



Marjoram in Menstrual Cycle Regulation: Traditional Uses and Potential Benefits

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ABSTRACT: -

Background:- A perennial herb of the Lamiaceae family, marjoram is native to the Mediterranean region and is commonly grown for its flavourful leaves and culinary uses. Marjoram has a various pharmacological action which contributes to the therapeutical effects includes anti-inflammatory, anti-spasmodic, analgesic, Hormone modulating, anti-oxidant and many others. marjoram also gives their effect in treatment of Pcos. Marjoram gives their action by maintaining the hormonal balance and potentially affecting estrogen and progesterone, insulin sensitivity. In the Pcos the marjoram gives there affect by significantly decreasing in Dehydroepiandrosterone sulphate levels (DHEA-S).

Method:- A thorough literature review was carried out with the aid of sources including Google Scholar, PubMed, and Scopus. Both in vitro and in vivo studies were chosen for inclusion because they were pertinent to the anticonvulsant properties of marjoram. The functions of important phytochemicals, including flavonoids and essential oils, in regulating neuronal excitability were examined.

Result:- According to research, marjoram extracts significantly reduce seizures in a variety of animal models by modifying neurotransmitter systems, such as glutamatergic and GABAergic pathways. The potential of phytochemicals like thymol and carvacrol to lessen seizure frequency and intensity is underlined.

Conclusion :- Marjoram shows promise as a natural anticonvulsant agent, warranting further research to fully understand its mechanisms and therapeutic potential. Future clinical studies are essential to establish its efficacy and safety in human populations.

Keywords :- Dehydroepiandrosterone sulphate (DHEA-S), Hormonal imbalance, Marjoram, Origanum marjoram, Pcos.

1. Introduction :-

Three percent to eight percent of women of reproductive age have PCOS, a prevalent endocrine and metabolic condition. Chronic anovulatory cycles, high testosterone levels, or polycystic ovarian morphology are the factors that identify this anomaly. Furthermore, it's typical to observe hyperinsulinemia and insulin resistance in female PCOS patients (1) Dehydroepiandrosterone-S (DHEA-S) was considerably lower in sweet marjoram tea, which also proved beneficial in treating polycystic ovarian syndrome. (2) The clinical features of PCOS encompass amenorrhoea, oligomenorrhoea, obesity, infertility resulting from anovulation and cutaneous manifestations like acanthosis nigricans, acne, and hirsutism. PCOS is also associated with other metabolic disorders including insulin resistance and increased expression of androgens (3) Origanum vulgare L. (OV), sometimes referred to as Himalayan/wild marjoram or Bantuli (in India), is a member of the Lamiaceae mint family's genus Origanum. The 43 species, 6 sub-species, 3 variations, and 18 natural hybrids that make

up the genus Origanum are widely distributed throughout the Mediterranean, Irano-Siberian, and Euro-Siberian regions. O. vulgare is the sole species known in India, and it is primarily found in J&K, HP, the UK, and Sikkim (4) It is a perennial aromatic, annual herb. Its synonym and accepted botanical name is Majorana hortensis, while the plant is commonly known as sweet marjoram. The plant is native to Greece, Cyprus and Turkey; however, it has also been cultivated in Morocco, Egypt, Tunisia, Algeria and elsewhere (5)

