Polycystic Ovarian Syndrome (PCOS) is the most common endocrinopathy in women of reproductive age and one of the leading causes of female infertility that has no specific aetiology. It manifests as a group of symptoms. The exact cause of PCOS is unknown; however, it has been linked to hormonal imbalance, mainly insulin resistance leading to hyperinsulinaemia, as well as genetic factors though specific genes have not been clearly identified so far. The sedentary lifestyle, dietary variations, lack of exercise, stress etc. are also the contributory factors. The symptoms of PCOS may begin in adolescence with menstrual irregularities, hyperinsulinaemia, hyperandrogenism obesity and may lead to infertility. Current treatments for PCOS are only moderately effective at controlling symptoms and preventing complications. Though in Ayurveda this condition has not been explained as a single disease entity, but it can be construed under the headings Yoniyapada and Artavadashti. This paper reviews the contemporary and Ayurvedic perspectives of PCOS and propounds adoption of a holistic treatment in the form of good stress-free lifestyle, appropriately balanced diet, Yoga, Pranayama, along with administration of wisely selected Ayurvedic drugs, for an effective management of PCOS.

Key words: Artavadashti, Holistic approach, Polycystic Ovarian Syndrome, Yoniyapada

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. [1] 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. [2] It is one of the leading causes of infertility or menstrual disorders in women & is increasing exorbitantly due to sedentary habits.

It is primarily characterized by extremely irregular menstrual cycles, in which even ovulation may not occur. Pubertal events seen in such cases include oligomenorrhea, hirsutism, acne and weight gain. There are no single criteria sufficient for clinical diagnosis because of multiple aetiologies and presentations. [3] Though globally it has an alarming incidence, its diagnosis is difficult as it manifests as a spectrum of symptoms rather than a specific one.

Relevance of work

The best known allopathic treatment for PCOS includes medicines such as clomiphene citrate, metformin, letrozole, tamoxifene and troglitazone. All these medicines have mild to severe side effects including hot flushes, arthritis, joint or muscle pain and psychological side effects as irritability, mood swings, depression and bloating. Due to the adverse effects caused by the allopathic medicines, alternative medicines which have a safer profile are the areas of interest these days. So this article is an attempt to compile and analyze an Ayurvedic approach to management of PCOS.

MATERIALS AND METHODS

Based on review and analysis of Ayurvedic literatures as Charaka Samhita, Sushruta Samhita and modern texts.

DISCUSSION

Modern perspective of PCOS

Aetiopathogenesis

The real cause of the PCOS is still unknown, however insulin resistance and hyperandrogenism resulting from hormonal imbalance, play an important role. Hypothalamo-Pituitary- Ovarian axis remains normal, but normal function is masked by inhibition of ovarian follicular development and inappropriate feedback to pituitary. The high oestrogen production is largely due to conversion of androgen to estrogen in the ovary and peripherally. It causes increase in luteinizing hormone (LH) and decrease in follicle stimulating hormone (FSH). A vicious circle is established because increase in LH induces thecal hyperplasia and hence increased androgen synthesis by the ovaries. High level of androgen results in decrease in the peripheral production of the sex hormone binding
globulin (SHBG). This leads to increased level of free androgens which manifests as hirsutism. The hyperthecosis is related to an over production of androgens which reduces granulosa cell proliferation and maturation, as well as stimulating fibrosis of surrounding stroma and capsule, resulting in anovulation and infertility.\(^4\) There is an association between hyperinsulinemia and hyperandrogenism, and in addition to hirsutism and infertility, PCOS has associated metabolic risks.\(^5\) Another consequence of the raised oestrogen level is the target organ effect on adipose tissue formation and endometrial hyperplasia, which may result in endometrial cancer.

