# Indian Journal of Nutrition



Volume 9, Issue 2 - 2022 © Nisha, et al. 2022 www.opensciencepublications.com

## **Therapeutic Effects of Olive Leaves**

### **Review Article**

Nisha and Pareek N\*

Department of Home Science (Food & Nutrition), Banasthali Vidyapith, Rajasthan, India

\***Corresponding author:** Pareek N, Department of Home Science (Food & Nutrition), Banasthali Vidyapith, Rajasthan, India; E-mail: navitahp@gmail.com

Article Information: Submission: 17/04/2022; Accepted: 23/05/2022; Published: 27/05/2022

**Copyright:** © 2022 Nisha, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### Abstract

Since ancient times, olive leaves have been used as a remedy for many diseases, mainly found in Mediterranean region. Various phenolic compounds present in it, which are responsible for therapeutic properties. In this review paper, we are trying to collect various health benefits which can be applied in different health conditions.

#### **Olive Leaves**

Olive leaves are first used medicinally in Ancient Egypt and were a symbol of divine power. It is used as a traditional medicine for the treatment of diabetes from centuries. Medicinal properties of olive leaves such as antioxidant, antimicrobial, hypoglycemic, antihypertensive, and anti-atherosclerotic effects are due to oleuropein content present in olive leaves [1]. Plenty of "Oleuropein" (phenolic compound) is found in olive leaves [2]. Phenolic compounds present in olive leaves are accountable for anti-oxidation stability. Oleuropein is the most important biphenol in olive leaf apart from all the phenolic constituents. Another important natural antioxidant i.e. hydroxytyrosol is produced by oleuropein. Due to its natural antioxidant property, it is used in many medical conditions. By decreasing lipid peroxidation in coronary dilation, it protects cells and organisms. It enhances lipid metabolism to overcome obesity problems. In olive oil industries, olive leaves are found in huge amounts as by-products. So, Olive leaves are deliberated as low-cost natural resource which can be used as good source of value-added products [3].

Salah and others conducted research on diabetic rats. Rats were made diabetic by introducing alloxan (120 mg/kg body weight ip) for 21 days. There were three groups of rats, in which first group was normal healthy control (n=6), second group was diabetic control (n=6) and third was diabetic rats (n=6), which were given olive leaves extract (100 mg/kg body weight). Blood glucose and triglycerides level of three groups were measured and at the end of the study. There was significant reduction in blood sugar and triglycerides were observed [4].

Carnevale and others conducted research on 20 healthy subjects who were divided into two groups, one of which took 20 mg of oleuropein and the other was the placebo. The measurements resulted in a noticeable decrease in the level of glucose in the blood and significant increase in insulin compared to the placebo group [5].

#### Therapeutic effects of olive leaves

#### Antihyperglycaemic agent

Antihyperglycemic activity of olive leaves shows its ability to reduce blood sugar. Olive leaves have potentiation of insulin release and enhanced peripheral uptake of glucose [6]. There are various animal studies have been done in which olive leaves were experimented to know the hypoglycemic activity. In alloxan- induced diabetic rabbits, oleuropein has been supplemented to reduce oxidative stress and hyperglycemia. Rabbits with diabetes have been fed with powdered olive leaves (500 gm) with 75% ethanol extract to decrease their blood sugar [7].

Oral administration of olive leaf extracts to diabetic and normal rats resulted in decreased blood sugar and triglycerides. 0.1, 0.25 and 0.5 g / kg body weight olive leaves extract were given for 14 days and compared with the rats that were not receiving olive leaves extract, found a reduction in blood sugar and triglycerides in rats receiving olive leaves extract [8].

Elsaid and others conducted research on adult male albino rats, weighing 220-250 g, were classified into five groups, with five rats in each group. The Control group included normal healthy rats and

#### INDIAN JOURNAL OF NUTRITION

was received normal chow diet which includes soybean meal, ground corn, fish meal, animal byproducts and water with no treatment for 4 weeks. Experimental group was diabetic rats, were injected with steptozotocin at a dose of 40 mg/kg body weight. Under, Diabetic and olive extract group, diabetic rats, were orally administered with watery extract of olive leaves ata dose of 250 mg/ kg body weight. Theresults showed a decrease in blood sugar level, which showed the hypoglycemicaction of olive leaves [9].

