Study on the mechanism of Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules for neonatal jaundice treatment

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Objective: To observe the mechanism of Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules for neonatal jaundice treatment and offer clinical help to neonatal jaundice treatment. Methods: 80 children with neonatal jaundice were selected and randomly divided into groups: the observation group (40 children) and the control group (40 children). The patient in the control group were treated with blue light and the patients in the observation group were treated with Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules. Biochemical parameters [TBA (total bile acid), TSB (serum total bilirubin), DB (Direct bilirubin) and TCB (Percutaneous jaundice index)], nerve factor [NSE (neuronspecific enolase), Aβ (β amyloid protein) and S100B (Astrocyte derived protein)] and myocardial enzyme spectrum [LDH (lactate dehydrogenase), CK (creatine kinase) and CK-MB (isoenzymes of creatine kinase)], liver function [ALT (Alanine aminotransferase) and AST (glutamic-oxalacetic transaminase)] and renal function (BUN and Cr) were detected and analyzed before and after treatment. Results: The comparison of Biochemical parameters, nerve factor and myocardial enzymes, liver function and renal function in the two groups before treatment were not statistically significant (P>0.05). Biochemical parameters (TBA, TSB, TCB and DB), nerve factor (NSE, Aβ and S100B) and myocardial enzyme spectrum (LDH, CK and CK-MB), liver function (ALT and AST) and renal function (BUN and Cr) in both groups after treatment significantly decreased compared with that before treatment. The changes were statistically significant (P<0.05). Biochemical parameters (TBA, TSB, TCB and DB), nerve factor (NSE, Aβ and S100B) and myocardial enzyme spectrum (LDH, CK and CK-MB), liver function (ALT and AST) and renal function (BUN and Cr) in observation group after treatment decreased more significantly compared with that in control group. The difference between two groups was considered to be statistically significant (P<0.05). Conclusions: Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules could regulate the Biochemical parameters, protect nerve function and cardiac muscle cells and improve liver and kidney function in newborns with jaundice. So it has a very important clinical significance of the treatment to neonatal jaundice.

1. Introduction

Jaundice is a common clinical disease in neonatal. The increased bilirubin level in children with jaundice will cause nerve injury, myocardial injury and dysfunction of liver and kidney. All these have seriously affected the growth and health of newborns. The treatment of neonatal jaundice has become an urgent task for the majority of medical workers[1-3]. This research studied the changes of biochemical parameters, nerve factor and myocardial enzymes, liver function and renal function after the treatment of Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules. Also, the mechanism of Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules for neonatal jaundice treatment is be explored in this study. We aimed to provide help for the clinical treatment of neonatal jaundice.
2. Materials and methods

2.1. General information

80 cases of neonatal jaundice from June 2013 to January 2016 in our hospital were selected. According to the random number table method, 80 cases patients were divided into two groups, the observation group and the control group. In the observation group, there were 40 patients, 24 males and 16 females, aged from 1 to 20 d, with an average of (10.7±4.5) d. The weight of the patients was 2 715–3 532 g, with an average of (3 108±195) g. Among them, there were 34 cases of term infants and 6 cases of premature infants. In the control group, there were 40 patients, 23 males and 17 females, aged from 1 to 20 d, with an average of (11.2±4.1) d. The weight of the patients was 2 764–3 579 g, with an average of (3 220±180) g. Among them, there were 33 cases of term infants and 7 cases of premature infants. There had no differences in the age, sex and disease severity, and physical condition, and there was no statistical significance ($P>0.05$).

2.2. Exclusion and rejection criteria

All patients were consistent with the diagnosis standard of neonatal pathological jaundice in the “Pediatrics (2008)”. All patients had no diseases of cardiovascular system, liver and kidney disease, genetic disease, immune system disease, endocrine and other diseases. Every child could stay awake and cooperate with relevant treatment actively. Every child was not allergic to related drugs. All children before treatment did not take other drugs. And there was detailed information of them before treatment. This study was approved by the ethics committee of our hospital, and their families have signed the informed consent. Everyone agreed to cooperate with the research treatment program.

