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Research Progress on the Integrated Treatment of Intellectual Development Disorders with Traditional Chinese and Western Medicine

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Abstract: Intellectual development disorder in children is mainly characterized by varying degrees of limitations in intellectual function and social adaptability. Treatment methods include traditional Chinese medicine and Western medicine, as well as rehabilitation training. Currently, the therapeutic effect of Western medicine for this disease is limited. In traditional Chinese medicine, the main approach is syndrome differentiation and treatment combined with acupuncture. The combination of traditional Chinese and Western medicine can improve the therapeutic effect of this disease. This article aims to review the research progress in the diagnosis and treatment of intellectual development disorder from both traditional Chinese and Western medicine perspectives, providing certain guidance for the treatment of this disease.

1. Introduction

Intellectual development disorder in children, also known as intellectual disability or mental retardation, is a neurological disorder that occurs during the developmental stage, mainly characterized by damage to intellectual function and adaptive ability caused by various factors. Studies show that the incidence rate of this disease in China is 0.93%, with no significant difference in the incidence rate between males and females [1]. The causes of this disease are complex and diverse, mainly including genetic factors, environmental factors, and social factors. The main symptoms include impaired cognitive function, delayed language and motor development, deficiencies in social life adaptability, and varying degrees of behavioral and emotional problems [2]. This article aims to elaborate on the integrated diagnosis and treatment of intellectual development disorder with traditional Chinese and Western medicine.

2. Clinical Manifestations

The clinical manifestations of intellectual development disorders mainly lie in the insufficiency of intellectual level and social adaptability.

2.1 Intellectual Function

Intellectual function includes low learning ability, inattentiveness, and poor memory. Low learning ability is manifested as slow speed in learning new knowledge and skills, difficulty in understanding and grasping abstract concepts, such as complex mathematical operations and grammar rules in Chinese. Inattentiveness is generally characterized by being easily distracted by the outside world and having difficulty concentrating on one thing for a long time, such as frequently being distracted in class and unable to focus on listening. Poor memory is often manifested as weak ability to remember new knowledge and information, with a fast rate of forgetting, possibly unable to remember learned words, text content, etc. Weak thinking ability: lagging logical thinking, abstract thinking, and creative thinking, poor ability to analyze and solve problems, such as inability to do complex reasoning problems and difficulty in coming up with novel problem-solving methods.

2.2 Social Adaptability

Social adaptability includes delayed language development, difficulty in interpersonal communication, deficiency in basic daily living skills, repetitive or abnormal behaviors, etc. Children with intellectual development disorders have language expression and comprehension abilities lagging behind their peers, possibly speaking late, having a small vocabulary, unclear language expression, and difficulty in understanding complex language instructions. They usually do not know how to interact with others, lack basic social skills, such as not knowing how to greet others proactively, share toys, etc., and have difficulty establishing and maintaining good interpersonal relationships. They have difficulties in basic self-care such as dressing, washing, eating, and using the toilet, requiring assistance and guidance from others, and have difficulty independently completing simple household chores. Some children may exhibit repetitive behaviors, such as clapping hands, shaking their bodies, etc., being overly sensitive to minor changes in the environment, insisting on fixed living habits and behavioral patterns, and experiencing strong emotional reactions when changes occur. The symptoms of intellectual development disorders vary among individuals, with different severity levels, and the forms and scopes of symptom manifestation also differ.

3. Diagnostic Criteria

The diagnosis of intellectual developmental disorders mainly relies on the following criteria, including clinical manifestations and laboratory and imaging examinations.

3.1 Clinical Manifestations

The onset age of the affected children is usually during the developmental stage, before the age of 18. Intelligence tests show an IQ below 70, typically with an intellectual level significantly lagging behind the average of their peers by at least two standard deviations. The children exhibit adaptive function deficits in multiple environments, with adaptive function levels not reaching the developmental stage and social cultural standards corresponding to their age, and have social adaptation difficulties, including interpersonal communication, daily living skills, learning or working abilities, etc[3]. A comprehensive medical history should be collected during diagnosis, including family genetic history, maternal pregnancy conditions, and the child's growth and development history. At the same time, mental and physical examinations should be conducted to make a comprehensive clinical assessment of the child's growth and development.

