ORIGINAL ARTICLE

EFFECTS OF OLIVE OIL ON LIPID PROFILE IN HYPERLIPIDAEMIC PATIENTS

Syed Neyaz Hasan[1], Deepankar Singh[1], Salman Shafi Siddiqui[1], Megha Kulshreshtha[1], Tanu Aggarwal[1]

Authors' Affiliation: [1]Muzaffarnagar Medical College; Muzaffarnagar, Uttar Pradesh
Correspondence: Dr. Syed Neyaz Hasan, Email: dr_neyaz@yahoo.com

ABSTRACT

Introduction: Hyperlipidaemia is a major risk factor for cardiovascular diseases and may be associated with metabolic syndrome. Olive oil contains monounsaturated fatty acids (MUFA) and various phytochemicals which have beneficial role in hyperlipidaemia.

Objective - The present study was conducted to explore the antihyperlipidaemic effect of olive oil.

Methods -We studied 60 hyperlipidaemic male subjects between 40 to 55 yrs of age who were divided into study (n=30) and control groups (n=30). The duration of this study was 6 weeks during which both the groups were allowed to take routine diet and study group was given additional 30 ml of olive oil per day.

Result - After 6 weeks, study group showed a significant fall in triglycerides, LDL and total cholesterol while a significant rise in HDL was recorded.

Conclusion- Thus, use of olive oil improved the serum lipid profile.

Key words: Olive oil, Lipid profile, MUFA, Hyperlipidaemia.

INTRODUCTION

Cardiovascular diseases, now a days are major cause of mortality and morbidity. It kills an estimated 17 million people worldwide each year[1]. Majority of these are due to heart attacks and strokes. Various factors are responsible as physical inactivity, unhealthy diet, tobacco consumption and smoking remain the largest risk factors for cardiovascular diseases worldwide. The main pathology behind strokes is formation of atheromatous plaque and hyperlipidaemia is one of the major causes for atherogenesis. Serum lipid abnormalities are major risk factors for noncomunicable disease [2]. Various studies have been conducted to evaluate the beneficial effects of olive oil. Many researchers have promoted its use. Homer said it liquid gold and Hippocrates referred it as of great therapeutic.

Saturated fatty acids are main culprit for hyperlipidaemia whereas unsaturated fatty acids are known as good fats. Olive oil is known for its high levels of monounsaturated fatty acids (MUFA) and it is a good source of phytochemicals, such as polyphenolic compounds, squalene and α-tocopherol. The objective of this study was to find out the beneficial effects of olive oil in hyperlipidaemia. As per India's Food safety and Standard Regulations, there are 3 types of olive oils—VOO, Refined, and olive-pomace oil

Virgin olive oil (VOO): the oil extracted from olives using purely mechanical means, under conditions that do not alter the oil.

Refined Olive oil: the oil refined from the virgin olive oil using methods that do not alter the fatty acid structure of the oil. Olive-Pomace oil: the obtained by treating olive pomace with solvents. Different studies have shown the various effects of olive oil on blood glucose and lipid profile.

A study was conducted on dietary olive oil and reported that olive oil was associated with significantly raised plasma concentration of low--density lipoprotein cholesterol (LDL), high-density lipoprotein cholesterol (HDL) [3]. Another study reported that dietary intervention with olive oil in comparison with alternative vegetable oils increased triacylglycerols (TAG)[4].

Although, in a recent study in obese subjects, a dietary treatment with olive oil indicated that LDL cholesterol and TAG were reduced [5]. Results from different studies on the effect of olive oil consumption on lipid profile are inconsistent. Hence, the objective of this study was to investigate the effect of olive oil on serum lipids in hyperlipidemic patients.

MATERIAL & METHODS

This study was conducted in Muzaffarnagar Medical College and Hospital, Muzaffarnagar to assess the beneficial effects of olive oil on lipid profile in hyperlipidaemic subjects.

Sample and Matching: Total 60 male subjects participated voluntarily in this study. They were randomly divided into control (n=30) and study (n=30) groups.

