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DEVELOPMENT AND STANDARDIZATION OF A RUTUMATI LAKSHANA BASED DIAGNOSTIC MODEL FOR OVULATION AND FERTILE PERIOD DETECTION

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ABSTRACT

The fertile period, or Rutukaala, is critical for conception, corresponding to ovum release (Beeja Nishkraman Kaal). Rutumati Lakshan describes characteristic cognitive, physiological, and behavioural changes observed in women during this period. While clinical methods such as transvaginal ultrasonography and endometrial assessment provide accurate information on ovulation timing and estrogen status, they are time-consuming, costly, and operator-dependent. This study presents a questionnaire-based tool that collects information on symptoms and cycle patterns, translating classical Rutumati Lakṣaṇa into systematic, assessable parameters for evaluating the fertile window. The tool offers a non-invasive, cost-effective screening method for identifying the fertile period; however, it cannot precisely determine ovulation and requires further validation. This approach provides a foundation for fertility awareness, preconception counselling, and research, integrating Ayurvedic principles with modern reproductive monitoring.

Keywords: Rutukaala, Rutumati, Estrogen, Follicular Phase, Ovulation

INTRODUCTION

Rutumati Lakshana refers to the characteristic signs and symptoms observed in a female during the Rutukaala, as mentioned in the Sushrut Samhita. According to Ayurvedic texts, the Rutu Kaala lasts about 12–16 days after menstruation and aligns closely with ovulation, which modern science identifies as critical for fertility.[1-3] Rutukaala is recognized as the most favourable period for conception and is also known as the Beeja Nishkraman Kaal (time of ovum release). Acharya Charaka states that once the previous cycle's accumulated elements are shed and a new cycle begins, a woman with a healthy Garbhashaya, Shonita, and Yoni (female reproductive system) is considered to be in the Rutukaala.

Diagnostic tools for assessing the fertile period are important because they help identify the most fertile days in the menstrual cycle. The present tool uses a questionnaire-based approach to gather information related to symptoms and cycle patterns. A questionnaire-based diagnostic tool grounded in Rutumati Lakṣaṇa holds significant importance because it transforms the classical Ayurvedic signs of fertility into assessable parameters. According to Ayurveda, Rutumati Lakṣaṇa includes 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) that signal the onset of the fertile period.[4] By converting these subtle physiological and psychological changes into structured questions, the tool allows for systematic and reproducible assessment of the fertile window. This not only helps individuals better understand their natural fertility patterns but also integrates traditional Ayurvedic wisdom with modern evaluative methods, making the tool a non-invasive, culturally aligned, and cost-effective approach for fertility awareness and clinical use.

Aim: The aim of this study is to develop a diagnostic methodology based on Rutu Kaala Lakshana for evaluating the fertile period.

Objectives

- To know the period of ovulation on the basis of Rutumati Lakshan.
- To frame questionnaire based on Rutumati Lakshan.

METHODOLOGY

Questionnaires are the easier and most commonly used tool for observational studies covering large populations. The questionnaire assesses the fertile period on the basis of Rutumati Lakshan and these symptoms can be compared with symptoms of estrogen sufficient phase. These symptoms can be divided into systemic changes, menstrual changes, ovulatory changes and endometrial changes during follicular phase. The questions included in the questionnaire were taken from the previous studies about fertile period and sign and symptoms mentioned in classics based on the Rutumati Lakshan.

Questionnaire consists 3 sections: Dermal changes, Cognitive behavioural changes and Systemic changes during Rutukaala.

Table 1: Dermal Changes Rutukaala

Parameter	Rutumati lakshan	Questions	Answers	Score	Sufficient endocrinal support by prominent estrogen during follicular phase
Dermal changes	Peena Prasanna Vadana and Praklinna Atma Mukha Dwijaam	Do you feel that your skin more radiant and firmer after the menstrual phase?	No Yes	0 1	- +
		How many times do you need to moisturize after the menstrual phase?	>3 times 2 times Once a day	0 1 2	- - +
		Feeling of oiliness in skin after the menstrual phase?	Extensive Easily visible Normal	0 1 2	- - +
		Do you get acne after menstrual phase?	Severe Moderate Mild None	0 1 2 3	- - + ++
		Does your mouth feel dry when eating a meal after menstrual phase?	Almost never Sometimes Often Usually	0 1 2 3	- - + ++

