Abstract


Vitamin D increases PPARγ expression and promotes beneficial effects of physical activity in metabolic syndrome.

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OBJECTIVES: Peroxisome proliferator-activated receptor (PPAR) and vitamin D signaling pathways regulate a multitude of genes involved in different physiological functions. The aim of the present study was to examine the effects of vitamin D supplementation and aerobic training on metabolic syndrome and PPARγ expression.

METHODS: Forty female ovariectomized rats were divided into five groups of aerobic training with high (OVX + Exe + HD), moderate (OVX + Exe + MD), and low dose of vitamin D (OVX + Exe + LD), aerobic training receiving vehicle (sesame oil; OVX + Exe + oil), and sham-operated control (sham) groups. After 2 mo of treatment, serum insulin, vitamin D, glucose, lipid profile, visceral fat, and liver PPARγ gene expression were measured.

RESULTS: The combination of exercise and high doses of vitamin D significantly reduced insulin (P = 0.039), blood glucose (P = 0.024), and homeostatic model assessment for insulin resistance (P = 0.011), and elevated PPARγ gene expression (P = 0.032). Also, treatment with aerobic training and either high or moderate vitamin D, ameliorated overall metabolic syndrome Z scores (P = 0.001).

CONCLUSION: Findings from the present study suggested that a sedentary lifestyle and vitamin D deficiency accelerated the occurrence of metabolic syndrome probably by decreasing the expression of nuclear receptor PPARγ. Additionally, adequate levels of plasma vitamin D are necessary to achieve the beneficial metabolic effects of physical activity.

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