

Natural Antioxidants from Dates: A Green Chemistry Approach

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ABSTRACT

Introduction: Oxidative stress is a major contributor to the development of chronic inflammatory and degenerative disease. In recent years, attention has shifted to medicinal plants as safer source of natural antioxidants. *Phoenix dactylifera* L., commonly known as Date-fruit, possess antioxidant chemicals (mostly in the form of polyphenols) which prevent the oxidization of biomolecules such as DNA, lipids, proteins. These fruits also have strong free radical scavenging effect that protects the cell against harmful effects.

Objective: The aim is to evaluate the in-vitro antioxidant potential of Ajwa dates and relate the activity to their phenolic and flavonoid content.

Methodology: Ajwa date fruit and seeds were separated from the pulp and finely ground. The pulp-to-seed ratio was 8:1, and the weight of the pulp and seeds was measured separately. For extraction, 958g of unprocessed pulp was mixed with 131g of powdered seed, and sequential extractions were carried out using hexane, ethyl acetate, acetone, and methanol, resulting in the fractions BPS-HX, BPS-EA, BPS-A, and BPS-M. The potent extracts, BPS-A and BPS-M, were analyzed using LC-ESI-MS/MS, while BPS-M underwent NMR analysis. Antioxidant capacity was evaluated employing standard in-vitro assays, including DPPH free radical scavenging, ABTS radical cation inhibition, and ferric reducing antioxidant power (FRAP). Total phenolic and flavonoid contents were quantified using spectrophotometric techniques, with ascorbic acid serving as the reference compound.

Result: Estimation of total polyphenol content of the extract mixture showed that AJWA dates possessed phenolic and flavonoid content in the range of 993mg-5020mg GAE/100g and 163mg-907mg RE/100g respectively. DPPH scavenging assay was represented in terms of Ascorbic Acid and Trolox equivalent, i.e., 4.293-26.910µM AAE/100g and 4.637-28.317µM TEAC/100g. While ABTS decolorizing assay was observed in the range of 9.61-29.18µM TEAC/100g. Antioxidant activity, measured by the FRAP assay, ranged from 0.137 to 0.905 mM FeSO₄/100g and 0.113 to 0.881 mM ascorbic acid equivalent (AAE)/100g.

Conclusion: These findings revealed that combine mixture of Ajwa (pulp and seed) extract possess high phenolic and flavonoid content than the separate pulp and seed extract. In- vitro testing revealed promising antioxidant activity in DPPH assay, ABTS assay and FRAP assay.

Keywords: Antioxidant Activity, Phoenix Dactylifera, Phenolic Content, Flavonoid Content.

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