

## *Theoretical Analysis of “TCM Wuyin Therapy” for Tension-type headache*

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**Abstract:** To explore the connotation of TCM Wuyin therapy in Modern clinical application, and explore the therapeutic effect and melody compatibility of Wuyin therapy in tension-type headache (TTH). PubMed, CNKI and Wanfang database were searched by computer, relevant literatures in recent ten years were collected and screened, and the syndrome differentiation principles of Wuyin therapy in TTH were summarized. Based on the theory of Yin and Yang and five elements, modern Wuyin therapy is a method to treat psychosomatic diseases by associating the five modes of gong, Shang, Jue, zhi, Yu with the viscera of human body. Stagnation of liver qi type can only use G Jue mode music; Liver-fire flaming type mainly chooses G Jue mode music, supplemented by #F Shang mode music; Liver and kidney deficiency type mainly selected B Yu mode music, supplemented by #D Gong mode music; Liver qi invading spleen type mainly selects G Jue mode music and #D Gong mode. Wuyin therapy is one of the characteristics of Traditional Chinese medicine in China. The new idea of "taking music as medicine" can play an obvious advantage in the application of TTH treatment, such as green, non-toxic side effects and so on. It is worth promoting and further studying, so as to further optimize the clinical diagnosis and treatment plan.

### 1. Introduction

Headache has become an important public health problem. Among 369 diseases and injuries estimated by The latest Global Burden of Disease studies (GBD) in 2019, headache ranked the second among the causes affecting DALYS in the age group of 10-24. Among the causes affecting DALYS in the 25-49 age group, headache ranks the fifth [1]. Among them, tension-type headache

is the most common type, characterized by slow onset, long course of disease and high lifetime prevalence, accounting for about 89% of headache patients, with an annual incidence of about 26.4% (95%CI 22.9-30.3), and the incidence increases year by year [2]. Clinical many patients can be accompanied by dizziness, insomnia, anxiety, depression and other symptoms, often because of mental and psychological factors repeated attacks, lingering difficult to heal. At present, Western medicine mainly adopts therapeutic and preventive treatment, such as acetaminophen, naproxen, ibuprofen and other drugs [3]. Although short-term effects can be taken, they are accompanied by more adverse reactions, and long-term drug use may even cause drug-dependent headache. A study in European and Latin American countries showed that active prevention of drug overuse could reduce the proportion of patients with headache disability due to drug overuse by nearly 60%[4]. The modern idea of "taking music as medicine" is based on "Huangdi Neijing" and "The Book of Rites • The Book of Music". It has a solid theoretical foundation, and many studies have proved that this method has a good effect on the prevention and treatment of mental and psychological diseases. Therefore, as a common psychosomatic disease in clinic, it is of great significance to actively study and explore the clinical benefits of five-tone therapy in the treatment of TTH, so as to supplement and replace drug therapy.

## **2. Etiology and Pathogenesis of TTH**

### **2.1. Etiology and Pathogenesis of TCM**

In the Chinese medicine, "Huangdi Neijing" first discussed the etiology and pathogenesis of headache, and pointed out that headache top disease, should be under the deficiency of solid, disease in foot Shaoyin, sun two meridian, disease even into the kidney. During the Jin Yuan period, Mr. Li Dongyuan first classified headache as external headache and internal headache. TTH belongs to the category of internal injury of seven emotions [5], and the etiology and pathogenesis of TTH are mainly explained in three ways: first, the liver causes emotional paralysis, liver loss, qi and blood block and clear the body, and pain is not normal; or the liver causes dysregulation, leading to qi stagnation and fire, burning the brain body, and headache; Two is due to the spleen, the emotional factors (such as depression anger, sadness, etc.) make the liver depression cross by the spleen soil, spleen deficiency transport loss, phlegm and dampness, Qingyang does not rise, and the brain is covered with pain; Three is due to the deficiency of the spleen and stomach qi and blood deficiency or Yin deficiency of the liver and kidney, so that the liver is lost in the nourishing, water does not contain wood, easy fire and wind, disturb the Qingqiao, causing head daze.

