Rutumati lakshanas-estrus signaling in humans

Abstract

Rutu is the period of ovulation in a female and '*Rutu kala*' denotes the peak fertility period in women. '*Rutumati*' is the woman who is in peak fertility period (from the 4th day of the menstrual cycle to 15th day of the menstrual cycle in healthy women). According to '*Sushruta samhita*', *peena vadana* (fat/fleshy/round face), *prasanna vadana* (bright / cheerful/attractive face), *praklinna atma*, *mukha*, *dwijaam* (humid /moist body, face, gums/oral cavity), *nara kaama* (interested in men), *priya katha* (interested in listening stories), *srasta akshi*, *kukshi moordhajaam* (flaccid/lax eyes, trunk and head), *sphurati bhujja*, *kucha*, *shroni*, *naabhi*, *uru*, *jaghana* and *sphichaam* (shining/quivering/expansion of shoulders, breasts, hips & loins, umbilicus/abdomen, thighs, vulva/mons veneris and buttocks), *harsha* (pleasure/delighted) and *autsukya* (eagerness/desire/excitement) are considered as *Rutumati lakshana's*. These *Rutumati lakshana's* are getting proved by latest research and there is a striking similarity found between *Rutumati lakshana's* and functions of estrogen hormone/human estrus/follicular phase/peak fertility period in women. Women have been thought to possess no distinctive sexuality during the fertile phase of their menstrual cycle. Abundant evidence now indicates that they do. Ancient *Ayurvedic* sages were able to detect ovulation in females by observing the various physiological and behavioral cues which occur during peak fertility. This supports the view that human ovulation is not concealed.

Keywords: estrus, *Rutumati lakshana*, *Ayurveda*, fertility, ovulation, estrogen

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Introduction

The word '*Rutu*' means the time which is favorable for procreation or time to get a healthy progeny or peak fertility period according to *Ayurveda*. *Rutu* is the period of ovulation in a female. '*Rutu kala*' denotes the peak fertility period in women. Duration of *rutu* is of 12 or 16 days according to different classical *Ayurvedic* texts. While calculating '*Rutu kala*', first three days and last one day should not be considered as initial three days consists of menstrual bleeding and last day (16th day) is not suitable for conception due to constriction of *yoni* (cervix/vagina). After excluding these four days out of sixteen, the duration of *rutu* becomes twelve. Conception will occur only during *rutu kala* (from the 4th day of the menstrual cycle to 15th day of the cycle). A woman possessing a healthy *yoni* (cervix/vagina), *garbhashaya* (uterus) and *shonita* (ovum/reproductive system) is termed as *rutumati* (from the 4th day of the menstrual cycle to 15th day of the menstrual cycle in healthy women). '*Rutumati*' is the woman who is in peak fertility period.¹

According to *Ayurveda*, '*Rutumati*' shows some '*lakshana's*' (physiological and behavioral features/changes) by which one can identify the woman during peak fertility and plan for conception. Woman looks bright, healthy, tendency to have sexual relations, happy and excited during *rutu kala*. These physiological and behavioral changes can be seen in *Rutumati* (women during peak fertility period) according to *Ayurveda*.²

While the commonly held belief is that estrus or ovulation is hidden in humans, there is actually a considerable amount of evidence to the contrary. Recent research has shown that normally cycling females change physically, behaviorally when they are more fertile. Ovulation is not hidden in humans; there are both physical and behavioral changes in ovulating females which can be detected. The present article explores the '*Rutumati lakshana's*' explained in classical *Ayurvedic* texts (written thousands of years before) in a scientific way with the help of modern research.

Rutumati lakshanas

According to '*Sushruta samhita*', *peena vadana* (fat/fleshy/round face), *prasanna vadana* (bright/cheerful/attractive face), *praklinna atma*, *mukha*, *dwijaam* (humid/moist body, face, gums/oral cavity), *nara kaama* (interested in men), *priya katha* (interested in listening stories), *srasta akshi*, *kukshi moordhajaam* (flaccid/lax eyes, trunk and head), *sphurati bhujja*, *kucha*, *shroni*, *naabhi*, *uru*, *jaghana* and *sphichaam* (shining/quivering/expansion of shoulders, breasts, hips & loins, umbilicus/abdomen, thighs, vulva/mons veneris and buttocks), *harsha* (pleasure/delighted) and *autsukya* (eagerness/desire/excitement) are considered as *Rutumati lakshana's*.² In '*Ashtanga samgraha*' also similar views were expressed.³ The description of similarity between the *Rutumati lakshana's* and the functions of estrogen hormone or estrus phase or follicular phase is as follows.

