

**Title: An attempt to understand the concept of PCOS w.s.r to Artavavaha Sroto Dusti****Dharmaraj Nagorao Lone*¹, Chitra Gawande², Pratibha Kulkarni³, N. D. Lone⁴**

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***Corresponding Author:** Email id: dnlteam@gmail.com; Ph: 9036881966, 7892531819.**Abstract:**

Polycystic ovarian syndrome (PCOS) is the most common endocrine ovarian disorder affecting 5 to 10% women of reproductive age. It is also known as stein- laventhal syndrome or hyper androgenic Anovulation. The main primary character of PCOS is irregular menstrual cycle which leads to improper ovulation. Exact pathogenesis of PCOS is not understood clearly, it may be discussed under following headings: Abnormality of Hypothalamic-pituitary compartment (Hormonal imbalance), androgen excess, anovulation, obesity and insulin resistance etc.



Srotas are the circulatory channels through which *Dosha's, Dhatu's and Mala's* moves from one part to another part of the body. Each *srotas* has *srotomoola, srotomarga and srotomukha*. The *moolasthanas* of *artavavahasrotas* are *garbhashaya*(uterus) and *artavavahidhamani's*(uterine & ovarian arteries). *Artavavahasrotas* may be categorized into *Shonitaartavavahasrotas* which carries menstrual blood through blood vessels and capillaries of the uterus & *Beejartavavahasrotas* which carries ovum through fallopian tubes.

Abnormality of *Artavavahasrotas* causes *Vandhyatva, MaithunaAsahishnuta* and *Artavanasha*. *Vandhyatva* caused due to abnormality in *chaturvidhagarbhottapadaka*(*rutu, kshetra, ambu and beeja*)*samagri*. *MaithunaAsahishnuta* related to *vatala, paripluta, vipluta* and *shandiyoniyapada*, while *Artavanasha* related to *Vandhya, Arajaska* and *shushkayonivyapada*. All these symptoms like *Vandhyatva, MaithunaAsahishnuta* and *Artavanasha* are correlated with common symptoms of PCOS which include Infertility, Dyspareunia & Amenorrhoea respectively.

As there is no curative treatment available in modern medicine, understanding of PCOS with reference to *Artavavahasrotodusti* may be a ray of hope to treat PCOS with *Ayurvedic* remedies.

Keyword: *Artava, Srotas, PCOS, Vandhyatva, Yonivyapada.*

Introduction:

The term Polycystic Ovarian Syndrome (PCOS) was first described by Irving Stein and Michael Leventhal as a Triad of 'Amenorrhoea', 'Obesity' and 'Hirsutism' in 1935 when they observed the relation between obesity and reproductive disorders. It is hence also known as the 'Stein-Leventhal Syndrome' or 'Hyperandrogenic Anovulation' (HA) and is the most common endocrine ovarian disorder affecting approximately 5- 10% women of reproductive age worldwide. PCOS is currently considered as a lifestyle disorder affecting 22-26% of young girls in their reproductive age in India. It is one of the leading causes of infertility in women.

It is primarily characterized by extremely irregular menstrual cycles, in which even ovulation may not occur.¹

The main features of PCOS are anovulation, hyperandrogenism and insulin resistance. Anovulation results in irregular menstruation, amenorrhea, ovulation-related infertility and polycystic ovaries. Hyperandrogenism results in acne and hirsutism. Insulin resistance is often associated with obesity, Type 2 diabetes, and high cholesterol levels.² Exact pathogenesis of PCOS is not understood clearly, it may be discussed under following headings: Abnormality of Hypothalamic-pituitary compartment (Hormonal imbalance), androgen excess, anovulation, obesity and insulin resistance etc.³

If pcos is not managed in early stage it may leads to cardiovascular disorders, obesity, infertility and may cause complications like depression,

complications in pregnancy, sleep apnea and endometrial cancer.⁴

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samagri.⁵ *MaithunaAsahishnuta* related to *vatala*, *paripluta*, *vipluta* and *shandiyoniyapada*, while *Artavanasha* related to *Vandhya*, *Arajaska* and *shushka yonivyapada*.⁶ *Vandhyatva*, *MaithunaAsahishnuta* and *Artavanashalakshana's* of *artavavahasrotodusti* are correlated with common symptoms of PCOS which include Infertility, Dyspareunia & Amenorrhoea respectively.