### **2.2. Etiology and Pathogenesis of Western Medicine**

Western medicine has not yet clarified the pathogenesis of TTH, but studies have found that [6] it may be the peripheral pain mechanism and central sensitization mechanism caused by psychological factors. When the body is in an adverse emotional state such as tension, fear and anxiety, it may increase the number of active myofascia trigger points [7], thus inducing the release of chemical mediators (such as bradykinin, 5-hydroxytryptamine and norepinephrine, etc.), causing the excitation of muscle nociceptors and increasing the endogenous substances such as serotonin, histamine and prostaglandin. Thus causing peripheral pain [8]; Secondly, because the spinal nucleus of the afferent center of trigeminal nerve in headache is the main region where norepinephrine and serotonin play their roles, when the activity of serotonin and norepinephrine is increased and the release ratio is unbalanced, it can also lead to traumatic pain sensitization of the central nervous system, causing the occurrence of TTH [8].

### 3. The Theoretical Basis of Five-Tone Therapy

Five-tone therapy was initially established on the basis of Yin and Yang theory, holistic view and nature view. As the Spring and Autumn Annals of Lu said, "The origin of music is distant, born in measurement, and rooted in Taiyi. Too one out of two instruments, two instruments out of Yin and Yang. Yin and Yang change, one up and one down, and the harmony becomes a chapter." [9] believes that music comes from the change of Yin and Yang, and can use natural sound order to regulate the harmony and unity of the internal and external environment of the human body and maintain balanced development, aiming at conforming to nature and the unity of nature and man. According to the record in Shuoyuan, there was already an embryonic form of music therapy in primitive clan society in which "Father Miao calmed patients with ancient Musical Instruments" [10]. Since the five tones of palace, Shang, Jiao, Zheng and Yu were first proposed in Guanzi ·Di in the Spring and Autumn Period, the theory of music therapy, represented by Huangdi Neijing, etc., emerged one after another: "The five viscera are in the same tone and can be conscious." "Palace sound belongs to soil metallurgy, can enter the spleen; Business sound such as Jin Ye, through the lung; Horn sound such as wood metallurgy, through the liver; Signs such as fire ye, through the heart; Feather sound like water, through the kidney." [11] It can be seen that five-tone therapy is also based on the five elements theory of traditional Chinese medicine (see Table 1 for the corresponding relationship between five tones). After the 1980s of the 20th century, western music therapy flowed into our country, and it was rapidly combined with Chinese traditional music therapy to develop modern Chinese five-tone therapy. It mainly combines the "five-tone theory" in the five elements theory of traditional Chinese medicine with the zang-fu organs, emotions and other relevant theories of the human body, so as to achieve the purpose of recuperating the body and mind and preventing diseases [12].

Table 1. Wuyin corresponding table

Five-tone	Five internal organs	Five element attribute
gong	spleen	earth
shang	ung	metal
jue	liver	wood
zhi	heart	fire
yu	kidney	water

### 4. Application Mechanism of Pentatonic Therapy

#### 4.1. TCM Mechanism

The mainstream view of modern traditional Chinese medicine five-tone therapy believes that the five-tone therapy should belong to the meaning of tone name, and the five-line attribute of the music is determined through the interval relationship and scale melody in the mode, so as to achieve the therapeutic purpose [13]. The five elements of Gong mode music belong to the soil, with large and harmonious melody, meaning of bionics, bearing and accepting. It is as vast as the earth, carrying all things, generous and inclusive, and can nourish qi and spleen, promote clearing and reduce turbidity. Clinically, it is mainly used for spleen and stomach weakness, insomnia, abdominal pain and vomiting, emaciation and fatigue. The five elements of Shang mode music belong to gold. The melody is light but vigorous, high and tragic, with the meaning of settling and convergence. It can promote and depress, nourish Yin and lung, tonify kidney and liver, and is mainly used in clinical for lung diseases such as lung deficiency, cough shortness of breath, grief, spontaneous sweating, dizziness and so on. The five elements of Jue mode music belong to the wood.

