Short Communication

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Origanum Majorana Essential Oil: Some Pharmacological and Toxicological Aspects

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ABSTRACT

Origanum majorana essential oil has proven to be a very versatile compound with great possibilities of therapeutic application. Its potential ranges from antibacterial action to anticancer activity. However, further studies are needed to assess its toxicological activity.

Keywords: Marjoram; Essential Oil; Pharmacology; Toxicity

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Origanum majorana L or Majorana hortensis Moench is an aromatic plant, rich in essential oils and native to the Mediterranean region, but commercially grown in southern Europe and worldwide throughout the year. It is popularly known as sweet marjoram and has been used in the form of an herbal infusion in folk medicine for asthma, cold, cough, cramps, depression, dizziness, gastrointestinal disorders, hay fever, headache, toothache, sinus congestions; as a diuretic and to promote menstruation [1,2]. Some important activities of O. majorana essential oil (Omeo) include antibacterial, antifungal and antioxidant actions and increased liver and kidney function [3,4]. Studies suggest that the oil can be used in the prevention of aging-related diseases [5-7] and central nervous system disorders [1,8] because of its antioxidant effects. Previous studies have reported the potential use of O. majorana ethanolic extract as an anticancer agent [9], whereas the tea extract has been shown to have immunostimulant, antigenotoxic, and antimutagenic properties [2,10,11]. Furthermore, O. majorana crude extract, dichloromethane, ethyl acetate and aqueous fractions have shown antibacterial and antifungal activity [12].

Preliminary studies by Heikal [13] have suggested that co-administration of 150 mg/kg or 300 mg/kg of O. majorana leaf extract attenuated testicular oxidative damage and apoptosis-related gene expression induced by methomyl exposure, which may be attributed to its antioxidant potential [13]. In another study, a lower dose (0.16 mL/kg) of Omeo was able to prevent ethanol-induced decline in sperm quality, testosterone levels, and weight of reproductive organs in male rats [1].

The acute oral median Lethal Dose (LD50) value for Omeo in rats has been reported as 2.24 g/kg and the acute dermal LD50 value in rabbits exceeds 5 g/kg. Furthermore, when applied at 6% in petrolatum to intact or abraded rabbit skin for 24 h under occlusion, Omeo was not found to be irritating [14]. A review of the literature demonstrates that terpinen-4-ol and γ-terpinene are present in Omeo at various concentrations [3,14-18], among other compounds. Terpinen-4-ol can produce toxic effects at concentrations above 1500 µL/mL when evaluated in vitro using a Salmonella/microsome assay [19,20]. The acute oral LD50 in rats has been reported as 3.65 g/kg (2.71–4.59 g/kg) for γ-terpinene, while the acute dermal LD50 in rabbits exceeds 5 g/kg. When applied at full strength to intact or abraded rabbit skin for 24 h under occlusion, γ-terpinene was reported as moderately irritating [21]. Besides that, O. majorana essential oil was not able to induce *in vitro* gene and chromosome mutations, when evaluated in *S. typhimurium* and V79 Chinese hamster lung fibroblast cells, respectively. These studies contribute to more information on the toxicity of this essential oil [18]. Although investigations into the medicinal properties of plants are ongoing, the safe use of medicinal plants should be carefully evaluated.

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