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ABSTRACT

Evaluation of Antioxidant, Antimicrobial, Anticancer, and Enzymes Effects of Terfezia Arenaria from Palestine

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Background: Terfezia arenaria is a species of desert truffle belonging to the Terfeziaceae family. Desert truffles typically grow in dry and semi-arid regions, including Syria, Iraq, Kuwait, Saudi Arabia, Morocco, Egypt, South Africa, Tunisia, and Palestine, and are generally classified as Terfezia or Tirmania. Beyond their unique aromatic properties, desert truffles are recognized for their nutritional and medicinal value. They are rich in carbohydrates, proteins, fats, minerals, lipids, and amino acids (Wang and Marcone, 2011). Additionally, they contain bioactive compounds such as ascorbic acid, ergosterol, phenolics, flavonoids, terpenoids, phytosterols, and polysaccharides. Among these, flavonoids are particularly valuable due to their antioxidant, anti-inflammatory, anti-mutagenic, and anticancer properties. Unlike edible mushrooms, truffles can produce these metabolites naturally. Several studies have reported their antioxidant and antimicrobial activities. Regardless of species, desert truffles are highly valued both locally and internationally as luxury food items (Harir et al., 2019).

Meanwhile, metabolic disorders such as obesity and diabetes remain pressing global health concerns. Obesity is a known risk factor for cardiovascular disease and insulin resistance, while diabetes mellitus is a major cause of morbidity and mortality due to microvascular and macro vascular complications.

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Aims: To explore Palestinian desert truffles, specifically T. arenaria collected from Al-Naqab soil, using supercritical and solvent-based extraction techniques. To investigate their antioxidant, antimicrobial, enzymatic, and anticancer activities, and to evaluate their potential for therapeutic applications.

Methods: To optimize extraction yields, three extraction procedures (maceration and sonication with dichloromethane, and Soxhlet with methanol) were investigated. Antimicrobial activity against five bacterial strains was determined. The DPPH assay was used to assess antioxidant activity, whereas α-amylase inhibition was examined as an antidiabetic indication. The extracts' cytotoxicity was evaluated against the MCF-7 and HT-29 cancer cell lines.

Results: The Soxhlet methanol extract gave the highest yield (29.05%). TLC revealed the presence of phenols, flavonoids, terpenoids, glycosides, and carbohydrates. While antimicrobial activity was negligible. The methanol extracts cytotoxicity on the cancer cell lines (MCF-7 and HT-29) was determined; the extracts showed 40-60% anticancer activities against all cancer cells after 2 days. The methanol extract demonstrated 77% antioxidant inhibition in DPPH, with an IC50 value of (____). To ascertain plant extracts' in vitro anti-diabetic efficacy, its α-amylase inhibitory action demonstrated that the methanol extract has strong α-amylase inhibitory activity, with IC50 values of (100mcg/ml). While the antilipase activity showed IC50 value of 150 mcg/ml.

Conclusion: Terfezia arenaria from Palestine shows great promise as a source of bioactive compounds with antioxidant, antidiabetic, and anticancer properties. Although antimicrobial effects were minimal, further research is recommended to isolate and test individual compounds in vivo for pharmaceutical development.

Keywords: Terfezia, Arenaria, antioxidant, antimicrobial, anticancer, enzymes.

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