The melody is straight and smooth. It has the meaning of growth and rising and it can relax the liver and regulate the qi, and promote the Tiaoda. clinical application is mainly used for liver qi stagnation, bulging chest tightness, timid and easy to panic, dry mouth bitter liver diseases; The five elements of Zhi mode music belong to fire, the melody is harmonious and beautiful, lively and warm, just like the fire, and has the sense of warm, rising and bright. It can chong Yang, aid the heart, calm the mind and calm the mind. In clinical practice, it is mainly used for heart and spleen deficiency, palpitation, weak exhaustion, chest shortness of breath and other cardiac diseases. The five elements of Yu mode music belong to water, and the melody is heavy and deep, quiet and soft, just like the sky hanging crystal curtain, flowing clouds and water. It has the meaning of nourishing, cooling and closing Tibetan, which can nourish Yin, tonify kidney and hide essence. Clinically, it is mainly used for kidney diseases such as waist and knee weakness, insomnia and dreaminess, deficiency fire and inflammation, upset, adverse urination and low libido [14]. See Table 2 for details.

*Table 2. The effect of five modes of music*

Wu Yin mode	Efficacy and effect	Clinical application
Gong mode music	Invigorating qi and invigorating spleen, clearing and reducing turbidity	Weakness of the spleen and stomach, insomnia, abdominal pain and vomiting, emaciation and fatigue
Shang mode music	Xuanfa Su descending, nourishing Yin and protecting lung, tonifying kidney and liver	Pulmonary diseases such as lung deficiency, cough shortness of breath, uncontrollable sadness, spontaneous night sweats, dizziness and so on
Jue mode music	Soothing the liver and regulating the qi, promoting the Tiao Da	Liver qi stagnation, bulging chest tightness, timid and easy to panic, dry mouth bitter liver diseases
Zhi mode music	Yang to help the heart, calm the mind	Insufficiency of heart and spleen, palpitation, weak fatigue, chest shortness of breath and other cardiac diseases
Yu mode music	Nourishing Yin, tonifying kidney and storing essence	Kidney diseases such as sore waist and knee, insomnia and dreams, weak fire and inflammation, upset, unfavorable urination, low libido, etc.

## 4.2. Mechanism of Western Medicine

Studies have found that music can relieve patients' pain in the following three ways: first, improve patients' pain threshold and tolerance, improve body immunity, and reduce headache symptoms [15]; Second, through the hypothalamic-pituitary axis, hormone levels are affected to reduce the body's cortisol concentration, so as to relieve anxiety [16] and reduce the risk of active myofascial trigger point elevation. Third, it affects brain neurotransmission and increases the expression of opioid receptors and the release of dopamine and endorphin, so as to produce a pleasant mood in human body and relieve pain [17] See Figure 1 for details.. The theory of physical resonance holds that sound waves have energy, and music is transmitted in the form of sound waves. When the harmonic series of natural frequencies of human organs (overtones) are consistent with the frequency of sound waves, they will resonate, thus stimulating energy and having an effect on human body. A related study has proved that the tone on a specific frequency and the tone on the overtone series of the tone can cause the excited response of twelve meridians, and the frequency of

the excited sensing of each meridians corresponds to the twelve semitones in the twelve equal temperament, and the ratio of the frequency excited sensing of the two meridians corresponding to the two adjacent semitones (1:1.05947) and the ratio of the twelve equal temperament (1: 1.059463) are highly consistent [18]. So the human body, like a musical instrument, has temperament. The musical frequencies corresponding to the liver meridian of foot Jueyin, the spleen meridian of foot Taiyin and the kidney meridian of foot Shaoyin related to the etiology and pathogenesis of TTH are shown in Table 3.

