

RESEARCH ARTICLE

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Investigations of Phytoconstituents, Antioxidant and Anti-Liver Cancer Activities of *Saueda monotoca* Forssk Extracted by Microwave-Assisted Extraction

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Abstract

Background: Wild edible plants are good sources for bioactive compounds, vitamins, and minerals with various applications. They can play a role in supporting the immune system and are highly beneficial as resources. *Saueda monotoca* Forssk is a wild edible plant that grows in Iraq and its biological activities have not yet reported. **Methods:** *Saueda monotoca* Forssk bioactive compounds were extracted by a microwave-assisted extraction method using ethanol as a solvent, and its chemical composition was analyzed by GC-MS. The biological activities were evaluated via antioxidant, anti-liver-cancer, antibacterial, and toxicity tests *in vitro*. **Results:** The results of GC-MS analysis showed that there were about 20 bioactive compounds. The most abundant compound was N,N-Dimethylglycine methyl ester, followed by 9,12,15-Octadecatrienoic acid, n-Hexadecanoic acid, and N,N-Dimethylglycine. The antioxidant activity of the ethanol extract of the plant showed a significant IC₅₀. The extract of *S. monotoca* against liver cancer cells (JICAM) showed significant toxicity. Flow cytometric analysis showed a significant induced apoptosis and cell cycle arrested at G1 phase. **Conclusions:** The results indicated the significance of the components of Iraqi *S. monotoca* Forssk by MAE method as a potential food supplement in nutrition systems to prevent liver diseases and enhance the liver's defense against diseases.

Keywords: Apoptosis- cell cycle- liver cancer- natural antioxidants- *Saueda monotoca* Forssk

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Introduction

Wild edible plants are an important source of edible healthy food due to the nature of the chemical compounds in the fruits, leaves, roots, tubers, and rhizomes, which could have applications in medical uses and daily diet (Bhattacharjee et al., 2010). Common wild edible plants include amaranth, asparagus, broadleaf, catfish, clover, chickweed, and chicory (Tariq and Riaz, 2017). They are reported to be used as medicines for wounds and possess nutritional activity. Various countries have been using wild edible plants species, like India, China, and some Arab and African countries (Georg et al., 2016). A number of wild edible plants grow in Iraq, but few studies have reported on their chemical compositions. One report showed the bacterial activity of 22 Iraqi wild plants (Abdulhameed, 2014). One of the most famous wild edible plants in Iraq is *Saueda monotoca* Forssk, which belongs to the family Chenopodiaceae and grows in hypersaline soil (Facon et al., 2014). It is used by Iraqi people in the southern region as a vegetable food and is available in

vegetable shops or markets. It is believed to have health benefit, it has a good taste, and is non-toxic (Al et al., 2018). One study investigated the phytochemicals of a methanol extract of the wild plant in Saudi Arabia (Elsharaby et al., 2019). People are suffering from liver diseases due to viruses, drugs, poisons, alcohol, cancer, and inherited diseases (Xiang and Guan, 2017). The long tradition of medicinal plants that have been used liver disease treatment could help to discover new plants with new biofunctions to prevent liver diseases and understand the mechanism of action (Li et al., 2015). Wild plants could play a role in hepatic protection due their antioxidant content, which could prevent damage from reactive oxygen species (ROS) and inhibit free radical generation (Guan and Li, 2015). The phyto-antioxidants discovered in wild plants are growing and can be explored using different extraction methods and solvents (Itaya and Mullen, 2011). Soils soils and environmental factors play a role in the chemical composition of wild plants (Coccamer et al., 2019). In addition, their toxicity has to be evaluated, and the compositions of toxic compounds have

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