2.3. Treatment method

The patients in the control group were also asked to accept the treatment of maintaining electrolyte balance, keeping warm and nutritional support. At the same time, Blue light irradiation treatment were given to the children: wavelength: 425–474 nm, irradiation time: 8 h every day. Also, related protection measures were performed on them. On the basis of control group, the observation group was given to Yinzhihuang granules (Lunan Houpu Pharmaceutical Co. Ltd. Chinese medicine standard word: Z20030028), mixing in boiled water for oral taking, 3 times a day, 6 g each time. At the same time, Bifid Triple Viable Capsules (Shanghai Xingyi Pharmaceutical Co. Ltd. Chinese medicine standard word: S10950032) were also given to the patients in the observation group, mixing in warm water for oral taking, 2 times a day, 3 capsules each time. The treatment period of the 2 groups was 5 d.

2.4. Blood sample collection

2 mL of fasting peripheral venous blood of patients in two groups were collected before treatment and 5 d after treatment. And then the related indexes were detected by clinical laboratory.

2.5. Detection of related factors

Nerve factor: NSE (neuronspecific enolase), Aβ (β amyloid protein), S100B (Astrocyte derived protein) and myocardial enzyme spectrum LDH (lactate dehydrogenase), CK (creatine kinase), and CK-MB (isoenzymes of creatine kinase) were detected by ELISA kits. The kits were purchased from Hangzhou Hua’an Biological Technology Co. Ltd, Shanghai Huagu Biological Technology and Co. Ltd, Cell Signaling Technology). Multi mode micro plate enzyme standard instrument of PerkinElmer company (Mode: EnSight™) was used to detect the absorbance OD value at 450 mm. And then, the corresponding concentration value was calculated by the standard curve. The operation process was performed according to the instruction strictly.

2.6. Detection of Liver and kidney function and biochemical indexes

The liver function: ALT (Alanine aminotransferase), AST (glutamic-oxalacetic transaminase); the renal function: BUN (urea nitrogen), Cr (creatinine) and biochemical indexes TBA (total bile acid), TSB (serum total bilirubin), DB (Direct bilirubin) and TCB (Percutaneous jaundice index) were detected by Automatic biochemistry analyzer of Hitachi 7180 (Japan).

2.7. Statistical analysis

SPSS 21.0 statistical package was conducted for statistical analysis. Relevant data indexes were described as mean ± standard deviation. Inter-group comparison was conducted by $t$ test. Values of $P<0.05$ were considered to be statistically significant.

3. Results

3.1. Comparison of biochemical parameters in the two groups before and after treatment
Analysis and comparison of Biochemical parameters, (TBA, TSB, DB and TCB) in patients were conducted. The comparison of Biochemical parameters in the two groups before treatment was not statistically significant (P>0.05). TBA, TSB, DB and TCB in both groups after treatment significantly decreased compared with that before treatment (P<0.05); TBA, TSB, DB and TCB in observation group after treatment decreased more significantly than that in control group, and it was considered to be statistically significant (P<0.05) (Table 1).

3.2. Comparison of nerve factor in the two groups before and after treatment

Analysis and comparison of nerve factor (NSE, Aβ and S100B) in patients were conducted. The comparison of nerve factor in the two groups before treatment was not statistically significant (P>0.05). NSE, Aβ and S100B in both groups after treatment significantly decreased compared with that before treatment and it was considered to be statistically significant (P<0.05). NSE, Aβ and S100B in observation group after treatment decreased more significantly than that in control group, and it was considered to be statistically significant (P<0.05) (Table 2).

3.3. Comparison of myocardial enzyme spectrum in the two groups before and after treatment

Analysis and comparison of myocardial enzyme spectrum (LDH, CK and CK-MB) in patients were conducted. The comparison of myocardial enzyme spectrum in the two groups before treatment was not statistically significant (P>0.05). LDH, CK and CK-MB in both groups after treatment significantly decreased compared with that before treatment; and it was considered to be statistically significant (P<0.05). LDH, CK and CK-MB in observation group after treatment decreased more significantly than that in control group and it was considered to be statistically significant (P<0.05) (Table 3).

