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A Clinical Trial of Modified Liuwei Dihuang Pills Combined with Acupuncture Rehabilitation in the Treatment of Intellectual Developmental Disorders Caused by Liver and Kidney Deficiency

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Abstract: *The researcher combined modified Liuwei Dihuang Pills and acupuncture rehabilitation to treat intellectual developmental disorders of liver and kidney deficiency and observed the clinical efficacy. We divided 100 children with intellectual development disorders due to liver and kidney insufficiency into two groups according to the random number table method, including 50 cases in the control group and the observation group. For the control group, we performed cognitive training and special education. For the observation group, a combination of modified Liuwei Dihuang Pills and acupuncture therapy was administered based on the control group. We analyzed the efficacy of both groups of patients after three months of treatment. For two groups, we compared overall response rates, levels of intellectual development, and ability to carry out daily activities before and after treatment. The results showed that the overall response rate of the observation group after treatment was significantly higher than that of the control group, $P<0.05$. There was no difference in levels of intellectual development between the two groups before treatment, and the difference was not significant ($P>0.05$). After treatment, the levels of intellectual development scores of the two groups increased, and the levels of intellectual development scores of the observation group were higher than those of the control group. The difference was statistically significant ($P<0.05$). There was no difference in the ability to carry out daily activities between the two groups of patients before treatment ($P>0.05$), while after treatment, the ability to carry out daily activities scores of the two groups increased significantly. The score of the observation group was higher than that of the control group, and the difference was statistically significant ($P<0.05$). Therefore, modified Liuwei Dihuang Pills combined with acupuncture rehabilitation has a good therapeutic effect on children with intellectual development disorders due to liver and kidney deficiency. In addition, it can significantly improve the children's levels of intellectual development and ability to carry out daily activities.*

Keywords: *Intellectual disability; Modified Liuwei Dihuang Pills; Acupuncture therapy; Traditional Chinese medicine*

1. Introduction

Intellectual developmental disorders, also known as mental retardation, refer to disorders that arise during development and involve deficits in intellectual and adaptive functioning that are manifested in three areas: concepts, social interaction, and practice [1-2]. Clinical features include slow reactions, lack of facial expression, delayed speech, learning disabilities, and poor social adjustment. Intellectual developmental disability is a vital public health issue that seriously affects families and society [3]. Intellectual developmental disabilities affect an individual's ability to learn and master knowledge. Children with disorders also face great challenges in employment and life independence, which seriously affects their ability to carry out daily activities. In addition, intellectual disability may lead to obesity, vision and hearing impairment, and epilepsy [4-6]. There is no disease name for intellectual development disorder in ancient Chinese medicine books. According to the clinical manifestations, it can be classified into the "five kinds of retardation-five kinds of flaccidity" of Chinese Medicine. This study used modified Liuwei Dihuang Pills combined with acupuncture rehabilitation to treat 50 children with intellectual developmental disabilities due to liver and kidney insufficiency and compared it with 50 cases of children with cognitive training and special education intervention alone. The results of the study are as follows.

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2. Data and Research Methods

2.1 General Information

From May 2023 to May 2024, the researchers selected pediatric outpatients or hospitalized children from Xi'an Hospital of Traditional Chinese Medicine Encephalopathy and various cooperative units. There were 100 children with intellectual developmental disorders of liver-kidney deficiency type. They were divided into two groups according to the random number table, with 50 cases in each group.

Observation group: 22 males and 28 females. Age 2-6 years old, with an average age of (3.85±1.20). Control group: 33 males and 17 females, aged 2-6 years old, with an average age of (3.80±1.25). There was no statistically significant difference in the general information in the two groups (P>0.05).