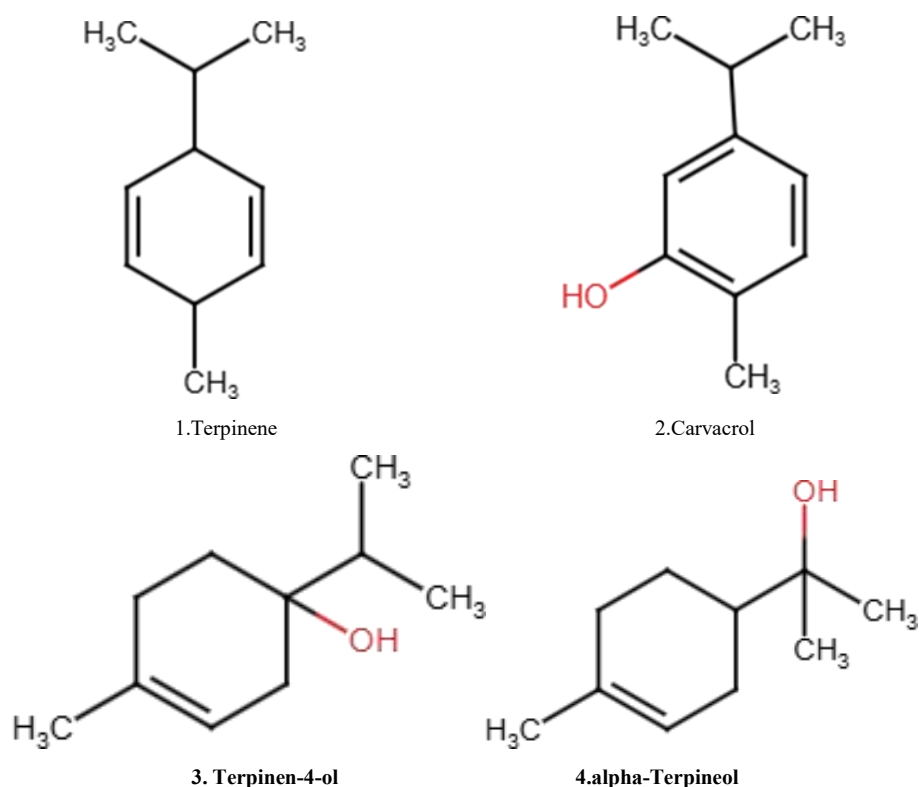


Figno :-1 Marjoram Leaves

2. Phytochemical Constituents

O. majorana's essential oil contains monoterpene hydrocarbons such as α - and β -pinene, camphene, sabinene, α - and β -phellandrene, r -cymene, limonene, b -ocimene, g -terpinene, terpinolene, a -terpinene, carvone, and citronellol. Other oxygenated chemicals found in *O. majorana* leaves and essential oil include linalyl acetate, a -terpineol, *trans*- and *cis*-carveol, thymol, anethole, geraniol, and carvacrol. (2) Essential oils are complex combinations made up of volatile, colorless, and typically aromatic molecules that dissolve poorly in water but very well in a variety of organic solvents, including ethanol, diethyl ether, and acetone. Terpenoids, or more specifically monoterpenes, which are flavouring compounds, and sesquiterpenes, whether oxygenated or not, are typical components of essential oils. Derivates of monoterpenes, or substances with various functional groups like esters, acetates, and alcohols, are among the additional ingredients. (5) Sage (*S. officinalis*) oil extract was obtained from "Nature's Alchemy," which is distributed by Lotus Brands, USA, whereas marjoram (*O. Majorana*) oil extract was obtained from the Agriculture Research Centre, Cairo, Egypt. The essential oils found in marjoram appeared to be useful for boosting metabolism and preserving a healthy weight (6) The main constituents of marjoram essential oil are γ -terpinene, γ - terpinene, *cis*-sabinene hydrate, α -terpinene, sabinene, and α -terpineol. (7) When mixed with AA, marjoram EO and hydrosol enhanced the quality of shredded carrots kept for nine days at 4 °C. (8) Marjoram's dried leaves hold their flavour better than those of other dry herbs like sage and thyme. It is typically added towards the end of cooking recipes to preserve the precise

