Available online at **www.ijmrhs.com**

ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2016, 5, 2:50-53

Role of prebiotic and probiotic in the management of chronic kidney disease patients

Mathew George[1], Lincy Joseph[2] and Deepa George[3*]

[1]Department of pharmacology, Pushpagiri College of pharmacy, Thiruvalla, Kerala, India
[2]Department of Pharmaceutical chemistry, Pushpagiri college of pharmacy,Thiruvalla, kerala, India
*[3]*Department of Pharmacy practice, Pushpagiri college of pharmacy,Thiruvalla, kerala, India*
Corresponding Email: deepageorge91@gmail.com

ABSTRACT

Chronic Kidney disease is more common in Indian population today. Hence the need of medications for chronic kidney disease also increased now a days. This study is designed to investigate the role of Prebiotics and probiotics in the management of chronic kidney disease patient. Oral administration of a probiotic formulation of selected microbial strains may extend renoprotection via intraintestinal extraction of toxic waste solutes in patients with chronic kidney disease (CKD) . The idea behind the research is to prevent the development of key damaging uremic toxins by targeting the process of bacterial protein fermentation in the gut. People with kidney disease have been shown to have a disturbed gut flora, which promotes the increased production of those harmful toxins. By supplementing patients with a specific combination of bacteria (probiotics) and beneficial fibre to support the growth of the good bacteria (prebiotics), it improve the health of the gut, suppressing the growth of bad bacteria and therefore decreasing the production of the toxins. In turn this should assist in delaying further kidney disease progression and improve heart health.

Key words: Chronic kidney disease, probiotics, prebiotics, Uremic toxins

INTRODUCTION

Chronic kidney disease (CKD), also known as chronic renal disease, is a progressive loss in renal function over a period of months or years. The symptoms of worsening kidney function are not specific, and might include feeling generally unwell and experiencing a reduced appetite. Often, chronic kidney disease is diagnosed as a result of screening of people known to be at risk of kidney problems, such as those with high blood pressure or diabetes and those with a blood relative with CKD. This disease may also be identified when it leads to one of its recognized complications, such as cardiovascular disease, anemia, or pericarditis. It is differentiated from acute kidney disease in that the reduction in kidney function must be present for over 3 months.

Chronic kidney disease is identified by a blood test for creatinine, which is a breakdown product of muscle metabolism. Higher levels of creatinine indicate a lower glomerular filtration rate and as a result a decreased capability of the kidneys to excrete waste products. Creatinine levels may be normal in the early stages of CKD, and the condition is discovered if urinalysis (testing of a urine sample) shows the kidney is allowing the loss of protein or red blood cells into the urine.

Recent professional guidelines classify the severity of CKD in five stages, with stage 1 being the mildest and usually causing few symptoms and stage 5 being a severe illness with poor life expectancy if untreated. Stage 5 CKD is often called end-stage kidney disease, end-stage renal disease, or end-stage kidney failure, and is largely synonymous with the now outdated terms chronic renal failure or chronic kidney failure; and usually means the patient requires renal replacement therapy, which may involve a form of dialysis, but ideally constitutes a kidney transplant.

Screening of at-risk people is important because treatments exist that delay the progression of CKD. If an underlying cause of CKD, such as vasculitis, or obstructive nephropathy (blockage to the drainage system of the kidneys) is found, it may be treated directly to slow the damage. In more advanced stages, treatments may be required for anemia and renal bone disease (also called renal osteodystrophy, secondary hyperparathyroidism or chronic kidney disease - mineral bone disorder (CKD-MBD).

Causes of Chronic Kidney disease

The two main causes of chronic kidney disease are diabetes and high blood pressure, which are responsible for up to two-thirds of the cases. Diabetes happens when your blood sugar is too high, causing damage to many organs in your body, including the kidneys and heart, as well as blood vessels, nerves and eyes. High blood pressure, or hypertension, occurs when the pressure of your blood against the walls of your blood vessels increases. If uncontrolled, or poorly controlled, high blood pressure can be a leading cause of heart attacks, strokes and chronic kidney disease. Also, chronic kidney disease can cause high blood pressure.