Peena and Prasanna Vadana (Attractive Face)

The word '*peena*' denotes fat/round/fleshy face and the word '*prasanna*' denotes happy/cheerful face. During *rutu kala* the women's face becomes attractive according to *Ayurveda*. Female facial attractiveness increases during the fertile phase of menstrual cycle. Female's faces become most attractive to males when the females are most fertile.⁴ The more symmetrical a woman is the more attractive. Symmetry has been correlated with fertility. Estrus is a phase of increased female sexual receptivity, proceptivity, selectivity and attractiveness.⁵ In young women, estradiol and progesterone affect fluid regulation also along with reproductive functions. Estradiol lowers the operating point for osmoregulation of arginine vasopressin and thirst and increases plasma volume. There were small increases in overall fluid retention by estradiol administration.⁶ The cheerful, attractive, symmetrical, fleshy face is one of the signs of estrus (follicular phase/peak fertility period) in females and it may be due to estrogen hormone abundance during that period.

Praklinna Dwija (Moist Gums/Healthy Oral Cavity/Healthy Periodontium)

The oral cavity/periodontium/gums are moist and healthy during *rutu kala*. The periodontium is composed of the supporting structures of teeth like gingiva, periodontal ligament, cementum, and alveolar bone. Sex steroid hormones are responsible for the healthy periodontium. Sex hormone receptors have been detected in the oral mucosa and salivary glands. There are estrogen receptors in osteoblasts and fibroblasts of periodontal tissues, which respond to the varying levels of hormones in different stages of reproductive life and thus affect the health of the periodontium. Variations in hormone levels directly affect the oral cavity as oral mucosa contains estrogen receptors. Oral mucosa resembles with vaginal mucosa in its histology as well as its response to estrogen hormone.¹¹ *Praklinna dwija* denotes the same (healthy periodontal tissues/oral cavity).

Nara Kaama (Increased Sexual Tendency)

In many species females are more sexually attractive to males near ovulation period. Some evidence suggests a similar pattern in humans also. Recent studies demonstrate that increase in sexual motivation in women near ovulation period.¹² Women appear to be more sexually attracted to men during mid-cycle; report more extra-pair sexual interests and behavior at this time.¹³ Women observed to be dressed in a more sexually provocative way when they were in the most fertile period.¹⁴ Women closer to ovulation were more likely to draw an outfit showing more skin.¹⁵ During the ovulatory phase, highly fertile women were more likely to initiate sexual activity, have stronger desire, and have more fantasies.¹⁶ Women in the ovulatory phase reported more interest in men and displayed more flirting behaviors.¹⁷

Priya Kathaam (Listening Stories/Participating in Recreational Activities)

This particular *lakshana* denotes a positive/cheerful/pleasant/happy mood during *rutu kala*. According to a research work, during ovulatory phase or mid-cycle the mood becomes cheerful and pleasant. Positive moods peaked during the ovulatory phase of the menstrual cycle.¹⁸ '*Priya kathaam*' denotes the joyful mood of *rutumati*.

Srasta Kukshi, Akshi Moordhajaam (Laxity/Flaccidity/Postural Sway/Lordosis Behavior)

