CHAMOMILE AS THERAPEUTIC MODALITY IN MEDICINE AND DENTISTRY: A REVIEW

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ABSTRACT

Chamomile is one of the most ancient medicinal herbs known to mankind. The dried flowers of chamomile contain many terpenoids and flavonoids contributing to its medicinal properties. Chamomile preparations are commonly used for many human afflictions. Essential oils of chamomile are used extensively in cosmetics and aromatherapy. In this review we describe the use of chamomile in traditional medicine with regard to evaluating its curative and preventive properties, highlight recent findings for its development as a therapeutic agent promoting human health. Chamomile (Matricaria chamomilla), a popular herb valued for centuries as a traditional medicine, has been used to treat various human ailments.

Keywords: Alternative therapy, Dentistry, Chamomile

Introduction

Name of the Medicinal Plant : *Matricaria chamomilla,Chamaemelum nobile*

Family : Compositae (Asteraceae)

Common name : Chamomile [1]

There are two herbs commonly called chamomile: Roman (common) chamomile and German (Hungarian chamomile, wild chamomile, scented mayweed). Roman chamomile (*Chamaemelum nobile, Anthemis nobilis*) is native in southwestern and northwestern regions of Europe (Spain, France, England) and is scattered around the eastern Mediterranean, the Balkans and Crimea. German chamomile (*Matricaria recutita*, *Chamomilla recutita*) is originally native to southeastern and southern Europe.[2] It is also grown in Germany, Hungary, France, Russia, Yugoslavia, and Brazil. It was introduced to India during the Mughal period, now it is grown in Punjab, Uttar Pradesh, Maharashtra, and Jammu and Kashmir.[3] It is one of the most commonly distributed medicinal herbs all over the world, except the tropical and the arctic regions. Both chamomiles are used in traditional herbalism and medicine; however, German chamomile is more frequently preferred for medicinal use. In addition, chamomile extract and essential oils are frequently used as components in several cosmetic and hygienic products.[2]

Chamomilla recutita is an annual herb with short but widespread roots. It varies in size (from small to two feet) depending on the locality and the soil. The leaves are finely divided—the lower ones grow in threes, the middle are paired and the upper is a single pinnate. The mildly scented flowers are arranged in flower heads, which are convex when they first bloom and later become conical in shape. The head is surrounded by 12–18 tongue-shaped, white ray florets and the disk florets. The flowers are collected from May to July.[2]

Roman chamomile is a very aromatic perennial herb and is more robust than Chamomilla recutita. The flower heads are hemispherical and densely surrounded by silvery white florets. It is a low-growing plant—less than 10 inches in height. The hairy and branched stems are covered with leaves divided into threadlike segments. This fineness gives the whole plant a feathery appearance. [2]

Historical Background

In India, the plant had been cultivated in Lucknow for about 200 years, and the plant was introduced in Punjab about 300 years ago during the Mughal period. It was introduced in Jammu in 1957. The plant was first introduced in alkaline soils of Lucknow in 1964–1965. There is no demand for blue oil as such at present in India.

Chamomile has been used in herbal remedies for thousands of years, known in ancient Egypt, Greece, and Rome. This herb has been believed by Anglo-Saxons as 1 of 9 sacred herbs given to humans by the lord. The chamomile drug is included in the pharmacopoeia of 26 countries. It is an ingredient of several traditional, unani, and homeopathy medicinal preparations. As a drug, it finds use in flatulence, colic, hysteria, and intermittent fever.[3]

Several doctors of ancient time of the 16th and 17th century that chamomile was used in those times in intermittent fevers.[3] Gould et al. have evaluated the hemodynamic effects of chamomile tea in patients with cardiac disease.[4] It was found in general that the patients fell into deep sleep after taking the beverage. Infusion prepared from chamomile exercised a marked stimulatory action on the secretary function of the liver. Toxicity of acetone-extract of *M.chamomilla* against larvae of *Gulex pipens L*. The other pharmacological properties include antiinflammatory, antiseptic, carminative, healing, sedative, and spasmolytic activity. However, chamomile has exhibited both positive and negative bactericidal activity with *Mycobacterium tuberculosis, Salmonella typhimurium, and Staphylococcus aureus.*[3]

