

Intelligent Moxibustion Instrument Based on Five-Tone Therapy

Tianfeng Xu and Li Xu

East China University of Science and Technology, No. 130 Melong Road, Xuhui District, Shanghai 200237, China

ABSTRACT

Purpose: In the background of great health, “health care” has become a trend. Against this background, this thesis aims to explore the research and development of intelligent moxibustion instrument design based on five-tone therapy.

Methods: Firstly, the function, application, and development of the five elements of music therapy are detailedly analyzed. Secondly, the function of moxibustion therapy and the current status of research on related products are discussed. Finally, the experimental application of the combination of five-tone therapy and moxibustion therapy is investigated, and the feasibility of the combination of the two therapies is analyzed in order to better meet the needs of users.

Result: It is concluded that the combination of five-tone therapy and moxibustion therapy makes the treatment more effective, and the intelligent moxibustion instrument is feasible which basing on five-tone therapy. At the same time, the application of emerging technologies such as graphene and infrared heat therapy has good development prospects.

Conclusion: With the development of the Internet, big data, and artificial intelligence, the integration of five-tone therapy into intelligent moxibustion products is a development trend. The combined treatment of the two therapies makes the operation convenient, comfortable, economical and safe. And it improves the shortcomings and deficiencies of traditional Chinese medicine treatment, and has wide clinical promotion and use value. In the future, efforts should be made to explore the function and scope of the application of Chinese medicine five-tone theory and traditional Chinese music in disease treatment and health care, and highlight the advantages of Chinese medicine five-tone therapy in this regard, so as to make it one of the important tools applicable to the regulation of subhealth. Meantime, moxibustion therapy should be combined with modern science and technology to further improve the efficiency of treatment, and make it environmentally friendly. The moxibustion instrument based on five-tone therapy will develop towards safe and multi-functional, Intelligent and personalized, user-centered and cultural-oriented. In this era of wisdom, Chinese medicine is slowly being combined with modern intelligence to find a connection between traditional and modern combinations.

Keywords: Five-tone therapy, Moxibustion therapy, Health care, Chinese medicine, Intelligence, User-centered

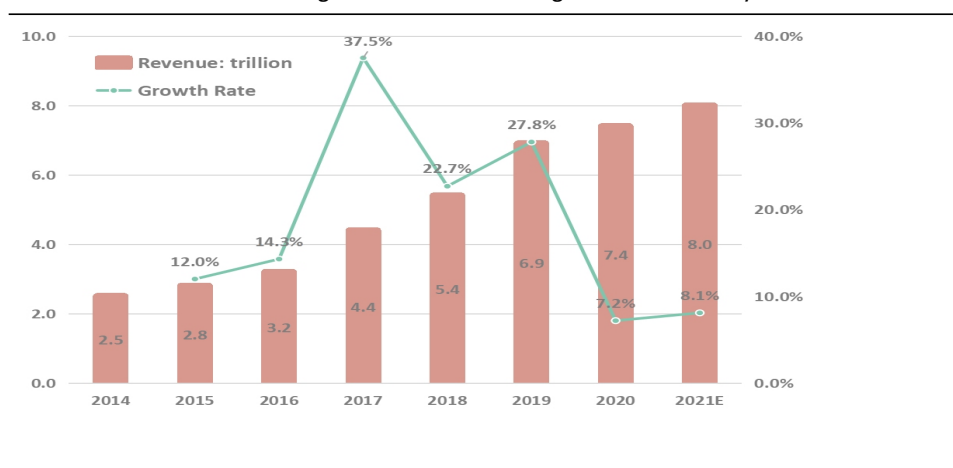
RESEARCH BACKGROUND

With the development of the social economy and human lifestyle, human diseases have changed from acute infectious diseases to chronic

non-communicable diseases. People's demand for health has also increased from treating diseases to promoting health in all aspects, and the content of medical and health services has been expanded to prevention, health care and treatment for patients, sub-healthy people and healthy people. Recently, it has become a trend to pay attention to and learn TCM. Table 1, shows the healthcare fever (Hu J. et al. 2022). The old style of high quality of life has become obsolete and the consumption of high-income people has changed from the pursuit of expensive material goods to the pursuit of an ideal healthy lifestyle. In addition, people need a feeling of poverty, peace, calmness, and sedation, which will change your thinking, health, and life.

