

Research progress on improving motor function of spastic cerebral palsy with integrated traditional Chinese and western medicine

Chenchen Zhang^{1,*}, Hui Wang²

¹*Shaanxi University of Traditional Chinese Medicine, Xianyang, Shaanxi, 712406, China*

²*Xi'an Traditional Chinese Medicine Brain Disease Hospital, Xi'an, 710032, China*

**Corresponding author*

Keywords: Spastic cerebral palsy, motor function, research progress

Abstract: Cerebral palsy is a common central nervous system disease syndrome in childhood. The lesions are in the brain and involve the limbs, which seriously affects the growth and development of children. The central motor and postural development disorders are the main causes of physical disability in children. The disease is slow growing and has a high chance of long-term disability. At present, the treatment methods for cerebral palsy are becoming more and more mature, and the treatment methods are diversified. Clinically, the treatment of cerebral palsy with integrated traditional Chinese and western medicine has achieved remarkable results. This article summarizes the research methods of integrated traditional Chinese and western medicine to improve the motor function of cerebral palsy.

1. Introduction

Cerebral palsy is a group of persistent central motor and postural developmental disorders and activity limitation syndromes, which are caused by non-progressive brain damage in the developing fetus or infant. The movement disorders of cerebral palsy are often accompanied by sensory, Perception, cognition, communication and behavioral disorders, as well as epilepsy and secondary muscle and skeletal problems [3]. Although most children can reduce muscle tension, correct abnormal posture, and improve movement disorders to a certain extent after long-term standardized rehabilitation treatment, due to the large individual differences in the degree of cerebral palsy dysfunction, routine rehabilitation exercises only rely on various sports Training techniques to improve the range of motion of children with spastic cerebral palsy cannot meet the children's further needs for exercise ability in the process of gradual rehabilitation. In recent years, the treatment of cerebral palsy with integrated traditional Chinese and Western medicine can significantly improve the motor function and self-care ability of children, which should be further promoted and applied in clinical practice.

2. The etiology of cerebral palsy in children

2.1. The understanding of TCM on cerebral palsy

There is no record of the disease name of "cerebral palsy" in the traditional medicine of the motherland, and most of the discussions about this disease are scattered in the literature of the past dynasties. There are many kinds of factors that affect the occurrence of cerebral palsy, and the ancient famous physicians mostly discussed the congenital and acquired factors. Congenital influencing factors are more related to major factors such as insufficient endowment, intrauterine infection or premature birth. The pathogenesis of this disease is the lack of congenital endowment, resulting in dystrophy of the brain and marrow, and inappropriate adjustment of the acquired body, resulting in the loss of moisturizing of the body. The disease is located in the brain and is related to the liver, spleen and kidney. According to the symptoms of pediatric cerebral palsy, most physicians attribute pediatric spastic cerebral palsy to the "five delays" and "five soft" diseases in traditional Chinese medicine. "Five delays" refers to the delay of standing, walking, sending, teeth, and speech. "Five soft" refers to soft neck, soft hands, soft feet, soft mouth, soft muscles. As recorded in "Golden Mirror of Medicine, The Essentials of the Heart of Young Branches": "It is mostly due to the weakness of the qi and blood of the parents, which is a congenital deficit". "Children's Play · Fetal Diseases" mentioned: "Those with weak fetuses are inherently affected by the lack of qi". In addition, as stated in "Summary of Baby Care: Five Softs": "The five softs are all due to the weakness of the qi of the five viscera, which cannot be nourished and full." "Baby Children's Hundred Questions: Five Softness" believes that "the five soft people are soft head, soft neck, soft hands, soft feet and soft muscles". It can be seen that the "five soft" and "five slow" focus on the description of motor growth retardation and dysfunction. Yu Haibo et al. [5] believed that this disease is a "constriction", due to shock in the fetus or wind during delivery, resulting in internal movement of the liver wind, resulting in the constriction of the muscles and veins of the limbs. Wang Junying [6] pointed out that spastic cerebral palsy in children is also similar to the category of "internal wind" in Chinese medicine, which is characterized by adduction and backward rotation of both upper limbs, flexion of elbow, wrist, and interphalangeal joints, and straight and crossed lower limbs in a "scissors-like" shape. "Pose, neck thrown back. The kidney stores essence, the main bone and marrow, the main growth and development. The liver stores blood, the body is the tendons, and the main cardinal is agile. Children with insufficient congenital endowments, loss of liver and kidney, and malnutrition in the sea of maru, so see growth retardation and unfavorable activities. In addition, kidney belongs to water, liver belongs to wood, water does not contain wood, liver blood is deficient, tendons and veins are out of nourishment and tend to contract urgently. The treatment should nourish the liver and kidney, relax the tendons and dredging the collaterals, so that the essence and blood are sufficient, the tendons and meridians are nourished, and the symptoms will disappear spontaneously. According to the incidence of spastic cerebral palsy in children, Wang Xuefeng et al. [7] believed that the TCM syndrome differentiation of spastic cerebral palsy belongs to the type with strong liver and weak spleen. The liver is in charge of dredging and excreting, and the muscles and muscles are combined in the body. The motor function of the muscles, veins and joints of the whole body must be nourished by the essence and blood of the liver. Insufficient or excessive consumption of the yin and blood of the liver, hyperactivity of liver yang and transformation of wind, the tendons and meridians are in a hurry, and the joints are unfavorable in flexion and extension. The spleen is the foundation of acquired, the source of qi and blood biochemistry, and the main muscles and limbs. Liver and spleen, weak spleen, lack of biochemical sources of qi and blood, muscle weakness and weakness due to lack of blood nourishment for tendons and muscles, convulsions of muscles and veins, stiffness of limbs, unfavorable joints, and

