



EFFICACY OF ALLICIN IN PATIENTS WITH HYPERLIPIDAEMIAS

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Submission Date: 28-12-2019

Revision Date: 28-01-2020

Publication Date: 20-03-2020

Author's Contribution

IW:Conducted the study and wrote the article. ZH:Helped in review the article. SA:Re-arranged data and corrected article. SMAN:Tables and figures. AJC and AN made corrections and did the proof reading.

All authors declare no conflict of interest.

This article may be cited as: Waheed I, Hassan Z, Ahmad S, Naqvi SMA, Chughtai AJ, Noeman A. Efficacy of allicin in patients with hyperlipidaemias. J Cardiovasc Dis 2020;16(1):24 - 27

ABSTRACT

BACKGROUND:Hypercholesterolemia and other Hyperlipidemias are the most commonly encountered disorders in patients suffering from Obesity, Diabetes Mellitus, Hypertension and Ischemic Heart Disease besides being a routine finding in individuals without any risk factors mentioned above. Whether it is a primary disorder of lipid metabolism, an inherited familial hyperlipidemia or due to any secondary cause, these predispose to coronary artery disease, cerebrovascular accidents, peripheral vascular disease and their fatal complications. Statins or HMG Co A reductase inhibitors are the drugs which have been used for the treatment of hyperlipidemias. Their sided effects have limited their use in many settings in spite of being very useful. Liver damage, myalgias, renal impairment and above all recent onset of diabetes mellitus has been reported with the use of these drugs. Much has been explained about the adverse effects of these drugs but no alternative medicine has been studied in trials available till now. There is deficiency of literature regarding availability of alternative of statins or HMG Co A reductase inhibitors for treatment of hyperlipidemias. **OBJECTIVE:** To study the efficacy of Allicin in patients with Hyperlipidemias.

MATERIAL AND METHODS: This experimental observational study done at Preventive Cardiology Clinic and Cardio metabolic OPD Departments of Cardiology, Government Khawaja Muhammad Safdar Medical College, Sialkot from 1st November 2019 to 30th November 2019. A total number of 100 patients with Hyperlipidemias were enrolled in the study. Informed consent was taken from all the patients after explaining the nature of drug used and dosage schedule. A fasting Lipid Profile was done in all cases under study and the results were recorded on a pre designed proforma. The guidelines of National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) were used for classification of Lipid Abnormalities detected on laboratory results. All patients were given Enteric Coated Tablets of Garlic containing active ingredient Allicin orally in a dose of 300 mg thrice daily for one month.. Patients remained on weekly Cardiology Metabolic clinic outpatient department follow up during the study period. At the end of one month a Fasting Lipid Profile was again repeated in all cases under investigation and the laboratory reports were recorded for final evaluation. The data collected was analyzed statistically on SPSS for windows version 21.

RESULTS: . A Total number of hundred patients were included. There was overall reduction in total cholesterol from 239.5 to 163.9 mg/dl , LDL cholesterol reduction was observed from a mean value of 157.67 to 123.38 mg/dl while VLDL values did not show any improvement with Allicin therapy however HDL values improved from 35.65 to 39.5 mg/dl. Triglycerides reduced from

273 to 134 mg/dl at the end of study period.

CONCLUSION: Allicin may be used to reduce high cholesterol level.

Key words: Efficacy of Allicin, hyperlipidemias, coronary artery disease.

(J Cardiovasc Dis 2020;16(1):24 - 27)

INTRODUCTION AND BACKGROUND:

Garlic (*Allium sativum* L.) which is a commonly used vegetable item popular with the name of Garlic, contains Allicin which is very effective in the treatment of Hyperlipidemias. It has no side effects like those of statins. Allicin (diallylthiosulfinate) is a defence molecule from garlic (*Allium sativum* L.) produced upon tissue damage from the non-proteinogenic amino acid Alliin (S-allylcysteine sulfoxide) in a reaction that is catalyzed by the enzyme Alliinase. Figure-1.