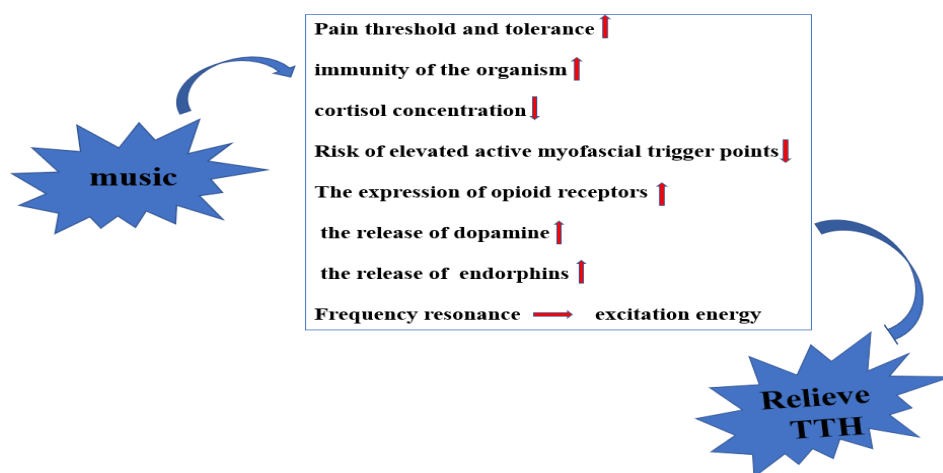


Figure 1. Mechanism of TTH in music therapy

Table 3. Twelve-tone equal temperament and twelve meridians

Meridians and Collaterals	Musical Alphabet	Frequency
bladder	C	261.6Hz
small intestine	#C	277.2Hz
heart	D	293.7Hz
spleen	#D	311.1Hz
stomach	E	329.6Hz
large intestine	F	349.2Hz
lung	#F	370.0Hz
liver	G	392.0Hz
gallbladder	#G	415.3Hz
triple energizer	A	440.0Hz
pericardium	#A	466.2Hz
kidney	B	493.9Hz

## 5. "Five-tone Therapy" on the Treatment of TTH

In the course of prolonged and unhealed TTH, both deficiency and substance exist, and can be transformed into each other. The cause is mainly related to qi, fire, wind and phlegm, involving the viscera of the liver, spleen and kidney. In clinical practice, it can be combined with the theory of five tones of modern Chinese medicine and experimental research results to make syndrome differentiation of TTH, with the method of soothing the liver and dispelling depression, fuzhengdispelling evil.

(1) Liver depression and Qi stagnation type Liver depression and Qi stagnation type TTH, mostly due to the mood is not smooth, unfavorable to reach, resulting in qi obstruction and collusive, not general pain. Clinical manifestations of head swelling pain or stinging discomfort, with two

temporal, the whole head or neck pain, with good sigh, mood depression, stay, night rest poor, even do not sleep, or with chest and flank, less abdominal distension and pain, red tongue thin white, pulse string. When the method of soothing the liver and regulating qi. Because the frequency of the stimulated sensing of the foot Jueyin liver is corresponding to the G tone, G Angle mode music can be mainly selected, such as Hujia Eighteen Beats, Jiangnan Silk Bamboo, Jiangnan Good, Spring Breeze and so on.

(2) Hyperactivity of liver Yang Hyperactivity of liver Yang TTH can be divided into two types: hyperinflammation of liver fire and deficiency of liver and kidney. The former due to liver drainage disorders, qi stagnation fire, burning brain orifice, hair headache. Clinical manifestations for the head swelling pain discomfort, mainly on both sides, often accompanied by dizziness, hypochthole, bitter mouth, irritable mood, red face, red tongue thin yellow, pulse string and number. When the liver to calm the wind Qianyang for the method. The main choice of G Angle mode music (see 3.1.1 for details), in order to calm liver Yang and relieve depression, promote the whole body qi qi. The latter because of liver and kidney Yin deficiency or acquired spleen and stomach qi and blood deficiency, liver loss, blood deficiency wind, resulting in pain, head dazzle pain. According to the principle that kidney meridian should be B and spleen meridian should be D, I mainly choose B feather mode music, such as "Gada Meilin", "Three lanes of Plum Blossom", "Falling Geese on the Flat Sand", "The West Mountain just passes the Post at Sunset", and match with #D palace mode music to complement the effect of blood production and liver and kidney toning, such as "Spring River and Flower Night", "Wuxi Scene", "Moonlight Sonata", "Lost Ring", "House of Flying Daggers".

(3) Liver depression multiplied by spleen liver depression multiplied by spleen TTH, mostly due to emotional factors (such as depression anger, sadness, excessive thinking, etc.), so that liver depression qi, cross by spleen soil, subtle not transport, water valley does not turn, phlegm and dampness block, Qingyang does not rise, brain body blind, headache. Clinical manifestations are headache faint and heavy, flat vegetarian less Na stay, abdominal distension and nausea, mood stuffy and uncomfortable, irritability, loose stool, pale tongue, white and greasy moss, pulse string slippery. When the treatment is to suppress the liver and support the spleen, the main choice of the smooth and melodious G Angle mode and the calm and solemn #D palace mode music complement each other (details of the tracks are 3.1.1 and 3.1.2), in order to ease the liver and relieve depression, strengthen the spleen and conquer dampness, See Table 4 for details.