#### Hypolipaedemic activity

Hypolipaedemic activity can be described as the process of reducing bad cholesterol and enhancing the good cholesterol in the body.

Olive leaves having antioxidant activities, were examined by a series of experiments. Lipid-lowering and the antioxidative activities of oleuropein were tested in pigs (N=24) for 8 days. There were three groups of pigs - one is control group fed only conventional diet and another two group's fed conventional diet supplemented 50 g/kg and 100 g/kg olive leaves. Olive leaves supplementation resulted in lowering the triacylglycerol level, lower body mass and storage of fat [10].

Laabondi and others concluded that olive tree extract is beneficial in reducing blood sugar and other related parameters. They induce diabetes in rats by injecting streptozotocin (55 mg/kg body weight) and rats were given 5% glucose in the drinking water for three days. The injected rats were used for the experiment after 72 hours. After 28 days of treatment, there was a significant effect ofolive tree extract on diabetic rats. There were four groups - Control rats, Diabetic rats, diabeticrats + glibenclamide, Diabeticrats +OTE (1gkg-1). Effect of olive leaf extract on total cholesterol, triglycerides, high - density lipoprotein, and low-density lipoproteins cholesterol in normal rats after 4 weeks of daily administration showed significant decrease [11].

#### Antihypertensive effects

Antihypertensive effects are an important property i.e. reducing blood pressure. Olive leaves are beneficial in controlling hypertension. Various researches have been done to prove the antihypertensive effect of olive leaves.

Lockyer and others conducted a randomized, controlled trial on pre-hypertensive volunteers, showed significantly lower blood pressure, after taking 136 mg oleuropein and 6 mg hydroxytyrosol enriched olive leaf extract for six weeks [12].

Susalit and their coworkers conducted trial on patients of stage I hypertension with daily dose of  $2 \times 500$  mg of olive leaf extract (prepared was 16-24%), out of which batch used was 19.9%(m/m) of oleuropein for four weeks, lowered systolic and diastolic BP with an effect comparable to that exerted by an effective dose (12.5-25 mg twice daily) of captopril [13].

Stevens and others concluded the positive effects of olive leaves extract on high blood pressure and dyslipidemia. 77 healthy adult overweight or obese subjects were randomly selected and received 500 mg of olive leaves extract for 8 weeks.Olive leaves supplementation did not significantly affect blood lipid levels after 4 weeks or after 8 weeks compared to the control group who did not receive olive leaves extract [14].

#### Cardioprotective effects

Cardioprotective means the mechanism which includes all the preservation of the heart by reducing or prevent in myocardial infarction. Several studies have revealed that olive leaves possess an extensive range of health-promoting properties including immune-stimulant, cardioprotective, hypotensive properties [15]. The causative factor behind the above mentioned properties are "oleuropein". Oleuropein has been reported to decrease the oxidation of LDL cholesterol. Mostly arterial tissues are damaged by oxidized LDL Cholesterol, there by promoting atherosclerosis [16].

Coni et al. (2000) found that the addition of oleuropein in the diet increased the ability of LDL to resist oxidation. They prepared three different diets, a standard diet for rabbits (diet A), a standard diet for rabbits modified by the addition of 10% (w/w) extra virgin oil (diet B), a modified standard diet for rabbits (diet C) differing from diet B only in the addition of 7 mg kg-1 of oleuropein [17].

#### Anti-inflammatoryactivities

Anti-inflammatory activity is the property of the material or substance necessary to reduce swelling or inflammation. Laabondi and others conducted research to show the anti-inflammatory and analgesic activities of olive tree extract. They did an experiment on male adult Wistar rats (120- 180g) and Swiss albino mice (20-25g) of both sexes were obtained from the animal breeding from the unit Faculty of Science Dhar El Mahraz-Fez-Morocco. The animals were maintained under controlled conditions of temperature (22±2degree Celsius) with a 12 hour light- dark cycle. Different doses of olive tree extract were given to the mice i.e. 100 mg kg-1, 250 mg kg-1, 500 mg kg-1, 1000mg kg-1 .There were the significant effect of olive tree extract as anti-inflammatory and anti-analgesic power of olive tree extract [18].

