

## Role of Olive Oil in Bone Health

**Latha Rani R.\***

Ph. D. 2<sup>nd</sup> Year  
Department of Food Science and  
Nutrition  
University of Agricultural  
Sciences, Bengaluru



\*Corresponding Author

**Latha Rani R.\***

E-mail: latharanjrani@gmail.com

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### INTRODUCTION

Olive (*Olea europaea*) is commonly called as evergreen tree or golden tree belongs to the family Oleaceae. It is native to the Mediterranean, Asia and Africa, but now found around the world and it is largely produced in Spain, Italy and Greece. Olives are one of the most extensively cultivated fruit crops in the world and it is characterized by small size, squat shape, oblong opposite leaves with white flowers. (Tagliaferri et al., 2014). Olive oil is considered as healthy oil because of its high content of monounsaturated fatty acid (mainly oleic acid), polyphenols (oleuropein), vitamin E and vitamin K. These nutrients can acts as bone protective agents and helps to reduce osteoporosis in postmenopausal women. A trending Mediterranean diet includes olive oil which is beneficial in the protection of chronic diseases, especially for bone health (Liu et al., 2014).

Diaz-Curiel et al. (2020) conducted a study on effects of virgin olive oil on bone health in ovariectomized rats. Total 48, 6-month-old female wistar rats weighing 320 g were divided into 4 groups 1) SHAM-simulated intervention (n = 12), 2) OVX-ovariectomized (n = 12), 3) OVX + 100 (n = 12), ovariectomized and treated with VOO (100 µL/day by oral gavage) 4) OVX + 200 (n = 12) ovariectomized and treated with Virgin olive oil (VOO)- (200 µL/day by oral gavage), all over 3 months. Results revealed that after 3 months of VOO treatment, although FBMD (femoral bone mineral density) and LBMD (lumbar bone mineral density) were not affected whereas the bone quality was improved. The elasticity of bone and fractal dimension (complexity of bone) were more similar to healthy bone.

Roncero- Martin et al. (2018) assessed the association of olive oil intake and bone density parameters in Spanish women.

Results revealed that there was significantly increased in volumetric bone mineral density (vBMD) (mg/cm<sup>3</sup>) ( $p < 0.01$ ) in the group with a higher intake of olive oil (>18.32 g/day) compared to low intake of olive oil (<18.32 g/day). Spanish women dietary intake of olive oil was positively associated with total, trabecular and cortical BMD (bone mineral density).

Mazzanti et al. (2015) carried out a study on effect of one year dietary supplementation with vitaminized virgin olive oil (VitVOO) on markers of bone turnover and oxidative stress in healthy post-menopausal women. Results found that one year oral supplementation with VitVOO are able to counteract bone loss by reducing both ucOC (under carboxylated osteocalcin) concentration and UCR (ratio between serum under carboxylated osteocalcin to serum carboxylated osteocalcin) and increasing the T-score values. Compared to VOO (Placebo), VitVOO in the diet of post-menopausal women represents a proper tool for bone protection and a useful strategy against oxidative stress.

Liu et al. (2014) conducted study on olive oil in the prevention and treatment of osteoporosis after artificial menopause. Results showed that EVOO (Extra virgin olive oil) significantly increased BMD and decreased phosphatase, alkaline phosphatase (ALP), IL-6, MDA (Malondialdehyde), and nitrate levels in mice. However, it had no significant effect on the Ca<sup>2+</sup> level. In clinical follow-up, EVOO also improved patient BMD levels on L3, L4 and left femoral neck. Olive oil not only improved serum bone indicators in castrated rats, but also prevent bone loss in patients.

Tagliaferri et al. (2014) investigated the effect of olive oil and vitamin D synergetic effect to prevent bone loss in mice. Mice were randomly divided into six groups (n=12). At 8 weeks of age, 4 groups of mice were bilaterally ovariectomized (OVX) and 2 batches were sham-operated (SH). Two supplementary OVX groups were given either

refined or virgin olive oil fortified with vitamin D<sub>3</sub>, to assess the possible synergistic effects with another liposoluble nutrient (Vit-D<sub>3</sub>). Results revealed that virgin olive oil fortified with vitamin D<sub>3</sub> is able to counteract the bone loss and improved bone remodeling and bone mineral density in mice.

Saleh and Saleh, (2011) evaluated the protective effects of olive oil supplementation against osteoporosis in ovariectomized (OVX) rats. Results found that OVX-rats showed a significant decrease in plasma calcium levels and a significant increase in plasma ALP, MDA and nitrates levels. These changes were reduced by olive oil supplementation in the Olive-OVX rats. Light microscopic examination of the tibia in Olive-OVX rats, cortical bone thickness (CBT) and the trabecular bone thickness (TBT) were markedly improved as compared to the OVX group. Thus, olive oil effectively mitigated ovariectomy-induced osteoporosis in rats and it may be a promising effect for the treatment of postmenopausal osteoporosis.

## CONCLUSION

Olive oil which is rich in MUFA and polyphenols helps to enhance the calcium deposition and bone mineral density. Different experimental models have demonstrated that virgin olive oil and its phenolic compounds may favor bone density maintenance. Moreover, the bioactive component of olive oil- oleuropein is of great importance in the protection of cardiovascular disease, cancers and also sin bone health (osteoporosis). Hence, olive oil particularly virgin olive oil is a potential source for the management of bone health and osteoporosis in women.

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