

Current Status and Research Progress of Chinese and Western Medicine Treatment for Insomnia

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Abstract: Insomnia, characterized by insufficient sleep duration and depth, difficulty falling asleep, easy awakening, and inability to return to sleep after waking, is a common clinical condition. Globally, over 37% of the population experiences acute insomnia, and more than 10% suffers from chronic insomnia. In China, the insomnia rate exceeds 15% and is increasing year by year. [1] Chronic insomnia can reduce the quality of life and induce cardiovascular and cerebrovascular diseases, metabolic disorders, and mental and psychological disorders, posing significant harm. Traditional Chinese Medicine (TCM) considers the core pathogenesis of insomnia to be an imbalance of yin and yang and dysfunction of the zang-fu organs. This article systematically reviews the epidemiology, Western medicine pathogenesis, TCM etiology and pathogenesis, Chinese and Western medicine treatment methods, and the advantages of their integrated application, providing a reference for standardized and individualized clinical prevention and treatment of insomnia.

Keywords: Insomnia; Sleeplessness; Yin-yang imbalance; Integrated Chinese and Western Medicine; Treatment progress

1. Introduction

Insomnia is a common heart-system disease in clinical practice, a disorder of the sleep-wake cycle caused by abnormal excitation of the sympathetic nervous system. With the acceleration of life's pace and increased mental stress, it not only significantly reduces an individual's quality of life but is also closely associated with various physical diseases such as cardiovascular diseases and metabolic syndrome, and significantly increases the comorbidity risk of mental disorders like anxiety and depression. [2] Modern medicine elucidates its pathogenesis from perspectives such as neurotransmitters, inflammatory factors, and HPA axis dysfunction, employing drugs, cognitive behavioral therapy, and physical therapy as primary means. TCM, centered on a holistic concept and treatment based on syndrome differentiation, employs both internal and external therapies, addressing both the symptoms and root causes. Integrated Chinese and Western medicine can complement each other's advantages, reduce toxicity, and enhance efficacy, making it a current research hotspot and mainstream direction in the diagnosis and treatment of insomnia. This article reviews the progress of Chinese and Western medicine treatment for insomnia as follows.

2. Epidemiology

In recent years, the prevalence of insomnia has continued to rise. The prevalence rate among adults in the United States reaches 30%-35%, France 30%, and Japan 18%-23%, showing a characteristic of higher prevalence in developed countries. Data from the China National Mental Health Report (2019-2020) indicate that the proportion of minors in China whose sleep duration does not meet the standard is as high as 95.5%; young and middle-aged groups have become high-risk populations for insomnia due to work competition and family pressures. [3] Insomnia can significantly increase the risk of anxiety, depression, hypertension, diabetes, and other diseases, and reduce social productivity, urgently requiring systematic, multi-modal interventions. [4]

3. Domestic and International Research Progress

3.1 Pathogenesis

The pathogenesis of insomnia in Western medicine is not yet fully clear. It is currently recognized as being related to the hypothalamic-pituitary-adrenal (HPA) axis, the cognitive-behavioral 3P model, and is closely associated with neurotransmitters, hormones, cytokines, and immunity.[5]

3.1.1 Neurotransmitter Imbalance

γ -aminobutyric acid (GABA) and Glutamate (Glu) are the most important amino acid neurotransmitters involved in regulating the sleep-wake cycle and circadian rhythm. The former increases deep slow-wave sleep by inhibiting neurons

in arousal-projecting brain regions, while the latter is an excitatory neurotransmitter that inhibits sleep onset and promotes wakefulness. The two maintain a dynamic balance to regulate the normal sleep-wake cycle. Dopamine (DA) participates in regulating emotions and has a wakefulness-promoting effect; abnormalities in its activity level may also affect sleep initiation and maintenance.[6]

3.1.2 Inflammatory Factors

In patients with insomnia, levels of inflammatory response factors, such as tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6), rise sharply. These factors are crucial for maintaining normal sleep patterns; interleukin is involved in the sleep-wake cycle, and increased secretion levels can lead to a reduction in sleep duration. [7]

3.1.3 Hypothalamic-Pituitary-Adrenal (HPA) Axis

Under adverse external environmental stimuli, the paraventricular nucleus of the hypothalamus in the HPA axis synthesizes and releases excessive corticotropin-releasing hormone (CRH), leading to a state of hyperarousal and resulting in insomnia. [8]

3.2 Progress in Western Medicine Treatment

3.2.1 Pharmacological Treatment

Commonly used clinical sedative-hypnotics include benzodiazepines and non-benzodiazepines, which exert a rapid hypnotic effect by activating GABA receptors. However, long-term use can easily lead to dependence, cognitive impairment, morning drowsiness, and other adverse reactions. [9]Melatonin and its receptor agonists are suitable for circadian rhythm disorder-type insomnia and are considered relatively safer.