“The Insight” shows that the sales of black technology TCM physiotherapy products are on a continuous rise in 2021, and the three most popular intelligent TCM physiotherapy products are cupping devices, moxibustion instruments, and massage and scraping tablets. The new white-collar workers are the most popular TCM health care population. Meanwhile, the digitization of TCM has become a major trend, and the new generation of information technology such as the Internet, cloud computing, and artificial intelligence is driving the innovative development of the TCM industry (Shi X. et al. 2022).

Table 1. Revenue scale and growth of China's large health industry.



FUNCTIONAL AND APPLICATION DEVELOPMENT OF FIVE-TONE THERAPY

Functionality of Five-Tone Therapy

Chinese medicine has a long history and a complete system of five-tone therapy, which has been valued by medical doctors and scholars for thousands of years. The ancient saying that “all diseases are born from qi and end in sound” fully illustrates the importance of music to people's health (Lin F. et al. 2018).

The main tune of Gong Shang Jue Zhi Yu (Li A. et al. 2021) corresponds to different healing effects: the leveling tone (5-So) is impatient and enthusiastic like fire, with a cheerful rhythm, and is suitable for playing with a flute to soothe the heart. The feather tone (6-La) is cool and light like water, with the qin tone, and can take kidney supplements. Gong tone (1-Do) is mellow and thick like earth, and should be played with the Sheng to strengthen the spleen. Shang tone (2-Re) is mournful and resounding like gold, with a high melody, and is suitable for playing guzheng to moisten the lungs. The horn-tuned music is round, long, and crisp like wood, and can be accompanied by xiao, which nourishes the liver (Wang W. et al. 2019).

Application and Development of Five-Tone Therapy

Five-tone therapy has a long history and has few side effects. It is not only effective in treating diseases of the internal organs and emotions, but also has a promising future as an auxiliary technique for the treatment and rehabilitation of some chronic diseases. Studies have shown that the five-tone therapy have achieved remarkable results, including improvement of diseases, the beauty and so on (Lv P. et al. 2021).

Music therapy started earlier in foreign countries. In 1890, Austrian physician Lichtendaal published the idea of a “music doctor”. In 1944 and 1946, Michigan State University and the University of Kansas established special music therapy courses to train professional music therapists. In 1950, the United States was the first to establish the Association for music therapy, which marked the beginning of music therapy. The Association for music therapy marked the birth as an emerging discipline in 1950 (Liu B. et al. 2009). Foreign research in music therapy is at the forefront, and Western music therapy had studied acoustic resonance mechanism in-depth, and its treatment is similar to that in Chinese medicine. Chinese medicine combines music, acupuncture points, and electrotherapy, which resulting in a greatly enhanced overall healing effect (Liu Y. 2022).

CURRENT STATUS OF RESEARCH ON MOXIBUSTION THERAPY AND ITS RELATED PRODUCTS

Functionality of Moxibustion

The heat effect produced by moxibustion stimulates the body’s acupuncture points through near-infrared radiation, which is then transmitted to the meridian system and finally acts on the diseased parts of the body (Hyde K. et al. 2009). Because of its simple operation, non-toxic side effects, and unique efficacy, it is suitable for circulation and promotion.




Moxibustion has the following functions in the human body: Firstly, it can warm the meridians and disperse cold, which is usually used in clinical practice to treat and improve symptoms such as dysmenorrhea and uterine cold in women (Liu Y. et al. 2022). Secondly, it can unblock the meridians, which is useful for the treatment of sores and boils and son on (Tang Z. et al. 2007). Thirdly, it can support and fix dehydration, and is often used to treat stroke and acute abdominal pain. Fifthly, it can pull out the poison and

release the heat, and have a two-way regulation effect on the body's function. Additionally, it can prevent disease and keep healthy, which can improve body resistance (Zhang J. et al. 2012).