Constituents

Over 120 constituents have been identified in chamomile flowers. Amino acids, polysaccharides and fatty acids are present in the mucilage, which makes up approximately 10% of the flower head. The yield of the volatile or essential oil from the flowers is 0.4–2.0%. The main constituents of the oil include the terpenoids α-bisabolol and its oxides (≤78%) and azulenes, including chamazulene (1–15%) (Matos *et al.*, 1993; Mimica-Dukic *et al.*, 1993)[5,6]. Chamazulene is an artifactual component, formed under high temperature and/or acidic conditions from matricin (prochamazulene), which is present in fresh flower heads. The formation of chamzulene can be minimized with CO_2 extraction. Farnesene (12–28%), spathulenol and spiroethers, including the *cis*/*trans*-en-yn-dicycloethers (8–20%), are also present in the volatile oil (Lis-Balchin *et al.*, 1998; Maday *et al.*, 1999)[7,8] . Teas brewed from chamomile contain 10–15% of the essential oil available in the flower. Qualitative and quantitative differences in the essential oil of chamomile are not markedly affected by growing conditions (e.g. fertilizer rate, irrigation, pesticide application), but can vary significantly between growing regions, in cultivated versus wild plant populations, and with different processing conditions. Several flavonoids and other phenolic compounds have been identified in various parts of the chamomile flower head, i.e. ligulate flowers, tubular flowers

and receptacles. Apigenin (16.8%), quercetin (9.9%), patuletin (6.5%), luteolin (1.9%) and their glucosides are the major flavonoids present in the total flower, although their relative concentrations vary within the different flower parts.[9]

Commercially Available as

Soaps

Detergent

Perfumes[10]

Cosmetic creams

Hair preparations

Skin lotions

Tooth pastes

Fine liquors

Herbal tea

Baby massage oil [3]

Mouthwash [11]

Medicinal and Dental Implications

Anti-inflammatory and antiphlogistic properties

The flowers of chamomile contain 1–2% volatile oils including alpha-bisabolol, alphabisabolol oxides A & B, and matricin (usually converted to chamazulene and other flavonoids which possess anti-inflammatory and antiphlogistic properties)[12,13]. A study in human volunteers demonstrated that chamomile flavonoids and essential oils penetrate below the skin surface into the deeper skin layers. This is important for their use as topical antiphlogistic (anti-inflammatory) agents. One of chamomile's anti-inflammatory activities

involve the inhibition of LPS-induced prostaglandin E(2) release and attenuation of cyclooxygenase (COX-2) enzyme activity without affecting the constitutive form, COX-1.[1]

Anti-cancer activity

Most evaluations of tumor growth inhibition by chamomile involve studies with apigenin which is one of the bioactive constituents of chamomile. Studies on preclinical models of skin, prostate, breast and ovarian cancer have shown promising growth inhibitory effects.[1] In a recently conducted study, chamomile extracts were shown to cause minimal growth inhibitory effects on normal cells, but showed significant reductions in cell viability in various human cancer cell lines. Chamomile exposure induced apoptosis in cancer cells but not in normal cells at similar doses [14]. The efficacy of the novel agent TBS-101, a mixture of seven standardized botanical extracts including chamomile has been recently tested. The results confirm it to have a good safety profile with significant anticancer activities against androgen-refractory human prostate cancer PC-3 cells, both *in vitro* and *in vivo* situation .