#### Antimicrobial activities

Antimicrobial activity against several microorganisms such as bacteria, fungi, mold and other parasites are caused due to the oleuropein content of olive leaves. A variety of antibacterial actions of oleuropein and its associated compounds have been demonstrated. The component usually associated with olive leaf antimicrobial properties is oleuropein.

Olive leaves are known to resist insect and microbial attack. Several *in vitro* studies have been conducted to identify the range of activities of olive leaf extracts. Olive leaf extract contains some special compounds called flavonoids, which possess anti-inflammatory abilities. Oleuropein is able to work against microorganisms. From research and clinical experiences, it can be said that supplemental olive leaf may be beneficial in the treatment for conditions caused by, or associated with, a virus, retrovirus, bacterium, orprotozoan. Olives which are unheated are brined to preserve, in which oleuropein is converted into elenolic acid in the body which may prevent viruses and bacteria from replicating [19].

Microencapsulated methanolic olive leaf extract incorporated

#### INDIAN JOURNAL OF NUTRITION

into tomato paste to get benefit from antimicrobial properties against *Aspergillus flavus* over short time (*i.e.* upto 4 days) and long-time (*i.e.* upto 10 days) storage [20].

Liu and others (2017) found the antimicrobial effect of olive leaf extract, which was ethanolic worked against major foodborne pathogens, including *Escherichia coli*, *Listeria monocytogenes*, and *Salmonella enteritidis*, and demonstrated a sufficient concentration of ethanolic extract (oleuropein and vabascoside) for almost complete inhibition of growth of these three pathogens [21].

#### **Anticancer effects**

Cancer has been a main cause of mortality in the past century and finding a definite cure for different types of it, a challenge for medicine. To treat cancer, medicines are made from toxic compounds, which are not able to discriminate between normal and cancerous cells, causing fatal side effects. According to various epidemiological studies, the incidence of cancer in Mediterranean region is thought to be the lowest. Polyphenols act as important cancer-preventing agents. Oleuropein is considered an important component having various health benefits. Now-a- days, Oleuropein is investigated for its anticancer effects. The anticancer effect of olive leaves is mainly due to the antioxidant qualities.

Antioxidant activity of olive leaves extracts leads to an inhibitory effect on cancer and endothelial cells proliferation. According to their study, it was concluded that oleuropein acts as an active component in inhibiting cancerous cells in human breast cancer, urinary bladder carcinoma. Rate of malignancies and carcinogenic activity is dependent on cell mutations [22]. Hamdi and others found oleuropein as an antitumor agent. A lot of important findings were obtained. The study was done both in vitro and in vivo. The influence of oleuropein was assessed in vitro on the cell proliferation of normal mice cells and cells derived from tumors and positive results were found [23].

#### Conclusion

Olive leaves have been used for a long time for remedy in various diseases. A large number of literature reviews are studied, and it is being concluded that olive leaves has antihyperglycemic, hypolipidemic, antihypertensive, cardioprotective, anti-inflammatory, antimicrobial qualities and anticancer qualities.

#### References

- De Bock M, Derraik J, Brennan CM, Biggs JB, Morgan PE (2013) Olive (*Oleaeuropea L.*) leaf polyphenols improve insulin sensitivity in middle aged overweight men: Arandomized, placebo-controlled, crossover trial. PLos One 8: e57622.
- Tayoub G, Sulaiman H, Hassan AB, Alrofi M, Hassan A, et al. (2012) Determination of Oleuropein inleaves and fruits of some Syrian olive varieties. Int Med Aromatic Plant 2: 428-433.
- Fki I, Sayadi S, Mahmoudi A, Daoued I, Marrekchi R, et al. (2020) Comparative study on beneficial effects of hydroxytyrosol- andoleuropein-rich olive leaf extracts on high-fat diet-induced lipid metabolism disturbance and liver injury in rats. Biomed Res Int 1-15.