3.2 Laboratory and Imaging Examinations

Genetic, metabolic, and endocrine laboratory tests, as well as special brain examinations such as CT and MRI, are used to search for the cause and make an etiological diagnosis[4].

4. Pathogenesis

The pathogenesis of intellectual developmental disorders is relatively complex. Currently, the more clearly understood factors include genetic factors, environmental factors, and other factors.

4.1 Genetic Factors

Chromosomal abnormalities such as Down syndrome, caused by an extra 21st chromosome, lead to intellectual developmental disorders and a series of symptoms in children. Single-gene genetic disorders such as phenylketonuria, due to gene mutations, result in a lack of an enzyme in the body, which cannot normally metabolize phenylalanine, thereby affecting the development of the nervous system and causing intellectual disabilities[5].

4.2 Environmental Factors

Maternal infection with rubella virus, cytomegalovirus, etc. during pregnancy may affect fetal brain development; poor nutrition during pregnancy, especially a lack of important nutrients such as folic acid and iodine, can also have adverse effects on the development of the fetal nervous system; in addition, exposure of pregnant women to harmful substances such as lead and mercury, or excessive alcohol consumption and smoking, may increase the risk of intellectual developmental disorders in the fetus. Premature birth and low birth weight infants, due to immature organ and nervous system development, are prone to intellectual developmental problems; oxygen deficiency and asphyxia during delivery can cause hypoxic-ischemic brain injury, affecting intellectual development; severe jaundice in the neonatal period, if not treated in time, can cause bilirubin to damage brain nerve cells, leading to intellectual disabilities. Severe head trauma, brain infections (such as meningitis, encephalitis), and other diseases can damage brain tissue and affect intellectual development; long-term malnutrition, especially protein-energy malnutrition, can affect the normal development and function of the brain.

4.3 Other Factors

Lack of good education and stimulation in early childhood, living in a monotonous, unloving, and interactive-poor environment, may also limit intellectual development. Some complex diseases or syndromes may also be accompanied by intellectual developmental disorders, such as congenital hypothyroidism, where insufficient thyroid hormone secretion affects the development of the brain and body, leading to intellectual disability. Additionally, the interaction of multiple factors may also cause intellectual developmental disorders, and the specific mechanisms are still under further research[6].

5. Western Medicine Treatment

The treatment of intellectual developmental disorders by Western medicine mainly includes the following aspects.

5.1 Drug Therapy

For some intellectual developmental disorders caused by clear etiologies, such as congenital hypothyroidism, thyroid hormone supplementation can be used for replacement therapy to improve thyroid function and promote intellectual and physical development. Patients with phenylketonuria need to control their diet and take special medications to help metabolize phenylalanine and reduce its damage to the nervous system. If the patient has mental symptoms, such as anxiety, depression, hyperactivity, and impulsiveness, corresponding psychotropic drugs can be used for symptomatic treatment. For example, risperidone is used to treat aggressive behavior or severe emotional problems, and methylphenidate is used to treat attention deficit hyperactivity disorder.

5.2 Rehabilitation Therapy

Rehabilitation therapy refers to the use of physical therapy, exercise therapy, etc. to help patients improve their motor ability, improve muscle strength, balance ability, and coordination ability, such as performing limb extension, massage, balance training, etc., to promote normal physical development and provide a better physical foundation for intellectual development. In terms of language rehabilitation, professional language therapists conduct training based on the patient's language disorders, including pronunciation training, language comprehension and expression ability training, etc., to improve the patient's language communication ability and promote intellectual development and social adaptation. In cognitive rehabilitation, cognitive training, such as attention training, memory training, and thinking ability training, helps patients improve cognitive functions, improve learning and problem-solving abilities[7].

