Effects of Ribavirin combined with Clostridium butyricum powder on T lymphocyte subsets and inflammatory factors in child patients with rotavirus enteritis

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ABSTRACT

Objective: To observe clinical efficacy of Ribavirin combined with Clostridium butyricum powder on child patients with rotavirus enteritis and analyze serum IL-6, IL-8, TNF- α concentration and change of T lymphocyte subsets. Methods: A total of 90 patients with rotavirus enteritis were randomly divided into control group (n=45) and observation group (n=45). The control group was given conventional therapy combined with Ribavirin. The observation group was treated with Clostridium butyricum powder on the basis of control group. The changes of T lymphocyte subsets and inflammatory factors were measured before and after treatment in all subjects. Results: There was no significant difference in serum T lymphocyte subsets between the control group and the observation group before treatment. After treatment, the levels of serum CD 3⁺, CD4⁺ and CD4⁺/CD8⁺ in both groups were higher than those before treatment, while CD8⁺ level was lower than that before treatment. The levels of serum CD3⁺, CD4⁺ and CD4⁺/CD8⁺ in the observation group were higher than those in the control group after treatment, while the CD8⁺ level was lower than that in control group in the corresponding period. There was no significant difference in the concentration of inflammatory factors between the control group and the observation group before treatment. After treatment, the levels of IL-6, IL-8 and TNF- α in the two groups were lower than those before treatment. The observation group was significantly lower than control group in corresponding period after treatment and difference was statistically significant. Conclusion: On the basis of conventional therapy and Ribavirin treatment, combined with Clostridium butyricum Powder for children with rotavirus enteritis can reduce concentration of inflammatory factors in peripheral blood and decrease expression of CD8⁺ T lymphocyte subsets level and improve the level of CD3⁺, CD4⁺ level. It is a potent effective drug for treatment of children with rotavirus enteritis.

1. Introduction

Rotavirus was a double-stranded RNA virus that caused acute enterogastritis of children through infecting mature enterocyte on intestinal villus[1,3], which was the most common reason resulted in diarrhea hospitalization of children under 5 years old[4,5]. At present, primarily used micro-ecology regulator that maintained intestinal flora at dynamic balance and antiviral drug that inhibited RV synthesis for clinical treatment of children with rotavirus enteritis. Clostridium butyricum powder could provide Clostridium butyricum in normal intestinal flora and recover abnormality of intestinal flora. Ribavirin was able to inhibit RV synthesis. The clinical efficacy of this two drugs combination had been reported[6,7], however it was rarely reported that mechanism of drugs combination. This research was aimed to observe effect of Ribavirin combined with Clostridium butyricum powder on children rotavirus enteritis and analyze change of immune function and inflammatory factors in child patients.
2. Data and method

2.1. General data

A total of 90 cases of child patients with rotavirus enteritis who were admitted in our hospital from March 2015 to September 2016 were selected and divided into control group and observation group according to lottery method and each group contained 45 cases. In control group, 23 males, 22 females, aged from 3-19 months; dehydration grade: 5 cases of severe, 13 cases of moderate, 27 cases of mild. In observation group, 26 males, 19 females, aged from 5-21 months; dehydration grade: 6 cases of severe, 15 cases of moderate, 24 cases of mild. There was no difference in gender ratio, age and disease condition and could carry out control experiment. Incorporation criteria: (1) age was under 3 years old; (2) conformed to clinical diagnostic criteria of child patients with rotavirus enteritis; (3) excluded drug susceptibility and other severe disease. Family members were informed and signed informed consent, this research was approved by hospital ethics committee.

2.2. Method

All of subjects accepted conventional therapy including rectified dehydration, rectified acidosis, maintaining electrolyte balance, the control group was given ribavirin injection (Produced by Zhengzhou Zhuofeng Pharmaceutical Co. Ltd, Approval number: H41023268), intravenous drip of 10-15 mg/kg every day according to weight of child patients, taken orally, 500 mg/time, 2 times/d, 3-7 d were a course of treatment[9]. On the basis of control group, observation group was given Clostridium butyricum powder (Produced by Qingdao Donghai Pharmaceutical Co. Ltd, Approval number: S20040088), took orally, 500 mg/time, 2 times/d, 3-7 d were a course of treatment[10].

2.3. Observation indexes

Extracted 3-4 mL of fasting periphery venous blood of patients before and after treatment in both groups, centrifuged at low temperature, and detected serum T lymphocyte subsets and inflammatory factors. Observation index of T lymphocyte subsets: CD3+, CD4+ and CD8+; detection equipment: FACS Calibur flow cytometry (American Becton Dickison company)[11]. Observation index of inflammatory factors: interleukin-6 (IL-6), interleukin-8 (IL-8) and tumor necrosis factor-α (TNF-α)[12]; detection equipment: spectrophotometer (Hangzhou Huier instrument and equipment limited company).

