

**AN AYURVEDIC APPROACH TO STUDY INSULIN RESISTANCE IN PCOS AND ITS MANAGEMENT: A REVIEW ARTICLE****Prashant Patil<sup>1</sup>\* and Vaishnavi Ganesh Shete<sup>2</sup>**

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**ABSTRACT**

PCOS is lifestyle disorder and prevalence of it is increasing very fastly in women. It is one of metabolic disease in which there is irregularities of menses, Polycystic appearance present in ovaries due to which there is ovarian dysfunction present, acne, acanthosis nigricans, obesity are the symptoms present. Insulin Resistance is the common pathology present in which there is raised insulin levels. According to ayurveda PCOS can be correlate with Artavdusht according to the symptoms. In samprapti kapha and vata dushti is there due to nidan sevan. Dushta kapha causes agnimandya which causes formation of aama and Uttarottar dhatudushti. As Artav is the upadhatu of rasa, there is dushti of aartav. In this review article total 22 articles were studied and it is concluded that ayurvedic medicine has also good effects on insulin Resistance in PCOS.

**KEYWORDS:** PCOS, Insulin Resistance, Ayurveda, Sthoulya, Hyperandrogenism.

**INTRODUCTION**

Stein and Leventhal described PCOS in 1935.<sup>[1]</sup> PCOS is one of metabolic disorder & it is multifactorial disease frequently associated with cluster of pathologies. PCOS is metabolic disorder characterized by excessive androgen production by ovaries, ovulatory dysfunction & morphological abnormalities. PCOS is clinically manifested as Oligo ovulation or Anovulation, Hirsutisms, Acne, Acanthosis nigricans, Obesity, Infertility, Irregularity of

menses, polymenorrhea, Oligomenorrhea. PCOS is also manifested as hormonal imbalance increased oestrogen, increased LH, decreased FSH, increased LH/FSH ratio, increased androgens, increased testosterone, increased prolactin and decreased SHBG.

Insulin Resistance due to raised fasting Insulin level is one of the common pathology present in the patient of PCOS. Fasting Insulin 25 uIU/ml and fasting glucose/ insulin ratio <4.5 suggest IR<sup>[2]</sup> and also Sr. Insulin > 3uIU/ml at 2 hours of post glucose load (75gm) suggest Severe IR.<sup>[3]</sup> According to modern, cases of PCOS are genetic abnormalities which affects signal transduction pathways Controlling steroidogenesis, Steroid hormones action, gonadotropins action & regulation, insulin action & Secretion, Obesity, Raised LH Secretion, Hyperandrogenism. etc. According to Ayurveda mithyachar, Pradushtarva, Bijadosha & Daiva are the causative factors for PCOS<sup>[4]</sup> Among all, Insulin Resistance is one of important pathology found in approximately 50-70% of patients.<sup>[5]</sup> IR is known as a state in which body requires greater than normal amount of insulin to produce a quantitatively normal response.<sup>[6]</sup>

IR i.e. Hyperinsulinemia causes estrogenic state in the body which causes disturbance in ovarian as well as liver function. Hyperinsulinemia also causes increase in testosterone is one of the main cause of Infertility. Hyperinsulinemia cause accumulation of belly fat which in turn is responsible for Obesity. PCOD can not correlates with single condition according to Ayurveda, it can be related with Anartava, Arajaska yonivyapad, lohikshaya, Vandhya, Pushpaghni yonivyapad. IR can be correlates with Sthoulya, medovaha Strotodushti, Kaphavrutta Vata, Prameha Poorvarupa. As Agnimandya is main cause in samprapti, Agnisanduksha will be the important treatment for IR. Kapha medohara, Vatanulmak Chikitsa, Ruksha Udvartana, Exercise, yoga, Pranayam are the treatment modalities.

## AIM

To study the Insulin resistance associated with PCOD and its treatment according to Ayurveda.

## OBJECTIVES

To study Insulin Resistance according to modern and ayurvedic point of view

To study Insulin Resistance associated with PCOS

To study treatment modalities of IR according to Ayurveda

## MATERIAL AND METHODS

Data was collected by searching the literature in the form of articles and scientific journals on databases like Google Scholar, PubMed, Research gate and from various textbooks. Keywords used in searching the literature are PCOS, Insulin Resistance, Ayurveda, Sthoulya, Hyperandrogenism. Total 22 articles were studied.