PCOS is also associated with some genetic factors. 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.\(^6\) PCOS is often caused by psychological factors. Increased stress can upset the normal menstrual cycle and causes hormonal changes as raised levels of cortisol and prolactin. This affects menstruation, which resumes normal trend only after the stress subsides. The sedentary lifestyles, dietary variations, lack of exercise have also been identified as contributory factors.

**Symptomatology**\(^7\)

- Oligomenorrhea or amenorrhea (primary or secondary)
- Anovulation (lack of ovulation and therefore infertility)
- Dysfunctional uterine bleeding (abnormal bleeding patterns at mid cycles)
- Enlarged ovaries with multiple small cysts
- Hirsutism (excess hair growth, usually in a male pattern), Infertility
- Insulin resistance
- Male-pattern hair loss and fat deposition
- Acne, oily skin, seborrhoea
- Weight gain, difficulties in losing weight, central obesity
- Acanthosis nigricans- patches of thickened, velvety, darkened skin on neck & other areas of skin

**Diagnosis**

Women may have cysts in the ovaries for a number of reasons and so it is the characteristic constellation of symptoms, rather than the presence of cysts themselves that is important in establishing the diagnosis of PCOS.

- The **Rotterdam criteria of assessment**: presence of two out of the following three criteria:\(^8\)
  - Oligomenorrhea and/or anovulation
  - Hyperandrogenism (clinical and/or biochemical)
  - Polycystic ovaries, with the exclusion of other aetiologies
- Gynaecologic ultrasonography (positive findings)
- Laparoscopic examination may reveal a thickened, smooth, pearl-white outer surface of the ovary.
- Serum (Blood) levels of androgens (male hormones), including androstenedione, testosterone and dehydroepiandrosterone sulfate may be elevated.

- The ratio of LH to FSH is greater than 1:1, as on day 3 of menstrual cycle.
- Reduced Sex Hormone Binding Globulin (SHBG) levels.
- Fasting biochemical screen and lipid profile.
- Prolactin to rule out hyperprolactinemia.
- TSH to rule out hypothyroidism.

**Ayurvedic perspective of PCOS**

It does not cannot be correlated to any single disease or syndrome in Ayurveda, but the symptoms bear a resemblance to the different terminologies mentioned in different Ayurvedic texts, such as:

- **ArajaskaYoniypapad** - As per Churaka, when Pitta situated in Yoni and uterus vitiates Rakta, the woman becomes extremely emaciated and discoloured. This condition is known as Arajaska.\(^9\) Acharya Chakrapani has described amenorrhea as a symptom.

- **LokatkhayaYoniypapada** - Vagbhata described that due to vitiation of Vata and Pitta, the amount of menstrual blood is decreased and the woman suffers from burning sensation, emaciation and discolouration.\(^10\)

- **VandhyaYoniypapada** - Sushruta has mentioned amenorrhoea or oligomenorrhoea as a symptom of sterility.\(^11\) Harita, while elaborating the six types of Vandhyayoni, mentions Anapayta Vandhya (infertility) as one of them wherein Dhatukshaya is the etiological factor of Nashtartava. Anapayta Vandhyayoni can be fairly compared with PCOS due to the similar features of anovulation and absence/ irregularity of menstruation, thereby resulting in sterility.

- **Ashtartava Dushhi** - Vagbhatta states that the Artava can be vitiated by the Doshas, resulting in eight types of Artavadushti. Such vitiation leads to Abhejata, which can be correlated to the anovulatory menstruation feature of PCOS.\(^12\)

- **Nashtartava – Sushruta** says that the Tridoshas can obstruct the Srotasas regulating menstruation and cause arrest of the menstrual flow.\(^13\)

- **Pushpaghni Jataharini** – As per Kashyapa, such women menstruate in time but it is useless (Vyathpushpa, i.e, anovulatory cycle), has corpulent and hairy cheeks (hirsutism- may be due to hyperandrogenism).\(^14\) Thus Pushpaghni Jataharini seems to be very near to PCOS.

