

ISSN NO: 2231-6876



INDO AMERICAN JOURNAL OF PHARMACEUTICAL RESEARCH

SIDDHA THERAPEUTICS FOR THE MANAGEMENT OF PCOS - A REVIEW

A. Faridha*, Gayathri Gunalan, A. Rajendra Kumar

Siddha Regional Research Institute (CCRS), Kuyavarpalayam, Puducherry – 605013.

ARTICLE INFO

Article history

Received 17/02/2018 Available online 31/03/2018

Keywords

Karparogam, Soothaga Katti, Soothaga Thadai, PCOS, Siddha Formulations, Herbs.

ABSTRACT

Siddha system of medicine is the renowned indigenous traditional system, provided for all the lives of earth by the scientific sages, Siddhars. The therapeutic methodology in Siddha is based mainly on three humors viz, vatham, pittham and kabam, which are when altered from its equilibrium, results in various ailments. In Siddha, etiology of a disease is mainly depicted with alterations in lifestyle, diet and environmental conditions. As a part of such modifications, PCOS is a major troublesome complication among female population in recent days. In Siddha literatures, Pararasasegaram, Yugimuni vaithiya kaaviyam, Gnanavettiyan -1500, PCOS and its associated complications may be related to sinaipai neer kattigal, soothagavaayu, soothaga kattigal, soothaga thadai, karparogam, karpa vaayu. PCOS, being a major restraint for healthy life, results in arising health issues such as hyperandrogenism, anovulatory menstrual cycle, sub-fertility, obesity, amenorrhoea and dysmenorrhoea along with insulin resistance. To overcome the adverse effects of available modern treatment, we are in need of implying the better methodology for the treatment of PCOS to sustain the growing female population of reproductive age. The objective of this review is to emphasize various Siddha formulations and available herbal-polyherbal practices for PCOS, which are depicted in the literatures possessing potential therapeutic values, are discussed with scientific validations. The management protocol ensures not only the treatment but also for the prevention and recurrence of the disease condition. The medicines practiced may be adopted for scientific validation in future for further clinical and research purposes.

Corresponding author

Dr. A. Faridha

Senior Research Fellow (Siddha), Siddha Regional Research Institute (Under Central Council Research in Siddha, Ministry of AYUSH, Govt. of India), Kuyavarpalayam, Puducherry – 605013. fari.jas@gmail.com

Please cite this article in press as **Dr. A. Faridha** et al. Siddha Therapeutics for the Management of Pcos - A Review. Indo American Journal of Pharmaceutical Research.2018:8(03).

INTRODUCTION

A metabolic disorder and one of the most common hormonal disorders, affecting the female population of reproductive age group (18-45 years) is, PCOS. It is a major troublesome ailment affecting the individual's quality of life which may be a hindrance for procreation in the near future. PCOS (Polycystic ovarian syndrome) is characterized by hyperandrogenism, ovulatory dysfunction with polycystic ovaries (fluid filled clear cysts with immature eggs, when seen through ultrasonogram). The pathophysiology and etiology of PCOS is an enigma in medical science as it is a syndrome rather than a single disease. WHO reports its prevalence as 3.4% of women worldwide. However 30% of women with PCOS will have normal menstrual cycle. Approximately 85%–90% of women with oligomenorrhea have PCOS while 30%–40% of women with amenorrhea will have PCOS. Its prevalence in India ranges from 2.2 to 26% with age group of 18 – 45 years. Prevalence of PCOS in South India is reported as 9.13%

A study conducted by PCOS society reports that one in every 10 women in India has polycystic ovarian syndrome and out of every 10 women, six are teenage girls. PCOS was described as early as 1935, but this health condition is estimated to affect about 10 million women globally in recent days. Another study conducted by the department of endocrinology and metabolism, AIIMS, shows that about 20-25% of Indian women of childbearing age are suffering from PCOS. While 60% of women with PCOS are obese, about 70% have insulin resistance, 60-70% has a high level of androgen and 40-60% has glucose intolerance.

