World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(RESEARCH ARTICLE)

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Evaluation of the antioxidant activity of certain extracts from the leaves of *Phlomis crinita* Cav from North western Algeria

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World Journal of Biology Pharmacy and Health Sciences, 2023, 16(02), 025–028

Publication history: Received on 07 September 2023; revised on 27 October 2023; accepted on 30 October 2023

Article DOI: https://doi.org/10.30574/wjbphs.2023.16.2.0443

Abstract

The *Phlomis crinita* Cav., a widely distributed Lamiaceae in northwestern Algeria, possesses numerous therapeutic virtues. The objective of this study is to evaluate the antioxidant properties of the leaves of this species by comparing them to ascorbic acid using the DPPH (2,2-diphenyl-1-picrylhydrazyl) method.

The assessment of antioxidant properties of extracts obtained through reflux, including chloroform, n-butanol, and ethyl acetate, revealed a highly significant activity with IC_{50} values comparable to that of ascorbic acid (reference), especially for the chloroform extract. These results may be attributed to polyphenols, particularly tannins and flavonoids. It would be interesting to quantify them and determine if there is a correlation between their content and the intensity of this activity.

Keywords: *Phlomis crinita* Cav; Antioxidant activity; DPPH; Polyphenols; Tannins; Flavonoids

1. Introduction

Phlomis crinita Cav. is a lamiaceae that is widespread in north-western Algeria and has many therapeutic properties. The aim of this study was to evaluate the antioxidant properties of the leaves of this species by comparing them with ascorbic acid using the DPPH (2,2-diphenyl-1-picrylhydrazyl) method [1,2].

2. Material and methods

2.1. Plant material

In January, the sample is collected in the Oued el Fodda region in Chlef at an altitude of 830 meters, at 36° 10' 59" North, 1° 31' 59" East, located in the Northwest of Algeria [1,3].

The leaves (approximately 500 grams) are left to dry for several weeks in a thin layer, in the shade, at room temperature, in a dry and well-ventilated place until complete desiccation. They are stored in paper bags, protected from light, moisture, and dust, until they are used [1,3].

2.2. Preparation of different extract

5 grams of plant material are refluxed using a methanol-distilled water mixture (70v/30v) for 1 hour. After filtration and subsequent evaporation of the solution to dryness, the residue is macerated in distilled water for 24 hours. Delipidation is carried out with n-hexane, followed by successive extractions using solvents of increasing polarity (in a separatory funnel) with chloroform, ethyl acetate, and n-butanol, using volumes of 3 x 50 ml for each solvent. The

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chloroform, ethyl acetate, and n-butanol extracts are evaporated to dryness at 44 °C, weighed, and reconstituted in methanol [4,5].

2.3. DPPH test protocol

The antioxidant activity was tested by the DPPH (2,2-diphenyl-1-picrylhydrazyl) method. First, the DPPH solution was prepared, and DPPH 2,2-diphenyl-1-picrylhydrazyl ($C_{15}H_{12}N_5O_6$; Mr 394.33) was dissolved in absolute methanol to obtain a 0.004% solution (stable for 48 hours in the dark at +4°C). A dilution range of the extract was prepared from the stock solution [6,7].

Into dry tubes, a volume of 1 ml of each dilution was introduced, plus 1 ml of 0.004% DPPH (2,2-Diphenyl-1-picrylhydrazyl) methanoic solution, followed by vortexing. The tubes were placed in the dark at room temperature for 30 min. The reading was carried out by measuring the absorbance at 517 nm by a spectrophotometer. A blank (negative control) was prepared and composed of 1 ml of methanol and 1 ml of DPPH (0.004%). For each dilution, the experiment was repeated three times [6,7].

3. Results

The antioxidant activities of the extracts obtained through reflux (chloroform, ethyl acetate, n-butanol) and ascorbic acid (reference) are depicted in Figures 1, 2, 3, and 4.

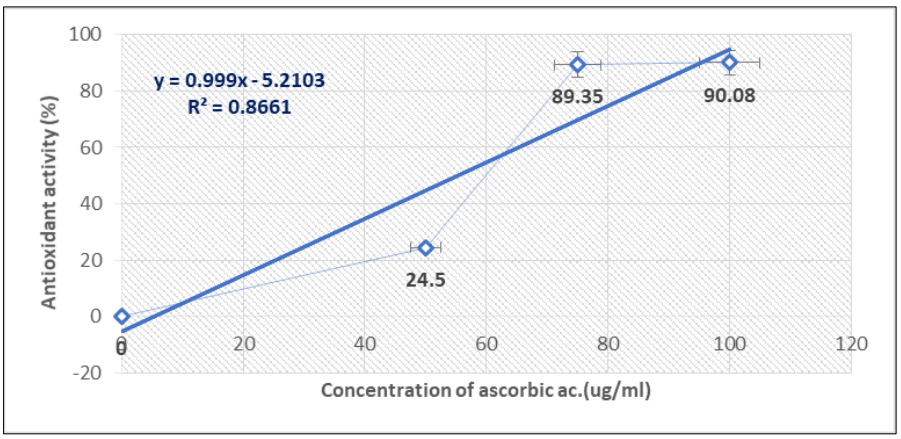

Figure 1 Antioxidant activity curve for ascorbic acid (reference)