Aims and Objects:

- To understand Pathophysiology of PCOS in *Ayurveda*.
- To evaluate symptomatology of *artavavahasrotodusti* related *yonivyapada's* and pcos.



Materials and Methods:

Based on review and analysis of *Ayurveda* classics, commentaries, modern literature, other recently published books, review articles and research journals.

Discussions:

POLYCYSTIC OVARIAN SYNDROME:

PCOS is characterized by hyperandrogenism, irregular ovulatory cycles and a metabolic derangement including glucose intolerance and hyperinsulinemia. Manifestation of PCOS are heterogeneous and several consensus definitions of the disorder have been produced to describe the disease with various emphases on clinical or biochemical hyperandrogenism, polycystic ovaries and oligoanovulation. The Rotterdam consensus (2003) defines PCOS as at least two of the following characteristics:

1. Clinical hyperandrogenism and /or hyperandrogenemia
2. Oligoanovulation
3. Polycystic ovaries on ultrasound.⁷

AETIOLOGY OF PCOS:

The exact cause of PCOS is unknown or heterogeneous in nature. However it has certainly been linked to a variety of aetiological factors.

➤ INSULIN RESISTANCE:

PCOS is not just a reproductive disorder but a multifaceted metabolic disorder that shows a high association with insulin resistance leading to hyperinsulinaemia, wherein 10% show Type II Diabetes. Besides, 30%-35% have

Impaired Glucose Tolerance (IGT). Such a condition results in the increased production of testosterone thus leading to abnormal or non-existent ovulation. Scientists at the Medical College of Georgia at Georgia Regents University reported that high activity levels of a micro RNA named miR-93 in fat cells hinders the use of glucose by insulin contributing to PCOS and also to insulin resistance.

➤ HORMONAL IMBALANCE:

The imbalance of certain hormones is common in women suffering from PCOS.

i) High testosterone levels leading to signs of hyperandrogenism.

ii) High Luteinizing hormone (LH) whose excessively increased levels disrupt proper ovarian functions.

iii) Low Sex Hormone Binding Globulin (SHBG) hormone that allows the expression of hyperandrogenism.

iv) High Prolactin levels which stimulates the production of milk in pregnancy and is found to be raised in comparatively few patients. The exact reason of these hormonal imbalances is unknown but researchers are trying to establish their link with the ovary itself, the part of the brain that governs the hormonal secretions or the other endocrine glands. The possibility whether insulin resistance triggers such changes too needs to be assessed.

➤ GENETIC FACTORS:

PCOS is a genetically determined ovarian disorder and the genetic links to the disease have been researched in detail.



Research at the University of Oxford and the Imperial College London revealed that a gene implicated in the development of obesity is also linked to susceptibility to PCOS.

A study published in 2005 also showed that excessive exposure to androgens during intra-uterine life may have a permanent effect on gene expression leading to PCOS and later to insulin resistance. The familial clustering of PCOS is common. It has been noted that the first degree relatives of patients with PCOS may be at high risk for diabetes and glucose intolerance. Similarly, a study revealed that mothers and sisters of PCOS patients showed higher androgen levels than the control subjects. PCOS is a genetically determined ovarian disorder and the heterogeneity can be explained on the basis of interaction of the disorder with other genes and with the environment.

➤ **STRESS AND OTHER PSYCHOLOGICAL FACTORS:**

PCOS is often caused by psychological factors. Increased stress can upset the normal menstrual cycle and causes hormonal changes such as raised levels of cortisol and prolactin which affect menstruation that normally resumes after the stress subsides.

