

AYURVEDIC MANAGEMENT OF AARTAVA KSHAYA W.S.R. POLYCYSTIC OVARIAN SYNDROME – A CRITICAL REVIEW

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Abstract

Diseases of longevity often referred as ‘lifestyle disorders’ are posing a great threat to the overall health of the society. Obesity, being on the top, gives rise to other disorders like Polycystic Ovarian Syndrome (PCOS) in females resulting into infertility. Prevalence of PCOS in Indian adolescents is 9.13% (in Andhra) whereas the estimated prevalence in women of reproductive age is 5-10%. The incidence of PCOS is greater in obese women than lean women. The conventional treatment for PCOS includes lifestyle changes (diet and exercise), medical treatment that includes ovulation induction and surgical therapy (ovarian drilling). There is still a low success rate in all these therapies in terms of gaining fertility and normal menstruation. Hence, an answer is sought for in traditional systems of medicine mainly in Ayurveda. This condition is closely associated with the condition named Artava kshaya (santarpanotha)[oligomenorrhoea due to lifestyle disorders]. But there are certain lacunae in the holistic approach to treat any disease. Basic among them is lack of evidenced based data. The present article highlights the treatment regimen to be followed in management of Artava Kshaya w.s.r. PCOS by specification of the evidences of clinical studies found after a critical review.

Keywords: Artava kshaya; PCOS; Evidence-based; Management.

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INTRODUCTION

Lifestyle diseases also referred to as diseases of longevity or diseases of civilization, are the ones that are reported to increase in frequency as countries become more industrialized and people live longer.^[1]

A new concept of Chronic Diseases of Lifestyle (CDL) is taking roots in conventional medicine. These are diseases that share similar risk factors because of exposure to unhealthy diets, smoking, lack of exercise and stress. These are non-communicable entities but still proving to be silent killers. These include atherosclerosis, alzheimer's disease, diabetes, chronic renal failure, asthma, cancer, osteoporosis, the highest on the list being obesity.^[2]

Obesity is a gateway to an arena of metabolic disorders as it hampers the functions of many vital systems of our body. It further gives rise to hypertension, type 2 diabetes, osteoarthritis, depression. The most important sequellae of obesity, today, is the faulty ovulation in females due to Polycystic Ovarian Syndrome (PCOS) which further leads to infertility.

There are reports of incidence of PCOS in non-obese and lean women too.^[3] But, the prevalence of obesity along with PCOS is higher. Hence, the present paper highlights the treatment regimen for *santarpanottha* (obese PCOS) patients.

Background

Starting from 1987, the obesity rate has increased from 10-14% to 25% and greater in this decade. Many reported studies suggest that obesity has a close association with PCOS e.g. in USA, in a survey more than 50% of patients with PCOS are either overweight or obese. It is well reported that obesity influences the phenotypic expression of PCOS and plays an important role in

pathophysiology of hyperandrogenism and chronic anovulation.^[4]

Clinical need for this guideline

I] Firstly, the increasing prevalence rate has given an alarming signal for the formation of novel guidelines including holistic aspects for the management of PCOS.

The prevalence of PCOS in some countries^[5] and areas of India^{[6][7][8]} is specified in Table 1.

II) The contemporary treatment of PCOS:^[9]

- 1) Loss of at least 5-7% body weight can restore ovulation in up to 80% obese patients possibly by reducing hyperinsulinaemia and thus hyperandrogenism when BMI is elevated.
- 2) Induction of ovulation (OI) with Clomiphene citrate is the next step in management, but it should be limited to three cycles. This is followed by use of insulin sensitizer as a single agent. Subsequently, administration of insulin sensitizer with Clomiphene is advisable.
- 3) Following insulin sensitizing, Gonadotropin therapy and FSH hormone are the next option. Pharmacotherapy includes Metformin (Glucophage), a drug of choice that increases ovulation and simultaneously reduces the problems caused by insulin resistance and regulates the excessively raised levels of the androgens. Apart from these, anti androgenic therapy is advisable to reduce the masculine effects of testosterone like alopecia, hirsutism etc. and Eflornithine as a cream to retard hirsutism.
- 4) Patients who do not respond to Clomiphene therapy are further subjected to surgical procedure namely Laproscopic Ovarian Drilling (LOD). It destroys the androgen producing tissues, thus correcting hormonal imbalance and restoring normal ovarian functioning.