Current Status of Moxibustion Product Research

The traditional moxibustion therapy often uses the burning of moxa sticks and columns (see Table 2) to stimulate the acupuncture points of the human body (Zhang G. et al. 2013). Although it has been used for thousands of years as an ancient method, there are some disadvantages, such as improper operation, harmful smoke and other problems (An D. et al. 2018). Nowadays, with the application of new heat-resistant materials and other technologies in the medical field, new technological moxibustion means are gradually becoming the main choice for people. Modern moxibustion therapy is closely combined with magnetic therapy methods and computerized electronic technology, which acts directly or indirectly on acupuncture points (Cui X. et al. 2011). In recent years, new moxibustion methods such as “prairie moxibustion”, “match moxibustion” and “sulfur moxibustion” have emerged at home and abroad (Wu X. et al. 2015). The early moxibustion apparatus combined modern magnetic therapy with traditional direct moxibustion to provide physical therapy in multiple areas, but still had environmental pollution. In the late 19th century, the concept of green design emerged worldwide, resulting in new adjustable micro-smoke moxibustion apparatus and multifunctional smoke-controlled moxibustion apparatus (Li C. 2017), which not fundamentally solve the problem of smoke emission. Recently, some electronic moxibustion instruments have appeared on the market, using infrared technology to heat moxa cakes or moxa stickers as a means of physical therapy for human acupuncture points (Yan L. 2018).

Table 2. The development of moxibustion instrument.

Type	Moxa Stick, Moxa Pillar	Ordinary Moxibustion Instrument	Intelligent Moxibustion Instrument
Usage	burning with a fire	treating with magnetic therapy	heating by infrared technology
Display			
Feature	effective, but contaminated	micro-smoke control	intelligent, adjustable, pollution-free

FEASIBILITY ANALYSIS OF INTELLIGENT MOXIBUSTION INSTRUMENT PRODUCTS BASED ON FIVE-TONE THERAPY

As two important therapies in traditional Chinese medicine, the combined treatment of five-tone therapy and moxibustion therapy has been applied to

clinical medical research and proven to be more effective through quantitative analysis.

For example, in the treatment of insomnia of heart-kidney disorder, Zheng Xiaocui et al. selected 100 patients with insomnia of heart-kidney disorder and randomly divided them into an observation group and a control group. The control group was treated with eszopiclone orally, while the observation group was treated with electronic moxibustion combined with five-tone therapy, and the clinical efficacy of the observation group was assessed to be better than that of the control group after two courses of treatment. Thus it was finally concluded that the combination of two therapies has a significant effect and can effectively improve the sleep condition of patients (Zheng X. 2018). Similarly, in a clinical study of five-tone therapy combined with ear circulation moxibustion to improve tinnitus in patients, Hua Aijun et al. divided 80 patients into two groups. The control group was treated with intravenous administration of drugs, and the treatment group was treated with five-tone therapy combined with meridian moxibustion on the basis of conventional treatment. Comparing the degree and duration of improvement of tinnitus in the two groups, and the results concluded that the combination of two therapies had a significant contribution to the improvement of the degree of tinnitus (Hua A. 2017).

At present, there have been about a hundred studies on the combined treatment of five-tone therapy and moxibustion therapy, and the conclusions reached are similar, that the combination of two therapies has a greater improvement in the treatment of the disease (Ding Y. 2015). Moxibustion therapy is the unity of acupuncture points, heat, and medicine, which accelerates the operation of qi and blood in the internal organs. At the same time, five-tone therapy plays a benign role in regulating the patient's emotion and is conducive to the therapeutic effect, which can improve the deficiencies of traditional Chinese medicine and have a wide range of clinical promotion and use value. Therefore, the product design of a moxibustion instrument based on five-tone therapy is feasible and has a good development prospect.

