再録 報文

J Nutr Sci Vitaminol, 52, 316−326, (2006)

Effect of the Protein and Oil Contents on Calcium Utilization in the Diets of Female Fischer Rats That Were Fed by Three Different Feeding Methods

Shizuko OHTSUKA[1], Takao KITANO[2], Yoshiaki MAEDA[1] and Shoji AZAMI[1]

[1]Department of Administrative Nutrition of Faculty of Health and Nutrition, Tokyo Seiei College, *4-6* Nishishinkoiwa 1-chome, Katsusika-ku, Tokyo, *124-8530*, Japan

[2]Department of Public Health, Graduate School of Medical Sciences Kumamoto University, *1-1-1* Honjo, Kumamoto *860-0811*, Japan

(Received December 26, 2005)

Summary

We studied the effects of varying the protein and oil contents in the diet and three different feeding methods on the utilization of dietary calcium (Ca) in female Fischer rats. The experimental diets were based on the AIN-76 diet. Rats were fed one of nine experimental diets containing different levels of protein and oil. The experimental diets contained 10, 20 or 40% of protein (milk casein) and 5, 10 or 20% of soybean oil. The three meal feeding methods were ad libitum feeding, pair feeding and adjustable feeding. The experimental diets that were given by prepared feeding were supplemented with a mineral and vitamin solution. The effects of the protein and oil contents in the diet were analyzed by two-way ANOVA. Among rats that were fed ad libitum, the oil content in the diet affected the degree of mineral and vitamin intake. Among the rats fed ad libitum, the oil content in the diet had a significant effect on the level of Ca intake, although it did not have a significant effect on the level of energy intake. For pair feeding, the feeding volume was limited in each group; therefore, there was a significant difference in energy intake and there was no significant difference in Ca intake among each diet group. For adjustable feeding, there was considerable mineral and vitamin intake, which effected the reduction of feeding volume depending on the oil volume in the diet. There were no significant differences in the energy, Ca and other mineral and vitamin intakes among the nine groups that were fed using adjustable feeding. In analyzing two-way ANOVA, in which the parameters were the contents of protein and oil in the experimental diets, there were difference in Ca utilization among rats that were fed using the three feeding methods. This result was shown to reflect on the difference as energy, mineral including Ca, and vitamin intake. However, the protein content in the diet had a significant effect on urinary Ca excretion in all three feeding methods. In addition, it was clear that the intake of protein and oil affected kidney calcification in all three feeding methods. The AIN Experimental Diet Committee reported that kidney calcification was found among rats that were fed the AIN-76 diet and that one of the causes of kidney calcification was the Ca/P ration in this diet. The protein and oil contents in the diets had significant effects on the degree of kidney calcification among rats that were fed by pair feeding or adjustable feeding. The results of this study suggest that the protein and oil contents in the diet play an important role in kidney calcification.

Key Words calcium balance, protein intake, oil intake, kidney calcification, feeding method