



## Review Article

www.ijrap.net

(ISSN Online:2229-3566, ISSN Print:2277-4343)



### A REVIEW ON ENDOMETRIAL RECEPTIVITY: BARRIER CROSS THROUGH AYURVEDA

Geeta Patki <sup>1\*</sup>, Vishala Turlapati <sup>2</sup>, Shreeja Thali <sup>3</sup>

<sup>1</sup> PhD Scholar, Professor, HOD, Department of Striroga and Prasuti tantra, Gomantak Ayurved Mahavidyalaya and Research Centre, Shiroda, Goa, India

<sup>2</sup> PhD Guide, Professor HOD, Department of Striroga and Prasuti tantra, Yashwant Ayurvedic College Kodoli, Kolhapur, Maharashtra, India

<sup>3</sup> Intern Doctor, Department of Striroga and Prasuti tantra, Gomantak Ayurved Mahavidyalaya and Research Centre, Shiroda, Goa, India

Received on: 15/09/23 Accepted on: 30/10/23

#### \*Corresponding author

E-mail: geetapatki22@gmail.com

DOI: 10.7897/2277-4343.1406164

#### ABSTRACT

Infertility – ‘inability for conception’ is a burning issue in the medical fraternity. Worldwide, the prevalence is increasing day by day. Many factors like ovulation disorders, uterine or cervical abnormalities, fallopian tube damage or blockage, endometriosis, pelvic adhesions, etc., contribute to female infertility. Defective or failed ‘Endometrial Receptivity’ (ER) is one among them. Ayurveda highlights ‘*Vandhyatva*’ as a failure to achieve live birth. *Rutu*, *kshetra*, *ambu*, and *beeja* are the 4 essential factors required for conception. Out of these, *kshetra* or *garbhshayya* is the most important as it is the site of implantation and abode for growing foetus. This article puts light on the concept of endometrial receptivity in relation to infertility.

**Keywords:** Endometrial Receptivity, Infertility, *Vandhyatva*

#### INTRODUCTION

Infertility is an upcoming burning issue in current society and a big challenge for the medical field. Infertility not only indicates “failed conception” but, it also contributes as a very impactful factor for family disputes, socio-economic disturbances, and psychosomatic illnesses. In the past few years, the cases of infertility have risen so much that the statistical data reveals that around 17.5% of the adult population – roughly 1 in 6 worldwide – experience infertility.<sup>1</sup> The reported prevalence of infertility is 12.5% in women and 10% in men.

Infertility is a disease of the male or female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse.<sup>1</sup> According to Ayurveda, *Vandhyatva* (infertility) is defined as failure to achieve a child (live birth).

There are many causes of infertility. Modern science basically highlights; tubal disorders, disorders of the ovaries, disorders of the endocrine system causing imbalances of reproductive hormones, and uterine disorders which could be inflammatory in nature such as Endometriosis, or congenital like septate uterus or benign like fibroids.<sup>1</sup> All these factors affect the health of the uterus. The total effect of it leads to “defective Endometrial Receptivity”. In *Ayurveda*, failure to achieve pregnancy may be understood by failed fertility season (*Rutukala*), improper endometrial bed (*Garbhashayya*) defective reproductive system (diseases of *Yoni*), nutritional failure, and gametal abnormalities. Importance is also given to factors like maternal age, emotional status or happiness of the mother (*saumanasyata*), diet, and code of conduct of copulation.

The endometrium is a hormonally regulated organ that is non-adhesive to embryos throughout most of the menstrual cycle in humans. Endometrial Receptivity means the readiness of the womb to accept the embryo at the time of implantation. For proper implantation and early continuation of conceptus, growing and receptive endometrium plays an important role. Endometrial defects may lead to pregnancy loss. For the continuation of pregnancy, the synchronic coordination between embryonic development and the endometrial status is crucial. Endometrial receptivity refers to a hormone-limited period in which the endometrial tissue acquires a functional and transient ovarian steroid-dependent status allowing blastocyst implantation and therefore pregnancy initiation. The accepted definition of endometrial receptivity is “the time required for endometrial growth when growing blastocyst may attach to endometrial tissue and invade vascular stroma.”<sup>2</sup> This is the time for reception of the conceptus via growing endometrium commonly referred to as the window of implantation [WOI]. Generally, it is calculated between days 20 and 24 of a normal 28-day menstrual cycle.<sup>2-3</sup> Many molecular pathways involve hormones, adhesion molecules, cytokines, and growth factors that help the window of implantation. The window of implantation can also be artificially created by the sequential use of exogenous estrogen and progesterone. Artificially created WOI facilitates more and more frozen embryo transfers than the fresh embryo transfers in the case of ARTs, increasing the rate of successful pregnancy.