Both groups were demographically matched. All Subjects were explained about aims, objectives and methodology. Written consent was taken from all the subjects. The approval of human ethical committee was taken.

Inclusion criteria: Hyperlipidaemic male patients of age group between 40-55 yrs were included in this study who had at least one of parameters of blood lipid indices including TC ≥250, HDL ≤30, LDL ≥150 and TAG ≥150 mg/dL with normal blood pressure.

Exclusion criteria: The Females and patients suffering from any Cardiovascular disease, thyroid disease, respiratory disease, diabetes and subjects taking lipid lowering drugs or steroid therapy, were excluded from this study.

Blood samples were obtained after an overnight (12 hours) fasting period before the study and in the last day of the intervention period. Lipid profile were measured by commercially available kits viz. triglycerides, total cholesterol and HDL were measured by Coral-GPO-PAP method end point, Erba-CHOD-PAP method end point and Erba-Phophotungstic Acid method end point respectively. Study group was given 15 ml of olive oil in morning and 15 ml in evening for a period of 6 weeks with their regular diet while control group was given the same regular diet with no olive oil. They were allowed to do their routine work as usual.

For our study we used Colavita Virgin Olive oil of Colavita company (Italy), 15 ml of which contains following nutritional values: energy – 120 Kcal; total fat – 14 gr; saturated fat – 2 gr; polyunsaturated fat -1 gr; monounsaturated fat – 11 gr; and cholesterol, carbohydrates, Na, K – nil.

The collected data were analyzed by student t test and values expressed as mean ± SD. The age, weight, heights were compared between the study and control groups shown in table 1.

OBSERVATION & RESULT

Demographic profile of study group and control group is shown in table 1. Age, weight and height wise both the group are comparable, no significant difference is observed.

Table 1: Demographic distribution between study and control groups

Characteristics	Study group Mean ± SD	Control group Mean ± SD	p value
Participants (n)	30	30	
Age (yrs)	48.21 ± 5.14	49.78 ± 3.13*	> 0.05
Weight (kgs)	90.13± 15.22	88.45 ± 14.74*	> 0.05
Height (cms)	170.55 ± 5.45	168.42 ± 4.57*	> 0.05

*p value > 0.05 (non significant)

It was found that there was significant improvement in all the lipid parameters as compare to control group as seen in the table 2.

Table 2: Serum lipid profile in study and control groups

Parameters	Study group(n=30): mean ± sd		Control group(n=30): mean ± sd	
	Before	After	Before	After
TAG (mg/dl)	210.42 ± 31.34	152.21 ± 20.79*	215.35±55.49	220.49±53.67**
LDL (mg/dl)	190±35.12	160.32 ± 21.34*	195.22 ± 25.25	189.54 ± 31.46**
HDL (mg/dl)	32.24 ± 4.21	45.72 ± 6.32*	33.68 ± 5.47	35.25 ± 4.25**
TC (mg/dl)	250.20 ± 42.22	198.42 ± 52.29*	245.56 ±34.29	249.37 ± 36.35**

* significant changes; ** not significant changes

DISCUSSION

This study was conducted among hyperlipidaemic subjects with the objective to evaluate the antihyperlipidaemic effects of olive oil. This study revealed the significant improvement in lipid profile by using olive oil. Various epidemiological studies have reported the role of olive oil in health benefits. Olive oil is an important source of fat in the Mediterranean diet and have a beneficial role in coronary artery disease [6]. Virgin olive oil contains many phytochemicals (natural plant chemicals), vitamins, antioxidants and polyphenols that have been clinically proven to be good health in several ways. A study in spain has established a connection between better emotional health and intake

of olive oil. It was also reported in a study that olive oil with fish oil supplement decreased the oxidative changes in LDL [7].

Covas MI [8] revealed in their study that consumption of olive oil reduces the risk of cardiovascular diseases.

It is a well known fact that Cardiovascular disease can be avoided or delayed by using unsaturated fatty acids and olive oil is a best source of mono-unsaturated fatty acids.

