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HYPOGLYCEMIC EFFECT OF OLIVE OIL ON PATIENTS AND HEALTHY INDIVIDUALS IN JORDAN

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ABSTRACT

Dyslipidemia and DM are groups of metabolic disorders which constitute major health problems worldwide. EVOO has been used in a folk medicine to treat diabetes, which have a potent effect in decreasing glucose level, triglyceride, cholesterol, LDL, and increased HDL, which studied previously.

EVOO lowered glucose level in diabetic patient and healthy people (Covas, 2007). Several studies revealed the importance of EVOO to manage the blood glucose level in diabetes type 2 patients, which may be due to the effect of its phenolic bioactive compounds such as: oleuropein, hydroxytyrosol, tyrosol, tocopherol…etc, these compounds have antioxidant activity, and give protection against metabolic diseases associated with oxidative stress such as diabetes. EVOO has not found in other plant oils, hasantioxidative properties of these compounds, olive oil might diminish the production of advanced glycosylated end products such as HbA1c

Phenolic compounds that are present in olive oil are commonly associated with increased levels of HDL-cholesterol and in improvements in endothelial function. Additionally, polyphenolic

compounds, including the phenolic acids, flavonoids, resveratrol and proanthocyanidins, might affect glucose metabolism via an inhibition of carbohydrate absorption and digestion, a reduction of glucose release from the liver or a stimulation of glucose uptake in peripheral tissues effect of EVOO improved blood levels of LDL

EVOO increased HDL in patient and healthypeople with higher total phenols . HDL levels have been inversely related to risk of coronary heart disease. The blood level of HDL is primarily determined by genetics

Daily use of at least 10ml/75kg of EVOO can improve the lipid profile with decreases in LDL and increasing in HDL, the use of EVOO will improve fasting and postprandial lipids by decreasing lipid oxidation and providing phenols (especially oleuropein) that work as general antioxidants. The health benefits of EVOO are strongly related to phenol content, with the monounsaturated fat content providing a much less significant role.

Keywords: Dyslipidemia; metabolic disorders; EVOO, LDL, HDL

INTRODUCTION

Diabetes mellitus (DM) is a group of diseases manifested with high and uncontrolled blood glucose levels negatively affect the body's ability to produce insulin or impair its function in the body. This condition gives avascular damage (retinopathy, nephropathy and neuropathy) caused by chronic diabetes. Which makes life expectancy short, significant morbidity due to specific diabetes related microvascular complications lead to increased risk of macrovascular complications (e.g. ischemic heart disease, stroke and peripheral vascular disease), ultimately diminishing quality of life . The development of DM could be as a result of several pathogenic processes. These processes destroy the Beta cells of the pancreas with consequent insulin deficiency; on another hand there will be resistance to insulin action. The abnormalities of carbohydrate, lipids and protein metabolism are due to poor action of insulin on target tissues due to insensitivity or lack of insulin. Symptoms of DM may present the following characteristics such as polydipsia, polyphagia, polyuria, and weight loss. Usually these symptoms are not severe, or may be absent. Dyslipidemia is a disorder in lipid metabolism that is associated with enhanced oxidative stress related to increased lipid peroxidation. Characterized by an elevation of serum levels of total cholesterol, triglyceride, and LDL cholesterol, along with maintaining low serum levels of HDL

cholesterol. While hyperlipidemia can be also defined as an elevation of fasting total cholesterol concentric.

EVOO has been used to treat a diabetes, which have a potent effects in decreasing glucose level, triglyceride, cholesterol, LDL, and increased HDL, which studied previously EVOO lowered glucose level in diabetic patient and healthy people .

Several studies revealed the importance of EVOO to manage the blood glucose level in diabetes type 2patients, which may be due to the effect of its phenolic bioactive compounds such as: oleuropein, hydroxytyrosol, tyrosol, tocopherol…etc, these compounds have antioxidant activity, and give protection against metabolic diseases associated with oxidative stress such as diabetes and this may or may not be associated with elevated TG concentration.

RESULTS

Dyslipidemia and DM are groups of metabolic disorders which constitute major health problems worldwide. According to the market surveys, drugs used for the management of these chronic disorders have the highest sales. Beside the genetic predisposition of the affected individual, diet and exercise constitute major factors that increase the risk of getting metabolic disorders including DM and dyslipidemia. With particular concern, especially to diet and junk food, people who are getting vegetables and fruits in regular bases have decrease incidence of dyslipidemia and DM consequences and they have better health compared to those who rely on junk food as their primary source of diet. EVOO has been used in a folk medicine to treat diabetes, which have a potent effect in decreasing glucose level, triglyceride, cholesterol, LDL, and increased HDL, which studied previously. In our study, we aimed to know the effect of EVOO on glucose, lipid profile and lipoproteins (LDL, HDL) levels.

This study has been conducted to primarily evaluate the biological activities as hypoglycemic and lipid lowering of EVOO on patients which dyslipidemia and DM in Jordan. The study was designed as a case control study with small population number including 12 individuals in each group who are eligibly asked to get sufficient quantities of olive oil in their main menu for a period of one month. The studied individuals were then screened for vital biochemical parameters related to dyslipidemia including TG, Cholesterol and lipoprotein levels in addition to the glucose and glycated hemoglobin as markers for monitoring of DM. Moreover, hepato-protective effects were also evaluated

after ingestion of EVOO where major liver enzymes were followed up in this study.

In the present review ingesting EVOO daily for a period of one-month lead to significant reduction of lipid profile and glucose levels in both patients and healthy individuals. The lipid profile especially cholesterol, was significantly decreased in both groups usually after 2 weeks of taking EVOO. Several studies showed that EVOO ingestion is usually associated with lower risks of developing dyslipidemia and complications of DM.