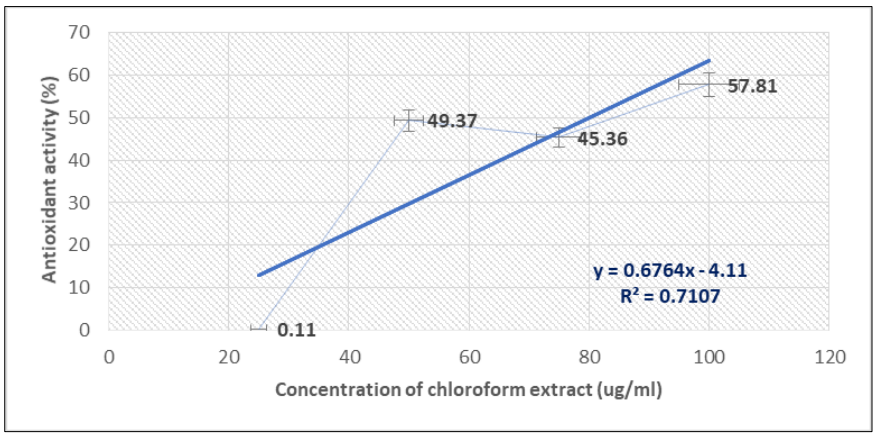

Figure 2 Antioxidant activity curve for chloroform extract

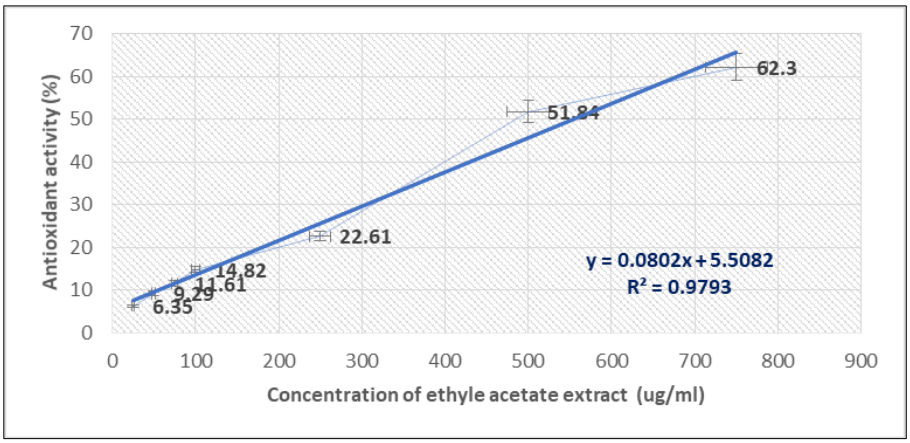

Figure 3 Antioxidant activity curve for ethyl acetate extract

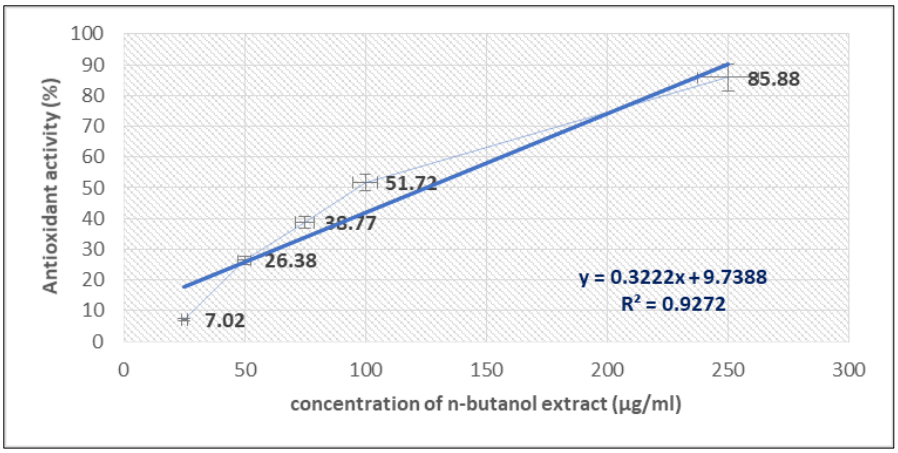

Figure 4 Antioxidant activity curve for n-butanolic extract

The inhibitory concentrations (IC 50) used to compare the antioxidant activities of the different extracts in relation to ascorbic acid are shown in Figure 5.:

