Review Article

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CLINICAL EVALUATION OF RITUKAAL IN RELATION TO FERTILE PERIOD: A REVIEW

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ABSTRACT

Introduction: The fertile period in a female's menstrual cycle is a brief window during which ovulation occurs, making the chances of conception very high. In an average 28-day menstrual cycle, ovulation typically occurs around the 14th day of the cycle. According to Ayurvedic texts, Ritu Kaala is the Beeja Nishkraman Kaala and is therefore the most suitable period for conception. The symptoms of Ritu Kaala in a female are described as Ritumati Lakshana. The duration of Ritu Kaala is about 12-16 days after the cessation of menses, which closely corresponds to the time of ovulation. In this review study, detailed content and references are analysed from the Sushruta Samhita, Vagbhatta, and Charaka Samhita, as well as from relevant books and previous research articles. According to the Sushruta Samhita, the Ritumati Lakshana include Peena Prasanna Vadana (fat/fleshy/radiant / happy cheerful face), Praklinna Atma Mukha Dwijaam (moist body, face, gums/oral cavity), Nara Kaama (Increase in libido), Priya Katha (politeness in behaviour), Srasta Akshi, Kukshi Moordhajaam (flaccid/lax eyes, trunk, and head), Sphurati Bhuja, Kucha, Shroni, Naabhi, Uru, Jaghana, and Sphichaam (pulsation in or twitching of arms, breasts, pelvic region, umbilicus, thighs and hips), Harsha Autsukya (energetic/delight/happy and excitement). A systematic diagnostic methodology developed to evaluate these characteristics, incorporating biomarkers. The study demonstrates that the Rutumati Lakshanas described in Ayurvedic texts are appropriate for identifying the fertile period. Evaluating Ritu Kaal in relation to the fertile period of women can help determine the fertile window in infertile women.

Keywords: Ritukaal, Ritumati Lakshan, Estrogen, Biomarker.

INTRODUCTION

The menstrual cycle, typically lasting 28 ± 7 days with a flow of 4 ± 2 days and a blood loss of 20 to 60 ml, is crucial for understanding fertility, as the first day of vaginal bleeding marks day 1 of the cycle.[1] Ovulation occurs between Day 12 and Day 16, making this time the fertile period for couples trying to conceive, as timing is essential for increasing the chances of pregnancy.

According to various Acharyas, the Ritu Kaala, which lasts about 12-16 days after menses, aligns closely with ovulation and is considered the most suitable time for conception. During the ovarian phase, ovarian follicles mature, and the endometrium undergoes proliferative changes. A woman exhibiting Ritumati Lakshan, a set of characteristics indicating readiness for conception, reflects a strong connection between these signs and the functions of estrogen during the follicular phase.

Additionally, acknowledging the emotional and psychological aspects of trying to conceive is important, as this journey can often be stressful. To enhance fertility awareness, it is essential to develop a diagnostic methodology based on Ritu Kaala Lakshana for evaluating the fertile period. Ayurveda, as a proven age-old science of life, provides valuable insights and holistic strategies for understanding and supporting reproductive health.

In Ayurveda, the female menstrual cycle is referred to as the Ritu Chakra, symbolizing its regular onset at consistent intervals. According to Acharya Sushruta, this cycle typically begins around the age of 12 and concludes by age 50, comprising three distinct phases: Rajahsravakaala (3-5 days), Rutukaal(12-16 days), and Rutuvyatitakaal (9-13 days). The Rajahsravakaala represents the menstrual phase, during which sexual intercourse is contraindicated, as noted in the concept of Rajaswalacharya. Following this, the Rutukaal is recognized as the most favourable period for conception, also known as the Beeja Nishkraman Kaal. This phase aligns closely with ovulation, which modern science identifies as critical for fertility. As Acharya Charaka states, once the previous cycle's accumulated elements are shed and a new cycle begins, a woman with a healthy Garbhashaya, Shonita and Yoni (reproductive system) are considered to be in the Rutukaala. This comprehensive understanding of the Ritu Chakra underscores its significance in both Ayurvedic and modern perspectives on reproductive health. The aim of this review study is to know the fertile period of female on the basis of Ritumati Lakshan and to establish the scientific base behind the assumption of Ritukaal and its symptom and events. In this review study, detailed content and references are analysed from the Sushruta Samhita, Vagbhatta, and Charaka Samhita, as well as from relevant books and previous research articles. The biomarkers related to the fertile period are grouped together. Clinical assessment of fertile period without much investigation with the help of symptoms given in Samhita is possible.