ANALYSIS OF USER NEEDS

According to the "Post-80s and 90s Health and Wellness Consumption Insight Report", more than 70 percent of the young people in the post-80s and 90s are now focusing on health and wellness. In order to obtain a wide range of user needs, we first conducted online research, read relevant literature and searched for product reviews on e-commerce platforms, and combined with user interviews for in-depth research to filter needs. In order to better understand user needs, six users were randomly interviewed and the results are shown in the Table 3.

More and more people are now concerned about health issues, and are willing to try some health and wellness therapies, such as moxibustion therapy. Among them, those who have experienced moxibustion therapy feel that their body is getting better and think that it will be more effective if they persist for a long time. According to the results of user research and interviews, the author drew the user mood fluctuation chart (see Figure 1). At present, the

Table 3. Structured questionnaire detailed Q&A.

Question	Answer 1	Similar Users	Answer 2	Similar Users
Are you concerned about health-related knowledge? How much do you know?	I have paid attention, understand quite a lot about health.	ueser 1, 2, 3, 5, 6	I have slightly concerned, but do not have sufficient knowledge.	user 4
Have you used moxibustion device or had experience with moxibustion? Do you think it works??	Yes,I felt fine, and it will bemore effective in the long term.	ueser 1, 3, 5, 6	No, I've heard of it, and I'd like to try it.	user 2, 4
Have you ever heard of five-tone music therapy? Do you know anything about it?	I've heard of it, and it's a bit like music therapy abroad.	user1, 3, 6	No,if there is a chance I can learn about	user 2, 4, 5
Would you try moxibustion therapy if it was combined with five-tone therapy?	I'd love to try it.	ueser 1, 2, 3, 4, 5, 6		
What other features do you expect to get?	It can be smarter and can be used anywhere, anytime.	ueser 2, 3, 5,	It can provide some feedback, preferably with targeted suggestions.	ueser 1, 4, 6

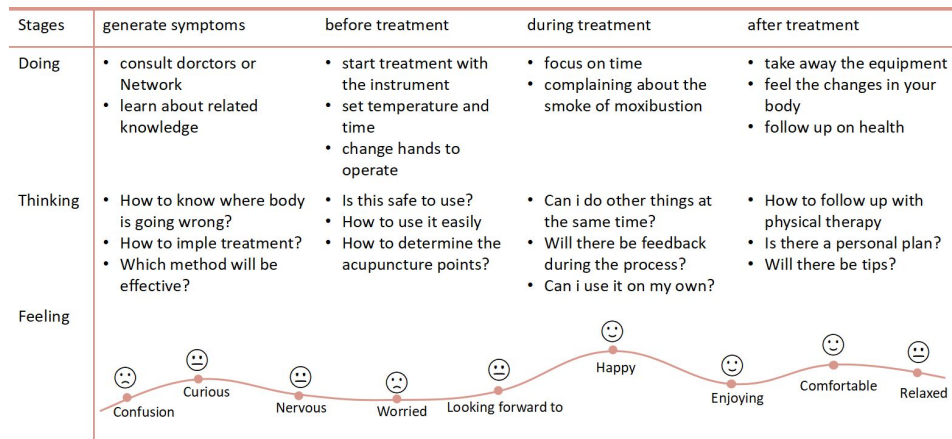


Figure 1: Map of user treatment mood swings.

moxibustion instrument products on the market have been formed. But as a product in contact with the body, the user’s emotions fluctuate from before to after physical therapy. Therefore, based on the analysis of the reasons for their emotional changes is of some practical value, and can improve the user’s favorability. Through effective design tools to improve the original design, it will bring users a better experience.

RESEARCH ANALYSIS OF PRODUCT DEVELOPMENT OF INTELLIGENT MOXIBUSTION INSTRUMENT BASED ON FIVE-TONE THERAPY

Through combing the current research status of two theories, the author concludes that the intelligent moxibustion instrument products based on five-tone therapy will have four directions, such as safe and multi-functional, intelligent and personalized, user-centered, and cultural output-oriented.

