

## Medicinal plants used to combat a major gynecological challenge: Ovarian cyst

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### Abstract

Documented data shows that ovarian cysts are prevalent between 8%-18% in women of all ages with high frequency in premenopausal and reproductive age. The exact etiology behind occurrence of ovarian cysts is still unknown however can be categorized as benign, borderline or malignant. Ovarian Hyper-stimulation Syndrome (OHSS), Ectopic pregnancy, Dermoid cysts, Polycystic ovaries and Endometriosis appears to be some of the potent causes of it. Mutation of BRCA 1 gene and BRCA 2 gene increases the risk dramatically. Trans-vaginal grey scan sonography, CT scan, PET, MRI, Chest X Ray are some commonly used techniques determine ovarian cysts. Cyst usually targets right ovary and contains only fluid surrounded by thin wall. India being a biodiversity rich country have a large variety of abundant medically essential plants are, thereby paving

a way for treatment of many women oriented illness. Ayurveda is an ancient medical therapy practiced successfully in a country like India and has an advantage over other treatments of being safe from any after effects and hence proves to be a boon for females suffering from ovarian cyst. *Trifolium paratense*, *Vitexagnus castus*, *Caulophyllum thalictroid*, *Achillea millefolium*, *Chamaelirium luteum* and *Piper nigrum* are some important medicinal plants used extensively to treat ovarian cyst. Fibrous food, zinc, mineral selenium, vitamin A and E are also advantageous to the patient.

**Keywords:** Ayurveda | Ovarian Cyst | Ovarian Syndrome | Medicinal Plants

### Introduction

The incidence of ovarian cysts has increased exponentially in past recent years making it a problem of genealogical concern Present day data shows that ovarian cysts are prevalent between 8% to 18% in women of all ages (Greenlee *et al.*, 2010; Paixao, 2017). Around 5% to 10% of total women adopt surgery due to ovarian cysts (Hilger *et al.*, 2006). The

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development of simple benign ovarian cyst is found to be more common in premenopausal women especially during menstruation when compared with postmenopausal women (Neelgund and Hiremath, 2016). Poly cystic ovaries are found in 70% women of reproductive age leading to Poly Cystic Ovarian Syndrome (Siriwardene *et al.*, 2016). Ovarian cysts are fluid filled ovarian follicles which fail to release ovum at the time of ovulation and continues to grow in size either in or on the surface of ovary (Helm, 2015). Cysts can be simple or complex and they may be small as well as large and could be multiple in number. Small cysts are usually asymptomatic while a large cyst may manifests as urinary tract obstruction, pulmonary hypoplasia, and sometimes as sudden death (Jedrzejewski *et al.*, 2008). Ovarian cysts can be categorized as either benign, or borderline or malignant (Zalaudek *et al.*, 2001). They are also classified in physiological and pathological type (Grimes *et al.*, 2014). Physiological cyst (benign) includes follicular cyst, corpus luteum cysts, dermoid cyst, theca-luteal cyst, cystadenomas, endometrioma cyst while pathological cysts include polycystic ovaries and neoplastic cyst. Some categorized ovarian cyst as uncomplicated and complicated structures (Nussbaum *et al.*, 1988). When corpus luteum fails to dissolve and continue to grow upto few centimeters, development of corpus luteum cysts occurs. It causes ovaries to twist resulting in acute pain and blood loss. Follicular cysts arise due to hormonal imbalance during ovulation. In this follicles do not break but continue to grow leading to irregularities in menstruation (Pal *et al.*, 2015; Williams, 2015). Theca luteal cyst is caused

by increased amount of human chorionic gonadotropin serum levels and ovarian hyperstimulation syndrome.

Ectopic pregnancy, Ovarian Hyperstimulation Syndrome (OHSS), Dermoid cysts, Poly cystic ovaries and Endometriosis are found to be some of the potent causes of it. Development and progression of ovarian cysts is promoted by number of risk factors like age, previous family history or personal history of breast cancer etc. Infertility, hypothyroidism, tubal ligation, nulliparity, maternal gonadotropins also work as promoting agents of ovarian cysts (Grabosch and Helm, 2016). Other than this mutation of BRCA 1 gene and BRCA 2 gene increases the risk dramatically (American College of Obstetricians and Gynecologists, 2010). Maternal diabetes, rh-isoimmune hemolytic disease, toxemia, deficiency of iodine or excess of bromide in the body, early periods, early menopause, also increases the risk 30-60 fold (Sehgal *et al.*, 2011). Elevated level of CA-125, uterine fibroids, endometriosis, pregnancy, ectopic pregnancy, ovarian cancer, anovulation, PCOS also greatly contribute to ovarian cyst (Hilger *et al.*, 2006).

