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A review study of therapeutic effects of *Myrtus communis*

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ABSTRACT

Myrtus, with the common name myrtle is a genus of flowering plants in the family Myrtaceae. The aim of this study was to review its therapeutic effects effects. This review article was carried out by searching studies in PubMed, Medline, Web of Science, and Iran Medex databases .The initial search strategy identified about 128 references. In this study, 113 studies was accepted for further screening and met all our inclusion criteria [in English, full text, therapeutic effects of Myrtus, and dated mainly from the year 1964 to 2015.The search terms were "Myrtus, "therapeutic properties", "pharmacological effects". It is commonly used for anti-bacterial effect, anti-anxiety effect, anti-acne vulgaris, antioxidant effects, antifungal and herbicidal effects, antileishmanial and cytotoxic effects, repellency effect, antifungal, anti-biofilm and adhesion activity, anti-oxidant, anti-inflammatory and anti-tumor properties, anti-cancer effect, scolicidal effects, gastrointestinal effect ,facial warts effects. Myrtus. is widely used for therapeutic and non-therapeutic purposes that trigger its significant value. Various combinations and numerous medicinal properties of its extract, oil, and leaves demand further and more studies about the other useful and unknown properties of this multipurpose plant.

Keywords: *Myrtus*,, Phytochemicals, Therapeutic effects, Pharmacognosy, Alternative and complementary medicine.

INTRODUCTION

Myrtus, with the common name myrtle [1], is a genus of flowering plants in the family Myrtaceae, described by Linnaeus in 1753.Myrtus communis L. (Myrtaceae), myrtle, is an evergreen shrub with strong antibacterial, anti-inflammatory, antihyperglycemic and antioxidant activities. Also, it is used as a sedative-hypnotic plant in Iranian traditional medicine. *Myrtus communis*, the common myrtle or true myrtle, is native across the northern Mediterranean region (especially in the islands of Sardinia and Corsica, where it is locally known by the name of *murta*) [2]. The plant is an evergreenshrub or small tree, growing to 5 metres (16 ft) tall [3]. The leaf is entire, 3–5 cm long, with a fragrant oil [4]. The star-like flower has five petals and sepals, and numerous stamens [5]. Petals usually are white. The flower is pollinated by insects. The fruit is a round berry containing several seeds, most commonly blue-black in colour. A variety with yellow-amber berries is also present. The seeds are dispersed by birds that eat the berries. It is a traditional medicinal plant for the Tuareg people. Several botanists do not consider *Myrtus nivellei* sufficiently distinct to be treated as a separate species. It is listed as an endangered species [6-8]. *Myrtus communis*, the Common Myrtle, is widely cultivated as an ornamental plant for use as a shrub in gardens and parks [9-11]. It is often used as a hedge plant, with its small leaves shearing cleanly. When trimmed less frequently, it has numerous flowers in late summer. It requires a long hot summer to produce its flowers [12-17]. In several

countries, particularly in Europe and China, there has been a tradition for prescribing this substance for sinus infections. A systematic review of herbal medicines used for the treatment of rhinosinusitis concluded that the evidence that any herbal medicines are beneficial in the treatment of rhinosinusitis is limited, and that for *Myrtus* there is insufficient data to verify the significance of clinical results[18, 19].

Chemical compound

M. communis contained 1, 8-Cineole (28.62%), α-Pinene (17.8%), Linalool (17.55%), and Geranylacetate (6.3%) as the major compounds and Geraniol (1.6%), α-Humulene (1.5%), eugenol (1.3%), isobutyl-isobutyrate (0.8%), and methyl chavicol (0.5%) as minor components. Chlorhexidine had the lowest MIC value among all medicaments tested. M. communis oil had less MIC values than NaOCl against both bacteria, but it had more MIC value against C. albicans [20, 21].