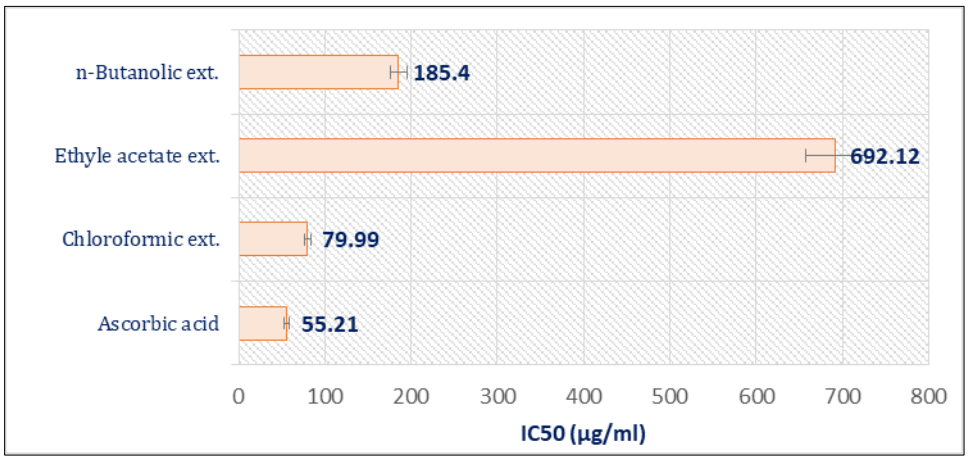

Figure 5 The inhibitory concentrations (IC 50) of the different extracts

4. Discussion and conclusion

The study of antioxidant properties revealed a very significant activity of all the extracts (chloroformic, n-butanolic, ethyl acetate) with IC_{50} values comparable to those of ascorbic acid, especially for the chloroformic extract; these results are similar to those of Limem-Ben Amor I. et al; 2009 [8] and Nabti B.; 2023 [9,10]; who attributed this activity to the presence of polyphenols, particularly tannins and flavonoids. It would be interesting to measure these substances and determine whether there is a correlation between their content and activity.

Compliance with ethical standards

Acknowledgments

We thank all members of the Pharmacognosy laboratory for the help they gave us in carrying out this work.

Disclosure of conflict of interest

The authors and all co-authors declare that they have no conflicts of interest in connection with this document, and the material described is not in the process of being published nor is it intended for publication elsewhere.

References

[1] Nabti B, Bourkaib S, Boukhalfa D. Phytochemical and biological investigation of leaf extracts of *Phlomis crinita* Cav. from northern Algeria. GSC Biological and Pharmaceutical Sciences. 2023; 22(02):020-029. doi:10.30574/gscbps.2023.22.2.0050.

[2] Limem-Ben Amor I, Boubaker J, Ben Sgaier M, Skandrani I, Bhouri W, Neffati A, Kilani S, Bouhlel I, Ghedira K, Chekir-Ghedira L. Phytochemistry and biological activities of Phlomis species. J Ethnopharmacol. 2009 Sep 7; 125(2):183-202. doi: 10.1016/j.jep.2009.06.022. Epub 2009 Jun 27. PMID: 19563875.

[3] Nabti B, et al. Evaluation of antioxidant and antimicrobial activities of polyphenols from leaf extracts of a spontaneous Phlomis from Northern Algeria. Batna J Med Sci. 2023; 10(1):96-101.

[4] J. Brunton. « Pharmacognosie (5° Éd.) Phytochimie - Plantes médicinales, Lavoisier -TEC ET DOC.(2016)

[5] S. Boutefnouchet, P. Champy, C. Girard, O. Grovel, T. Hennebelle, E. Poupon, E. Seguin. « Pharmacognosie, Obtention et propriétés des substances actives médicamenteuses d'origine naturelle », Elsevier / Masson. (2020).

[6] Molyneux P and Songklanakarin J. (2004). The use of the stable free radical diphenylpicrylhydrazyl (DPPH) for estimating antioxidant activity. Sciences technology, 212-218.

[7] Dall'Acqua S, Cervellati R, Loi MC, Innocenti G. Evaluation of in vitro antioxidant properties of some traditional Sardinian medicinal plants: Investigation of the high antioxidant capacity of Rubus ulmifolius. Food Chemistry. 2008 Jan 15; 106(2):745-749.

[8] Limem-Ben Amor I. , Boubaker J. , Ben Sgaier M. , Skandrani I. , Bhouri W., Neffati A. , Kilani S. , Bouhlel I. , Ghedira K. , Chekir-Ghedira L.,2009: Investigation of biological activity of polar extracts isolated from *Phlomis crinita* Cav ssp. mauritanica Munby. Drug and Chemical Toxicology, 2009; 32(1) : 38–46.

[9] Nabti B, Bammoune N, Meliani H, Stambouli B. Antioxidant and antimicrobial activities of Spirulina from the region of Tamanrasset, Algeria. Journal of Herbal Medicine. 2023; 41:100748.

[10] Boutennoun, Hanane, et al. In vivo assessment of anti-inflammatory and antioxidant activities of *Phlomis crinita* polyphenols. European Journal of Biological Research 13.2 (2023): 94-105.