Ovarian cysts generally mimic the ectopic pregnancy and other adnexal masses during diagnosis, so great care should be taken while diagnosing ovarian cyst in a patient (Tehrani *et al.*, 2014). Trans-vaginal Ultrasound, wedge biopsy, CA-125 Blood Test, HE4 gene expression along with CA-125 serum concentration is very helpful in distinguishing epithelial ovarian cancer from benign ovarian tumors (Fawzey *et al.*, 2016). Neutrophil lymphocyte ratio and platelet lymphocyte ratio along with serum cancer antigen 125 is also very useful in distinguish malignant

ovarian cysts from benign ovarian cysts. Proteomics is used extensively in women with elevated C-125 in which several blood proteins especially apo-lipoprotein is also used as a marker in differentiating malignant and benign ovarian masses, highly efficient intra-operative frozen section, Trans-vaginal grey scan sonography, CT Scan, PET, MRI, Chest X Ray are some commonly used techniques and methods used to determine ovarian cysts. On an ultrasound image, ovarian cysts may resemble bubbles. The cyst usually contains only fluid and it is surrounded by a very thin wall. Cyst usually targets right ovary.

Women of 22 -30 has a higher risk of ovarian cyst. Smoking habit increases the chances of ovarian cancer (Greenlee *et al.*, 2010). In the U.S. nearly all premenopausal women are affected with ovarian cyst but the chances of conversion of ovarian cyst into ovarian carcinoma are found to be 15 cases per 100,000 women. Optimal and effective clinical management of ovarian cystic lesions require knowledge of differential diagnosis, imaging features, and management trends (Wasnik *et al.*, 2013). Though ovarian cysts are not very deadliest but it poses various great threats to the women's reproductive health, if ignored for prolonged time. Public awareness regarding women oriented disease like ovarian cyst is very important in combating this disease completely.

Several treatments are given for the curing this disease but inculcating habits like avoiding caffeine, egg, refined food, red meat, white sugar and alcohol can help the patients to control or limit the ovarian cyst (Yasothai, 2014). Mixture of triphala churna and trikatu churna, and kanchnaar guggul with aloe vera

juice and Chandraprabhavat, sharangdhar samhita, Madhya khand, kachnaar guggul and manibhadra churna have therapeutic effects. They limit the size of cyst and cure dismenorrhoea, gynecological syndromes and hormonal imbalance (Sehgal *et al.*, 2011). Surgical methods are also very useful during emergency but major treatment depends on the medicines. Different type of surgery is used to treat large size ovarian cysts including cystectomy, oophorectomy, hysterectomy, laparoscopy and laparotomy (Garg, 2011). In allopathic treatment, oral contraceptive pill, progestins, antiandrogens and ovulation induction agents are successfully used to cure or limit the growth of ovarian cancer. Medicines like morphine sulfate, oxycodone, ibuprofen, indomethacin, naproxen, diclofenac, ketoprofen, ketorolac, metformin, sprintec and provera are commonly used to overcome from cyst (Grunkemeier *et al.*, 2007). Allopathic medication is commonly and effectively used to reduce the symptoms of ovarian cyst. Yoga proves to be inexpensive, natural and effective stress buster in treating and managing ovarian cyst, particularly PCOS. Several asanas are proved to be very useful for PCOS patients such as bhramri pranayama, bhadrasana, sun salutation, bhujangasana, naukasana, dhanurasana, warrior pose, sputa badhakonasana, chakki chalanasana, shavasana, padmasana, and kapalbhati etc. since stress and unhealthy lifestyle are one of the factors responsible for ovarian cyst.