➤ **MISCELLANEOUS:**

The sedentary lifestyle, dietary variations, lack of exercise or intensive physical exercise have also been contributory factors as also extreme weight loss, disorders of the endocrine system and various disorders of the ovaries.⁸

PATHOPHYSIOLOGY:

Exact pathogenesis of PCOS is not understood clearly, it may be discussed under following headings: Abnormality of Hypothalamic-pituitary compartment (Hormonal imbalance), androgen excess, anovulation, obesity and insulin resistance etc.

➤ **ABNORMALITY OF HYPOTHALAMIC-PITUITARY COMPARTMENT (HORMONAL IMBALANCE):**

- Increased pulse frequency of GnRH leads to increased pulse frequency of LH, leptin, a peptide secreted by fat cells and by the ovarian follicles in presence of hyperinsulinemia may be responsible for this.
- GnRH preferential to LH rather than FSH.
- Increased pulse frequency and amplitude of LH results in tonically elevated level of LH.
- FSH level is not increased this mainly due to the Negative feedback of chronically elevated oestrogen and follicular inhibin.
- Increased free oestradiol due to reduced sex hormone binding globin (SHBG) bear positive feedback relationship to LH.
- The LH:FSH Ratio increased.

➤ **ANDROGEN EXCESS:**

- Abnormal regulation of androgen forming enzyme is thought to be main cause for excess production



of androgens from the ovaries and adrenals.

- Principal source of androgens are

- a) **OVARY**
- b) **ADRENALS**
- c) **SYSTEMIC METABOLIC ALTERATIONS**

A. OVARY: Produces excess androgens due to

- I. Stimulation of theca cells by high LH
- II. P₄₅₀ C₁₇ enzymes hyperfunction
- III. Defective aromatization of androgens to oestrogen.
- IV. Stimulation of theca cells by IGF-1 (insulin growth factor)

B. ADRENALS: Adrenals are stimulated to produce excess androgens by

- I. Stress
- II. P₄₅₀ C₁₇ enzymes hyperfunction
- III. Associated high prolactin level.

C. SYSTEMIC METABOLIC ALTERATIONS:

I. HYPERINSULINEMIA CAUSES

- a) Stimulation of theca cells to produce more androgens.
- b) Insulin results in more IGF-1 by autocrine action, IGF-1 stimulates theca cells to produce more androgens.

- c) Insulin inhibits hepatic synthesis of (SHBG) resulting in more free level of androgens.

II. HYPERPROLACTINEMIA:

- a) In about 20% cases there may be mild elevation of prolactin level due to increased pulsitivity of GnRH or due to dopamine deficiency or due to both.
- b) The prolactin further stimulates adrenal androgen production. Whatever may be the aetiology the endocrinologic effect of PCOS produce vicious cycles of events.

➤ **ANOVULATION:**

Because of low FSH level, follicular growth is arrested at different phases of maturation. The net effect is diminished oestradiol and increased inhibin production due to elevated LH. There is hypertrophy of theca cells and more androgens are produced either from theca cells or stroma.

There is defective FSH induced aromatization of androgens and oestrogens. Follicular microenvironment is therefore more androgenic rather than oestrogenic. Unless there is follicular microenvironment, follicular growth, maturation and ovulation cannot occur.

There is huge number of atretic follicles that contribute to increased ovarian stroma (hyperthecosis) LH level is tonically elevated without any surge.

➤ **OBESITY AND INSULIN RESISTANCE:**



Obesity recognized as an important contributory factor. Apart from excess production of androgens, obesity is also associated with reduced (SHBG). It also includes insulin resistance and hyperinsulinemia which in turn increases the gonadal androgen production.

Aetiology of insulin resistance is unknown mutations of the insulin receptor gene in the peripheral target tissues or reduced tyrosine autophosphorylation of the insulin receptor is currently thought to be an important cause.⁹

SYMPTOMATOLOGY:

- Common symptoms of PCOS Includes
- Oligomenorrhea or amenorrhea-irregular, few or absent menstrual periods or cycles.
- Infertility due to Anovulation.
- Dyspareunia – pain during sexual intercourse.
- Enlarged ovaries with multiple small cysts
- Hirsutism (excess hair growth, usually in a male pattern),
- Insulin resistance
- Male-pattern hair loss and fat deposition
- Acne, oily skin, seborrhea
- Weight gain, difficulties in losing weight, central obesity
- Acanthosis nigricans- patches of thickened, velvety, darkened skin on neck & other areas of skin.¹⁰



