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Review Article

STRI VANDHYATVA (FEMALE INFERTILITY DUE TO ANOVULATORY CYCLE): AYURVEDIC AND MODERN REVIEW

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ABSTRACT

Infertility now a day's is the most common social stigma and psychological burden amongst the couple. It is defined as the inability to conceive after one year of unprotected intercourse. Among the common causes of infertility like premature ovarian insufficiency, Poly-endocrine Metabolic Ovarian Syndrome (PMOS), premature ovarian failure, hypothalamic dysfunction, ovarian resistance syndrome, ovulatory issues contribute the most. Anovulation is defined as the failure to produce a mature ovum by ovary, being an important cause of infertility among women accounting for about 40% of cases. In Ayurvedic literature infertility is described as *Vandhyatva.* Ayurvedic literature like *Harit Samhita, Sushruta Samhita, Charak Samhita, Kashyapa Samhita* and *Rasa Ratna Sammuchhay* have given brief description of *Stri vandhyatva. Sushruta Samhita* has mentioned about *Ritu, Kshetra, Ambu,* and *Beeja*. Among them *Beeja* is considered as core and is mandatory for factor for conception. Contemporary science offers treatment like hormonal therapies as well as Assisted Reproductive Technology. In Ayurvedic text various *Panchakarma* therapies are mentioned in which *Uttar basti* is considered as one of the best treatments for infertility. The aim of this study is to review the Ayurvedic and modern science prospective of *Stri Vandhyatva* (female infertility due to anovulatory cycle).

INTRODUCTION

Infertility is defined as failure to conceive after one year of regular (3-4 times per week) unprotected intercourse and avoiding contraceptives during the time period [1]. Factors contributing to infertility are- female factors 40%, male factors 30%, due to combinations of both 20% and remaining 10% cause is unknown[2]. Now days there is a spike in the prevalence of infertility due various factors involving life style, increased stress level, delayed marriage, addictions and other genetic factors. Infertility is social stigma for the couple in which female partner is held accountable and responsible.

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Infertility affects people worldwide and has significant impact on social, economic and psychological wellbeing. In Ayurvedic text like *Harit Samhita, Sushruta Samhita* have given brief description of *Stri Vandhyatva*. In Ayurveda, *Vandhyatva* is described as result of various gynaecological disorders (*Vyapada)* such as *Yoni-Vyapada* and *Artava-Vyapada*[3,4]. *Acharya Sushruta* have mentioned about four factors essential for conception[5]. *Acharya Kashyapa* has mentioned about *Pushpaghni Jataharini*. In anovulatory cycle no mature egg is released from the ovary so the ovulation is not attained resulting in the disruption in the formation of corpus luteum which leads to the absence of progesterone during the luteal phase and fertilization does not occur leading to infertility. Hypothalamic-Pituitary-Ovarian axis governs the ovulation by pulsatile secretion of hormones such as Gonadotropin releasing hormone (GnRH) by, Follicle Stimulating Hormone (FSH) and Luteinizing hormone (LH). Uterus undergo cyclic changes every month under the influence of hormones

to ensure the proper functioning of menstrual cycle. Any disruption at any level of these cyclic changes can result in anovulation and subsequently cause infertility. The etiology responsible for the disturbance includes Polyendocrine Metabolic Ovarian Syndrome (PMOS), hyperprolactinemia, thyroid disorders, premature ovarian insufficiency, insulin resistance and lifestyle disorders. [6,7]

Disease Review

Ayurvedic Review

In Ayurvedic text, *Vandhyatva* have been described in *Brihattreya* and *Laghuttreya. Acharya Charaka has* mentioned *Vandhya, Sapraja* and *Apraja*[8]*. Acharya Sushruta* has described *Vandhyatva* under *Vandhya Yonivyapada*[9]*. Acharya Charak* has given detailed description of *Aharaj, Viharaj* and *Mansik Nidana* which are nearly similar to modern causes of infertility[10]. *Acharya Sushruta* in *Sharir Sthan* explained that any deformity to *Artavavaha Srotas* could lead to *Artavanash* and *Vandhyatva* [11]*. Acharya Bhela* has exclaimed that due to *Beeja* of parents, inadequate consumption of *Rasas,* disorders of *Yoni* lead to *Vandhyatva* in females[12]. *Acharya Bhavprakasha* has described *Vandhya* in *Yonirogadhikara*[13]*. Acharya Harita* has given brief description of *Vandhyatva* and has mentioned the types of *Vandhyatva* under *Kakvandhya, Anpatya, Garbhasravi* and *Mritvatsa*[14]*.* According to *Bhavprakasha* vitiated *Vata* is responsible for *Vandhyatva* mentioned under *Vandhya yoni Vatala yoni* which results in *Abijta, Nastaartava, Alpahartava.* According to *Ashtanga Samgraha* abnormality of *Bija leads* to *Vandhyatva.* In *Rasa Ratna Sammuchhay* 9 types of *Vandhya* has been mentioned[15]. *Acharya* Kashyapa has explained *Pushpaghni Jataharini* which could be corelated to infertility due to anovulation. In *Pushpaghni Jataharini* women menstruate at regular interval of time but unable to conceive[16]. According to *Acharya Charak Vata Dosha* is responsible for the exploitation of *Yoni*[17]*.* The word *"Yoni"* indicates reproductive organs collectively. Ovulation is governed by *Vata Dosha*. Therefore, any vitiation in *Vata Dosha* will leads to disturbance in ovulation. *Acharyas* have mentioned that if *Ashtartava dushti* remains untreated can leads *Abeejatva* (anovulation).