### **Consequences of Ovarian Cyst**

Ovarian cyst in most cases manifest in the form of Polycystic Ovarian Syndrome (PCOS) which in turn elicit other conditions to

develop. PCOS is the chronic metabolic endocrinal disease affecting every one out of five woman. It is a common heterogeneous condition, manifested as diverse implications including reproductive (hyper-androgenism, hirsutism, anovulation, multiple immature follicles, ovulatory dysfunction, menorrhagia, dysfunctional uterine bleeding, chronic pelvic pain during menses, sub-fertility, infertility, miscarriage, gestational diabetes, pregnancy induced hypertensive disorders, neonatal complications, endometrial hyperplasia), phenetic (persistent acne, facial hair growth, hair loss, acanthosis nigricans, obesity, male pattern alopecia, oily skin, dandruff), metabolic (insulin resistance, metabolic syndrome, dislipidaemia, high blood pressure, impaired glucose tolerance, diabetes mellitus type-2, cardiovascular disease) and pshycological (anxiety, depression, lack of confidence, deteriorate life) features (Deeks *et al.*, 2010; Conisha, 2017). Benign breast disease, benign ovarian tumors, fibroids, ovarian and endometrial cancers are one of the most consistent epidemiological consequences of ovarian cyst (Ness *et al.*, 2000; Tabarrai and Kasraei, 2017). Different interlinked consequences of ovarian cyst are shown in figure 1.

### **Mechanism of Ovarian Cyst**

An FSH surge stimulates the emergence of a new follicle formation, from which a single dominant follicle is selected at the time of deviation. Through a positive feedback loop oestradiol stimulates GnRH and LH pulsatility, which in turn supports growth and development of the dominant follicle. Upon reaching preovulatory size, follicular steroidogenic activity reaches a peak and

produces a preovulatory oestradiol surge. This surge either fails to elicit a GnRH and subsequent LH surge or the GnRH/LH surge is delayed. The dominant follicle, therefore, does not ovulate but, due to the ongoing LH pulsatility, continues to grow and becomes a cyst.

The disruption of the hypothalamic-pituitary-gonadal axis can be caused by factors affecting the oestradiol feedback mechanism and GnRH/LH release at the hypothalamic-pituitary level **(1)** and/or by an aberrant follicle growth and development with alterations in receptor expression and steroidogenesis **(2)**, leading to an altered oestradiol surge and feedback **(3)**. Hypothalamic-pituitary function and follicular growth/development may be affected by NEB through metabolic/hormonal adaptations. In addition, in the situation of NEB, the expression of genetic hereditary factor(s) associated with COF may be promoted or the functional importance may increase, which in turn may affect follicle growth and hypothalamic-pituitary function. Figure 2 shows the schematic representation of the pathogenesis and the possible pathways involved in the formation of ovarian cysts (Vanholder, 2006).

### **Ethno-medicinal plants used to treat ovarian cancer**

Use of oral contraceptive, progestins, antiandrogens, and ovulation inducing agents are standard therapies in allopathic medication. Oral contraceptives prevent the re-occurrence of cyst. But the repeated use of Metformin, sprintec, YAZ, Tri-Sprintec, TriNessa, Provera, spironolactone, GeneressFe, and Seasonique, and Mononessa drugs interferes in fertility of a patient (Rofe *et*

*al.*, 2013). Excessive painful or irregular periods was reduced by 25–50% among women using the combined pill compared with nonusers (Grimes *et al.*, 2006). Hence, to prevent a patient from all these types of side effects use of natural treatment and methods from Ayurveda is highly recommended. Several important medicinal herbs and plants in Ayurveda used for curing ovarian cysts are listed in table 1.

Ayurveda is the ancient method to treat number of diseases and is also popular in demand and practice nowadays (Samy *et al.*, 2008). Hundreds of plant species are extensively used by practitioners to cure ovarian pathology and other related issues. Kanchnar guggulu is good for PCOS (polycystic ovaries). Polycystic ovaries results in number of gynecological problems including anaemia and sub-fertility which can be treated by another ayurvedic regimen, Kalyalakagrita.

Kalyanakagrita and Kanchnarguggulu are made of several natural ingredients like Haritaki, Daru, Bhibhitaka and many more (Siriward *et al.*, 2010).

In conclusion, from the above discussion in present day scenario, ovarian cyst has emerged as the most life threatening problem in the women all over the world. In most of the cases lack of awareness, illiteracy, poverty and unavailability of the treatments is responsible for the spread and growth of the cysts in the female's body. Hence, the required facilities and awareness about cysts should be made available for the common people who are not able to approach those kind modern and affective treatments. Ayurveda is the ancient medical therapy having greater curative effects in ovarian cysts. This treatment regimen prevents reoccurrence of ovarian cysts.