2.2 Case Selection

2.2.1 Diagnostic Criteria

The Western medicine diagnostic criteria are as follows. First, the intelligence function is lower than the average level. In other words, the IQ is lower than the standard deviation of the population average, generally below 70 points. Second, there are cognitive impairment and adaptive deficits. Third, symptoms appear early in development. According to the literature [7], the standard of TCM syndrome differentiation is drawn up. The following people belong to the type of liver and kidney deficiency: People with delayed speech, slurred speech, mental retardation, dull facial expression, scattered thinking, moving more than resting, impulsivity, short temper and irritability, short stature, thin body, muscle spasms, lack of sleep, night sweats, hot palms and soles, pale tongue, little plaque or dark red tongue, threadlike pulse, and light fingerprints.

2.2.2 Inclusion Criteria

It conforms to the diagnostic criteria of intellectual developmental disorder in traditional Chinese medicine and Western medicine. In addition, the patients aged 2-6 years (this age group has high therapeutic value and is easy to observe and evaluate), and the patients can continue treatment for three months. This study was approved by the hospital medical ethics committee.

2.2.3 Exclusion Criteria

Here are those who do not meet the inclusion criteria: First, children under two or over six years old. Second, intellectual development disabilities are caused by genetic metabolic diseases. Third, children with complications such as epilepsy or severe convulsions make it difficult to evaluate the effectiveness of the program. Fourth, those with serious diseases such as cardiovascular, liver, kidney, and hematopoietic systems. Fifth, those with mental illness, which affects the implementation of the research and clinical efficacy. Sixth, those with severe self-mutilation behavior, inability to cooperate with treatment, and unable to be treated for three months. Seventh, patients with reaction and language problems caused by autism, hearing, or articulatory diseases. Eighth, patients or their family members do not agree to participate in this study.

2.2.4 Dropout Cases

All subjects who have filled out the informed consent form and are qualified to enter the trial, no matter when and for whatever reason, withdraw as long as they do not complete the observation period stipulated in the protocol, will be regarded as dropout cases, including those whose condition worsens, and patients or family members who request to withdraw midway.

2.3 Treatment Method

For the observation group, we used Chinese medicine, acupuncture, cognitive training, and special education.

For the control group, we only used cognitive training and special education, with the same methods as the observation group.

2.3.1 Treatment with Chinese Medicine

Main formula: Jiawei Liuwei Dihuang Pills (modified version of Golden Mirror of the Medical Tradition).

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Treatment method: enrich water to moisten wood, replenishes essence and marrow

Drug composition: Rehmannia glutinosa, yam, Cornus, poria, Alisma, peony bark, Acanthopanax bark, velvet antler, musk, etc.

Indications: People with delayed speech, slurred speech, mental retardation, dull facial expression, scattered thinking, moving more than resting, impulsivity, short temper and irritability, short stature, thin body, muscle spasms, lack of sleep, night sweats, hot palms and soles, pale tongue, little plaque or dark red tongue, threadlike pulse, and light fingerprints.

Usage: decoct with water, one dose per day, taken respectively in the morning and evening, four weeks for a course of treatment.

2.3.2 Acupuncture

(1) Main points: Temporal Third Needle, Sishen Needle, Baihui, Shuigou, Fengchi, Yamen, Lianquan. Acupoints: Jiao's language area, Ganshu, Shenshu, Xuanzhong, Fuliu, Taixi. For those who are emaciated, add Zusanli, Sanyinjiao, and Pishu. For those with unclear pronunciation, difficulty chewing and swallowing, and salivation, add Dicang Jieche and Chengjiang points.

(2) Procedure: The child remains seated while the surrounding area is regularly sanitized. Utilize a Huatuo acupuncture needle that measures 0.30 mm in diameter and 25 mm in length. Puncture the point on the head at a depth of 0.5-0.8 cun horizontally. The Sishen needle should be inserted flatly towards Baihui, with the three temporal needles inserted downwards along the skin. Baihui is pricked flatly towards the back, Shuigou is pricked upwards 0.2-0.3 cun, Lianquan is pricked 0.5 cun towards the throat, Yamen is pricked straight towards the jaw for 0.5 cun, and Neiguan is pricked straight for 0.3-0.5 cun. In Shuigou, Lianquan, and Yamen, the needles are inserted rapidly and removed immediately. The needles are only pierced briefly into the body without being left in. Rotate or turn every 10-20 minutes. For those who comply with the treatment, keep the needle inserted for 1 hour.