Table 2: Cognitive Behaviour Changes During Rutukaala

Parameter	Rutumati lakshan	Questions	Answers	Score	Sufficient endocrinal support by prominent estrogen during follicular phase
Cognitive Behaviour Changes	Priya Katha and Harsha and Autsukya	Do you feel calm after menstrual phase?	Almost never Sometimes Often Usually	0 1 2 3	- - + ++
		Feeling of having polite behaviour to others after menstrual cycle.	Strongly Disagree Disagree Agree Strongly Agree	0 1 2 3	- - + ++
		Feeling of less irritability / more tolerable to others after menstrual phase.	Almost never Sometimes Often Usually	0 1 2 3	- - + ++
		Feeling more self-confident after menstrual phase.	Almost never Sometimes Often Usually	0 1 2 3	- - + ++
		Do you feel more concentrated after menstrual phase?	Not at all A little Quite a bit Extremely	0 1 2 3	- - + ++
		Do you feel cheerful after menstrual phase?	Not at all A little Quite a bit Extremely	0 1 2 3	- - + ++
		Do you feel energetic after menstrual phase?	Not at all A little Quite a bit Extremely	0 1 2 3	- - + ++
	Nara Kaama	How often did you feel sexual desire or interest after menstrual phase?	Never Rarely Sometime Always/often	0 1 2 3	- - + ++

		What was intensity of your sexual desire or interest after menstrual phase?	Absent Mild Moderate Strong	0 1 2 3	- - + ++
		How often did you experience discomfort/pain during vaginal penetration after menstrual phase?	Always Most often Sometimes Almost never	0 1 2 3	- - + ++

Table 3: **Systemic Changes During Rutukaala**

Parameter	**Rutumati lakshan**	**Questions**	**Answers**	**Score**	**Sufficient endocrine support by prominent estrogen during the follicular phase.**
Systemic changes	Gastric symptom	Bloating after menstrual phase?	Present Absent	0 1	- +
	Sleep	Difficulty in falling asleep after menstrual phase?	Almost always Often Sometimes Rarely	0 1 2 3	- - + ++
	Menstrual cycle	Irregular/Regular	Irregular Regular	0 1	- +
		Duration of menses	>10 days 8-9 days 6-7 days 3-5 days	0 1 2 3	- - + ++
		Mid cycle pain	Absent Present	0 1	+ -
		BBT (Mid cycle rise in temperature)	Absent Present	0 1	+ -
		Cervical mucus stretchability	< 1 cm 1 to 4 cm 5 to 8 cm >10 cm (ovulation)	0 1 2 3	- - + ++

Scoring and Interpretation
(-): -- Insufficient Estrogen level
(+): -- Moderately compromised Estrogen level
(++): -- Sufficient sustained Estrogen level

0–18: Insufficient endocrinal support by prominent estrogen during follicular phase
1**9–36:** Moderately compromised
37–54: Sufficient endocrinal support by prominent estrogen during follicular phase

Table 4: Uterine and Ovarian Changes in Rutukaala

Physiological changes in Rutukaala	**Uterine and Ovarian changes in Rutukaala**
Navina Raja establishment[5]	Proliferation of endometrium i.e. establishment of functional endometrium after menstrual phase
Beeja Nishikta Kaal[6]	Ovulation
Yoni Samvrana after Rutukaala[7]	Physiological closure of cervical os after fertile period

Table 5: Follicular and endometrial growth during follicular phase

Parameter	**Results**	**Interpretation**
Ovulation/ follicle size (D12-D16)	<12mm follicle	Insufficient Estrogen level
	12-17mm	Moderately compromised Estrogen level
	18-23mm	Moderately compromised Estrogen level
	Rupture of follicle	Sufficient sustained Estrogen level induced the LH surge, which raised LH to the threshold required for ovulation.
Day of ovulation	No ovulation	Insufficient Estrogen level
	D (12-4)-D (16+4)	Moderately compromised Estrogen level
	D (12-2)-D (16+2)	Moderately compromised Estrogen level
	D12-D16	Sufficient sustained Estrogen level induced the LH surge, which raised LH to the threshold required for ovulation.
Endometrial thickness	<4mm	Insufficient Estrogen level
	4-6mm	Moderately compromised Estrogen level
	6-7mm	Moderately compromised Estrogen level
	>8mm	Sufficient sustained Estrogen level

In modern clinical practice, ovulation can be accurately assessed through serial transvaginal ultrasonography for follicular monitoring, alongside endometrial thickness evaluation, which together provide insights into ovulation timing and endometrial receptivity. These measurements also allow assessment of estrogen adequacy, identifying deficiencies or excesses that may impact fertility management. However, this approach can be time-consuming, costly, and operator-dependent, requiring multiple visits and skilled personnel for accurate interpretation.