The word '*srasta*' denotes subluxation or laxity or flaccidity or downward displacement. '*Srasta kukshi, akshi moordhajaam*' means flaccidity or laxity of the muscles of trunk, eye and head. It also denotes a forward bending posture (lordosis) or postural sway. The menstrual cycle is composed of follicular, ovulatory and luteal phases, each of which has markedly different hormonal profiles. Estrogen, one of the primary female sex hormones, peaks during ovulation and has been specifically studied regarding its relationship to human connective tissue. Human connective tissues such as tendons, muscles and ligaments are composed of collagen fibers which are packed closely together. The closer the collagen fibers are packed together, the greater the mechanical strength, which influences the strength of the muscles and ligaments. An obvious sex related difference was observed in the role of estrogen in regulating muscle mass and also ligament laxity. Many studies have explained that estrogen has an inhibitory effect on collagen synthesis, which alters connective tissue metabolism. Decreased collagen synthesis leads to ligament laxity and weak muscle strength because of increased serum levels of estrogen, decrease in collagen formation and fibroblast proliferation. As

estrogen levels peak during the ovulatory phase, significant increase in knee laxity have been detected. Various studies have investigated the effect of menstrual cycle on laxity of the ligaments and knee stabilizing muscles such as quadriceps and hamstring.¹⁹

It was observed that, postural sway and the neuromuscular activities of the ankle stabilizing muscles would increase at ovulation in healthy young women. It was also observed that significantly greater postural sway occurs during ovulation, when the estradiol concentration peaks. This would support the previous evidence pointing to a greater reduction in balance ability and tremor during ovulation period. A previous study also showed greater ankle laxity at ovulation than in other phases of the menstrual cycle.¹⁹ All these evidence indicates that, there is general muscle, ligament laxity during the period of ovulation which supports the physiological change during *rutu kala*, '*Srasta kukshi, akshi moordhajaam*'. This *lakshana* (*Srasta kukshi, akshi moordhajaam*) denotes either postural sway during ovulatory phase because of laxity of muscles and ligaments or lordosis behavior or posture.

'Lordosis behavior' which is also known as 'mammalian lordosis' (bent backward) or 'presenting' is the naturally occurring body posture for sexual receptivity to copulation seen in most mammals. It is commonly seen in female mammals during estrus. In the female of many species of lower mammals, the most fundamental motor sequence, that is absolutely necessary for copulation, is immobilization and/or lordosis.²⁰ When the male mounts the female, the mechanical somato-sensory stimuli trigger lordosis and the vaginal stimuli of copulation increase the lordotic response. Lordosis, which is absolutely essential to lower mammals becomes useless and no longer plays any role in human sexual behavior.²¹ On the basis of phylogenetic analyses, it is suggested that human ancestors possessed moderate sexual swelling like lower mammals.¹⁴ The *srasta kukshi, akshi moordhajaam* explained as *rutumati lakshana* showing some resemblance with lordosis behavior /posture even though it is absent in humans.

Sphurati Bhuja, Kucha, Shroni, Naabhi, Uru, Jaghana and Sphichaam

The word '*sphurana*' denotes quivering or expansion or shining. Various body parts shows *sphurana* during *rutu kala* like *bhuja* (shoulders), *kucha* (breasts), *shroni* (hip and loins), *naabhi* (umbilicus/abdomen/visceral), *uru* (thighs), *jaghana* (mons veneris/vulva) and *sphichaam* (buttocks); interestingly all these body parts contains subcutaneous fat depots during fertility period. Due to the underlying excessive subcutaneous fat in the above mentioned body parts they shows *sphurana* (quivers/expansive/heavy/large). During ovulation along with breasts other body parts fluctuate in symmetry.²²

It has been known that estrogen is a major regulator of adipose tissue development and deposition in males as well as females. Fat accumulation in different depots is sexually dimorphic. Men accumulate more visceral fat, whereas women accumulate more subcutaneous fat and women possess a higher percentage of body fat.²³ Morphological features such as overall body fat, body fat distribution (as measured by waist-to-hip ratio), breast size, and hip width have been proposed to influence female attractiveness and desirability.²⁴ Estrogen promotes the accumulation of subcutaneous fat. Estrogen regulates body fat distribution and facilitates fat mobilization in the visceral depot and fat deposition in the subcutaneous depot.²⁵

Compared to men women have higher percent body fat and deposit it in a different pattern with relatively more adipose tissue in the hips and thighs. Subcutaneous white adipose tissue (SAT) depots, just under the skin, store 80-90% of total body fat, mainly in the abdominal (around the waist), sub scapular (on the upper backs), gluteal and femoral (thigh) areas. Women have more SAT both in the abdominal and in the gluteo-femoral area. Typical gynoid fat distributions also appear for the first time during puberty in girls. Early clinical studies based on anthropometric measurements also proved that the protective peripheral fat distribution phenotype (pear shaped) is mainly seen in women. Women are more effective in storing fat subcutaneously.²⁶