ineffective movements. The treatment should focus on softening the liver and spleen, relaxing the tendons and relieving spasm. If the spleen is strong, the qi and blood will be biochemically active, and if the liver blood is replenished, the muscles and bones will relax and orderly.

2.2. Western medicine's understanding of cerebral palsy

Modern medicine believes that the etiology of cerebral palsy is complex and there are many risk factors. The pathogenesis of cerebral palsy is a developmental defect and brain injury that occurs before the brain matures. At present, there are still a large number of children with unknown causes [8]. The etiology can be roughly divided into prenatal factors, perinatal factors and postpartum factors according to time. Antenatal factors state that cerebral palsy may develop due to the mother before birth. Poor maternal lifestyle habits during pregnancy, such as alcoholism and smoking, may increase the incidence of cerebral palsy. Many diseases may also affect the fetus, such as severe infection, poisoning during pregnancy, diabetes, rheumatism, etc. [9,10]. In addition, mental retardation, nutritional deficiencies and unreasonable drug treatment during pregnancy may also lead to cerebral palsy. In addition to the above factors, some people in the current study point to a genetic predisposition to cerebral palsy. Children with cerebral palsy are more likely to have cerebral palsy when there are children in the family. Among perinatal factors, preterm birth is one of the most important factors for cerebral palsy. Preterm infants are reported to have a higher risk of developing cerebral palsy than term infants. The birth weight of newborns is also associated with the occurrence of cerebral palsy. Macrosomia and low birth weight infants have a higher incidence of cerebral palsy than normal neonates. In addition, hypoxia-ischemia and placental function may also lead to cerebral palsy. Postpartum factors include many postpartum neonatal diseases that may lead to cerebral palsy, including respiratory distress syndrome, convulsions, intracranial hemorrhage, intracranial infection, brain trauma, and hypoxic-ischemic encephalopathy [11]. At the same time, the pathogenesis of this disease is diverse and extensive. From a cytological point of view, it is mainly the structural changes of brainstem nuclei, cortex and gray matter neurons, the changes of white matter nerve fibers and the separation of myelin [12]. From the perspective of etiology, the main developmental disorders and malformations of the central nervous system, Zhouhai's ventricular softening (PVL), brain injury caused by birth injury, bilirubin encephalopathy, hypoxic ischemic encephalopathy, congenital infection [13]. In recent years, many epidemiological studies have shown that most cerebral palsy is congenital, the prevalence of assisted reproductive technology (ART) may increase the incidence of monozygotic twins, but also more prone to cerebral palsy [14]. Therefore, clarifying the pathogenesis of cerebral palsy, strengthening early identification and diagnosis, and taking effective preventive measures in time can effectively reduce the incidence of children with cerebral palsy.