Table 1: Prevalence of PCOS in some countries

Place	Percentage
Southern China	2.4%
Iran	14.6%
Germany	14.8%
South Australia	17.8%
Sri Lanka	6.3%
India	
a. Mumbai	12.2%
b. Andhra Pradesh	9.13%
c. Lucknow	3.7%

It ultimately decreases the elevated LH and Testosterone levels and increases the FSH levels. A failure of all these calls for single embryo transfer by In Vitro Fertilization (IVF) as the last resort.

III] Lacunae observed in the conventional management.

- Symptomatic treatment which doesn't correct the basic cause e.g ovarian drilling surgeries or cosmetic creams to treat hirsutism.
- The mental and occupational aspects influencing the untoward increase of infertility are not taken into consideration
- Less highlight on the correct implementation of dietary habits. (For example - effects of fast foods and canned foods, overuse of bakery products, fermented foods etc.)
- Lack in incorporation of regulation of homeostasis in body and biological clock by simple routine habits.
- Excessive use of drugs like metformin, clomiphene and HRT (Hormone replacement therapy) that further worsens the conditions. Also, a paucity of data is observed in their scientific validation on prolonged use.

Overall review of the available data indicates that the holistic approach is inevitable for the management of such syndromes.

Assessment of Aartava Kshaya

In Ayurveda, the cardinal sign of vyadhi is agnimandya. Consideration of Jatharagni and dhatvagni dysfunction is of prime importance in lifestyle disorders.

Pertaining to infertility, Bhela Samhita has described the factors promoting fertility in females: ^[10]

Avandhya is a term given to fertility in females when she practises Pathyahara, laghubhojana, anudavartanashila, apradushta yathagarbhashaya, suvishuddha srotasa bhavanti.

This is the ideal format for history taking wherein various factors contributing to fertility are checked; lack of which leads to infertility.

These terms may be explained as follows:-

- History whether the patient is aware about a sumptuous and biologically balanced diet (Pathya) according to her constitution.
- The nature of foodstuffs that are often consumed which can have a role in overall assimilation and cellular absorption process.
- History of any vatadushti before (Anudavartanasheela), frequent dysmenorrhoea, etc.
- Garbhashaya sampat - i.e. anatomical and functional normalcy of reproductive organs.
- Suvishuddha srotas: here includes the total shuddhi of artavavaha srotas and others influencing it.

Causes

In the symptoms of Artava Kshaya, according to Sushruta ^[11] are given to be (yathochit kala adarshanam) which could either be irregularity of menses, scanty menses or irregularity in ovulation. Dalhana opines to prefer Vamana

therapy than Virechan as saumya guna is more. This again points towards obese PCOS management.

In case of lean patients or non-obese, the reason of scanty menses corresponds to lohitakshaya which vata pitta dominant. Here, virechan along with uttar basti can be the best management. Lean PCOS patients surely will need rasayana therapy too to normalize Pitta and hence facilitate ovulation function done by Kapha.

Lifestyle disorders can be correlated with santarpanaja vyadhi of Ayurveda.^[12]

Santarpanaja vyadhi are those which arise due to cheshtadveshi (physical inactivity), divaswapa (excessive sleep especially in afternoon), madhura, guru ahara including pishta, guda, mamsa, (starchy, non-veg diets, etc). The examples of Santarpanaja vyadhi are Prameha, Atisthaulya, Klaibya, Aampradosh, Indriya evam srotasa lepa, etc.

Atisthaulya is regarded as one of the disease in ashtauninditiya in Charak Samhita. According to him, obesity is such a metabolic disorder which influences the manifestation of other diseases esp. related to vata and agni.

Factors influencing PCOS

Now-a-days, a strong focus is laid on the contribution of dietary habits and physical inactivity.