Many aspects of the disorder are not understood properly as its symptoms and severity vary greatly. Women with PCOS are often found to have higher than normal insulin levels. Insulin resistance can make it harder to lose weight, which is why women with PCOS often struggle with this issue.

The treatment methodology for PCOS in modern system of medicine aims at curing mainly the symptoms with the help of oral contraceptive pills, anti-diabetic drugs, anti-androgenic drugs, lipid lowering drugs which may produce certain complications in the reproductive period of women. The prolonged usage of market drugs in treating PCOS may lead to abdominal bloating, flushing, dizziness, breast tenderness, metorrhagia, multiple pregnancies due to over stimulation syndrome and so on. PCOS is an emerging endocrinology health problem resulting in complications such as obesity, sub-fertility, hirsutism, amenorrhoea, dysmenorrhoea, insulin resistance, cardio vascular diseases, endometrial cancer, breast cancer and miscarriage. Hence, promotion of healthy lifestyles and early interventions are required to prevent future morbidities and we are also in need of implying a better methodology for the treatment of PCOS, to prevent the adverse effects of modern drugs.

Siddha system of medicine, the traditional system of Tamil people teaches the way of living to attain the eternal life. According to the Siddha system, the etiology of a disease is predominantly depicted through alterations in the three humors *vatham*, *pitham* and *kabam* due to dietary and lifestyle changes. PCOS may be related to *Garpavaayu*, *Soothagathadai*, *Soothagavayu*, *Soothagathadai*, according to the presenting complaints, in Siddha system of medicine. As per the text, *Pararasasekeram*, *Garpavaayu* is one among the *Garparogam* mentioned in it. The symptoms of *Garpavaayu* are abdominal discomfort, dysmenorrhoea, low back pain, constipation, amenorrhoea, and heaviness of thigh pertaining to the clinical manifestations of PCOS. According to *panchabootham* and *mukkutram* theory, bitter taste (*kaippu suvai*) and astringent taste (*thuvarppu suvai*) influences *vatham* and neutralizes *pitham* and *kabam*. In Siddha literatures, herbs possessing emmenagogue action are of mainly bitter in taste. The major cause for PCOS may be due to deranged *vatham* and *kabam*. Hence herbs which are bitter in taste are used to normalise the deranged humors. The management protocol is aimed at to alleviate the *vatham* with the help of purgative drugs initially, then to induce the ovulation, to regulate the menstrual cycle and to increase the chances of fertility; therefore the associated symptoms like hyperandrogenism, obesity, and insulin resistance due to impaired *kabam* may be managed in a better way.

The therapeutics in Siddha enunciates the treatment to the core of the ailment. This evidence based system of ancient medicine renders various therapies including internal and external medications with herbal, mineral, metal and animal based drugs. Also Siddha system emphasizes promising methodologies for the prevention and recurrence of the illness by adopting *kaala ozhukkam* (healthy life style), *yogam* and *aasanas* for procuring a healthy life.

The aim of this review is to discuss about the available therapeutics in Siddha for the management of PCOS and its associated conditions. This review will emphasize the Siddha therapeutics which includes individual medicinal herbs, poly-herbal, and herbo-mineral formulations which are practically used in the treatment of PCOS. Medicinal plants possessing emmenagogue action are discussed here. Many herbs which are indicated for PCOS in Siddha literatures with lack of practical applications may be subjected to scientific validation for future clinical practice.

Siddha Therapeutics for PCOS and its Related Conditions. Individual Medicinal Plants

Various medicinal plants have been indicated for the treatment of PCOS related gynaecological disorders in different Siddha literatures of Agathiyar Siddhar and Theran Siddhar. The usage of individual medicinal herbs is of much importance due to its easy availability and cost effectiveness. In this current review, few important medicinal plants with notable antiandrogenic activity for PCOS and menstrual abnormalities with scientific evidences are summarised below. Also these plants possess *kaippu suvai* (predominantly) and *thuvarpu suvai*, thereby regularize the deranged *vatham* and *kabam*, which is the major cause for irregular menstrual cycle and obesity in PCOS condition as discussed earlier. The inference from the classic Tamil verses is also given below:

Kalyanamurungu- Erythrina variegata Linn.