Other conditions that affect the kidneys are:

- Glomerulonephritis, a group of diseases that cause inflammation and damage to the kidney's filtering units. These disorders are the third most common type of kidney disease.
- Inherited diseases, such as polycystic kidney disease, which causes large cysts to form in the kidneys and damage the surrounding tissue.
- Malformations that occur as a baby develops in its mother's womb. For example, a narrowing may occur that prevents normal outflow of urine and causes urine to flow back up to the kidney. This causes infections and may damage the kidneys.
- Lupus and other diseases that affect the body's immune system.
- Obstructions caused by problems like kidney stones, tumors or an enlarged prostate gland in men.
- Repeated urinary infections.

Symptoms of Chronic Kidney Disease

Most people may not have any severe symptoms until their kidney disease is advanced. Some symptoms include

- feel more tired and have less energy
- have trouble concentrating
- have a poor appetite
- have trouble sleeping
- have muscle cramping at night
- have swollen feet and ankles
- have puffiness around your eyes, especially in the morning
- have dry, itchy skin
- need to urinate more often, especially at night.

Towards the later stages of CKD, the importance of five key nutrients becomes more of a priority: these are phosphorous, potassium, sodium, protein and fluid. People with kidney disease have been shown to have a disturbed gut flora, which promotes the increased production of those harmful toxins. By supplementing patients with a specific combination of bacteria (probiotics) and beneficial fibre to support the growth of the good bacteria (prebiotics), we expect to improve the health of the gut, suppressing the growth of bad bacteria and therefore decreasing the production of the toxins. In turn this should assist in delaying further kidney disease progression and improve heart health.

Probiotic are types of' living friendly bacteria similar to those that inhabitant our digestive tract. They are naturally found in cultured or fermented foods such as yoghurt, butter milk and can also be taken in supplemented form. They may also help to restore good bacteria after a course of antibiotics. Probiotics include *Lactobacillus acidophilus* and *Bifidobacterium lactis*, which are found in yoghurt. The term probiotic is currently used toingested microorganisms associated with beneficial effects to humans and animals. The term came into more common use after 1980. The introduction of the concept is generally attributed to recipient Élie Metchnikoff, who in 1907 suggested that "the dependence of the intestinal microbes on the food makes it possible to adopt measures to modify the flora in our bodies and to replace the harmful microbes by useful microbes"

Prebiotics are 'nonliving' food ingredients that reach the large intestine unaffected digestion, and feed the good bacteria in our gut helping them to grow and flourish. Prebiotics which include fructooligo saccharides (FOS),galacto –oligosaccharides are naturally found in many foods including legumes, wheat products, rye based foods etc.

The idea behind the research is to prevent the development of key damaging uremic toxins by targeting the process of bacterial protein fermentation in the gut. People with kidney disease have been shown to have a disturbed gut flora, which promotes the increased production of those harmful toxins. By supplementing patients with a specific combination of bacteria (probiotics) and beneficial fibre to support the growth of the good bacteria (prebiotics), it improve the health of the gut, suppressing the growth of bad bacteria and therefore decreasing the production of the toxins. In turn this should assist in delaying further kidney disease progression and improve heart health.

Natarajan Ranganathan *et al* [1] conducted a 6 month prospective study on probiotic dietary supplementation of promoting healthy kidney function in patient with chronic kidney disease stage 3 and stage 4. Outcomes were compared using biochemical parameters: blood urea nitrogen(BUN), serum creatinine, and uric acid. Sixty four patients were enrolled in the study. The main outcome of this priliminary trial include a reduction of BUN, enhanced well-being and absence of serious adverse event,thus supporting the use of chosen probiotic formulation for bowel based toxic solute extraction. BUN levels and Quality of life show difference in outcome in placebo and probiotic treatment period. Oral ingestion of probiotics (90 billion colony forming unit) was well tolerated and safe during the entire period of all sites. BUN levels decreased in 29 patients, creatinine level decreased in 20 patients and uric acid level decreased in 15 patients.

Elia friedman *et al* [2] conducted a study on Probiotic dietary supplementation in patient with stage3&stage4 chronic kidney disease in Canada. This is a prospective 6 month study of probiotic bacteria was conducted in outpatients in Ontario, Canada. Primary endpoints included effect on hematologic, biochemical and fecal variables. The primary aim of study was to assess biochemical and clinical effects of a probiotic dietary supplement in stage3 and stage 4. Among the outpatients who completed the study, the mean change in BUN concentration during the probiotic treatment period is high, in addition the mean change in uric acid concentration were moderate .