## RESULT

Sr. No.	Name of articles	Name of author	Result
1	A Case Study on Ayurvedic Management in insulin resistance in P.C.OD <sup>[7]</sup>	Anju GS. (Ayurveda Gynaecology Practitioner, Asraya Clinic, munroe Island. Kollam, Kerala, India)	IR can be corelated with atisthoulya, which is causes due to santarpanotta nidanas which causes angnimandya and dhatwagnimandya and ultimately medovaha strotodushti. Acanthosis seen in IR can be related with karshnya which is seen in vatavridhhi. Triphala acts as medohara and takra is deepan.
2	Concept of Polycystic Ovarian Syndrome: Perspective of Ayurveda s Modern Science. <sup>[8]</sup>	Patel M, Prajapati DP	PCOS is Clinically manifested as oligo-ovulation. biochemical & Clinical hyperandrogenism, hirsutism, male pattern baldness, acne, acanthosis nigricans. In ayurveda Does not correlate with single condition but Anartawa, Arajaska yonivyapada due to increase vata, Lohitkshaya, Vandhya, Pushpaghni Abeejata (Anovulation)
3	Ayurvedic management of Aortava eslayo WSR to PCOS-A Critical Pevieu <sup>[9]</sup>	Anagha ranade, Rabinarayan Acharya	Bad dietary habits result in influencing in abnormal assimilation and absorption leading to insulin sensitivity. Insulin Resistance is the main cause of Pcos as it interferes with the ovulation process due to hormonal imbalance. IR can be corelates with sthoulya in ayurveda
4	An Ayurvedic Approach in management of Polycystic ovarian Syndrome <sup>[10]</sup>	Saroj kumar Sarvesh kumar Singh, kshipra saroja, Avadhesh Kumar	Bijadosha is main nidan of IR. Gymnema sylvestre, Asparagus recemosa found to lowers IR. Yoga found to be more effective than exercise in improving IR.
5	Ayurvedic management of pcos vis-a-vis of DM <sup>[11]</sup>	Ramugade Divya Dhanaji; Gharote Archana Prashant, Phatak Shruti Dilip	Increase intake of Sugar, carbohydrates like pasta, breads, rice, potatoes are the culprit for increasing IR. IR is important phenomenon that leads to rapid and premature ageing, heart diseases, stroke, demensia, cancer. Pramehagna dravayas are used to reduce IR.
6	A Review of Polycystic Ovarian Syndrome in	Pallavi Pathee, Satender Pathee	PCOS is frequently associate with IR. Increased insulin causes decrease in levels of SHBG in liver which inturn increases

	Ayurveda <sup>[12]</sup>		levels of androgens. According to ayurveda, it is due to mandagni and excessive eating of kapha promoting food.
7	A Review on Ayurvedic Perspective of PCOS <sup>[13]</sup>	Sruthi O, Sunitha GR, Sowmya KS	PCOS is most commonly associated with IR, obesity, hirsutism, ovulatory dysfunction, type 2 DM. According to ayurveda it can be correlated with the poorvarupa of prameha. kapha and vata dosha; Medovaha strotas and rasa, rakta, mansa, medo asthi and artava are the dhatu involved.
8	A Review of management of P.C.O.S through Ayurveda. <sup>[14]</sup>	Smita mallikarjun Patil, Veena Ajay Patil	IR is one of the clinical feature of PCOS. Artavavaha, medovahastrodushti hetu and yonivyapad hetu involved in samprapti. Suryanamaskar, sarvangasan, paschimottanasan, ardhmatsayendra-asana and pranayamas like nadishodan, bhramari beneficial in improving IR.
9	Concept of metabolic Syndrome in Ayurveda <sup>[15]</sup>	Bharat C Pandhar, Alantruta P Dave	IR is metabolic disorder and according to Ayurveda it can be correlated with medovaha strotas dushti in initial stage and prameha and sthulya in later stage. Kaphamedohara vatanuloman aushadhi, niruha basti, ruksha udvartana, exercise can be beneficial.
10	A Case Study on Ayurveda management in PCOS <sup>[16]</sup>	Shahina mole S Ammu k. Sasi	Kanchanar guggulu has vatakapha shamak, lekhan, shothahara, antidiabetic action helps in reducing IR associated with PCOS. Triphala has hypoglycemic action.
11	Review of Ayurvedic Concept of PCOS <sup>[17]</sup>	Suman Kumari. Anjana Saxena	Cause of PCOS are Generic factor- Obesity & IR as one of major root cause of PCOS Environmental -Sedentary lifestyle, over eating, Stress Insulin Resistance
12	Association of Insulin Resistance & Elevated Androgen levels with PCOS <sup>[18]</sup>	Yalan xh, JieQiao	PCOS is disease characterized by greater levels of androgens, ovulatory dysfunction, and morphological abnormalities. Most recent findings conclude that obesity is the main risk factor of IR in individual suffering from PCOS.
13	A Brief Review on PCOD According to Ayurveda & modern <sup>[19]</sup>	Dr. monali k Chandak	In ayurveda, pcod names as bijakosha granthi but on the basis of sign and symptoms it comes under aartavdushti, yonivyapad, rajadushti, strotasushti and ras dhatu dushti. In ayurveda IR, obesity and Infertility is due to dominance of