The leaf of *Erythrina variegata* L. possesses emmenagogue action according to Siddha pharmacology and is one of the most commonly practised traditional medicines since long time for gynaecological disorders by Siddha medical practitioners.

Evidence in Siddha literature:

கருப்பா சயத்திற் கறுத்துத் தடித்தே பருத்தவுதி ரத்தினைப் பஞ்சாய்த் துரத்திவிடும் -பண்முருக்கு மின்பமொழிப் பாவாய் - உலகறிய முண்முருக்கம் பூவை மொழி .[16]

Inference:

It can be given for any tumor like abnormalities in uterus and ovaries. Also it is administered during dysmenorrhoea and thus it helps in expelling the accumulated menstrual blood.

Uses:

The leaf juice of this plant is given for two to three months twice a day for in fertility. This leaf juice also helps in reducing obesity. The decoction of flower helps in reducing dysmenorrhoea when applied externally [16].

Scientific evidences:

Shalini *et al*, studied the effect of *Erythrina variegata* leaves in letrozole induced polycystic ovarian disease in female wistar albino rats in comparison with the standard drug metformin [1]. The animals treated with ethanolic extract of *Erythrina variegata* leaves with 200mg/kg and 400 mg/kg body weight dose, showed a significant changes in body weight(decreased),lipid profile(decreased, except HDL),blood glucose levels(decreased) and also reduction in ovarian and uterus weight. The histopathological features revealed the presence of secondary follicles and corpus luteum development with ovulation. Also, the researchers studied the antioxidant property of the plant.

The anti-inflammatory effect of *Erythrina variegata*, studied in rats, showed a significant reduction in granuloma formation and inhibition of WBC migration [2]. Lahari *et al*, quoted the effect of antiangiogenic activity, antimicrobial activity and diuretic property of *Erythrina variegata* [3].

Karunseeragam- Nigella sativa Linn.

The seeds of *Nigella sativa* L. are well known for its emmenagogue action in Siddha system of medicine and is most commonly prescribed drug for the management of menstrual abnormalities.

Evidence in Siddha Literature:

கருஞ்சீ ரகத்தான் கரப்பனொடு புண்ணும் வருஞ்சிராய்ப் பீநசமு மாற்றும் அருந்தினால் -காய்ச்சல் தலைவலியுங் கண்வலியும் போமுலகில் வாய்ச்ச மருந்தெனவே வை. [16]

Inference:

Nigella sativa has been indicated for skin diseases like eczema, ulcerations, chronic sinusitis, fever headache and ocular pain in Siddha literature. Besides, as mentioned in the T.V. Sambasivampillai Maruthuva Agarathi (Siddha Medical Dictionary), Nigella sativa when administered in small doses is effective for the management of dysmenorrhoea, which is a concerning symptom in PCOS condition [18].

Uses:

One to three gram of seed powder is indicated for soothakakattu, soothagasoolai. [16]

Scientific evidences:

Jasim, et al, studied the effect of Nigella sativa on healthy female rats to rule out the enhancement in thyroid function and reproductive hormones for a period of 30 days [4]. The hormonal assay revealed significant improvement in T3, T4 levels and decrease in TSH level and also the levels of LH, GnRh were increased and hence it promoted the estrogen synthesis. Nigella sativa also had effective antioxidant activity.

Mohammed Arif *et al*, (2016) validated the effect of Thymoquinone, an active component of *Nigella sativa* on PCO rats [5]. They studied the anti-inflammatory effect which is one of the essential things in the treatment of PCOS in mouse granulose cell lines KK1 (*in vitro*) and positively obtained the suppression of NF-kB pathway. Also the *in vivo* studies in female rats revealed the effect of thymoquinone as it increased the ovulation through follicular development and leutinization.

