Probiotic supplements prevented oxonic acid-induced hyperuricemia and renal damage

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Introduction:

Hyperuricemia is often present in the population, with some studies reporting a prevalence as high as 21% in men and women. While the presence of hyperuricemia in the absence of gout has often been described as “asymptomatic”, recent studies suggest hyperuricemia may have a contributory role in metabolic and cardiovascular diseases. Extrarenal excretion of uric acid via the intestine accounts for one-third of its total excretion. Uric acid is secreted into the gut where it is rapidly metabolized by bacterial microbiota. Moreover, it was recently shown that gouty patients have a significantly different intestinal microbiota in comparison to normouricemic subjects, a finding that suggests an interaction between the microbiota and intestinal UA metabolism and excretion that could potentially modulate serum uric acid levels.

Patients have a significantly different intestinal microbiota in comparison to normouricemic subjects, a finding that suggests an interaction between the microbiota and intestinal uric acid metabolism and excretion that could potentially modulate serum uric acid levels. Thus, the gut microbiota could be an attractive alternative biotherapeutic product for hyperuricemia/gout applications.

Probiotic supplements prevented oxonic acid-induced hyperuricemia and renal damage

Thirty male Wistar rats were ordered from Envigo Mexico (Mexico City, Mexico), and given 5 days to acclimate to the housing facility prior to be trained for baseline systolic blood pressure (SBP) measurement. Rats were housed in micro barrier system cages and given access to food and water ad libitum during acclimation. Animals were monitored on a daily basis for health status. Baseline urine and fecal samples were collected by placing rats in metabolic cages (Tecniplast, Varese, Italy) for 16 h with food and water ad libitum. SBP was measured by tail-cuff manometry in conscious animals previously accustomed to this procedure (NIBP System IN125/R. ADInstruments Inc. Dunedin, New Zealand). Three consecutive measurements were recorded, and the mean reported. After SBP quantification a sample of blood was taken from the tail vein (900 μL), and plasma stored at -20°C until further processing. Five groups of 6 rats each were used. Oxonic acid, potassium salt was dissolved daily by gavage using flexible polyethylene tube and a syringe in morning hours for a total of 5 weeks, including weekends.

Diet. Rat Chow AIN-93 (Purified Diets for laboratory rodents) was purchased from Dyets Inc. Bethlehem PA. Two probiotic containing formulas were prepared and stored at -20°C. The compositions of the formulas were: Phlebolite-Cream of wheat. Formula 1: L acidophilus KB27 (5.0 B CFU/day), L rhamnosus KB79 (5.0 B CFU/day), Xylooligosaccharide-50.0 mg per day. Formula 2: L acidophilus KB27 (5.0 B CFU/day), L rhamnosus KB79 (5.0 B CFU/day), Xylooligosaccharide-50.0 mg per day, curcuminic-25.0 mg/day. The formulas were mixed into the rat chow and made into 5.0 gram balls. The following groups were included:

C = Control group. Normal healthy rats receiving normal regular diet. HU + : Oxonic acid-induced hyperuricemia receiving normal regular diet.

HU + F1 : Oxonic acid-induced hyperuricemia receiving probiotics formula 1 containing diet.

HU + F2 : Oxonic acid-induced hyperuricemia receiving probiotics formula 2 containing diet.

Oxonic acid dosing and probiotics feeding were started at the same time point. No adverse events were observed during the 5-week follow-up, and all rats reached the end of the study.

Systolic blood pressure measurements, urine collection, and blood samples were obtained at 3 and 5 weeks, at this latter point diarrhoea was observed in the oxonic acid-fed rats. The rats reached the end of the study.

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Conclusions/Summary

We demonstrate for the first time the ability of probiotics containing uricolytic bacteria to lower serum uric acid in hyperuricemic animals with beneficial consequences on blood pressure and renal disease. We suggest clinical studies are needed to evaluate this approach for treating hyperuricemia in humans.

Funding for this project was provided by Kibow Biotech, Inc. Newtown Square PA, 19073

Introduction:

Hyperuricemia is often present in the population, with some studies reporting a prevalence as high as 21% in men and women. While the presence of hyperuricemia in the absence of gout has often been described as “asymptomatic”, recent studies suggest hyperuricemia may have a contributory role in metabolic and cardiovascular diseases. Extraenal excretion of uric acid via the intestine accounts for one-third of its total excretion. Uric acid is secreted into the gut where it is rapidly metabolized by bacterial microbiota. Moreover, it was recently shown that gouty patients have a significantly different intestinal microbiota in comparison to normouricemic subjects, a finding that suggests an interaction between the microbiota and intestinal UA metabolism and excretion that could potentially modulate serum uric acid levels. Current therapy for lowering serum UA includes inhibitors of xanthine oxidase (allopurinol, febuxostat), recombinant uricase (rasburicase) and uricosuric agents (probenecid). Nevertheless, all these drugs may produce undesired secondary effects. Therefore, the development of alternative therapeutic strategies to reduce UA concentrations would be useful. Hence, a natural inexpensive, safe product as a non-drug/probiotic dietary supplement could be an attractive alternative biotherapeutic product for hyperuricemia/gout applications.

Aim:

This pilot study was designed to evaluate the potential of two probiotic supplements to lower systemic uric acid concentrations. Secondary objectives were to evaluate whether hyperuricemia was accompanied by a therapeutic benefit on the hyperuricemia-induced renal damage and hypertension. Finally, we profiled fecal microbiota in order to assess the effects of hyperuricemia and probiotic supplementation on bacterial community structure.

Learning Objectives:

1. To discuss the probable health advantages of using probiotics to reduce serum uric acid levels instead of drugs.
2. To discuss the positive impact of treating hyperuricemia for preventing renal and cardiovascular damage.
3. To discuss the suitability of performing clinical studies.

Methods:

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