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Effect of Olive Oil on Patients Suffering from High Blood Pressure

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Abstract

Expanding access to antihypertensive medications has significantly enhanced both the prolonged existence and standard of life in patients with hypertension. However, hypertension persists as a predominant risk factor for ischemia and infarction of Heart tissues highlighting the critical necessity for more comprehensive management strategies for both prehypertensive and hypertensive individuals. Adopting healthier eating habits like the Mediterranean diet and the nutritional Approaches to Stop Hypertension (DASH) diet has been shown to positively influence blood pressure and is now recommended as an essential part of managing hypertension in addition to pharmacological interventions.

In this context, a thorough analysis of the dietary components of the diet and their impact on systolic and

diastolic pressure stabilization is warranted. This study specifically looks at the effects of the oil of olives and its main ingredients on blood systolic and diastolic levels in both healthy people and people with cardiac muscles and vascular diseases. It does this after a thorough review of the literature on the impact of a Mediterranean-style diet on risk factors for heart disease. Results from trials involving both humans and animals consistently show that olive oil has antihypertensive qualities. We conclude that the use of olive oil as the main fat source in hypertension management regimens is recommended for people in good health and those with heart problems, owing to its high level of concentration of omega-3 acids and antioxidant polyphenols.

Keywords: Blood Pressure, Diastolic and Systolic, Olive Oil

Introduction

With some variance across societies that deal with cardiovascular disease (CVD), hypertension is generally understood to be a persistent increase in systolic and diastolic blood pressure level (BP) over 130/80 mmHg that has no known cause. This illness causes end-organ damage over time and raises morbidity and mortality rates (Oparil S., 2018) [19]. Individuals with primary hypertension have lived longer thanks to easier utilization of healthier and more efficient blood pressure-lowering drugs over the past 50 years. Despite these developments, the primary cause of CVD incidence worldwide is still hypertension. There is a dire need for more appropriate management of those with high blood pressure in nations that are developed as well as

developing, as the World Health Assembly predicts that the total number of individuals with hypertension will climb from 1 billion to a staggering 1.5 billion by 2025 (Briasoulis A., 2014)^[6].

Most of the environmental variables that cause the development of hypertension are directly linked to bad lifestyle practices, in combination with genetic predispositions. These include consuming too many calories, which leads to overweight and obesity, an unbalanced diet that includes an excessive amount of sodium and potassium, and not enough physical activity (Naghavi M., 2015)^[17]. Moreover, a genetic tendency plus long-term psychological stress might lead to a persistently elevated blood pressure. The interaction of these variables emphasizes how crucial it is to make educated food decisions as a key tactic for assisting with blood pressure control (Patel R.S., 2017)^[21].

Dietary Strategies in Blood Pressure Management:

Most of the environmental factors that lead to the development of hypertension are directly linked to bad lifestyle practices, in addition to inheritance. These include consuming too many calories, which leads to overweight as obesity, an unbalanced diet that includes an excessive amount of potassium and sodium and not enough physical activity. Moreover, a genetic tendency plus long-term psychological stress might lead to a persistently elevated blood pressure. The interaction of these variables emphasizes how crucial it is to make educated food decisions as a key tactic for assisting with blood pressure control.

Fruits are usually had for dessert every day, and processed sugars are only eaten once a week. Eggs are consumed once a week, red meat is eaten in moderation, milk products, fish, and chicken are utilized in small quantities, and wine is often drunk in mild to moderate quantities, usually with meals.

OO was previously recognized by Ancel Keys, the man behind the Mediterranean diet, as a vital part of a balanced Mediterranean diet (Aboul-Enein B.H., 2017)^[1]. Because it supports cardiovascular health, OO is regarded as a functional meal (Aparicio-Soto M., 2016)^[3]. On the other hand, research is currently being done to determine how OO regulates hypertension.

