

# Research Progress in the Treatment of Motion Sickness

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**Abstract:** Motion sickness is a disease characterized by vertigo, nausea, vomiting and other symptoms in traditional transportation and visual information technology. Signs of motion sickness occur in humans and animals when they are at sea, traveling by car or plane, and in space. In addition, some other special conditions, such as simulators, movie theaters, and video games, have also been described as causing pseudo disease. Treatment is directed towards reducing conflicting sensory inputs, speeding up the acclimation process, and controlling nausea and vomiting. At present, there are various clinical treatment methods, taking drugs to relieve vomiting is the main treatment method, but the effect varies from person to person. Therefore, this paper reviews the relevant data published in recent years, aiming to summarize the treatment methods of motion sickness, and provide a reference for the development of new treatment methods with small side effects and good efficacy to reduce the proportion of patients with motion sickness.

**Keywords:** Acupuncture treatment; Clinical treatment; Drug therapy; Motion sickness disease.

## 1. Introduction

Motion sickness is due to various causes of seasickness, motion sickness, air sickness and swaying, jolting, rotating motion caused by the general name of the disease. It is usually manifested as anorexia, nausea, yawning, sighing, increased salivation, hiccup, headache, blurred vision, non-vertigo dizziness, drowsiness, spatial disorientation, inattention, vomiting, and even causes arrhythmia, collapse, shock and other serious symptoms in severe patients [1]. According to the investigation, China is one of the countries with the highest incidence rate of "motion sickness" in the world, 80% of the people have appeared the motion sickness of different degrees. And the individual variation of motion sickness is large, the incidence of women and children is higher. Motion sickness affects people's travel and life happiness [2]. Pilots have the highest probability of being eliminated due to motion sickness during the test [3]. To control these symptoms, there are clinical treatments such as medication, acupuncture, patch, psychology. This paper reviews these clinical research developments, and reviews the clinical manifestations and treatment of motion sickness.

## 2. Western Drug Therapy

At present, the internal drugs used to treat motion sickness are divided into anticholinergic drugs, antihistamines, traditional Chinese medicine, etc. [4].

Among them, TCM treatment is favored by people for its advantages of safety and small side effects. Generally speaking, drug therapy may be affected by the occurrence of symptoms such as vomiting, resulting in poor drug absorption effect [5]. For patients prone to severe motion sickness and those who do not respond to conservative measures, medication may be considered. Due to the accompanying adverse effects, such as drowsiness and confusion, these drugs can be used in conjunction with sympathetic agents (catecholamine activators) to improve efficacy and alleviate the adverse effects [6].

### 2.1. Anticholinergic Drugs

Anticholinergic drugs mainly include scopolamine, phenylacetone hydrochloride, atropine, scopolamine, and benzenol [7]. Scopolamine is the most effective anticholinergic drug for motion sickness. In addition to its central anticholinergic properties, scopolamine acts as a non-selective anticholinergic agent by inhibiting input to the vestibular nucleus and vomiting center.

Scopolamine can be used as a transdermal patch behind the ear. Its action time is about 8 hours. An advantage of the transdermal route is that it allows for long-term maintenance of therapeutic blood levels of drugs with short half-lives. Oral delivery routes help prevent the effects of symptoms such as vomiting on drug absorption.

Scopolamine can also be taken orally and is often used to treat motion sickness when rapid action is needed. When taken orally, scopolamine is effective within 30 minutes and lasts 4-6 hours, making it useful for short trips [7]. Scopolamine can also be administered as a nasal spray.

However, adverse effects include dry mouth, dry eyes, blurred vision, dilated pupils, photosensitivity and dermatitis at the application site. The dosage should be determined according to individual physique. Moreover, transdermal scopolamine should not be used in children under 10 years of age, as its safety in this age group has not been determined, and it should be used with caution in the elderly [8].

### 2.2. Antihistamines

First-generation antihistamines have been shown to be effective in the prevention and treatment of motion sickness, including cinnamion razine, promethazine, tea phenhydramine, Diphenhydramine, cyclizine and meclizine [9]. Their effectiveness may be due to their antihistamine activity and anticholinergic properties. Although antihistamines may have a longer duration of action than scopolamine and must be taken 2 hours before travel, their longer duration of effective action makes them suitable for use on long trips [10].

Some common adverse reactions include sedation, impaired motor function, dizziness, dry mouth and throat, blurred vision, urinary retention and constipation [11].

Antihistamines can aggravate urinary retention and narrow Angle glaucoma. Because antihistamines cause more drowsiness and sedation than scopolamine, they should not be used when reduced alertness may be harmful [12]. The sedative effects of antihistamines may be enhanced by the use of alcohol and some central nervous system inhibitors. Used alone, antihistamines rarely have serious toxic effects. Intramuscular injections of antihistamines may be necessary for vomiting patients and those who cannot tolerate oral medications.