(3) Treatment course and precautions: During acupuncture and needle retention, the doctor can guide or assist the child to practice moving the tongue up and down, left and right, sticking out the tongue, imitating whistling, blowing, puffing the cheeks, and practising Pinyin pronunciation. In addition, massage their perioral-related acupuncture points, such as Lianquan, Dicang, and Jieche. Treatments are given five times a week for four weeks. After each treatment cycle, the intelligence and language skills will be evaluated. Treatment will be suspended if the patient has a cold, fever or is otherwise unwell.

2.3.3 Rehabilitation (Cognitive Training and Special Education)

It mainly includes training and education in cognitive ability, communication and daily life adaptation behavior, self-care ability, etc., and individualized education and training methods are formulated according to the condition. General rehabilitation training includes physical therapy, occupational therapy, speech therapy, sensory integration training and special education.

Treatment is done once a day, five times a week, for 40 minutes each, for four weeks.

2.4 Observation Indicators

For evaluating intelligence level, we used the Gesell Development Scale (0 ~ 3 years old, 4 ~ 6 years old) [8]. The changes in scores in five energy zones, namely, great movement, fine movement, adaptability, language ability and personal-social behavior, were evaluated before and after treatment in the two groups. We judged the curative effect according to the changes in five energy zone scores before and after treatment. Score improvement = (Post-treatment score–Pre-treatment score) / Pre-treatment score×100%. Significant effect: Score improvement of 30% or more. Effective: the score improvement rate is 10% ~ 30%. Invalid: the score improvement rate is less than 10%.

For evaluating living ability, we used the ability to carry out daily activities scale (consists of 9 items, each with 0-3 points, with a total score range of 0-27 points) to evaluate the children's ability to carry out daily activities before and after treatment [9]. Observe the changes in the ability to carry out daily activities before and after treatment. The higher the score, the stronger the ability to carry out daily activities.

Before and after treatment, each evaluation result was recorded once. Observation period of curative effect: 3 months.

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2.5 Statistical Analysis

All data were analyzed using SPSS 25.0 statistical software, and quantitative data were expressed as (mean ± standard deviation). Independent samples t-test was used for comparison between two groups, and percentage (%) was used for qualitative data. The X2 test was used for qualitative data. All statistical analyses were statistically significant with P<0.05.

3. Experimental Results

3.1 Comparison of Clinical Efficacy between Two Groups of Children with Mental Retardation

The overall response rate of the observation group was significantly higher than that of the control group (P<0.05). The results are shown in Table 1.

Table 1: Comparison of clinical efficacy between two groups of children with mental retardation

Groups	Number of cases	Significant effect	Effective	Invalid	Total effective
Observation group	50	25	22	3	47(94%)
Control group	50	19	23	8	42(84%)
X^2					3.997
P					0.037

3.2 Comparison of Developmental Levels between Two Groups of Children with Mental Retardation before and After Treatment

There was no difference in levels of intellectual development between the two groups before treatment, and the difference was not significant (*P*>0.05). After treatment, the levels of intellectual development scores of the two groups increased, and the levels of intellectual development scores of the observation group were higher than those of the control group. The difference was statistically significant (*P*<0.05). Table 2 shows the experimental results.

Table 2: Comparison of developmental level between two groups of children with mental retardation before and after treatment (Unit: Point)

Groups	Number of cases	Before treatment	After treatment
Observation group	50	63.27±3.77	81.27±5.77
Control group	50	62.89±4.14	75.89±5.14
t		0.637	5.897
P		0.511	0.000

3.3 Comparison of Ability to Carry Out Daily Activities between Two Groups of Children with Intellectual Disabilities Before and After Treatment

Before treatment, there was no difference in the ability to carry out daily activities between the two groups of children, and the difference was not statistically significant (*P*>0.05). After treatment, the scores of the ability to perform daily activities increased significantly in the two groups. The score of ability to perform daily activities was higher in the observation group than in the control group, which was statistically significant (*P*<0.05). Table 3 shows the experiment results.