A total of 584 Correspond keywords were found using analysis of medical subject headings (MeSH) associated with publications that were retrieved; 68 of these keywords met the threshold criteria (minimum total occurrences = 10). The MeSH phrase "Mediterranean diet" was the second-most frequently referred key word in terms of "occurrence," only surpassed by "humans." Assessing how strong of the overlap associations with other terms, we then generated a term map. The terms that had the strongest overall links were selected and shown as bubbles.

Olive oil has been a sacred and valuable gift throughout Mediterranean history. It appears in the Bible, the Koran, and Greek mythology. Originating in the Eastern Mediterranean, the olive tree spread via the Greeks, athletes used it on their bodies, and it was integral to medicines and cosmetics. It was praised by figures like Hippocrates as "the great healer" and Homer as "liquid gold."

Australia, China, Japan, and South Africa are among the nations where olive oil (OO) has been grown in recent years. All the same, most OO is still grown and consumed in

Mediterranean regions. But in the last few years, demand has increased in non-traditional areas. More people are becoming aware of the medical advantages of olive oil (OO), especially the extra-virgin version (EVOO), which has been shown to improve cardiovascular health. This trend is probably caused by the Mediterranean diet's rising popularity outside of its original regions. Washing, the decantation process centrifugation, and filtering are among the mechanical or physical methods used to extract extra virgin olive oil (EVOO) from olive fruit. By employing these techniques, it is ensured that the oil retains trace amounts of bioactive components, such as antioxidant polyphenols, from the olives.

It takes a lot more work to produce polyphenol-rich OO or EVOO than other forms of oil manufacture. Increased advanced agricultural and technological methods are needed to provide a high-quality product, which calls for increased funding. Given that EVOO makes up only 1- 2% of the fat consumed globally – compared to 30-31% for oil from soybeans, 27% for coconut oil, 12% for the oil of rapeseed, and 10% for sunflowers oil—these factors most likely restrict the production and usage of EVOO on a global scale.

Epidemiological Studies Provide Evidence of Olive Oil and High blood pressure:

The late 1980s saw the emergence of the first substantial epidemiological data connecting blood pressure management with fat eating. Based on 3-every day food records, Williams *et al.* found an adverse connection between oleic acid intake and systolic as well as diastolic (SBP, DBP) in a small longitudinal study comprising 76 middle-aged males in the United States. However, bigger, later prospective cohort studies did not fully validate these preliminary findings.

To investigate how various dietary fat types of impact blood pressure, researchers examined 24-hour meal diaries from 11,342 middle-aged men who participated in the Several Risk Factor Interventions Trial. Lower diastolic blood pressure, also known as DBP, was searched to be associated with a greater intake of polyunsaturated fatty acids (PUFA) and an increased PUFA to saturated cholesterol (SFA) ratio. It was unexpected that monounsaturated fats (MUFA) had no protective effect. However, the 8-year follow-up of 1,714 middle-aged men in the Chicago Western Electrical Company Experiment revealed that all forms of saturated cholesterol, were linked to higher systolic arterial pressure (SBP) but not diastolic blood pressure (DBP).

In another National Health and Dietary Examination Survey, which included, the individuals with the greatest systolic and diastolic blood pressure levels also reported considerably higher utilization of cholesterol, which appears to corroborate Stamler's findings (Hajjar I., 2003)^[10].

In conclusion, researchers from the Community Study evaluated the association between blood pressure (BP) and oil intake (OO), as determined by dietary questionnaires given by interviewers to middle-aged men and women who had no prior history of hypertension. According to the findings, OO consumption had an inverse relationship with DBP in males and SBP in both genders.

You can supplement this with information from Longitudinal Examination into Neoplasia and dietary longitudinal (EPIC)" study, which was the largest based on populations cohort study focusing on the advantages of the

Mediterranean lifestyle on cardiovascular health (Trichopoulou A., 2003) [29].

In addition, data from the biggest population-based cohort study concentrating on the beneficial effects of the Mediterranean food regimen on cardiac health—the "Greek European Longitudinal Research into Cancer and Nutritional cohort (EPIC)" research—can be added (Trichopoulou A., 2003) [29]. 500 million people from 10 European countries are presently a part of this early 1920s-founded membership. According to consistent findings, sub-studies carried out in Italy, Greece, and Spain have found a negative connection between high blood pressure and adherence to the specific diet.