*Table 4. TCM dialectical classification therapy on Wu Yin*

Syndrome differentiation of TCM		Give music therapy
Liver depression and qi stagnation type TTH		G Jue mode music, such as Hu Jia 18 Beats, Jiangnan Silk Bamboo, Jiangnan Good, Spring Breeze
Liver yang hyperactivity type TTH	Liver fire on inflammation type	G Jue mode music
	Liver and kidney deficiency type	B-Yu mode music, such as Gadameilin, Three lanes of Plum Blossom, Falling Geese on the Flat sand, Sunset Just past the hill in the West and with #D Gong mode music
Liver depression multiplied by spleen type TTH		G Jue mode music and #D Gong mode music



## 6. Give Music Therapy Mode

(1) Receptive music therapy The receptive music therapy refers to somatosensory vibration music therapy and music one-color light therapy. The former uses somatosensory sound equipment to convert the low frequency part of music into physical vibration and acts on TTH patients so that they can also feel the sound wave vibration while listening to music, while the latter uses music one-color light therapy instrument. Music, color, light, electric current and other factors are integrated to treat TTH[19].

(2) Active Participatory therapy Active participatory therapy refers to guiding TTH patients to participate in music singing, acting, playing, dancing and other artistic forms, so as to achieve therapeutic effect.

(3) Integrative Therapy Integrative therapy refers to the therapeutic methods that combine acupuncture, medicine and massage on the basis of syndrome differentiation. For example, Qin Guishui et al. [20] treated headache with hyperactive liver-yang with acupuncture combined with five-tone therapy. The results showed that the total effective rate of the observation group was 93.33%, which was higher than that of the control group (73.33%,  $P < 0.05$ ). It was proved that the combination of five tone acupuncture could relieve the symptoms of headache patients with hyperactive liver Yang and improve the cure rate. For drug combination, Chaihu Shugan powder (liver-stagnation type), Qingliver-exhuozhitong Decoction (liver-fire Shangyan type), Yangxuenao Granules (liver-kidney Yin deficiency type) and Jiawei Linggui Zhugan Decoction (liver-stagnation - spleen type) can be selected [21]. In clinical treatment, the appropriate Xerox method can be selected according to the condition of TTH disease and the needs of patients.

## 7. Conclusion

In this paper, the application principle and method of five-tone therapy in the treatment of tension headache are preliminarily described. Modern five-tone therapy of traditional Chinese medicine has a solid theoretical basis, green, non-invasive, non-toxic side effects, and has incomparable advantages of drugs and other therapeutic means, which can provide a new theoretical and method basis for the clinical treatment of psychosomatic diseases like TTH. However, the five-tone therapy system has not been standardized at present, and there may be a problem of poor performance due to the complex repertoire. Therefore, it is urgent for professional medical workers and professional folk musicians to jointly establish a systematic and standardized five-element music database. With the rapid development of the bio-psycho-social medical model, psychosomatic disorders such as TTH have received more extensive attention [22]. Therefore, it is of great significance to accelerate the research and promotion of five-tone therapy, promote the popularization of five-tone therapy, and seek better complementary and alternative therapies for patients to eliminate diseases.

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Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Conflict of Interest

The author states that this article has no conflict of interest.

