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# Chemical composition and antioxidant activity of phenolic compounds and essential oils from *Calamintha nepeta* L.

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## Abstract:

**Background:** Essential oils, infusion and decoction extracts of *Calamintha nepeta* L. were evaluated for their bioactive substances (polyphenols and essential oils) and antioxidant activities.

**Methods:** The amounts of phenolic compounds were determined by colorimetric assays and identified by high performance and liquid chromatography coupled with ultraviolet detector (HPLC-UV) method. The chemical composition of essential oils was determined by gas-chromatography coupled with mass spectrometry (GC/MS) method. For the evaluation of the antioxidant activity of essential oils and extracts, two different assays (reducing power and DPPH radical scavenging activity) were used.

**Results:** Infusion extract presented the highest phenolic content, followed by the decoction one, while the lowest amount was observed in essential oils. The amount of flavonoids of the decocted extract was higher than that of the infused one. The phenolic profile of *C. nepeta* infusion and decoction extracts revealed the presence of 28 and 13 peaks, respectively. Four phenolics compounds were identified in infusion (gallic acid (GA), rosmarinic acid (RA), caffeine (C) and caffeic acid (CA)) and two were identified in decoction (GA and RA). The chemical composition of essential oils revealed the presence of 29 compounds, accounting for the 99.7% of the total oils. Major compounds of essential oil (EO) were trans-menthone (50.06%) and pulegone (33.46%). Infusion and decoction extracts revealed an interesting antioxidant activity which correlates positively with their total phenolic contents.

**Conclusions:** These results showed that *Calamintha nepeta* could be considered as a valuable source of phenolics and essential oils with potent antioxidant activity.

**Keywords:** antioxidant activity, *Calamintha nepeta*, essential oils, polyphenols, preparation method

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## Introduction

Secondary metabolites such as phenolic compounds and essential oils are important products of medicinal plants which are reported for several roles as medicinal agents, showing antioxidant effects [1, 2].

Lamiaceae species, such as thyme, rosemary, calament, peppermint, sage, lemon balm and oregano, have been reported to possess a wide diversity of phytochemicals (hydroxycinnamic acids and flavonoids) with antioxidant activity [3]. Recent studies have shown that hydroxycinnamic acids, namely rosmarinic acid (RA) and caffeic acid (CA), exhibit a number of interesting biological activities, e. g. antioxidant [4]. RA belong to Labiatae tannins (CA derivatives), which are oligomers formed by esterification (ester condensation) of CA and its hydrated derivative, 3, 4-dihydroxyphenyllactic acid [4, 5]. It is commonly found in species of the subfamily Nepetoideae of the Lamiaceae. Also, RA and CA were identified as hydroxycinnamic acids of Lamiaceae [6, 7]. HPLC-UV methods have been used in the identification and quantification of phenolic acids from Lamiaceae species [8]. It used for the analysis of CA and RA in aqueous extracts of aromatic herbs such as *Thymus vulgaris*,

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