- a) In a study,^[13] the habitual dietary intake and physical activity levels of women was done in a 7-day estimated food and activity diary and questionnaire was completed by 210 women with PCOS for calculation of activity levels, energy and nutrient intakes and dietary glycaemic index; It was observed that 50% of overweight women with PCOS were not coming up to the mark of physical activity as

per recommended in the conventional medicine.(atleast 30 mins. of moderate activity /day.) Also, the % energy contribution from fat was greater in these women. Mean dietary glycaemic index was more in this group of subjects. The total sugar intake was also high.

- b) Many studies state that the bad dietary habits result in influencing in abnormal assimilation and absorption leading to insulin insensitivity. Insulin resistance is the main cause of PCOS as it interferes with the ovulation process due to hormonal imbalance.
- c) Studies also indicate that lack of adequate exercise leads to an imbalance in energy expenditure and energy consumption further worsening the endocrinal disturbance.
- d) In a survey study, recording of physical activity and sedentary habits of adolescent girls having PCOS was done and compared with those of healthy girls. The results catered to findings of physical inactivity in PCOS group.^[14]
- e) In a study, improper sleeping durations resulted in increased insulin insensitivity.

Thus, adequate sleep also has a role to play.^[15]

Obesity Vis A Vis PCOS

In a survey study^[16] of prevalence of PCOS in the general population according to BMI, of the 675 women included in the study, 5.3% were underweight, 41.8% were normal whereas 52.9% obese. The study indicated that prevalent obesity may increase the risk of PCOS in a population with modest effect. PCOS is reported to cause 75% of causes of anovulatory infertility.

Charaka has described dushti hetu of medovaha srotasa as follows:^[17]

Charaka has stated the causative factors of obesity are, individual who do not exercise daily, sleep in the afternoon, which overeat and consume lots of fatty foods and alcohol succumb to obesity.

Etiopathogenesis

In order to set proper guidelines for management of any disease, the knowledge of hetus (causes) and Samprapti is necessary. Ayurvedic line of treatment is known as Samprapti bhang chikitsa (curbing the whole vicious cycle of pathogenesis) after which a recommendation of further management can be given. This is an ideal holistic approach.

Ayurvedic concept of obesity

A subtle samprapti has been given in the Charaka samhita sutrasthana “astounindityam adhyayam.”^[18]

The hypersensitivity of hunger receptors to ghrelin due to leptin resistance in pathophysiology exactly matches Ayurvedic samprapti of atisandhukshan of jatharagni in obese. In lean & non-obese, patients leptin resistance is not present but insulin resistance is present in both. The insulin resistance in lean women is hypothesized to be of dysfunction of hypothalamo-pituitary axis.

Charaka has given sthana of samana vayu.^[19]

It can be correlated neuropeptide Y with the function of samana vayu. Impaired functioning of leptin causes hypersensitivity of ghrelin causing excessive hunger in the patient. Besides, ghrelin is produced in pancreas and stomach which tallies its sthana as per shloka.

Madhav nidanakar has given the following samprapti.^[20]

Here we can correlate excessive consumption of carbohydrates. The ultimate degradable

product is glucose which can be considered madhura avasthapaka. Excess glucose increases blood viscosity which leads to tissue dehydration. This can be called vata prakopa at tissue level. Excessive carbohydrate diet leads to insulin resistance and leads to leptin resistance vicious circle so ultimately more fat production.

Pushyanti anye na dhatava!

Causes previously stated like adhyashan and avyayama in medovaha srotodushti i.e. chronic calorie excess and inactivity results in fatty acid deposition in liver (yakrut) and muscle (snayu). As per Ayurveda, these are mulasthanas of previous dhatus like rakta and mamsa respectively. As regards to the successive dhatus, like asthi (bone); the metabolism of bone is hampered due to leptin resistance.

PCOS as a sequel of sthaulya

Acharya Sushruta has given subtle description about etiology and pathogenesis of sthaulya.^[21]

Rasa nimittam eva sthaulya karshyam cha|

Thus the poshaka rasa formed after agni sanskar is responsible for obesity or lean body structure. Artava, raja is given as upadhatu of rasa dhatu.