Interestingly, when statistically controlled for the consumption of vegetables and OO, which are frequently utilized together, OO constituted the nutritious item that had the biggest favorable effect on blood pressure (Psaltopoulou T., 2004) [22]. Practically speaking, after correcting for sex, maturity level, body weight, waist-to-hip ratio, caloric intake, exercise, and vegetable consumption, it was discovered that SBP and DBP were dropped by 0.8 and 0.3 millimeters of respectively, with every 22 g rise in daily OO consumption.

The dietary and physical characteristics from the Italian cohort of EPIC, which included 7600 women between the years of 35 and 65 who weren't previously diagnosed with hypertension before, were thoroughly studied in connection to SBP and DBP (Masala G., 2008) [13]. Multivariate tests based on the major nutritional fatty acid types (SFA, the MUFA, and PUFA) suggest that there is a nearly statistically significant negative correlation between MUFA and DBP. However, there was once more an inverse relationship between DBP and OO usage (Masala G., 2008) [13].

Further, a prospective analysis using data collected in the SUN Study found only a negative interlinking between OO intake and men's risk of developing high blood pressure. In this study, 28.5 months of follow-up were conducted on 5573 persons who were not diagnosed with high blood pressure at baseline. The chances of developing hypertension were 50% lower in men in the highest quartile of OO consumption compared to those in the lowest quartile. The reason behind the absence of association in women was believed to be the small number of patients suffering from High blood pressure in the female group (Alonso A., 2004) [2].

These results are consistent with the most current findings of the experiment. In this study, 4,600 middle-aged men and women from 17 different geographic and cultural cohorts in the United States, Japan, China, and the United Kingdom were analyzed to determine the associations between both systolic and diastolic blood and different food and nutrient intakes (Miura K., 2013) [15].

Clinical Trial Evidence on Olive Oil and Hypertension: Search Approach

Although there are many encouraging signs from observational studies that olive oil lowers blood pressure, the unreliability of the nutritional conclusions drawn from these studies (Miura K., 2013) [15] has prompted scientists to look for stronger proof. Researchers have been relying more and more on randomized research studies (RCTs), the high standard for proving an association connecting a subjection and its consequences, to boost faith in nutritional outcomes

associated to olive oil. RCTs are an important source of information when creating medical guidelines and public health policies (Pan A., 2018) [20].

RCTs are now frequently used to evaluate the effect of nutrients or foods on the cardiovascular system, in a procedure like that used for licensing novel medications and medical devices, by reducing or removing confounding biases—common issues in observational studies (Pan A., 2018) [20]. Consequently, we conducted a thorough search of Scopus, PubMed, and Scopus and Web of Science to locate RCTs assessing the impact of olive oil and its main ingredients (oleic acid or antioxidant polyphenols) on the control of blood pressure.

Additionally, olive oil was given as margarine enhanced with the oleic acid (Rasmussen O.W., 1993) [25] or in the form of capsules in several studies, with daily dosages varying between 1 to 6 kg (Appel L.J., 2005) [4]. Continuous settled blood pressure monitoring is regarded as the grade of excellence in both practices done in clinics and elevated blood pressure findings for evaluating the impact of medication as well as nutritional treatments on blood pressure (BP) because multiple blood pressure (BP) measures provide a more accurate reflection of levels of BP than a single reading [60]. But just three of the 19 investigations that were chosen employed ABPM to assess blood pressure (Domenech M., 2014) [7]. Overall, eating olive oil was not associated with any serious negative events, except for a few minor gastrointestinal side effects.

Results of Clinical Trials with olive oil as its ingredient and Hypertension

The late 1980s saw the completion of one of the first randomized clinical trials examining olive oil's (OO) potential as an antihypertensive agent (Mensink R.P., 1988) [14]. In 47 healthy volunteers, the consequences of a high-fat, olive oil-enriched diet were assessed in relation to a minimal in fat, carbohydrate-rich benchmark diet. There was no discernible difference in the two groups' blood pressure levels (SBP and DBP) after 36 days. This research was the initial study to imply that modifying the consumption of olive oil and its derivatives in the diet could control blood pressure (Mensink R.P., 1988) [14].

