Negative Association of Plasma Cholesterol and Low-density Lipoprotein Cholesterol, but not Testosterone or Growth Hormone, with Bone Mineral Density in Elderly Korean Men

*Dong Jun SUNG [1], *Wi-Young SO [2]*

1. *Division of Sport Science, College of Science and Technology, Konkuk University, Chungju-si, Republic of Korea*
2. *Sports and Health Care Major, College of Humanities and Arts, Korea National University of Transportation, Chungju-si, Republic of Korea*

Corresponding Author: Email: wowso@ut.ac.kr

Dear Editor-in-Chief

Elderly individuals are susceptible to conditions that are negatively related to osteoporosis. Testosterone and growth hormone deficiencies have been linked with low bone mineral density (BMD), which is an important marker of osteoporosis (1-2). Moreover, epidemiological studies have strongly correlated BMD with lipid profiles in men (3) and women (4-5). BMD is also associated with hypercholesterolemia (6-7). In elderly Korean women, growth hormone and high-density lipoprotein cholesterol (HDL-C) concentrations are significantly associated with BMD (8). Nevertheless, in Asian countries, especially South Korea, no studies have examined the association between BMD and lipid profiles. Elucidation of BMD-related lipid profiles in elderly men will provide valuable information to improve the management of BMD. Forty-four elderly men exceeding 65-years-of-age from the Chungju Senior Welfare Center in Korea participated in this study. Fasting glucose, total cholesterol, HDL-C, low-density lipoprotein cholesterol (LDL-C), and triglyceride concentrations were measured using an ADVIA 1650 automated analyzer (Bayer Health Care, Tarrytown, NY, USA). Cholestest N HDL (Daiichi, Japan) was used to determine glucose concentra-

tions. Growth hormone and testosterone concentrations were assessed using an immunometric assay method with the COBRA II Gamma counter (Packard, Palo Alto, CA, USA) and the electrochemiluminescence immunoassay (Roche Diagnostics, Basel, Switzerland), respectively. BMD was measured by dual energy X-ray absorptiometry using a 1000 scan system (DEXA, City, State, USA) at the average femur. Correlations between BMD and related factors were analyzed through the Pearson correlation coefficient analysis.

All statistical procedures were performed using SPSS version 19.0 for Windows (SPSS, Chicago, IL, USA). The level of significance was set at $p < 0.05$.

Negative correlation with BMD was evident for total cholesterol ($r = -0.337$, $P = 0.025$) and LDL-C concentrations ($r = -0.396$, $P = 0.008$). Fasting glucose ($r = 0.029$, $P = 0.851$), plasma testosterone ($r = 0.116$, $P = 0.452$), triglyceride ($r = -0.095$, $P = 0.541$), HDL-C ($r = 0.123$, $P = 0.428$), and growth hormone concentrations ($r = -0.160$, $P = 0.298$) were not correlated with BMD. Thus, total cholesterol and LDL-C concentrations might be factors that affect BMD in elderly men. In ad-

dition, we analyzed variables that could be used to estimate BMD in elderly men.

Acknowledgments

References

1. Greenspan SL, Coates P, Sereike SM, Nelson JB, Trump DL, Resnick NM (2005). Bone loss after initiation of androgen deprivation therapy in patients with prostate cancer. *J Clin Endocrinol Metab*, 90(2):6410-6417.
2. Wüster C, Abs R, Bengtsson BA et al. KIMS Study Group and the KIMS International Board. Pharmacia & Upjohn International Metabolic Database (2001). The influence of growth hormone deficiency, growth hormone replacement therapy, and other aspects of hypopituitarism on fracture rate and bone mineral density. *J Bone Miner Res*, 16(2):398-405.
3. Hernández JL, Olmos JM, Ramos C, Martínez J, de Juan J, Valero C, Nan D, González-Macías J (2010). Serum lipids and bone metabolism in Spanish men: the Camargo cohort study. *Endocr J*, 57(1):51-60.
4. Adami S, Braga V, Zamboni M, Gatti D, Rossini M, Bakri J, Battaglia E (2004). Relationship between lipids and bone mass in 2 cohorts of healthy women and men. *Calcif Tissue Int*, 74(2):136-142.
5. Yamaguchi T, Sugimoto T, Yano S, Yamauchi M, Sowa H, Chen Q, Chihara K (2002). Plasma lipids and osteoporosis in postmenopausal women. *Endocr J*, 49(2):211-217.
6. Tankò LB, Bagger YZ, Christiansen C (2003). Low bone mineral density in the hip as a marker of advanced atherosclerosis in elderly women. *Calcif Tissue Int*, 73(1):15-20.
7. Koshiyama H, Wada Y, Nakamura Y (2001). Hypercholesterolemia as a possible risk factor for osteopenia in type 2 diabetes mellitus. *Arch Intern Med*, 161(13):1678.
8. Sung DJ, Lee YS, Cha KS (2014). Comparative analysis of physical fitness, growth hormone, estrogen and health-related factors according to level of bone mineral density in elderly women. *Korea J Sport Sci*, 23(6):1115-1124.