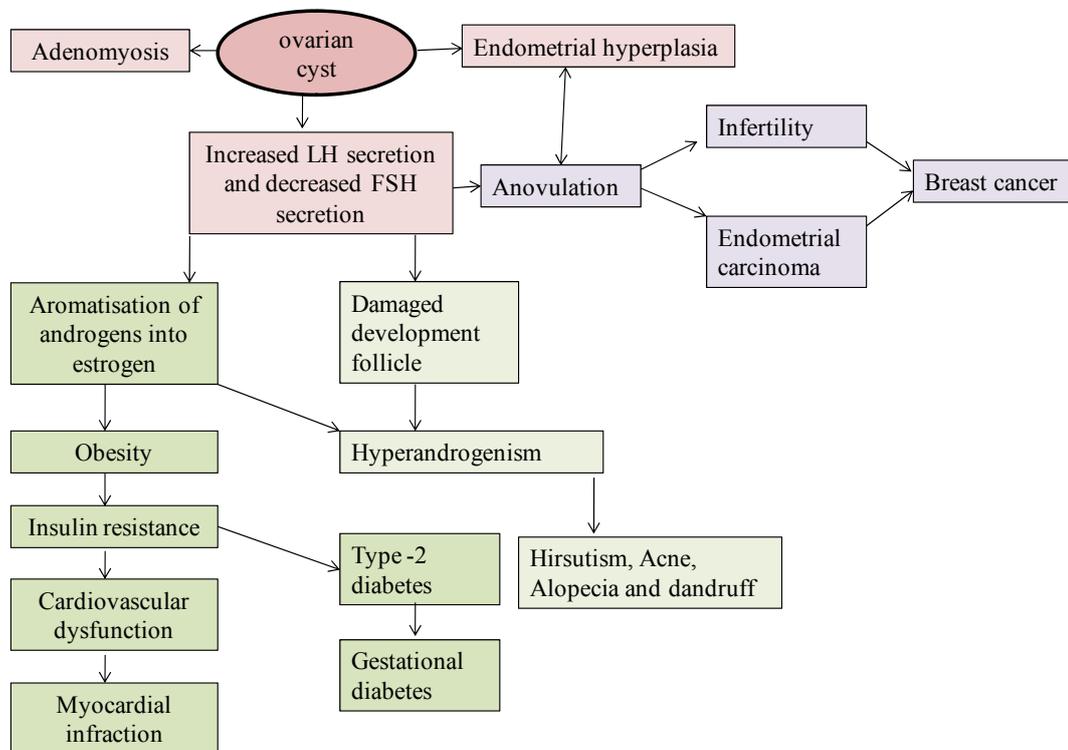


Fig 1: Different interlinked consequences of ovarian cyst

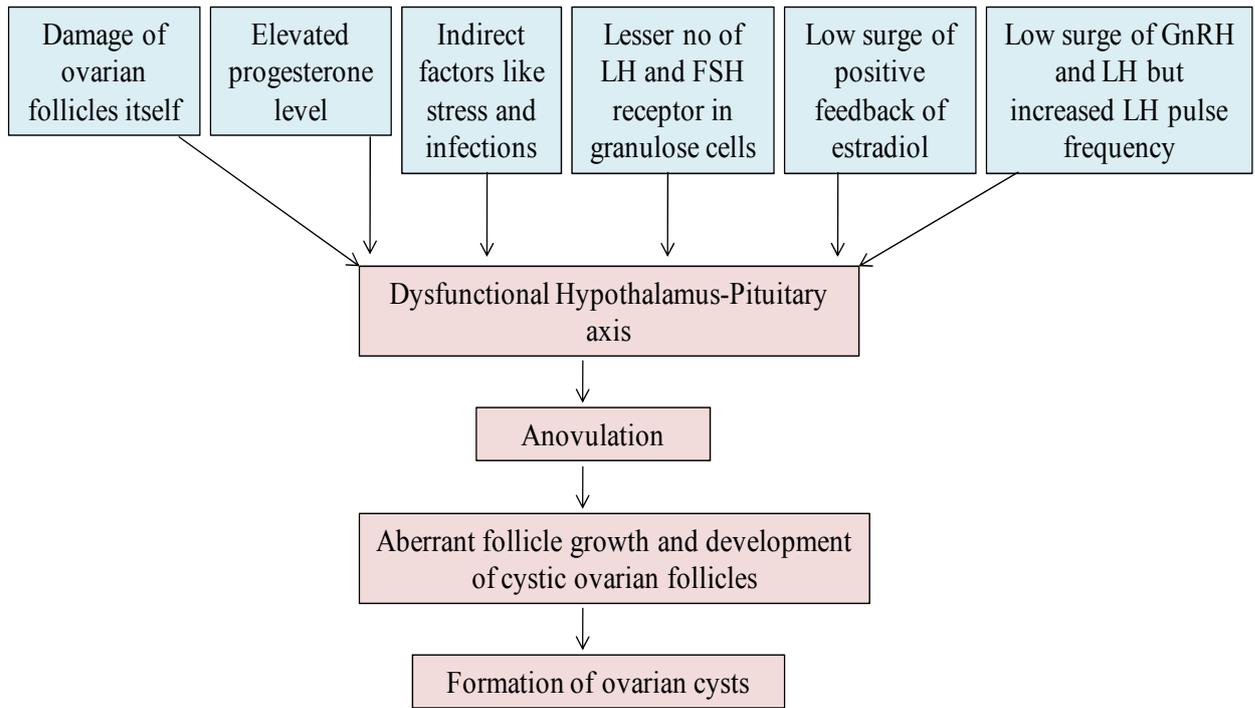


Fig 2: Mechanism of ovarian cyst formation

| S. No. | Name of The Plant            | Common Name          | Family        | Parts Used  | Benefits  | References  |
|--------|------------------------------|----------------------|---------------|---|---|---|
| 1.     | <i>Achillea millefolium</i>  | Yarrow               | Asteraceae    | Whole plant   | Relieve pain and useful in endometriosis and regulates irregular flow                     | Aggarwal <i>et al.</i> , 2011; Vahide <i>et al.</i> , 2014      |
| 2.     | <i>Acorus calamus</i>        | Vacha/ sweet flag    | Acoraceae     | Whole plant   | Has anti inflammatory activities and relieves pain  | Kim <i>et al.</i> , 2009; Wu <i>et al.</i> , 2009               |
| 3.     | <i>Actaea racemosa</i>       | Black cohosh         | Ranunculaceae | Whole plant   | Useful in treating amenorrhea, dysmenorrhea, uterine                                      | Newton <i>et al.</i> , 2006; Sakineh <i>et al.</i> , 2010       |
| 4.     | <i>Albezzia lebbok</i>       | Shirish/Flee tree    | Fabaceae      | Bark  | Is anti-inflammatory  | Faisal <i>et al.</i> , 2012                                     |