Nigella sativa has been extensively studied for its effective pharmacological activities such as hypoglycemic activity, hypolipidemic effect, estrogenic effect, cytotoxic effect and antioxidant properties [6]. The effect of *Nigella sativa* has also been evaluated for its potent activity in patients having Hashimoto's thyroiditis [7].

Sathakuppai- Anethum graveolons Linn.

Anethum graveolens is also an easily available herb possessing emmenagogue action which is mainly used as uterine tonic especially given during postnatal period of women for removing the lochia thereby regularises the menstrual cycle after delivery.

Evidence in Siddha Literature:

வாதமோடு தூதிகா வாதம் சிரசுநோய் மோதுசெவி நோய்கபநோய் மூடுசுரம் - ஓதுகின்ற மூலக் கடுப்பு முதிர்பினசம் போகும் ஞாலச் சதகுப்பை நாடு. [16]

Inference:

It is advised for the deranged *kabam* and *soothiga vatham* (a convulsive disorder especially due to menstrual abnormalities in young women).

Uses:

The leaf extract or leaves boiled in castor oil is used in treatment of *soothagakattu* and *soothagasanni*. Hence, it can be administered even for mood swings and anxiety seen in PCOS [16].

Scientific evidences:

The ethanol extract of *Anethum graveolens* have been studied for the hormonal changes in PCO rats. The experimental animal group treated with *Anethum graveolens* revealed the significant decrease in progesterone level and increase in the estrus cycle [8].

Ali et al, mentioned the beneficial effects of Anethum graveolens as anti-hyperlipidemic, anti-inflammatory, analgesic and antioxidant activities along with positive effect on female reproductive system [9].

Nochi - Vitex negundo Linn.

Vitex negundo L. has been used variedly for menstrual disturbances in recent days. According to Siddha pharmacology, Nochi possesses diuretic and vermifuge properties.

Evidence in Siddha Literature:

நோயா கலியை நொடிக்கு ளருந்தவெம்மை யோயா மணாளு முயர்த்துதலுக் காய -வந்தமுதல் நண்பாகி வாதத்தை யேயுறவாற் சிந்துவாரங்கனலுந் தீ. [16]

Inference:

Vitex negundo when given in decoction form regularizes the imbalanced vatham so that the natural force essential for ovulation in PCOS can be restored.

Uses:

Handful of fresh *Vitex negundo* leaves is boiled in 400 ml of water till it reduces to 1/4th volume. This decoction is effectively used for the induction of ovulation. [16]

Scientific evidences:

Diaz et al, studied the broad cytotoxicity effect of *Vitex negundo leaves* in human cancer cell line with Vitexcarpine, a flavone isolated from *Vitex negundo leaves* [10]. The seed extract of *Vitex negundo* has been subjected for analysing its potential to lower the testosterone levels in hyperandrogenic female SD rats induced with PCO, against the standard drug Finastride. The histopathological results revealed a remarkable increase in the primordial follicles, reduction in follicular cysts and level of testosterone. There was a decrease in mean blood sugar level, triglycerides level and body weight too. The anti-androgenic activity may be due to the presence of beta-sitosterol and inhibition of 5α -reductase [11]. Also the leaves of *Vitex negundo* have been used as sitz bath for inflammatory conditions of uterus and ovaries, amenorrhoea and oligomenorrhoea [12].

Malai Vembu- Melia azadirach Linn.

Melia azadirach L. is well known for its fertility enhancement through purgative action and is a very potent anthelmentic. It is widely practised among Siddha medical practitioners for infertility management.

Evidence in Siddha Literature:

மலட்டு புழுவும் வயிற்றின் வலியும் அலட்டுவாய்வும் போம் அடக்கி கோலட்டும் -உலவேஞ் சினைதேவற்கண் ஓதிமமே கேளாய்; மலைவேம்பின் பேரை வழுத்து. [16]

Inference:

Melia azadirach leaves are administered for dysmenorrhoea and abdominal flatulence, which are the premonitory symptoms of PCOS. Also the leaves possess potential properties for infertility management.

