

Effects of Olive Oil and Garlic on Serum Cholesterol and Triglycerides Levels in the Patients of Type-II Diabetes Mellitus

Ali Raza Memon, Allah Bux Ghanghro, Imran Ali Shaikh, Nasreen Qazi,
Irshad Hussain Ghanghro, Umair Shaikh

ABSTRACT

BACKGROUND: Diabetes mellitus and dyslipidemia with their complications disclose unscrupulous impact on human health, and increase the rate of mortality all over the world. The allopathic medicine is being used and consumed all over the world for the treatment of hazardous disease and their complications. Nowadays hypothesis has raised that natural production like olive oil and garlic etc having potential benefits to control glycemic control, blood cholesterol, triglycerides, lipoproteins (Low density lipoprotein & High density lipoprotein).

AIMS & OBJECTIVE: To evaluate the effects of natural remedies (combination of olive oil & garlic) on serum cholesterol and serum triglyceride (TAG's) levels with comparison to conventional allopathic (statin) therapy.

METHODOLOGY: This Randomized Control Trial (RCT) study conducted at Institute of Biochemistry Sindh University Jamshoro with collaboration of diabetic clinic medical wards LUMHS Jamshoro. Total 160 patients recruited and divided into two groups as control and case study group. Anti diabetic and statin drugs were given to each group with same dose and balanced diet, formulated capsules containing 1.1 ml of olive oil & 500mgs of garlic powder were given only patients of case study group for 3 months. Biochemical analysis of serum cholesterol & serum TAG's was done at zero level, level – I & level – II by enzymatic calorific method on Cobas auto analyzer.

RESULTS: The study presented that serum cholesterol level & serum TAG's levels were statistically normalized in case study group as compared to control group.

CONCLUSION: The natural remedies (Phyto therapy) have an important role in the treatment of dyslipidemia in type – II diabetic patients, so Phyto therapy can also takes part in the prevention of complications due to dyslipidemia in diabetic population.

KEY WORDS: Diabetes Mellitus, Hypercholesterolemia, Triglycerides, Olive oil, Garlic, Statin Drugs.

This article may be cited as: Memon AR, Ghanghro AB, Shaikh IA, Qazi N, Ghanghro IH, Shaikh U. Effects of Olive Oil and Garlic on Serum Cholesterol and Triglycerides levels in the Patients of Type-II Diabetes Mellitus. J Liaquat Uni Med Health Sci. 2018;17(02):101-5. doi: 10.22442/jlumhs.181720559

INTRODUCTION

Type-II diabetes is the most common and most preventable sort of diabetes. Being overweight, having metabolic syndrome are extreme unplanned elements that may be changed by weight loss program and way of life changes¹. The mortality rate has been increasing day by day all over the world due to different complications of diabetes². Hyperlipidemia is also one of the associated features of type – II diabetes, uncontrolled hypercholesterolemia leading myocardial infarctions, diabetic nephropathy, cerebral stroke etc³. For the prevention of complications of diabetes mellitus and their hazardous effects on human health multiple factors required like proper diet, regular exercise and proper treatment. Statin drugs mostly used all over the world for the treatment of hypercholesterolemia and for reducing the level of

serum triglycerides⁴. Nowadays natural remedies (Phytochemical therapies) under study for the treatment of diabetes, cardiovascular disease, skin diseases, cancers, hypertension etc by using different form of natural diet and their components like olive oil, garlic extractions, different herbal leaves⁵⁻⁷.

Saturated fatty acids are primarily responsible for hyperlipidemia while unsaturated fatty acids are called appropriate fat. Olive oil is known for its excessive ranges of monounsaturated fatty acids (MUFA) and it is a good supply of Phytochemicals, which includes polyphenolic compounds, squalene and components vitamin E⁷.

A member of the Liliaceae family that is Garlic (*Allium sativum*) commonly herb is used all over the world especially in Asian countries for cooking, giving the different taste to foods⁸.

