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Observation on the Effectiveness of Yinzhihuang Granules in the Treatment of Neonatal Jaundice

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Abstract: *Objective:* To analyze the therapeutic efficacy of Yinzhihuang granules in treating neonatal jaundice. *Methods:* A total of 62 neonates with jaundice, admitted from September 2021 to September 2023, were randomly divided into two groups. The observation group received Yinzhihuang granules, while the control group received conventional blue light therapy. The overall efficacy rate and other indicators were compared. *Results:* The observation group showed a higher overall efficacy rate and superior clinical indicators compared to the control group ($P < 0.05$). Before treatment, there was no significant difference between the two groups in bilirubin, liver function, or immune function indicators ($P > 0.05$). After one week of treatment, the observation group had lower bilirubin and liver function indicators and higher immune function indicators than the control group ($P < 0.05$). *Conclusion:* Yinzhihuang granules can improve the efficacy of neonatal jaundice treatment, accelerate recovery, reduce bilirubin levels, protect liver function, and enhance immune function in neonates.

Keywords: Yinzhihuang granules; Neonatal jaundice; Bilirubin indicators; Immune function indicators

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1. Introduction

Neonatal jaundice is a skin-yellowing disorder caused by bilirubin metabolism dysfunction, with blue light therapy being a common treatment that can accelerate jaundice resolution [1]. Traditional Chinese Medicine (TCM) attributes the etiology of this condition to the invasion of cold, damp, and pathogenic toxins, requiring therapies such as dampness-clearing, jaundice-resolving, and heat-clearing detoxification. Yinzhihuang granules are a commonly used TCM formula for this condition, facilitating bilirubin absorption and shortening the course of the illness in neonates. Based on this premise, the present study selected 62 neonates with jaundice to evaluate the therapeutic effects of Yinzhihuang granules.

2. Materials and methods

2.1. General information

From September 2021 to September 2023, 62 neonates with jaundice were admitted and randomly divided into two groups. The observation group included 31 cases, with 18 males and 13 females; age ranged from 8 to 25 days, with a mean of (12.85 ± 2.42) days; weight ranged from 2.72 to 3.94 kg, with a mean of (3.25 ± 0.43) kg. The control group included 31 cases, with 19 males and 12 females; age ranged from 7 to 24 days, with a mean of (12.93 ± 2.58) days; weight ranged from 2.70 to 3.95 kg, with a mean of (3.27 ± 0.51) kg. Comparison of data between groups showed $P > 0.05$.

2.2. Methods

Both groups received basic therapy: nutritional support, appropriate warming, and oral administration of a bifidobacterium triple live bacterial powder. This was dosed at 0.5 g per time (half a packet), and taken twice daily for 7 days.

The observation group was treated with Yinzhihuang granules, taken at 1.5 g per dose, three times a day for 7 days. The control group received blue light phototherapy using a double-sided blue light box. Each exposure session lasted 6 to 8 hours, with a 4-hour break in between, continuing for 7 days.

2.3. Observation indicators

(1) Clinical indicators: Observed indicators included jaundice resolution time, daily stool frequency, meconium clearance time, and hospital stay duration.

(2) Bilirubin and liver function indicators: Fasting venous blood samples were collected before treatment and after one week of treatment. These samples were centrifuged at 3000 r/min for 30 minutes, and total bilirubin (TBIL), indirect bilirubin (IBIL), and direct bilirubin (DBIL) were measured using enzyme-linked immunosorbent assay (ELISA). Alanine transaminase (ALT) and aspartate transaminase (AST) were also measured as liver function indicators.

(3) Immune function indicators: Venous blood samples were centrifuged, and bilirubin measurement was conducted using a bilirubinometer to determine $CD4^+$, $CD8^+$, and $CD4^+/CD8^+$ ratios.

2.4. Efficacy evaluation criteria

(1) Significant efficacy: Bilirubin levels returned to normal, and skin yellowing resolved by more than 70%.

(2) Initial efficacy: Bilirubin levels decreased, and skin yellowing resolved by 40% to 70%.

(3) No efficacy: Bilirubin levels remained unchanged, and skin yellowing did not reach a 40% reduction.

2.5. Statistical analysis

Data were processed using SPSS 21.0 software. Measurement data were analyzed using *t*-tests and expressed as mean ± standard deviation (SD), and count data were analyzed using χ^2 tests and expressed as [*n* (%)]. A *P*-value of less than 0.05 was considered statistically significant.

3. Results

3.1. Comparison of overall efficacy between groups

Table 1 shows that the overall efficacy rate of the observation group was higher than that of the control group ($P < 0.05$).

Table 1. Comparison of overall efficacy between groups [*n* (%)]

Group	*n*	Significant efficacy	Initial efficacy	No efficacy	Total effective rate
Observation group	31	20 (64.52)	10 (32.26)	1 (3.23)	96.77 (30/31)
Control group	31	16 (51.61)	8 (25.81)	7 (22.58)	77.42 (24/31)
χ^2	-	-	-	-	5.167
P	-	-	-	-	0.023

3.2. Comparison of clinical indicators between groups

Table 2 shows that the clinical indicators in the observation group were superior to those in the control group ($P < 0.05$).

Table 2. Comparison of clinical indicators between groups (mean ± SD)

Group	*n*	Jaundice resolution time (d)	Daily stool frequency (times)	Meconium clearance time (d)	Hospital stay (d)
Observation group	31	6.24 ± 1.53	5.39 ± 0.87	1.86 ± 0.36	6.95 ± 1.80
Control group	31	9.37 ± 1.78	4.40 ± 0.76	2.77 ± 0.42	10.79 ± 1.93
t	-	7.425	4.772	9.159	8.101
P	-	0.000	0.000	0.000	0.000

3.3. Comparison of bilirubin and liver function indicators between groups

Before treatment, there was no difference in bilirubin indicators between the two groups ($P > 0.05$). After one week of treatment, bilirubin and liver function indicators in the observation group were lower than those in the control group ($P < 0.05$), see **Tables 3** and **4**.