| 5.     | <i>Aloe vera</i>             | Aloe                 | Asphodelaceae | Leaves  | Used to resolve ovarian problems and others related to cyst                               | Maharajan <i>et al.</i> , 2010; Mahor <i>et al.</i> , 2016      |
| 6.     | <i>Asparagus racemosus</i>   | Shatavari            | Asparagaceae  | Herb  | Improves stamina and helpful in carrying women's reproductive cycle without any problems. | Visavadiy and Narasimhacharya, 2009; Mitra <i>et al.</i> , 2012 |
| 7.     | <i>Asphaltum</i>             | Shilajit             | Pedaliaceae   | Flower  | Boon for menorrhagia, dysmenorrhea  | Carlos <i>et al.</i> , 2012; Wanjari <i>et al.</i> , 2016       |
| 8.     | <i>Baliospermum montanum</i> | Danti                | Euphorbiaceae | Leaves  | Balances female hormones  | Panda <i>et al.</i> , 2014; Chaganti and Prasad, 2015           |
| 9.     | <i>Bauhinia variegata</i>    | Kachnar/orc hid tree | Leguminosae   | Whole plants including leaves, flower, bud and fruits | Contains alkaloids, tannins and ascorbic acid that help in resolving ovarian cyst.        | Balakrishnan and Bhat, 2015                                     |
| 10.    | <i>Beta vulgaris</i>         | Beet root            | Amaranthaceae | Fruit   | Eradicates problems produced by ovarian cyst  | Restuccia <i>et al.</i> , 2012                                  |