These are some conditions which portray the symptomatology of PCOS. Considering all the above mentioned types of conditions/diseases quoted in the classics, it can be noted that neither of them bears a complete resemblance to the current diagnostic criteria of PCOS. Thus it can be inferred that none of the above said terminologies can be perfectly correlated to PCOS.

**Proposed Samprapti (Etiopathogenesis)**\(^15\)

Ayurveda considers a concatenation of four basic etiological factors - unhealthy lifestyle, menstrual disorders, genetic factors, and cryptogenic factors in the establishment of female genital disorders (Yoni Vyapata). 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
- **Dashyas** : Rasa and Rakta
- **Srotasas** : Artava Vaha Srotasa and Phala Vaha Srotasa (Sashrutra )
- **Agni** : Mandagni
- **Srotodushthi** : Srotasang and Vimarga Gamana
- **Vyaadihi marg** : Bauhya Rogamarga
- **Pratyaatmniyat lakshana** : Anartava (amenorrhea and anovulation)

Vishama aahar-vihara (improper diet and activities) causes Agnimandhya (reduced digestion and metabolism) leading to Apakwata (immature) of Aadhy rasa (foremost digestive extract) and formation of saam (immature) rasa which vitiates the aartava (menstrual blood) as well as increases the kapha dosha, which further leads to “srotorodhajanyap apachitamedohdatuvriddhi” (Meda dhatu increase due to obstruction in body channels) and Vata Prakopa causing obesity and amenorrhea.

Vata and Kapha prakopak aahar-vihara causes vitiation of Vata and Kapha Doshas, which leads to Agnimandhya which give rise to Ama production and Samvana Vata Vikriti in Aamashaya (stomach) due to Jatharagni Mandhya (reduced digestive fire) and Ama production in different Dhatus due to Dhatvagni Mandhya (reduced metabolism). This Ama production causes improper enzymatic reactions leading to incomplete metabolism and hormonal imbalance like hyperinsulinaemia, hyperandrogenism ultimately leading to different menstrual disorders like anovulation and amenorrhea/ oligomenorrhea and ovarian abnormalities like polycystic ovaries.

Due to Ama production, Srotovardhah (obstruction in body channels) occurs in Artava Vaha Srotasa, leading to improper regulation of Apana Vata and artava which manifests as anovulation and amenorrhea/ oligomenorrhea.

**Management of PCOS in Ayurveda**

**The therapeutic approach in Ayurveda**

In Ayurveda, the management approach to PCOS is concentrates on treating Agnimandhya at Jatharagni and Dhatvagni level and alleviating Srotovardhah and ultimately regularizing the Apana Vata. So, Ayurvedic treatment protocol for PCOS includes -

1. **Shodhana Chikitsa**
2. **Shaman Chikitsa**
3. **Life style management**

Such treatment protocol clears obstructions of Srotasa in the pelvis, normalises metabolism, detoxifies of body, strengthens and revitalizes the female reproductive system, which regularizes the menstrual cycles and re-establishes the hormonal imbalance and thus the PCOS gets treated.

1. **Shodhana Chikitsa**

This primarily includes selected Panchakarma upakrama (5 major treatment modalities) especially Anuvasana (enema with medicated oil), Niruha (enema with medicated decoction) and Uttarabasti (enema in the genital tract) which are more beneficial in this condition. The classics too quote Basti to be the modality of choice in this context due to its utility in conditions of vitiated Vata. Other Panchakarma modalities like Vamana (emesis), Virechana (purgation) are also prescribed for vitiated Kapha and Pitta respectively. Snehana (oleation) and Swedana (sudation) need to be given prior to any Panchakarma.