Table 3: Comparison of ability to carry out daily activities between two groups of children with intellectual disabilities before and after treatment

Groups	Number of cases	Before treatment	After treatment
Observation group	50	6.57±1.77	18.85±3.77
Control group	50	6.19±1.64	16.49±3.14
t		1.337	4.897
P		0.176	0.000

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4. Discussion

The etiology of intellectual developmental disabilities is very complex, and the cause of many cases remains unknown. Current research has found that the known causes of intellectual developmental disorders can be divided into two categories: biological and psychosocial factors [10]. Biological factors mainly include premature birth, low birth weight, history of asphyxia, perinatal brain injury, congenital brain dysplasia (cranial CTMRI shows frontal and temporal lobe hypoplasia, expansion of the integumentary cavity, frontotemporal sulcus, widening and deepening of the frontal fissure, extracranial cerebral oedema), microcephaly, hypoxic-ischemic encephalopathy (HIE), neonatal intracranial haemorrhage, hyperbilirubinemia (kernicterus, bilirubin encephalopathy), congenital brain malformations, genetic diseases, etc. [11] They are also found in maternal diseases during pregnancy, maternal exposure to radiation and chemical poisons during pregnancy [12]. Regarding social and psychological factors, it is mainly due to being in a bad social and cultural environment and psychological trauma for a long time after birth [11]. In addition, some studies have found that there is a certain relationship between the occurrence of mental retardation and gestational age. The younger the gestational age, the higher the probability of mental retardation [13].

In traditional Chinese medicine, there are no disease names such as "mental developmental disorder and mental retardation". However, based on the symptoms and clinical manifestations such as developmental delay, seldom speaking, speech disorders, and delayed closure of the fontanelle, it can be included in the category of "five kinds of retardation (characterized by retardation in standing, walking, hair and teeth growth and speaking) and five kinds of flaccidity" in traditional Chinese medicine [14]. The brain is the home of the soul, and the innate essence and energy are closely related to the brain marrow. In Essentials of Integrated Traditional Chinese and Western Medicine, Tang Rongchuan mentioned, "The reason we can't forget things is in our memory, and the place where we remember is the kidney meridian. Yishen Shengjing, into the marrow, and stored in the brain." He proposed the method Benefit kidney and sperm, tonic brain and beneficial marrow. In this research, the disease is caused by congenital deficiency, epilepsy, convulsions, etc., which consume the liver and kidney yin essence over time. The deficiency of essence leads to insufficient marrow and lack of nutrition for tendons, veins, and muscles, so doctors often treat the liver and kidney. Therefore, this study theoretically summarizes and proposes the key pathogenesis of "liver and kidney deficiency, bone marrow loss of nutrition, and low intelligence". We established the treatment principle of "enriching water to moisten wood, replenishing essence, and marrow, brightens the brain and improves intelligence". Liuwei Dihuang Pills, a Chinese patent medicine commonly used in clinical practice, has the function of nourishing yin and tonifying kidneys. Qian Yi's original intention in making Liuwei Dihuang Pills was to treat the "five kinds of retardation" in children, which is what people today call pediatric developmental disorders. Liuwei Dihuang Pills were later developed in the clinical practice of traditional Chinese medicine and became a thousand-year-old medicine for nourishing the liver and kidneys and maintaining health. This recipe is based on the Golden Mirror of the Medical Tradition. The main ingredients are Rehmannia glutinosa, yam, Cornus, poria, Alisma, peony bark, Acanthopanax bark, velvet antler, Musk, etc. This prescription is a tonic agent that has the effect of nourishing the yin and tonifying the kidney. It can treat symptoms such as liver and kidney deficiency, delayed speech, slurred speech, mental retardation, dull facial expression, scattered thinking, moving more than resting, impulsivity, short temper and irritability, short stature, thin body, muscle spasms, lack of sleep, night sweats, hot palms and soles, etc. In the prescription, we reuse Rehmannia root as the main medicine to nourish yin and kidney, replenish essence, and benefit marrow. Cornus officinalis nourishes the liver and kidneys and can astringe semen. Yam tonic spleen yin, also can solid essence, a total of minister medicine. The three components match and nourish the liver, spleen, and kidney, called "three tonics", mainly tonifying the kidney and yin, which is used to cure the root cause. It is combined with Alisma orientalis to eliminate dampness and turbidity and prevent the nourishing and greasy effect of Rehmannia glutinosa. Peony bark extinguishes internal fire, and Cornus officinalis controls warmth and astringency. Poria permeates Spleen moisture and supports the effect of yam. These three drugs permeate dampness, clear deficiency heat, and replenish partial excess to treat symptoms. They are all complementary medicines. A medicinal diet combining six flavors. It is called San-bu-san-xie, with a higher dose of tonic, and is mainly used for supplementation. For the liver, spleen, and kidney, fill three yin, and tonify the kidney yin, which is the characteristic of this prescription. In addition, we adjust the dosage of the medicines such as Acanthopanax acanthopanax, deer antler, and Musk used according to the symptoms. Pharmacological studies demonstrate that Rehmannia root improves experimental brain dysfunction and enhances memory in the elderly. Rehmannia root, yam, and Cornus officinalis can regulate the central nervous system of the brain, improve brain metabolism and the transmission of central neurotransmitters, and enhance learning and memory. At the same time, yam, Cornus officinalis, and poria cocos can promote the growth and development of brain cells. Long-