quantity of flavour and smell. (9) The phenolic chemicals gallic acid, caffeic acid, *p*-coumaric acid, ferulic acid, apelin, and *trans*-2-hydro cinnamic acid are typically found in ethyl acetate/water extract, methanol, acetone, and water (10) The most prevalent flavonoids found in sweet marjoram are hesperetin, catechin, quercetin, kaempferol, naringenin, eriodictyol, diosmetin, luteolin, and apigenin (2) *Majorana hortensis* is distinguished for its powerful, flavorful, and humorous scent. Because of its fragrant nature, research on the marjoram herb revealed that volatile oil was one of its main phytoconstituents (64) Based on the available data, it was discovered that the plant's aerial portion contains sesquiterpenoid and monoterpenoids (65,66) phenol-methyl ethers, such as *trans*-anethole 10 tri-terpenoids, oleanolic acid, urinary acid, linalyl acetate, terpenyl acetate, and *granyl* acetate 18 (terpene ester) (67,68) It has been reported that the plant's aerial parts contain β -sitosterol (69) A variety of tannins, including caffeic acid, carnosic acid, carnosol, labiatic acid, and rosmarinic acid, are present in the herb's aerial portions (70) Its leaves contain fatty acids called linolenic, linoleic, and oleic acid. The leaves and flower components of the marjoram herb are used to separate vitamin A and vitamin C (71) According to reports, the most common phenolic glycosides in sweet marjoram essential oil are arbutin, methyl arbutin, vitexin, and orientin/thymonin (72) The most prevalent flavonoids found in sweet marjoram are hesperetin, catechin, quercetin, kaempferol, naringenin, eriodictyol, diosmetin, luteolin, and apigenin (73) and kaempferol-3- O-glucoside, quercetin-3-O-glucoside, naringenin-O-hexoside, and rutin are flavonoid glycosides identified in sweet marjoram (74,75) The essential oil of *O. majorana* has been shown to include monoterpene hydrocarbons, such as α and β -pinene, camphene, sabinene, α - and β -phellandrene, r -cymene, limonene, b -ocimene, g -terpinene, terpinolene, a - terpinene, carvone, and citronellol (76,77,78) Antimicrobial, antibacterial, antispasmodic, antiseptic, antidepressant, antiviral, and many more pharmacological characteristics are possessed by these substances (79) Nearly 2-3% of E.O. is present in various sections of the marjoram plant (leaves, stems, and flowers), which are extracted using both conventional techniques (steam-hydro distillation) and cutting-edge techniques (supercritical fluid extraction, microwave-assisted extraction). The majority of the chemicals that make up E.O. are hydrocarbons and phenolic compounds (80)



3. Pharmacological activity

Herbs known as marjoram (*Origanum majorana* L) are found all over the world. Marjoram is used in food to flavor soups, salads, meats, and sausages. It has historically been used as a folk treatment for gastrointestinal issues, rheumatism, anxiety headaches, cramps, depression, diuretics, paroxysmal coughs, and asthma (11). It has been demonstrated that dried marjoram, marjoram tea, or compounds made from marjoram have hepatoprotective, anti-inflammatory, anti-PCOS, and cardioprotective qualities(12)

Some women use marjoram tea to induce menstruation, manage mood swings associated with the menstrual cycle, ease the symptoms of menopause, and encourage the production of breast milk(13) Dehydroepiandrosterone-S (DHEA-S) was considerably lower in sweet marjoram tea, which also proved beneficial in treating polycystic ovarian syndrome. (2) Also, a few of the primary ingredients in marjoram have the ability to raise hormone levels, which aids in the treatment of polycystic ovarian syndrome and its effects. Mood fluctuations and other premenstrual symptoms that are uncomfortable before to periods can be relieved with this herb oil (14) Extracts of marjoram and its essential oil are highly helpful in treating painful periods, balancing hormones, and controlling the menstrual cycle (15). Consequently, it was established that marjoram tea improves the hormone profile of female PCOS patients. It reduces adrenal androgen release and increases insulin sensitivity(16) Majoram oil is used to treat rheumatism, muscle aches, and flatulence because it contains a significant amount of eugenol, which, when tested against cyclooxygenase enzymes, has anti-inflammatory properties.

Eugenol's ability to block enzymes makes it a great option for treating inflammatory diseases like rheumatoid arthritis, osteoarthritis, and bowel disorders by relieving their symptoms.

This chemical molecule help treat excess leucorrhea and menstrual pain when taken in moderation; nevertheless, it might increase the flow rate during menstruation, which can result in menorrhagia (9)

Majorana tea extract was found to improve insulin sensitivity, lower adrenal androgen levels, and considerably lower DHEA (17) Locals believe that marjoram herb (*Origanum majorana*) can balance hormones and control the menstrual cycle. Thus, the purpose of this pilot study was to conduct a randomised, double-blind, placebo-controlled trial to examine the impact of marjoram tea on the hormonal profile of women with polycystic ovarian syndrome (PCOS)