Paola Vanessa etal [3] conducted a study on Effect of probiotic on human blood urea levels in patient with chronic renal failure. The aim of the study was to determine the effectiveness of 2 lactobacillus doses in achieving a decrease a urea concentration with stage 3 and stage4 patients. Patients with CKD show an increase in bowel aerobic bacteria that produce uremic toxins and decreased anaerobic bacteria as bifidobacteria and lactobacillus. 30 Patients were provided the medication and followed for 8 weeks . Group A and Group B patients were provided different doses. Final samples were obtained to calculate the concentration of urea and serum creatinine. When analyzing the percentage change between different doses a decrease in>10 percentage was found in blood urea concentration for patient treated with high dose.

Mansh Rathi *et al* [4] conducted a study on Effect of prebiotic and probiotic supplementation in CKD .The purpose of this short term intervention study was to study the effect of prebiotic –probiotic therapy and diet counselling on nutrition ,renal progression and overall health of CKD patients. The mean age of patients was 45 years. All patients were prescribed enteric coated gelatin capsules containing lyophilized *streptococcus thermophilus, lactobacillus acidophilus* and *bifidobacterium longum* in a dose of 15 colony forming units. Studies showing there is a reduction in uremic toxins .Statistical analysis was carried out using paired t test .

Elia friedman *et al* [5] conducted a study on Probiotic dietary supplementation in patient with stage3 & stage4 chronic kidney disease in Canada. This is a prospective 6 month study of probiotic bacteria was conducted in outpatients in Ontario, Canada. Primary endpoints included effect on hematologic, biochemical and fecal variables. The primary aim of study was to assess biochemical and clinical effects of an probiotic dietary supplement in stage3 and stage 4. Among the outpatients who completed the study, the mean change in BUN concentration during the probiotic treatment period is high,in addition the mean change in uric acid concentration were moderate

Ando Y *et al* [6] conducted a study on Effect of Oral intake of an enteric capsule preparation containing *Bifidobacterium longum* (Bifidus HD) on the progression of chronic renal failure, reduction of these intestinal Putrefactive products can be expected to retard the progression of renal failure. In the present study, an enteric capsule preparation containing *Bifidobacterium longum* was administered orally to 27 patients with chronic renal failure for 6 months. A significant retardation of progression of renal failure was found in patient with an initial serum creatinine level>or 4mg/dl or those with an initial serum inorganic phosphate level>4mg/dl. Bifidus HD is considered a useful tool for suppressing the progression of chronic renal failure .

Kelly S Swanson *et al* [7] conducted a study on Fructooligosaccharides and Lactobacillus acidophilus Modify Bowel function and protein catabolites excreted by healthy humans. The objective of the experiment was to determine whether supplementation with fructooligosaccharides and *lactobacillus acidophilus* affected bowel function and fermentative end product concentration in feces of healthy humans.68 subjects were enrolled in the study. FOS and LAC modified several metabolites associated with gut health, with FOS tending to be beneficial.

CONCLUSION

By supplementing patients with a specific combination of bacteria (probiotics) and beneficial fiber to support the growth of the good bacteria (prebiotics), it improves the health of the gut, suppressing the growth of bad bacteria and therefore decreasing the production of the toxins. In turn this should assist in delaying further kidney disease progression and improve heart health. This study help to find the role of probiotics in reducing uremic toxins such as creatinine ,blood urea nitrogen, uric acid of chronic kidney disease patient.

REFERENCES

[1] Ranganathan N. Probiotic dietary supplementation in patients with stage III and IV chronic kidney disease. Curr Med Res Opin. 2009;25:1919-1930.
[2] Paola Vanessa .Effect of probiotic on human blood urea levels in patient with chronic renal failure .Nutr Hosp. 2014 ;29(30):582-590
[3] Mansh Rathi . Effect of prebiotic and probiotic supplementation in CKD;Kidney Research and clinical practice;31(2):A67
[4] Elia Friedman . Probiotic dietary supplementation in Canada. Curr Med Res Opin. 2009 ;25:1919-1930.
[5] Ando Y .Effect of Oral intake of an enteric capsule preparation containing Bifidobacterium longum on the progression of chronic renal failure.Nihon Jinzo gakkai shi 2003;45(8):759-64
[6] Kelly S Swanson . Fructooligosaccharides and lactobacillus acidophilus modify bowel function and protein catabolites excreted by healthy humans; Jnutr.2002;132(10):3042-50