Lycopene Intake in relation to Bone Mineral Density, Bone Turnover Markers and Oxidative Stress Status in Healthy Postmenopausal Women: A cross-sectional study.

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Introduction: Lycopene is an antioxidant known to decrease the risk of age-related chronic diseases and recent evidence suggests that it has a protective effect on bone. Oxidative stress induced by reactive oxygen species (ROS) is associated with the risk of bone loss and osteoporosis, and can be reduced by certain antioxidants such as lycopene.

Objectives: To assess the effect of lycopene intake on bone mineral density (BMD) and bone turnover markers (BTMs) in relation to oxidative stress parameters among healthy Saudi postmenopausal women.

Subjects and Methods: A total of 440 healthy women (aged ≤ 50-65) years provided 4-day dietary records, blood and urine samples. Serum samples were used to measure serum lycopene, protein thiols, lipid peroxidation, total antioxidant status (TAS), total oxidant status (TOS), oxidative stress index (OSI), BMD [at five bone sites measured by dual-energy x-ray absorptiometry (DXA)] and BTMs (bone formation markers: s-OC and s-PINP; bone resorption markers: s-CTx and u-NTx). Women were stratified according to serum lycopene (nmol/kg body wt) quintiles (Q_1-Q_5) and examined in relation to the above variables.

Results: Higher dietary lycopene intake exhibited higher serum lycopene ($P < 0.000$) and positive effects were demonstrated on bone health: significant increases in BMD values (by 4.8 – 9.1%), increases in bone formation (by 13.0 – 32.1%); and decreases in bone resorption (by 22.8 – 27.5%) markers in the highest quintile (Q_5) of serum lycopene as compared with the lowest quintile (Q_1) group. Such changes were accompanied by improved oxidative stress parameters (OSI decreased by 34.0%, $P < 0.000$) including increases in protein thiols (18.7%,

P < 0.000) and decreases in lipid peroxidation (41.9%, P < 0.000) at higher serum lycopene levels. After adjustment for confounders, the odds ratio (OR) for the lowest quintile of BMD in the high groups (Q_2-Q_5) of serum lycopene versus the lowest quintile (Q_1) was 0.44 (95% CI: 0.6 – 0.90) [for lumbar spine (L_1-L_4)] and 0.62 (95% CI: 0.17 – 0.95) (for neck femur), respectively.

Conclusions: These results suggest that dietary antioxidant lycopene decreases oxidative stress and the levels of bone resorption markers and increases antioxidative status and bone formation markers in postmenopausal women, and may be beneficial in decreasing the risk of bone loss and/or osteoporosis.