Uses:

3-5 g of the leaf paste when given with rice soaked water during first three days of the menstrual cycle will induce fertility and reduces the pain due to dysmenorrhea [16]. A medicated oil, *Malaivembathi thailam* prepared with *Melia azadirach* leaves as a major ingredient, is exclusively prescribed for infertility.

Scientific evidences:

Azarnia *et al.*, studied the serum concentrations of sex hormones in rats induced with PCO with the hydroalcoholic extract of *Melia azadirach*. The results revealed its antisteroidogenic properties [13]. Serum concentrations of FSH was significantly increased (P<0.05) and the levels of testosterone and estradiol were decreased significantly in the treatment groups when compared with PCO rats. The anti-hyperglycemic activity of *Melia azadirach* leaves exhibited a significant result in allaxon induced diabetic rats [14].

Aatruthumatti- Citrullus Colocynthis Linn.

Citrullus colocynthis L. is the most frequently used herb for the management of irregular menstrual cycle. The fruits of this plant possess enormous medicinal values for dysmenorrhoea, amenorrhoea and medicines prepared with Citrullus colocynthis are extensively prescribed for uterine and ovarian abnormalities in Siddha medicine.

Evidence in Siddha literature:

கிடையெங்கே சோம்பலெங்கே கேடுறச்செய் வாதக் கடையெங்கே யாற்றுக் கலிங்க மடைதிறக்கின் -அண்டை யடைச்சலெங்கே யாயிழையார் சூதகத்தின் உண்டை யுடைச்சலெங்கே யோது.[17]

Inference:

It is indicated for *soothaga katti* (abscess or tumour or suppression of menstrual discharge) which leads to dysmenorrhoea. It also alleviates *vatham* and thereby regularizes the menstrual cycle.

Uses:

The fleshy part of this fruit is used for uterine disorders and constipation with a dose level of 65mg to 200 mg for a specific period of time. [16]

Scientific evidences:

The fruit extract of *Citrullus colocynthis* has been studied in letrozole induced PCOS female rats for the for its hypolipidemic activity, anti-androgenic activity. The ethanolic effect of *Citrullus colocynthis* drastically reduced the levels of increased testosterone and LH levels, mean blood glucose levels and lipid profile. The histopathological studies stated that there was a presence of thick corpus luteum indicating ovulation with the restoration of normal estrus cycle when compared with the control and untreated group. Also it possessed antioxidant and cytotoxic properties [15].

Effective single herbs for PCOS along with Siddha Properties- Table 1.

S.No.	Tamil Name	Botanical Name	Phytochemicals	Siddha Properties
1.	Kalyanamurungu	Erythrina variegata L.	3-eicosyne, Squalene, Gallic acid, Caffeic acid, Phytol, Butanoic acid.	Suvai-Kaippu, Kaarppu. Thanmai- Veppam. Pirivu- Kaarppu.
2.	Karunjeeragam	Nigella sativa L.	Nigellinine-N-oxide, Nigellicine, Arenasterol-5-ene, lophenol, α -hederin and fatty acids.	Suvai- Kaippu. Thanmai-Veppam. Pirivu-Kaarppu.
3.	Sathakuppai	Anethum graveolens L.	Carvone, limonene, α-phellandrene, diterpene, cineole, myrcene, paramyrcene, dillapiole, isomyristicin, myristicin, myristin, apiol, dillapiol, gallic acid.	Suvai-Inippu,Kaarppu. Thanmai-Veppam. Pirivu-Kaarppu.
4.	Nochi	Vitex negundo L.	Nishidine, Negundoside, Hydrocotylene, Nishindaside, Essential oil	Suvai-Kaippu, Kaarppu, Thuvarppu. Thanmai- Veppam. Pirivu- Kaarppu.
5.	Malaivembu	Melia azadirach L.	Terpenoids and limonoids like l-Cinnamoyl-3-acetyl-11-hydroxy meliacarpin,l-Cinnamoyl- 3-methacrylyl-11-hydroxy meliacarpin, Deacetylsalannin, α & β-Pinene,α- Terpinene & Terpineol,Kaempferol-3-O-β-rutinoside, Kaempferol-3-L-rhamno-D-glucoside, Rutin.	Suvai- Kaippu. Thanmai- Veppam. Pirivu- Kaarppu.
6.	Aatru thumatti	Citrullus colocynthis L.	Cucurbitacin-E,I,J,L,T, Coloside A, Colocynthitin, Colocynthin, Isovitexin, Citrullol	Suvai- Kaippu. Thanmai- Veppam. Pirivu- Kaarppu.