3. Progress in the treatment of children with cerebral palsy

3.1. Advances in TCM treatment

Acupuncture therapy, massage therapy, traditional Chinese medicine fumigation therapy, traditional Chinese medicine, acupoint sticking, acupoint catgut embedding and other traditional Chinese medicine therapy have achieved certain curative effects in the treatment of cerebral palsy, and achieved gratifying results. At present, more and more scholars are good at using comprehensive therapy to treat children with cerebral palsy. Its advantage is to reorganize and integrate various means so that they work together. Many studies have also shown that this method has the advantages of faster efficacy, better long-term efficacy, and fewer adverse reactions than any single treatment method.

3.1.1. Acupuncture treatment

Nowadays, traditional Chinese medicine has received attention in the treatment of children with cerebral palsy. The application of acupuncture and moxibustion therapy by Kuang Yi [15] et al. can play a role in neuromodulation and humoral regulation, affecting the central nervous system and blood circulatory system of children, improving the blood vessels of brain lesions, and improving spasticity in children. Symptoms are of high value. At the same time, it is also confirmed that acupuncture can improve the density of hippocampal neurons after ischemia and hypoxia, and promote the positive expression of nerve growth factor in brain tissue. Therefore, it can be considered that acupuncture can promote the repair of damaged nerve cells and the remodeling of neural structure, restore the function of the central nervous system of the spinal cord, and cooperate with rehabilitation training to improve the rehabilitation effect.

3.1.2. Massage therapy

The main difference between pediatric massage and adult massage is that the technique should be lighter, softer, and more stable. Because the main features of spastic cerebral palsy are low muscle strength and muscle tension, which affects the development of sports, massage techniques such as acupoint acupressure, meridian massage, and pinching are often used to clear the meridians, adjust tendon reset, loosen adhesions, and smooth joints. At present, massage combined with rehabilitation training, massage combined with acupuncture, massage combined with traditional Chinese medicine and other rehabilitation methods have been widely used in clinical practice. The application of Liu Can [16] and others can further improve the muscle strength and gross motor function of children with cerebral palsy. With modern rehabilitation technology, it nourishes the liver, kidneys, and body, makes the meridians comfortable, balances the yin and yang of the viscera, and improves children's disease resistance and recovery ability. Zhou Rui [17] and others applied the Xingnao Tongdu Tui Na method, which can promote the establishment of children's normal posture and movement patterns, and promote the improvement of motor function. The movement disorder has achieved satisfactory results in a short period of time. This method It is simple, convenient, cheap and experienced.

3.1.3. Chinese medicine fumigation and washing treatment

As one of the commonly used methods for the treatment of spastic cerebral palsy, traditional Chinese medicine fumigation has significant advantages in improving movement disorders and abnormal posture in children with cerebral palsy. Chinese medicine fumigation has a long history. Its mechanism is to use the absorption, penetration and excretion properties of the skin. The medicinal steam and medicinal bath produced by the decoction of traditional Chinese medicine directly act on the surface of the limbs. On the one hand, the active ingredients of the drugs contained in the steam and medicated bath are directly absorbed through the skin, pores and other parts, and enter the patient's body, internal organs and various tissues, thereby promoting blood circulation, removing blood stasis, fumigation and the warmth of the medicated bath. The effect can promote blood circulation and lymph circulation, promote metabolism, improve system function, reduce muscle tension, relieve muscle spasm, maintain and expand joint range of motion, correct contracture, thereby improving exercise ability and expanding joint range of motion. Traditional Chinese medicine fumigation and bathing are often used clinically. For example, Ge Shuang [18] used traditional Chinese medicine fumigation and bathing to treat spastic cerebral palsy and cerebral palsy scale and GMFM-88 scale scores were significantly higher than those of the control group, with significant curative effect, can relieve lower limb muscle tension, significantly improve children's quality of life, promote the development and establishment of gross motor function,

improve the efficacy of rehabilitation function training. Dong QiuJun [19] and others treated children with spastic cerebral palsy through traditional Chinese medicine fumigation and bathing combined with rehabilitation training. The study showed that the treatment group had immediate effects. After fumigation and bathing, children's joint contractures are relieved and muscles are relaxed, which can better cooperate with other rehabilitation treatments, relieve children's pain, and improve children's clinical rehabilitation compliance.