Another study depicted that the consumption of two tablespoons of olive oil, for six weeks, significantly lowered the concentration of LDL cholesterol [9]. Oxidized LDL appears to play an important role in

atherogenesis[10]. MUFA and various phytochemicals present in olive oil, generate LDL particles which appear to be more resistant to oxidation[11] .The reduction of oxidative effect, thrombogenicity and the formation of plaque can explain the preventive effects of olive oil on atherosclerosis development [12] .

Mostafa Noroozi [13] in 2012 conducted a study to see Effect of Olive Oil with Low Calorie Diet on Blood Lipids in Hyperlipidemic Patients and revealed the beneficial effects of olive oil. They reported a significant fall in LDL and total cholesterol while a significant rise in HDL

Another study revealed the beneficial effects of olive oil on blood glucose and lipid parameters in NIDDM patients and reported a significant fall in blood glucose and LDL and total cholesterol [14] .

Olive oil has been proven clinically to have beneficial effects on cardiovascular system ought to presence of various phytochemicals and MUFA.

REFERENCES

1. WHO.int/cardiovascular_diseases/en/cvd and Australian diabetes council (29 sep 13).

2. Naghavi M., et al.. From vulnerable plaque to vulnerable patient-Part III: Executive summary of the Screening for Heart Attack Prevention and Education (SHAPE) Task Force report. Am. J. Cardiol., 2007, 99, 1481–1482.

3. Jespersen L., Jakobsen M.U., Hasseldam H., Marckmann P., The effect of dietary oils on blood lipids and the risk of ischemic heart disease with special emphasis on olive oils. Ugeskr Laeger., 2001, 163, 4736–4740.

4. Rueda-Clausen C.F., Silva F.A., Lindarte M.A., Villa-Roel C., Gomez E., Gutierrez R., Cure-Cure C., Lopez-Jaramillo P., Olive, soybean and palm oils intake have a similar acute detrimental effect over the endothelial function in healthy young subjects. Nutr. Metab. Cardiovasc. Dis., 2007, 17, 50–57.

5. Perez-Guisado J., Munoz-Serrano A., Alonso-Moraga A., Spanish Ketogenic Mediterranean Diet, a healthy cardiovascular diet for weight loss. Nutr. J., 2008, 26, 30–31.

6. Psaltopoulou T., Naska A., Orfanos P., Trichopoulos D., Mountokaakis T., Trichopoulou A., Olive oil, the Mediterranean diet, and arterial blood pressure: the Greek European Prospective Investigation into Cancer and Nutrition.

7. Ramírez-Tortosa MC, Suárez A, Gómez MC, Mir A, Ros E, Mataix J, Gil A Clin Nutr. 1999 Jun;18(3):167-74.

8. Covas M.I., Olive oil and the cardiovascular system. Pharmacol. Res., 2007, 55, 175–186.

9. Haban P., Klvanova J., Zidekova E., Nagyova A., Dietary supplementation with olive oil leads to improved lipoprotein spectrum and lower n-6 PUFAs in elderly subjects. Med. Sci. Monit., 2004, 10, 149–154.

10. Lapointe A., Couillard C., Lemieux S., Effects of dietary factors on oxidation of low-density lipoprotein particles. J. Nutr. Biochem.,2006, 17, 645–658

11. Gimeno E., de la Torre-Carbot K., Lamuela-Raventós R.M., Castellote A.I., Fitó M., de la Torre R., Covas M.I., López-Sabater M.C., Changes in the phenolic content of low density lipoprotein after olive oil consumption in men. A randomized crossover controlled trial. Brit. J. Nutr., 2007, 98, 1243–1250.

12. Cullinen K., Olive oil in the treatment of hypercholesterolemia. Med. Health R. I., 2006, 89, 113.

13. Martinez-Gonzalez M.A., Sanchez-Villegas A., The emerging role of Mediterranean diets in cardiovascular epidemiology: monounsaturated fats, olive oil, red wine or the whole pattern? Eur. J. Epidemiol., 2004, 19, 9–13.

14. Abdul Rahim Al Jamal and Abdallah Ibrahim Int J Diabetes & Metab (2011) 19:19-22