			kapha dhatu
14	Ayurvedic Review of PCOD & its management <sup>[20]</sup>	Vaishali mishra, Ankit Lakra	Kaphavardhak ahar causes mandagni due to which there is utpati of aama. aama cause medo dhatwagni mandya which produces vikrut meda. Aama also vitiates rasa dhatu and as artava is upadhatu of rasa there is aartavadushti.
15	Management of metabolic Syndrome through Ayurveda <sup>[21]</sup>	Kavitha Shamra Preeti Sharma	Shilajatu is tridosahara. Anti inflammatory activity due to presence of high concentration of fluvic acid & humic acid reduce inflammation which improve IR. Antioxidant activity, Hypoglycaemic activity Shilajatu stimulate pancreas to secrete insulin.
16	Effect of diet on IR in PCOS <sup>[22]</sup>	Yujie Shang, Huifeng Zhou	Dietary changes were significantly related to decrease IR & body composition in PCOS. Study also done trial comparing diet verses exercise indicating that diet was more favourable in term of HOMA IR & showed a trend of more weight loss.
17	Effect of yoga exercise on metabolic & Homeostatic parameters of Insulin Resistance <sup>[23]</sup>	Pastucha D, Filipcikova R. J	Study shows that positive effect of yoga exercises not only on anthropometric parameters, but also on homeostatic indices HOMA-IR & QUICKI by reducing glycaemia, cholesterol, triglycerides, B.P. There is also reduction of Catecholamine's, Sympathetic tonus, Oxidation stress.
18	Impact of an Integrated yoga therapy Protocol on IR & Glycemic Control in Patients with type II DM <sup>[24]</sup>	manoharon mangala Gowri, Jayanthi Ranjendran	Yoga- Cost effective. Non invasive Yoga- positive effect on Stress related hypoglycemia, Stress increases release of epinephrine in conjunction with glucagon leads to increase blood glucose. Pranayam & Yoga helps to reduce stress.
19	Role of Misha - Amalaki in Pros: A Conceptual Study <sup>[25]</sup>	Dr. Swati Alha. Dr Mahesh Kumar, Dr Hetal Dave	Haridra- lipolytic and anticholesterol properties. Regularises and stabilises gut and cellular metabolism and this includes proper productikn of insulin. Amalaki- Positive effect on pancreas where insulin is produced. antidiabetic action.
20	A Review on Phytomedicine & their mechanism of Action on PCOS <sup>[26]</sup>	Sudhakar Pachiappan, Kothai Ramalingam, Arul Balasubramanian	Cinnammomum zylenticum, Twak, Meshshringi (Gymnema Sylvestre), metha spicata (Pudino), Ashoka (Saraka indica), Gokshur (Tribulw terrestris) Aswagandha (Withania Sumnifera) improves insulin sensitivity.

21	Insulin Resistance in women with PCOS <sup>[27]</sup>	Andrea Dunaif. M.D. Feinberg school of medicine Northwestern Uni, Chicago, Illinois	PCOS is an metabolic disorder in which profound peripheral IR is seen. There is increase basal insulin secretion and decrease hepatic insulin extraction. IR in PCOS is due to Unique post binding defect in signal transduction. There is increase serine phosphorylation of Insulin receptor and Insulin receptor Substrate (IRS-1) that Inhibit metabolic signalling.
22	Clinical Significance of IR Index as Assessed by Homeostasis model Assessment (HOMA). <sup>[28]</sup>	YUKIO JHEDA, TADASHI SUEHIRO Dept of Internal medicine, Kochi, Japan, Endocrine Journal 2001, 48(1) 181-86	There are numerous methods of assessing IR like Euglycemic Hyperinsulinemic Clamp, Steady state plasma glucose method, Minimal model technique. But these are not always Suitable HOMA IR is simple method described by Matthews et al. HOMA IR is convinient and useful method. It is based on hypothesis that basal glucose and Insulin resistance are largely determined by Simple feedback loop.