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term feeding of Liuwei Dihuang Pills will improve the memory acquisition and retention ability of mice, enhance their spatial memory ability, and partially improve their conditioned avoidance response-ability.

5. Conclusion

In this study, for the selection of acupuncture points for acupuncture treatment, reference was made to the selection pattern of Jin's Three Needles for the treatment of cognitive disorders in children, and the Sishen Needlepoints were located on top of the circulatory routes of the directing vessel and bladder meridian. The Governor Vessel governs the yang of the body. The bladder meridian and the kidney meridian are mutually exclusive. The kidney masters the bone and produces marrow in the brain, so acupuncture can stimulate the whole body's qi, blood, and fluids, adjust the brain's meridians, and fill in the marrow to help the brain. In addition, the Temporal three needles can regulate qi, yin, and yang. Modern research [15-16] shows that the acupoints mentioned above are all located in the parietal lobe, cerebellum, temporal lobe, and frontal lobe of the emotional intelligence and memory functional areas, stimulating the corresponding cerebral cortex acupoints in the functional areas. On the one hand, it can promote blood flow, improve blood circulation, awaken dormant nerve cells in the brain, enhance the oxygen absorption ability of brain cells, and promote the repair of damaged nerve cells; on the other hand, it can promote the development and maturation of brain cells and improve cognitive function. Shui Gou is where the Yang and Ming of the hands and feet meet, which can awaken the mind, open the body orifices, relieve cramps, and calm the mind; Feng Chi can regulate the Qi of the head and neck, purify the head and eyes and regulate the Qi and blood; Bai Hui opens the body orifices, awakens the mind and has a positive effect on the brain and intellect. The Yamen combined with the Lianquan point affects the pharynx, relieving the throat, purifying the meridians, and calming the mind. While the remaining appropriate points regulate the function of the liver and kidneys, nourish the liver and kidneys, benefit the essence, and replenish the marrow.