Artava can correspond to ovum whereas Raja can correspond to menstruation. So any disturbance in rasadhatvagni will lead to derangement of raja & artava in particular. But the Apana vayu is the main in functioning of Artava. In Charak samhita, Apana vayu is stated to possess a significant role in maintaining normal Artava (ovum).

As per Sushruta, due to sthaulya, there is avarana of kapha and meda which obstructs the normal functioning of vata thereby leading to Artava kshaya. Here, artava kshaya

corresponds probably to anovulation. This pathogenesis is stated by Sushruta.^[22] Ashtanag sangrahaakar as clearly states artava to be beeja like shukra dhatu and then states granthyartava as a artava dushti. Ovulation has been given as drushtartava that occurs on 12 th day.^[23]

Management

As per Sushruta,^[11] nidana parivarjana (avoiding or curbing the practice that vitiates diseased condition) is considered to be indispensable before any treatment. Herein lays the necessity of lifestyle modification in Obesity with PCOS.

Thus, the treatment mode will be classified into two aspects-

A] Curative

The chikitsa in artavakshaya by Sushruta.^[24]

Sanshodhanam agneyanam cha dravyanam
vidhivat upayoga:

Dalhana quotes that Artava is normally agneya in nature; Vamana therapy decreases saumya guna and increases the agneya guna. The examples given are sesame, urad dal, alcoholic preparations, etc.

In Ayurveda, chikitsa is of two types – Sanshodhan and sanshamana.

1) Sanshodhan Chikitsa

It aims at improving ailments by curbing the root cause. Here, Sanshodhan chikitsa and that too vamana is stated to be applied. Vamana karma is basically given shleshmadhikyata. Being a santarpana vyadhi, there is rasadushti in the patient which leads to ama formation in obese person. The deranged metabolic process further continues as a chain reaction disturbing the function of all dhatus. The mala of Rasa is kapha. Herein, the malaswarupa kapha is

increased and so the nutrition to the upadhatu raja is hampered leading to its imbalance.

Evidence based reports

1) In a pilot clinical study, effect of Vamana karma on anartava wsr secondary amenorrhoea was studied in 4 patients, out of which 3 patients experienced normal menstruation after a week of the therapy.^[25]

2) A clinical study was undertaken in order to assess clinical efficacy of a full proof Ayurvedic regimen in sub-fertility in PCOS in a total of 40 patients for duration of 6 months in 3 stages.

Stage 1

For the first 14 days, patients received 30ml of Triphala Kwatha, 2 pills of Chandraprabha and 5g of powder of Manibhadra twice a day at 6'o clock.

Stage 2

From day 15 to 4th month, they received 5g of each powder of Shatavari (*Asparagus racemosus*), Shatapushpa (*Peucedanum graveolens*) and Guduchi (*Tinospora cordifolia*) twice a day and 20 ml krishna jeeraka BID.

Stage 3

From 4th to 6th month, 5g of each powder of Atibala (*Abutilon indicum*) and Shatapushpa and 4 pills (each 125mg) of Rasayana Kalpa (*A. racemosus*, *Terminalia chebula*, *T. belarica*, *Embelica officinalae*, *T. cordifolia*, *Nardostachys jatamansi*, *Herpestis monniera*) twice a day with 20ml of Sahachara oil twice a day followed by uttarbasti with 5ml of oil of Shatapushpa two consecutive days per month after complete cessation of menstruation. At the end, there was a significant result in improving regularity in menstrual cycle, discoloration of skin, reduction in polycystic

appearance of ovaries and improvement of follicular maturity. At the end of the treatment 57.5% of patients had normal duration of menstrual bleeding.^[26]

2) Agneya chikitsa

Firstly, our body is stated as agnishomiya. Normally, Artava is stated to be agneya in nature. The shleshmala aahara vihara results in soma gunadhikya thus, influencing artava kshaya. The properties of agneya dravyas-ushna, ruksha, tikshna, vishada, sukshma, dahaka, prabha (aura), varna (lustre of skin), pachana (metabolism).