2.4. Statistical method

Statistical Software SPSS 20.0 was used for all data processing and analyzing, data of immune function and inflammatory factors was represented by Mean ± SD t-test was applied to comparison of intra-group before and after treatment and inter-block, \( P<0.05 \) indicated the difference was statistical significant.

3. Results

3.1. Effect of both treatment methods on T lymphocyte subsets of child patients with rotavirus enteritis

Before treatment, there was no difference in T lymphocyte subsets of both groups \( (P>0.05) \), after treatment, CD3+ and CD8+ level in observation group was respectively \( (62.82±4.12)\% \), \( (39.17±3.07)\% \), \( (57.34±3.75)\% \), all of these was significantly higher than before treatment \( (P<0.05) \), moreover observation group after treatment was obvious higher than control group in corresponding period, the difference was statistically significant \( (P<0.05) \). As shown in Table 1.

3.2. Effect of both treatment methods on inflammatory factors of child patients with rotavirus enteritis

Before treatment, there was no difference in inflammatory factors level of both groups \( (P>0.05) \), after treatment, serum IL-6,
Table 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Time</th>
<th>IL-6 (ng/L)</th>
<th>IL-8 (ng/L)</th>
<th>TNF-α (ng/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>45</td>
<td>Before treatment</td>
<td>148.26±30.84</td>
<td>184.63±46.21</td>
<td>157.84±43.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>113.71±22.19</td>
<td>133.29±32.47</td>
<td>64.73±31.94</td>
</tr>
<tr>
<td>Observation group</td>
<td>45</td>
<td>Before treatment</td>
<td>150.67±31.24</td>
<td>181.72±45.36</td>
<td>155.93±41.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>85.12±17.53</td>
<td>107.84±19.76</td>
<td>35.72±19.63</td>
</tr>
</tbody>
</table>

Note: * compared with before treatment in same group, P<0.05; # compared with control group in corresponding period, P<0.05.

4. Discussion

Dysentery was primary public health problem in developed and developing country[13]. Rotavirus diarrhea occupied 25%-30% of severe diarrhea. In all of enteric pathogens, rotavirus seemed to be the most important pathogens that caused infants acute gastroenteritis[14-16]. Therefore, it was necessary that exploited effective drug that could treat child patients with rotavirus enteritis. Clinical drugs took supplying water and electrolyte that missed in infection, change of them might affect RV infection recovery[19-21]. Therefore, this research selected inflammatory factors IL-6, TNF-α and IL-8 as observation index. Results demonstrated that compared with conventional therapy combined with ribavirin in control group, combined with Clostridium butyricum powder in observation group could more effectively decreased serum IL-6, IL-8 and TNF-α concentration in child patients with rotavirus enteritis, this demonstrated that ribavirin combined with Clostridium butyricum powder could down-regulate serum inflammatory factors and decrease inflammatory reaction induced by rotavirus.

Whatever cellular immunity or humoral immunity played important role in human and animal confronting rotavirus. It was demonstrated that RV specificity cytotoxic T cell response existed in host, such as immune cytotoxic T cells passive transfer. CD3+, CD4+ and CD8+ T lymphocytes were used to evaluate rotavirus vaccine also judge efficacy of drug for child patients with rotavirus enteritis[22,23]. T lymphocytes were active cells of immune regulation through periphery blood circulation. Under normal condition, the species and quantity of T lymphocyte subsets were in balance. This result revealed that after treatment CD3+ level in observation group was obvious higher than control group in corresponding period, while CD4+ level in observation group was significant lower than control group in corresponding period which indicated combined with Clostridium butyricum powder was able to improve immune function, recover T lymphocytes subsets balance. The reason might be the pharmacologic effect of drug combination: Clostridium butyricum powder could regulate abnormality of intestinal flora in child patients, protect intestinal mucosa, maintain flora balance and promote phagocytic function of macrophage; ribavirin could inhibit replication and spread of RV and decrease clinical symptoms of patients[10,22]. Combination of both drugs could more effectively reduce inflammatory reaction and enhance humoral and cellular immunity.

In conclusion, conventional treatment and ribavirin combined with Clostridium butyricum powder could effectively down-regulate serum inflammatory factor level, enhance serum CD3+ and CD4+ level and decrease CD8+ level which was a potential therapy for child patient with rotavirus enteritis.

IL-8 and TNF-α concentration in observation group and control group were respectively (85.12±17.53) ng/L, (107.84±19.76) ng/L, (35.72±19.63) ng/L and (113.71±22.19) ng/L, (133.29±32.47) ng/L, (64.73±31.94) ng/L, all was lower dramatically than before treatment in both groups (P<0.05); moreover the level in observation group after treatment was obvious lower than control group in corresponding period, the difference was statistically significant (P<0.05). As shown in Table 2.
Reference


