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Observation of effect of different doses of gamma globulin combined with dexamethasone on children with ITP

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Abstract. Purpose: To observe the clinical efficacy of different doses of gamma globulin combined with dexamethasone in treating children with idiopathic thrombocytopenic purpura (ITP). Methods: 116 children with ITP admitted from 2018 to 2019 were selected as the study objects and randomly divided into the control group and the observation group, with 58 cases in each group. The control group was treated with high-dose gamma globulin combined with dexamethasone, and the observation group was treated with low-dose gamma globulin combined with dexamethasone. The therapeutic effect of the two groups of children and the changes in platelet related indicators before and after treatment were compared. Results: the total effective rate was 82.76% for the observation group and 87.93% for the control group, and there was no statistical difference between the two groups (P>0.05). After treatment, the average levels of PLT, MPV, PDW and PCT in the two groups were higher than those before treatment (P<0.05), and the differences were statistically significant, while the platelet related parameters between the two groups after treatment had no statistical difference (P>0.05). Conclusion: Low-dose gamma globulin combined with dexamethasone has a definite therapeutic effect in the treatment of children with ITP, and the cost is low, so that it is worthy of clinical promotion and application.

Keywords. Idiopathic thrombocytopenic purpura (ITP), gamma globulin, dexamethasone.

Idiopathic thrombocytopenic purpura (ITP), also known as immune thrombocytopenic purpura, is a bleeding disease caused by abnormal platelet production and destruction due to abnormal autoimmune function, and mainly occurs in children and adolescents. Its main clinical manifestations include spontaneous bleeding spots on skin and mucous membrane, and it may cause visceral organ hemorrhage and intracranial hemorrhage in severe cases, which are life-threatening [1]. At present, the main clinical treatment methods for ITP are to regulate immunity and increase platelets of the patients. Many clinical studies have shown that glucocorticoid combined with high-dose gamma globulin has a positive effect on the treatment of ITP, but some problems still exist. The cost of gamma globulin is high, and high-dose use of gamma globulin brings certain economic pressure to the families of the children, and the clinical application is also limited. Some studies have shown that reducing the dosage of gamma globulin can also achieve the corresponding therapeutic effect [1]. This study observed the therapeutic effect of different doses of gamma globulin in the clinical treatment of ITP, hoping to provide a reference for guiding clinical medication in the later stage. The results are reported as follows.

1. Data and methods

1.1. General data

116 children with ITP hospitalized in Shanxi Children's Hospital from 2018 to 2019 were selected. All of them had the first onset of ITP. According to the diagnostic criteria for ITP formulated by the Hematology Group of the Pediatric Branch of the Chinese Medical Association [2], 52 children had their platelet count < 10 x 10^9/L, and 63 children at (10-25) x 10^9/L. The clinical manifestations were mainly bleeding spots and ecchymosis on skin and mucous membrane. Exclusion: children with severe organ hemorrhage and intracranial hemorrhage, which are life-threatening; children with other blood diseases or immune system diseases; children with malignant tumors; children who have received other treatments. The study was approved by the hospital's ethics committee, and the family members of the children had a detailed understanding of the treatment plan and signed the informed consent. 116 cases were randomly divided into the control group and the study group. There were 58 children in the control group, including 31 males and 27 females, aged 2-11 years, with an average age of (5.1 ± 1.3) years, and the course of disease was 3-12 d, with an average course of (4.9 ± 1.6) d; there were 58 children in the observation group, including 33 males and 25 females, aged 3-12 years, with an average age of (5.3 ± 1.5) years, and the course of disease was 2-11 d, and an average course of (5.1 ± 1.3) d. There was no statistical significance (P>0.05) between the two groups of children in terms of general data, so they were comparable.

2. Methods

All the children were given routine treatment after admission, and were treated with dexamethasone injection (Datong Changxing Pharmaceutical Co., Ltd., GYZZ No. H14020637) at a dose of 0.5 mg/kg, which was added into 10% glucose solution for intravenous drip, once a day, for 5 consecutive days; the medication was adjusted according to the actual conditions of the children. If the platelet reached the normal level, the patients would change to oral prednisone (Taosheng Pharmaceutical Co., Ltd., GYZZ No. H34020009) at a dose of 1.5 mg/kg, once a day; the drug dosage would also be adjusted according to the changes in the patients' conditions. On the basis of routine treatment, the control group was treated with high-dose gamma globulin at 400 mg/kg, once a day; the observation group was treated with low-dose gamma globulin (Sichuan Yuanda Shuyang Pharmaceutical Co., Ltd., GYZZ No. S20060063) at 200 mg/kg, once a day. The two treatment methods were applied in the two groups continuously for 5 days.

1.3. Observation indicators

The therapeutic effects of two groups of children were observed. Efficacy evaluation criteria: significantly effective: after treatment, the children had no bleeding symptom, and PLT count > 100 x 10^9/L; effective: After treatment, the bleeding symptoms of the children were significantly improved, the platelet improved than before treatment, and the PLT count was >50 x 10^9/L or increased by more than 30 x 10^9/L on the original basis; ineffective: after treatment, the bleeding symptoms of the children did not improve or even worsen, and the PLT count did not change significantly or even decreased. Total effective rate = significantly effective rate + effective rate. PLT (platelet count), MPV (mean platelet volume), PDW (platelet distribution width), and PCT (platelet thrombocytocrit) of the two groups of children were observed before and after treatment.

