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The Inhibitory Effect of Garlic on Protein Level of in Cholesterol Synthesis Pathway, in Liver of Male C57BL/6 Mouse

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Abstract

Atherosclerosis (AS), one of the most important causes of death in today's modern societies, is the narrowing or blockage of the arteries by plaques. In recent decades, due to changes in lifestyle and diet, hypercholesterolemia and its complications, including atherosclerosis have been widespread. Consequently, the growing risk of coronary heart disease is associated with an increase in total cholesterol, LDL lipoprotein, and a decrease in the level of HDL-derived lipoprotein.

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Introduction

Atherosclerosis (AS), one of the most important causes of death in today's modern societies, is the narrowing or blockage of the arteries by plaques that include cholesterol, platelets, monocytes/macrophages, calcium, condensing proteins and other materials [1]. This complex disease progresses and develops by some risk factors, such as changes in levels of lipids and plasma lipoproteins, disruption of blood pressure regulation, platelet function, and coagulation factors, arterial smooth muscle cell metabolism, and so on [2].

In recent decades, due to changes in lifestyle and diet, hypercholesterolemia and its complications, including atherosclerosis have been widespread. However, the mechanism for initiating and expanding atherosclerosis lesions has not yet been fully understood. Interactions of complex factors and associated biological processes involved in atherosclerosis. Among these, high levels of plasma LDL, in particular its oxide form (ox-LDL) and renin-angiotensin system activity (RAS), are key factors in the development and development of atherosclerosis, and epidemiologic studies have shown that a definite correlation there is an incidence of coronary heart disease and blood cholesterol levels [2]. And a 1% decrease in serum LDL levels is associated with a 2% reduction in coronary heart disease [3].

Consequently, the growing risk of coronary heart disease is associated with an increase in total cholesterol, LDL lipoprotein, and a decrease in the level of HDL-derived lipoprotein [4]. now statins option medication to reduce blood cholesterol levels [5] and most recently with the use of statins, LDL levels in men with coronary artery disease 25 percent, followed by deaths due to coronary artery disease 30%

less [3]. Atorvastatin is the most effective member of the statins that blood cholesterol levels by inhibiting the enzyme 3-hydroxy-3-HMG-CoA (HMGR) reduces the enzyme 3-hydroxy-3-HMG-CoA (HMGR) rate-limiting enzyme in the biosynthesis of cholesterol which is dependent on the endoplasmic network and catalyzes the conversion of 3-hydroxy-3-methylglutaryl-cove (HMG-CoA) conversion [4]. However, sometimes unpleasant Statins as a lipid lowering drug. As a result, there is a need for a new, effective and harmless new treatment to lower blood cholesterol. Epidemiologic studies indicate that a vegetarian-rich diet may reduce the spread of chronic diseases, such as atherosclerosis. Garlic is one of the herbal foods found in the clinic, as well as empirical studies with hypocholesterolemic properties [6].

The traditional use of garlic dates back thousands of years ago. Garlic was used thousands of years ago for various dietary and pharmaceutical uses, among which the most important therapeutic properties include lowering blood pressure, anti-cancer, healing of wounds, and reducing blood glucose. New garlic reduces blood cholesterol and triglyceride levels, which is associated with a lower risk of atherosclerosis and coronary heart disease. The effects of garlic on reducing blood lipids are attributed to inhibition of liver enzymes responsible for the synthesis of cholesterol [12].

But scientific data bit to support the medicinal properties and therapeutic so far, there is still the Molecular mechanism of the effect of these compounds to reduce the biosynthesis of cholesterol Is unknown and probably this effect by inhibiting the enzyme 3-hydroxy-3-HMG-CoA Reeducates? (HMGR). Therefore, this in vivo study was conducted to investigate the effect of garlic on the Protein content of 3-hydroxy-3-methylglutaryl-co-reductase (HMGR) enzyme in tissues that Supply essential cholesterol mainly via internal synthesis.

Previous studies

According to a study by Qureshi AA and colleagues in 1983, it was found that garlic supplements in the diet suppressed the activity of lipogenic and cholesterogenetic liver enzymes such as HMG-CoA reductase [13]. In a 1993 study by WarShafsky and colleagues on patients with high blood cholesterol, it was found that those who took garlic as a drug showed a 9% reduction in plasma cholesterol compared to the placebo group [14].

In a study by Morcos NC in 1997, taking garlic and fish oil supplements in people with high cholesterol and high blood sugar for one month reduced cholesterol, triglycerides and LDL and increased HDL levels [15]. During a research conducted by Liu L., *et al*. in 2000, it was concluded that garlic action is associated with a decrease in plasma cholesterol levels due to the effect that the organosulphur compounds present on cholesterol metabolism and the prevention of secretion of liver enzymes in conversion Acetate plays a key role in cholesterol, reducing biosynthesis of cholesterol in the liver and consequently lowering the plasma cholesterol concentration [16].

In a 2001 experiment on female rats, Singh added di-alyl disulfide to their diet and measured HMG-CoA reductase enzyme activity in their liver cell microsomes, observing that the activity of the HMG-CoA enzyme Reductase was significantly reduced by about 77 to 79% [17]. In a study by Slowing K., *et al*. In 2001, consumption of garlic in low-cholesterol diet mice reduced the level of LDL cholesterol in these rats [18].

Liu and colleagues reported in 2002 that HMG-CoA reductase enzyme activity in hepatocyte cells in rats treated with S-allyl cysteine sulfoxide, S-ethyl cysteine sulfoxide and S-propyl cysteine sulfoxide was greater than that of mice Who did not receive treatment were reduced by 30-40% [19].

In the same year, Lin, MC and colleagues found in their epidemiological studies that long-term consumption of new garlic reduces plasma levels of cholesterol and triglyceride, which is associated with a lower risk of atherosclerosis and coronary heart disease [20].

In 2004, Meenakshi and colleagues investigated the hypolipidemic activity of synthetic di-alyl disulfide derivatives (DADS) in male hypercholesterolemic rats, and found that di-alyl disulfide derivatives such as Bis [3- (4'-substituted phenyl) prop- 2-ene] disulfides have significant antihyperlipidemic activity and are effective in lowering cholesterol levels in hypercholesterolemia [21].

In 2009, Santosh Kumar Rai and colleagues investigated the effect of new analogs of diaalidine sulfide (DADS) on HMG-CoA reductase gene expression in hypercholesterolemic mice, and their results showed that analogues of di-alyl di Sulfide (DADS) inhibits HMG-CoA reductase enzyme activity by reducing its mRNA levels [5].

In 2010, M. Roeuf Hamed., *et al*. In his experimental studies examined the therapeutic effect of administration of medicinal herbs with atorvastatin in hyper cholesterolemic mice, and concluded that the administration of each medicinal herb for garlic or pepper for 8 weeks Mice fed with cholesterol-rich foods reduced their cholesterol levels by 23% and 33%, respectively. They also said that combination therapy with atorvastatin and garlic or pepper reduced levels of hypercholesterolemic mouse plasma cholesterol levels by 47% and 50%, respectively [6].

According to studies conducted by Yin Lu and his colleagues on ICR mice in 2012, they concluded that allicin present in garlic had beneficial effects in reducing cholesterol, triglycerides and blood glucose in rats, and also aliskine reduced the level of cholesterol hepatic It reduces meaning significantly [22].

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