3.2.2 Cognitive Behavioral Therapy for Insomnia (CBT-I)

CBT-I is a first-line non-pharmacological therapy for insomnia. Through cognitive restructuring, sleep hygiene education, stimulus control training, sleep restriction therapy, and other methods, it corrects maladaptive sleep cognitions and behaviors. It offers lasting efficacy without significant side effects and is suitable for patients with chronic insomnia and those with comorbid anxiety or depression. The goal of CBT-I is to change patients' dysfunctional beliefs and behavioral habits regarding insomnia, enhance sleep drive, consolidate circadian rhythm, and reduce hyperarousal and anxiety. Represented by CBT, it also includes mindfulness therapy, music therapy, hypnotherapy, etc. [10]In recent years, it has achieved certain effects in treating insomnia patients with comorbid anxiety or depression symptoms and chronic insomnia.

3.2.3 Physical Therapy

The physical therapy system encompasses neuromodulation techniques (such as repetitive transcranial magnetic stimulation rTMS, transcranial electrical stimulation tES/taVNS), circadian rhythm regulation methods (light therapy, frontal cooling technology), physiological signal feedback training (biofeedback therapy), and multi-sensory intervention techniques (virtual reality VR, aromatherapy, specific frequency sound wave stimulation, etc.). [11]Clinical practice indicates that physical therapy can serve as a synergistic supplementary regimen to pharmacological and psychological treatments. Its non-invasive nature makes it more acceptable to patients with lower compliance. It has demonstrated clear efficacy in improving core indicators such as sleep onset latency and sleep maintenance efficiency, often used as an adjunctive treatment.

4. Progress in Traditional Chinese Medicine Research

4.1 Etiology, Pathogenesis, and Classification

Insomnia was first recorded in the Yellow Emperor's Inner Canon (Huangdi Neijing), where it was termed "inability to lie down" and "inability to close the eyes." Its pathogenesis involves disharmony between nutrient and defensive qi, yin-yang imbalance, and predominant yang not entering yin, resulting in "lack of vitality during the day, lack of sleep at night." [12] Yang governs daytime activity, while yin governs nighttime rest. If defensive yang qi is abnormal and fails to enter nutrient yin, the eyes cannot close, leading to a lack of vitality in both day and night. The renowned Han Dynasty physician Zhang Zhongjing categorized the causes of insomnia into external contraction and internal damage, first proposing the term "inability to sleep." He stated in the Essentials from the Golden Cabinet (Jingui Yaolüe) - 'Discussion on the Pulse, Patterns, and Treatment of Blood Impediment, Consumptive Disease': "Consumptive disease with deficient dysphoria and inability to sleep, Sour Jujube Decoction governs it." [13]Li Zhongzi, in his Required Readings for Medical Professionals (Yizong Bidu), elaborated extensively on insomnia: "The causes of insomnia are roughly five: one is qi deficiency, one is yin deficiency, one is phlegm stagnation, one is water retention, and one is stomach disharmony." [14] Modern TCM believes that insomnia is primarily located in the heart, involving the liver, gallbladder, spleen, stomach, kidneys, and other

zang-fu organs, often presenting as intermingled deficiency and excess patterns. Common clinical pattern types include: Heart-Spleen Deficiency, Liver Fire Harassing the Heart, Phlegm-Heat Harassing the Heart, Heart-Kidney Disharmony, and Heart-Gallbladder Qi Deficiency.

4.2 Traditional Chinese Medicine Treatment

4.2.1 Internal Treatment

TCM treatment for insomnia is diverse, encompassing both internal and external methods. Internal treatment, which is more conventional, centers on syndrome differentiation and treatment, offering stable therapeutic effects. Prescriptions are modified based on the specific pattern by adding or subtracting substances, such as heavy settling and spirit-calming medicinals like Dragon Bone, Oyster Shell, and Magnetite. Treatment methods include heavy settling and spirit calming, nourishing the heart and calming the spirit, clearing the liver and draining fire, fortifying the spleen and replenishing qi, and harmonizing the heart and kidneys. Representative formulas include Sour Jujube Decoction, Spleen-Returning Decoction, Gentian Liver-Draining Decoction, Gallbladder-Warming Decoction, Celestial Emperor Heart-Supplementing Elixir, and Interaction Pill.