Charak Samhita	***Harita Samhita***	***Rasa Ratna Sammuchhay***
Vandhya	*Kakavandhya*	*Adivandhya*
Sapraja	*Anpatya*	*Vataja*
Apraja	*Garbhasravi*	*Pittaja*
	Mritvatsa	*Kaphaja*
	Balakshaya	*Sannipataja*
	Garbhakosha Bhanga	*Raktaja*
		Daivaja
		Bhutaja
		Abhicharaja

***Nidana* of Anovulation**

There are scattered references for *Nidana* of *Vandhyatva* which are described below

- *Nidana sevana*- Various *Aharaj* and *Viharaj nidana* leads to *Vata dushti* and *Vata* is responsible for *Vandhyatva.* According to *Acharya Charak Vata* is the root cause of *Yoni dushti.*
- *Rasa Dhatu dusti* – It is mentioned in *Samhitas* that due to altered dietary and lifestyle habits like eating *Ruksha bhojan, Atimatra bhojan, Akala bhojan, Ahita bhojan, Guru bhojan, Atisnigdha bhojan, Sheeta bhojan, Tikshna bhojan, Atichinta, Atichankraman, Achankrman, Diwaswap, Ratrijagran Vata* gets aggravated and causes *Rasa dhatu dusti* which causes *Rasa Dhatu Kshaya* ultimately resulting in *Kshaya* of its *Updhatu Aartava* causing irregular menstruation and anovulation.
- *Asriga dosha- Asriga* also known as *Stri Beeja* is responsible for *Matruj bhava.* Due to aggravated *Doshas Aartava* becomes *Stri Beeja rahita* i.e. anovulatory cycle resulting in infertility.
- According to *Acharya Charaka* due to *Beeja bhag dushti* of *Stri shonita* and *Artava* she delivers a *Vandhya* child.
- Injury to *Artavavaha srotas*- According to *Acharya Sushruta* any injury to *Artavavaha srotas* can leads to *Vandhyatva.*
- *Yonivyapada- Acharya Charaka, Acharya Sushruta, Acharya Vagbhata* and *Acharya Bhavmishra* had mentioned 20 types of *Yonivyapada* including *Bandhya, Shandi, Phalini* and *Andini Yonivyapada* which leads to infertility.
- *Mansik nidan- Atichinta, Akarmanyata, Shok, Bhaya, Maithuna Aniksha* can also cause *Beejopghat* and leads to infertility.

- *Avarana*- Vitiated *Kapha* works as *Avarak* of *Apana Vayu* which is responsible for *Vegnigrahan- Adharniya Veg Dharan* causes vitiation of *Vata* and according to *Acharya Charak Vata* is responsible for *Dushti* of *Yoni.*
- Use of *Tikshna Virechana*- According to *Acharya Kashyapa* use of *Tikshna Virechana* in *Mridu Koshtha* women *Apana- Vayu* gets vitiated and induces *Beejopghata.*

Ashtartava dushti

- *Vridhavasthajanya*- According to *Acharyas* in *Vridhavastha Vata* is dominant *Dosha* and there is marked *Jarajanya Dhatukshaya.* All these factors contribute to *Artavanasha* resulting in infertility.
- Lifestyle factors- Disturbed lifestyle like eating habits, eating junk and packed foods disturbed sleep cycle, inadequate sleep, emotional and mental stress are responsible for hormonal imbalance and metabolic disorders.