PROPOSED SAMPRAPTI OF PCOS IN AYURVEDA:

The disease process of PCOS can be clearly elucidated on the *Ayurveda* lines by considering the *Samprapti Ghatakas* (factors) responsible for the manifestation of *Samprapti* (pathogenesis) in following way:

- *Doshas: Tridoshas* with *Vata* and *Kapha* predominance
- *Dushyas: Rasa* and *Rakta*
- *Srotasa: Artava VahaSrotasa* and *PhalaVahaSrotasa* (*Sushruta*)
- *Agni: Mandagni*
- *Srotodushti: Srotosanga*
- *Vyaadhimarg: Baahya Rogamarga*
- *Pratyatmniyatlakshana: Anartava* (amenorrhoea and anovulation)

Vishamaaahar-vihara (improper diet and activities) causes *Agnimandya* (reduced digestion and metabolism) leading to *Apakwata* (immature) of *Aadya rasa* (foremost digestive extract) and formation of *saam* (immature) *rasa* which vitiates the *aartava* (menstrual blood) as well as increases the *kaphadosha*, which further leads to “*srotorodhajanyaapachitamedodhatuvriddhi*” (*Medadhatu* increase due to obstruction in body channels) and *Vata Prakopaka* causing obesity and amenorrhoea. *Vata* and *Kapha prakopaka* *aahar-viharacauses* vitiation of *Vata* and *Kapha Doshas*, which leads to *Agnimandhya* which give rise to *Amaproduction* and *Samana Vata Vikriti* in *Aamashaya* (stomach) due to *Jatharaagni Mandhya* (reduced digestive

fire) and *Amaproduction* in different *Dhatu* due to *Dhatwagni Mandhya* (reduced metabolism). This *Amaproduction* causes improper enzymatic reactions leading to incomplete metabolism and hormonal imbalance like hyperinsulinaemia, hyperandrogenism ultimately leading to different menstrual disorders like anovulation and amenorrhoea/ oligomenorrhoea and ovarian abnormalities like polycystic ovaries.

Due to *Amaproduction*, *Srotavarodha* (obstruction in body channels) occurs in *Artava Vaha Srotasa*, leading to improper regulation of *Apana Vata* and *artava* which manifests as anovulation and amenorrhoea/ oligomenorrhoea.¹¹

SROTAS:

The term “*srotas*” denotes a channel or path through which the nutrient materials to the various tissues are supplied for nourishment. It is derived from the root “*स्त्रु स्त्रवणे*” meaning to flow, to ooze, to exude, to cause to flow etc. *Charakacharya* has defined the *srotas* as “*स्त्रवणात् स्रोतांसि*” meaning thereby the structure through which *stravanam* (oozing, filtering or permeation) takes place.

Depending upon direction, aim and function *srotas* are explained in *Charakasamhita* by following names:

1. *Srotamsi* (channels)
2. *Siras* (veins)
3. *Dhamanis* (arteries)
4. *Rasayani* (lymphatics)
5. *Rasavahini* (capillaries)

6. *Nadi* (tubular conduits)
7. *Panthan* (passages)
8. *Margas* (pathways)
9. *Sharirachidras* (body orifices, openings cavities)
10. *Sanvrita- asamvrita* (covered and uncovered passages)
11. *Sthanas* (sites, locus)
12. *Ashayas* (repositories)
13. *Niketas* (restores)¹²

यावन्तः पुरुषे मूर्तिमन्तो भावविशेषास्तावन्त एवास्मिन्स्रोतसांप्रकारविशेषाः।

The specific varieties of the channels of circulation in the human body are the same in number as the structural entities in it.¹³

According to *sushrutacharyasrotasa*'s are considered as *pratyanga*'s of body and classified into two types.