Nowadays researchers upheld the clinical benefits of

garlic extraction (oil & powder) using for the treatment of many diseases due to its anti hypercholesterolemic, anti hyperlipidemic, anti-hypertension, anti-diabetic, anti-thrombotic and anti-hyperhomocysteinemia effects⁹.

Objective

To evaluate the efficacy of Phyto chemical therapy (combination of olive oil & garlic) on serum cholesterol and serum triglyceride levels with comparison to conventional allopathic (statin) therapy.

METHODOLOGY

This Prospective Randomized Control Trial (RCT) study was conducted at the Institute of Biochemistry Sindh University Jamshoro with collaboration of diabetic clinic at medical wards LUMHS Jamshoro from July 16 – October 15, 2017 (3 months study). Total 160 (males & females) with inclusion criteria of age range 40 – 60 years diagnosed cases of type – II diabetic mellitus patients with increased level of serum cholesterol between (200–300 mg/dl), increased level of serum triglycerides between (150-300 mg/dl) were recruited from diabetic clinical OPD LUMHS Jamshoro with their own consent. All subjects were selected on the basis of non-probability type of sample technique. These patients were divided in to two groups, Group A (Control Group) and Group B (Case Study Group) each group contains 80 patients. Exclusion criteria: The cases of type-I Diabetes Mellitus, patients having already done angioplasty, patients of Renal Dialysis, person having history of allergy from olive oil or garlic, peoples age less than 40 years or more than 60 years were excluded from this study.

The mean BMI of all subjects were 26.9 kg/m² (19 -25 kg/m²) the mean FBS 181mg/dl (70 -110mg/dl) & mean HbA1c% 10.8% (up to 6.5%) before start of study.

Serum Cholesterol and serum triglyceride were measured at zero level (before the start of treatment), at level – I (after the completion of 1 month therapy) and at level – II (after the completion of 3 months therapy). Patients inducting in study was given Tb.Getformin 2/500 mg, one tablet AC (before breakfast) as anti diabetic and Tb: Rovista 10mg one tablet with night meal as statin group. The patients of both groups were given this same therapy up to three months but patients of group B (case study group) was given also formulated capsules of olive oil and garlic powder (1.1 ml of olive oil & 500 mgs of garlic powder in each capsule) two times a day. After taking proper history, patient consent 3 ml of 10–12 hours fasting blood sample under aseptic measures

collected from each subject, after centrifugation serum cholesterol & serum triglycerides were measured by calorific enzymatic method on Cobas Auto Analyzer (model C 111 ACN 435).

All data was statistically analyzed by SPSS version 16, Paired t test was used to compare serum cholesterol and serum triglyceride at zero level, level – I & II.

RESULTS

Total eighty (80) diabetic patients in each group, the serum Cholesterol and serum TAG's levels were measured at level – 0, I & II. The mean serum cholesterol level at level - 0 in group A was 282 ±3.4 mg /dl, at level –I; 252 ±2.9 mg/dl, and at level –II, 214 ±3.2 mg/dl while in group B mean serum cholesterol level at level – 0 was 283 ±3.5 mg/dl, at level –I, 250 ±2.7 mg/dl and at level – II 196 ±1.9 mg/dl, after completion of three months therapy there was significant decline of serum cholesterol in group B (p = < 0.05).

The mean serum TAG's level at zero level in group A was 255 ±2.2mg /dl, at level–I 229 ±2.1 mg/dl, and at level –II 197 ±1.9 mg/dl while in group B mean serum TG's at level - 0 was 255 ±2.7 mg/dl, at level –I; 217 ±2.0 mg/dl and at level –II, 177 ±1.8 mg/dl, after completion of three months therapy there was significant decline of serum TG's in group B (p = < 0.05).

The general detail of each group given in table – I, & serum cholesterol and serum TAG's at three different levels were mention in table no: 2 & table no: 03 respectively.