#### DIAGNOSTIC TECHNIQUES

Extensive studies have been aimed to develop a special marker for uterine receptivity and these have been based on; biochemical evaluation, ultrasound study of pinopodes, ultrasound scoring systems, and ultrasound assessment of sub-endometrial blood flow.<sup>4</sup> The most important biochemical markers for endometrial

receptivity are *Cytokines* – Leukemia Inhibiting Factor (LIF), Colony stimulatory Factor (CSF) Interleukin-1 (IL-1); and, *Integrins* – Glycodelin and Mucin 1 (MUC 1).<sup>5</sup> An easier, reproducible, and accurate marker for endometrial receptivity was postulated to be a Transvaginal ultrasound study of the endometrium and its blood supply by color doppler. Another diagnostic technique of the Uterine Scoring System of Reproduction (USSR) proposed by Applebaum in 1995, comprises; endometrial thickness, endometrial layering, myometrial contractions, myometrial echogenicity, uterine artery doppler flow evaluation, endometrial blood flow, myometrial blood flow seen on greyscale examination.<sup>6</sup> One more promising diagnostic tool is the Endometrial Receptivity Array (ERA) test.<sup>5</sup> An ERA is a test that claims to find the optimal time for an embryo to be transferred into a woman's uterus for implantation. ERA involves taking a biopsy of the endometrial lining of the uterus and testing the tissue to see which genes are expressed. The endometrium will be categorized as either receptive, pre-receptive, or post-receptive.

## FACTORS AFFECTING ENDOMETRIAL RECEPTIVITY

### Endometrial Thickness

It is defined as the maximal distance between the echogenic interfaces of the myometrium and the endometrium, measured in the plane through the central longitudinal axis of the uterus. The spiral arteries respond to the hormonal changes of the menstrual cycle and undergo transformations as well. These responses include the proliferation of the endothelium, thickening of the wall, and coiling. Various studies described the receptive endometrium as one that has an endometrial thickness of more than 7 mm, is three-layered or five-layered.<sup>7</sup>

### Endometrial Pattern

It is the relative echogenicity of endometrium and myometrium as seen on the longitudinal transvaginal scan. There are various scoring systems being used for grading endometrium. Smith et al classify the endometrium into 4 types according to the echotexture pattern. They are considered to be useful in deciding receptivity.<sup>8-9</sup>

Grade I: Hyperechoic

Grade II: Isoechoic

Grade III: Triple line/Trilaminar

Grade IV: Echogenic black line surrounding the midline echo.

### Uterine Blood Flow

A good blood supply to the endometrium is considered to be an essential requirement for implantation. A good blood supply ensures continuous nutrition for the growing embryo.

## AYURVEDIC APPROACH

### Factors Essential for Conception

*Sushruta* says that, if *Rutu* (optimal season of fertility), *Kshetra* (field i.e. healthy female reproductive system), *Ambu* (water i.e. nourishing substance), and *Beeja* (seed i.e. ovum and sperms); assemble together, the conception will definitely occur<sup>10</sup>. *Vagbhata II* has accepted the importance of *rutu*, *kshetra*, *ambu*, and *beeja*, and emphasized that besides healthy *garbhashaya*; *marga* (vaginal canal), *rakta* (ovum), and *shukra* (sperms); properly functioning *Vayu* and normal psychological status (happy mood) are also essential.<sup>11</sup> *Ayurveda* explains that *kshetra* comprises of the whole female reproductive system/ *garbhashaya*<sup>12</sup>; specifically, the *Garbhashaya* is situated in the third *avarta* of the *yonis*.

### Rutukala (Most Fertile period)

*Rutukala* is termed as the period most suitable for the achievement of conception.<sup>13</sup> *Rutu* literally means season, the favorable season for fertility. A female of good reproductive age, she bears a monthly fertility span which is referred to as a regular/monthly *Rutukala* or *visheshajanana samarthyakala*, also known as "*garbha grahan yogya kala*."<sup>14</sup> *Artava* in its stage of formation is *saumya* and *saumya dravya* is dominant in *Kapha dosha*. *Rutukala* phase is characterized by the proliferation of endometrium followed by ovulation. The reconstruction of tissue/proliferation/regeneration is done by *Prithvi* and *Jala*, which are the *bhautika* components of *Kapha*. Hence the *Rutukala* phase is dominated by *Kapha dosha*. Usually, the *Rutukala* i.e. fertile period is of 12-16 nights<sup>15-16</sup>. If the *yonis*, *garbhashaya* and *artava* are healthy, and the female consumes *ghrita* and *ksheera* on regular basis and is of *Kapha prakriti*, *Rutukala* can even be for the entire month. According to *Acharya Kashyapa*, *Rutukala* is of 12 nights for *Brahmani*, 11 nights for *Kshatrani*, 10 nights for *Vaishya* and 9 nights for *Kshudra*.<sup>13</sup> According to *Acharya Bhavamishra*, *Rutukala* is of 12, 10, 8 and 6 for *Brahmani*, *Kshatrani*, *Vaishya* and *Kshudra* respectively<sup>17</sup>.