Polyherbal combinations

Nigella sativa L., Anethum graveolons L. and Coscinium fenestratum (Goetgh) Colebr.

35g of the above ingredients and 105g of palm jaggery are mixed well and given in *kottaipakku alavu* (3 - 4 g) in *sombu kudineer* (decoction) enhances the chances of fertility by regulating the menstrual cycle [16].

Bambusa arundinacea (Retz) willd. (Moongil), Syzygium cuminum (Naaval) and Acacia nilotica willd. (Karuvel)

The above plant roots (each 17.5g) are prepared as decotion and consumed with 17.5 gm of palm jaggery and cow's butter for the treatment of infertility and this polyherbal combination is mentioned as *Malattu karpam*, one of the *karpam* medicines [21].

Siddha Formulations

The below table deals with the various Siddha formulations that are used for the management of PCOS and its associated conditions.

Table 2

S.No.	Name of the Formulation	Nature of the Formulation	Indications	Dosage and Adjuvant	Reference
1	Chithiramoola Kuligai	Herbomineral	Yoni putru, Soolai noigal	One black pepper Size	SFI, Part –II, P.No.156
2	Kumari Lehgyam	Herbal	Maadhavidaai pinigal	5-10g twice a day	SFI, Part- II, P.No.71
3	Arumuga Chendhuram	Herbomineral	Vedisoolai, Karbarogam and Soolai	500 mg with <i>Thirikadugu</i> chooranam; Adjuvant – Honey	SFI, Part – I, P.No.36
4	Agasthiyar Kuzhambhu	Herbomineral	Soodhaga Vaayu, Karbavadham.	One <i>kundrimani</i> size (130 mg) should be taken along with <i>naavar pattaisaaru</i> and <i>Seeragapodi</i> .	SFI, Part – I, P.No.60
			Maladu.	Should be taken along with peepel leaves paste which is prepared with cow's	
			Soodhavayu, Thiratchivali	milk. Should be taken with pepper and dry ginger as adjuvant.	
5	Rasagandhi Mezhugu	Herbomineral	Vedi Soolai, Thudi Soolai, Yoni Silandhi, Yoni putru.	500mg twice a day	SFI, Part – I, P.No. 68,69
6	Nava Uppu Mezhughu	Herbomineral	Soolai, Soodhaga Vayu	One black pepper size	SFI, Part- I, P.No. 71,72
7	Nandhi Mezhughu	Herbomineral	Sronidhanoi, Yoni putru, Garba azhivu noi	500mg once or twice a day; Adjuvant- Palm jaggery	SFI, Part- I, P.No.70,71
8.	Siddhathi Ennai	Herbal	Garpasoolai, Perumbadu, Soothagavettai, Gunmam	3-5 drops with <i>sombu</i> kudineer	SFI, Part – I, P.No.104
9.	Senkottai Nei	Herbal	Vatha noi kootangal	5-10 ml twice a day	SFI, Part- I, P.No.132
10.	Kumatti Chooranam	Herbal	Gunmam, Mandham	4.1g once a day	Siddha Vaidhiya Thirattu, P.No. 215
11.	Vaan Kumari Lehgyam	Herbomineral	Sarva roga nivarani	2-4g with water –twice a day	Gnana Vettiyaan–1500, P.No. 103.
12.	Nilakadambhu Chooranam	Herbal	Soothaga Vayu, Soothagavali, menorrhagia, Soothaga idupuvali	2g with milk	SKM Anubhava murai 1998, I Edition, P.No.38
13.	Gunma Kudori	Herbal	Soothaga vayu, Vali and Gunmam	One sundai alavu (250mg)	Siddha Vaidhiya Thirattu, P.No. 200, 201
14.	Pattukaruppu	Herbo-mineral	Soothaga soolai, Soothaga sanni, Soothaga vettai	1-2 arisi alavu (65 -100mg)	Siddha Vaidhiya Thirattu, P.No. 163