|     |                                 |                         |               |  |   |   |
|-----|---------------------------------|-------------------------|---------------|--|---|---|
| 11. | <i>Caulophyllum thalictroid</i> | Blue cohosh             | Berberidaceae | Flower   | Useful in curing endometriosis, and ovarian cyst. Help in toning the ovaries, and prevent the bloating, inflammation and uneasiness due to ovarian cyst | Xia <i>et al.</i> , 2014                                      |
| 12. | <i>Chamaelirium luteum</i>      | False Unicorn Root      | Liliaceae     | Root   | Reduces menstrual cramps, growth of cyst and chances of infertility.  | Victoria <i>et al.</i> , 2012                                 |
| 13. | <i>Cinnamomum camphora</i>      | Karpoor                 | Lauraceae     | Flowers and fruits                                 | Has anti inflammatory activity on the ovaries   | Lee <i>et al.</i> , 2006; Mishra, 2016                        |
| 14. | <i>Cinnamomum tamala</i>        | Tejpatta                | Lauraceae     | Bark and leaves                                    | Is anti inflammatory and helps in pain  | Chakraborty <i>et al.</i> , 2010; Mishra <i>et al.</i> , 2010 |
| 15. | <i>Cinnamomum zeylanicum</i>    | Cinnamon/ Dalchini      | Lauraceae     | Bark and leaves                                    | Reduces the risk of insulin resistance, irregular periods and diabetes  | Arentz <i>et al.</i> , 2014                                   |
| 16. | <i>Citrullus colocynthis</i>    | Bitter apple            | Cucurbitaceae | Fruit  | Has purgative, anti-inflammatory, antidiabetic, hair growth-promoting, abortifacient, and antioxidant properties an dhelp in reproductive               | Ostovan <i>et al.</i> , 2014                                  |
| 17. | <i>Clerodandrum serratum</i>    | Bharangi                | Lamiaceae     | Flower   | Reduce fibroids and help in increasing appetite that mitigate weakness  | Singh <i>et al.</i> , 2012; Dave <i>et al.</i> , 2015         |
| 18. | <i>Commiphora wightii</i>       | Kachnar gugglu          | Burseraceae   | Resin  | Reduces cyst and tumors. Purify blood   | Dev, 1997; Sharma and Sharma, 2014                            |
| 19. | <i>Crataeva religiosa</i>       | Varuna                  | Capparaceae   | Leaf   | Maintain fertility  | Lagnika <i>et al.</i> , 2011                                  |
| 20. | <i>Curcuma longa</i>            | Haridra/ haldi          | Zingiberaceae | Root   | Induce proper ovulation and is anti-inflammatory  | Bharti <i>et al.</i> , 2007; Reddy <i>et al.</i> , 2016       |
| 21. | <i>Cyprus rotundus</i>          | Mustak/ Java grass      | Cyperaceae    | Whole plant  | Helps to dissolve ovarian fibroids  | Natrajan <i>et al.</i> , 2006; Kum <i>et al.</i> , 2017       |
| 22. | <i>Dioscorea villosa</i>        | Wild Yam                | Dioscoreaceae | Root   | Useful for menstrual spasm, premenopausal complaints, miscarriage, painful labor and inflammation in ovaries  | Roy <i>et al.</i> , 2011                                      |
| 23. | <i>Elettaria cardamomum</i>     | Cardamomum              | Zingiberaceae | Seeds  | Dissolves fibroids  | Verma <i>et al.</i> , 2009                                    |
| 24. | <i>Embillica officinalis</i>    | Amala/Indian gooseberry | Euphorbiaceae | Seeds, leaves, bark, root, flower and dried fruits | Antioxidant, anti-cancerous, anti-inflammatory functions  | Bhandari <i>et al.</i> , 2012; Jain <i>et al.</i> , 2015      |
| 25. | <i>Glycyrrhiza glabra</i>       | Mulethi                 | Fabaceae      | Roots  | Is anti-inflammatory in action and anti-oxidant   | Dhingra <i>et al.</i> , 2006                                  |
| 26. | <i>Grifola frondosa</i>         | Maitake Mushroom        | Meripilaceae  | Fruit  | Remedy for polycystic syndrome by normalizing hormonal imbalance. Controls body weight and insulin resistance   | Ding <i>et al.</i> , 2016; Pachiappan <i>et al.</i> , 2017    |
| 27. | <i>Linum usitatissimum</i>      | Flax/linseed            | Linaceae      | Seeds  | Dissolves cyst  | Nowak <i>et al.</i> , 2007; Grant, 2010                       |