2. **Shaman Chikitsa**

Ayurveda has a wide range of medicines to strengthen ovarian functions. Some of the medicinal herbs having which can strengthen ovarian functions are:

**Shatavari:**
- **Latin name:** Asparagus racemosus Willd.
- **Family:** Lilliaceae
- **Habit:** Woody climber
- **Parts used:** Tuberous roots
- **Action on PCOS:** It helps in promoting normal development of ovarian follicles, regulates menstrual cycle and revitalizes the female reproductive system. Shatavari also helps in combating hyperinsulinemia (high levels of insulin), mainly due to its phytoestrogen. [18]

**Kumari:**
- **Latin name:** Aloe vera ex Linn.
- **Family:** Lilliaceae
- **Habit:** Acaulescent herb
- **Parts used:** Leaf, leaf-juice, dried juice of leaf
- **Action on PCOS:** It helps in promoting normal development of ovarian follicles, regulates menstrual cycle and revitalizes the female reproductive system. Shatavari also helps in combating hyperinsulinemia (high levels of insulin), mainly due to its phytoestrogen. [18]

**Ashoka**
- **Latin name:** Saraca asoca (Roxb.) De Wilde
- **Family:** Fabaceae
- **Habit:** Small tree
- **Parts used:** Stem bark, flower, seed
• Action on PCOS: The herb has a stimulatory effect on the ovarian tissue, which may exhibit an estrogen like activity that enhances ovulation and repair of the endometrium. [21]

Lodhra
• Latin name: Symlocos racemosa Roxb.
• Family: Symlocaceae
• Rasa – Kashya; Guna- Laghu, Raksha; Vipaka- Katu, Veerya-Sheetta
• Part used: Bark
• Action on PCOS: Trials are suggestive of its role in normalizing FSH, LH which is needed for a woman’s wellbeing. Oral administration of aqueous extract of S. racemosa to female rats, significantly stimulated serum FSH level along with the rise in serum LH level; histopathological study revealed enhanced folliculogenesis, presence of mature follicles and detached oocytes, which are results of increased FSH and LH levels. [22] S. racemosa treatment significantly decreased testosterone levels which were found to be elevated in luteoloude induced PCOS in rats. S. racemosa significantly restored other biochemical parameters of blood such as oestrogen, progesterone and cholesterol levels. It also restored the histology of ovarian tissue. The ovarian and uterine weights were also significantly recovered after the S. racemosa treatment. [23]

Guduchi:
• Latin name: Tinospora cordifolia (Willd.) Miers ex Hook. f. & Jhoms.
• Family: Menispermaceae
• Guna- Gur, Snigdha; Rasa-Tikta, Kashaya;Vipaka-Madhur; Veerya-Ushna, Tridosha-har
• Actions & uses: Anti-inflammatory, antidiabetic, reduces hyperinsulinaemia, antioxidant, antistress effect. [24]
• Parts used: Stem
• Action on PCOS: Chronic inflammation in tissues is the root cause for insulin imbalance and ovarian cysts. Guduchi is a powerful anti-inflammatory herb. It helps in revitalize all the body tissues and boosts metabolism naturally. It also helps to lower the insulin resistance. It regularizes the menstrual flow. [25]

Triphala
• It refers to a mixture of three fruits- Amalaki (Embllica officinalis Gaertn), Haritaki (Terminalia chebula Retz) and Bibhitaki (Terminalia bellirica Roxb).
• Action on PCOS: It is a rich source of Vitamin C, a powerful natural antioxidant that helps in reducing the inflammation by scavenging free radicals. Triphala helps in cleansing and detoxifying the system and thus helps in curing PCOS. The extract of Triphala is found to possess the ability to scavenge free radicals as DPPH (diphenylpicrylhydrazyl) and superoxide. The phenolic compounds present in these extracts are mostly responsible for their radical scavenging activity, and may be helpful in controlling various hormonal influences which are causing menstrual irregularities. [26]

Dashmool
• This is an aqueous extract of a combination of roots of 10 plants known to be clinically beneficial in various disorders and may also be helpful in a variety of conditions related to menstruation. [27] According to Sushruta Samhita, it has Vata-Kapha pacifying and Aapmaachana, [28] property which are the key points of the Ayurvedic treatment protocol proposed in this article.