Mahabhutagni concept

Agneya dravyas (sesame, alcoholic preparations, etc have been stated) are agni mahabhuta pradhan. The rakta dhatu also is agneya. Pitta and rakta have ashrayashrayi sambandh. The mukhya sthana is yakrit for rakta dhatu.

Liver is regarded as a major site of carbohydrate metabolism, fat metabolism and protein metabolism. Reduced hepatic extractions, impaired suppression of hepatic gluconeogenesis and abnormalities in insulin receptor signalling causes improper insulin metabolism. In a study, it has been proved that liver has a significant role in maintaining fertility. The highest activation of oestrogen receptors was found in liver. This also supports the ayurvedic principle of formation of rakta from rasa dhatu, thus intermediate upadhatu precursors may be correlated with these oestrogen receptors. Besides, the major lipid responsible for reproductive steroidogenesis i.e cholesterol is principally found in liver. Thus, the Agneya chikitsa can be considered in respect of stimulant for bhutagni site i.e liver in order to correct the SHBG levels i.e steroid hormone binding globulin levels (which are otherwise normally secreted in liver) as also facilitate normal

conversion of cholesterol to androstenedione, finally into estrogen.

Besides, Agneya dravyas will induce normal restoration of hepatic gluconeogenesis thereby reducing insulin resistance. PCOS according to Ayurveda can be treated with yet another dimension i.e. avarana chikitsa.

Improper function of Apana can be treated with avritta apana chikitsa given in Charak Samhita. It includes dipana, grahi dravyas, vatanulomana drugs with sanshodhan of pakvashay. This is a package treatment of obesity. Dipana and vatanulomana drugs will probably act on the leptin resistance and ghrelin insensitivity thereby alleviating the symptoms. Pertaining to aushadhi chikitsa, the pharmacological actions and gunas of drugs from Lekhaniya Mahakashaya are specified in Table 2.

Ahara

Acharyas have suggested to use those dravyas that are guru but still apatarpana.^[36] This can be correlated with concept of GI and GL. Now-a days, a great emphasis is laid on adequate diet prescription for obesity and PCOS. GI-glycemic index^[37] is a major of how quickly blood sugar levels rise after eating a particular food. A lower glycemic index suggests slower rates of digestion and absorption of foods promoting satiety and delaying hunger and promotes fat oxidation thereby controlling weight. This can be correlated with guru gunatmak anna. This concept matches with that given in Bhela samhita, guru ahara can be dravyata: or matrataha: i.e. the guruta depends on the nature of drug (probably low glycemic index foodstuffs as they delay process of digestion and absorption) and the quantity of foodstuff. (probably glycemic load.) The Glycemic index and Glycemic load of some commonly consumed foodstuffs are mentioned in Table 3.

Table 2: The gunas and pharmacological actions of drugs from Lekhaniya mahakashaya

Sl.No.	Dravyas	Guna karma	Pharmacological actions
1	Apamarga	Ruksha, ushna, tikta rasa	Seeds exhibited inhibition of pancreatic lipase ^[27]
2	Haridra	Ruksha, laghu, ushna, katu rasa	The main constituent curcumin upregulates adipocyte energy metabolism. ^[28]
3	Maricha	Katu rasa, tikshna, ushna, laghu, ruksha	Piperine acts by increasing thermogenesis. ^[29]
4	Guggul	Laghu ruksha, sara, tikshna,	Z-guggulsterone increases the lipolytic activity ^[30]
5	Musta	Tikta rasa, ruksha, laghu,	It stimulates lipolysis in adipocytes by activation of beta adrenoceptors. ^[31]
6	Ativisha	Tikta rasa, ruksha, ushna	It inhibits HMGR enzyme leading to a block in formation of cholesterol. ^[32]
7	Chirabilva	Tikta, kashay, laghu, ushna	Lipolytic, reduce HMGR enzyme ^[33]
8	Vidang	Tikta rasa, laghu, ruksha, katu rasa	Down regulation of leptin. ^[34]
9	Katuki	Ruksha, laghu, pitta sarak	Anti-obesity effect. ^[35]

