



Research Article

Observing the Effects of Probiotics Combined with Rexine and Peptisonide Enteral Nutrition Guidance in Postoperative Intracerebral Hemorrhage Patients

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Abstract

Objective: To investigate the therapeutic effects of probiotics combined with Rexine or Peptisonide enteral nutrition guidance in postoperative intracerebral hemorrhage (ICH) patients.

Methods: Clinical data of 60 ICH patients treated at our hospital from May 2022 to January 2024 were retrospectively analyzed. The patients were divided into an observation group (OG) (probiotics combined with Peptisonide) and a control group (CG) (probiotics combined with Rexine), with 30 cases in each group. The comparison of neurological function scores, immunoglobulin levels, inflammation and infection markers, and adverse reactions between the two groups was conducted during the treatment process.

Results: Before treatment, the two groups were comparable in terms of The National Institutes of Health Stroke Scale (NIHSS) scores, Immunoglobulin A (IgA), Immunoglobulin G (IgG), Immunoglobulin M (IgM), D-lactic acid, and Procalcitonin (PCT) levels ($P>0.05$). After treatment, the NIHSS scores significantly decreased in both groups, with a more pronounced reduction observed in the OG ($P<0.05$). Levels of IgA, IgG, and IgM significantly increased, with a more substantial rise in the OG ($P<0.05$). The D-lactic acid levels significantly decreased, and both the D-lactic acid and PCT levels were lower in the OG ($P<0.05$). The incidence of vomiting, gastric retention, and gastrointestinal bleeding did not differ significantly between the two groups ($P>0.05$), but the incidence of diarrhea and constipation was notably lower in the OG compared to the CG ($P<0.05$).

Conclusion: The probiotic combined with Peptisonide enteral nutrition scheme significantly improves neurological function, enhances immunity, reduces inflammatory response, and decreases adverse reactions.

Keywords: probiotics, Rexine, Peptisonide, enteral nutrition, ICH, therapeutic effect

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1 INTRODUCTION

In the United States, approximately 10% of all stroke cases are intracerebral hemorrhage (ICH)^[1]. ICH is a disease caused by the rupture of cerebral blood vessels, leading to a substantial amount of blood seeping into the brain tissue and forming a hematoma, resulting in brain tissue necrosis. This condition is often associated with a very high mortality rate^[2]. ICH predominantly occurs in the elderly population and typically presents with severe symptoms. It is closely related to factors such as cerebrovascular diseases, hypertension, and smoking^[3]. Without timely and effective treatment, patients are at a significant risk of mortality^[4]. While surgical treatment is a common approach, it may lead to postoperative complications such as swallowing difficulties and temporary loss of eating ability^[5,6]. Therefore, enteral nutrition therapy is required but can cause complications including diarrhea and bloating, which can lead to gut microecological imbalance and malnutrition^[7,8]. In summary, early postoperative enteral nutrition support is crucial.

Probiotics can aid in regulating gastrointestinal function and immune response by altering the activity of the patient's gut microbiota. They help maintain microbial balance in the intestine, improve nutrient absorption, enhance immune system function, and promote intestinal health recovery^[9]. Enteral nutrition formulas provide the essential nutrients and energy required by the body, including amino acids, essential fatty acids, and vitamins^[10]. Rexine uses whole protein as a nitrogen source and contains a comparable amount of fat^[11]. Peptisonide is a short peptide enteral nutrition formula that can quickly provide energy and protect the mucosa for those with impaired gastrointestinal function^[11,12]. Currently, probiotics have shown efficacy in treating diarrhea symptoms and improving nutritional status in patients^[13]. However, there is a lack of studies on the combined application of probiotics and nutritional formulas.

Therefore, this study selects the clinical data of 60 ICH patients treated at our hospital from May 2022 to January 2024 to investigate the effects of probiotics combined with Rexine and Peptisonide enteral nutrition guidance in postoperative ICH patients.

2 MATERIALS AND METHODS

This retrospective study reviewed the clinical records of 60 ICH patients who received treatment at our hospital between May 2022 and January 2024. The patients were categorized into two groups based on their treatment methods: an observation group (OG) and a control group (CG), with 30 patients in each group. Inclusion criteria: (1) meeting the Chinese Guidelines for the Diagnosis

and Treatment of ICH (2019)^[14]; (2) complete clinical data. Exclusion criteria: (1) patients with gastrointestinal bleeding; (2) individuals with psychiatric conditions; (3) individuals with cancer. This research received approval from our hospital's medical ethics committee, and informed consent was obtained from both the patients and their families.