CONCLUSION

The above mentioned Siddha medicinal plants and various Siddha formulations are effectively used for the management of PCOS and its related complications. Besides, many other plants and formulations that possess hypoglycemic activity (corrects the insulin resistance), hypolipidemic activity (reduces obesity) and antiandrogenic activity may also be used for the treatment of PCOS. Many of the above mentioned therapeutics are employed based on medical practice. These are yet to be scientifically proved by clinical trials so that it may be adopted by the conventional medicine and thus helpful for the betterment of the mankind. The incidence of PCOS among women and teenage girls has risen to such an extent that the Indian Council of Medical Research (ICMR) has taken up a nationwide survey. The reason it is dangerous is that, if this condition is left unchecked or undiagnosed, it can lead to infertility among other long-term health concerns. Non-communicable diseases such as diabetes, CVD and cancers panic the human population in recent days. However, these diseases can be managed and prevented from getting transmitted to next generation whereas PCOS needs to be get rid of, as this condition may be a hindrance in producing the next generation if not managed effectively. Hence, as stated in the previous lines, it is hereby reinstated that extensive future research in several aspects is required in order to emphasize the significance of therapeutic values of Siddha system of medicine in a much better way.

Abbreviations:

PCOS - Poly Cystic Ovarian Syndrome

PCO – Poly Cystic Ovaries LH – Luteinizing Hormone

FSH - Follicle Stimulating Hormone
TSH - Thyroid Stimulating Hormone
CVD - Cardio Vascular Diseases
HDL - High Density Lipoprotein
SFI - Siddha Formulary of India

Conflict of Interest

The authors declare no conflict of interest.