Common cold

Common cold (acute viral nasopharyngitis) is the most common human disease. It is a mild viral infectious disease of the upper respiratory system. Typically common cold is not lifethreatening, although its complications (such as pneumonia) can lead to death, if notproperly treated. Studies indicate that inhaling steam with chamomile extract has been helpful in common cold symptoms; however, further research is needed to confirm these findings.[1]

Cardiovascular conditions

It has been suggested that regular use of flavonoids consumed in food may reduce the risk of death from coronary heart disease in elderly men. A study assessed the flavonoid intake of 805 men aged 65–84 years who were followed up for 5 years. Flavonoid intake (analyzed in tertiles) was significantly inversely associated with mortality from coronary heart disease and showed an inverse relation with incidence of myocardial infarction. In another study[4], on twelve patients with cardiac disease who underwent cardiac catheterization, hemodynamic measurements obtained prior to and 30 minutes after the oral ingestion of chamomile tea exhibited a small but significant increase in the mean brachial artery pressure. No other significant hemodynamic changes were observed after chamomile consumption. Ten of the

twelve patients fell into a deep sleep shortly after drinking the beverage. A large, well-designed randomized controlled trial is needed to assess the potential value of chamomile in improving cardiac health. [1]

Colic/Diarrhea conditions

An apple pectin-chamomile extract may help shorten the course of diarrhea in children as well as relieve symptoms associated with the condition[4]. Two clinical trials have evaluated the efficacy of chamomile for the treatment of colic in children. Chamomile tea was combined with other herbs (German chamomile, vervain, licorice, fennel, balm mint) for administration. In a prospective, randomized, double-blind, placebo-controlled study, 68 healthy term infants who had colic (2 to 8 weeks old) received either herbal tea or placebo (glucose, flavoring). Each infant was offered treatment with every bout of colic, up to 150 mL/dose, no more than three times a day. After 7 days of treatment, parents reported that the tea eliminated the colic in 57% of the infants, whereas placebo was helpful in only 26% (P<0.01). No adverse effects with regard to the number of nighttime awakenings were noted in either group. Another study examined the effects of a chamomile extract and apple pectin preparation in 79 children (age 0.5–5.5 y) with acute, non-complicated diarrhea who received either the chamomile/pectin preparation (n = 39) or a placebo (n = 40) for 3 days. Diarrhea ended sooner in children treated with chamomile and pectin (85%), than in the placebo group (58%). These results provide evidence that chamomile can be used safely to treat infant colic disorders.[1]

Gastrointestinal conditions

Chamomile is used traditionally for numerous gastrointestinal conditions, including digestive disorders, "spasm" or colic, upset stomach, flatulence (gas), ulcers, and gastrointestinal irritation. Chamomile is especially helpful in dispelling gas, soothing the stomach, and relaxing the muscles that move food through the intestines. The protective effect of a commercial preparation (STW5, Iberogast), containing the extracts of bitter candy tuft, lemon balm leaf, chamomile flower, caraway fruit, peppermint leaf, liquorice root, Angelica root, milk thistle fruit and greater celandine herb, against the development of gastric ulcers has been previously reported. STW5 extracts produced a dose dependent anti-ulcerogenic effect associated with a reduced acid output, an increased mucin secretion, an increase in prostaglandin E release and a decrease in leukotrienes. The results obtained demonstrated that

STW5 not only lowered gastric acidity as effectively as a commercial antacid, but was more effective in inhibiting secondary hyperacidity.

Health Promotion

It has been claimed that consumption of chamomile tea boosts the immune system and helps fight infections associated with colds. The health promoting benefits of chamomile was assessed in a study which involved fourteen volunteers who each drank five cups of the herbal tea daily for two consecutive weeks. Daily urine samples were taken and tested throughout the study, both before and after drinking chamomile tea. Drinking chamomile was associated with a significant increase in urinary levels of hippurate and glycine, which have been associated with increased antibacterial activity. In another study, chamomile relieved hypertensive symptoms and decreased the systolic blood pressure significantly, increasing urinary output. Additional studies are needed before a more definitive link between chamomile and its alleged health benefits can be established.