### Augmentation Of Fertility Period

Daily consumption of *ghrita - ksheera, mudita* (good mindset and happy mood), *Kapha prakriti* (having *Kapha* dominant body constitution by birth), and *shuddha* or *avyapanna* i.e. disease free *yonis*, help to maintain the fertile period for a longer duration.<sup>18</sup>

## DISCUSSION

Implantation is defined as the process by which an embryo attaches to the uterine wall and penetrates first the epithelium and then the circulatory system of the mother to form the placenta. Implantation occurs in the endometrium of the anterior or posterior wall of the body near the fundus on the 6<sup>th</sup> day which corresponds to the 20<sup>th</sup> day of a regular menstrual cycle. The implantation process occurs in three steps - apposition, adhesion, and invasion. Human implantation is a highly complex and multifactorial process. Successful implantation at the very least requires the presence of a healthy embryo, a receptive endometrium, a synchronized and successful molecular dialogue between the two, and immune protection from the host<sup>19</sup>.

In *Ayurveda*, when looking at the concept of implantation and fertility, *Rutukala* is the very crucial time. Here, the role of *Rasa dhatu* along with the *dhatvagni* is of utmost importance as they are responsible for the formation of proper *artava* as well as nourishment of the whole reproductive system. Menstruation i.e. *purana rajahpravartana* leads to *yonigarbhashaya shuddhi*. Previous monthly-grown *artava* (endometrium) sheds off and starts being replaced by '*nutan artava*' through proliferation of basal layer. This new development is very much healthy and pure. In this span, the *srotasas* also get good nourishment and the *ambu* helps in maturation of healthy *beeja*. *Rutukala* phase being dominated by the *Kapha dosha*; the vagina, cervix, uterus; all the *avartas* of *yonis* become wet, *mrudu*, *snigdha* which helps for the reception of the sperms and continue till *Garbhavapana* (implantation)<sup>14</sup>. The process differs individually and is governed by diet and regimen too. In the previous era, as the style of regimen and diet used to differ in different *Varnas*; it reciprocates the varied *Rutukala*.

*Ayurveda* has given the diagnostic criteria for the identification of fertile period in women. As per the classics, the *Rutumati stree* (female in her most fertile period) looks bright and healthy, her mouth and teeth are moist, she is anxious to hear love stories and have sexual relations, her flanks-eyes-hair are lax, she has

quivering or twitching over arms, breasts, pelvis, umbilicus, thighs and hips and is happy and excited i.e. *prasannata* or *sumanasata* of female, indicate she is ready for conception<sup>20</sup>. During this time, the utero-cervical and vaginal fluid becomes sperm friendly. When these symptoms reach their peak, it results in rupture/liberation of the ovum (*stree-beejotpatti*). So, the *Rutukala* starts from clearance of *kshetra*, nourishment of *artava* as well as *garbhashaya* and completed by *stree-beejotpatti*. It means that the topographical preparation of the female reproductive system is completely ready for *garbhadhaana* and *garbhaavapana*<sup>14</sup>.

In order to achieve and maintain the fertility period for a longer duration, a female should consume *ghrita - ksheera* on a daily basis, have *shuddha yoni*, and have a happy mood (*mudita*). *Ahara* plays a major role in changing physiology. A good diet helps to produce *prakrut Rasadi dhatus*, hormones, and pheromones as well as proliferation of endometrium and growth of follicles. Maintaining chemical equilibrium in the cavity i.e., *Garbhashayya* is also related to diet. If female indulges in *madhura, sheeta, brumhaniya ahara*, it helps to increase *prakrut Rasa dhatu*. *Shuddha Rasa dhatu* formed from the *ahara-rasa*, further nourishes all other entities for the formation of *Garbhashayya*. In a nutshell, diet plays a crucial role in the formation of all the components of *garbha*. *Ghrita* is said to be *virya-Oja-Kapha-Meda vardhak* (increasing all these entities qualitatively as well as quantitatively). *Ghrita* has *madhura rasa* and *vipaka*, and *sheeta virya*; also, it has a unique quality of *samskaranuvartana* i.e. without losing its own qualities, it can imbibe the qualities of other drugs<sup>21</sup>. *Ksheera* being *Madhura, snigdhaandsheetala*; it is *tushtikarak* (gives satisfaction), *pushtikarak* (produces anabolic effect), *viryavardhak, balavardhak, manaskara, jeevaniya* (increases vitality of life) and *shramahara*<sup>22</sup>. It can be inferred that, *Ghrita* and *Ksheera* increase the *prakrut Kapha dosha* which is required to prolong the window of implantation.