REFERENCES

- 1. Shalini Karunanithi, Vijaya Bharathi, Raj Kishore and Radha Ramalingam, The pharmacological activity of leaves of *Erythrina variegata* Linn. on metabolic symptoms of experimentally induced polycystic ovarian disease. World Journal of Pharmacy and Pharmaceutical Sciences, 2017; 6(5); 1487-1504.
- 2. Krishna Raju Mantena VR, Tejaswini G. Anti Inflammatory activity of *Erythrina variegata*. International Journal of Pharmacy and Pharmaceutical Sciences, 2015; 7 (4): 386-388.
- 3. Lahari K, Divya M, Vidhyavathi N, Kishore L and Poojitha N. A novel review on *Erythrina variegata*, International research journal of pharmacy, 2015:6(4): 231-233.
- 4. JASIM, Wafaa Kadhim; HASSAN, Mayada Sahib; KEAM, Ghsoon Ghanem. Study the effect of *Nigella Sativa* on thyroid function and reproductive hormone of female rat. Journal of Contemporary Medical Sciences, [S.l.], 2016; 2 (6): 67-69.
- 5. Mohammed Arif, Sonu Chand Thakur and Kasturi Datta. Implication of thymoquinone as a remedy for polycystic ovary in rat. Pharmaceutical Biology, 2016; 54 (4): 674 685.
- 6. Anwar-ul Hassan Gilani, Qaiserjabeen, A review of medicinal uses and pharmacological activities of *Nigella sativa*. Pakistan Journal of Biological Sciences, 2004; 7(4): 441-451.
- 7. Mahdieh Abbasalizad Farhangi, Parvin Dehghan, Siroos Tajmiri and Mehran Mesgari Abbasi. The effects of Nigella sativa on thyroid function, serum Vascular Endothelial Growth Factor (VEGF) 1, Nesfatin-1 and anthropometric features in patients with Hashimoto's thyroiditis: a randomized controlled trial. BMC Complementary and Alternative Medicine, 2016;16: 471-479.
- 8. Monsefi M, Ghasemi M, Bahaoddini A. The effects of *Anethum graveolens* L. on female reproductive system. Phytotherapy research, 2006; 20 (10): 865–868.
- 9. Ali Esmail Al-Snafi. The Pharmacological Importance of *Anethum Graveolens*. A Review. International Journal of Pharmacy and Pharmaceutical Sciences, 2014; 6(4): 11-13.
- 10. Diaz F, Chavez D, Lee D, Mi Q, Chai HB, Tan GT, Kardono B.S, Riswan S, Fairchild CR, Cordell GA, Pezzuto JM and Kinghorn AD. Cytotoxic flavone analogues, of Vitexicarpin, a constituent of leaves of *Vitex negundo*. Journal of Natural Products. 2003; 66(6): 865-867.
- 11. Shetty Divya K, Patil Swati S. Studying the Testosterone Lowering Potential of *Vitex negundo (Nirgundi)* Seed Extract in Hyperandrogenic Female Rats Induced with Polycystic Ovaries. Int. J. Pharm. Sci. Rev. Res., 33(1), 2015; 211-216.
- 12. Mariyam Roqaiya, Wajeeha Begum and Sana Fatima Majeedi. A Review on *Unani* traditional uses of *Sambhalu* in females as well as phytochemical and pharmacological properties. IJPSR, 2016; Vol. 7(1): 31-41.
- 13. Azarnia M, Kamyab SZ, Mirabolghasemi SG, Saeidnia S. Effect of hydroalcoholic extract of *Melia azedarach* L. seeds on serum concentration of sex hormones in polycystic ovary syndrome induced in female rats. Feyz 2015; 19(2):112-18.
- 14. Prashant Kumar, Raghuveer Irchhiaya, Rubina Lawrence, AmitaVerma, KusumSingh, Vinita Ahirwar. Antihyperglycemic effect of the leaves of *Melia azedarach* on alloxan induced diabetic rats. International Journal of Pharm Professionals Research, 2014; 5(4): 1121 1124.

- 15. Sowmiya M and Sudha KM. Evaluation of *Citrullus Colocynthis*(L) Schrad. Fruit Extract in letrozole induced Polycystic Ovarian Disease in female rats. World Journal of Pharmacy and Pharmaceutical Sciences, 2017; 6(6): 1167-1170.
- 16. Murugesa mudaliar K.S, *Gunapadam*, Part I-*Mooligai vaguppu*, Dept of Indian Medicine and Homoeopathy, Chennai-106, 2002, P.No.247,248,422,423,463,464,628,863.
- 17. Mohan R.C, Pathinen Siddhargal arulicheidha Patharthaguna cinthamani, Thamarai library, Chennai, 2006, P.No. 174.
- 18. Sambasivam Pillai T.V,Tamil-English Dictionary(Based on Indian Medical Science), Dept. of Indian Medicine and Homoeopathy, Chennai,1998, Vol 4(1).P.No.367-371,382.
- 19. Kuppusamy Mudaliar K.N, Utthamarayan K.S., Siddha Vaithiya Thirattu, Dept of Indian Medicine and Homoeopathy, Chennai, 2006.
- 20. SFI(Siddha Formulary of India), Govt. of India, Ministry of Health and Family Welfare, Dept. of AYUSH, New Delhi ,Vol I,II,2011.
- 21. Dr. Thiyagarajan R, Siddha Maruthuvam Sirappu, Commissionerate of Indian Medicine & Homoeopathy, Chennai, 2008, P.No.19