5.3 Educational Intervention

Special education is an important part of the treatment for patients with intellectual developmental disorders. Based on the patient's intelligence level and individual characteristics, a personalized education plan is formulated, and suitable teaching methods and means are adopted, such as intuitive teaching, game teaching, etc., to help the patient acquire knowledge and skills, improve self-care ability and social adaptability[8]. During the Western medicine treatment of intellectual developmental disorders, multi-disciplinary team cooperation is usually required, including doctors, rehabilitation therapists, and special education teachers, to jointly formulate a comprehensive treatment plan and promptly adjust the treatment plan according to the patient's condition changes and development.

6. Current Status of Traditional Chinese Medicine Research

6.1 Origin of Disease Names

Intellectual development disorders can be classified in traditional Chinese medicine as "Five Delay - Five Softness"[9]. The relevant records are as follows: Cao Yuanfang's "Zhu Sheng Yuan Hou Lun" was the first to include the content of "Five Delay - Five Softness" for children, but it did not directly propose the disease name. It recorded symptoms such as "delayed walking", "no teeth growing", and "no hair growing", and attributed them to "insufficient constitution and insufficient blood and qi". Qian Yi's "Xiao Er Yao Zheng Zhi Jue" proposed the "theory that the kidney governs bone growth and marrow production", stating that "delayed walking, delayed teeth growth, and delayed hair growth all belong to kidney deficiency", emphasizing the treatment principle of tonifying the kidney and enriching essence, which laid the foundation for the later diagnosis and

differentiation of Five Delay. He created "Liu Wei Di Huang Wan" to tonify the kidney and fill essence, becoming the basic prescription for treating Five Delay. Lu Bosi's "Yin Tong Bai Bu Bu Wen" was the first to systematically name it, clearly classifying "standing delay, walking delay, hair growth delay, tooth growth delay, and speech delay" as "Five Delay", and pointing out that it is related to "weak fetus" and "insufficient primordial yang". Five Softness refers to the softness and weakness of the head, mouth, hands, feet, and muscles. Wu Qian's "Yi Zong Jin Jian ·You Ke Xin Fa Yao Jue" systematically discussed Five Delay and Five Softness as "Miscellaneous Symptoms Section", systematically summarizing that Five Delay's causes and mechanisms are mostly due to the weakness of parents' qi and blood, resulting in weak bones and muscles, difficulty in walking, slow tooth growth, inability to sit steadily, all due to insufficient kidney qi. Five Softness refers to the softness of the head, hands, feet, mouth, and muscles. Its causes and mechanisms are all due to insufficient reception, lack of qi and blood, or imbalance after illness, and deficiency of both spleen and kidney.

6.2 Pathogenesis

Ancient physicians believed that the core pathogenesis of Five Delay and Five Soft was "insufficient in the beginning and loss of nourishment in the later stage", and the specific types were kidney qi deficiency type: the main bone growth and marrow production function was lost, resulting in delayed development of bones, teeth, and intelligence. Spleen and stomach deficiency type: insufficient blood and qi production, loss of nourishment of muscles, resulting in weakness and incoordination. Liver blood deficiency type: loss of nourishment of tendons, leading to movement dysfunction (such as delayed walking, standing delay). Stagnation of phlegm and blood blockage type: a few cases were caused by birth injuries or external pathogenic factors, resulting in blockage of meridians (such as modern diseases corresponding to cerebral palsy, etc.)[10,11].

6.3 Traditional Chinese Medicine Treatment

6.3.1 Traditional Chinese Medicine Treatment

It mainly includes oral Chinese medicine decoctions and patent medicines, treated through syndrome differentiation and treatment.