(18) *Origanum majorana* has long been used to control the menstrual cycle and restore hormonal equilibrium. A controlled, double-blind, randomized trial including 25 PCOS women was carried out. The Majorana tea extract was found to improve insulin sensitivity, lower adrenal androgen levels, and considerably lower DHEA. The current study's findings indicated a positive impact on PCOS-affected women's hormonal profiles (19) The study used a double-blind, controlled placebo experiment to examine menstruation women with PCOS. The PCOS women's hormonal profiles were improved by marjoram tea, which may have been caused by a drop in androgenic hormones and an improvement in insulin sensitivity(20)

Table 1 : Chemical Compounds and Pharmacological properties of Marjoram

| Parts Used | Formulations | Chemical compounds | Pharmacological benefits | Reference |
|------------|--------------------------------------|---|--|---|
| Flowers | Essential oil and methanolic extract | Terpenoids , carvacrol , camphene , linalool , myrcene , 1,8-cineole, carvone , limonene | Antimicrobial , antibacterial ,antifungal, antioxidant , antiparasitic | (Ayari et al., 2013; Jan et al., 2018; Bouyahya et al., 2021) (40,41,42) |
| Stems | Essential oil | Thymol , linalool , sabinene , camphene , borneol , carvacrol methyl ether | Antibacterial, antifungal, antioxidant ,antimicrobial, Hepatoprotective | (Guerra-bone et al., 2015 ; Muqaddas et al., 2016) (43,44) |
| Leaves | Essential oil and ethanolic extract | Terpenoids, terpineol, sesquiterpene, tannic acid , pinene , linalool , gallic acid , borneol , carvacrol | Antianxiety, antifungal, antiseptic, antidiabetic, anticancer, antibacterial, antiparasitic, relieves menstrual cramps | (Jiang et al., 2011; Calín-Sánchez et al., 2015; Ayari et al., 2016) (45,46) |
| Seeds | Essential oil and ethanolic extract | Terpenoids, Phenolic acid, Ascorbic acid , gallic acid , thymol , terpinyl acetate , cinnamic acid | Antibacterial, antioxidant antimicrobial, antiviral, stimulate digestive secretions , antifungal | (Xylia et al., 2018; Jan et al., 2018; Baj et al., 2018; Bouyahya et al., 2021) (47,48) |

In rats, majoram extract contains a variety of active ingredients that stimulate digestion in addition to pepsin secretions and gastric juice (81) Neuropsychiatric conditions like "Alzheimer Disease" tend to be less severe and develop more slowly when important functional dietary components are consumed (82) Majoram leaf powder and extract reduce genotoxicity, immunosuppression, and tissue damage caused by tumorous organelles (83)

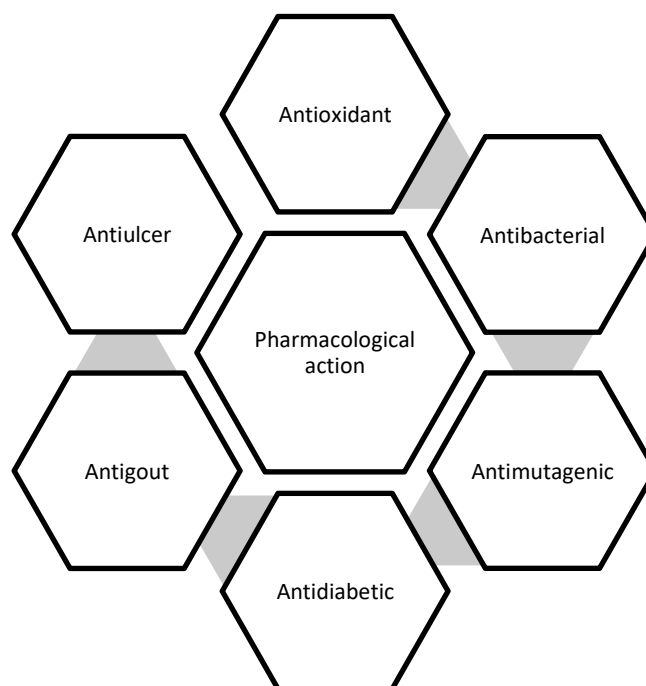
Marjoram tea is used by some women to start menstruation, alleviate mood swings associated with menstruation, ease menopausal symptoms, and encourage the production of breast milk (84) Food poisoning, staph infection, tetanus infection in wounds, typhoid, malaria, influenza, common cold, mumps, and measles are just a few of the common disorders that can be treated with marjoram, a powerful antiseptic, antibacterial, antifungal, and antiviral agent (85)