4.2.2 External Treatment:

External treatment includes tuina (Chinese therapeutic massage), cupping, acupuncture, auricular acupuncture, acupressure with seeds, acupoint thread embedding, acupoint injection, etc., which can improve the symptoms and sleep quality of insomnia patients. Common clinical methods include: Acupuncture at Pishu (BL-20) and Sanyinjiao (SP-6) to fortify the spleen, replenish qi, and nourish blood; needling Xinshu (BL-15) and Shenmen (HT-7) to calm the heart and spirit, achieving the goal of qi transforming into blood, and blood nourishing the heart, to treat the Heart-Spleen Deficiency pattern of insomnia. Needling Xingjian (LR-2) to drain liver fire, Zuqiaoyin (GB-44) to descend gallbladder fire, Fengchi (GB-20) to treat headache, and Shenmen (HT-7) to calm the heart and spirit, to treat the Liver Fire Flaring Upward pattern of insomnia. Modern research has found that TCM meridian combing therapy has significant clinical effects. Based on the theories of meridians and zang-fu organ functions, acupuncture stimulates the transmission of meridian qi, thereby promoting the smooth flow of qi and blood. By stimulating key areas, it activates the conductive function of the meridians, promotes the circulation of qi and blood, thereby harmonizing yin and yang, balancing zang-fu organ functions, and effectively alleviating insomnia symptoms. [15] New research also suggests that aromatherapy can improve sleep. Volatilized herbal scents, with functions of guiding medicine upward and opening the orifices with aromatics, have a bidirectional regulatory effect on the human nervous system, thus balancing the function of the central nervous system, playing a role in refreshing the brain, opening orifices, and promoting sleep. Aromatic substances can also be absorbed by the human body through acupoints and meridians, achieving the effect of balancing yin and yang. Clinical research by Li Mingqing et al. showed that after aromatherapy care with lavender for fracture surgery patients, their sleep quality improved, and their dependence on medication was also reduced. [16]

5. Advantages of Integrated Chinese and Western Medicine Treatment

Liu Qiong et al. [17], through a summary of nearly 10 years of research on treating intractable insomnia, found that integrated Chinese and Western medicine can more efficiently alleviate the discomfort caused by insomnia, reduce the side effects of Western medication, shorten the course of the disease, and improve treatment outcomes. Wang Kuiling et al. [18] summarized research concluding that Western medicine primarily treats insomnia by reducing the excitability of the sleep center or regulating the balance of excitatory and inhibitory neurotransmitters in the brain's sleep centers. In contrast, TCM treatment emphasizes syndrome differentiation and embodies a holistic concept. Integrating Chinese and Western medicine achieves a balance between the systemic and the holistic, accomplishing a treatment effect that addresses both symptoms and root causes. Multiple clinical studies have confirmed that modalities such as combining Chinese herbal formulas with Western medicine, acupuncture with CBT-I, and external treatment with physical therapy exhibit significantly superior efficacy compared to single treatments. Western medicine provides rapid symptom control, while TCM offers holistic conditioning to reduce the recurrence rate.

6. Summary

Overall, insomnia has a high prevalence rate and widespread harm, making it a significant public health issue. Western medicine elucidates the pathogenesis at neurological, immunological, and endocrinological levels, providing rapid treatment onset, but its long-term application has limitations such as dependence and adverse reactions. TCM, centered on yin-yang imbalance and zang-fu organ dysfunction, emphasizes treatment based on syndrome differentiation and multi-route drug

administration, with prominent advantages in holistic regulation. Integrated Chinese and Western medicine can achieve complementary advantages, enhanced efficacy with reduced toxicity, and address both symptoms and root causes, making it the preferred approach for chronic and intractable insomnia. Future directions should involve conducting more large-sample, high-quality clinical studies, perfecting a standardized diagnosis and treatment system for integrated Chinese and Western medicine, and driving the prevention and treatment of insomnia towards standardization, precision, and individualization.

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