6.3.2 Acupuncture Treatment

Acupuncture treatment mainly includes acupuncture, acupoint injection, and moxibustion. Acupuncture is divided into ordinary acupuncture method and intelligent acupuncture method. The main acupoints for ordinary acupuncture method are: Bai Hui, Sishen Cong, Shen Ting, Ben Shen, the lower 2/5 of the top and lower 1/2 of the temporal line, Shui Gou, Feng Chi, Yan Men, Tong Li, Hou Xi. The main acupoints for the intelligent acupuncture method are: Sishen Cong, Bai Hui, Da Fu Mu, Ben Shen, Feng Chi, Nei Guan, Gu Guai, Zuo San Li. The combination of acupoints is diverse, and the most commonly used is the syndrome-based combination of acupoints. Acupoint injection therapy: Selective application of vitamin B1 injection, vitamin B12 injection, Danshen injection, Compound Musk Injection, and Triphosphocytidine D Sodium Injection. The selected acupoints are: Bai Hui, Shen Ting, Feng Chi, Da Zui, Yan Men, Xin Yu, Ren Yu, Min Yuan, Zuo San Li and the back intervertebral spinous process acupoints[12]. Electroacupuncture therapy: After obtaining qi through acupuncture, electroacupuncture can be added. Commonly selected acupoints: Bai Hui, Sishen Cong, Zh ìSan Qian, Da Fu Mu, Tian San Qian, Shou Zh ìQian, Select the density and output voltage that the child can tolerate, 30 minutes each time. Moxibustion: Based on the principle of selecting acupoints through syndrome differentiation, the following acupoints were

selected: Bai Hui, Xin Yu, Ren Yu, Pi Shui, Guan Yuan, Zu San Li, Yin Jiao San. It can be done with warm moxibustion, ginger-separated moxibustion, or ginger-needled moxibustion.

6.4 Other Traditional Chinese Medicine External Treatment Methods

Traditional Chinese medicine external treatment includes acupoint plasters, massage therapy, meridian head therapy, traditional Chinese directional drug diffusion therapy, Chinese medicine rubbing therapy, scraping therapy, and Chinese medicine steam bath therapy[13].

7. Advantages of Integrated Traditional Chinese and Western Medicine Treatment

7.1 Comprehensive Intervention, Balancing Local and Overall

Western medicine identifies the cause through neuroimaging (such as MRI), genetic testing, etc., and uses drugs (such as neurotrophic agents, drugs for improving brain metabolism), behavioral intervention (such as Applied Behavior Analysis ABA), cognitive training, etc. to specifically improve neurological functions and enhance cognitive abilities. Traditional Chinese medicine, based on theories such as "Kidney governs bones and produces marrow, the brain is the reservoir of marrow" and "Heart governs the spirit", uses traditional Chinese medicine (such as tonic kidney and wisdom formulas), acupuncture (such as acupuncture at Baihui and Sishencong acupoints) to regulate the functions of internal organs, tonify qi and blood, and improve the overall constitution. Combined advantages: Western medicine addresses organic issues (such as abnormal brain development), while traditional Chinese medicine regulates imbalances in qi and blood, achieving a synergistic effect of "specific treatment + overall conditioning".

7.2 Reducing Side Effects, Enhancing Tolerance

Some Western drugs (such as central stimulants) may cause adverse reactions such as loss of appetite and insomnia. Traditional Chinese medicine can alleviate the side effects of Western drugs. For example, Chinese herbal medicines that tonify the spleen and stomach can reduce the irritation of drugs on the gastrointestinal tract and enhance the tolerance of children to treatment.

7.3 Individualized Syndrome Differentiation, Making Up for the Deficiencies of Standardized Western Medical Treatment

Traditional Chinese medicine treats diseases based on syndrome differentiation and formulates individualized plans. For example, for children with "deficiency of kidney essence" syndrome, a method of tonifying the kidney and filling essence is used, and for children with "accumulated phlegm" syndrome, a method of eliminating phlegm and opening the orifices is used. Western medicine combines standardized methods such as cognitive behavior training and language rehabilitation, and the combination of both can take into account individual differences and evidence-based medical evidence.

7.4 Enriching Intervention Methods, Improving Rehabilitation Effectiveness

Traditional Chinese medicine techniques such as massage (such as pinching the spine, massaging Zusanli), auricular acupuncture, and moxibustion assist in improving children's attention, appetite, and sleep, creating better physical conditions for Western medical rehabilitation training. Western medical support such as transcranial magnetic stimulation (TMS), sensory integration training, etc. combined with traditional Chinese medicine techniques may enhance neural plasticity and improve

the efficiency of cognitive function improvement.

