



Artemisia herba-alba Asso. essential oil antibacterial activity and acute toxicity



Anis Bertella^{a,*}, Kheira Benlahcen^a, Sidaoui Abouamama^a, Diana C.G.A. Pinto^b, Karim Maamar^a, Mebrouk Kihal^a, Artur M.S. Silva^{b,*}

^a Laboratory of Applied Microbiology, Department of Biology, Faculty of Life and Natural Sciences, University of Oran 1 Ahmed BenBella, 31100, Algeria

^b Department of Chemistry & Organic Chemistry, Natural Products and Food Stuffs (QOPNA), University of Aveiro, Campus de Santiago, 3810-193 Aveiro, Portugal

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ABSTRACT

Artemisia herba-alba Asso., known as the desert wormwood, is a medicinal plant and its essential oil is used in Algerian herbal medicine. In the present study the *in vitro* antibacterial activity against 21 bacterial strains and chemical composition of *Artemisia herba-alba* essential oil were investigated. The acute toxicity by determination of the median lethal dose was also studied. The results of gas chromatography/mass spectrometry analysis of the essential oil gave 19 compounds accounting for 98.7% and the major constituent was camphor with an amount of 50.7%. A significant antibacterial effect was observed with important zones of inhibition against *Klebsiella oxytoca* (31.3 mm) by disc diffusion method and against *Acinetobacter baumannii* (47.6 mm) by micro-atmosphere method. The minimum inhibitory concentration and the minimum bactericidal concentration values were ranging from 5 to 10 mg mL⁻¹ and 10–20 mg mL⁻¹, respectively. Moreover, their ratio exhibited by the essential oil was 2. The bactericidal end point was achieved after 24 h of exposure to the essential oil, for all the bacteria assayed. The oil was slightly toxic with a median lethal dose of 615 mg kg⁻¹. The results of this study suggest that the essential oil of *Artemisia herba-alba* can be a source of natural antibacterial agents with potential pharmacological applications.

1. Introduction

Infection diseases caused by the bacterial species are becoming a serious therapeutic problem (Soković et al., 2007), notably with the increase of drug resistant pathogens (Prabuseenivasan et al., 2006) that appear by the broadly and inappropriate use of antibiotics (Sbayou et al., 2014). This bacterial resistance developed versus the current antibiotics and the demands for natural compound exhibiting antimicrobial activity have motivated the researchers to investigate the efficiency of new antimicrobial agents, such as essential oils and extracts from plants (Alim et al., 2009; Rahman et al., 2011). Hence essential oils and plant extracts are promising new sources of natural alternatives to drugs (Rahman et al., 2011), this is relative to their anticancer, antinociceptive, antidiabetic, antiviral, antibacterial and antioxidant properties (Luciardi et al., 2016).

Artemisia herba-alba Asso. (syn: *A. inculta* Del.), known as the desert wormwood (Sheeh in arabic), is a medicinal and aromatic dwarf shrub belonging to the genus *Artemisia*, *Asteraceae* family and *Anthemideae* tribe (Hudaib and Aburjai, 2006; Dahmani-Hamzaoui and Baaliouamer, 2010; Tilaoui et al., 2011), that grows wild in arid areas of the

Mediterranean region spreading into middle east, north-western Himalayas and India (Vermin et al., 1995). In Algeria, *A. herba-alba* is abundant in the arid areas, steppes and Sahara (Dahmani-Hamzaoui and Baaliouamer, 2010). The essential oil of *A. herba-alba* (known as armoise oil) is historically known in traditional and herbal medicine. Numerous scientists have showed various biological and pharmacological effects in the oil, especially antimicrobial (bacteria and fungi) (Hudaib and Aburjai, 2006).

Essential oils are generally known as non-phytotoxic compounds with potential activity against microorganisms, except when they are inappropriately used and consequently can lead to harmful effect on human health (Mizanur-Rahman et al., 2013).

To the best of our knowledge, there are no available reports on the toxicological effects of *Artemisia herba-alba* essential oil growth in Algeria, and the antibacterial effect by gaseous contact. Thus, the aim of the present study is to investigate the chemical composition and the antibacterial activity of *Artemisia herba-alba* essential oil, and its acute toxicity by the determination of the median lethal dose (LD₅₀).

* Corresponding authors.

E-mail addresses: bertella.anis@gmail.com (A. Bertella), artur.silva@ua.pt (A.M.S. Silva).