Different Effects of Soy and Whey on Linear Bone Growth and Growth Pattern in Young Male Sprague-Dawley Rats

INTRODUCTION

The most effective environmental factor that affects longitudinal growth is nutrition, but the exact composition and the relative benefits of specific dietary proteins in supporting linear growth is unknown. A study conducted in 105 countries found that protein intake from milk products, followed by animal protein, emerged as the most significant nutritional correlate of stature. In addition, plant based diets were not able to provide the optimal stimuli for physical growth. The use of plant-based protein isolates in food formulations has become a focus of interest due to greater sustainability, lower production costs, and a lower ecological footprint in addition to health and ideological reasons. Our recent studies showed that specific nutrients can dramatically affect growth. We therefore examined Whey (milk proteins) and Soy (plant based proteins) proteins as both contain all essential amino acids and are considered the best proteins in their categories according to the protein digestibility-corrected amino acids score (PDCAAS).

AIM

The aim of this study was to check the effect of the dietary proteins Whey and Soy on linear growth and bone structure.

METHODS

- Young male Sprague Dawley rats were fed with either Whey or Soy based diets (28% protein of total calories and matched for calories, macro- and micro-nutrients).
- Rats were monitored for 11, 24 or 74 days in an Ad libitum protocol or a Pair-fed protocol for 24 days.
- At sacrifice, humerus length and Epiphyseal Growth Plate (EGP) height and organization were measured.
- For safety, whole blood was drawn to assess total blood chemistry, Glucose Tolerance Test (GTT) and fasting glucose (data not shown) and also IGF-I levels.
- µCT analysis was used to determine the quality of the formed bone.

CONCLUSIONS

In this study we wanted to determine the better protein for supporting optimal linear growth. Indeed, we found that use of different proteins had a differential effect on the growth pattern. Accelerated growth (weight gain and humerus length) in the short term experiments observed in the Soy group was no longer present in the long-term experiments. Bone mineralization was greater in the whey group in the long term experiments. A higher and better 

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REFERENCES


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CONCLUSIONS

In this study we wanted to determine the better protein for supporting optimal linear growth. Indeed, we found that use of different proteins had a differential effect on the growth pattern. Accelerated growth (weight gain and humerus length) in the short term experiments observed in the Soy group was no longer present in the long-term experiments. Bone mineralization was greater in the whey group in the long term experiments. A higher and better organized EGP in the Whey groups throughout all the experiments was found and may indicate better growth potential. There was no indication for metabolic disturbance in either group. All values were in the normal range. IGF-I levels were not significantly different between the groups at the end of the short term experiments, however when there were no differences in food consumption, serum levels of IGF-I were significantly greater in the whey group.

To conclude, the growth pattern of young rats fed iso-calorie iso-protein content diets were significantly affected by the identity of the protein. As Soy led to a more robust growth and whey led to greater EGP, it may be possible that protein blends will provide the benefits of the better of the two worlds.

ACCOMMODATIONS

The authors are grateful to Mrs. Biana Shtaiha and Mrs. Michal Foist for technical assistance, to Dr. Michal Gavian-Yackobovitch and Dr. Barbara Mickelson (Tikkad Diets Division, Enrico, USA) for their help in designing the special diets.