

Effect of Synbiotic Supplementation on Serum Systemic Inflammatory Marker and Serum Albumin in Patients Admitted to ICU

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Abstract

Introduction: The role of inflammation and malnutrition in critically ill patients has been shown in some studies. The aim of the study is to determine the effect of symbiotic on serum systemic inflammatory marker (hs-CRP) and albumin in critically ill patients.

Methods: Sixty patients admitted to the intensive care unit of Sabzevar Vasei hospital were randomized two groups that received symbiotic or placebo for 2 weeks. Levels of serum hs-CRP and albumin were measured before and after the study.

Results: There was a significant differences between two groups the Levels of serum hs-CRP (P=0.0001) and albumin (P=0.0001).

Conclusion: Results of study were showed that administration of symbiotic in critically ill patients reduced the levels of serum hs-CRP and increased the levels of serum albumin.

Keywords: Synbiotic; hs-CRP; Albumin; Critically ill

Introduction

A hyper-catabolic state and systemic inflammation and sepsis common seen in critically ill patients [1]. Serum Albumin is one of the best indicators of nutrition status and hypo-albuminemia has been considered as protein malnutrition [2]. In some studies, serum albumin has been more significantly influenced by factors other than nutritional intake [3-5]. Inflammation may reduce serum albumin level and severe hypo-albuminemia are common in critically ill patients [3]. Recently, it is suggested that consumption of probiotics would be a novel approach to decrease inflammation in humans [6,7]. Probiotics are kinds of living microorganisms which have beneficial health effects on humans. Two main groups of probiotic bacteria which are most used involving *Lactobacillus* and *bifidobacteria* [8,9]. Prebiotics are carbohydrate that transit undigested through the small intestine and reach the colon where stimulate the growth and /or activity of probiotics [10]. However, available evidence about the effects of probiotic on inflammation is controversial. Therefore, the purpose of this study is to evaluate the effects of symbiotic (pre and probiotic) on serum C-reactive protein (CRP) as a marker of inflammation and albumin as a nutritional status marker.

Methods

Protocol design

Sixty patients were participated in the study of Vaseei hospital in sabzevar. In this Study, inclusion criteria were critically ill patients who were 18-40 years, expected to stay in ICU at least 2 weeks, and received enteral nutrition and require mechanical ventilation. Exclusion criteria were patients who could not tolerate enteral nutrition, unstable hemodynamics, cancer, diabetes mellitus, immune disorders, intestinal obstruction or ischemia and they who expected to expire in less than 2 weeks. After approval of ethics committee of Sabzevar university of Medical Sciences and written informed consent was obtained from all guardian participants, patients were randomized to two groups, the first group received standard treatment plus placebo and the second group

received standard treatment plus symbiotic (Bioplus Life Sciences Pvt. Ltd. Bangalore, India) 2 tablets daily for 2 Weeks. Each tablet of symbiotic contained of 150×10^6 spores of *Lactobacillus Coagulans* and 100 mg Fructo-Oligosaccharides.

Data collection

Energy requirement were calculated as 25-30 kcal /kg bw. Fasting blood sample were obtained from each patient to evaluate serum hs-CRP and albumin on day 1 and 14. Serum hs-CRP was measured by using Enzyme Linked Immuno Sorbent Assay (ELISA) kits (Monobind, Inc., Lake Forest, Calif., USA) and albumin was determined using Bromcresol Green method by auto-analyzer selectra 2, kits (Pars Azmoon., Tehran., Iran).

Data analysis

Data were analyzed by SPSS Version 16 and by independent t-test and paired t-test. P-Value <0.05 were considered significant for all statistical tests. The results are expressed as mean \pm SD and differences were considered significant at P<0.05.

Results

In this study, there were 20 female and 40 males. Demographic data of patients was shown in Table 1. No significant differences were

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Received June 01, 2016; Accepted June 01, 2017; Published June 09, 2017

Citation: Akram K, Ali T, Hassan RM, Moosaalreza T (2017) Effect of Synbiotic Supplementation on Serum Systemic Inflammatory Marker and Serum Albumin in Patients Admitted to ICU. J Prob Health 5: 176. doi: 10.4172/2329-8901.1000176

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	Placebo group	Synbiotic group	P value
Age (year)	32.77 ± 2.26	32.70 ± 1.70	P>0.05
Sex (Male/female)	(21/9)	(19/11)	P>0.05
BMI (kg/m ²)	22.10 ± 2.00	22.09 ± 2.00	P>0.05

Table 1: Demographic data of patients in the study.

	CRP (mg/L)		Albumin (gr/dl)	
	Synbiotic	Placebo	Synbiotic	Placebo
Day 1	2.76 ± 1.07	2.46 ± 1.10	3.64 ± 0.09	3.52 ± 0.09
Day 14	2.06 ± 1.01	3.40 ± 1.10	3.90 ± 0.10	3.41 ± 0.09
P-value	0.0001		0.0001	

Table 2: Levels of serum hs-CRP and Albumin at baseline and the end of the study in two groups.

observed patients' demographic data between two groups. Levels of serum hs-CRP and albumin at the first and the end of study were shown in Table 2. There was a significant difference between two groups in levels of serum hs-CRP and albumin (P=0.0001, P=0.0001 respectively).

Discussion

The present study was showed that critically ill patients who received synbiotic supplementation, had reduction in inflammation than did the patients received placebo. C-reactive protein or CRP is commonly used as a marker of systemic inflammation and its serum level is a useful indicator of the extent of an inflammatory process [11,12]. Kotzampassi et al. was reported a similar finding. In their study, consumption of synbiotic 2000 forte, caused a significant reduction in serum CRP compared to placebo group [13]. Also, the Study was done by Alberda et al., probiotics VSL # 3 treatment was decreased serum CRP levels more than placebo or bacterial sonicates [14]. A dissimilar results was reported by Mc Naught et al. enteral feeding of Provia, an oatmeal-based drink containing lactobacillus plantarum 299 V to critically ill patients had no significant effect on serum CRP Levels [15]. Similarly, a study on 6 Volunteers for aperiod of 6 weeks showed significant reduction in serum hs-CRP by probiotic VSL#3 treatment compared to placebo group [16]. These Controversial observation may be attributed to factors such as strains of probiotic used in the study or dosage and duration of study.

The serum albumin level is a useful indicator of nutritional status. Malnutrition is characterized by a low serum albumin level. The decrease in serum albumin resulting from inflammatory cytokines is a most important issue among hospitalized patients [17,18]. Hypoalbuminemia is the result of combined effects of inflammation and inadequate protein and caloric intake in patients with chronic disease. Inflammation and malnutrition both reduce albumin level by reducing rate of synthesis and inflammation alone is associated with a greater fractional catabolic rate [19]. In the present study, synbiotic significantly decreased serum albumin. Some researchers showed that probiotics enhance nutritional status and systemic immune responses [20,21]. Fukushima showed that administration of enteral nutrition with fermented milk containing of probiotic L. John sonii La1 for 12 weeks, increased in serum albumin and decreased in TNF- α compared to placebo in elders [20]. In another study, Kaburagi et al. indicated that probiotic Lactobacillus John sonii La1 enhanced serum albumin concentrations and body weight in aged mice with protein-energy malnutrition [21].

Conclusion

Results of study were showed that administration of synbiotic in

critically ill patients reduced the levels of serum hs-CRP and increased the levels of serum albumin.

Acknowledgements

This study was supported by Sabzevar University of Medical Sciences of Sabzevar of Iran. The authors gratefully acknowledge the cooperation of the guardian of participating patients.

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