DISCUSSION

After thoroughly analysing the Ayurvedic text as well as the recent advances studies for the fertile period of female, the findings are structured in this study. (Table 1-5)

The Ritumati Stree Lakshana describes a number of symptoms, marking the ovulatory phase of the menstrual cycle. Ritumati Stree during Ritukaal looks bright and healthy, her mouth and teeth are moist, polite behaviour, her flanks, eyes, and hair become lax, she has quivering or twitching over arms, breast, pelvis, umbilicus, thighs and hips. She looks happy and excited during this phase of Ritu Chakra. The release of eggs from the ovaries and the corresponding increase in estrogen levels in the body cause these symptoms. The ovulatory phase typically lasts for 12-14 days which corresponds to the duration of Ritukaal.

Table 1: Symptoms of Ritukaal in relation to fertile period

Lakshan	Signs and Symptoms
Peena Prasanna Vadana	(fat/fleshy/radiant / happy cheerful face)
Praklinna Atma Mukha, Dwijaam	(moist body, face, gums/oral cavity)
Nara Kaama	Increase in libido
Priya Katha	Politeness in behaviour
Srasta Akshi, Kukshi Moordhajaam	(flaccid/lax eyes, trunk, and head)
Sphurati Bhuja, Kucha, Shroni, Naabhi, Uru, Jaghana, and Sphichaam	(Pulsation in or twitching of arms, breasts, pelvic region, umbilicus, thighs and hips)
Harsha Autsukya	(energetic/delight/happy and excitement)

Table 2: Physiological changes in Ritukaal in Relation to fertile period

Physiological changes in Ritukaal	Ritukaal in Relation to fertile period
Acharya Charaka says that during Rutukaal, in Ritumati women **Navina Raja** settles and the reproductive tract is in healthy condition.[2]	Proliferation of endometrium i.e. establishment of functional endometrium after menstrual phase
Beeja Nishikta Kaal.[3]	Ovulation
Ritukaal Maryada[4, 5, 6] Acharaya Sushruta- Dwadasha Ratri (12 days) Acharya Bhavaprasha- Shodash Ratri (16 days) Acharya Dalhana- while taking 16 days into consideration, the first 3 days of menstruation and last 1 day if excluded due to Yoni Sankocha, it is 12 days.	12-16 days

Table 3: Dermal Changes in Ritukaal and its relation to its biomarker

Ayurveda	Modern	Biomarker
Peena Prasanna Vadana	Dermal Changes	Lipid content↑↑
		Skin thickness↑↑
		Hydration↑↑
		Collagen ↑↑
		Elasticity ↑↑
		Hair growth ↑↑
Praklinna Atma Mukha, Dwijaam	Healthy Periodontium	Salivary flow rate ↑

Table 4: Cognitive Behaviour Changes in Ritukaal in relation to its biomarker

Ayurveda	Modern	Biomarker
Nara Kaama	Libido	Estrogen
Priya Katha	Good mood and polite behaviour	Estrogen increases serotonin level
Harsha and Autsukya	Happy and energetic	Estrogen increases serotonin level and promotes muscle strength

Table 5: Uterine and Ovarian changes in Ritukaal

Ayurveda	Assessment
Navina Raja establishment[2]	USG for increase in endometrial thickness
Beeja Nishkraman Kaal[3]	Follicular Study -serial TVUS for follicular growth and ovulation
Yoni Samvrana after Ritukaal[7]	On Per Speculum uterine sound should pass the cervical os.

Physiological changes in Ritukaal in Relation to fertile period and their assessment

During proliferative phase, the endometrium increases in thickness from approximately 0.5 mm to 3.5–6.0 mm for each singular apposed layer, creating the trilaminar appearance seen on ultrasound, which includes the endometrium from both sides of the uterus and their junction.[8]

Serial TVUS, which permits direct observation of events in the ovary just before and immediately after ovum release. In its final stages of development, the preovulatory follicle grows at a predictable pace, approximately 2 mm per day (range: 1–3 mm/day). After ovulation, the follicle collapses, margins become less distinct, the density of internal echoes increases, and the volume of cul-de-sac fluid increases.[9]

During Ritukaal cervical os opens and muscles of cervix becomes smooth which allow entry of sperm in uterine cavity. On Per Speculum uterine sound should pass the cervical os.