Table 3: Glycemic index (GI) & glycemic load (GL) of common foodstuffs

Food	GI	Serving size	Net carbohydrate	GL
Peanuts	14	110 g	15	2
Pizza	30	260 g	42	13
Low fat yoghurt	33	245 g	47	16
Potato chips	54	114 g	55	30
Brown rice	55	195 g	42	23
Honey	55	1tbs	17	9
Ice-cream	61	72g	16	10
White rice	64	186 g	52	33
White bread	70	30 g	14	10
Water melon	72	154 g	11	8
Popcorn	72	16 g	10	7
Oatmeal	58	234 g	21	12

Thus, the concept of guru ahara is justified. In case of apatarpana, all foodstuffs possessing medoghna properties must be prescribed. e.g. gavedhuka (which has a direct role on NPY and leptin receptor), yava (barley), priyangu (*Setaria italica*), shyamak (*Echinochloa frumentacea*), cheenak (*Panicum millaceum*). Studies are needed in these foodstuffs. Besides these, madhu (honey) and takra (fresh buttermilk) which is a good source of vitamins and lactic acid. Fruits can include amla rasa pradhan like oranges, lemons, sweet lime, also pineapple, papaya that stimulate digestion.

Role of diet in PCOS

a) A clinical study^[38] was conducted in overweight women with PCOS, wherein the diet was altered in order to check the efficacy

in restoration of reproductive and metabolic physiology.

One group(n=14) received high protein diet(HP, 40% carb., 30%protein) and the other received low protein diet(LP, 55% carb, 15% protein). The energy restriction was of 12 wk (6000kJ/day) and the 4 wk of weight maintenance. There was improvement in menstrual cyclicity, lipid profile, and insulin resistance (as measured by the homeostasis model); and decreases in weight (7.5%) and abdominal fat. A considerable decrease was observed in insulin resistance and fasting insulin. In a clinical study,^[39] a prolonged satietogenic effect of protein intake, providing mechanistic support for increasing protein intake and restricting the simple sugar intake in a PCOS diet.

b) New research findings^[40] suggest use of foods rich in inositol in diet of PCOS. Its supplement alongwith folic acid produced spontaneous menstrual cycles in up to 88% of anovulatory patients and maintained normal ovulation in 72% of patients for up to 6 months. The rich sources include sprouts of legumes, citrus fruits, wheat germ, pineapple, guava, grapes and nuts.

Sushruta has advised to include fish in diet in case of nashtartava.^[22]

c) In a animal study,^[41] different diets were administered in 4 groups of male alino rats. The four groups received high fat butter, high fat soy, high fat olive and high fat fish diets. Results of this study suggest that high fat diets containing fish oil and olive oil can increase the desacyl-ghrelin which may play a role in weight, appetite control and insulin resistance improvement in young rats.

Improvement in ghrelin suggests the probable agneya effect. Besides, the omega -3 acids promote ovulation.

d) In another study,^[42] proteins derived from fish have found effective on insulin sensitivity. In vitro and in vivo data also support an important role of amino acids in glucose homeostasis through modulation of insulin action on muscle glucose transport and hepatic glucose production, secretion of insulin and glucagon.

Rohit matsya is said to be vatahara and vrishya, which must be scientifically validated.

Vihara

Vyayama nityo jirnanshi yava godhuma bhojana: |

Santarpankritai doshai: sthauilyam muktavimuchyate^[43]

a) Exercise

This firstly includes regular exercise. Many studies have reported improvement in insulin resistance and thereby regularity in menses by regular exercise.

b) Pranayama

In a clinical study,^[44] effect of kapalbhati pranayama was observed in 60 obese doctors in relation to BMI and abdominal skinfold thickness. They were divided further into two groups. The study group was asked to practise kapalbhati for 8 weeks. A significant decrease was observed in study group as regards to BMI and abdominal skin fold thickness.