1. Bahirmukhasrotas:

“श्रवणनयनवदनघ्राणगुदमेढ्राणि नव
स्रोतांसिनराणांबहिर्मुखानि,
एतान्येवस्त्रीणामपराणि च त्रीणि द्वेस्त
नयोरधस्ताद्रक्तवहंच” || सु.शा ७/९

Bahirmukhasrotasa's are also called *navadwara*'s they are common for both sexes, seven are present in head region and two in the lower part of the body.

Two ears, two eyes, one mouth, two nasal passages, anus, the urethra.

Above these are common for both sexes.

But there are three extra *bahyasrotasa*'s present in women, as two breasts acts as outlet for milk, one *apatyamarga* (*yonidwara* or opening for menstrual blood).



2. Antaramukhasrotas: (yogavahisrotas)

“तानितुप्राणान्नोदकरसरक्तमांसमेदो
मूत्रपुरीषशुक्रार्तववहानि” ॥सु.शा ९/१२

Sushrutacharyahas explained 11 pairs (11x2) of *srotasa* 's. As follows

Pranavaha, annavaha, udakavaha, rasavaha, raktavaha, mamsavaha, medovaha, mutravaha, purishavaha, shukravaha and artavavaha srotas 's.¹⁴

ARTAVA, ARTAVAVAHA SROTAS AND ITS DUSTI:

Artava represents the elements that are produced following a rhythm and events of cycles in female genital physiology.

Hence we can consider three interdependent elements under *artava*:

- *Dhatu* (upadhatu) *rupaartava* (ovarian hormones)
- *Beejarupaartava* (ovum)
- *Rajahsravaor shonitasravarupaartava* (menstrual flow).

➤ DHATU(UPADHATU) RUPA ARTAVA AS OVARIAN HORMONES:

तासामपि बलं वर्णं शुक्रं पुष्टिं करोति हि।
एतेन स्त्रीणां सप्तमो धातुरार्तवं.. ॥ भा.पु
३/१८८

रजसिचोपचीयमानेशनैःशनैःस्तनगर्भाशययो
न्यभिवृद्धिर्भवति। सु.सू १४/१८ डल्हण

Like *shukradhatu* in males, *artava* in females imparts *bala, varna* and *pushti* hence it is considered as *dhatu*.

Dhaturupaartava, is responsible for development of breast, uterus, vagina can be considered as ovarian hormone.¹⁵

➤ BEEJA RUPA ARTAVA (OVUM):

तत्रस्त्रीपुंसयोःसंयोगेतेजःशरीराद्वायुरुदीरयति

ततस्तेजोनिलसन्निपाताच्छुक्रं च्युतं योनिमभि
प्रतिपद्यतेसंसृज्यते चार्तवेन॥ सु.शा ३/४

During the act of coitus between man and woman the *teja* is activated by the *vayu* and semen is discharged due to the combined action of both *tejas* and *vayu* into vagina and later it unites with *artavavizbeejarupa artava*.¹⁶

➤ RAJAHSRAVA OR SHONITASRAVA RUPA ARTAVA (MENSTRUAL FLOW):

मासिमासिरजःस्त्रीणांरसजंस्त्रवतित्र्यहम्।
वत्सराद्वादशाद्धूर्वयातिपञ्चाशतःक्षयम्॥अ.ह
.शा १/७

Rajah as *upadhatu* of essence part of *rasa dhatu*, expelled for three days every month in women. This physiological process starts at age of twelve and disappears at the age of fifty. So *rajah* expelled out is menstrual blood.¹⁷

ARTAVAVAHA SROTAS AND ITS DUSTI:

आर्तवहेद्वे,
तयोर्मूलंगर्भाशयआर्तववाहिन्यश्चधमन्यः,
तत्रविधायवन्ध्यात्वंमैथुनासहिष्णुत्वमार्तव
नाशश्च॥ सु.शा ९/१२

There are two *artavavahasrotasa's* their *moolasthanas* are *Garbhashaya* and *Artavavahinidhamanias*.

