Hydroxytyrosol, a Phenyl Ethyl Alcohol with Health Effects

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Abstract: Olive oil is one of the most common and important cooking oils is obtained from olive fruits. It is known as the main source of bioactive phenyl ethyl alcohol, hydroxytyrosol. Hydroxytyrosol and its derivatives representing half of the polyphenols occurring in olive oil are responsible for the nutraceutical properties and pharmacological effects of olive oil. Hydroxytyrosol is easily absorbed and it has a good bioavailability. In addition, hydroxytyrosol has negligible adverse effects and therefore, much attention has been paid to this compound as one of the most important polyphenols. Up to now, several scientific reports demonstrated a wide range of pharmacological effects about hydroxytyrosol. Therefore, the present study aimed to critically review the available knowledge about health-promotion effects of hydroxytyrosol and its chemistry, bioavailability, pharmacokinetics and toxicity.

Keywords: Antioxidant, cardioprotective, hydroxytyrosol, olive oil, polyphenols.

INTRODUCTION

From ancient times, humans depend on nature to find food, cloth, medicine, etc. [1-3]. Numerous medical plant species have been used in traditional medicine to treat a range of diseases [3-5]. Modern medicine studies on plant extracts and/or isolated phytochemicals have been approved and support this long-lasting applications of herbal medicine [6-8]. Nowadays, a plethora of evidence shows numerous side effects of synthetic drugs and draw attention to the problems caused by synthetic compounds [2, 9, 10]. Overall, safety, efficacy, accessibility, cost-effectiveness, etc. of plant sources make them a well-recognized alternative to synthetic drugs [11-13]. These realities have aroused enthusiasm in many pharmaceutical companies to produce a novel herbal formulations and/or isolated natural products in order to combat certain diseases [3, 4, 14, 15].

Olive tree (Olea europaea L., Oleaceae) is a native polymorphic, medium-sized tree of the Mediterranean area which is cultivated in the dry subtropical climatic area and even in the extreme environments [16-18]. In addition to the Mediterranean region, olive tree is common important cultivated plants in the Middle East as well [19]. It has furrowed stem and spindle shaped coriaceous dark green leaf [20, 21]. The olive fruit is known as one of the most important medicinal fruits in the human diet which includes epicarp (skin), mesocarp (pulp), and endocarp (pit) [22, 23].

Taxonomic evidence showed that there are six different subspecies of Olea europaea including subspp. europea, cuspidata, guanchica, cerasiforæs, maroccana, imperniæ [24, 25]. Despite different morphological features occurring between the natural olive tree subspecies, chemical constituents and organoleptic qualities of these plants are unique with multiple beneficial effects on human health [22, 26-30].

Transparent, yellowish, and aromatic oil obtained from olive fruit by simple pressure has different culinary usage [31-34]. Olive oil has multiple beneficial effects due to its phytochemicals such as oleic acid (major component) and hydroxytyrosol (minor component) as well as vitamin E [32, 35-38]. This paper aimed to critically review the available literature concerning the health-promotion effects of hydroxytyrosol, and give an insight into its pharmacokinetics and toxicity.

HYDROXYTYROSOL

Hydroxytyrosol (2-(3,4-dihydroxyphenyl)ethanol) (Fig. 1) is a phenyl ethyl alcohol mainly found as a secoiridoid derivative, acetate or in its free form in virgin olive oil [39-41]. Hydroxytyrosol and its derivatives are produced from ester of hydroxytyrosol and eucalyptol, oleuropein [42-44]. Several factors influence the amount of polyphenolic compounds of virgin olive oil such as the olive subspecies, fruit maturity, oil processing methods as well as agronomic and soil characteristics [19, 45-47]. However, hydroxytyrosol and its derivatives are known as major polyphenolic compounds of virgin olive oil which represent half of its polyphenols (between 100-300 mg/kg) [48-50]. Another natural source of hydroxytyrosol is wine [51]. It has been found in different Italian (0.4 to 1.9 mg/L) and Greek wines (0.22 to 54.27 mg/L) both red and white wines [51-54].