3.1.4. Other therapies

In addition, a large number of studies have shown that traditional Chinese medicine, acupoint application, acupoint catgut embedding and other traditional Chinese medicine therapies have obvious therapeutic effects on children with cerebral palsy. According to the symptoms and signs of children with cerebral palsy, combined with tongue, pulse or fingerprints, traditional Chinese medicine treats Liuwei Dihuang Pill, Guipi Decoction, Tongqiao Huoxue Decoction, Erchen Decoction, Yigong San Modified and Bu Tian Da Zao Pill, and Experience in the treatment of cerebral palsy. Deficiency syndrome is very common in clinical practice, so tonifying deficiency is a method to treat deficiency syndrome. For example, He Puren, a master of traditional Chinese medicine, put forward three principles of "replenishing", "passing" and "adjusting" to treat growth retardation in children with cerebral palsy, that is, replenishing the congenital and strengthening the root, regulating the yang qi of the whole body, clearing the orifices, strengthening the brain and refreshing the brain. Professor Wang Youpeng [20] developed an innovative patented drug based on the three principles of He Puren, a master of traditional Chinese medicine, combined with Buyang Huanwu Decoction, Professor Dong Tingyao and Professor Liu Bichen's commonly used drugs for the treatment of cerebral palsy, combined with years of clinical practice experience - Shujin Jiannao Granules. Clinical experiments have proved that Shujin Jiannao Granules are easy to carry, have an excellent taste, and have a precise curative effect. In addition to Yang Xiaohui et al. [21], through the combined treatment of oral administration, application of traditional Chinese medicine and acupoint catgut embedding, it has been confirmed that comprehensive therapy can significantly improve children's motor function, physical function and living ability, and can achieve good results in the treatment of children with cerebral palsy. In recent years, the minimally invasive technique of traditional Chinese medicine acupuncture has been applied to cerebral palsy, and three surgical techniques have been established: cutting correction, muscle stimulation and nerve stimulation, which have the effect of relieving spasticity and contracture.

3.2. Advances in Western Medicine Treatment

Western medicine treatment includes rehabilitation technology treatment, Western medicine treatment, surgical treatment, BOTX-A injection, physical factor treatment and orthopedic brace treatment. Unification, intensified research efforts in treatment methods, and a large number of studies have confirmed that children's motor function has improved significantly.

3.2.1. Rehabilitation technology therapy

Rehabilitation therapy is the main clinical means at present. my country's rehabilitation medicine has developed rapidly and the quality of rehabilitation services is ideal, but there is still a certain gap compared with developed countries. Currently, clinically commonly used physical therapy (PT), occupational therapy (OT), speech therapy (ST) and so on. The efficacy of rehabilitation alone is quite different. At present, integrated traditional Chinese and Western medicine has been widely used in clinical practice. Zhu Guoli [22] applied scalp acupuncture combined with nerve-promoting rehabilitation technology to children with cerebral palsy. In addition, the latest rehabilitation

treatment technologies in recent years include vibration therapy, robotics, etc. Judging from a large number of literatures, vibration therapy can improve the exercise level of children with cerebral palsy in many aspects, and the long-term effect is good, and it can improve their quality of life, but more research evidence from the clinical aspect is still needed. In addition, although robotics has been primarily used in the rehabilitation of patients with brain injuries and strokes in the past, it has gradually been applied to the treatment of children with cerebral palsy. Not only is it a promising adjunctive and alternative treatment for cerebral palsy, but it can also promote the recovery of children's motor function and daily communication skills. For example, Alex et al. [23] had five children interact with the robot via smartphones for five months and recorded via brain wave sensors. The experimental results show that the robot can help children with cerebral palsy receive rehabilitation treatment, and is an effective and promising auxiliary treatment tool.