Anti-bacterial effect

The therapeutic effects of the vaginal gel of Berberis vulgaris 5% (in metronidazole base) and Myrtus communis L 2% (in metronidazole base) with only metronidazole vaginal gel 0.75% on bacterial vaginosis was compared. Findings of the study showed that treatment with a combination of Myrtus communis L or Berberis vulgaris in metronidazole base improve the efficacy of bacterial vaginosis therapy (22].

Antimicrobial activity of the samples against three microbial strains were evaluated the results showed that α-pinene, 1, 8 cineole, β-pinene and limonene are the highest contributors in antimicrobial properties of M. communis essential oil. Other researches have reported high antimicrobial activities for the plant essential oils rich in these compounds confirming our findings[6].

Antimicrobial activity of this plant against Enterococcus faecalis, Staphylococcus aureus and Candida albicans was assessed compared to that of sodium hypochlorite (NaOCl) and chlorhexidine. M. Communis essential oil with the minimum inhibitory concentration in the range of 0.032-32 μg/mL was an effective antimicrobial agent against persistent endodontic microorganisms[20].

Anti-anxiety effect

The effect of 80% ethanolic extract of M. communis leaves on sleep and anxiety in mice and rats was evaluated. The data show the anxiolytic and muscle relaxant effect of the extract without anticonvulsant activities. The anxiolytic, myorelaxant and hypnotic effects without effect on seizure threshold are in line with the effect of an alpha 2 GABA receptor agonist [4].

Anti-acne vulgaris

Evidence of Propionibacterium acnes growing as a biofilm in cutaneous follicles was presented. The efficiency of Myrtacine on P. acnes biofilm alone or combined with antibiotics was demonstrated and can lead to consider it as a potent adjunctive product efficient during the antibiotic course for acne vulgaris treatment [3].

Antioxidant effects

The protective effect of the myrtle berry seed aqueous extract (MBSAE) against esophageal reflux (ER)-induced damage in esophagus mucosa as well as the mechanisms implicated was determined. The results showed, also, that the ER was accompanied by a state of oxidative stress as assessed by an increase of lipid peroxidation, a decrease of the sulphhydryl groups and glutathione levels, as well as antioxidant enzyme activities depletion. It suggest that MBSAE exerted a potential protective effect against ER-induced damage in rat esophagus, at least in part, due to its antioxidant properties [9].

The effect of different quality RWs on physiological and biochemical parameters and the recovery capacity in Myrtus communis L. plants was evaluated. The highest salinity levels produced oxidative stress, as seen from the rise in electrolyte leakage and lipid peroxidation. The use of regenerated water together with carefully managed drainage practices, which avoid the accumulation of salt by the substrate, will provide economic and environmental benefits [17].

Antioxidant activities of Myrtus communis leaf phenolic compounds (McPCs) were investigated on 2,2'-9-azino-bis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS(+) •) .it showed that no synergic or additive effect between α-tocopherol and myrtle extracts or caffeic acid in α-tocopherol-enriched phospholipid/BS dispersion, but myricitrin

showed an additive effect and thus promoted the total antioxidant activity. These data showed that myrtle extract could be used as potential natural antioxidants, food stabilizers, or natural health products. besides, myrtle extract may be a source of natural antioxidants to counteract phospholipid peroxidation as well as α-tocopherol [23].

Essential oils (EOs) from several individuals of Myrtus communis L. (M. communis) growing in different habitats in Sardinia have been studied. Principal component analysis applied to the chromatographic data confirm a differentiation and classification of EOs from the four groups of M. communis plants. Finally, antioxidant activity of the studied EOs shows differences between the various categories of samples[5].

A selected lactic acid bacterium for increasing the antioxidant features of myrtle berries was used, with the perspective of producing a functional ingredient, dietary supplement or pharmaceutical preparation. The antioxidant activity was preliminarily evaluated through in vitro assays, further confirmed through ex vivo analysis on murine fibroblasts, and the profile of phenol compounds was characterized. The lactic acid fermentation of myrtle berries is a suitable tool for novel applications as functional food dietary supplements or pharmaceutical preparations [13].