DISCUSSION

After thoroughly analysing the ayurvedic text as well as the recent advances studies for the fertile period of female questionnaire is prepared**.** High grades 2 and 3 shows good endocrinal support during foliicular phase whereas lower grades show compromised support during follicular phase. Estradiol concentrations of 200 pg/mL for 50 hours are necessary to initiate this LH surge (Young, 1976). The mean duration of the LH surge is 48 hours, and ovulation occurs 36 to 40 hours after the LH surge onset (Hoff, 1983; Lemarchand-Beraud, 1982).

Dermal changes

Peena Prasanna Vadana- Effect of estrogen on skin-
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. [8]

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. [8]

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.[9]

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. [8]

Effect on Elasticity-Estrogens in the dermis increase hyaluronic acid content and thus its water content which increases elasticity.[8]

Effect on hair growth- estrogen acts to prolong the anagen phase of the hair growth cycle so that daily shedding decreases. [8]

Acne

During the premenstrual and menstrual phases, estrogen levels tend to be lower on average but rise later during the end of the follicular and luteal phases. On the other hand, peaks in progesterone levels are noted during the luteal phase, while troughs occur during the premenstrual phases. Throughout history, these hormonal changes, and thus conversely, phases of the menstrual cycle have earned a considerable reputation as affecting female behaviour, both psychological and physical. It is thus natural to consider the menstrual cycle to be correlated with the counts of inflammatory or non-inflammatory acne lesions. Non-inflammatory lesions, as opposed to inflammatory ones, are more closely correlated to androgen production, which in turn peaks during the late luteal phase. Thus, explaining the rise in the count of comedones during this period.[11]

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. [12]

During Rutukaala, 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. [13]

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 fern pattern are formed as a result of the higher levels of salt content in the dried saliva sample. [14] Cystatin-S offers as a biomarker protein and/or indicator of ovulatory phase in saliva. [15]

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.

Calmness

Estrogen calms the fear response in healthy women and female rats, according to the Harvard researchers, who were led by Kelimer Lebron-Milad, an HMS instructor of psychiatry. The Emory researchers, led by postdoctoral researcher Ebony Glover, showed that the same is true for women suffering from PTSD. The higher the estrogen was in their blood when they trained on a fear-extinction task, the less likely women were to startle. Both studies used "fear-conditioning" paradigms, in which the subject is trained to fear a safe "conditioned stimulus" such as a colored shape, paired with a frightening or painful "unconditioned stimulus" like a finger-shock or a puff of air to the neck or eye. In both studies, women or female rats showed less fear response to the neutral stimulus when estrogen was high than when it was low. [16]

In preclinical studies, it demonstrated positive modulation of GABA receptors by converting to allopregnanolone, leading to anxiolytic and antidepressant effects. Bernardi *et al.* in 2003 and Pluchino *et al.* in 2005 suggested that estradiol positively modulates allopregnanolone, thereby increasing its effect. [17,18]

Irritation

Ovulatory and follicular increases in proactive aggression may also be driven by changes in reward sensitivity. Reactive aggression has been linked to negative urgency, defined as a tendency to act impulsively during intense negative emotional states, whereas proactive aggression is specifically associated with positive urgency, or impulsive behavior driven by heightened positive affect, in between-person research (Hecht and Latzman, 2015).[19] Individuals who are sensitive to hormonal fluctuations show greater activation in reward-related neural regions during the mid-follicular phase relative to the luteal phase, suggesting enhanced reward sensitivity when estradiol (E2) levels are high (Bayer, Bandurski, and Sommer, 2013; Dreher *et al.,* 2007).[20,21] In line with this pattern, appetitive motivations such as substance craving and sexual desire are positively correlated with E2 and tend to be stronger during the follicular phase than the luteal phase (Jones *et al.,* 2018; Roney and Simmons, 2013, 2016).[22-24] Additionally, evidence indicates that assertiveness may peak around ovulation (Blake, Bastian, O'Dean, and Denson, 2017). [25] Together, elevated E2 levels—characterized by increased reward-related neural responsiveness, stronger appetitive urges, and heightened assertiveness during the follicular and ovulatory phases—may increase vulnerability to proactive aggression as a means of achieving desired rewards.[26]

Confidence

During the ovulatory phase, women are much more likely to experience an increase in confidence, sociability, and willingness to take risks. Studies by Schleifenbaum *et al*. (2021) and DeBruine *et al.* (2005) [27,28] are examples that support these observations.