So far, there is no effective drug for cerebral palsy. Clinical drug treatment mainly plays the role of nourishing nerves and relieving spasm. Drugs that nourish nerves mainly refer to drugs that have certain effects on vegetative cells, promoting synaptic connections and myelin development, such as gangliosides, mouse nerve growth factor (mNGF), and cerebroprotein hydrolysates. Relevant studies have shown that: monosialotetrahexosylganglioside sodium is one of the main components of cell membranes, which is more widespread in mammalian cell membranes, and has a higher proportion in central nervous tissue, and participates in the differentiation of neuronal structures. The exogenous intramuscular injection channel can improve its overall level, effectively protect brain nerve cells, play a protective role on $\text{Na}^+\text{-K}^+\text{-ATP}$, $\text{Ca}^{2+}\text{-Mg}^{2+}\text{-ATP}$ enzyme activity, balance oxygen free radicals, and repair the central nervous system [24].

3.2.2. Surgical treatment

Specifically, it includes selective partial transection of peripheral nerves and orthopedic surgery of bone and muscle-muscle bonds. At this stage, selective partial rhizotomy, selective partial transection of peripheral nerves, and common carotid adventitial dissection are commonly used. (Namely, cervical sympathetic denervation), correction of flexion deformity of medullary joint, correction of medullary joint adduction deformity, correction of flexion deformity of knee joint, correction of foot deformity, etc., all of which have achieved certain curative effects accordingly. Surgical treatment mainly relieves spasticity and reduces muscle tone while preserving normal sensory function. Of course, surgery is not the main way to treat cerebral palsy, but to create better conditions for rehabilitation training. He Binghui [25] and others proved the safety of the operation by observing the spasticity relief and limb function status after selective posterior rhizotomy in 163 children with cerebral palsy.

3.2.3. Other treatments

In terms of relieving spasm, neuromuscular blockers (botulinum toxin type A) are more representative, and their mechanism is to relieve muscle spasm and reduce muscle tone by inhibiting the release of acetylcholine from nerve endings. Xu Huan et al [26] believed that after mastering the therapeutic dose and comprehensively considering the condition, botulinum toxin type A can significantly relieve muscle spasm in children with cerebral palsy, improve standing and walking functions, reduce steps, increase stride, and improve limb movement. function and quality of life. As for the choice of oral drugs, foreign studies have shown that doctors' prescriptions and doses are different in clinical practice, but baclofen and bapentin are used more frequently [27]. Another study further found that intrathecal baclofen was most effective in controlling muscle tension and spasticity at doses of 60 to 264 micrograms per day [28]. The authors believe that although many drugs can improve local symptoms in children with cerebral palsy, it is still

necessary to further develop standardized drug prescription treatment plans based on the best evidence and the consensus of clinical experts. Secondly, the commonly used physical factor treatments for cerebral palsy patients include various forms of electrical stimulation therapy, biofeedback therapy, light therapy, water sports and spa, which have been widely used in the rehabilitation of cerebral palsy. At present, low-frequency pulsed electrical stimulation, biofeedback therapy and spastic muscle therapy instruments are commonly used treatment methods, which can better relieve muscle spasm, reduce muscle tension, and have a good auxiliary effect on children with spastic cerebral palsy. In addition, the symptoms of children with spastic cerebral palsy are mainly lower extremity dysfunction. Reasonable and appropriate use of orthoses can improve children's abnormal posture, establish normal lower extremity biological lines, and effectively improve their standing and walking abilities. The main purpose of orthopedic device treatment is to maintain or increase the range of motion of the joint; protect or stabilize joint function; prevent further joint deformity. At present, ankle-foot orthoses are one of the effective means to prevent and correct joint deformities. Ankle foot orthoses are used for walking training to improve lower extremity motor function. Pan Zhiliang et al. [29] used dynamic ankle-foot orthoses to observe the motor function of children before and after 3 months of training, and found that the use of orthoses could relieve ankle pain in children with spastic cerebral palsy and effectively improve their balance function and motor function.

4. Summary

To sum up, the clinical treatment methods for cerebral palsy are diverse and increasingly diversified, but there is still no cure. Through clinical research in recent years, the author found that the combination of traditional Chinese medicine acupuncture, massage and other treatment methods with Western medicine rehabilitation is the main treatment method, but it is worth noting that due to the particularity of children's physiological characteristics, no matter what treatment method is used, the adverse effects on children cannot be ignored. Children with cerebral palsy have the same problem, and the best treatment method should be selected according to the specific situation of the child.