Table 1: Classification of Lipoproteins and their contents

	CLASSES OF LIPOPROTEINS	
1	Chylomicrons	Triglyceride rich carrier of dietary fats
2	Very Low Density Lipoprotein (VLDL)	Triglyceride rich carrier of hepatic synthesized triglycerides (TG)
3	Intermediate Density Lipoprotein (IDL)	Cholesterol rich remnant particles derived from lipolysis of triglycerides in VLDL
4	Low Density Lipoprotein (LDL)	
5	High Density Lipoprotein (HDL)	Cholesterol rich particle that transports cholesterol to liver for disposal or recycling

Table 2: The Secondary causes of Dyslipidemia and their resulted Lipid Abnormalities

DISORD ER	Lipid abnormalities
Diabetes mellitus	↑ TG and ↓ HDL cholesterol
Nephritic syndrome, Cholestasis and Hypothyroidism	↑ TC
Alcohol abuse & Pregnancy	↑ TG
DRUGS	**Lipid abnormalities**
Diuretics, steroid, amiodarone, protease inhibitors, cyclosporine, and contraceptives	↑ TG and/or TC, ↓ HDL cholesterol

DISCUSSION

researchers showed that EVOO lowered glucose level in diabetic patient and healthy people .Several studies revealed the importance of EVOO to manage the blood glucose level in diabetes type 2 patients, which may be due to the effect of its phenolic bioactive compounds such as: oleuropein, hydroxytyrosol, tyrosol, tocopherol…etc, these compounds have antioxidant activity, and give protection against metabolic diseases associated with oxidative stress such as diabetes. This might be due to the high content of unsaturated fat and, particularly of monounsaturated fatty acids (MUFAs) mainly, theoleic acid in olive oil. In addition, another study indicated that there are some components of EVOO have not found in other plant oils, hasantioxidative properties of these compounds, olive oil might diminish the production of advanced glycosylated end products such as HbA1c.

Phenolic compounds that are present in olive oil are commonly associated with increased

levels of HDL-cholesterol and in improvements in endothelial function .Additionally, polyphenolic compounds, including the phenolic acids, flavonoids, resveratrol and proanthocyanidins, might affect glucose metabolism via an inhibition of carbohydrate absorption and digestion, a reduction of glucose release from the liver or a stimulation of glucose uptake in peripheral tissues

Using HbAIC as an indicator for hypoglycemic effects of EVOO on DM patients was clinically and diagnostically not reliable where the results failed to show statistically significance for both groups. This is thought to be related to the short period of conducting the study since HbA1C usually needs more time to be correctly evaluated.

Thus, daily use of at least 10 ml/75kg of EVOO for a minimum one month LDL decreased from 181 to 74and 102 to 60 for both patients and healthy respectively. Consuming more EVOO per day with a higher total phenol content could lead to similar or greater LDL reductions in a shorter time period. LDL has been the lipoprotein most researched since the 1980s, primarily because LDL is the lipoprotein with the highest cholesterol content. For this reason, when TC is elevated, LDL is also frequently elevated. The majority of the dietary studies have focused on the effect of saturated fat on LDL levels. Relatively few studies have assessed the effect of EVOO on LDL levels, but this study indicated that EVOO improved blood levels of LDL.

EVOO increased HDL in patient and healthy people; EVOO is the only food known to independently increase HDL. Consumption of EVOO at a minimum of 10 ml/75kg) daily increased HDL in as little as 7 days. EVOO with higher total phenols should result in greater HDL increases. HDL levels have been inversely related to risk of coronary heart disease. The blood level of HDL is primarily determined by genetics(Meiliana and Wijaya, 2014). However, diets will influence HDL levels and HDL is typically more diet-sensitive than LDL. HDL levels are inversely related to fasting triglycerides. Diets that are lower in fat and higher in carbohydrate will result in an increase HDL compared to a lower-fat diet; the inclusion of EVOO seems to lead to an independent increase in HDL. The present study is designed on 24 individuals who consumed 10 ml/75kg daily of EVOO for one month led to an increase HDL.

The presented study showed reductions in TC after one month of 10ml/75kg EVOO. There was a significant increase in HDL

,Thus, Daily use of at least 10ml/75kg of EVOO can improve the lipid profile with decreases in LDL and increasing in HDL, the use of EVOO will improve fasting and postprandial lipids by decreasing lipid oxidation and providing phenols (especially oleuropein) that work as general antioxidants. The health benefits of EVOO are strongly related to phenol content, with the monounsaturated fat content providing a much less significant role. EVOO is the only oil that is high both in monounsaturated fat and phenol content, and comparable health benefits would not be provided by other oils or foods. Unfortunately, EVOO labels often do not usually reveal phenolic content, phenols diminish with time, and studies have shown that a high percentage of oils sold as EVOO was not fresh.

Some strategies for improving one's chances of obtaining a quality EVOO include selecting oils with a harvest date from the most recent season as well as choosing containers that protect the oil from light.

CONCLUSION

EVOO is a good natural product that was considered as a complementary alternative medication (CAM) for the management of diabetes mellitus and dyslipidemia.

In the present study EVOO had the ability to lower blood glucose levels in diabetic patients, as the study showed that EVOO reduced the serum blood glucose levels, as well as the serum lipid profile including Triglyceride, cholesterol, and lipoproteins (HDL, LDL and VLDL)

Thus, EVOO can be potentially highlighted as an alternative therapy for the management of hyperglycemia associated with type 2 diabetes mellitus, and for dyslipidemia

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