|     |                             |                             |                  |                  |   |   |
|-----|-----------------------------|-----------------------------|------------------|------------------|---|---|
| 28. | <i>Momordica charantia</i>  | Karela                      | Cucurbitaceae    | Fruit            | Is anti-diabetic and anti-oxidant and helps in relieving symptoms of poly cystic syndrome                         | Chaggan, 2015   |
| 29. | <i>Piper chaba</i>          | Chavya                      | Piperaceae       | Root and fruit   | Relieves in painful menses  | Kumar <i>et al.</i> , 2008;   |
| 30. | <i>Piper longum</i>         | Pippali                     | Piperaceae       | Fruits and seeds | Treats menstrual pain and pain in ovaries   | Lakshmi <i>et al.</i> , 2006; Nabi <i>et al.</i> , 2013                             |
| 31. | <i>Piper nigrum</i>         | Maricha/ Black Pepper       | Piperaceae       | Fruit            | Help in dissolving the cyst. Helps absorb nutrients in body   | Lu <i>et al.</i> 2012; Sireeratawong <i>et al.</i> , 2012; Tan <i>et al.</i> , 2013 |
| 32. | <i>Ricinus communis</i>     | Castor                      | Ricininae        | Seeds            | Oil helps in limiting size of ovarian cyst  | Tunaru <i>et al.</i> , 2012; Abulrasheed <i>et al.</i> , 2015                       |
| 33. | <i>Saraca indica</i>        | Ashok                       | Caesalpinioideae | Leaves           | Contains anti-inflammatory properties and help in reducing pain from cyst   | Bhalerao <i>et al.</i> , 2014   |
| 34. | <i>Symplocas racemosa</i>   | Lodhra                      | Symplocaceae     | Flower           | Potent herb in maintaining female reproductive health and relief pain   | Rao <i>et al.</i> , 2011; Jadhav <i>et al.</i> , 2015                               |
| 35. | <i>Taraxacm officinale</i>  | Dendalion                   | Asteraceae       | Leaf and roots   | Provide potassium, of which deficiency appears to contribute in the growth of the cyst. Reduces pain and swelling | Busmann and Glenn, 2010; Nasri <i>et al.</i> , 2015                                 |
| 36. | <i>Terminalia bellerica</i> | Bhibhitaki                  | combrataceae     | Fruit, bark      | Maintain female hormones and the regular menstruation, controls excess blood flow and pain                        | Patil <i>et al.</i> , 2010; Deb <i>et al.</i> , 2016                                |
| 37. | <i>Terminlia chebula</i>    | Haritaki                    | Combrataceae     | Fruit            | Contains phytochemicals that limit the size of ovarian cyst   | Jayweera, 1981; Bag <i>et al.</i> , 2013  |
| 38. | <i>Tinospora cordifolia</i> | Guduchi/ Giloy              | Menispermaceae   | Leaves           | Antioxidants which fight free-radicals, giloy helps remove toxins, purifies blood                                 | Nair <i>et al.</i> , 1996; Dhanasekaran <i>et al.</i> , 2009                        |
| 39. | <i>Trifolium paratense</i>  | Red clover                  | Fabaceae         | Whole plant      | Reduces menstrual cramp, helps in treating infertility  | Ghazanfarpour <i>et al.</i> , 2015  |
| 40. | <i>Tylphora indica</i>      | Anantmool                   | Apocynaceae      | Flower           | Helps in regulating menstrual cycle   | Bhatia <i>et al.</i> , 2013; Pratheesh <i>et al.</i> , 2014                         |
| 41. | <i>Vitexagnus castus</i>    | Chaste berry                | Lamiaceae        | Roots            | Prevent ovarian cyst by lowering estrogen level and help in menstrual complaints                                  | Die <i>et al.</i> , 2009; Salehi <i>et al.</i> , 2016                               |
| 42. | <i>Withania somnifera</i>   | Ashwagandha, Indian gingsen | Solanaceae       | Whole plant      | It provides strength to deal with the negative health impacts and is antispasmodic.                               | Karakava, 2004; Dhiman, 2014  |
| 43. | <i>Zingiber officinale</i>  | Ginger                      | Zingiberaceae    | Roots            | Remove out tiny cysts completely and prevent ovarian cancer. Balances hormonal level                              | Rhode <i>et al.</i> , 2007  |

**Table 1:** Important Medicinal Plants used to combat ovarian cyst

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