Osteoporosis

Osteoporosis is a metabolic bone disease resulting from low bone mass (osteopenia) due to excessive bone resorption. Sufferers are prone to bone fractures from relatively minor trauma. Agents which include selective estrogen receptor modulators or SERMs, biphosphonates, calcitonin are frequently used to prevent bone loss. To prevent bone loss that occurs with increasing age, chamomile extract was evaluated for its ability to stimulate the differentiation and mineralization of osteoblastic cells. Chamomile extract was shown to stimulate osteoblastic cell differentiation and to exhibit an anti-estrogenic effect, suggesting an estrogen receptor-related mechanism. However, further studies are needed before it can be considered for clinical use. [1]

Sleep aid/sedation

Traditionally, chamomile preparations such as tea and essential oil aromatherapy have been used to treat insomnia and to induce sedation (calming effects). Chamomile is widely regarded as a mild tranquillizer and sleep-inducer. Sedative effects may be due to the flavonoid, apigenin that binds to benzodiazepine receptors in the brain. Studies in preclinical models have shown anticonvulsant and CNS depressant effects respectively. Clinical trials are notable for their absence, although ten cardiac patients are reported to have immediately

fallen into a deep sleep lasting for 90 minutes after drinking chamomile tea[4]. Chamomile extracts exhibit benzodiazepine-like hypnotic activity. In another study, inhalation of the vapor of chamomile oil reduced a stress-induced increase in plasma adrenocorticotropic hormone (ACTH) levels. Diazepam, co-administered with the chamomile oil vapor, further reduced ACTH levels, while flumazenile, a BDZ antagonist blocked the effect of chamomile oil vapor on ACTH.[1]According to Paladini *et al.* [15], the separation index (ratio between the maximal anxiolytic dose and the minimal sedative dose) for diazepam is 3 while for apigenin it is 10. Compounds, other than apigenin, present in extracts of chamomile can also bind BDZ and GABA receptors in the brain and might be responsible for some sedative effect; however, many of these compounds are as yet unidentified.

Anxiety and seizure

Chamomile has been reported in the treatment of generalized anxiety disorder (GAD). But the reports seem contradictory as an earlier report suggests that German chamomile showed significant inhibition of GAD activity. The recent results from the controlled clinical trial on chamomile extract for GAD suggests that it may have modest anxiolytic activity in patients with mild to moderate GAD. Extracts of chamomile (*M. recutita*) possess suitable effects on seizure induced by picrotoxin. Furthermore, apigenin has been shown to reduce the latency in the onset of picrotoxin-induced convulsions and reduction in locomotor activity but did not demonstrate any anxiolytic, myorelaxant, or anticonvulsant activities.

Inflammatory conditions

Inflammation is associated with many gastrointestinal disorders complaints, such as esophageal reflux, diverticular disease, and inflammatory disease. Studies in preclinical models suggest that chamomile inhibits *Helicobacter pylori*, the bacteria that can contribute to stomach ulcers. Chamomile is believed to be helpful in reducing smooth muscle spasms associated with various gastrointestinal inflammatory disorders. Chamomile is often used to treat mild skin irritations, including sunburn, rashes, sores and even eye inflammations but its value in treating these conditions has not been shown with evidence-based research.

Wound healing

The efficacy of topical use of chamomile to enhance wound healing was evaluated in a double-blind trial on 14 patients who underwent dermabrasion of tattoos. The effects on

drying and epithelialization were observed, and chamomile was judged to be statistically efficacious in producing wound drying and in speeding epithelialization. Antimicrobial activity of the extract against various microorganisms was also assessed. The test group, on day 15, exhibited a greater reduction in the wound area when compared with the controls (61% versus 48%), faster epithelialization and a significantly higher wound-breaking strength. In addition, wet and dry granulation tissue weight and hydroxyproline content were significantly higher. The increased rate of wound contraction, together with the increased wound-breaking strength, hydroxyproline content and histological observations, support the use of *M. recutita* in wound management. Recent studies suggest that chamomile caused complete wound healing faster than corticosteroids. However, further studies are needed before it can be considered for clinical use. [1]