The happiness of the mind is another essential factor for a longer *Rutukala* and thereby good endometrial receptivity. The concerned female should be excited and mentally prepared to bear the child. Happy hormones play a very important role in the regulation of menstrual cycles and conception. Oxytocin levels generally increase with physical affection. Hormone Serotonin – a natural neurotransmitter is considered to be the chemical responsible for maintaining mood balance. When serotonin is at normal levels - the person feels more focused, emotionally stable, happier, and calmer. Another neurotransmitter, Dopamine along with Serotonin plays an important role in sexual arousal. High or low levels of dopamine are associated with several mental health and neurological diseases. The body also releases hormones called Endorphins, which are released during pleasurable activities to help reduce stress and improve the sense of well-being.

As *Rutukala* is dominated by *Kapha dosha*, this period is naturally longer in a *Kapha pradhana prakriti* female. *Kapha* or *Shleshma* is *snigdha* (unctuous), *shlakshna* (smooth), *mridu* (soft), *madhura* (sweet), *manda* (slow acting), *stimita* (stable), *guru* (heavy), *pichchhila* (slimy)<sup>23</sup>. Because of its unctuousness, the predominance of *Kapha* has unctuous organs. Due to *madhura guna* of *Kapha*, the person has abundant '*shukra*' and libido. *Kapha* gives stability to the body. Due to density, all the organs are well-developed and perfect. Due to the *pichchhila guna*, the joints are well united and strong indicating *Kapha* is *sandhanakara*. *Kapha* does *brumhana* and provides *bala* (good physique as well as good immunity). All in all, *Kapha* is needed for growth and development.

In concern to the achievement of a healthy reproductive system (*avyapanna yoni*), different local treatments like *Uttarbasti, Yonidhavana* may prove to be promising.

## CONCLUSION

Implantation is a very intricate process that relies on factors like good endometrial receptivity and a longer window of implantation. Successful implantation at the very least, requires the presence of a healthy embryo, a receptive endometrium, a synchronized and successful molecular dialogue between the two, and immune protection from the host. According to Ayurveda, *Garbhadhaana* and *Garbhaavapana* are possible only when *rutu, kshetra, ambu, and beeja* assemble together. The time period ensuring this synchronicity is *Rutukala*. *Rutukala* is predominated by the *Kapha dosha* and this period is longer in females who regularly consume *ghrita* and *ksheera*, are *mudita* (happy and cheerful), and naturally have *Kapha pradhana prakriti*. Hence, drawing a parallel between the concepts of endometrial receptivity and *Rutukala*; it can be said that *ghrita - ksheera nitya sevana*, a happy, stress-free mind and *Kapha* predominant body constitution increases endometrial receptivity ensuring higher chances of conception. This topic has a huge scope and can be further studied in detail with clinical correlation.