3 METHODS

Both the CG and the OG received probiotic combined treatment. The treatment regimen included oral administration of Bifid Triple Viable Capsules (Shanghai Sine Pharmaceutical Co., Ltd., National Drug Approval Number S10950032), 1.5 grams three times a day, diluted in an appropriate amount of drinking water, and administered through a nasogastric tube for 1 week.

The CG received probiotics combined with Rexine enteral nutrition treatment, administered through a nasogastric tube with Rexine enteral nutrition solution (Huarui Pharmaceutical Co., Ltd., National Drug Approval Number J20140075). The energy density of this solution is 1kcal/ml. The initial dose was 10ml (equivalent to 10kcal)/kg on the first day, with an infusion rate of 20ml/h, gradually increasing to 25-30ml per kg of body weight. The rate was increased by 20ml/h daily, with a maximum infusion rate of 70-80ml/h. The OG received probiotics combined with Peptisonide enteral nutrition treatment, administered through a nasogastric tube with Peptisonide enteral nutrition solution (Nutricia Pharmaceutical Co., Ltd., National Drug Approval Number H20010285). The administration method and dosage for Peptisonide and Rexine were the same. During the treatment, doctors regularly assessed the patients' nutritional status and gastrointestinal function. Based on these monitoring results, nutritional formulas and infusion rates were adjusted accordingly. Both groups were treated continuously for 1 week.

4 OBSERVATION INDICATORS

4.1 Neurological Function Score

The National Institutes of Health Stroke Scale (NIHSS)^[15] was used to evaluate the degree of neurological impairment in ICH patients. The scale ranges from 0 to 42 points. Higher scores indicate more severe neurological impairment, while lower scores indicate less severe impairment.

4.2 Changes in Immunoglobulin Levels

Venous blood samples (3-5mL) were collected from both groups before and after treatment to measure immunoglobulin levels, including Immunoglobulin G (IgG), Immunoglobulin A (IgA) and Immunoglobulin M (IgM), using immunoturbidimetry.

Table 1. Comparison of General Information between the Two Groups ($\bar{x}\pm s$)

Group		CG	OG	t/χ^2	P
Case(n)		30	30		
Gender	Male	14	15	0.0667	0.7962
	Female	16	15		
Age	Maximum	66	65	0.0007	0.9789
	Minimum	45	44		
	Average	55.93 \pm 4.69	55.88 \pm 4.71		
	Brainstem	5	6		
Hemorrhage position	Cerebellum	9	8	0.2793	0.9639
	Cerebral hemisphere	6	7		
	Basal ganglia	10	9		

Table 2. Comparison of NIHSS Scores Between the Two Groups ($\bar{x}\pm s$)

Group	Case	Before Treatment	After Treatment
CG	30	8.16 \pm 2.03	2.23 \pm 0.78
OG	30	8.26 \pm 2.15	3.17 \pm 0.56
<i>t</i>		0.1852	5.3620
<i>P</i>		0.8537	0.0001

4.3 Changes in Inflammation and Infection Indicators

Venous blood samples (2-5mL) were collected from both groups before and after treatment to measure Procalcitonin (PCT) levels using immunofluorescence, and D-lactate levels using colorimetry.

4.4 Adverse Reactions

During the treatment period, medical staff closely monitored the patients for symptoms and signs of adverse reactions, recording and managing occurrences of vomiting, gastric retention, diarrhea, gastrointestinal bleeding, and constipation.

4.5 Statistical Analysis

Using SPSS 22.0 software, statistical analysis was conducted, and GraphPad Prism 9 software was employed for image processing. Measurement data were described as mean \pm standard deviation ($\bar{x}\pm s$) and analyzed between groups using the *t*-test. For categorical data, represented as numbers and percentages (%), comparisons between groups were assessed using the χ^2 test. A significance level of $P<0.05$ was considered statistically significant.

5 RESULTS

5.1 Comparison of General Information between the Two Groups

Between the two groups, comparison of general information revealed no statistically significant differences ($P>0.05$), indicating comparability (Table 1).

5.2 Comparison of NIHSS Scores between the Two Groups

Before treatment, there were no significant differences

in NIHSS scores between the two groups ($P>0.05$). After treatment, both groups showed significant reductions, with the OG demonstrating a significantly greater decrease compared to the CG ($P<0.05$). See Table 2.