## References

- [1] Vos Theo Lim, Stephen S Abbafati, Cristiana Abbas Kaja, et al. *Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019*. *The Lancet*, 2020, 396: 1204–1222.
- [2] Chan-Young Kwon, Sang-Hoon Yoon, Sun-Yong Chung. *Clinical Efficacy and Safety of Miniscalpel-Needle Treatment for Tension-Type Headache: A Systematic Review and Meta-Analysis*. *Chin J Integr Med*, 2020, 26(9):713-720.
- [3] Burch R ebecca. *Migraine and Tension-Type Headache: Diagnosis and Treatment*. *Med. Clin. North Am*, 2019, 103:215.
- [4] Bendtsen L, Munksgaard S, Tassorelli C, et al. *Disability, anxiety and depression associated with medication-overuse headache can be considerably reduced by detoxification and prophylactic treatment. Results from a multicentre, multinational study (COMOESTAS project)*. *Cephalalgia*, 2014, 34: 426–433.
- [5] Ke Juan, Guo Weifeng, Xu Qian et al. *Essence experience of GUO Wei-feng about treating chronic tension headache from the theory of 'combined internal and external pathogen'*. *China Journal of Traditional Chinese Medicine and Pharmacy*, 2019, 34 (01): 140-142.
- [6] Sait Ashina, Dimos D. Mitsikostas, Mi Ji Lee, et al. *Tension-type headache*. *Nat Rev Dis Primers*, 2021, 7(1):24.
- [7] Palacios-Ceña M, Castaldo M, Wang K. *Relationship of active trigger points with related disability and anxiety in people with tension-type Headache*. *Medicine*, 2017, 96(13):e6548.
- [8] Liu Doudou, Lei Qi, Yang Qian. *Progress in the pathogenesis of tension-type headache*. *Chinese Journal of Medicine*, 2019, 54(1): 19-23.
- [9] Hu Sumin. *Discussion on the theoretic basis of traditional Chinese medicine music therapy*. *China Journal of Traditional Chinese Medicine and Pharmacy*, 2014, 29(10):3080-3082.
- [10] Zhang Yong, Zhang Hongyi. *Analysis of music therapy methods in Chinese dynasties*. *Chinese Music*, 2014, 1: 184-187.
- [11] Li Yue, Wang Yirong. *Research on the Theory of "Taking Music as Medicine, Medicine and Music are Connected" for Diagnosis and Treatment*. *Asia-Pacific Traditional Medicine*, 2021, 17(3):194-197.
- [12] Shao Dan, Pan Yu, Zhang Dan. *Application of five-tone theory of Traditional Chinese Medicine in treatment of diseases and health preservation*. *Journal of Yunnan University of Traditional Chinese Medicine*, 2011, 34 (6) : 62-66.
- [13] Li Jingze. *Analysis of Five elements music therapy system and existing problems*. *Modern Music*, 2019, 10: 154-157.
- [14] Xu Qifeng, Ye Liwei, Xia Zhenru, et al. *Application of the pentatonic therapy in treating psychosomatic diseases*. *Clinical Journal Of Chinese Medicine*, 2020, 12(22):52-55.
- [15] Bittman B B, Berk L S, Felten D L, et al. *Composite effects of group drumming Music therapy on modulation of neuroendocrine-immune parameters in normal subjects*. *Altern Ther Heal Med*, 2001, 7(1):38-47.
- [16] Cynthia Mejía-Rubalcava, Jorge Alan é-Tavira, Hugo Mendieta-Zerón, et al. *Changes induced by music therapy to physiologic parameters in patients with dental anxiety*. *Complement Ther Clin Pract*, 2015, 21(4): 282-286.
- [17] Adiel Mallik, Mona Lisa Chanda, Daniel J. Levitin. *Anhedonia to music and mu-opioids: Evidence from the administration of naltrexone*. *Sci Rep*, 2017, 7(2): 41952.
- [18] Wei Xinyu. *On Relation between Twelve Equal Temperament in Music and Twelve Meridians of Human Body*. *Journal of Xiangnan University*, 2021, 42(3): 90-93.



- [19] Li Hang, Hu Chunlei. *Progress of clinical application of traditional music therapy in China* . *Chinese Journal of Rehabilitation Medicine*, 2011, 26(10):993-996.
- [20] Tan guishui. *Clinical observation of acupuncture combined with five-tone therapy in patients with hyperactive liver-yang headache* . *Women's Health Research*, 2020, 13: 114-129.
- [21] Zhang Hongwei, Bai Yun, Sun Yaping. *Research Status of Tension-type Headache in Traditional Chinese Medicine* . *Journal of Sichuan of Traditional Chinese Medicine*, 20, 38 (2) : 216-219.
- [22] Lu Peng, Li Rui. *Research Progress of Five-tone Therapy in TCM* . *Henan Traditional Chinese Medicine*, 201,41(8):1291-1296.