Dermal Changes in Ritukaal and its relation to its biomarker Peena Prasanna Vadana

The word 'Peena' denotes fat/round/fleshy face and the word 'prasanna' denotes happy/cheerful face. The perceived attractiveness of women's' faces vary across the menstrual cycle and is higher in the periovulatory than in the luteal phase.

Effect on Lipid Content-Corneocytes (keratinocytes) in the stratum corneum are covered by epidermal lipids, which protect against water loss. Barrier integrity is determined by the integrity of epidermal lipids, including lipid coverage of the corneocytes, with inadequate lipid coverage resulting in an increase in transepidermal water loss. Analysis of the secretion of skin surface lipids over the menstrual cycle demonstrated that skin surface lipid secretion was significantly higher during 16 to 20 days than during other times in the menstrual cycle.[10]

Effect on Sebum Production- Androgens are well known to be the primary stimulator of sebum production in humans. Estrogens, however, suppress sebum production at high concentrations. The sebum content of the skin is therefore related to the menstrual cycle, with the lowest sebum level at the peak of the estrogen level. [10]

Effect on Skin Thickness-Eisenbeiss *et al* measured skin thickness by ultrasound in 22 fertile women over the course of 1 cycle and found that skin thickness was significantly higher over days 12 to 14 than at days 2 to 4; skin was also thicker at days 12 to 14 than at days 20 to 22.[10]

Effect on Hydration-Muizzuddin *et al* measured skin moisturization, using skin surface electrical capacitance, and found that most subjects exhibited the driest skin during the menstrual flow, when circulating estrogen levels are at their lowest. [10]

Effect on Collagen Production-Estrogens increase the transformation of soluble collagen into insoluble cross-linked forms, slowing the breakdown of dermal collagen. Type I collagen is mainly responsible for skin thickness and type III collagen for its elasticity. [10]

Effect on Elasticity-Estrogens in the dermis increase hyaluronic acid content and thus its water content which increases elasticity.[10]

Effect on hair growth- estrogen acts to prolong the anagen phase of the hair growth cycle so that daily shedding decreases. [10]

Praklinna Atma Mukha, Dwijaam
Praklinna Mukha and Dwija (Moist Gums/Healthy Oral Cavity/ Healthy Periodontium)
Salivary glands contain sex hormone receptors. Salivary flow rates depend upon estrogen status of the individual.[11]

During Ritu kala, the oral cavity, periodontium, and gums remain moist and healthy. The periodontium, which includes the gingiva, periodontal ligament, cementum, and alveolar bone, relies on sex steroid hormones for its well-being. These hormones are detected through their receptors found in the oral mucosa and salivary glands, including estrogen receptors in osteoblasts and fibroblasts of periodontal tissues. These receptors respond to fluctuating hormone levels throughout different stages of reproductive life, directly influencing the health of the periodontium. Since the oral mucosa contains estrogen receptors, its histology and hormonal response are similar to that of vaginal mucosa. This concept is reflected in the term Praklinna Dwija, which refers to the healthy condition of the oral cavity and periodontal tissues. [12]

The saliva is the biological fluid which shows the typical fern pattern during the pre-ovulatory phase of the menstrual cycle. Before ovulation, there are two hormones-estrogen and ACTH that are known to stimulate the Aldosterone, which in turn helps in regulating the electrolytes and also the levels of fluid in the human body. Estrogen rushes during the fertile phase of the cycle and this causes Sodium Chloride crystals to form in the shape of fern leaves in both saliva and cervical mucus. It is the crystallization of Sodium Chloride (NaCl) that produces the ferning appearance in saliva. Therefore, saliva fern pattern is one of the best non-invasive techniques to evaluate ovulation. These patterns are absent during the infertile phase of the cycles. As ovulation starts to set in, there is a transitional pattern of ferns that appear sparsely. But denser and thicker fern pat terns are captured as ovulation is about to start and during. The Estrogen hormone levels correspond to the saliva patterns and the fertility stage itself. As ovulation is nearing, estrogen levels increase and cause a rise in the levels of sodium present in the body. The increasing salinity in the saliva during the ovulatory phases is a result of the changes in the chemical composition and this can be noticed while the saliva samples are allowed to dry. The crystallization patterns or farming pattern are formed as a result of the higher levels of salt content in the dried saliva sample.[13] Cystatin-S offers as a biomarker protein and/or indicator of ovulatory phase in saliva.[14]