Safe and Multi-Functional

Safety is the first performance that all products need to meet. There are some factors to ensure the safety such as correct judgment of acupuncture points, safe operation, reasonable use cycle and so on. In order to make the operation safer and reduce pollution, the moxibustion instrument adopts infrared rapid heating moxa paste, so that it acts on the human body to achieve the physical therapy effect, which is both hygienic and convenient. Using advanced technology to improve safety while ensuring the effectiveness of moxibustion and user experience. As a home moxibustion instrument, storage, lightweight and portability are factors that need to be considered. Reducing the volume of the instrument so that users can use it anytime and anywhere. In addition, the instrument not only is a charging pile and packing box, but also play the role of audio, built-in wireless headphones. Thus, multi-functionalization has become the development trend of moxibustion instrument.

Intelligent and Personalized

With the development of the Internet and big data, an intelligent home is an inevitable trend. Intelligent moxibustion instrument makes users have a good experience by reducing the volume of instrument, improving the process, providing personalized service, regular feedback and so on. Regular treatment is beneficial to keep healthy and develop good habits. Five-tone therapy chooses corresponding music according to the symptoms of the disease, together with moxibusting acupuncture point. The temperature, time and period of moxibustion are different for individual users, so it is necessary to provide personalized services with the corresponding APP. The APP can be used to find the disease and give targeted recommendations, accompanying corresponding music. Therefore, intelligent and personalization become the competitive advantage of future products.

User-Centered

The core of any innovative design is the user. As a user-centered product, the moxibustion instrument pays close attention to the users, establishes a user journey map, and looks for pain points in the process of use. It helps to optimize existing products and bring a better user experience. At the same time, due to the different performance of symptoms presented by human physiology and psychology, the instrument puts the user's feelings in the first place, and makes corresponding adjustments in response to the user's feedback. Considering that more and more middle-aged and elderly people are using intelligent products, the whole process should be as simple and convenient as possible and the methods should be clear and easy to understand. Based on ergonomic considerations, the size of the design should be in line with the human body structure. Therefore, as an intelligent moxibustion instrument product, the future product should be more user-centered and enhance the user experience.

Cultural Output-Oriented

The design will dig deep into the traditional Chinese medicine culture, study Chinese medicine treatment methods and combine with interactive design and existing digital technology to develop intelligent products. It can relieve physical fatigue and reduce mental stress, achieving physical and mental relaxation. In this era of wisdom, Chinese medicine is slowly being combined with modern intelligence, it is important to find a connection between the combination of tradition and modernity. In addition to the physical efficacy of the product, we hope to bring other positive feelings. It can help people pay attention to the traditional culture of Chinese medicine and make people have a good understagding of the culture of Chinese medicine and pass it on.

PRACTICE OF INTELLIGENT MOXIBUSTION PRODUCT DESIGN BASED ON FIVE-TONE THERAPY

An intelligent moxibustion instrument is systematic, consisting of three parts: small moxibustion, system box, and intelligent terminal. The small moxibustion has a heating function with graphene technology and infrared combination and matches moxa tablets. It is convenient and hygienic and can be used to treat multiple acupuncture points at the same time. The system box not only serves as a charging pile box and a packing box, but also plays the role of a stereo with built-in wireless headphones, which is suitable for a variety of scenarios. The smart terminal can help users find the disease and have corresponding suggestions, including acupuncture points, time, temperature and so on. It is also accompanied by corresponding music to develop a personalized physiotherapy plan. Among these three parts, small moxibustion is linked to the smart terminal, and when users use it. It generates corresponding data analysis, records the physical therapy process, and forms a personal plan (see Figure 2).



Figure 2: Intelligent moxibustion products based on five-tone therapy.