Estrogens, directly or through activation of their receptors present on adipocytes and in adipose tissues, facilitate adipose tissue deposition and function. Estrogen augments the lipid accumulation in the subcutaneous depot in women. Premenopausal women tend to store fat on the hips, thighs and buttocks, giving them a pear shape also called gynoid, or gluteo-femoral pattern of adipose tissue distribution. Women accumulate energy reserves in subcutaneous depot to prepare for adipose tissue mobilization required for lactation.²⁷ Any feature or marker of stored fat in females, such as larger body, breasts and buttocks is assumed to be attractive to males. Only those physical features which signal female reproductive capability are perceived to be attractive and preferred by males. Body, breast, waist-to-hip ratio (WHR) sizes interactively influence judgment of attractiveness, feminine looks, healthiness, and desirability for a relationship.²⁴

Body shape is determined by the nature of body fat distribution and it is significantly correlated with women's sex hormone profile as well as reproductive capability. Estrogen hormone stimulates fat deposition in the gluteo-femoral region more than in other body regions. Women have greater amounts of body fat in lower parts of their body (gynoid, "pear shaped" body fat). After puberty females deposit more fat in the hips and buttocks. WHR size provides reliable information regarding reproductive age, fertility and health status of a woman at a glance. Estrogen levels correlates significantly & positively with breadth and circumference measures of trunk, with thigh circumference and with body weight.²⁸

Harsha and Autsukya (Pleasure/Delight/Excitement)

Both *harsha* and *autsukya* denotes positive, cheerful mood and also explains sexual receptivity and proceptivity. Positive mood peaks during ovulation period.¹⁸ and women showed more interest in men, displayed more flirting, sexually provocative behaviors. Near ovulation, it was found that women walked slower and their gait was rated as sexier. Such behaviors were interpreted as unconscious desires of women near ovulation to reinforce their attractiveness in order to attract more men and to increase their choice of a partner.¹⁷

Until recently, women have been thought to possess no distinctive sexuality during the fertile phase of their menstrual cycle. Abundant evidence now indicates that they do. Women possess a distinct fertile sexuality which is functionally homologous with as well as functionally similar to estrus observed in other vertebrate species. Women's scent appears to be more attractive to men during their fertile phase and they dress more attractively or provocatively during ovulation. This sexuality is appropriately referred to as estrus.²⁹ Recent research indicates that some observable characteristics in women change over their cycles, including voice pitch, skin color.¹³ The fertile period in human females has been considered to be concealed traditionally. Facial images of women taken during their follicular phase were found to be more attractive compared with images of the same women

taken during their luteal phase. Women become more symmetrical their WHR is lower and their skin becomes lighter around the time of ovulation. All these characteristics are known to be important markers of attractiveness.¹⁴

Female voices get higher and therefore more attractive and more feminine to male ears, at stages of high fertility. This is a perceptible sign of ovulation in females.³⁰ Menstrual cycle effects on women's body movements (dance and gait movements) and also makes them more attractive during peak fertility. Recent evidence suggests that the concept of concealed ovulation in women should be reconsidered as there appear to be certain behavioral, visual, olfactory and vocal cues that serve as indirect cues to female fertility status. Menstrual cycle effects on women's body movements and men are sensitive to these effects, as they expressed a stronger preference (via attractiveness judgments) for women's body movements at times of peak fertility period.³¹

Conclusion

Rutumati lakshana's explained in Ayurvedic texts (thousands of years before) are getting proved by latest research and there is a striking similarity found between *Rutumati lakshana's* and functions of estrogen hormone/human estrus/follicular phase/peak fertility period in women. Ancient Ayurvedic sages were able to detect ovulation in females by observing the various physiological and behavioral cues occur during peak fertility. This supports the concept of 'human ovulation not concealed'.

Conflict of interests

The authors declare that there is no conflict of interests.

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