Garlic, administered in a daily dose of 2×2 capsules (each capsule containing ethyl acetate extract from 1 g peeled and crushed raw garlic),



reduced significantly total serum cholesterol and triglycerides, and increased significantly HDL-cholesterol and fibrinolytic activity.¹ Effects of the garlic on platelet aggregation and Arachidonic acid metabolism were examined; it inhibited platelet aggregation induced by several platelet agonists, and also platelet thromboxane formation. It has immune modulating, anti-oxidant and anti-inflammatory and vasodilating effect properties. Garlic's lipid lowering effects are mediated via inhibition of HMG CoA reductase by diallyl di- and tri-sulphide components of garlic. Garlic has a high concentration of sulfur-containing compounds. Allicin is formed when Alliin, a sulfur-containing amino acid, comes into contact with the enzyme Alliinase when raw garlic is chopped, crushed, or chewed. Dried garlic preparations containing Alliin and Alliinase must be enteric coated to be effective because

gastric acid inhibits alliinase enzyme. Statins are also inhibitors of HMG Co A reductase enzyme but they simultaneously inhibit the Co Enzyme Q10 or Ubiquinone which is an important protective agent and its inhibition by statins can lead to myositis and statin induced myalgias. Allicin is also an inhibitor of HMG Co A reductase enzyme but it does not inhibit Ubiquinone of Co Enzyme Q 10 due to which it is safe in those patients who suffer from such side effects like Myalgias and muscle damage. Statins can not be used in patients with liver disease or impairment of hepatic function while there is no such side effects with Allicin. It is therefore superior alternative to statins in such patients. Garlic ingredient Allicin efficiently lowers blood cholesterol when used in combination with Atorvastatin.²

RATIONALE: The rationale of this study is to study the efficacy of Allicin which is the active ingredient of a commonly used vegetable i.e garlic in patients with hyperlipidemias as a primary preventive strategy so that an alternative drug is available for those patients who develop the adverse effects of statin therapy.

MATERIAL AND METHODS:

100 patients of all ages and both genders with Hyperlipidemias were enrolled in the study. Mean age of the patients under study was 55.94 years. 59 patients were males while 41 patients were females.

All patients of Hyperlipidemias who were not taking any drug were included in the study. Patients taking statins and diagnosed Coronary Artery Disease were excluded from the study. Informed consent was taken from all the patients after explaining the nature of drug used and its dosage schedule. A fasting lipid profile was done in all cases under study and the results were recorded on a pre designed proforma. The guidelines of National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) were used for classification of Lipid Abnormalities detected on laboratory results. All patients were given Enteric Coated Tablets of Garlic containing active ingredient Allicin orally in a dose of 300 mg thrice daily for



one month. On account of huge amount required for proper therapeutic dose and gastrointestinal side effects Raw Garlic was not used. Enteric coated Tablets with 300 mg dosage were used in all cases under study. Patients remained on weekly Cardiology Metabolic clinic outpatient department follow up during the study period. At the end of one month a Fasting Lipid Profile was again repeated in all cases under investigation and the laboratory reports were recorded for final evaluation. The data collected was analyzed statistically on SPSS for windows version 21.

RESULTS:

Data collected was subjected to statistical analysis by SPSS for windows version 21 and results thus obtained were tabulated and investigated. Allicin therapy had promising results on different fractions of Lipid Profile. There was overall reduction in total cholesterol from 239.5 to 163.9 mg/dl, LDL cholesterol reduction was observed from a mean value of 157.67 to 123.38 mg/dl while VLDL values did not show any improvement with Allicin therapy however HDL values improved from 35.65 to 39.5 mg/dl. Triglycerides reduced from 273 to 134 mg/dl at the end of study period. The fractions of Lipid profile effected mainly by Allicin Therapy included Total Cholesterol, LDL, HDL and Triglycerides while VLDL remained unaffected by