Cognitive Behaviour Changes in Ritukaal in relation to its biomarker

Nara Kaama
Increasing androgen production in the preovulatory stage in the cycle may serve two purposes: (1) a local role within the ovary to enhance the process of atresia of the lesser follicles and (2) a systemic effect to stimulate libido nearing the time of ovulation.[15] Estradiol presumably impacts female sexual functioning by acting on the central nervous system to increase sexual desire; however, these central effects are likely moderated by peripheral effects of estradiol acting directly on the genitals. Estradiol on its own (at periovulatory levels) increases sexual desire in naturally and surgically postmenopausal women (Dow *et al*., 1983, Davis *et al.,* 1995; Dennerstein *et al*., 1980; Sherwin, 1991).[16] Physiology of the female sexual response is incompletely understood but involves hormonal and central nervous system (CNS) factors. Estrogens influence sexual response. Estrogen helps maintain genital tissue sensitivity, vaginal pH, normal microflora, elasticity, lubrication, and pelvic muscle tone. It is suspected but not proved that androgens are involved and act via androgen receptors and estrogen receptors (after intracellular conversion of testosterone to estradiol).[17]

Priya Katha
Politeness in voice and behaviour. The follicular phase, marked by elevated estrogen levels, is associated with a more positive mood, which can manifest in more polite behaviour.

Harsha and Autsukya
There is compelling scientific evidence indicating the neuromodulatory and neuroprotective effect of estrogen, which is directly relevant to mood symptomotology. The amygdala, hippocampus and a number of non-mesial temporal structures are regions centrally involved in mood regulation, and have consistently demonstrated sensitivity to fluctuating levels of sex hormones such as estrogen. Estrogen plays a significant role in mediating mood and affect via site-specific neural structures, the primary regions being the amygdala, hippocampus and the

hypothalamus. The neurotransmitter systems directly up-regulated by estrogen include serotonin, acetylcholine, and the catecholamines (i.e., dopamine, epinephrine, and norepinephrine), all of which have been implicated in the modulation of mood processes. Estrogen increases serotonin postsynaptic responsivity and number of receptors, as well as serotonin uptake and synthesis, all mechanisms which have direct implications on mood regulation.[18] In a study, the dynamic strength as measured by a handgrip dynamometer was highest during the follicular phase compared to luteal and menstrual phase. The literature intends that the levels of oestrogen which is seen peak during follicular phase may promote muscle strength by varying carbohydrate, protein and fat metabolism in the body.[19]

Role of Kapha Dosha in Ritukaal

Ritukaal is characterised with the proliferation of endometrium followed by ovulation. The proliferation of functional layer of endometrial tissue is done by Prithivi and Jala which are the Bhautika components of Kapha. In commentary on Sushruta Samhita by Acharya Chakrapaani Dutta, it is mentioned that, Artava in its early stage of formation is Saumya or it has characteristics like Kapha, thus this stage is dominated by Kapha Dosha.[20] The function of Kapha is Upachaya which means development. So, here it is responsible for further development of endometrial cells by proliferative and secretory changes through estrogen and progesterone respectively. Kapha by its Sthira and Bandha Karma prevent uterine lining from shedding. So, governing factors for endometrium proliferation as Estrogen (Kaphaja in nature) control growth of the uterine lining during the first part of the menstrual cycle.

Functions of Kapha in cognitive behaviour like Priya Katham and Harsha-Utsaha can be linked with Bala (Provides physical and mental strength), Kshama (Maintains the quality of forgiveness) and Driti (Maintains the quality of patience) Karma of Kapha Dosha. Nara Kama in Ritumati can be linked with Tama Guna (Jala and Prithivi Mahabhuta both have Tama Guna) and Vrishta Karma (maintains the reproductive health) of Kapha Dosha. Somatic Symptoms like Peena, Prasanna Vadna, Praklinna-atmamukha Dwijam are due to Snigdha, Mridu and Shalakshana Guna of Kapha due to Jala and Prthivi Bhautikta.

CONCLUSION

The study underscores the relevance of Rutumati Lakshanas, as described in Ayurvedic texts, as valuable indicators for recognizing the fertile period. These Lakshanas encompass a range of physiological and cognitive signs and symptoms that coincide with fertile phase of the menstrual cycle. Combining the insights from Ayurvedic texts with modern scientific basis offers a holistic approach to fertility management. The integration of these two perspectives provides a more comprehensive framework for identifying the fertile window, improving fertility awareness, and enhancing the chances of conception, especially in individuals with infertility concerns.

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