5.3 Comparison of Changes in Immunoglobulin Levels Between the Two Groups

Figure 1 illustrates that before treatment, there were no significant differences in IgA, IgG, and IgM levels between the two groups ($P>0.05$). After treatment, both groups showed significant increases in these levels, with the OG exhibiting notably higher levels than the CG ($P<0.05$).

5.4 Comparison of Inflammation and Infection Indicators Between the Two Groups

As shown in Figure 2, there were no significant differences in D-lactate and PCT levels between the two groups before treatment ($P>0.05$). After treatment, D-lactate levels significantly decreased in both groups, and the levels of D-lactate and PCT in the OG were significantly lower than those in the CG ($P<0.05$).

5.5 Comparison of Adverse Reaction Incidence Between the Two Groups

The incidence of vomiting, gastric retention, and gastrointestinal bleeding did not differ significantly between the two groups ($P>0.05$). However, the OG exhibited significantly lower rates of diarrhea and constipation compared to the CG ($P<0.05$). See Table 3.

6 DISCUSSION

ICH is a common and high-risk acute cerebrovascular

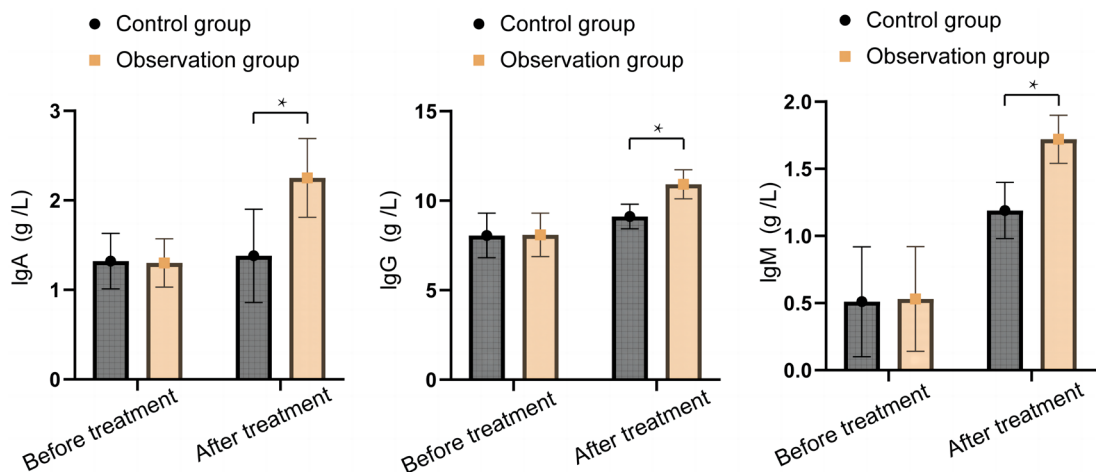


Figure 1. Comparison of changes in immunoglobulin levels between the two groups. * Show that $P < 0.05$.

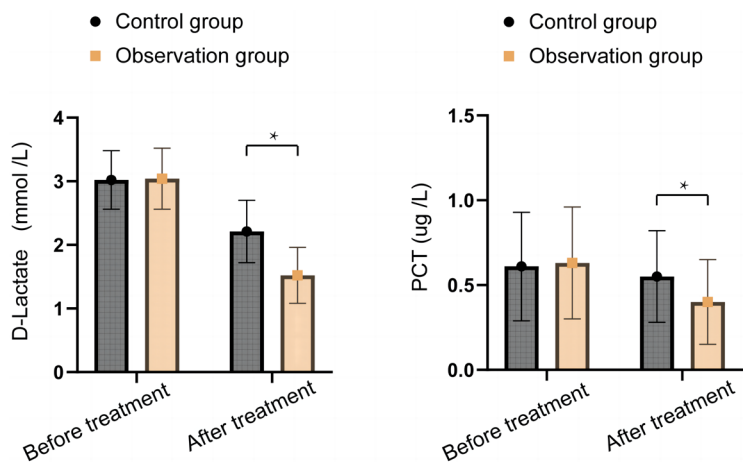


Figure 2. Comparison of changes in inflammation and infection indicators between the two groups. * Show that $P < 0.05$.

