The effect of probiotics on serum levels of cytokine and endotoxin in peritoneal dialysis patients: a randomised, double-blind, placebo-controlled trial


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Received: 25 June 2014 / Accepted: 24 September 2014
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Abstract

Inflammatory markers such as interleukin (IL)-6 and tumour necrosis factor-alpha (TNF-α) are elevated in dialysis patients and can predict cardiovascular events and all-cause mortality. Endotoxin is an important source and also another marker of inflammation in patients with chronic kidney disease. The aim of this study was to evaluate the impact of oral probiotics on serum levels of endotoxemia and cytokines in peritoneal dialysis (PD) patients. The decline of residual renal function, peritonitis episodes, and cardiovascular events were also recorded. From July 2011 to June 2012, a randomised, double-blind, placebo-controlled trial was conducted in PD patients. The intervention group received one capsule of probiotics containing \(10^9\) cfu *Bifobacterium bifidum* A218, \(10^9\) cfu *Bifidobacterium catenulatum* A302, \(10^9\) cfu *Bifidobacterium longum* A101, and \(10^9\) cfu *Lactobacillus plantarum* A87 daily for six months, while the placebo group received similar capsules containing maltodextrin for the same duration. Levels of serum TNF-α, interferon gamma, IL-5, IL-6, IL-10, IL-17, and endotoxin were measured before and six months after intervention. 39 patients completed the study (21 in the probiotics group and 18 in the placebo group). In patients receiving probiotics, levels of serum TNF-α, IL-5, IL-6, and endotoxin significantly decreased after six months of treatment, while levels of serum IL-10 significantly increased. In contrast, there were no significant changes in levels of serum cytokines and endotoxin in the placebo group after six months. In addition, the residual renal function was preserved in patients receiving probiotics. In conclusion, probiotics could significantly reduce the serum levels of endotoxin, pro-inflammatory cytokines (TNF-α and IL-6), IL-5, increase the serum levels of anti-inflammatory cytokine (IL-10), and preserve residual renal function in PD patients.

Keywords: cytokines, endotoxin, inflammation, peritoneal dialysis, probiotics

1. Introduction

Chronic inflammation, which is widely seen in chronic kidney diseases (CKD) including long-term dialysis patients, is associated with malnutrition, atherosclerosis and an increased mortality risk (Stenvinkel et al., 2005). Inflammatory markers such as interleukin (IL)-6 and tumour necrosis-alpha (TNF-α) are elevated in dialysis patients and can predict cardiovascular events and all-cause mortality (Kimmel et al., 1998; Stenvinkel et al., 2002, 2005). Endotoxin is bacterial lipopolysaccharide, and makes up the outer membrane of Gram-negative bacteria (Raetz and Whitfield, 2002). Endotoxin is also an important source and also a marker of inflammation in CKD (Hauser...