 Apart from the above ones, there are many more Ayurvedic drugs that can be used in management of PCOS e.g., Kashyapa quotes the use of Rasona (Allium sativum Linn) to be beneficial in all disorders of Artava. [29] He also states that the use of Shatapushpa (Anethum graveolens Linn) and Shatavari (Asparagus racemosus Wild) Kalpa in an infertile woman may help her gain progeny. [30] Other formulations like Pushapdhana Rasa, Kanchnar Gaggula, Chandraprabha Vati, Vanga Bhasma, Trivanga Bhasma, Rajaj Pravaratini Vati, Phala Ghipta, Pushyanuga Churna, Kumaryasa, Ashokarista etc. are also useful accordingly in PCOS.

3. Life style management of PCOS [31]

Diet regimen
An appropriately designed diet regimen for a PCOS patient is one that not only aims at weight management, but also prevents the long-term risks of PCOS viz. Type II Diabetes, cardiovascular diseases etc. Insulin resistance and hyperinsulinaemia are the key aetiological factors of PCOS that need to be targeted in such a way that not only the insulin levels gets reduced, the insulin sensitivity is also improved. Hence a high fiber, low saturated fat and low glycaemic index carbohydrate diet is strongly recommended.

Avoid-
- High glycaemic index foods- e.g., White rice, potatoes, refined flour and bakery products.
- Milk should be consumed in moderation because its protein limits the normal testosterone processing, leading to a rise in its blood levels.
- Hydrogenated and Trans fats e.g., Cooked oil, processed foods as they increase risk of T2DM, Cardiovascular diseases etc.
- Alcohol, Caffeine, Nicotine and other addictive agents also should be avoided.

Consume: Whole grain- e.g., Shashitika and Shouali (variety of rice) etc., Green leafy vegetables-rich in minerals, vitamins and nutrients, Low glycaemic index whole fruits-e.g., apples, pears, grapes, oranges, plums, prunes etc. that contain fibre, vitamins, minerals and phytoneutrients. Bright coloured vegetables-e.g., carrots, capsicum, beet, salads etc should be used as their antioxidants reduce the oxidative stress of PCOS. Sprouts- contain phytoestrogens that reduce the oestrogen levels. Carbohydrate and protein rich diet; small, frequent and healthy meals with plenty of daily water intake; Vit.B12 which maintains sugar and fat
metabolism, thyroid function and hormonal balance can all contribute to prevention of PCOS.

Yoga and Pranayama therapy

Weight loss is the most essential part of treatment, as it rectifies hormonal imbalance, elevates the insulin and sex hormone binding globulin levels and reduces the testosterone levels. Several Yoga postures aid in weight loss, relieve stress and improve the ovarian blood supply, thereby assisting treatment of PCOS. Different Asanas like Sarvangasana, Ardhamatsyendrasana, Mandukasana, Suryanamaskara and Pranayama like Kapalabhati, Ujjayi, Anuloma-Viloma Pranayama can be very beneficial for PCOS patients.

CONCLUSION

Polycystic ovarian disease is a lifestyle disorder and the leading cause of infertility among women of reproductive age group, leading to endocrine dysfunction and multiple sign and symptoms. The condition is to be properly perceived, interpreted and diagnosed which is key to providing a better line of treatment. It is the need of hour to plan a comprehensive care through Ayurveda, which should be complete and conducive to the patients. Treatment of a woman affected with PCOS needs a well balanced controlled diet and exercise for weight reduction, along with medications and preventive measures. So it will be more beneficial to follow the healthy mode of life mentioned by Ayurveda. Thus adopting a holistic treatment, good lifestyle with appropriately balanced diet, Yoga, Pranayama and a stress-free living can in toto prove to be a wholesome and effective management protocol for PCOS.

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