In conclusion, modified Liuwei Dihuang Pills combined with acupuncture rehabilitation have good therapeutic effects in treating children with mental developmental disorders due to liver and kidney deficiency. This research targets the core symptoms of the disease and focuses on improving intelligence and the ability to carry out daily activities. In addition, the Chinese herbal medicine treatment for intellectual developmental disorders organically combines acupuncture and moxibustion treatment with rehabilitation training, making it worthy of clinical promotion.

References

[1] American Psychiatric Association D S. Diagnostic and statistical manual of mental disorders: DSM-5[M]. Washington, DC: American psychiatric association, 2013.
[2] Jiang Z F, Shen K L. Zhu Futang practical pediatrics[J]. People's Medical Publishing House, 2002.
[3] Wang D, Zhang L, Wu X. Effects of adaptive physical activity on physical activity level and social adaptability of children with severe mental retardation in welfare institutions under healthy Chinese background [J]. Journal of Tianjin Institute of Physical Education, 2023, 38 (3):367-372.
[4] Qi N, Yang K, Lei X, et al. Clinical and genetic analysis of mental retardation and microcephaly associated with pontine and cerebellar dysgenesis in 2 children [J]. Chinese Journal of Medical Genetics, 2023, 40 (4):408-412.
[5] Cai C, Shangguan H, Wu W, et al. Clinical phenotyping and genetic analysis of X-linked intellectual disability caused by HUWE1 mutation [J]. Laboratory Medicine, 2023, 38(2):117-123.
[6] Lin L, Pan H, Ma Y, et al. Progress in genetic research and prevention of single gene-related developmental retardation and mental retardation [J]. Chinese Journal of Perinatal Medicine, 2023, 26(6): 514-518.
[7] Kong M, Liu Z, Huang C. Guidelines for Clinical Diagnosis and Treatment of Pediatrics of Traditional Chinese Medicine, Mental Retardation (Formulation) [J]. Journal of Pediatrics of Traditional Chinese Medicine, 2016, 12(2):1-5.
[8] Lin W, Wang X, Wu J, et al. Application of Wechsler Intelligence Scale for Children (4th Edition) in Intelligence Structure Analysis of Children with Attention Deficit Hyperactivity Disorder [J]. Chinese Journal of Child Health Care, 2012, 20 (1):58-61.
[9] Reilly CC, Bausewein C, Garrod R, et al. Breathlessness during daily activity: The psychometric properties of the London Chest Activity of Daily Living Scale in patients with advanced disease and refractory breathlessness [J]. Palliat Med, 2017, 31(9):868-875.
[10] Lin W L. Doctoral dissertation of Guangzhou University of Chinese Medicine in 2010 [J]. 1.

ISSN 2706-6819 Vol.6, Issue 11: 22-28, DOI: 10.25236/IJFM.2024.061104

Guangzhou: Guangzhou University of Chinese Medicine, 2010, 1-59.
[11] Bélanger S A, Caron J. Evaluation of the child with global developmental delay and intellectual disability [J]. Paediatrics & child health, 2018, 23(6): 403-410.
[12] An J, Chen S, Feng C, et al. Analysis of mental development status of 1168 infants and young children. Chinese Journal of Practical Neurology [J], 2007, 10(7): 78-79.
[13] Wang S. Analysis of the causes of developmental delay in 117 children. Southwest Military Medicine [J], 2018, 20(1): 74-75.
[14] Shi L. A clinical study combining the Neiguan acupoint and Zhisanzhen to treat motor disorders in mentally retarded children[J]. Chinese Journal of Health Care and Nutrition, 2015, 25(8): 18.
[15] Guse AH, Diercks BP. Integration of nicotinic acid adenine dinucleotide phosphate (NAADP)-dependent calcium signaling[J]. J Physiol, 2018, 596(14): 2735-2743.
[16] Wei J, Xie C Z, Yuan Q. Acupuncture combined with fatigue rotarod training improves motor and cognitive functions in pMCAO rats [J]. Chinese Journal of Acupuncture, 2019, 39(7): 748-754.