

POSTER PRESENTATION

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The effects of calcium and glucose supplementation on bone of young female rats in case of disturbances in energy balance caused by their food restriction and exercise

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From International Society of Sports Nutrition: 8th Annual ISSN Conference and Expo Las Vegas, NV, USA. 24-25 June 2011

Background

Female athletes, with a strong awareness of their weight loss, are prone to restrict their food intake. A major concern arisen from such athletes' daily training would be an imbalance of energy intake and energy expenditure which resulted in an osteoporotic fracture. Calcium (Ca) is a major mineral content in bone, otherwise Glucose (Glu) is an energy source. It is not clear whether Ca or Glu supplementation have a positive effect on bone in case of disturbances in energy balance caused by their food restriction and exercise.

Methods

49 female Sprague-Dawley rats (age 8 weeks) were divided into 6 groups: ad libitum feeding (0.6% Ca diet) and non-exercise group [Cont group]; ad libitum feeding (0.6% Ca diet) and exercise group [Ex group]; food restriction (0.6% Ca diet)and exercise group [REx group]; food restriction, Ca supplementation (1.2% Ca diet) and exercise group [REx+Ca group]; food restriction (0.6% Ca diet), Glu supplementation and exercise group [REx+Glu group]; food restriction, Ca supplementation (1.2% Ca diet), Glu supplementation, exercise group [REx+Ca+Glu group]. They were reared in individual cages during 38 days. Food restriction was 70% of food intake of the Cont group. Exercise was voluntary wheel running. We measured the number of revolutions every day. After the treatment period, intra-abdominal fat, femur, lumbar spine and tibia were collected.

Statistical analysis was performed using ANOVA followed by a Scheffe's post hoc comparisons test (p<0.05).

Results

Final body weight of REx group (167.4±10.2g), REx+Ca group (172.5±18.9g) and REx+Ca+Glu (229.6±15.4g) group compared with the Cont group (257.5±12.5g) were significantly lower (p<0.001). Running distance was not significant different among the 5 groups (EX group, REx group, REx+Ca group, REx+Glu group and REx+Ca +Glu group) (7083±5575, 12021±7392, 10750±7266, 10743±6182 and 9144±6048 m). Abdominal fat weight of EX group (2.05±0.86g/100gBW), REx group (1.26 $\pm 0.49 \text{g}/100 \text{gBW}$), REx+Ca group (1.12 $\pm 0.63 \text{g}/100 \text{gBW}$), REx+Glu group (1.72±0.46g/100gBW) and REx+Ca+Glu group (1.56±1.05g/100gBW) compared with the Cont group (4.67±1.56g/100gBW) were significantly lower (p<0.001). Femur weight and femur length of REx group (0.431±0.029g and 3.151±0.067cm) and REx+Ca (0.454 ±0.045g and 3.175±0.082cm) group compared with the Cont group (0.543±0.030g and 3.417±0.039cm) were significantly lower (p<0.001).

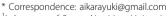
Conclusions

It is concluded that Ca supplementation had no effect, but Glu supplementation had a positive effect on bone under food restriction and wheel running.

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Published: 7 November 2011



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doi:10.1186/1550-2783-8-S1-P29

Cite this article as: Aikawa et al.: The effects of calcium and glucose supplementation on bone of young female rats in case of disturbances in energy balance caused by their food restriction and exercise. Journal of the International Society of Sports Nutrition 2011 8(Suppl 1):P29.

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