8. Deficiencies in the Integrated Treatment of Traditional Chinese and Western Medicine

8.1 Theoretical System Differences Lead to Difficulties in Integration

The concepts in traditional Chinese medicine such as "qi and blood" and "meridians" are difficult to directly connect with the theories of Western neuroscience and molecular biology, resulting in unclear treatment mechanisms and possible doubts about their scientific nature. In terms of efficacy evaluation, traditional Chinese medicine aims for "improvement of symptoms" (such as enhancement of speech clarity), while Western medicine relies on quantitative indicators (such as intelligence tests and neuroelectrophysiological examinations). The evaluation systems of the two lack a unified standard. There are certain contradictions between the two.

8.2 Insufficient Clinical Research Evidence and Weak Evidence-Based Foundation

The existing clinical studies on the integrated treatment of intellectual developmental disorders are mostly small sample, non-randomized controlled trials, and there are methodological flaws (such as unreasonable design of the control group), making it difficult to be recognized by the international medical community. The mechanism of action is not fully clear, and the components of traditional Chinese medicine compound prescriptions are complex, making it difficult to analyze their specific effects on neural development through modern pharmacological methods, limiting their application and promotion.

8.3 Lack of Industry Standards and Existence of Unstandardized Treatment Risks

The qualifications of practitioners vary, and some institutions lack a professional background in the integration of traditional Chinese and Western medicine. They may blindly combine treatment methods (such as excessive use of traditional Chinese medicine or inappropriate combination of Western medical techniques), leading to potential safety hazards (such as liver toxicity of traditional Chinese medicine and excessive stimulation of children). The treatment plans are highly arbitrary, and there are no unified national guidelines for the integrated diagnosis and treatment of traditional Chinese and Western medicine. The treatment plans of different institutions vary significantly, which may affect the reproducibility of the therapeutic effect.

9. Conclusion

Intellectual development disorder in children, characterized by limitations in intellectual function and social adaptability, poses significant challenges to clinical treatment due to its complex etiology and diverse manifestations. This review summarizes the progress in integrated traditional Chinese and Western medicine (TCM-WM) approaches for this condition, highlighting the complementary roles of both medical systems.

Western medicine, with its focus on etiological diagnosis (e.g., genetic testing, neuroimaging) and targeted interventions (e.g., etiological drug therapy, rehabilitation training, educational intervention), provides a solid foundation for addressing specific neurological and functional deficits. TCM, rooted in the theory of "Five Delay-Five Softness," emphasizes syndrome differentiation and employs a range of therapies—including herbal medicine, acupuncture, moxibustion, and external treatments—to regulate holistic bodily functions, particularly tonifying kidney essence, nourishing qi and blood, and unblocking meridians.

The integration of TCM and Western medicine offers distinct advantages: it enables comprehensive intervention by combining Western medicine's precise targeting of neurological functions with TCM's holistic regulation; reduces adverse effects of Western drugs through TCM's conditioning; compensates for the standardization of Western medicine with TCM's individualized syndrome differentiation; and enhances rehabilitation efficacy by enriching intervention methods.

However, challenges remain. Theoretical discrepancies between TCM (e.g., concepts of qi and blood) and Western medicine (e.g., neuroscience) hinder seamless integration, while a lack of unified evaluation criteria complicates efficacy assessment. Additionally, clinical evidence is limited by small-sample, non-randomized studies, and the absence of standardized guidelines raises risks of non-optimal treatment practices.

Future research should focus on strengthening high-quality randomized controlled trials to establish evidence-based foundations, exploring the mechanisms of TCM-WM integration through modern pharmacological and neuroscientific methods, and developing unified diagnostic and therapeutic guidelines. By addressing these gaps, integrated TCM-WM holds great promise for improving the prognosis and quality of life of children with intellectual development disorder, offering a more comprehensive and effective paradigm for clinical practice.

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