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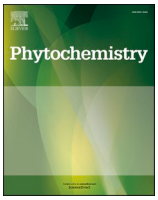

trans-Tiliroside: A potent α-glucosidase inhibitor from the leaves of *Elaeagnus angustifolia* L

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ABSTRACT

Elaeagnus angustifolia L. (Elaeagnaceae) is an important medicinal plant associated with numerous pharmacological activities. Its leaves are used as a therapeutic agent in traditional medicinal systems to treat diabetes. However, the active compounds responsible for the beneficial effects of *E. angustifolia* remain unclear. In this study, we determined the bioactive profile of *E. angustifolia* leaves using open column chromatography and semi-preparative HPLC. Further, we sought to determine its α-glucosidase and α-amylase inhibitory activities, and its DPPH and ABTS radical-scavenging activities. Four undescribed flavonol glycosides, igdoside A–D, and four known glucosides were isolated from the ethyl acetate and *n*-butanol extracts of *E. angustifolia* leaves. Thereafter, the compound structures were identified using spectroscopic methods, including NMR and mass spectrometry. Of the compounds extracted, kaempferol-3-*O*-(6″-*trans*-*p*-coumaroyl)-β-D-glucopyranoside (*trans*-tiliroside), exhibited the highest α-glucosidase inhibitory activity with an IC_{50} value of 2128 ± 63 μM compared to the positive control, acarbose (IC_{50} = 6561 ± 207 μM). *trans*-Tiliroside was also found to exhibit potent scavenging activity against the ABTS radical, with an IC_{50} value of 5 ± 0 μM, compared to the positive controls, trolox (31 ± 1 μM) and α-tocopherol (50 ± 1 μM). In addition, isorhamnetin-3-*O*-β-D-galactopyranoside (IC_{50} = 6 ± 0 μM) and astragalin (IC_{50} = 6 ± 0 μM) showed similar ABTS radical-scavenging activity as *trans*-tiliroside. Based on HPLC, the content of *trans*-tiliroside was 9.69% in the ethyl acetate extract, 1.04% in decoction, 0.34% in 70% methanol extract, and 0.23% in infusion. None of the extracts and compounds showed α-amylase inhibition or DPPH-scavenging activity.

1. Introduction

The Elaeagnaceae family is represented by two floral species in Turkey. One of them, *Elaeagnus angustifolia*, is a thorny shrub that can reach a height of 7 m. *E. angustifolia* is deciduous; grows naturally in Europe, Turkey, Caucasus, Syria, Iran, Afghanistan, and Pakistan; and is widely cultivated throughout Turkey (Güner et al., 2012; McKean, 1965).

E. angustifolia has been identified as having numerous ethnobotanical uses by the local people of Turkey and is a potential herbal medicine for the treatment of diabetes mellitus (DM). The decoction of its leaves is consumed as a blood glucose-lowering agent (Arıtuluk and Ezer, 2012) while the infusions from its flowers and leaves are consumed as diuretics and antipyretics (Baytop, 1999). Previous studies have shown that *E. angustifolia* exerts antiarthritic, anti-inflammatory, antimicrobial, antimutagenic, antinociceptive, antioxidant, antitumor, cardioprotective, gastroprotective, hypolipidemic, insecticidal, tyrosinase inhibitory, and wound-healing effects (Carradori et al., 2020; Farzaei et al., 2015). The *in vitro* α-glucosidase and α-amylase inhibitory effects of the 70% methanol extract prepared from the leaves of *E. angustifolia* have been evaluated using different methods. However, to the best of our knowledge, further studies have not been conducted to determine the effective compounds in the extract (Saltan et al., 2017). By investigating the hypoglycemic effect of polysaccharides obtained from the fruit of this

Abbreviations: ABTS, 2,2′-azinobis-3-ethylbenzothiazoline-6-sulfonic acid; DPPH, 1,1′-diphenyl-2,2′-picrylhydrazyl; HPLC, high performance liquid chromatography; NMR, nuclear magnetic resonance.

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