Injuries or Abnormality of *Artavavahasrotas* causes the symptoms like *Vandhyatva*, *MaithunaAsahishnuta* and *Artavanasha*.¹⁸

VANDHYATVA (INFERTILITY):

Failure to achieve conception is nothing but infertility. Four important factors or constituents to form *Garbha* are explained by *sushrutacharya* as *chaturvidhagarbhottapadakasamagri*, which includes. *Rutu* (season or fertile period), *Kshetra* (healthy uterus, fallopian tubes, all reproductive organs of male and female), *Bija* (shukra and shonitaviz sperm and ovum) and *Ambu* (Aahar rasa or proper nutrient fluid) & *charakoktta shad garbhavrudhikarabhava's* (*matruja*, *pitruja*, *atmaja*, *satvaja*, *satmyaja* and *rasaja*).

Abnormality in any of the *chaturvidhagarbhottapadakasamagri* or *shad garbhavrudhikarabhava's* will cause *vandhyatvaviz* infertility. This is one of the common symptoms of the PCOS.¹⁹

MAITHUNA ASAHISHNUTA (DYSPAREUNIA) RELATED YONIVYAPADA:

VATALA YONIVYAPADA:

According *charakacharya* aggravated *vayure* reaches reproductive system and produces pricking and other pain. *Sushrutacharya* has described local symptoms like roughness, stiffness, acute pain and pricking pain. In these conditions *maithunaasahishnuta* (dyspareunia) may be takes place. This resembles dyspareunia one of the common symptom of PCOS.²⁰

VIPLUTA AND PARIPLUTA YONIVYAPADA:

विद्याद्विप्लुतानित्यवेदनाम् ।
परिप्लुतायां भवति ग्राम्यधर्मैरुजाभृशम् ॥ सु. उ
३८/१०

Viplutais such *yonivyapada* in which there is continuous pain occurs at *yonipradesha* which doesn't allow for act of sexual intercourse which ultimately results in *MaithunaAsahishnuta*, while in *pariplutayonivyapada* severe pain takes place at the time of coitus viz (dyspareunia). This is one of the common symptoms of the PCOS.²¹

ARTAVANASHA (AMENORRHOEA) RELATED YONIVYAPADA:

ARAJASKA:

अरजस्केति अनार्तवा । च. चि ३०/१७
(चक्रपाणि) *chakrapani* has described *Anartava* as a symptoms of *arajaskayonivyapada*.

SHUSKA YONIVYAPADA:

शुष्का नष्टार्तवा कथिता | शा.पु ७/१७८
आढमल् टिका

Acharyaaddhamala has mentioned *nastartava* as the only symptom of *shuska yonivyapada*.²²

VANDHYA YONIVYAPADA:

वन्ध्यांनष्टार्तवाविद्यात् | सु.उ ३८/१०

Artava is absent in *vandhyayonivyapada*.

The term *vandhya* in *yonivyapada* is characterized by a specific feature the *nastartava* or *neerartava* viz Amenorrhoea.²³

Instead of *nastartava*, *neerartava* or *artava- virahitata* has been explained by *Bhavaprakash*.²⁴

So all the above *yonivyapada*'s and *dustachaturvidha* & *shadvidhagarbhottapa dakabhava*'s explained by *sushrutacharya* and *charakacharya* correlated with common symptoms of PCOS like dyspareunia, amenorrhoea and infertility and other associated symptoms of PCOS.

Conclusion:

✚ Polycystic ovarian disease is not explained directly in *Ayurveda*. Etiology, pathophysiology and symptomatology of PCOS is not exactly understood even in modern science.

✚ Some of the symptom like infertility, dyspareunia and amenorrhoea are exactly correlated with *ArtavavahasrotodustilakshanavizV andhyatva*, *Maithunaasahishnuta* and *Artavanasha*. And these

lakshana's of *artavavahasrotodusti* found in *Arajaska*, *Vandhya*, *Shuska*, *Vatala*, *Vipluta* and *Pariplutayonivyapada*.

✚ If this correlation between *yonivyapada*, *artavavahasrotodustilakshana* and common symptom of PCOS understood scientifically – which may be helpful to treat the patients of PCOS with *Ayurvedic* remedies which are free from harmful side effects.

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