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Research Paper

The Impact of Oral Probiotics on Laboratory Parameters in Patients With Alcohol Toxicity: A Single-blinded Intervention Study

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ABSTRACT

Background: Alcohol toxicity is a significant medical emergency with implications for patient management and outcomes. This single-blinded randomized intervention study investigated the effects of oral probiotics on various laboratory parameters in patients with acute alcohol toxicity.

Methods: A total of 30 eligible patients were randomly assigned to either the control (placebo) or intervention (oral probiotics) group.

Results: While the study did not reveal a significant impact on the length of hospital stay (LOHS), it did demonstrate notable improvements in laboratory variables, including pH, serum glutathione level, serum vitamin B6 level, and O_2 saturation, in the probiotic group.

Conclusion: These findings suggest the potential benefits of probiotics in mitigating certain aspects of alcohol toxicity.

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Introduction

Alcohol toxicity is a common medical emergency, especially among middle-aged males [1]. Conventional treatments may not always be effective, leading to prolonged hospitalization and potential complications, particularly in children. Timely intervention [2] is crucial due to the short window between intoxication and the onset of life-threatening complications. While various therapeutic modalities exist, probiotics have emerged as a novel treatment option. Bowel flora plays a role in alcohol metabolism, and probiotics can modulate alcohol and acetaldehyde concentrations in chronic users [3]. Our study evaluated the effects of probiotics on laboratory parameters in alcohol toxicity, including the length of hospital stay (LOHS).

Materials and Methods

This single-blinded, randomized, controlled trial was conducted at Loghman Hakim Hospital in Tehran, Iran, between October 2021 and April 2022. The study enrolled patients with acute alcohol intoxication admitted to the toxicology ICU who were eligible to participate without any age or gender limitation. Patients with one of these exclusion criteria were not recruited into this study: 1) Concomitant intoxication with other drugs, 2) Refusal to enter the study, and 3) Patient death during the study.

Patients were randomly assigned to the intervention (oral probiotics) or control (placebo) group. Patients in the intervention arm were treated with two probiotic capsules (manufactured by Zisttakhmir company from Iran). The two capsules served as one serving size that contained probiotic elements (*Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Lactobacillus bulgaricus*, *Bifidobacterium breve*, *Bifidobacterium longum*, *Streptococcus thermophilus*). Prebiotic elements including Fructooligosaccharides, Lactose, Mg stearate, and talc were served via nasogastric tube one hour after antibiotic administration, every 8 hours for 7 days. In the control group, a placebo was used instead of probiotic capsules exactly as the probiotic capsules such as the method of administration and regimen.

The primary outcome was LOHS, while secondary outcomes included serum glutathione level, serum vitamin B6 level, and O_2 saturation.

Results

The study included 15 patients in each group, with no significant age or gender differences. Laboratory variables, except for APACHE II and glutathione levels, were comparable between the two groups (Table 1). The study did not reveal a significant difference in LOHS between the placebo and probiotic groups (P=0.2). However, after the intervention, the probiotic group showed significantly higher pH (P=0.02), serum glutathione level (P=0.004), serum vitamin B6 level (P=0.008), and O_2 saturation (P=0.01) compared to the placebo group (Table 2).

Discussion

Alcohol affects bowel flora and reduces beneficial microorganisms involved in alcohol metabolism [4]. Probiotics are beneficial in restoring the gut's bacterial flora in the context of alcohol intoxication [5]. Our study aligns with previous research indicating that probiotics can improve liver enzymes and restore the bowel flora in patients with alcohol-induced liver injury [6, 7]. While probiotics did not significantly impact LOHS in our study, they demonstrated notable improvements in various laboratory parameters associated with alcohol toxicity.

Conclusion

This single-blinded intervention study suggests that oral probiotics may not significantly affect the LOHS in patients with alcohol toxicity. However, they improve key laboratory parameters related to alcohol toxicity, including pH, serum glutathione level, serum vitamin B6 level, and O_2 saturation. Further research is needed to determine the optimal dosage and duration of probiotics in managing alcohol toxicity.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Research Ethics Committee of Shahid Beheshti University of Medical Sciences (Code: IR.SBMU.RETECH.REC.1400.442). This trial was registered with the Iranian Registry of Clinical Trials (IRCT) (Code: IRCT20210720051946N3). All the patients or their companions (legally eligible decision-makers in their absence) were required to fill out the consent form to enter the trial. Researchers adhered to the ethical considerations of the Helsinki Declaration and the confidentiality of patients' information. The pa-

Table 1. Baseline characteristics of placebo and intervention groups

Item	Groups	Mean±SD	P
APACHE II score	Control	21.64±12.87	0.01
	Intervention	33.93±12.84	
Serum glutathione level (ng/mL)	Control	2.3±0.33	0.01
	Intervention	1.97±0.36	
Serum vitamin B6 level (ug/L)	Control	30.98±1.34	0.15
	Intervention	30.06±2.01	
Types of Ingested Alcohol	**Groups**	**No. (%)**	
Ethanol	Control	2(13.3)	
	Intervention	1(6.7)	
Ethanol and methanol	Control	6(40)	
	Intervention	6(40)	
Others	Control	7(46.7)	
	Intervention	8(53.3)	

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Table 2. Laboratory data in the placebo and intervention groups, after interventions

Item	Groups	Mean±SD	P
APACHE II score	Placebo	10.71±6.57	0.08
	Probiotic	15.47±7.76	
Serum glutathione level (ng/mL)	Placebo	1.88±0.4	0.004
	Probiotic	2.28±0.29	
Serum vitamin B6 level (ug/L)	Placebo	29.63±1.48	0.008
	Probiotic	31.74±2.44	
pH	Placebo	7.35±0.08	0.02
	Probiotic	7.42±0.06	
PCO_2 (mm Hg)	Placebo	43.96±11.55	0.07
	Probiotic	36.95±9.28	
PO_2 (mm Hg)	Placebo	57.13±41.52	0.8
	Probiotic	59.35±25.74	
HCO_3 (mEq)	Placebo	22.92±5.39	0.4
	Probiotic	24.21±4.53	
O_2 saturation (%)	Placebo	69.61±21.93	0.01
	Probiotic	85.57±8.37	

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tient's consent has been taken and the consent form is available on request.

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Authors' contributions

Data collection: Mahnaz Tajdari, Farbod Amiri and Mitra Rahimi; Drafting the manuscript: Mahnaz Tajdari, Laya Ohadi and Fariba Ghorbani; Review and editing: Shahin Shadnia and Peyman Erfan Talab Evini; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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