Appearance of Design

Modeling is the most prominent expression of the design form and visual effects. Taking into account the user group, the orange colour is full of intelligence, brings positive psychological implication, and enhance the user's trust to product. In the whole shape design, the transition of the curved surface is mostly used. The smooth and rounded shape is to convey the feeling of closeness and warmth. The four feet of the base are made of silicone, which can increase stability (see Figure 3).



Figure 3: Display of design.

Functions of Design

The design consists of multiple parts to meet the moxibustions of several body parts at the same time. The small moxibustion is portable, which can free your hands to the maximum extent. The small moxibustion is mainly for heating, with disposable moxa tablets. Four levels of high-purity and high-saturation gradient light are used to indicate the moxibustion mode, which gives the user a sense of ritual operation and makes the moxibustion mode intuitive. The APP gives personalized advice, including point guidance, five-tone selection, time and temperature adjustment and so on.

Structures of Design

In order to comply with the green design trend, the design uses graphene material to release heat and make capillary dilation and then uses infrared penetration to help moxa penetration. It overcomes the shortcomings of traditional moxibustion products that produce smoke, but also ensures smoke-free use conditions in the home environment. Internal application of nano-cotton, MCH95 alumina ceramic sheet, and other materials, making the whole product low energy consumption, to achieve energy-saving and efficiency. The system box with wireless charging, Bluetooth audio, to put that charge, wireless unbound (see Figure 4).

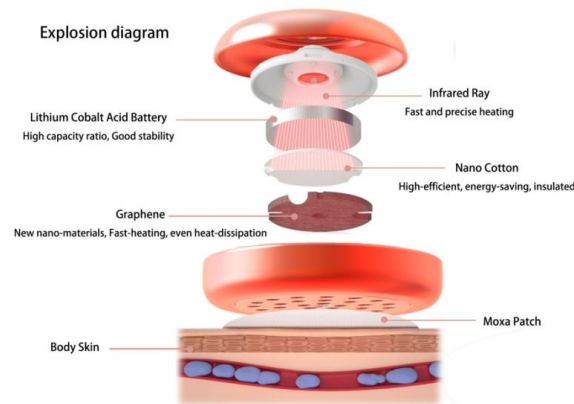


Figure 4: Structures of design.

CONCLUSION

The development of TCM shows a shift from therapeutic to preventive health. On the basis of people's increasing awareness of the role of moxibustion in health care, moxibustion therapy is increasingly becoming a hot spot for people's health care consumption and presents four major trends: the rising trend of daily consumption, the trend of focusing on health care, the trend of green medical care, and the popularity of health care. The production of moxibustion instruments is also undergoing continuous improvement and innovation, and moxibustion technology is becoming more and more mature. At the same time, the research and application of traditional Chinese medicine are still in their initial stage, and it is mostly used as an auxiliary treatment in clinical medicine. Although some studies have proved that the combination of five-tone therapy and moxibustion therapy has a better therapeutic effect, there is no established product on the market. This paper analyzes the functional and application development of five-tone therapy, the research status of moxibustion therapy and its related products, and the feasibility of two therapies, and concludes that intelligent moxibustion instrument products based on five-tone therapy have good development prospects. There will be in-depth development in safety and multi-function, intelligence and personalization, and user-centered and cultural output-oriented. It will be a product that combines two therapies and will be combined with modern science and technology to further improve the efficiency of treatment. While it can be environmental-friendly and promote Chinese medicine and pass it on in a subtle way, which is beneficial to human development.

REFERENCES

- An D., Qi F., Liu Z. (2018) Research progress of smokeless moxibustion [J], Chinese Traditional Chinese Medicine Modern Distance Education Volume 16 No. 13. pp. 158–160.
- Cui X. (2011) Modernization of moxibustion therapy from the successful development of multifunctional moxibustion instrument [C], Zhangjiajie: Proceedings of the 19th National Clinical Symposium on Acupuncture and Moxibustion of the Clinical Branch of the Chinese Acupuncture and Moxibustion Society. pp. 220–221.