- Salah M, Hafedh A, Manef A (2017) Anti-diabetic activity and oxidative stress improvement of Tunisian Gerboui olive leaves extract on alloxan induced diabetic rats. J Mat Environmental Sci 8: 1359-1364.
- Carnevale R, Silvestri R, Loffredo L, Novo M, Cammisotto V, et al. (2018) Oleuropein, a component of extra virgin oliveoil, lowers postprandial glycaemia in healthy subjects. Br J Clin Pharmacol 84: 1566-1574.
- Gonzalez M, Zarzuelo A, Gamez MJ, Utrilla MP, Jimenez J, et al. (1992) Hypoglycemic activity of olive leaf. Planta Med 58: 513-515.
- Al-Azzaiwe HF, Saeed Alhamdani M-S (2006) Hypoglycemic and antioxidant effect ofoleuropein in alloxan- diabeticrabbits. Life Sci 78: 1371-1377.
- Eidi A, Eidi M, Darzi R (2009) Antidiabetic effect of Olea europaea L. in normal and diabetic rats. Phytother Res 23: 347-350.
- Elsaid FG, Alsyaad KM, Alqahtani FA (2018) The role of olive leaves and pomegranate peel extracts on Diabetes Mellitus induced in male rats. Egypt J Hosp Med 71: 3079-3085.
- Paiva-martins F, Barbosa S, Silva M, Monteiro D, Pinheiro V, et al. (2014) The effect ofolive leaf supplementation on the constituents of blood and oxidative stability of red blood cells. J Functional Foods 9: 271-279.
- Laaboudi W, Ghanam J, Ghoumari O, Sounni F, Merzouki M, et al. (2016) Hypoglycemic and hypolipidemic effects of phenolic olive tree extract in streptozotoc in diabetic rats. Int J Pharmacy Pharmaceutical Sci 8: 287-291.
- Lockyer S, Yaqoob P, Spencer JPE, Rowland I (2017) Impact of phenolic-rich olive leaf extract on blood pressure, plasma lipids and inflammatory markers: a randomised controlled trial. Eur J Nutr 56: 1421-1432.
- SusalitE, Agus N, Effendi I, Tjandrawinata RR, Nofiarny D, et al. (2011) Olive (Oleae uropaea) leaf extract effective in patients with stage-1 hypertension: comparison with Captopril. Phytomedicine 18: 251-258.
- Stevens Y, Winkens B, Jonkers D, Masclee A (2021)The effect of olive leaf extract on cardiovascular health markers: a randomized placebo-controlled clinical trial. Eur J Nutr 60: 2111-2120.
- Visioli F, Poli A, Gall C (2002) Antioxidant and other biological activities of phenols from olives and olive oil. Med Res Rev 22: 65-75.
- Somova LI, Shode FO, Ramnanan P, Nadar A(2003) Antihypertensive antiatherosclerotic and antioxidant activity of triterpenoids isolated from olea europaea, subspecies Africana leaves. J Ethnopharmacol 84: 299-305.
- Coni E, Di Benedetto R, Di Pasquale M, Masella R, Modesti D, et al. (2000) Protective effect of oleuropein, an olive oil biophenol, on low density lipoprotein oxidizability in rabbits. Lipids 35: 45-54.
- Laaboudi W, Ghanami J, Aissami H, Merzoukii M, Benlemlihi M, et al. (2016) Anti- inflammatory and analgesic activities of olive tree extract. Int J Pharm and Pharm Sci 7: 414- 419.
- 19. Ozkaya F, Ozkaya M (2011) Oleuropein using as an Additive for Feed and Products used for Humans. J Food Process Technol 2: 113.
- Jafari SM, Ghanbari V, Dehnad D, Ganje M (2017) Neural networks modeling of *Aspergillus flavus* growth in tomato paste containing microencapsulated olive leaf extract. J Food Safety 97: 5216-5222.
- Liu Y, Lindsay C, Malik N (2017) Assessment of the Antioxidant Activity of the olive leaf extract against Food borne Bacterial Pathogens. Front Microbiol 8: 113.
- 22. Goulas V, Exarchou V, Troganis AN, Psomiadou E, Fotsis T, et al. (2009) Phytochemicals in olive-leaf extracts and their antiproliferative activity against cancer and endothelial cells. Mol Nutr Food Res 53: 600-608.
- Hamdi H, and Castellon R (2005) Oleuropein, a non-toxic olive iridoid, is an anti-tumor agent and cytoskeleton disruptor. Biochem Biophys Res Commun 334: 769-778.