The Effects of Moderate Intensity Walking Exercise on Stem Cell Mobilization, Differentiation and Maturation in PBMC and Bone Remodeling of Postmenopausal Women

Abstrak:

Reduced serum estradiol (E2) level on postmenopausal women leads to decrease muscle mass, increasing adipogenesis and negativeuncoupling bone remodeling, which tends to increase osteoporosis incidence. Bone Remodeling (BR) is determined by activities of osteoblast (OB), from bone marrow derived- and adipose derived-mesenchymal stem cell/MSC, and activities of osteoclast (OC), from hematopoietic stem cell/HSC. The MSC's osteogenic differentiation are affected by osteogenic microenvironment including humoral, interleukin, vitamine and mechanical force factors. Moderate intensity walking exercise has been proved promote BR in postmenopausal women, but its effects on stem cell mobilization, differentiation and maturation which leads to positive uncoupling BR and the role of serum IL-6 and PTH in this process still not clear. The aim of this study was to analyze the effect of moderate intensity walking exercise to stem cell mobilization, differentiation and maturation in PBMC and BR on postmenopausal women, and revealed the role of serum IL-6 and PTH changes in that process. This one group pretest-posttest design research has been done on 14 postmenopausal women, which underwent moderate intensity walking exercise for 30 minutes 3 times week for 3 weeks. There was an increasing of MSC mobilization, but reduced HSC mobilization on PBMC. There were increasing on differentiation and maturation of circulated stem cell on PBMC. The change of IL-6 affected the changes of % early OB/OC lin cell, sP1NP and the ratio of sP1NP/CTx. The change of sIL-6 affected the changes of % early OB/OC lin cell, % late OC lin cell and sP1NP. The change of sPTH affected the changes of sCTx and the ratio of sP1NP/CTx. The conclusion was a moderate intensity walking exercise revealed increasing stem cell mobilization, differentiation and maturation in PBMC, with domination on osteoblastic lineage cell, which lead to positive uncoupling BR on postmenopausal women. Subacute exercise sIL-6 affected stem cell differentiation in PBMC and mature OB, subacute exercise sPTH affected positive uncoupling BR via OC.

Keyword:
walking exercise, stem cell, bone remodeling, IL-6, PTH

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