References

- [1] Li Xiaojie, Qiu Hongbin, Jiang Zhimei, et al. Epidemiological characteristics of children with cerebral palsy in twelve provinces and cities in China [J]. *Chinese Journal of Practical Pediatrics*, 2018, 33(5): 378-383.
- [2] Yi Xuanchao, Tang Leping, Wu Qingming, Zhang Huijia, Guo Chunguang, Du Geshu, Shao Xiangning. Effects of Liu's Pediatric Massage on Children with Cerebral Palsy with Mild Intellectual Disability [J]. *Chinese Journal of Rehabilitation Medicine*, 2016, 31(01): 64-67.
- [3] Tang Jiulai, Qin Jiong, Zou Liping, Li Xiaojie, Ma Bingxiang. Guidelines for Rehabilitation of Cerebral Palsy in China (2015): Part One [J]. *Chinese Journal of Rehabilitation Medicine*, 2015, 30(07): 747-754.
- [4] Chen Xuemei, Ji Duo. Tracing the ancient literature of traditional Chinese medicine for cerebral palsy [J]. *Chinese National Folk Medicine*, 2018, 27(22): 8-10.
- [5] Yu Haibo, Zeng Chaogao, Jin's three-needle therapy combined with rehabilitation training in the treatment of children with spastic cerebral palsy [J]. *Journal of Guangzhou University of Traditional Chinese Medicine*, 2010, 27(2): 119-122.
- [6] Wang Junying. The therapeutic effect of traditional medicine on children with cerebral palsy [J]. *Modern Rehabilitation*, 2001, 5(5): 13-14.
- [7] Wang Xuefeng, Hu Xiaoli. Analysis of traditional Chinese medicine on spastic cerebral palsy (syndrome of strong liver and spleen) in children [J]. *Chinese Journal of Pediatrics*, 2005, 1(2): 6.
- [8] Zhang Guoping. Observation on the effect of acupoint injection of ganglioside combined with nerve-promoting rehabilitation technology in the treatment of children with cerebral palsy [J]. *Chinese Journal of Practical Neurological Diseases*, 2014, (19): 10-111.
- [9] Tu Bo, Zhang Hongmei, Song Gaofei, etc. Analysis of the clinical effect of cerebellar parietal nucleus electrical

