Evaluation of the effect of *Anethum graveolens* L. crude extracts on serum lipids and lipoproteins profiles in hypercholesterolaemic rats

*Yazdanparast R., Bahramikia S.*

Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran

Received: 28 Nov 2007 Revised: 28 Jan 2008 Accepted: 9 Feb 2008

**ABSTRACT**

*Background and the purpose of study:* *Anethum graveolens* L. (Umbilliferae) is used in Iranian folk medicine as an anti-hypercholesterolaemic plant. The present study was carried out to determine the effect of *Anethum graveolens* extract (AGE) on serum lipoproteins in hypercholesterolaemic rats and also to determine its mechanism of action to some extent on liver hydroxy-3-methyl-glutaryl-CoA (HMG-CoA) reductase activity.

*Methods:* The changes in serum triglyceride (TG), total cholesterol (TC), high density lipoprotein-cholesterol (HDL-C) and low density lipoprotein-cholesterol (LDL-C) were measured using enzymatic kits. Hepatic HMG-CoA reductase activity was indirectly measured by the HMG CoA/mevalonate ratio. The amount of total phenolic and flavonoid compounds were also determined by common colorimetric methods.

*Results:* Keeping the rats on a high-fat diet for 7 consecutive days increased the serum TC, TG and LDL-C levels significantly. However, the HDL-C level decreased relative to normal rats. Treatment of hyperlipidaemic rats with AGE (single daily dose of 1 ml, equivalent to 500 mg of the plant powder) and high-fat diet for up to 10 and/or 30 days reversed the serum lipid levels compared to rats which were fed only high-fat diet. In addition, our data indicated significant increase in HMG-CoA/mevalonate ratio as compared to rats which were fed high-fat diet after treatment with AGE for 30 days, indicating a decrease in the enzyme activity. Experiments showed that AGE has the phenolic and flavonoid content of 105.2 mg of gallic acid equivalents/g of the dried extract and 58.2 mg of catechin equivalents/g of the dried extract, respectively.

*Conclusion:* The cumulative results clearly indicate that *A. graveolens* possesses potent hypocholesterolaemic effects in rats probably mediated through the suppression of endogenous cholesterol biosynthesis by inhibition of the activity of HMG-CoA reductase.

**Keywords:** *Anethum graveolens*; Hypercholesterolaemic rats; Hypolipidaemic property; HMG-CoA reductase; Flavonoids content.

**INTRODUCTION**

Cardiovascular disease, currently the leading cause of death and illness in developed countries, will soon become the pre-eminent health problem worldwide (1-3). Atherosclerosis, a progressive disease characterized by the accumulation of cholesterol, low density lipoprotein-cholesterol (LDL-C) and fibrous elements in the large arteries, constitutes the single most important contributor to this growing burden of cardiovascular disease (4-5). Elevated levels of plasma total cholesterol (TC) and triglycerides (TG) have been implicated as causative factors in development of atherosclerosis and coronary heart diseases (CHD) (4-6). Efforts to develop effective and better hypolipidaemic drugs have led to the discovery of natural agents. Research in herbal medicine has increased in the world as an alternative solution to health problems. Many plant extracts have been shown to have hypocholesterolemic activity in rats and the effects of several extracts have been described (7-11). *Anethum graveolens* L. (Umbilliferae), known as dill, is an annual herb growing in the Mediterranean region, Europe, central, southern Asia and it is widely cultured in south eastern region of Iran. The plant is used both medicinally and as an aromatic herb and spice and cookery. Dill has been used traditionally for gastrointestinal ailments such as flatulence, indigestion, stomachache colic and to tract intestinal gas (12). The presence of flavonoids, phenolic compounds and essential oil in *Anethum graveolens* has been reported (13-16). Some pharmacological effects of the plant such as antimicrobial (17), antispasmodic (18), anti secretory and mucosal protective effects have also been reported (12). The anti-hyper-