- Ding Y., Ma R. (2015) Observation on the efficacy of Yuanluo with acupuncture points in treating insomnia of the heart-kidney disorder type [J], *Shanghai Journal of Acupuncture and Moxibustion* Volume 34 No. 5. pp. 415–417.
- Hu J., Xu S., Xu C., Lu H., Wang J. (2022) Exploration of family rehabilitation management based on TCM health care [J], *Journal of Chinese Medicine Management* Volume 10 No. 30. pp. 220–222.
- Hua A., Tang Y. (2017) Clinical study on the combination of five elements music therapy and ear meridian moxibustion to improve tinnitus in patients [J], *Journal of Shaanxi University of Traditional Chinese Medicine* Volume 5 No. 40. pp. 57–59.
- Hyde K., Lerch J., Norton A. (2009) Musical training shapes structural brain development[J], *JNeurosci* Volume 29 No. 10. pp. 3019–25.
- Li A., Liu T., Liu D. (2021) An overview of the application of Chinese five-tone music therapy in bone and joint diseases[J], *Guangming TCM* Volume 8 No. 36. pp. 2832–2835.
- Li C. (2017) Smokeless moxibustion suspension instrument: CN205924469U [P].
- Lin F., (2018) Exploration of discriminatory music application based on the five tone theory of the Yellow Emperor's Classic of Internal Medicine [J], *Chinese Journal of Traditional Chinese Medicine* Volume 33 No. 12. pp. 5535–5537.
- Liu B., Yu F., Shi J. (2009) Progress of music therapy at home and abroad [J], *Journal of Jiangxi College of Traditional Chinese Medicine* Volume 8 No. 21. pp. 89–91.
- Liu Y., Chu H., Hu J. (2022) An investigation of the mechanism of moxibustion therapy[J], *Chinese Journal of Traditional Chinese Medicine* Volume 11 No. 38. pp. 10–14.
- Lv P., Li R. (2021) Progress of research on the five tone therapy in Chinese medicine [J], *Henan Chinese Medicine* Volume 8 No. 41. pp. 1291–1296.
- Shi X., Zheng X., Zhang D. (2022) Current situation and innovative development of Chinese medicine technology integration in Chinese and Western medicine hospitals in the new era [J], *Journal of Chinese Medicine Management* Volume 9 No. 30. pp. 31–33.
- Tang Z. (2007) Study on the effect of moxibustion on blood stasis to activate blood circulation and remove stasis [J], *Journal of Anhui College of Traditional Chinese Medicine* Volume 26 No. 1. pp. 21–24.
- Wang L., Li X., Zhang L. (2001) Progress of domestic and international research on the mechanism of moxibustion therapy[J], *Chinese Acupuncture* Volume 9 No. 21. pp. 567–570.
- Wang W., Jiang Y., Jiang Y. (2019) Exploration of the five tone therapy in Chinese medicine and its mechanism of action[J], *Baihua Yuan* Volume 33 No. 12. pp. 99–101.
- Wu X., Yao H., Sun J. (2015) A multifunctional smoke-controlled moxibustion box: CN104940017A [P].
- Yan L. (2018) Research on the marketing system of intelligent moxibustion instrument of Lihao Company [D].
- Zhang G., Liu M., Zhang H. (2013) The relationship between the warming and tonifying effects of moxibustion [J], *Shi Zhen Guo Ji Guo Yao* Volume 24 No. 10. pp. 2468–2469.
- Zhang J., Wang L., Wu H. (2012) Analysis of the connotation of the concept of moxibustion warming through warming and tonicity [J], *Chinese Acupuncture* Volume 32 No. 11. pp. 1000–1003.
- Zheng X., Wen X., Tong Y. (2018) The efficacy of electronic moxibustion with five elements music therapy in treating insomnia of the heart and kidney disorder type [J], *Integrated Chinese and Western Medicine Nursing* Volume 4 No. 12. pp. 74–76.