Mucositis

Mouth ulcers are a common condition with a variety of etiologies. Stomatitis is a major dose-limiting toxicity from bolus 5-fluorouracil-based (5-FU) chemotherapy regimens. A double-blind, placebo-controlled clinical trial including 164 patients was conducted [16]. Patients were entered into the study at the time of their first cycle of 5-FU-based chemotherapy and were randomized to receive a chamomile or placebo mouthwash thrice daily for 14 days. There was no suggestion of any stomatitis difference between patients randomized to either protocol arm. There was also no suggestion of toxicity. Similar results were obtained with another prospective trial on chamomile in this situation. Data obtained from these clinical trials did not support the pre study hypothesis that chamomile could decrease 5-FU-induced stomatitis. The results remain unclear if chamomile is helpful in this situation.[1]

Alternative agents based on herbal extracts are therefore of particular interest. There is some evidence indicating the beneficial effect of plant extract on gingival inflammation and plaque accumulation or subgingival periodontopathic microorganisms. German Chamomile (GC) has been known as an anti-inflammatory, antibacterial and bacteriostatic, wound-healing promoter and deodorant and has been used in combination with other herbal ingredients as mouthwash or dentifrice to reduce plaque growth and to improve the gingival health .[11]

Anti-inflammatory effects of Chamomile extract have been investigated in numerous studies and it could be attributed to a particular component of the mouthrinse. Salicylic acid in the

form of a methyl ester provides an anti-inflammatory effect in the GC mouth rinse. The effect of mouthwashes containing salicylic acid, on gingival inflammation and plaque accumulation has been well documented by studies. The other constituents which are found in whole plant chamomile extract are flavonoids, including apigenin, chamazulene and α-bisabolol. The flavones act as anti-inflammatory agents due to interfering with the arachidonic acid pathway. Furthermore, it has been stated that the GC extract promotes wound healing by decreasing the inflammatory responses and accelerating granulation and regeneration of the tissues on topical application. In accordance with various studies which have shown that the plant extracts can inhibit plaque accumulation and suppress the subgingival pathogens. [11]

Adverse Effects

A relatively low percentage of people are sensitive to chamomile and develop allergic reactions. People sensitive to ragweed and chrysanthemums or other members of the Compositae family are more prone to develop contact allergies to chamomile, especially if they take other drugs that help to trigger the sensitization.

Chamomile tea is also a folk remedy to treat conjunctivitis and other ocular reactions. A clinical study on seven hay fever patients with conjunctivitis showed that washing the eye with chamomile tea further provoked the inflammatory reactions. In contrast, no symptoms were observed after oral challenges with the tea. Only a few cases reported that ingestion of chamomile tea caused an anaphylactic reaction. All patients suffered from hay fever and one of them had bronchial asthma caused by a variety of pollens. In one case the patient additionally ingested aspirin, which might be suspected to trigger the anaphylactic shock.[2]

Dosage Recommendation

Chamomile may be used medicinally in many forms. Infusion can be prepared from fresh or dried flower heads, usually 2–3 teaspoonsfuls in a cup of boiling water, infused for 10 minutes and taken orally three times a day. From tincture, 1–4 mL can be diluted in a cup of spring or filtered water, taken orally three times a day. The same preparation can be used externally as a fomentation. An infusion of 1 teaspoonful of flower heads can be given to children for pain of dentition, stomachache, earache or neuralgic pain. [2]

Conclusion

Chamomile has been used as an herbal medication since ancient times, is still popular today and probably will continue to be used in the future because it contains various bioactive phytochemicals that could provide therapeutic effects. Chamomile can help in improving cardiovascular conditions, stimulate immune system and provide some protection against cancer. Establishing whether or not therapeutic effects of chamomile are beneficial to patients will require research and generation of scientific evidence. It is advisable that the discriminate and proper use of chamomile preparations could be safe and provide therapeutic benefits however the indiscriminate or improper use can be unsafe and harmful.

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