TABLE I: GENERALIZED PARAMETER OF BOTH GROUPS BEFORE START OF RESEARCH STUDY

Parameter	Group A (Control Group)	Group B (Case Study Group)
No: of subjects	80 (60 males & 20 females)	80 (58 males & 22 females)
Age	40 – 60 years	40 – 60 years
BMI (19 -25 kg/m)	26.9 kg/m ²	26.9 kg/m ²
FBS (70 -110 mg/dl)	181 mg/dl	181 mg/dl
HbA1c %(up to 6.5%)	10.8 %	10.8 %
Serum Cholesterol (150 – 200mg/dl)	282 mg/dl	283mg/dl
Serum TAG's (100 – 150 mg/dl)	255 mg/dl	255mg/dl

TABLE II: SERUM CHOLESTEROL LEVEL (MG/DL) AT DIFFERENT LEVEL OF RESEARCH STUDY

Level	Group A	*Group B
Level – 0	282 ± 3.8	283 ± 3.9
Level – I	252 ± 2.9	250 ± 3.5
Level – II	214 ± 3.8	196 ± 4.8*

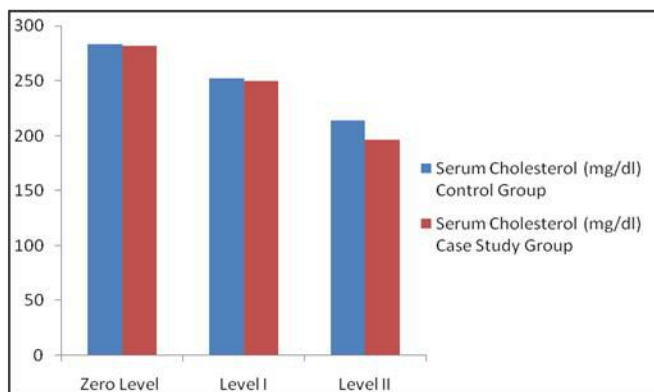
(*shows p value = <0.05)

TABLE III: SERUM TAG'S LEVEL (MG/DL) AT DIFFERENT LEVEL OF RESEARCH STUDY

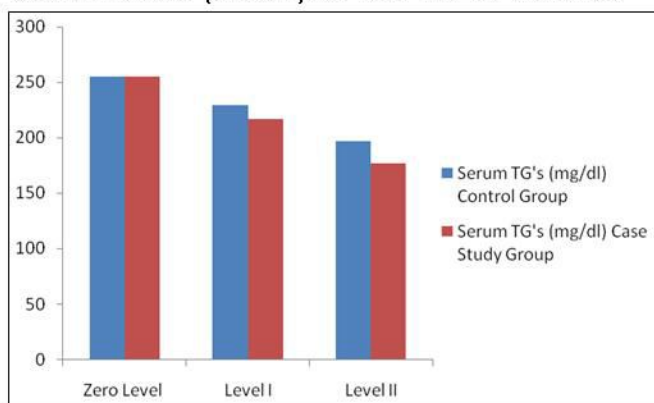
Level	Group A	*Group B
Level – 0	255 ± 2.4	255 ± 2.4
Level – I	229 ± 2.5	217 ± 4.8
Level – II	197 ± 3.1	177 ± 3.2*

(*shows p value = <0.05)

GRAPH I: SERUM CHOLESTEROL LEVEL (MG/DL) AT DIFFERENT LEVELS



GRAPH II: SERUM TAG'S (MG/DL) AT DIFFERENT LEVELS



DISCUSSION

Diabetes mellitus is penetrating health problem and the superiority of diabetes keep growing distinctly due

to getting older population, extended urbanization and extra sedentary existence¹. Many traditional plant life treatments had been encouraged in the opportunity system of medication for remedy of diabetes mellitus and garlic is one instance of herbals used but most of the proof for their beneficial outcomes is circumstantial¹⁰. The current recommendation required that serum cholesterol less than <180–200 mg/dl and serum TG's less than < 150mg/dl¹¹.

