Poster Presentation-7th Annual Conference on Prevention in Renal Disease-September 19th- 20th 2008 Toronto, Canada

Oral ingestion of probiotics and fecal analysis in CKD III and IV patients – Preliminary observations

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1. BACKGROUND

Intestinal microflora of animals and humans represents a complex ecosystem containing several species of both beneficial and harmful microorganisms. In recent years the concept of "probiotics" has been the focus of attention by health professionals for both the prevention and treatment of animal and human diseases. Probiotics are "live microorganisms, which, when administered in adequate amounts, confer a health benefit on the host." As their safety and health benefits are being established, it is reasonable to anticipate that probiotic bacteria will be incorporated into a growing number of clinical regimens. Several *in vitro* studies and exploratory testing of orally administered probiotic bacteria in rats and minipigs with surgically induced chronic kidney disease (CKD) were previously carried out. Based on the encouraging results observed, a human trial is now in progress. Although the overall aim of the study is to observe the effect of ingesting a probiotic bacterial formulation on fecal microbial patterns and signs and symptoms in CKD patients, only the fecal microbial results will be presented.

2. OBJECTIVE

To determine the effect of ingesting daily a probiotic bacterial formulation by CKD patients on intestinal microbial ecology.

3. HYPOTHESIS

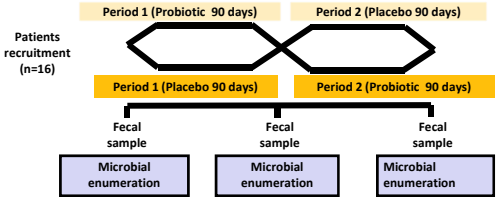
Intestinal microflora of CKD patients differs considerably from that of normal healthy human subjects. Ingesting 'probiotic' bacteria will result in the growth and colonization of these bacteria and improved microbial ecology.

4. STUDY DESIGN

A fully randomized, double blind, placebo controlled, cross over study was performed for a period of six months with sixteen CKD patients. Fecal samples were collected at the beginning, middle (90 days) and the end (180 days). Under these conditions, each patient served as her/his own control. A schematic of the study design used is shown in figure 1.

5. METHOD

Figure 1. Study Design



Sixteen patients who were clinically diagnosed with CKD were given capsules containing either a placebo or a probiotic formulation (Kibow Biotics®) containing 90 billion CFU/day (2 X 15billion/gel cap, three times). The initial treatment period was for three months, followed by crossover after 3 months and return to initial therapy for a 2nd treatment period of three months. Various primary, secondary and tertiary parameters were evaluated and these data will be reported separately. Each patient was given a stool collection kit consisting of special toilet seat adapters and plastic bags for the collection of fecal samples. Specially adapted syringes for the purpose of fecal biopsies, pre-weighed vials containing appropriate media for microbiological enumeration, and Styrofoam containers with dry ice were also provided. Immediately following defecation, subjects were instructed to transfer 1-2 grams of fecal material by using the syringe into two separate vials, mix thoroughly and place them into the dry ice container and transport same to our laboratory for analysis. Subjects were trained in the process of fecal collection by a technician. At the time of analysis, fecal samples were thawed, mixed and aliquots were taken for dilution. Following measurements were made:

1. Fecal pH using a pH meter
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Bacteria	Media	Incubation		
		Condition	Temperature (°C)	Time (Hrs)
Total Aerobes (TAE)	Schaedler agar	Aerobic	37	72
Total Anaerobes (TA)	Schaedler agar	Anaerobic *	37	72
S. thermophilus (St)	M 17 agar	Aerobic	37	72
L. acidophilus (La)	Ragosa SL agar	Anaerobic *	37	72
B. longum (Bl)	MRS agar + Cys-HCl	Anaerobic *	37	72

6. RESULTS

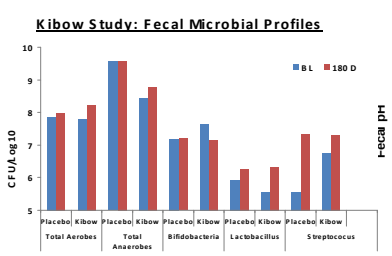

Figure 2: Effect of Ingesting Probiotic Bacterial Formulation on Fecal Microbiology

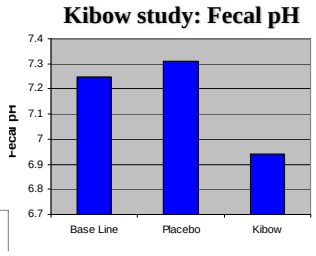

Figure 3. Effect of Ingesting Probiotic Bacterial Formulation on Fecal pH

7. SUMMARY OF RESULTS

- Total microbial counts of study subjects were much lower (10^{10} CFU/gm) than a normal healthy population (10^{12} CFU/gm)

- Fecal pH during probiotic ingestion period decreased significantly ($P < 0.03$) to a more acidic status while there was increased growth of ST and LA during probiotic ingestion

8. CONCLUSION

This study found that the intestinal microflora of CKD patients differs considerably from normal healthy subjects. It also shows that oral ingestion of a probiotic regimen as formulated for these CKD patients is indeed safe and may provide beneficial advantages in augmenting gut microflora suggesting a potential clinical application for a gut-based uremia therapy (Enteric Dialysis™).

9. ACKNOWLEDGEMENT

We would like to thank Gelda Scientific, Mississauga, ON, for funding this Canadian human clinical trials.