A few years later, a trial with fifteen individuals with type 2 diabetes corroborated similar results, showing that an olive oil-enriched meal had even greater antihypertensive benefits than a diet heavy in carbohydrates (Rasmussen O.W., 1993) [25]. The effects of an isocaloric diet supplemented with grapeseed oil to fry them which is abundant in the polyunsaturated fatty acid, or PUFA, linoleic acid, and an olive oil-enriched diet for three weeks were later compared by the same researchers (Thomsen C., 1995) [28]. The blood glucose and lipid levels were not significantly affected by either diet; however, the olive oil-enriched diet showed stronger antihypertensive qualities than the grapeseed oil-enriched meal (Thomsen C., 1995) [28]. Some years later, OO was specifically investigated as an additional nutraceutical assistance in the pharmaceutical treatment of hypertension, after these encouraging results (Ferrara L.A., 2000) [8].

Twenty-three hypertension patients were assigned to be tested by giving either a diet that included extra virgin olive oil or a diet high in sunflower seeds (SO) in this stimulating randomized longitudinal trial. After six months, only the OO meal significantly reduced systolic and diastolic pressure of blood in the body. Interestingly, only when OO was added

to the diet did the recommended daily number of antihypertensive drugs needed to drop blood pressure significantly decrease (Ferrara L.A., 2000)^[8]. This implies that OO might be employed as a potential nutraceutical in the treatment of hypertension as an adjuvant. The Omni Heart collaborative study team used a cross-over randomized design to investigate the effects of three different nutrient-dense meals on serum lipid levels and blood pressure in a cohort of 164 people who were not taking antihypertensive medications between 2003 and 2005.

High in unsaturated fatty acid (MUFA) from canola oil, olive oil, and safflower oils, and high in carbs (like the DASH diet), were the three diets that were being tested. After six weeks, compared to the diet high in carbohydrates, the MUFA- and protein-packed meals significantly reduced blood pressure and enhanced lipid profile control (Appel L.J., 2005)^[4]. Also confirmed by studies on healthy individuals were the same results (Rasmussen B.M., 2006)^[24]. An enhanced diet rich in saturated oils or an improved diet rich in MUFA were randomly assigned to 162 trial participants.

High oleic acid butter and margarine from OO and SO were part of the MUFA intake diet; high SFA butter and margarine from an unknown dietary source were part of the saturated fat diet. Then, each group was randomized to get either fish oil or a placebo. Three months later, SFA had little impact on SBP or DBP, whereas MUFA produced a decline in both. Another instance of E"OO's efficacy as an antihypertensive drug comes from a group of elderly hypertensive individuals who were exposed to 60 g of SO or EVOO on a regular basis. Only one month later did SBP measurements in the EVOO sample return to normal.

So, similar beneficial outcomes were also analyzed in a cohort study including elderly individuals who were obese and were randomly assigned to include olives, or corn and oil of soybean seeds in their Western food routine for three months. But according to sub-analyses conducted by Toledo and Domenech (Domenech M., 2014)^[7] the experiment known as "Prevenición con Dieta Mediterranean (PREDIMED)" (O'Brien E., 2013)^[18] is the one that clearly showed the importance of OO in the management of blood pressure.

In recent years, the antioxidant polyphenol has been extensively studied as one of the minor OO constituents that may oversee the antihypertensive effect. Initially, this was assessed in a group of forty male Spanish people with coronary cardiovascular disease (Fito M., 2005)^[9]. For three weeks, those involved during this study either polyphenol-rich olive oil (EVOO) or purified form of olive oil, which has a very low antioxidant polyphenol content.