3.4. Comparison of liver and renal function in the two groups before and after treatment

Analysis and comparison of liver function (ALT and AST) and renal function (BUN and Cr) in patients were conducted. The comparison of liver function and renal function in the two groups before treatment was not statistically significant (P>0.05). Liver function (ALT and AST) and renal function (BUN and Cr) in both groups after treatment significantly decreased compared with that before treatment; and it was considered to be statistically significant (P<0.05). Liver function (ALT and AST) and renal function (BUN and Cr) in observation group after treatment decreased more significantly than that in control group and it was considered to be statistically significant (P<0.05) (Table 4).

Table 1

Comparison of biochemical parameters in the two groups before and after treatment (n=40, x±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>TBA (μmol/L)</th>
<th>TSB (μmol/L)</th>
<th>DB (μmol/L)</th>
<th>TCB (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>Before treatment</td>
<td>35.48±4.11</td>
<td>167.62±5.49</td>
<td>80.36±4.18</td>
<td>19.19±1.38</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>10.26±1.35</td>
<td>19.83±1.67</td>
<td>8.67±0.91</td>
<td>5.21±0.84</td>
</tr>
<tr>
<td>Control group</td>
<td>Before treatment</td>
<td>35.54±4.26</td>
<td>167.87±6.48</td>
<td>80.59±4.25</td>
<td>19.30±1.45</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>24.33±3.41</td>
<td>41.55±2.03</td>
<td>30.84±2.39</td>
<td>7.84±0.97</td>
</tr>
</tbody>
</table>

Compared with control group before treatment, P<0.05; compared with control group after treatment, P<0.05.

Table 2

Comparison of nerve factor in the two groups before and after treatment (n=40, x±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>NSE (μg/L)</th>
<th>Aβ (μg/L)</th>
<th>S100B (μg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>Before treatment</td>
<td>53.45±5.27</td>
<td>35.17±3.28</td>
<td>0.24±0.08</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>20.19±2.84</td>
<td>10.68±1.31</td>
<td>0.11±0.02</td>
</tr>
<tr>
<td>Control group</td>
<td>Before treatment</td>
<td>53.51±5.66</td>
<td>35.40±3.33</td>
<td>0.25±0.10</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>37.26±3.59</td>
<td>24.37±2.23</td>
<td>0.18±0.04</td>
</tr>
</tbody>
</table>

Compared with control group before treatment, P<0.05; compared with control group after treatment, P<0.05.

Table 3

Comparison of myocardial enzyme spectrum in the two groups before and after treatment (n=40, x±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>LDH (U/L)</th>
<th>CK (U/L)</th>
<th>CK-MB (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>Before treatment</td>
<td>263.45±8.24</td>
<td>382.15±9.66</td>
<td>50.23±6.65</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>162.77±6.23</td>
<td>222.74±7.39</td>
<td>30.89±4.58</td>
</tr>
<tr>
<td>Control group</td>
<td>Before treatment</td>
<td>264.01±9.15</td>
<td>383.16±9.87</td>
<td>50.48±5.50</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>196.87±7.11</td>
<td>290.54±8.31</td>
<td>43.69±5.28</td>
</tr>
</tbody>
</table>

Compared with control group before treatment, P<0.05; compared with control group after treatment, P<0.05.
Bilirubin is toxic to brain cells. The accumulation of bilirubin in the blood increases the burden of the brain, which will cause acute neurological dysfunction, even death seriously[6–8]. All these affect the life health and the physical development of newborns. The study found that the incidence of neonatal jaundice within 1 week has reached 80%[9]. Also, the number of newborns in our country is about 1.8 million per year[10]. The influence of jaundice on the health of newborns is one of the main concerns of medical and scientific research workers.