- stimulation combined with systematic rehabilitation exercise in the treatment of children with cerebral palsy [J]. *Anhui Medicine*, 2016, 20(4): 754-755.
- [10] Ding Fang. Clinical observation on the comprehensive treatment of children with cerebral palsy by hyperbaric oxygen [J]. *Journal of Modern Integrative Medicine*, 2015, 24(14): 1538-1540.
- [11] Di Fazio, R. L., Harris, M., Vessey, J. A. et al. Opportunities lost and found: Experiences of patients with cerebral palsy and their parents transitioning from pediatric to adult healthcare [J]. *Journal of pediatric rehabilitation medicine*, 2014, 7(1): 17-31.
- [12] Shi Zhenguo, Ye Zhiying. An overview of the progress in the treatment of children with cerebral palsy [J]. *Clinical Practice of Integrated Traditional Chinese and Western Medicine*, 2018, 18(11): 180-183. DOI: 10.13638/j.issn.1671-4040.2018.11.089.
- [13] Ruan Weiwei. Clinical study on the effect of "Five Heart Points" on cognitive function in children with cerebral palsy [D]. *Nanjing University of Traditional Chinese Medicine*, 2019:3-4.
- [14] Yu Li, Liu Lijie, Zeng Peng, Luo Hanyu, Lin Ling, He Jiamin, Lin Xing. Analysis of risk factors for cerebral palsy in high-risk children in Huizhou City [J]. *Practical Clinical Medicine*, 2019, 20(4): 100- 103.
- [15] Kuang Yi, Wang Liang, Zhou Yongxing, Wu Haihao, Liu Ti, Li Wen, Zhang Chen, Ma Lichun. Clinical application of acupuncture combined with rehabilitation training in the treatment of children with cerebral palsy [J]. *Shenzhen Journal of Integrated Traditional Chinese and Western Medicine*, 2021, 31(13):63-64. DOI: 10.16458/j.cnki.1007-0893.2021.13.030.
- [16] Liu Can, Wang Paoqiu, Liu Yueqin, Liu Hongwen, Long Yajun. Effects of massage on muscle tone and motor function in children with spastic cerebral palsy [J]. *China Rehabilitation Theory and Practice*, 2013, 19(10): 960-962.
- [17] Zhou Ruigang, Zhao Bing, Zhou Yuanshi. Effects of Xingnao Tongluo Tuina on motor function in children with spastic cerebral palsy [J]. *Clinical Research of Traditional Chinese Medicine*, 2016, 8(19): 46-48.
- [18] Ge Shuangzhi. Study on the rehabilitation of children with spastic cerebral palsy by traditional Chinese medicine fumigation and washing combined with acupuncture [J]. *Electronic Journal of Clinical Medicine Literature*, 2019, 6(70):16+20. DOI: 10.16281/j.cnki.jocml.2019.70.010.
- [19] Dong Qiujun, Li Xin Shangqing. Clinical observation of traditional Chinese medicine fumigation combined with rehabilitation training in the treatment of children with spastic cerebral palsy [J]. *Bright Traditional Chinese Medicine*, 2018, 33(21): 3122-3124.
- [20] Qi Xiaoyu, Yang Xi, Liu Lujia, Qu Wanying, Jing Weichao, Wang Youpeng. Research progress in the treatment of spastic cerebral palsy by Chinese and Western medicine [J]. *Shaanxi Traditional Chinese Medicine*, 2017, 38(7): 981-982.
- [21] Yang Xiaohui, Deng Xiangqi. Treatment of 20 cases of spastic cerebral palsy by oral administration of traditional Chinese medicine, acupuncture and massage combined with medicated bath, and acupoint catgut embedding [J]. *Bright Traditional Chinese Medicine*, 2019, 34(2): 265-266.
- [22] Zhu Guoli. Analysis of the clinical efficacy of scalp acupuncture combined with nerve-promoting rehabilitation technology in the treatment of children with cerebral palsy [J]. *World Latest Medical Information Digest*, 2018, 18(96):42+44. DOI: 10.19613/j.cnki.1671-3141.2018.96.025.
- [23] Alex A. Lins, Juliana M. de Oliveira, Joel JPC Rodrigues, et al. Robot-assisted therapy for rehabilitation of children with cerebral palsy - A complementary and alternative approach. 2019, 100: 152-167.
- [24] Heidi Schwellnus, Gillian King, Patricia Baldwin, et al. A Solution -Focused Coaching Intervention with Children and Youth with Cerebral Palsy to Achieve Participation-Oriented Goals [J]. *Physical & Occupational Therapy in Pediatrics*, 2020, 40(4): 423-440.
- [25] He Binghui, Chen Jiping, Wang Xi'an. Selective posterior rhizotomy for the treatment of children with cerebral palsy [J]. *Journal of Jiangxi Medical College*, 2004(05): 80-81.
- [26] Xu Huan, Xu Xiaojing, Song Shasha, Tong Pei, Lu Min. Meta-analysis of the efficacy of botulinum toxin A in the treatment of children with spastic cerebral palsy [J]. *China Rehabilitation*, 2019, 34(9): 489-493.
- [27] Harvey Adrienne, Reddihough Dinah, Scheinberg Adam, Williams Katrina. Oral medication prescription practices of tertiary-based specialists for dystonia in children with cerebral palsy [J]. *Journal of paediatrics and child health*, 2018, 54(4).
- [28] Zhai Shuang, Liu Siyuan. Research progress in rehabilitation treatment of children with cerebral palsy [J]. *Journal of Clinical Military Medicine*, 2019, 47(11): 1273-1275.
- [29] Pan Zhiliang, Li Jinling, Shan Minyu, Li Yinxing. Effects of dynamic ankle-foot orthoses on motor function in children with spastic cerebral palsy [J]. *China Medical Innovation*, 2019, 16(26): 116-119.