Table 3. Comparison of Adverse Reaction Incidence Between the Two Groups (%)

Group	Case	Vomiting	Gastric Retention	Diarrhea	Gastrointestinal Bleeding	Constipation
CG	30	4	2	11	5	10
OG	30	2	1	2	4	2
χ^2		0.1228	0.0008	5.2002	0.0022	4.5000
P		0.7260	0.9774	0.0226	0.9626	0.0339

disease characterized by complex and rapidly progressing pathology, with high rates of disability and mortality^[16]. Due to changes in diet and lifestyle, the incidence of ICH is gradually increasing^[17]. ICH causes multiple organ damage, leading to neuroendocrine dysfunction and metabolic disorders, resulting in malnutrition and affecting prognosis^[18]. Therefore, stronger nutritional support is required. In this study, we explored the effects of probiotic combined with Rexine (CG) and probiotic combined with Peptisonide (OG) on neurological impairment, immunoglobulin levels, inflammatory and infection markers, and adverse reactions in 60 ICH patients. NIHSS scores indicate that the treatment with probiotics combined with Peptisonide is more effective than that with probiotics combined with Rexine. Overall, the enteral nutrition

regimen can improve neurological function and reduce adverse reactions.

After treatment, NIHSS scores significantly decreased in both groups, with the OG showing a greater reduction than the CG. This indicates that probiotics combined with Peptisonide are more effective in improving neurological impairment in ICH patients compared to probiotics combined with Rexine. Zhang^[19] reported that providing sufficient energy helps maintain normal physiological functions, meet nutritional needs, and enhance neurological function. Additionally, before treatment, there were no significant differences in IgA, IgG, and IgM levels between the two groups. However, after treatment, the levels of IgA, IgG, and IgM significantly increased in both groups,

with the OG showing greater improvement. This suggests that probiotics combined with Peptisonide help enhance the immune function of patients. Immunoglobulins are antibodies, including IgG, IgM, and IgA. IgA plays a role in the mucosal defense system^[20,21]. IgG is crucial for long-term regulation in primary immune responses^[22], while IgM is the earliest antibody to appear, mainly used for early disease diagnosis and initial defense^[23]. However, further research is needed on the changes and significance of IgA, IgG, and IgM in ICH.

Our results show that before treatment, there were no significant differences in D-lactic acid and PCT levels between the two groups. After treatment, D-lactic acid levels significantly decreased in both groups, and the levels of D-lactic acid and PCT in the OG were lower than those in the CG. This suggests that probiotics combined with Peptisonide can reduce serum D-lactic acid and PCT levels in ICH patients. D-lactic acid can enter the bloodstream during infection or intestinal mucosal damage. When intestinal inflammation occurs, increased permeability leads to the release of PCT into the bloodstream, rapidly raising its concentration^[24]. Probiotics aid in nutrient absorption, inflammation suppression, and maintenance of the intestinal mucosa. Peptisonide can be directly absorbed by the intestinal mucosa, protecting the gut barrier and reducing infections^[25].

There were no significant differences in the incidence of vomiting, gastric retention, and gastrointestinal bleeding between the two groups. However, the incidence of diarrhea and constipation in the OG was significantly lower than in the CG, indicating that probiotics combined with Peptisonide can effectively reduce adverse reactions in ICH patients. Studies have shown that probiotics combined with low-fat enteral nutrition can effectively improve the nutritional status and reduce diarrhea in patients with ICH or cerebral infarction^[26].

In conclusion, the combination of probiotics and Peptisonide enteral nutrition provides significant therapeutic benefits for postoperative ICH patients. It can improve neurological and immune functions, reduce infections, and lower the incidence of adverse reactions, thus having important implications for improving patient outcomes.

Acknowledgements

Not applicable.

Conflicts of Interest

The authors declared no conflict of interest.

Ethical Statement

The protocol was approved by the ethics committee of The First Affiliated Hospital of Hebei North University. All Patients and guardians of the patients were informed about

the study and voluntarily signed informed consent forms. All the methods were carried out in accordance with the Declaration of Helsinki.

Author Contribution

Liu F was responsible for the design and writing of the paper. Zhao Y designed the experiments. Zhang L was involved in data analysis. Gao N, Qiao Z, and Yao J contributed to the literature search.

Abbreviation List

CG, Control group

ICH, Intracerebral hemorrhage

IgA: Immunoglobulin A

IgG: Immunoglobulin G

IgM: Immunoglobulin M

NIHSS, The National Institutes of Health Stroke Scale

OG, Observation group

PCT, Procalcitonin

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