The study found that Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules can improve the biochemical parameters (TBA, TSB, TCB and DB), nerve factor (NSE, Aβ and S100B) and myocardial enzyme spectrum (LDH, CK and CK-MB), liver function (ALT and AST) and renal function (BUN and Cr) in newborns with jaundice.[11–13] The maximum absorption peak of bilirubin located in the blue region. Blue light can cause the change of the nature, the structure and efflux pathway, so as to reduce the activity of bilirubin and promote its discharge. And then the level of bilirubin in the patients is reduced. However, the blue light irradiation often causes gastrointestinal reactions, affecting the liver function and renal function, which reduces the level of bilirubin in patients[14–16]. Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules can reduce the production of bilirubin and improve the liver function and renal function, so as to promote the recovery of neonatal jaundice.

Table 4
Comparison of liver and renal function in the two groups before and after treatment (n=40, T±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>Time</th>
<th>ALT (U/L)</th>
<th>AST (U/L)</th>
<th>BUN (mmol/L)</th>
<th>Cr (μmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>Before treatment</td>
<td>63.64±4.28</td>
<td>61.34±5.05</td>
<td>7.62±1.16</td>
<td>59.17±4.12</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>30.03±2.75*</td>
<td>28.43±2.28*</td>
<td>4.15±0.55*</td>
<td>48.23±3.75*</td>
</tr>
<tr>
<td>Control group</td>
<td>Before treatment</td>
<td>64.05±4.58</td>
<td>61.66±5.21</td>
<td>7.66±1.23</td>
<td>59.41±4.39</td>
</tr>
<tr>
<td></td>
<td>After treatment</td>
<td>45.20±3.49*</td>
<td>41.33±4.18*</td>
<td>5.87±0.74*</td>
<td>53.22±4.01*</td>
</tr>
</tbody>
</table>

Compared with control group before treatment, *p<0.05; compared with control group after treatment, #p<0.05.

4. Discussion

Jaundice is a common clinical disease, which occurs within 1 week of newborns. Neonatal jaundice can be divided into 2 types: pathological jaundice, which need intervention treatment; physiologic jaundice, which will regress spontaneously[4,5]. Hypoxia, asphyxia often leads to abnormal metabolism of bilirubin during the course of delivery, causing neonatal damage of organs and tissues. The pathological jaundice of newborn will cause bilirubin encephalopathy with the aggravation of bilirubin, which will cause acute neurological dysfunction, even death seriously[6–8]. All these affect the life health and the physical development of newborns. The study found that the incidence of neonatal jaundice within 1 week has reached 80%[9]. Also, the number of newborns in our country is about 1.8 million per year[10]. The influence of jaundice on the health of newborns is one of the main concerns of medical and scientific research workers.

The study found that Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules can improve the biochemical parameters (TBA, TSB, TCB and DB), nerve factor (NSE, Aβ and S100B) and myocardial enzyme spectrum (LDH, CK and CK-MB), liver function (ALT and AST) and renal function (BUN and Cr) of newborns with jaundice. The decrease of bilirubin in patients[14–16]. The maximum absorption peak of bilirubin located in the blue region. Blue light can cause the change of the nature, the structure and efflux pathway, so as to reduce the activity of bilirubin and promote its discharge. And then the level of bilirubin in the patients is reduced. However, the blue light irradiation often causes gastrointestinal reactions, affecting the liver function and renal function, which reduces the level of bilirubin in patients[14–16]. Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules can reduce the production of bilirubin and improve the liver function and renal function, so as to promote the recovery of neonatal jaundice.

In conclusion, the influence on biochemical parameters (TBA, TSB, TCB and DB), nerve factor (NSE, Aβ and S100B) and myocardial enzyme spectrum (LDH, CK and CK-MB), liver function (ALT and AST) and renal function (BUN and Cr) in newborns with jaundice with the treatment of Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules were detected in the research. The mechanism of Yinzhihuang granules, Blue light irradiation combined with Bifid Triple Viable Capsules for the treatment of neonatal jaundice was discussed. This study provides help for the clinical treatment of neonatal jaundice.
References