## REFERENCES

1. <https://www.who.int/news/item/04-04-2023-1-in-6-people-globally-affected-by-infertility>
2. Achache H, Revel A. Endometrial receptivity markers, the journey to successful embryo implantation. Hum Reprod Update. 2006 Nov-Dec;12(6):731-46.
3. Norwitz ER, Schust DJ, Fisher SJ. Implantation and the survival of early pregnancy. N Engl J Med. 2001 Nov 08;345(19):1400-8.
4. Malhotra N, Malhotra J, Singh A, Gupta P, Malhotra N. Endometrial Receptivity and Scoring for Prediction of Implantation and Newer Markers. J South Asian Feder Obst Gynae 2017;9(2):143-154
5. Giudice LC. Potential biochemical markers of uterine receptivity. Hum Reprod 1999 Dec;14(Suppl 2):3-16.
6. Applebaum M. The uterine biophysical profile. Ultrasound Obstet Gynecol (1995) 5(1):67-8. DOI: 10.1046/j.1469-0705.1995.05010067.
7. Thichnan D, Arger P, Tureck R, Blasco L, Mintz M, Coleman B. Sonographic assessment of the endometrium in patients undergoing in vitro fertilisation. J ultrasound Med 1886 Apr;5(4):197-201
8. Psychoyos A. Hormonal control of uterine receptivity for radiation. J Reprod Fertil 1976;25(Suppl):17-28.
9. Smith B, Porter R, Ahuja K, Craft I. Ultrasonic assessment of endometrial changes in stimulated cycles in an *in vitro* fertilization and embryo transfer program. J in Vitro Fertil Embryo Transf 1984 Dec;1(4):233-238
10. Shri Dalhanacharya, Sushruta Samhita, Sharirasthana: Shukrashonitashuddhishaariram/ 33, Nibandha Samgraha Commentary, Edited by Vd. Jdavji Trikamji Acharya, Reprint edition, Varanasi: Chaukhamba Orientalia; 2021; p 348
11. Vagbhata, Ashtanga Hridaya, Sharirasthana: Garbhavakranti/ 8-9, Sarvangsundara tika of Arundatta, Reprint Edition, Varanasi: Chaukhambha Sanskrit Sansthana; 2021; p 363
12. Indu, Ashtanga Samgraha, Sharirasthana: Angavibhagasharira/ 84, Shashilekha Sanskrit Commentary, First Edition, Varanasi: Chaukhambha Sanskrit series office; 2006

13. Vriddha Jivaka, Kasyapa Samhita, Sharirasthana: Jatisutriyasharira/5, Vidyotini Hindi Commentary, Reprint Edition, Varanasi: Chaukhambha Sanskrit Sansthan; 2019; p 117
14. Patki G. Understanding of Rutu in Relation with Fertility, Int. J. Ayu. Alt. Med, 2017.
15. Indu, Ashtanga Samgraha, Sharirasthana: Putrakaamiya/38, Shashilekha Sanskrit Commentary, First Edition, Varanasi: Chowkhamba Sanskrit series office; 2006; p 270
16. Vagbhata, Ashtanga Hridaya, Sharirasthana: Garbhavakranti/26, Sarvangsundara tika of Arundatta, Reprint Edition, Varanasi: Chaukhambha Sanskrit Sansthan; 2021; p 367
17. Sri Brahmasamskara Mishra and Sri Rupalalaji Vaishya, Bhavaprakasa of Sri Bhavamishra edited with 'Vidyotini' Hindi Commentary, Purvakhand: Garbhaprakaran/2, Varanasi: Chaukhamba Sanskrit Bhawan; 2013; p 20.
18. Indu, Ashtanga Samgraha, Sharirasthana, Putrakaamiya/64, Shashilekha Sanskrit Commentary, First Edition, Varanasi: Chowkhamba Sanskrit series office; 2006; p 270
19. Aghajanova L, Hamilton AE, Giudice LC. Uterine receptivity to human embryonic implantation: histology, biomarkers, and transcriptomics. Semin Cell Dev Biol. 2008 Apr;19(2):204-11.
20. Shri Dalhanacharya, Sushruta Samhita, Sharirasthana: Garbhaavakrantishaariram/ 7-8, Nibandha Samgraha Commentary, Edited by Vd. Jadavji Trikamji Acharya, Reprint edition, Varanasi: Chaukhamba Orientalia; 2021; p 351
21. Charaka and Drudhabala, Charaka Samhita of Agnivesha, Sutrasthana: Annapanavidhi/ 231-232, with Ayurveda-Dipika commentary of Chakrapanidatta, Varanasi: Chaukhamba Orientalia; 2004; p 166
22. Charaka and Drudhabala, Charaka Samhita of Agnivesha, Sutrasthana: Deerghanjeevitiya/ 108-113, with Ayurveda-Dipika commentary of Chakrapanidatta, Varanasi: Chaukhamba Orientalia; 2004; p 22
23. Charaka and Drudhabala, Charaka Samhita of Agnivesha, Vimanasthana: Rogabhishagjitiyavimanam/ 96, with Ayurveda-Dipika commentary of Chakrapanidatta, Varanasi: Chaukhamba Orientalia; 2004; p 277

**Cite this article as:**

Geeta Patki, Vishala Turlapati, Shreeja Thali. A review on endometrial receptivity: Barrier cross through Ayurveda. Int. J. Res. Ayurveda Pharm. 2023;14(6):41-44  
DOI: <http://dx.doi.org/10.7897/2277-4343.1406164>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publishing quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.