

Exploring the Phytoconstituents, Differential Pharmacology, and Interaction with Empagliflozin of *Olea europaea* Leaves Extracts

Zinah Kadhim Saeed¹, Ali Mahmoud Al-Samydai^{1,*}, Moath Alqaraleh², Nidal Adel Qinna³,
Bayan Yousef Ghanim³, Amal Mayyas⁴, Deniz Al-Tawalbeh⁵, Shrouq Taiseer Alstori⁶, Walhan Alshaer⁶,
Farah Al-Mamoori⁷, Lidia Kamal Al-Halaseh⁸

¹Pharmacological and Diagnostic Research Centre, Faculty of Pharmacy, Department of Pharmaceutics and Pharmaceutical Technology Al-Ahliyya Amman University, Amman, JORDAN.

²Department of Medical Laboratory Sciences, Faculty of Science, Al-Balqa Applied University, Al-Salt, JORDAN.

³Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmacy, Petra University, JORDAN.

⁴Department of Pharmacy, Faculty of Health Sciences, American University of Madaba, Madaba, JORDAN.

⁵Department of Medicinal Chemistry and Pharmacognosy, Faculty of Pharmacy, Yarmouk University, Irbid, JORDAN.

⁶Cell Therapy Center, The University of Jordan, Amman, JORDAN.

⁷Department of Pharmaceutical Sciences, Faculty of Pharmacy, Zarqa University, Zarqa, JORDAN.

⁸Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Mutah University, Al-Karak, JORDAN.

ABSTRACT

Background: The *Olea europaea* L. leaves have long been used in treating various illnesses. Its pharmacological activity based on the phytoactive constituents; therefore, optimizing the extraction process should intensify the benefits. **Aim:** The study aimed to optimize the extraction process for *O. europaea* L. leaves, evaluate their antioxidant and anti-inflammatory activities, and explore their influence on the biochemical parameters of diabetic animals. **Materials and Methods:** The differential pharmacology of the extracts and combinatorial therapy with the antidiabetic agent; empagliflozin, were explored. The aims were accomplished after several *in vitro* and animal studies: quantification of flavonoid and phenol content, measurement of the antioxidant activity, identification of the active constituents, and assessment of hepatic and renal functions, lipid profile, and glycemic status. In addition, molecular biology tools were used to measure the expression of the inflammatory mediators IL-6 and IL1 beta. **Results:** Findings reveal that the hydroalcoholic binary system reinforced by the sonication yields the highest polyphenol (44.40 ± 1.414 mg/g dry extract equivalent to gallic acid) and total flavonoids (31.0700 ± 1.202 mg/g dry extract equivalent to quercetin). Extract by the same system showed high substantial antioxidant activity. HPLC-MS/MS reveals oleuropein and its aglycon, o- and p-coumaric acid, hydroxytyrosol acetate, and betaine compounds. A significant reduction in the average weight was recorded in diabetic mice (29.79 ± 2.88 g) compared to the control (32.61 ± 2.57 g). A significant reduction in producing the inflammatory mediators IL-6 and IL1 beta was measured. **Conclusion:** Olive leaves are a potential addition to conventional medicines to enhance the health profile of diabetic mice.

Keywords: Olive, *Olea europaea* L., Diabetes, Phytoanalysis, IL-6, IL1 beta, Phytotherapy, Biodiversity, Sustainability.

Correspondence:

Dr. Ali Mahmoud Al-Samydai

Pharmacological and Diagnostic Research Centre, Faculty of Pharmacy, Al-Ahliyya Amman University, Amman-19328, JORDAN.

Email: a.alsamydai@ammanu.edu.jo

Dr. Lidia Kamal Al-Halaseh

Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Mutah University, Al-Karak-61710, JORDAN.

Email: drhalaseh@mutah.edu.jo

ORCID ID: 0000-0002-2635-3619

Received: 25-06-2023;

Revised: 11-01-2024;

Accepted: 24-04-2024.

INTRODUCTION

Diabetes Mellitus (DM) is one of the top ten leading causes of death worldwide.¹ The exact etiology of the disorder is still under debate. Both types I and II are characterized by high blood sugar levels and are caused by environmental and genetic factors.²

Despite extensive research and the high impact on the global economy, DM remains insufficiently understood, therefore, limited efficient treatments available in markets.³

There is an increasing reliance on traditional medicine and heredity recipes in treating DM, along with other diseases, which stands as an unending practice. The ethnopharmacology of selected herbal remedies has confirmed biological activities in ameliorating blood sugar levels after several *in vitro*, *in vivo*, and clinical studies.⁴ The hypoglycemic activity was linked to the contained secondary metabolites such as polyphenols, alkaloids, and terpenoids.⁵



DOI: 10.5530/ijper.58.3s.100

Copyright Information :

Copyright Author (s) 2024 Distributed under Creative Commons CC-BY 4.0

Publishing Partner : EManuscript Tech. [www.emanusciprt.in]