

## Pharmacognostical evaluation, phytochemical analysis and antioxidant activity of the roots of *Achillea tenuifolia* Lam.

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**Background and Aims:** *Achillea* L. (Asteraceae) contains about 100 species throughout the world with many therapeutic aspects. *Achillea tenuifolia* is one of the mentioned species that grows wildly in Iran.

**Methods:** In this research the antioxidant activity of methanol and ethyl acetate extracts obtained from the roots of *A. tenuifolia* against free DPPH (2,2-diphenyl-1-picrylhydrazyl) radical together with the total phenol contents of extracts were assayed. Furthermore, preliminary phytochemical analysis of the above mentioned extracts and microscopic characterization of various plant tissues were determined.

**Results:** The results showed that total phenol contents of methanol and ethyl acetate extracts were  $59.4 \pm 1$  and  $70.6 \pm 3.8$  ( $\mu\text{g}/\text{mg}$  EXT), respectively. IC<sub>50</sub> value for BHA, vitamin E, methanol and ethyl acetate in radical inhibition were calculated in the following order: 7.8, 14.2, 145.5 and 320  $\mu\text{g}/\text{mL}$ . The scavenging capacity of methanol extract was higher than ethyl acetate extract. Preliminary phytochemical analysis indicated that both extracts contained sterols and terpenoids, nevertheless, tannins were detected in the methanol extract. Microscopic observations exhibited the presence of undeveloped cypsela, papillae stigma and elongated epidermal cells in the flower tissue, lanceolate leaflet with anomocytic stomata, cubic calcium oxalate prism and oil containing cells in the leaf parts, anomocytic stomata and cicatrix in the stem segments and finally sclereids, pitted and spiral vessels in the root tissue.

**Conclusions:**

Root extracts of *A. tenuifolia* mainly contain tannins, terpenes and sterols, and shows antioxidant activity not necessarily related to their total phenol content. Different plant tissues exhibited characteristic microscopic properties which make it distinguishable from other *Achillea* species.

**Keywords:** *Achillea tenuifolia*; Antioxidant activity; Microscopy; Preliminary phytochemical analysis