Antifungal and Herbicidal Effects

The herbicidal effects of the oils on the seed germination and seedling growth of Amaranthusretroflexus L., Chenopodium album L., Cirsiumarvense (L.) Scop.,Lactucaserriola L., and Rumexcrispus L. were also determined. The oils completely or partly inhibited the seed germinations and seedling growths of the plants. The findings of the present study suggest that the M. communis essential oils might have potential to be used as natural herbicides as well as fungicides [24].

Antileishmanial and cytotoxic effects

The antileishmanial effects of the essential oil and methanolic extract of Myrtus communis against Leishmania tropica on an in vitro modelwas evaluated. Essential oil indicated a more cytotoxic effect as compared with the methanolic extract of M. communis. The findings of the present study demonstrated that M. communis might be a natural source for production of a new leishmanicidal agent [25].

Repellency effect

Repellency effect of this plant was examined and it was demonstrated that Essential oil of Myrtus communis have repellency effect, even with 10% concentration of essential oil [14].

Antifungal, anti-biofilm and adhesion activity

The adhesion activity, the biofilm formation and the action of the Myrtus communis L was evaluated. The antimycotic activity of the EO towards the three species was also evaluated, and the results were compared with the minimum inhibitory concentration of six antimycotics. The activity of the EO against C. albicans and C. parapsilosis was better than that obtained against C. tropicalis; moreover, the strains used in the assay were adhesive and biofilm producer, and the effect of myrtle EO on the biofilm formation yielded encouraging results [26].

Anti-oxidant, anti-inflammatory and anti-tumor properties

An endophytic strain of Neofusicoccumaustrale recovered from a myrtle branch was selected based on the bioactivity of its culture extracts, and found to produce myrtucommulones A and D. The availability of a microbial strain to be cultured in vitro may provide access to more substantial amounts of these products for further investigations in view of their possible pharmaceutical use [27].

Anti-cancer effect

The potential of MC to induce apoptosis of cancer cells was examined. MC showed to cause loss of the mitochondrial membrane potential in MM6 cells and evoked release of cytochrome c from mitochondria. Interestingly, Jurkat cells deficient in caspase-9 were resistant to MC-induced cell death and no processing of PARP or caspase-8 was evident. In cell lines deficient in either CD95 (Fas, APO-1) signalling, FADD or caspase-8, MC was still able to potently induce cell death and PARP cleavage. Conclusively, MC induces apoptosis in cancer cell lines, with marginal cytotoxicity for non-transformed cells, via the mitochondrial cytochrome c/Apaf-1/caspase-9 pathway [28].

Scolicidal effects
The scolicidal effects of Myrtus communis L. essential oil against protoscoleces of hydatid cysts and also its toxicity in mice model was investigated. It was demonstrated that the M. communis essential oil at the concentration of 100 µl/ml after 5 min of exposure killed 100% protoscoleces. No significant difference ($p > .05$) was observed in the clinical chemistry and hematological parameters following oral administrations of M. communis essential oil at the doses 0.05, 0.1, 0.2, and 0.4 mL/kg for 14 days [18].

Gastrointestinal effect
Pharmaceutical dosage form of Myrtus communis L. (myrtle) in reflux disease compared with omeprazolwas assessed. Concerning each group, significant changes were found in FSSG, dysmotility-like symptoms and acid reflux related scores. No significant differences were observed between all groups in final FSSG total scores (FSSG2). Further studies with more precise design and larger sample size may lead to a better outcome to suggest the preparation as an alternative intervention [11].

Facial warts
The efficacy of Myrtle as a method of ITM was investigated on common warts. Myrtle is especially useful for facial warts. These two cases highlighted a new method for treatment of common warts especially facial warts and it needs more investigations [29].

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