



Extraction study and the antibacterial activity of phenol and flavonoid contents in *Mentha pulegium L.* from Algeria

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Abstract

The present study describes the total phenolic and flavonoids content, and in vitro antibacterial activity of petroleum ether, ethyl acetate and n-butanolic extracts from *Mentha pulegium L.* growing in Tarik Ibn Ziad within the region of Ain-Defla located in northern Algeria. The harvesting of the plant is made for three months: February, March and April 2013. We chose four bacterial strains common in human pathology, belonging to Gram positive and Gram negative classes. Bacterial strains used were: *Pseudomonas aeruginosa* (Gram negative), *Escherichia coli* (Gram negative), *Klebsiella pneumoniae* (Gram negative) and *Staphylococcus aureus* (Gram positive). These bacterial species are responsible for skin infections (*Staphylococcus aureus*), urinary and digestive tract infections (*Escherichia coli*), and nosocomial infections (*Klebsiella pneumoniae* and *Pseudomonas aeruginosa*). Antimicrobial was performed with the Bauer-Kirby method by the well diffusion technique using Petri plates made by Muller Hinton agar containing the culture. We initially made the extractions with ethanol and after we used petroleum ether, EtOAc and n-BuOH. Tests by the Shibata reaction and chromatography (TLC) showed the presence of flavonoids in all samples. The quantitative determination of total polyphenols by Folin-Ciocalteu presented the richness of ethyl acetate extract polyphenol (115.81, 277.38, and 61.36) µg GAE/g (Microgram of Gallic Acid Equivalent / gram) for crops of February, March and April respectively. Expression of results of antibacterial activity showed that the petroleum ether extract (28%) and the n-butanol extract (30.67%) are more active in *Klebsiella pneumoniae*; by against the ethyl acetate extract is more active on *E. coli* (32%).

Keywords: *Mentha pulegium L.*, flavonoids, polyphenols, antibacterial activity, Folin-Ciocalteu, Shibata reaction.

1. Introduction

With its varied and usually very sunny climate, Algeria has considerable potential for medicinal and aromatic plants such as mints. This type of plant has very interesting biological properties which find applications in various areas, namely in medicine, pharmacy, cosmetics and agriculture. However, the evaluation of plant protection properties, antioxidant and antimicrobial remains a very interesting and useful task. They represent a new source of active compounds [1-7]. Indeed, the secondary metabolites are the subject of much research in vivo and in vitro, in particular, the search for new natural constituents such as phenolic compounds. Many studies have shown that flavonoids were able to inhibit different types of microorganisms: bacteria, yeasts, molds, protozoa and even viruses. However, there was high specificity between the active molecules and the target microorganisms; hence the importance of choosing the appropriate flavonoid [8-10].

Like other species of mint, used in traditional medicine; the *Mentha pulegium L.* has identical properties: digestive, carminative, cholagogue, antispasmodic, pulmonary antiseptic, refreshing, tonic, appetizer, stomachic, choleric, expectorant and bechic. The leaves and flowering tops are used, against palpitations, intestinal fermentation, liver pain, dizziness, general weakness, hiccups, chronic bronchitis and obstinate cough [11, 12].