Pharmacologically statin group of drugs use for the treatment of dyslipidemia but nowadays nutritional therapies especially phytochemical therapy; flavonoid compounds from natural food items like olive oil, garlic, and pumpkin for treatment of diabetes mellitus, dyslipidemia, cancers, hypertension, obesity etc¹². Olive oil contain monounsaturated fatty acids like Oleic acid which also suppress the key enzyme of cholesterol synthesis that is HMG CoA Reductase, statin drugs also inhibit this enzyme but olive oil also another beauty it contain 0.7% of squalene compound which inhibit the another enzyme of cholesterol synthesis metabolic pathway i.esqualene monooxygenase^{13,14}. Garlic contain sulphur compounds allicin & di-allyl disulphide which also inhibit the key enzyme of cholesterol metabolism and also inhibit synthesis of triglycerides¹⁵.

The current study showing that combination of phytochemical therapy with allopathic treatment have more significant role for reducing serum cholesterol, triglycerides level (p < 0.05) in comparison with only allopathic therapy. Our study also correlates with following studies;

Siddiqi NA, et al⁹ studied on 30 diabetic patient with dyslipidemia they used garlic powder in their study which correlate with our study they concluded that there is significant decline in serum cholesterol and TG's (<0.05).

Abbas Muhammadi et al¹⁶ applied garlic extractions on mice models with hypercholesterolemia & increased level of TG's. Garlic significantly (<0.05) control the alpha LXR receptor to reduce the serum cholesterol & TG's.

Zuhair Maroof Hussien¹⁷ studied on 50 diabetic patients with dyslipidemia, he found significant reduction (<0.05), (0.01) in serum cholesterol & TG's by using 600 mgs garlic powder daily for three months.

Khan TM et al¹⁸ premeditated effects of olive oil on lipid profile in diabetic patients, they studied upon 60 patients, in their study they found that there was significant ($p < 0.05$) reduction in serum cholesterol & TG's levels in patients who used olive oil with statin drugs.

Hence the components of olive oil & garlic having the potent role to control the serum cholesterol and TG's levels.

CONCLUSION

The natural remedies (phyto therapy) have an important role in the treatment of dyslipidemia in type-II diabetic patients, so natural therapies can also takes part in the prevention of complications due dyslipidemia in diabetic population.

Conflict of Interest

There is no any conflict of interest.