A clinical study^[45] was undertaken to assess the efficacy of a Short-Term Yoga-Based Lifestyle Intervention in Reducing Stress and Inflammation in a total of 86 patients having chronic inflammatory diseases and obesity. The regimen consisted of asanas (postures), pranayama (breathing exercises), stress management, group discussions, lectures, and individualized advice for a period of two weeks. There was a significant decrease in chronic inflammatory markers like plasma cortisol and TNF alpha and increase in beta endorphins.

c) Asanas

In a clinical study,^[46] effect of a yoga program on glucose metabolism and blood lipid levels in adolescent girls with polycystic ovary syndrome between 15 and 18 years who met the Rotterdam criteria. The 90 participants were randomly divided into 2 groups. One group practised yoga consisting of suryanamaskar, asanas, pranayama and meditation for 1hr/day for 12 weeks while the other group performed conventional physical exercises.

Yoga was found to be more effective than conventional physical exercises in improving glucose, lipid, and insulin values, including

insulin resistance values, in adolescent girls with PCOS.

4) Proper dietary habits: Jirnashana

A new concept of satiety index is emerging. A clinical study was done to validate the satiating capacities of some food stuffs. Isoenergetic 1000 kJ (240 kcal) servings of 38 foods separated into six food categories (fruits, bakery products, snack foods, carbohydrate-rich foods, protein-rich foods, breakfast cereals) were fed to groups of 11-13 subjects. Satiety ratings were obtained every 15 min over 120 min after which subjects was free to eat ad libitum from a standard range of foods and drinks. A satiety index (SI) score was calculated by dividing the area under the satiety response curve (AUC) for the test food by the group mean satiety AUC for white bread and multiplying by 100. Thus, white bread had an SI score of 100% and the SI scores of the other foods were expressed as a percentage of white bread. The highest score was produced in boiled potatoes and the lowest in croissant.^[47]

B] Preventive Management

The nidana parivarjana (avoiding of the causative factors)

1) Shleshmala aahara

This includes consumption of foodstuffs like bakery products e.g bread, cakes, pastries, puddings in excess, also rice, fast foods, oily foods, canned foods, processed foods, overuse of cornflakes and breakfast cereals, etc.

2) Adhyashan

Dalhana has quoted the meaning to have a habit of overeating without leaving a considerable amount of time in between two meals or eating without a proper hunger trigger. Also 'ajirna bhojana abhyasina' is stated which means to have food before the

complete digestion of previous meals is ceased. Thus, the habit of overeating must be strictly avoided.

In a survey study, the eating pattern was irregular and the frequency of eating was high in overweight women with PCOS.

3) Avyayama

Evidence: Supporting this, a survey study^[48] proved by means of questionnaire to assess the physical activity and dietary habits in PCOS that women with PCOS do not achieve the necessary physical activity, and mean % energy is more from fat and the dietary glycemic index is higher in overweight obese women with PCOS as compared to healthy weight women with PCOS. The total sugar intake was high.

4) Divaswapna

Adequate sleeping habits must be practised as abnormal duration and timings lead to a disturbed biological clock.

Intervention

- 1) Undergo seasonal sanshodhan therapy i.e Vamana in Vasant rutu , Virechan in Sharad rutu and Basti chikitsa in Varsha rutu.
- 2) Practising Dinacharya and Rutucharya.
- 3) Nitya vyayama

In a clinical study,^[49] effect of anuloma viloma pranayama was assessed in obese school going children wrt positive attitude in 51 students. The children were divided into three equal groups. One group practised anuloma-viloma pranayam, the other group practised kapalbhati and the third was control group. It had significant effect on increase in breath holding capacity. A clinical study^[50] was undertaken in order to check the efficacy of yoga in young male practitioners on insulin sensitivity and cardiac autonomic function.