The researchers found that when both oils were used, the participants' SBP decreased. EVOO rich in polyphenols had a greater impact, nevertheless, suggesting that OO oxidants have a unique role in BP regulation mechanisms (Fito M., 2005)^[9]. A few years later, a mixed sample consisting of fit male and female participants confirmed these preventive benefits (Konstantinidou V., 2010)^[12]. Recently, a simple-style diet introduced with either polyphenol-rich OO or polyphenol-free OO was given to 24 healthy and hypertensive women who had not previously taken hypertension or lipid-lowering medications.

Over the course of two months, only polyphenol-rich OO showed a substantial decrease in both SBP and DBP. It's

interesting to note that the trial's level of blood pressure reduction was like what was attained with first-line antihypertensive drugs that are frequently used [46]. We acknowledge, nevertheless, that not all studies have found a positive relationship between MUFA or OO and blood pressure, especially when OO is provided as encapsulating extracts (Taylor J.S., 2006)^[27].

Talk The lifespan and quality of life of hypertension patients have increased due to increased access to high pressure-lowering medicines since the introduction of these medications in the Collaborative Program in the late 1960s. However, high blood pressure is still a major risk factor for stroke and heart attack, which emphasizes the significance of putting blood pressure screening programs in place to ensure that hypertensive persons are identified early and receive appropriate therapy.

The Journal related to cardiac studies and some association updated the adult blood pressure recommendations in response to promising new findings showing a more significant drop in blood pressure among hypertensive patients. They explicitly advised keeping the blood pressure thresholds at the existing levels of 130 mm Hg and 80 mm Hg and recommending that all hypertension patients, even those who need pharmaceutical therapy, adopt suitable lifestyle modifications.

This is because the therapeutic benefit of antihypertensive drugs may be counteracted, and target blood pressure values may not be reached if lifestyle modifications are not adopted (Blumberg J., 2010)^[5]. Therefore, in the age of "evidence-based nutrition," a thorough examination of how foods affect blood pressure regulation is needed.

A variety of food elements that either promote or safeguard against hypertension have been studied and found in several population-based nutritional studies. Among preventative factors, the Mediterranean way of life is one frequent component of the diet that is thought to be the most cardiovascular-protective diet (Widmer R.J., 2015)^[30]. This review delves further into the benefits of olive consumption and its primary constituents on blood pressure regulation in both normal and at-risk persons, as well as its fundamental mechanisms of action.

Following a review of the 19 studies that examined the impact of oil of olives (OO) in vascular disease-related conditions, such as diabetes and hypertension, we discovered that either sub-chronic and long-term OO intake, especially when consuming between 10 and 60 mL of EVOO daily, consistently reduced blood pressure (DBP) and, to some extent, SBP. The SBP and DBP showed decreases ranging from -10 and -1 mmHg, however the level of BP drop varied greatly. Estimates show that an average decline in SBP is associated with a up to 5% decrease in coronary heart illnesses causes death and an eight percent decrease in stroke mortality (R, 1991)^[23].

The differences in blood pressure changes seen between studies might be due to a variety of variables, including olive oil amount and quality, nutritional, family history, length of the therapy or being exposed, and others.

Therefore, more study should focus on a few crucial factors including the time and doses of OO intake as well as the genetic categorization of hypertension patients to lessen the within-group variability regarding the outcome (S.R., 2010)^[26]. Currently, on an initial basis and in view of the updated literature, consuming an EVOO containing high amounts of antioxidants polyphenols—at minimum 5 mg of active

ingredients that are in Olive oil daily, split into two heaping spoonsful—is a good strategy to avoid hypertension.

Conclusion

The antioxidant polyphenols and high oleic acid content of OO contribute to its typically substantial anti-hypertensive effects in both human and experimental studies. Based on the assessed consequences, it is quite tough to identify the factors that most efficiently contribute to BP control. Rather, it appears that the whole ranges of olive oil and its constituents show their optimal effectiveness inside the conjugated architecture of their original matrix. This proposes that while creating prospective goods, the natural setting in which molecules that operate are found should be as nearly mimicked as feasible. Thus, it seems that EVOO is the best fat option for managing hypertension in patients who are otherwise healthy as well as those who have cardiovascular disease.

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