1.4. Statistical methods

SPSS17.0 statistical software was used for data analysis. $\bar{x} \pm s$ represents measurement data, and % represents counting data. The data between groups were compared by t test and x^2 test respectively, the difference was statistically significant when $P<0.05$.

2. Results

2.1. Comparison of therapeutic effect between two groups of children (see Table 1)

Table 1. Comparison of treatment effective rate between two groups of children, cases

Group	Number of cases	Significantly effective	Effective	Ineffective	Total effective rate (%)
Control group	58	24	27	7	87.93
Observation group	58	22	26	10	82.76
x^2 value					0.62
P					>0.05

2.2. Comparison of relevant indicators between two groups of children before and after treatment

There was no statistically significant difference in platelet related parameters between the two groups before treatment ($P>0.05$). After treatment, the average levels of PLT, MPV, PDW and PCT of the two groups were significantly higher than those before treatment, and the differences were statistically significant ($P<0.05$). There was no statistically significant difference in platelet related parameters between the two groups after treatment ($P>0.05$). See Table 2.

Table 2. Comparison of relevant indicators between the two groups of patients before and after treatment ($\bar{x} \pm s$)

Group	Time	PLT (10^9/L)	MPV (fL)	PDW (%)	PCT (%)
Control group	Before treatment	20.15 ±5.16	9.78 ±2.21	12.86 ±4.33	1.62 ±1.12
	After treatment	278.51 ±71.12[1)]	11.71 ±3.26[1)]	22.16 ±4.35[1)]	3.36 ±1.57[1)]
Observation group	Before treatment	19.97±5.11	9.35 ±2.52	13.14 ±4. 87	1.59 ±1.19
	After treatment	270.36±68.54[1)2)]	10.95±3.68[1)2)]	21.68±4.641[1)2)]	3.24±1.62[1)2)]

Note: 1) $P<0.05$ compared with that before treatment; 2) $P<0.05$ compared with that after treatment

3. Discussion

Idiopathic thrombocytopenic purpura is a common blood system disease in children. Its main symptoms are bleeding of skin mucosa and visceral organs, and intracranial hemorrhage in severe cases, which may cause death. At present, it is believed that ITP is a disease related to abnormal immune system. After the child is infected by virus, the antigen antibody complex produced by the immune response of the body can attach to platelets and cause damage to platelets, or the autoimmune response of the body after virus infection produces antiplatelet antibodies, which increases the damage to platelets, decreases the platelet count, and increases the risk of bleeding [3].

At present, the main drug for clinical treatment of idiopathic thrombocytopenic purpura is glucocorticoid, which can reduce the binding of antibodies to autoantibodies and promote the dissociation of antibodies that have already been bound, that is, inhibit the binding of antigen antibody complex generated by the immune reaction of the body to Fc receptors on the platelet membrane, inhibit the formation of antiplatelet antibodies, and promote the dissociation of the formed antiplatelet antibodies to inhibit the autoimmune reaction of children with ITP, reduce platelet damage, stimulate bone marrow hematopoiesis, and promote platelet maturation, etc. [4] Gamma globulin is a blood product extracted from the blood of healthy people, which contains rich antibodies. During transfusion, the patients can quickly obtain a large amount of immunoglobulin, which not only blocks the binding of Fc receptor of macrophages to platelet autoantibodies to decrease the ability of macrophages to destroy platelets, but also can inhibit the formation of platelet related antibodies [5]. At present, glucocorticoid combined with gamma globulin is commonly used in the clinical treatment of ITP, which can not only inhibit children's autoimmune response, but also enhance children's immunity and promote the recovery of

platelet level. However, the price of gamma globulin is high, and the use of high-dose gamma globulin in clinical practice has caused serious economic burden to the patients. Therefore, how to reduce the dosage of gamma globulin while ensuring the therapeutic effect is the focus of clinicians. This experiment used glucocorticoid combined with different doses of gamma globulin to treat ITP, and observed the therapeutic effects. The results showed that the total effective rate of low-dose gamma globulin combined with glucocorticoid in the treatment of ITP was 82.76%, and the total effective rate of high-dose gamma globulin combined with glucocorticoid in the treatment of ITP was 87.93%, there was no significant difference between the two groups (P>0.05); the mean levels of PLT, MPV, PDW and PCT in children treated with high-dose and low-dose gamma globulin combined with glucocorticoid were significantly higher than those before treatment, and the differences were statistically significant (P<0.05). After treatment, there was no statistically significant difference in platelet related parameters between the two groups (P>0.05). The results showed that the effects of low-dose and high-dose gamma globulin combined with glucocorticoid on ITP were comparable.

To sum up, the clinical efficacy of low-dose gamma globulin combined with glucocorticoid in the treatment of ITP is equivalent to that of high-dose gamma globulin, and the efficacy is definite. It is worthy of promotion and application in clinical practices to reduce the economic burden of children.

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