Table 3. Comparison of bilirubin indicators between groups before and after treatment (mean ± SD, μmol/L)

Group	*n*	TBIL		IBIL		DBIL	
		Before	After	Before	After	Before	After
Observation group	31	324.95 ± 26.71	114.96 ± 15.20	307.53 ± 21.73	110.83 ± 8.19	20.26 ± 2.78	7.88 ± 1.50
Control group	31	322.10 ± 27.53	139.62 ± 17.51	308.02 ± 20.38	118.35 ± 9.80	20.38 ± 2.91	9.46 ± 1.64
t	-	0.414	5.921	0.092	3.278	0.166	3.958
P	-	0.681	0.000	0.927	0.002	0.869	0.000

Table 4. Comparison of liver function indicators between groups before and after treatment (mean ± SD, U/L)

Group	*n*	ALT		AST	
		Before	After	Before	After
Observation group	31	64.01 ± 6.81	33.52 ± 3.15	62.88 ± 7.19	31.06 ± 4.20
Control group	31	64.05 ± 6.76	39.06 ± 3.50	62.34 ± 7.30	36.72 ± 4.75
t	-	0.023	6.551	0.293	4.970
P	-	0.982	0.000	0.770	0.000

3.4. Comparison of immune function indicators between groups

Before treatment, there was no difference in immune function indicators between the two groups ($P > 0.05$). After one week of treatment, immune function indicators in the observation group were superior to those in the control group ($P < 0.05$), as shown in **Table 5**.

Table 5. Comparison of immune function indicators between groups (mean ± SD, %)

Group	*n*	$CD4^+$		$CD8^+$		$CD4^+/CD8^+$	
		Before	After	Before	After	Before	After
Observation group	31	38.15 ± 4.36	46.55 ± 6.13	21.58 ± 2.79	23.68 ± 1.62	1.74 ± 0.60	2.19 ± 0.43
Control group	31	38.19 ± 4.21	41.21 ± 6.05	22.04 ± 2.91	22.17 ± 1.56	1.77 ± 0.59	1.90 ± 0.35
t	-	0.037	3.452	0.635	3.738	0.198	2.912
P	-	0.971	0.001	0.528	0.000	0.843	0.005

4. Discussion

The etiology of neonatal jaundice is relatively complex. Possible causes include the persistent effects of bacterial toxins on red blood cells, leading to abnormal bilirubin excretion; low levels of bilirubin absorption-inhibiting enzymes in breast milk, which elevate blood bilirubin levels; and neonatal acidosis [2]. The standard treatment is phototherapy, which accelerates the breakdown of bilirubin in the skin, promoting its transformation into water-soluble isomers that are excreted via urine and bile. While phototherapy, a physical treatment, alleviates jaundice symptoms, it does not address the underlying cause, which limits its therapeutic effectiveness [3].

Traditional Chinese Medicine (TCM) views neonatal jaundice as a manifestation of "damp-heat fetal toxin," where excessive damp-heat obstructs bile flow, leading to symptoms like jaundiced skin. The therapeutic principles include reducing jaundice, clearing heat and detoxifying, and promoting diuresis, for which Yinzhihuang granules are a suitable choice [4]. This herbal medicine, formulated entirely from traditional herbs, contains *Artemisia capillaris*, which helps reduce jaundice, promotes bile secretion, and clears heat and dampness; *Gardenia jasminoides*, known for its effects in clearing heat, cooling blood, promoting bile secretion, and protecting the liver; *Scutellaria baicalensis*, which has antipyretic, choleretic, astringent, and heat-clearing properties; and *Lonicera japonica*, known for its anti-inflammatory, detoxifying, and heat-clearing effects [5].

The results showed that the overall efficacy rate of the observation group was higher than that of the

control group, and its clinical indicators were also superior. After one week of treatment, bilirubin and liver function indicators were lower, and immune function indicators were higher in the observation group compared to the control group ($P < 0.05$). These findings indicate that Yinzhihuang granules can significantly alleviate neonatal jaundice. *Artemisia capillaris*, which is rich in active ingredients like scoparone, protects liver and bile function, accelerates bile secretion, and promotes the excretion of bilirubin and bile acids. This helps prevent hepatic cell necrosis or degeneration, improving liver and bile function indicators [6]. *Gardenia jasminoides* contain gardenoside B and A, which enhance the liver's ability to uptake bilirubin and expedite its excretion. Additionally, *Gardenia* can boost the activity of hepatic glucuronyl transferase, significantly improving bilirubin excretion capacity and reducing bilirubin levels [7]. *Scutellaria baicalensis*, containing baicalin, has strong diuretic effects that facilitate the excretion of bilirubin via urine, thereby lowering its concentration in the body. *Lonicera japonica* contains chlorogenic acid, which inhibits the release of inflammatory mediators and prevents peroxidation of lipid components in cell membranes, thereby exerting hepatoprotective and choleretic effects [8]. Combined with phototherapy, this regimen can regulate neonatal immune function, improve intestinal peristalsis, and reduce inflammatory responses, leading to lower bilirubin and liver function indicators and higher immune function indicators in neonates [9,10].

5. Conclusion

In conclusion, Yinzhihuang granules improve the effectiveness of neonatal jaundice treatment, shorten the treatment duration, protect liver and bile function, and effectively enhance neonatal immunity.

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Disclosure statement

The author declares no conflict of interest.

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