Table 4: Recommendations for diet from various vargas of Kaiyyadeva nighnatu

Sr.No.	Dravya		Guna karma
		Phala varga	
1]	Amalaki phala		Vrishya, medohara
2]	Bijapura phala rasa		Agni dipana, vatakaphanashan
3]	Bijapura beeja		Garbhada
4]	Narikel dugdha		Guru, vrishya, vatakaphahar
5]	Akshot		Guru , vrishya, ushna
6]	Panas beej		Guru, vrishya
7]	Patol phala		Vrishya, katu, ushna,dipana
8]	Vartak		Madhura, katu vipaki,agnidipaka
9]	Kshudra karela		Laghu, pathya, svadu
		Shaka varga	
10]	Chanakshaka		Pittakrud, chirapaki
11]	Lonishaka		Amla, vatashleshma har
12]	Kurantika		Madhur ,sara, vrishya
13]	Dronapushpi		Mahur, guru, ruksha
14]	Sunishannak		Madhur, dipana,
15]	Ardraka		Guru , tikshna , vrishya
16]	Trikatu		Sthaulyahar, dipana
17]	Jiraka		Garbhashayshodhan ,dipana, katu
18]	Shatapushpa		Katu, ushna, tikshna, pittavardhak
19]	Ajamoda		Katu rasa , vrishya, laghu,
20]	Lasuna		Guru, tikshna, vrishya agnivardhak
21]	Surana		Sthaulyahar
22]	Shrungatak		Vrishya, guru, kaphahar
		Dhatu varga	
23]	Saindhav		Lavana, Madhura, vrishya ,sukshma
		Dhanya varga	
24]	Kukkutanda		Agni, vrishya, sthauyanashak
25]	Pakvadhanya tandula		Dipana , pachana
26]	Yava		Vrishya,guru,agnidipana ,sthaulyavilekhana
27]	Godhuma		Guru, vrishya, kaphahar
28]	Gavedhuka		Karshyakari
		Drava varga	
29]	Ardhashrut jala		In all rutus
30]	Aja dugdha shrut sheet		Laghu, madhur
31]	Godugdha		Sneha less than mahisha dugdha
		Tail varga	
32]	Til tail		Sukshma, shaulyanashan, tikshna
33]	Eranda tail		Guru, sukshma ,srotoshodhana
		Krutanna varga	
34]	Agneya aushadh siddha odana		Atyartha laghu
35]	Vilepi		Agnidipaka , laghu
36]	Shuka dhanya yush +patol		Kapha meda shoshan
37]	Yava pupalika		Vishada, laghu, medoghna
38]	Anagar sanskrit pupa		Laghutama, vatanulomaka
39]	Dhana		Guru, ruksha, kaphamedohar
40]	Saktu		Laghu, vrishya, vanhidipana
41]	Lumbika (apakva bhrushta godhuma)		Kaphamedoshoshan
42]	Kvatitha (kadhi)		Laghu, dipana ,vatakaphaghna
43]	Matsya (smallest)		Oja vardhak, medoghna

For this purpose, fasting insulin levels were measured in the two groups, one (n=15) having healthy yoga practitioners and other having healthy males not practising yoga. The levels of fasting insulin were decreased significantly in yoga practitioners thus proving a preventive role to check insulin insensitivity.

4) Udvartana - kaphamedovilayana. It is stated to decrease the lipids.

5) Utsadana - This is stated specially in females.

6) Aaharkala - one should consume meals in morning when the days are shorter and nights are longer in the season and in evening when days are longer. (Pratarashe tu ajirne api sayam aashe na dushyati)

7) Effect of skipping meals is barred. It results in mandagni.

8) Aahar matra - nirdishtam sukham yavat hi jiryati.

9) Water intake dosage - twice the meals.

10) Anupana helps to stimulate digestion prolonged due to intake of guru aahar.

11) Pathya in ahara^[51] - The Pathya aspect has been well described in Pathyapathya vibhodhaka Nighantu i.e. Kaiyyadeva Nighantu. After a critical analysis of the various vargas of this nighantu, the dravyas that can prove useful in PCOS dietary recommendation have been shortlisted from various vargas and presented in a tabular form in Table 4.

CONCLUSION

Thus, the probable treatment regimen to be followed in management of Artava Kshaya w.s.r. PCOS has been designed with suitable clinical evidences. The proper execution of such regimens in Ayurveda after a collection of more clinical data can certainly contribute to the evidenced based approach of traditional medicine.

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