

# Determining the Medium- Term (3 months) Effect of Phosphorus Premeal on Reducing Energy Intake and Body Weight.

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*Background:* The present study is based on preliminary data, that a dose of 500 mg Phosphorus (P) was able to reduce subsequent food intake by about 27-33%. Assuming that using the highest dose of P (500 mg), three-times-daily ingestion of 500 mg P doses (before each meal: breakfast, lunch, and dinner) would increase daily phosphorus intake by 1.5 g, so intake from supplement plus food would be in the range of about 3 g, which would be 25% lower than the upper limit of intake for phosphorus (4 g/day). It is well accepted that changes in body weight require about 3 months. Using body weight as the outcome, which is the ultimate outcome of weight loss approaches, would provide robust information on the role of phosphorus.

*Objective:* We will investigate the effect of chronic phosphorus supplementation of 375mg with each main meal (breakfast, lunch, and dinner) on reducing food intake to the extent that body weight will be reduced. The effect of 3 months phosphorus supplementation with meal intake (breakfast, lunch and dinner) on body weight in overweight and obese subjects was examined. Primary outcome variables will be body weight, BMI, waist circumference, HbA1c, insulin and GLP-1. We hypothesize that meal phosphorus supplementation of 375mg will decrease GLP-1 and subsequent food intake and lead to a reduction in body weight, waist circumference, HbA1c, and improve insulin sensitivity of overweight and obese subjects. Such reduction would be expected to reduce morbidity and mortality of the subjects.

*Design:* This was a double-blind, randomized, placebo-controlled study. Overweight and obese subjects (n=50) (18 men and 32 women) with a BMI of  $31 \pm 1.3$  and a mean age of  $29.75 \pm 2.36$  (mean $\pm$ SEM) participated in this study. Subjects were randomized to receive placebo (cellulose) or potassium phosphate (375mg) tablets at a specified time with each main meal (breakfast, lunch, and dinner) for a period of 3 months. Body weight, BMI, waist circumference, HbA1c, insulin and GLP-1 were collected at baseline and after 3 months of supplementation.

*Results:* After 3 months P supplementation, the change in weight ( $-0.44 \pm 0.53$  kg), BMI ( $0.16 \pm 0.18$  kg/m<sup>2</sup>) and WC ( $-3.48 \pm 0.60$  cm) was significantly ( $p < 0.05$ ) lower compared with placebo ( $1.13 \pm 0.45$  kg,  $0.42 \pm 0.18$  kg/m<sup>2</sup> and  $0.38 \pm 0.4$  kg/m<sup>2</sup>, respectively). The change in insulin, GLP-1 and HbA1C did not differ between groups

*Conclusion:* Phosphorous supplementation over a period of 3 months was significantly associated with decreased body weight, BMI, and waist circumference. However, there was no significant effect on insulin concentration and GLP-1.