Samprapti* of *Stri Vandhyatva [18]

Due to various *Nidan sevana* such as *Aharaj nidan, Viharaj nidan,* and *Mansik hetu* leads to *Doshas – Vata, Pitta, Kapha* and *Agni dushti* which results in *Ama* formation and creates *Srotoavrodh* and *Rasadushti* which leads to *Sthanasanshrya* due to *Khavaigunya* and due to *Dhatvagni Mandya* results in *Uttarotar dhatudushti* and causes *Kshaya* of *Artava* i.e., *Kshayatmaka Dushti* and contribute to *Abeejotsarga.*

Nidana sevana
↓
Tridosha Dushti, Agni Mandya
↓
Ama formation
↓
Srotoavrodh
↓
Dhatvagni Mandya
↓
Rasa & Rakta Uttarotar Dhatu dushti
↓
Artava Updhatu formation affected
↓
Artava Kshaya
↓
Abeejotsarga (anovulation)
↓
Stri Vandhyatva (female infertility)

Samprapti Ghatak

Dosha- *Vata Pradhan Tridosha*

Dushya-*Rajah, Artava*

Srotas-*Artavavaha Srotas*

Adhishthana- *Garbhashaya*

Sadhya-Asadhyata- *Krichhasadhya/Asadhya*

Chikitsa [19]

1. *Nidana Parivarjan*

2. *Shamana Chikitsa- Nashta Pushpantak Rasa, Pushpadhanva Rasa, Trivanga Bhasma, Ashwagandhadi Churna, Pushyanug Churna, Dashmool Kwath, Kumariasava, Ashokarishta, Phalaghrita, Kalyan Ghrita, Konch Pak, Lahshuna Kalpa, Shatpushpa Kalpa, Shatavari Kalpa.*

3. *Shodhana Chikitsa*

- *Snehana*– (For *Bahya* and *Abhyantara*) *Phalaghrita, Shatavari Ghrita, Narayana taila, Mahanarayan taila, Bala taila, Amlak ghrita*
- *Swedana- Nadi, Sankara, Prastar Sweda*
- *Sanshodhana – Mridu Vaman* and *Virechan*
- *Basti- Niruha Basti, Anuvasana Basti, Uttar Basti*

Modern Review

According to WHO Infertility definition "Infertility is a disease of the reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse". Infertility is divided into two types one is Primary Infertility in which conception never occurred either and the other is Secondary Infertility which is defined as inability to conceive or give birth inspite of having a previous pregnancy.

WHO Classification of anovulation on the basis of origin [20]

Group I: Anovulation due to hypogonadotropic hypogonadism (5% - 10%) which includes functional hypothalamic amenorrhoea.

Group II: Anovulation due to normo-gonadotropic normo–oestrogenic. This is the largest group contributing 75% - 85% in anovulatory cycle includes PMOS (Polyendocrine Metabolic Ovarian Syndrome).

Group III: Anovulation due to hyper–gonadotropic hypogonadism (10% - 20%) which includes premature ovarian insufficiency.

Group IV: Anovulation due to hyperprolactinaemic anovulation contributing approximately 5% - 10%.

Causes of Female Infertility

Systemic	Tuberculosis
Endocrinopathy	Thyroid disturbances, hyperprolactinemia
Vaginal	Vaginismus, vaginitis, vaginal atresia
Cervical	Chronic cervicitis, cervical erosion
Uterine	Uterine fibromyoma, infantile uterus
Ovarian	Anovulation, chronic oopheritis, PMOS
Tubal	Tubal occlusion, salpingitis

According to FIGO manual tubal factors 25-35%, ovulatory factors 30-40%, cervical factors 5% accounts for female infertility [21].

When the follicles fail to rupture and extrusion of oocyte does not occur it is termed as anovulation and the cycle is termed as anovulatory cycle. There are multiple factors responsible for anovulatory cycle and leading to infertility like as endocrine factors, pituitary factors, ovarian factors, and other lifestyle dysfunctions.

Causes of Anovulatory cycle

Endocrine factors	Thyroid dysfunction, pituitary adenoma, hyperprolactinemia, diabetes mellitus, congenital adrenal, hyperplasia
Hypothalamic factors	Stress, weight changes, intense exercise, eating disorders
Ovarian factors	PMOS, premature ovarian insufficiency
Lifestyle dysfunction	Eating habits, obesity, smoking, alcohol, poor nutrition

Phases of menstrual cycle [22]

In normal endometrium cycle functional zone of endometrium undergoes cyclic changes under the influence of estrogen and progesterone hormone which is divided into four phases.

Regenerative phase

It begins during the end of menstruation and completed within 2-3 days under the influence of rising estrogen. It involves regeneration of endometrium surface epithelium, glands, blood vessels, and stroma from the basal layer.