Social and interpersonal interactions also change depending on the phase of the cycle. During the ovulatory phase, women are more open to new relationships and social interactions, which may be due to higher estrogen levels. Research by Haselton *et al.* (2007)[29] indicates that women are more sociable and inclined to make social connections during this period. In contrast, during the luteal phase, women may avoid confrontation and be less inclined to engage in social interactions, as a study by Neave *et al.* (2008)[30] confirms. [31]

Concentration

Cognitive function is the brain's ability to think, understand, learn, remember, and concentrate. Studies have demonstrated that women tested during phases of the menstrual cycle that are characterized by high levels of estrogen, had higher scores and made fewer errors on memory tests than women who were tested when estrogen levels were low. [32,33]

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 affects 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.[34] 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.[35]

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. [36]

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).[37-41]

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).[42]

Sleep

Most women experience regular cyclic changes in sex hormones lasting approximately 28 days, also known as the menstrual cycle. Ovarian hormone concentrations are regulated by the

hypothalamic-pituitary-gonadal axis: neurons in the hypothalamus release gonadotropin releasing hormone (GnRH), which causes the anterior pituitary to release the gonadotropins luteinizing hormone (LH) and follicle-stimulating hormone (FSH) into the bloodstream, which in turn act on the ovary to regulate follicular development and the production of sex steroid hormones. The menstrual cycle can be separated into two phases. In the follicular phase (approximately days 1–14), an ovarian follicle matures and estradiol grows to peak in concentration. High estrogen permits LH and FSH to spike and trigger ovulation, while estradiol temporarily decreases. After ovulation, the ruptured follicle transforms into the corpus lutea and thus the luteal phase (approximately days 15–28) begins. LH and FSH decrease as estradiol slowly increase again and progesterone increases significantly. Estradiol, progesterone, LH, and FSH are at low concentrations as menses occurs and the cycle begins again. [43]

Many studies have found changes in sleep architecture across the phases of the menstrual cycle, with most sleep disturbances occurring in the luteal phase. In the luteal phase, women experienced increased sleep onset and awakenings, and lower sleep efficiency and quality compared to the follicular phase (Manber and Bootzin, 1997; Baker and Driver, 2004).[44,45] Women in the luteal phase had less REM sleep and more non-rapid eye-movement (NREM) sleep, with an increase in SWS in particular (Schwerin *et al.,* 1998; Baker *et al*., 2002).[46,47] EEG power density varies throughout the menstrual cycle, with the highest density of sleep spindles occurring in the luteal phase (Driver *et al.,* 1996).[48] The luteal phase is also associated with elevated core body temperature, which could potentially interact with sleep processes to impact sleep quality (Baker *et al.,* 2001a).[49]

Abdominal Bloating or Abdominal fullness

The classic description of PMS includes increasing breast tenderness, abdominal bloating, headache, sleeplessness, fatigue, emotional lability, mood swings and depression, irritability, fluid retention and weight gain beginning 7-14 days prior to menses. [50] It has been postulated that increased production of vasopressin, aldosterone, prolactin and systemic prostaglandins which affect renal function and contribute to fluid retention and thus bloating.[50]

Menstrual cycle

The "typical" menstrual cycle is 28 ± 7 days with menstrual flow lasting 4 ± 2 days and blood loss averaging 20 to 60 ml. By convention, the first day of vaginal bleeding is considered day 1 of the menstrual cycle. [51]

Ovarian phase is the the phase during which there is maturation of ovarian follicles and proliferative change in endometrium. Ovulation occurs at the end of follicular phase that is between Day 12 – Day 16.