REFERENCES

1. Watanabe M, Yokotsuka M, Yamaoka K, Adachi M, Nemoto A, Tango T. Effects of a lifestyle modification programme to reduce the number of risk factors for metabolic syndrome: a randomized controlled trial. *Public Health Nutr.* 2017; 20(1):142-153. doi: 10.1017/S1368980016001920
2. Zheng Y, Ley SH, Hu FB. Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. *Nat Rev Endocrinol* 2018; 14(2): 88-98. doi: 10.1038/nrendo.2017.151.
3. Duarte JS, Bello C, Ferreira R, et al. Atherogenic-dyslipidemia in patients with type 2 diabetes linked to microvascular complications and heart disease. *Atherosclerosis J.* 2017; 263: e265. DOI: <https://doi.org/10.1016/j.atherosclerosis.2017.06.858>
4. Chait A, Goldberg I. Treatment of Dyslipidemia in Diabetes: Recent Advances and Remaining Questions. *Curr Diab Rep* 2017; 17(11):112. doi: 10.1007/s11892-017-0942-8.
5. Covas MI, Nyssönen K, Poulsen HE, et al. The effect of polyphenols in olive oil on heart disease risk factors: a randomized trial. *Ann Intern Med* 2006; 145(5):333-41.
6. Pérez-Martínez P, García-Ríos A, Delgado-Lista J, et al. Mediterranean diet rich in olive oil and obesity, metabolic syndrome and diabetes mellitus. *Curr Pharm Des* 2011; 17(8):769-777.
7. Rodríguez-Morató J, Xicota L, Fitó M, et al. Potential role of olive oil phenolic compounds in the prevention of neurodegenerative diseases. *Molecules* 2015; 20(3):4655-80.
8. Odebunmi EO, Oluwaniyi OO, Bashiru MO. Comparative proximate analysis of some food condiments. *J Appl Sci Res* 2010; 6(3):272-74.
9. Siddiqui NA, Haider S, Rehman MM, Perveen T. Role of herbel formulation of garlc on lipid profile in the patients of type –II diabetes mellitus related dyslipidemia. *Pak Heart J.* 2016; 49(4):146 -150
10. Rajput DS, Dash DK, Sahu AK, Mishra K, Kashyap P, Mishra SP. Brief update on Indian herbs and spices used for diabetes in rural area of Chhattisgarh. *IJPCA* 2017; 4(1):1-4.
11. Saedisomeolia A, Taheri E, Djalali M, Moghadam AM, Qorbani M. "Association between serum level of vitamin D and lipid profiles in type 2 diabetic patients in Iran". *J Diabetes Metab Disord* 2014; 13:7. doi: 10.1186/2251-6581-13-7
12. Shahidi F, Ambigaipalan P. Phenolics and polyphenolics in foods, beverages and spices: Antioxidant activity and health effects—A review. *J Funct Foods* 2015; 18(part B):820-897. Doi:<https://doi.org/10.1016/j.jff.2015.06.018>
13. Tripoli E, Giammanco M, Tabacchi G, et al. The phenolic compounds of olive oil: structure, biological activity and beneficial effects on human health. *Nutr Res Rev* 2005; 18(1):98-112. doi: 10.1079/NRR200495.
14. Bulotta S, Celano M, Lepore SM, Montalcini T, Pujia A, Russo D. Beneficial effects of the olive oil phenolic components oleuropein and hydroxytyrosol: focus on protection against cardiovascular and metabolic diseases. *J Transl Med* 2014; 12(1):219. doi: 10.1186/s12967-014-0219-9.
15. Rochlani Y, Pothineni NV, Kovelamudi S, Mehta JL. Metabolic syndrome: pathophysiology, management, and modulation by natural compounds. *Ther Adv Cardiovasc Dis.* 2017; 11(8):215-25. doi: 10.1177/1753944717711379.
16. Mohammadi A, Oshaghi EA. Effect of garlic on lipid profile and expression of LXR alpha in intestine and liver of hypercholesterolemic mice. *J Diabetes Metab Dis* 2014;13(1):20. doi: 10.1186/2251-6581-13-20

17. Hussien ZM. Effect of Garlic on Dyslipidemic Patients with Diabetes Mellitus Type – 2. DJM 2014; 6(1): 100-104.
18. Khan TM, Iqbal S, Rashid MA. Comparison of lipid

lowering effect of extra virgin olive oil and Atorvastatin in Dyslipidemia in type 2 diabetes mellitus. J Ayub Med Coll Abbottabad. 2017; 29 (1):83-86.



AUTHOR AFFILIATION:

Dr. Ali Raza Memon (*Corresponding Author*)

Assistant Professor, Department of Biochemistry
Liaquat University of Medical & Health Sciences,
(LUMHS), Jamshoro, Sindh-Pakistan.

Email: ali.bio.lumhs@gmail.com
raza.memon@lumhs.edu.pk

Prof. Allah Bux Ghanghro

Director Institute of Biochemistry
Sindh University Jamshoro, Sindh-Pakistan.

Prof. Imran Ali Shaikh

Department of Medicine
LUMHS, Jamshoro, Sindh-Pakistan.

Prof. Nasreen Qazi

Department of Pharmacology
LUMHS, Jamshoro, Sindh-Pakistan.

Mr. Irshad Hussain Ghanghro

Water testing & Surveillance Laboratory
Department of Community Medicine
LUMHS, Jamshoro, Sindh-Pakistan.

Dr. Umair Shaikh

Medical Officer
LUMHS Hospital Jamshoro, Sindh-Pakistan.