Allicin or Garlic in Lipid profile of our patients.⁴ There substantial evidence in previous studies about the safety, non toxic nature and hypocholesterolemic and anti inflammatory activities of Garlic.⁵ Garlic and Allicin has been found to have beneficial effects in treatment of Hyperlipidemias, Hypertension, Platelet Aggregation, anti carcinogenic and Fibrinolytic activity.⁶ In another study they have found efficacy of Garlic or Allicin in patients with cardiovascular diseases, Hypertension and Hyperlipidemias besides its antimutagenic, anti carcinogenic, antioxidant, immune modulating, antimicrobial including antibacterial, antiviral, anti parasitic and antifungal effects.⁷ Garlic preparations should not be used with a high protein meal due to delayed emptying of the stomach. Moreover there is strong evidence of decreased bioavailability of Garlic or Allicin when used in non enteric coated or raw form. Therefore an enteric coated preparation should always be used for treatment of Hyperlipidemias and other diseases.⁸ Allicin and garlic compounds have been found to have ameliorating effects on high blood pressure and its associated morbidity.⁹ Allicin which is the active content of Garlic yields hydrogen sulfide (H_2S) on degradation in the form of organic diallyl polysulfides which are potent H_2S donors in the presence of thiols and H_2S has cardioprotective and cytoprotective effects. The administration of H_2S prevents myocardial injury and dysfunction as it has effects on vascular reactivity. These myocardial protective effects of garlic are mediated by H_2S dependent mechanisms.¹⁰ Results of a study revealed that both the skin and flesh garlic extracts are useful in Norepinephrine induced Cardiomyopathy and hypertrophy of myocardial cells and cell death and apoptosis. The underlying mechanisms are attributed to Nitric Oxide and H_2S .¹¹ In animal models researchers have found that Allicin exerts a cardio protective effect by blocking Bcl-2/Bax signalling pathway depended apoptosis which results in improvement of cardiac function.¹² One group of researchers found that garlic powder was not so much effective in reducing total cholesterol.¹³ The results of our study are contrary to their findings. We had a significant reduction in total cholesterol in our study population. Garlic extracts not only exert hypolipidemic effects but also hypoglycaemic effects in diabetic patients.¹⁴ Garlic extracts have significant cholesterol and Triglyceride reducing effects in pharmacological doses.¹⁵ There is strong evidence of reduction of Triglycerides and LDL as compared to VLDL and HDL in a meta analysis.¹⁶

Table-1: Demographic profile of the patients (mean values)

n =100	
Age	55.94 Years
Sex	Males = 59 Females =41
BMI	30.65

Table-2: Efficacy of allicin therapy on lipid profile (mean values)

n=100		
Lipid Fractions mg/dl	Before allicin therapy (mean values)	After one month of allicin therapy (mean values)
Total Cholesterol	239.5	163.9
LDL cholesterol	157.67	123.38
VLDL cholesterol	31.62	31.32
HDL cholesterol	35.65	39.5
triglycerides	273	134

Allicin Therapy.

DISCUSSION:

Garlic exhibits a cholesterol and other lipid fractions cholesterol-lowering effect on account of its biologically active compound known as Allicin.³ A local study has revealed short term benefits of Garlic on lipid profile. The results of our study are more promising as compared to this study as we have seen a significant impact of



There is convincing evidence of inhibition of platelet aggregation by garlic extracts.¹⁷ No significant effect of garlic and Allicin was seen on VLDL like previous studies. The results of study endorse this finding of previous researchers whereas there is strong evidence of total cholesterol, LDL and Triglyceride reduction and a rise in HDL levels after Allicin and Garlic therapy.

CONCLUSION:

In patients who suffer from side effects of statins Allicin is a very good alternative drug for Hyperlipidemias without any side effects and good control of different fractions of lipid profile especially Triglycerides, Total cholesterol and a rise HDL. Hence we conclude that Allicin has proven to be very effective in treatment of Hyperlipidemias and especially in primary prevention of cardiovascular diseases.

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