Basal Body Temperature BBT

Monitoring of BBT has become one of the simplest and least invasive methods to detect ovulation. The body temperature is raised to 0.5-1°F (0.2-0.5°C) following ovulation. The rise sustains throughout the second half of the cycle and is called “biphasic pattern” (Fig. 17.2). There may be a drop in the temperature to about 0.5°F before the rise and almost coincides with either LH surge or ovulation. The demonstrable rise actually occurs about 2 days after the LH peak and with a peripheral level of progesterone greater than 5 ng/mL. Optimally timed intercourse during the fertile period increases the chance of conception (20%).[52]

Transvaginal Ultrasonography

The classic signs related to the ultrasound diagnosis of ovulation are; follicle rupture and follicular emptying, an irregular wall with multiple echoes within the follicle, and the presence of fluid in the cul-de-sac of Douglas.

Follicular study

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. [53]

It takes 3 months for the follicle to grow and mature to ovulation—2 months to reach an antral stage measuring 1 mm; 2 weeks to reach 5 mm and another 2 weeks to reach 20 mm before ovulation. [54]

Endometrial thickness

At the beginning of the proliferative phase, the endometrium is relatively thin (1 to 2 mm).[55] Under the influence of estrogen, the glandular and stromal cells of the functionalis layer proliferate rapidly following menses. This period of rapid growth, the proliferative phase, corresponds to the ovary's follicular phase. As this phase progresses, glands become more tortuous and cells lining the glandular lumen undergo pseudo stratification. The stroma remains compact. Endometrial thickness approximates 12 mm at the time of the LH surge and does not increase significantly thereafter. [56]

Sono graphically, the endometrium's appearance during the menstrual cycle correlates with the phasic changes in its histologic anatomy. During the follicular phase, when the endometrium is provided estrogen from ovarian folliculogenesis, the stratum basale appears echogenic due to spectral reflections from the mucus-laden glands. In contrast, the stratum functionale is relatively hypoechoic because of its orderly arrangement of glands that lack secretions. The central opposing surfaces of these two endometrial layers manifest as a highly reflective, thin midline strip. Together, the three echogenic lines create the characteristic trilaminar appearance of the proliferative endometrium. [57]

Cervical Mucous

The observation of estrogenic cervical mucus—clear, watery, stretchable, and relatively abundant—suggests a normal level of ovarian estrogen production, but its absence cannot be interpreted confidently because many normal women exhibit such mucus only during the late follicular phase of the cycle when estrogen levels are relatively high. Women skilled in the cervical mucus method can detect evidence of fertile-type mucus prior to the first menses in the postpartum period. [58]

The glandular elements of the cervix proliferate during the follicular phase and the epithelial cells become taller. Under the influence of estrogens, the glands also actively secrete a mucus which will stretch into threads measuring more than 6.5 cm, and even 10–15 cm, at the time of ovulation. This property of

"spinnbarkeit" is the basis of the thread test for oestrogen in circulation.[59]

CONCLUSION

The present questionnaire has been meticulously developed based on the classical descriptions of Rutumati Lakṣhaṇ as elucidated in Ayurvedic literature, along with the established modern physiological signs of the fertile period. The objective of this tool is to facilitate a systematic, non-invasive, and integrative assessment of the fertile window in women by correlating traditional Ayurvedic indicators with contemporary biomedical parameters.

This questionnaire is proposed for future application in clinical and research settings to evaluate its validity, reliability, and feasibility. Upon implementation, it is expected to serve as a valuable instrument for enhancing understanding of reproductive physiology, promoting awareness of natural fertility indicators, and supporting evidence-based integrative approaches in reproductive health care. The structured design of this questionnaire holds potential relevance for further scientific evaluation and may contribute meaningfully to research in the field of Ayurveda and modern gynaecology.

Scope

The prepared questionnaire has scope for future use as a simple, non-invasive, and cost-effective tool to assess the fertile period in women by integrating Rutumati Lakṣhaṇ with modern fertility signs. It may be applied in clinical practice, research, fertility awareness programs, and preconception counselling. Additionally, it provides a basis for further clinical validation and large-scale studies to establish scientific correlation between Ayurvedic concepts and modern reproductive physiology.

Limitations

Despite its potential scope, the questionnaire cannot determine the exact timing of ovulation and only indicates the probability of the fertile period. It is intended as a screening tool rather than a diagnostic instrument. The assessment is based on subjective signs and symptoms, which may lead to false-positive or false-negative results. As the questionnaire is yet to be implemented, its validity and reliability remain to be established, and further clinical evaluation is required before it can be used for definitive assessment.

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