



## Phytochemical screening of antioxidant and antibacterial activities of methanolic extracts of some Lamiaceae



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### ABSTRACT

In this study, methanolic extracts of four Lamiaceae (*Ajuga iva*, *Marrubium vulgare*, *Mentha pulegium*, and *Teucrium polium*) were studied for antioxidant and antibacterial activities as well as for polyphenols contents. The antioxidant activity of extracts was evaluated with the use of three assays (reducing power, DPPH assay, and hydrogen peroxide scavenging assay). Generally, the examined plants can be divided in two groups; the first one regrouped plants with high antioxidant activity (*M. pulegium* and *T. polium*) and the second one regrouped plants with low activity (*M. vulgare* and *A. iva*). The antioxidant activity of extracts showed strong positive correlation with total phenolics and total flavonoids. The antibacterial effect of extracts against *Escherichia coli* and *Staphylococcus aureus* has been reported by agar disk diffusion and micro-dilution methods. *Escherichia coli* was more sensitive to the extracts than *S. aureus* and the most effective extract was *M. vulgare*.

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### 1. Introduction

The family of Lamiaceae consists of about 230 genera and 7100 species worldwide (Harley et al., 2004). Many species of the Lamiaceae family are considered of high importance because of their uses in medicine, culinary, and cosmetics (Harley et al., 2004). Some of the major genera belonging to Lamiaceae family are *Ajuga*, *Marrubium*, *Mentha* and *Teucrium*.

The genus *Ajuga* consists of 50 species and is distributed in the temperate and warm temperate zones in the Old World. Several species of the genus *Ajuga* are used in African and Asian folk medicine. *Ajuga iva* L. is used in traditional medicine in Algeria to treat diabetes (Bondi et al., 2000) and gastrointestinal disorders. It is known to have hypoglycaemic (El Hilaly and Lyoussi, 2002), anti-inflammatory, antifungal, antimicrobial, antifebrile, and anthelmintic activities (Bondi et al., 2000; Bellakhdar et al., 1991; Ben Jannet et al., 1999; Stocker et al., 2004). Chemical studies on *A. iva* have revealed the presence of several flavonoids, tannins, terpenes, and steroids (Houghton and Raman, 1998).

*Marrubium vulgare* L. is native to North Africa, Central and Western Asia, and Southern Europe. It grows wild in dry sandy

soils and wastelands. This plant is used in folk medicine for the treatment of a variety of diseases, including inflammatory, gastroenteric, and respiratory disorders (Balmé, 1982; Newall et al., 1996). *Marrubium vulgare* is reported to possess vasorelaxant (El-Bardai et al., 2003), hypoglycemic, antihypertensive (El-Bardai et al., 2004), analgesic (DeSouza et al., 1998), anti-inflammatory (Sahpaz et al., 2002), antispasmodic antinociceptive, hypotensive, insecticidal, and antioxidant properties (Weel et al., 1999). Chemical analysis of this plant has demonstrated the presence of terpenes, sesquiterpenes (Nicholas, 1964; Henderson and McCrindle, 1969), alkaloids (Pandler and Wagner, 1963), and phenolic compounds (De Vicenzi and Maialetti, 1995), diterpenoids were also found, the main one being marrubiin (Knoess, 1994).

*Mentha pulegium* L. is native to North Africa, Europe and Asia (Chalchat et al., 2000). It is strongly aromatic and has been traditionally used for treatment of cold, sinusitis, cholera, food poisoning, bronchitis, tuberculosis, digestive, liver, and gallbladder disorders (Gruenwald et al., 1998). It is also known for its antispasmodic, carminative, antiseptic, anti-inflammatory (Shirazi et al., 2004), antioxidant (Mata et al., 2007; Jain et al., 2012; Teixeira et al., 2012), and antimicrobial properties (Erhan et al., 2012; Teixeira et al., 2012). Chemical studies on *M. pulegium* have revealed the presence of essential oils (Zwaving and Smith, 1971; Mahboubi and Haghi, 2008), phenolic compounds (Dall Acqua et al., 2008; Teixeira et al., 2012), and flavonoids (Zaidi et al., 1998).

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