## DISCUSSION

PCOS is multifactorial metabolic disorder and Insulin Resistance is one of the most important entity in PCOS. Insulin Resistance is nothing but Increase insulin level in the body that is Hyperinsulinemia. Quickly absorbed sugar, liquid calories, Carbohydrates like bread. Pasta, rice, potatoes, etc are the dietary products which develops insulin resistance in the body. Body demand more insulin for the same work of keeping your body blood sugar even And thus there is increased insulin level called as Hyperinsulinemia. PCOS manifested with various signs & symptoms among which Obesity, infertility, acanthosis nigricans are due to IR. Hyperinsulinemia causes increase secretion of GnRH from hypothalamus which increases LH and decreases FSH Secretion from pituitary, which affects the function of ovary and there is Chronic Anovulation. Hyperinsulinemia causes estrogenic state of body which disturbs the function of liver and ovaries. Hyperinsulinemia also increases testosterone Which causes decrease in SHBG level in liver which inturn increases bio- availability of estrogen in the body. IR also increases cortisol level which is called as Stress hormone. There are various methods of detecting IR, from which HOMA IR (Homeostatic model Assessment) is more useful and convinient. Fasting Insulin level, Fasting glucose: Insulin ratio also used to find IR. In modern, Combined oral contraceptives, Oral Metformin, weight reduction are the only treatment Modalities for IR.



Insulin Resistance can be correlates with Sthoulya, Prameha Poorvamopa. Medovahastrotodushi. Kaphavrutta Vata Lakshnas according to Ayurveda. Santarpanotha, Kaphavardhak ahar Vihar are the nidanas which cause kaphamedo vriddhi. Due to which there is Jatharagnimandya which cause formation sama Annarasa. Aama cause dhatvagnimandya mainly medo dhatwagni mandya. There is increase medo dhatu which cause Sthaulya. Due to Kapha and vata prakopaka aahar viharaj nidan sevana, there is vitiation of vata, mainly Apanvayu and as Garbhashay is situated in Apankeshtra, there is disturb function of Garbhashay. Kaphawardhak ahar causes Jatharagni mandya and formation of Ama. Ama cause Rasadhatwogni mandya. As Raja is Upadhatu of rasa there is dudushti of raja. So according to Ayurveda PCOS can be related to the Aartavdushti. Hypersensitivity of receptor to ghrelin due to leptin resistance in pathology matches Atisandukshan of Jatharagni in Obese. Some Studies corelates the IR with Prameha Poorvarupa (Prediabetic Stage) because of the symptoms like Anga Shithilatwa. Ghanangata (Obesity), keshvriddhi (Hirsutism). Chikitsa includes Shaman, Yoga and Pranayama Pramehaghna dravyas are mainly used like Triphala. Twak, Meshshringi (*Gymnema Sylvestre*), metha spicata (*Pudino*), Ashoka (*Saraka indica*), Gokshur (*Tribulus terrestris*) Aswagandha (*Withania Sumnifera*), Haridra, Shilajatu, kanchanar guggulu are the drugs which have hypoglycemic action and helps to reduce insulin resistance Dietary changes will significantly related to reduce IR. Triphala is Deepan which improves jatharagni, it is Kledomedovishoshan, tridoshahara, Triphala is kashayeerasa pradhan pancharasa, laghu ruksha guna, Anushna Virya and due to all these properties it helps for sampraptibhanga. Twak (*Cinnamomum zeylanicum*) contents cinnamaldehyde which is hypogylcemic. Twak downregulated testosterone. It has antiandrogenic which decreases insulin and insulin like growth factor1 and increases glucose utilization. *Gymnema sylvestre* contents inositol which is antidibetic and lupeol which is antihyperglycemic in action. Gymnemic acid prevents excess glucose absorption in intestine. *Mentha spicata* is hypoglycemic, hypolipidemic. It contains flavonoids, phenol, terpenoids, steroids which are antidiabetic. *Saraca indica* contains inositol which is antidibetic and lupeol which is antihyperglycemic. *Tribulus terrestris* contains beta sitosterol which is hypoglycemic.

Haridra contains limoneme which is antiobesity, beta sitosterol which is hypoglycemic. Kanchanar is antidiabetic due to presence of ascorbic acid. DASH diet, Calorie deficiet diet helps in reducing IR. Yogas like Suryanamaskar, sarvangasan, paschimottanasan, Ardhamatsendrasan, Vakrasan, Navasan stimulate pancrease for insulin secretion. Yoga also

has positive effect on stress Induced hypoglycemia.

## CONCLUSION

Insulin resistance is the important factor associated with patient to having PCOS. IR includes metabolic symptoms like Hyperinsulinemia. Hyperandrogenism, Obesity, HTN, type II Dm. This study shows that in Ayurveda wide range of drugs are available and also yoga and Pranayamas are effective in treatment of IR in PCOS.

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