The presence of flavonoids, phenols, tannins (phenolic compounds), and triterpenoids may be the reason why *Origanum majorana* ethanol extracts (stem and root) demonstrated strong antioxidant activity, reducing power ability, free radical scavenging activity, and metal chelating ability when compared to standards like ascorbic acid (86)

Through the use of residual film and total application assays, the essential oils of leaves demonstrated insecticidal action against adults of *Aphis fabae* L. and *Aspergillus* species as well as fourth instars of *Spodoptera littoralis* (87,88) Numerous bioactive substances found in marjoram have pharmacological and physiological effects, including antibacterial, antiviral, hepatoprotective, antidiabetic, and anti-inflammatory qualities.

Consequently, it has a lot of potential for usage as a health supplement or nutraceutical to improve general health and wellness (89) It is applied topically to sprains, backaches, toothaches, tight muscles, and painful joints (90)

Adult asthma sufferers' health and lung functioning improved when marjoram oils were administered at a low dose (2 drops per day) (91)



Figno : 2 Pharmacological action

4. Traditional uses :-

4.1 Antioxidant activity :-

Significant antioxidant activity is shown by the water extract, essential oil, and ethyl acetate extract of the aerial portion of *O. majorana*. Moreover, ethanolic, n-hexane, and hydroalcoholic extracts of sweet marjoram have been shown to possess antioxidant qualities.²⁰ Phenolic substances that have antioxidant properties include flavonoids, ursolic acid, carnosic acid, carnosol, hydroxycinnamic acid, and caffeic acid

4.2 Antidiabetic activity :-

The phenolic acid and flavonoid components (hesperetin, luteolin, arbutin, quercetin, rosmarinic acid, ferrulic acid, and catechin) present in *O. majorana* extract are responsible for its antidiabetic properties. Moreover, a number of mechanisms, including elevated plasma insulin levels, hepatic glycogen synthesis stimulation, increased glucokinase activity, downregulated glucose-6-phosphatase (G6pase), and phosphoenolpyruvate carboxykinase (PEPCK), have been reported in studies to underlie the antidiabetic effects of ferulic acid ⁽²⁴⁾

4.3 Antimutagenic activity :-

In an open maze test, an intraperitoneal dosage of 200 mg/kg body weight of leaf extract has demonstrated anti-anxiety effects in rats. The result was similar to diazepam and dose dependant ⁽⁹⁾

4.4 Antimicrobial activity :-

The methanol extract demonstrated substantial efficacy against *Aspergillus niger*, *Fusarium solani* and *Bacillus subtilis*. In comparison to regular nystatin, the methanol extract demonstrated greater efficacy against *Aspergillus niger*. The antibacterial properties of marjoram leaves are effective against *Aspergillus fumigatus*, *Bacillus anthracis*, *Proteus vulgaris*, *Salmonella stanley*, *S. newport*, *Streptococcus agalactiae*, and *S. guneus* ⁽¹⁰⁾

4.5 Antianxiety activity :-

Two major factors that lead to a number of health issues, such as depression, sleeplessness, disrupted mental health, etc., are stress and anxiety. The calming effects of the chemical components in marjoram E.O. soothe the muscles and nerves that surround the brain ⁽⁴⁹⁾ This herb, which is nervine (strengthens the nervous system), is used as an anti-anxiety herb that elevates mood and releases feel-good hormones. Since ancient times, people have used it to relieve tension and stress by either inhaling the essential oil or massaging it on the afflicted area ⁽⁵⁰⁾ When administered intraperitoneally to

rats in an open maze model at a dose of 200 mg/kg b.w., the leaf extract demonstrated anti-anxiety benefits. The effects were similar to those of diazepam and dose dependant (51)

4.6 Antigout activity :-

When administered orally to Swiss albino rats provoked with potassium oxonate, the ethanol extracts of the stem (200 mg/kg b.w.) and the root (400 mg/kg b.w.) shown anti-gout action. In terms of lowering uric acid, creatine, ESR, and MDA and raising reduced glutathione levels, the effect was dose-dependent and significant (52)