Generally speaking, the second-generation antihistamine drugs are non-sedative drugs, such as cetirizine, fexofenadine, astemizole and loratadine, which are ineffective in preventing or treating motion sickness [13].

Pregnant women are relatively prone to motion sickness. Antihistamines such as thephenhyamine and megoinsulin can be used safely if pregnant women need to prevent and treat motion sickness [14].

### **2.3. Sympathetic Etic (Catecholamine Activator)**

Sympathomimetic drugs (catecholamine activators) such as ephedrine and d-amphetamine are not superior to scopolamine and antihistamines in the prevention or treatment of motion sickness. Instead, they are often used in combination with scopolamine and antihistamines to overcome drowsiness and impaired performance caused by these drugs. However, the addition of ephedrine to scopolamine or chlorpheniramine does not improve the effectiveness of any drug against carsickness [15].

Studies have shown that the combination of scopolamine and d-amphetamine is very effective, because these two drugs combine their different anti-motion sickness characteristics and their respective sedative and stimulating side effects, and offset each other.

However, due to the possibility of drug dependence and abuse caused by d-amphetamine, which may inhibit the functions of the body organs, the addition of d-amphetamine to scopolamine is not suitable for general use, and is mainly used for space flight and special military purposes [16]. Generally, clinical diagnosis and treatment should not prescribe sympathetic drugs for patients with cardiovascular disease or at risk of cardiovascular disease.

## **3. Take Traditional Chinese Medicine for Internal Treatment**

Motion sickness, also known as dyskinesia, is a change in the vestibular system in response to movement or provocative stimuli perceived by movement. For the treatment of motion sickness, although western medicine treatment has certain therapeutic value, it has certain restrictions on the applicable population and patients of different ages, and is also prone to drug resistance, so it is not suitable for long-term use. China's traditional Chinese medicine culture has a long history. The treatment of traditional Chinese medicine has the advantages of small side effects of traditional Chinese medicine, low treatment cost, high effect, different course of treatment, etc., which is recognized and satisfied by the people [17]. At present, the common oral Chinese medicine treatment methods include ginger, Xiaobanxia decoction, Huoxiang Zhengqi oral liquid, Xiaochaihu decoction and other treatment methods.

### **3.1. Ginger**

Traditional Chinese medicine believes that ginger is a pungent and mild medicine. In clinical practice, ginger can be used to treat colds, stomach colds and vomiting. Its most important effect is to dispel wind chill on the surface and warm the stomach to stop vomiting. Ginger is pungent and warm, which can warm the stomach and expel cold. It has a good antiemetic effect and is known as the "Oujia Holy Medicine".

People with motion sickness often have dizziness, nausea, vomiting and other symptoms during the attack. In folk customs, people with motion sickness often chew ginger slices or shredded ginger in their mouth before driving off the ship. With the help of the function of ginger to reduce adverse reactions, such as dizziness, nausea and vomiting, it has a good effect. Some patients stick ginger tablets on the belly button Shenque point, and use the medicinal properties and effects of ginger and other Chinese herbal medicines to regulate qi and stomach, reduce adverse reactions and stop vomiting. This treatment is simple and safe, and can alleviate the adverse reactions caused by motion sickness. According to the survey, China is rich in resources of ginger, salvia miltiorrhiza and other Chinese medicinal materials, so we can develop different types of products, expand the scope of the applicable population, improve the cure rate, and lay a solid foundation for the clinical treatment of motion sickness. This method highlights the advantages of traditional Chinese medicine treatment and clinical application value, which is worth promoting among the people [17]. If further therapeutic effect is pursued, it can be combined with other TCM treatment methods to improve the efficacy.

### **3.2. Xiaopin Xia Soup**

The Xiaobanxia decoction from the Synopsis of the Golden Chamber is composed of one liter of *Pinellia ternata* and one liter of ginger. Its main therapeutic effect is to reduce phlegm and stomach, reduce adverse reactions and stop vomiting. Its main symptoms are phlegm, vomiting or retching and hiccup [18]. Phlegm retention in the stomach can cause gastric disharmony, nausea and vomiting, abdominal fullness, discomfort and other symptoms. Excessive vomiting will inevitably damage body fluid, resulting in restlessness and thirst. Those who are thirsty will vomit as soon as they drink, so they want to relieve. The king drug in the prescription is *Pinellia ternata*, which is hot and warm. *Pinellia ternata* has the power of eliminating dampness and phlegm, and dispelling ruffians and masses. The official medicine and adjunct is the pungent ginger, which has the effect of warming the stomach and relieving nausea. It also restricts the toxicity of *Pinellia ternata* and ensures drug safety. The combination of the two drugs can eliminate phlegm and stop vomiting, and can be used for the treatment of motion sickness [19]. The clinical research experiment shows that Xiaobanxia decoction has a synergistic effect with metoclopramide, and it can strengthen the prevention and treatment of nausea and vomiting during chemotherapy. It is also reported that the method of injecting Xiaobanxia decoction into Zusanli acupoint caused nausea, vomiting and other symptoms during chemotherapy of gastric cancer, with an effective rate of up to 87%, ensuring the normal progress of chemotherapy [20].