Proliferative phase

This phase is also known as estrogenic or follicular phase lasting 5-14th days or upto ovulation and controlled by estrogen hormone. In this phase endometrial glands become straight and tubular along with proliferation of stromal cells and elongation of spiral arteries. Endometrium thickens 10-12 mm by ovulation. Ovulation occurs approximately after 10-12 hours of the LH peak or after 32-36 hours of the onset of LH surge.

Secretory phase

This phase is also known as progesterone or luteal phase with duration of 15-28th days or after ovulation controlled by progesterone from the corpus luteum. In this phase glands become tortuous and secrete glycogen rich material, stroma becomes edematous, and spiral arteries coiled. Endometrium is now receptive for implantation and attains maximum thickness of 12 mm.

Menstrual phase

Menstrual phase occurs due to regression of the corpus luteum which leads to fall in estrogen and progesterone resulting in shedding of functional layer of endometrium lasting usually for 3-5 days.

Pathophysiology of anovulatory menstruation

During anovulatory cycle the ovarian follicles grow but remains < 18mm in diameter so ovulation does not occur. The estrogen is still secreting in increased amount but due to imbalance in hormonal balance and unresponsiveness of the hypothalamus to the estrogen GnRH is suppressed as a result LH surge fails to occur results in no ovulation and endometrium continues to be exposed in increasing estrogen and remains in proliferative phase or in hyperplastic state. The endometrium becomes fragile because there is poor structural stromal support.

Results of anovulatory cycle

Anovulatory cycle can lead to irregular, heavy or prolonged bleeding.

Investigation

1. Serum Progesterone (Day 8- Day 21)
2. Serum LH (Midcycle daily)
3. TVS (Day 12- Day 14)
4. Laparoscopy (Secretary Phase)
5. Fern test
6. Urinary LH

Treatment

- Stimulation of ovulation- Clomiphene citrate, Letrozole, hCG, GnRH and its analogs.
- ART (Assisted Reproductive Technology).

DISCUSSION

According to *Acharyas Dhatuvyuhakara karma* of *Vata* is primary causative factor for *Vibhajana* and *Pravartana* which means cell division leading to ovum development and ovulation is controlled and govern by *Apana Vayu.* Any imbalance in *Apana Vata* can affect the process of ovulation. In contemporary science disruption at any level of Hypothalamic-Pituitary-Ovarian axis can hinders the process of ovulation. Thus, it could be concluded that ancient and modern science runs parallel on the idea of *Stri Vandhyatva* (Female Infertility due to anovulatory cycle). According to *Charak Samhita Agni Mandyata* is responsible for *Ama* formation which leads to *Marga avarodha* due to *Vata* and *Kapha* which results in *Uttarotar dhatu dushti* and results in *Artava kshaya* and *Abeejotsarga.* Thus, eliminating these *doshas* through *shodhana* and *shaman chikitsa* is a crucial step in the treatment of *Stri Vandhyatva* (female infertility due to anovulatory cycle). Ayurvedic *Samhitas* has mentioned about specific *Aharaj, Viharaj, Mansik nidana* of *Stri Vandhyatva* corelates with causative factors such as diet, lifestyle and psychological stress of modern science. According to *Acharya Sushruta* four factors essential for conception is *Ritu* (time)*, Kshetra* (uterus and its passage)*, Ambu* (proper hydration and nutrition) and *Beeja* (ovum and sperm) that means ensuring and maintaining proper health of uterus, tubes, cervix, vagina, ovum and sperm with proper diet plan and psychological wellbeing is crucial for achieving conception. WHO's classification of anovulation can be corelated with the description of *Vandhyatva* provided by *Acharya Harita.* So, an integrative approach will be beneficial for the management of anovulatory cycle.

CONCLUSION

Infertility due to anovulatory cycle has spiked tremendously in the past decades due to psychological, environmental, and lifestyle factors. According to Ayurveda, *Aharaj, Viharaj, Manas nidana* contribute to *Vata Pradhan Tridosha dusti* and *Agni Mandya* leading to *Uttarotar dhatu dusti* leading to *Artavakshaya* and *Abeejotsarga.* Modern science also emphasizes on lifestyle, dietary habits, stress etc. play a causative role in Hypothalamus- Pituitary- Ovarian axis disturbance. Hence an integrative approach combining *Panchkarma* procedures like *Virechana, Basti, Uttar Basti, Nasya* and modern hormonal diagnostic tool is required for management of *Stri Vandhyatva* (female infertility due to anovulatory cycle).

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