4.7 Hepatoprotective activity :-

The hepatoprotective effect of *Origanum majorana* methanolic extract in rats with CCL4- induced liver damage demonstrated that the toxic effect of CCL4 was greatly lessened in the animals administered 200 mg/kg and 400 mg/kg b.w (53,54)

4.8 Antiprotozoal activity:-

The in vitro antiprotozoal action of the volatile oil and several leaf extracts, such as n-hexane, aqueous ethanol, and ethanolic ammonia extracts, against the single protozoan species *Pentatrichomonas hominis* has been demonstrated using the disk diffusion method (55)

4.9 Cardioprotective benefits :-

Marjoram is a supplement that can be taken to prevent blood clotting and thin the blood, which helps to prevent heart attacks (25) The Cardioprotective properties of the genus *Origanum* help in avoiding severe heart problems like thrombosis by improving the flow of blood through the circulatory system (26)

4.10 Antiulcerogenic activity :-

Sweet marjoram ethanol extract restored the lost mucus on the stomach wall and dramatically reduced the incidence of ulcers, basal gastric secretion, and acid production (27)

4.11 Antitumor activity:-

According to tests for matrigel invasion and wound-healing, *O. majorana* at noncytotoxic doses greatly reduced the migration and invasion of MDA-MB-231 cells. Additionally, this plant prevents MDA-MB-231 from adhering to HUVECs and stops it from migrating through the endothelium through TNF-activated HUVECs. It downregulates NFκB at the nuclear level and inhibits the activities of matrix metalloproteinase-2 and -9 (MMP-2 and MMP-9) and phosphorylation of IκB. It lowers MDA-MB-231 cells' generation of nitric oxide (NO). In vivo tumor growth and metastasis are inhibited by *O. majorana* (28)

4.12 Antiplatelet activity :-

Sweet marjoram leaf methanol extract prevents platelets from adhering to a laminin- coated plant (56) It significantly reduced platelet aggregation brought on by thrombin, arachidonic acid, and adenosine diphosphate (ADP) This action is brought on by arbutin (57)

4.13 Anticholinesterase Inhibitory activity :-

Sweet marjoram essential oil and ethanol extract have demonstrated anticholinesterase inhibitory action (58) This effect is caused by ursolic acid (59)

4.14 Insecticidal activity :-

The essential oils of leaves demonstrated insecticidal action against adults of *Aphis fabae* L. and *Aspergillus* species, as well as fourth instars of *Spodoptera littoralis*, using the residual film and total application assays (60,61)

4.15 Antibacterial activity :-

By estimating the minimal inhibitory concentration, the ethanol and water extract of *O. majorana*

L. have demonstrated antibacterial activity against both Gram-positive and Gram-negative bacteria, as well as potential food uses. Similar to water extract, ethanol extract demonstrated a significant level of inhibition against bacteria (62)

4.16 Antiovicidal activity :-

When applied to human head lice, the essential oils demonstrated ovicidal and adulticidal properties against pyrethroid/malathion-resistant and insecticidal-susceptible *Pediculus humanus capitis*. The control of *P.h. capitis* adults and eggs was found to benefit from the use of essential oils and their constituents, especially linolool, (-)-terpinene-4-ol, and α -terpineol, as fumigants with contact action (63)

5. Clinical Study :-

The culinary herb marjoram (*Origanum majorana*) has been investigated in therapeutic settings for possible health benefits. Marjoram is well known for its antibacterial, anti-inflammatory, and antioxidant qualities. It has been tested in a number of small-scale human investigations. Its effect on hormonal balance, especially in women with polycystic ovarian syndrome (PCOS), is one noteworthy research topic. Marjoram tea has been demonstrated in clinical trials to help women with PCOS control their menstrual cycles, reduce androgen levels, and increase insulin sensitivity.

Marjoram has also been studied for its ability to treat gastrointestinal issues and for its mild sedative properties, which may help reduce tension and anxiety. Antimicrobial activity has also been shown by the essential oils of the herb, especially against bacterial and fungal infections. More thorough and regulated clinical research are required to completely comprehend marjoram's therapeutic potential and safety for long-term use in a variety of medical problems, even though these studies reveal encouraging outcomes.

Marjoram enhances the immunological status, growth performance, and carcass qualities. The literature on marjoram and its impact on immunity is currently lacking; further research may be necessary (29) The chemical makeup of marjoram and how its leaves, hydro-alcoholic extract, and essential oils can heal experimental rat damaged liver (30) the impact of marjoram (*Origanum Majoranum*) and sage (*Salvia Officinalis*) aqueous extracts on dialysis patients with advanced chronic renal disease (31)

Marjoram is used to treat gastrointestinal issues, the common cold, respiratory allergies, diabetes, skin damage, disorders of the nervous system, dysmenorrhea, menopause complications, and disinfection (32)

Only the DHEA-S level differed significantly between the two groups, however both the fasting insulin and DHEA-S levels considerably decreased in the intervention group. Consequently, the beneficial impact of marjoram tea on the hormone profile of females with PCOS was verified. It suppresses adrenal androgen release and increases insulin sensitivity (35)

OME's vasorelaxant effect resulted from both an endothelium-dependent rise in cGMP buildup and PI-3K pathway activation. Our combined results provide credence to the use of marjoram in the treatment and control of hypertension (36) When compared to CCh-induced contractions, the methanolic leaf extract of *O. majorana* suppresses contractions against high K^+ with more potency, indicating that the plant's antidiarrheal and antispasmodic activities are primarily mediated by voltage-gated Ca^{++} channels (37) The extract from *O. majorana* had twenty-one compounds, according to the GC-MS analysis, with α -terpineol being the most abundant chemical. It has been shown that α -terpineol possesses antidiarrheal properties in mice (38)

It has been reported that *O. majorana* leaves combined with stems can effectively treat rheumatism, headaches, fever, coughing, sleeplessness, and stomachaches. Therefore, when combined with the flowers in the infusion preparation mode, the leaves have calming and intestinal antispasmodic effects and are useful against certain illnesses like fever, headaches, and colds (39)

The effects of *O. majorana* methanol extracts on human platelet antiaggregant activity are linked to the well-known method that non-steroid anti-inflammatory medicines (NSAIDs) work by blocking the metabolic pathway of prostaglandins. They discovered that *O. majorana* extracts prevented platelet aggregation brought on by either ADP (2.0 μ g/ml) or collagen (2.0 μ g/ml) in a dose-dependent manner. Arbutin is the active hydroquinone-D-glucopyranoside that is isolated through successive fractionation of methanol extracts. All of the stimulating substances that were examined (collagen, ADP, arachidonic acid, and thrombin) caused this significant inhibition of platelet aggregation (92,93,94)

Terpinen-4-ol (41.6%), the main component of *O. majorana*'s essential oil, influenced the soil stages of phytonematodes (*Rotylenchulus reniformis*, *Crictonemella* spp., and *Hoplolaimus* spp.) and prevented over 80% of *Meloidogyne incognita* juvenile hatching, as opposed to roughly 3.5% at the control (95,96)

The essential oil of sweet marjoram contains sabinene hydrate and α -terpineol, which inhibited the expression of the NF κ B gene, cyclooxygenase 2 (COX2), interleukin 1b (IL-1b), IL-6, and IL-10, as well as the creation of tumor necrosis factor- α (TNF α) (97)

Quercetin is one of the bioactive substances from *O. majorana* that have been the subject of clinical studies. In fact, by preventing the production of inflammatory mediators including cytokines and chemokines, this chemical showed significant clinical anti-inflammatory effects (98)

Quercetin has been demonstrated to activate granulocyte and macrophage colony factors (GM-CSF), interleukins (IL-10, IL-1 β , IL-2, IL-6, and IL-8), and lower the level of c-reactive protein (CRP). In a different athletics study (99)

Additionally, taking 15 mg of gallic acid daily for seven days decreased CRP significantly (by 39%) (100)

By using wound-healing and matrigel invasion experiments, the non-cytotoxic doses of *O. majorana* dramatically reduced the migration and invasion of the MDA-MB-231 cells. Additionally, this plant inhibits MDA-MB-231's transendothelial migration through TNF- α -activated HUVECs and reduces

its adherence to HUVECs. It inhibits matrix metalloproteinase-2 and -9 (MMP-2 and MMP-9) activity, phosphorylates I κ B, and decreases NF κ B's nuclear level. It lowers MDA-MB-231 cells' generation of nitric oxide (NO). In vivo, *O. majorana* encourages the suppression of tumor growth and metastasis (101)

It has been demonstrated that *Origanum majorana* essential oil is a strong acaricidal agent against *Acarapis woodi* (Renie), the parasite that causes acarine illness and infiltrates the honeybees' tracheal system in the winter and early spring.

The percentage of infestation in the bee colonies treated with *O. majorana* essential oil (10 drops of oil per piece of cotton wool in a Petri dish placed beneath the combs of infested colonies) had already decreased noticeably after 15 days of treatment, and no infestation was discovered among the tested bees after 30 days (102)

Extracts from marjoram leaves are the subject of numerous studies aimed at treating stomach ulcers. It was discovered that consuming 250–500 grams of marjoram extract per day can reduce the chance of developing ulcers later on. Additionally, it supports the development of beneficial bacteria, which helps to maintain intestinal health (103)

Vitamin C, which is abundant in fresh marjoram (51.4 μ g of the required dose per 100g), has antiviral, wound-healing, and immunity-boosting properties (104)

6. Toxicology: -

An extensive safety margin for *O. Majorana* extract in mice has been shown by acute toxicity testing. Pregnant women should be worried about the emmenagogue qualities of sweet marjoram. (2) Pregnant and nursing women should not use its essential oil (21) Pregnant women should avoid consuming high amounts of marjoram since it may trigger the onset of menstruation.

Additionally, it slows blood clotting and raises the potential for bruises and bleeding in those who are mostly afflicted with slows the pulse and causes bleeding disorders. Marjoram also increases the secretion of fluid in the lung when used in large quantities, which can aggravate lung problems such as asthma and emphysema(22) There is now conflicting information in the literature on the toxicity of EOs both in vivo and in vitro. The effects of skin sanitizer, respiratory diseases, carcinogens, reproductive toxicity, and organ toxicity are among the health risks (23) Medicinal substances obtained from marjoram and other herbs are used in many pharmaceutical medications instead of dangerous chemicals since they have fewer negative effects(14)

7. Result: -

Marjoram has been used historically and ethnobotanically to treat menstruation abnormalities and symptoms like exhaustion, mood swings, and cramping. Marjoram is frequently used in traditional ways as a culinary herb or in teas and tinctures.

Many bioactive substances can be found in marjoram, such as flavonoids, phenolic acids, and essential oils like thymol, carvacrol, and terpinen-4-ol. These substances may have therapeutic effects because of their well-known anti-inflammatory, antioxidant, and antispasmodic qualities.

The anti-inflammatory and antispasmodic properties of marjoram's essential oils and flavonoids may lessen the pain and suffering associated with menstrual cramps.

Marjoram reduces dehydroepiandrosterone sulphate (DHEA-S), which helps cure Pcos. It also helps with female fertility, eases cramps, and has numerous other uses.

8. Conclusion: -

Traditional medical systems have long used marjoram (*Origanum majorana*) because of its supposed ability to regulate the menstrual cycle. Its potential effects on menstrual health have been summarized in this review, which also includes new evidence. By following traditional methods, marjoram is said to help ease the discomfort of menstruation, control irregular cycles, and treat symptoms related to hormone swings.

Although there is still little information to go on, it appears that marjoram includes bioactive substances that have anti-inflammatory, antispasmodic, and hormone-modulating qualities. These characteristics support conventional wisdom and offer a tenable explanation for how marjoram might affect menstrual health. To confirm these advantages and identify the best doses and safety profiles, more thorough clinical trials are required as most research are preclinical or have small sample numbers.

In summary, there is not enough data at this time to provide firm recommendations, even though marjoram shows potential as a supplemental strategy for regulating the menstrual cycle. Subsequent investigations ought to concentrate on meticulously planned clinical trials to validate conventional assertions, examine the herb's effectiveness and safety, and clarify its mechanisms of action. Until then, marjoram should be used carefully under a doctor's supervision, especially when combined with traditional treatments.

It has been shown that marjoram is a useful herb for controlling menstrual health. It may lessen the symptoms of menstruation diseases because of its analgesic, anti-inflammatory, and hormone-balancing qualities. The evidence that is now available suggests that marjoram has potential as a natural

medicine for improving menstrual regulation and general reproductive health, but more research is required to determine standardized dosages and long-term effects.

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