### **3.3. Huoxiang Zhengqi Oral Liquid**

Huoxiang Zhengqi Oral Liquid, the main drug of which is Huoxiang, is a Chinese patent medicine composed of many

traditional Chinese medicines, including *Atractylodes Rhizoma Atractylodes*, *Angelica Dahuricae*, *Cortex Magnoliae officinalis*, etc., which has the effects of regulating qi, strengthening stomach and spleen, relieving exterior dampness [21]. *Huoxiang Zhengqi Oral Liquid* can be used for patients with symptoms such as cold in summer, dampness stagnation of internal injuries, fever and headache, nausea and vomiting, diarrhea in stool, etc., and can also be used for headache, dizziness Chest and diaphragm tightness, abdominal distension, vomiting, diarrhea, cold outside and dampness inside. The use of *Huoxiang Zhengqi Oral Liquid* can effectively inhibit the adverse reactions of motion sickness, and the treatment method has good therapeutic safety. This treatment is of great significance in the treatment of motion sickness.

### 3.4. Xiaochaihu Soup

Xiaochaihu decoction is a conciliator composed of seven traditional Chinese medicines, namely, laborious bupleurum root, bitter scutellaria root, sweet and bitter ginseng, licorice root of Ganping, pungent pinellia, pungent ginger, and sweet and warm jujube. It has the effect of reconciling Shaoyang[22]. Xiaochaihu decoction is mainly used to treat typhoid fever and shaoyang syndrome, and can cure diseases with symptoms such as chest and flank pain, upset and vomiting; Chaihu soothes the liver and relieves depression, and penetrates the evil spirit of Shaoyang; Scutellaria can clear away the heat of Shaoyang [23]. Pinellia ternate, ginger dry dampness and phlegm. Ginseng and jujube are good for qi and spleen. One is to strengthen the body and dispel evil, and the other is to take qi to resist evil. The roasted licorice, as an assistant medicine, can help the ginseng and jujube to maintain their rightness, and can harmonize the medicinal properties of various herbs. Xiaochaihu decoction and its modified prescriptions are quite effective in treating phlegm turbid upper Mongolia syndrome, and different herbs are added according to different symptoms. Based on the seven medicinal materials of Xiaochaihu decoction, it can promote the harmony between Shaoyang and stomach qi. Taking it according to the course of treatment, it can dispel the evil qi, mediate the pivot of the whole body, inhibit the adverse reaction of motion sickness, and improve the travel happiness index of patients. It is worth learning from and promoting.

Inheriting the culture of traditional Chinese medicine can help people have a scientific understanding of health and disease, and give full play to the role of traditional Chinese medicine in health. Taking traditional Chinese medicine internally and using traditional Chinese medicine to treat motion sickness have many advantages. The specific treatment methods should be treated according to the symptoms. While obtaining the curative effect, we should also learn from and promote the traditional Chinese medicine treatment methods to better inherit and carry forward the excellent traditional culture.

## 4. TCM Skin Patch for External Use

Traditional Chinese medicine topical skin patch has the characteristics of remarkable effect, few side effects, convenient use, without oral administration can achieve the effect of prevention, this patch will have a good use value and market prospects. Studies have shown that traditional Chinese medicines such as ginger, clove and patchouli have significant anti-motion sickness effects [24], and have excellent alleviating effects on the symptoms of motion sickness.

According to the basic theory of traditional Chinese medicine, ginger and patchouli were used as main extracts and combined with the theory of meridians and acupoints to prepare the anti-motion sickness TCM skin patch and conduct clinical experiments to observe its efficacy [25].

### 4.1. Development Status of TCM Patches for Motion Sickness

At present, scopolamine patch is a common western medicine patch in the market, but it may cause discomfort such as thirst, blurred vision, drowsiness and headache after use. Western medicine patch can only relieve the discomfort in a short time, but cannot fundamentally correct the problems of motion sickness patients, and the recurrence rate is relatively high [25]. Compared with the limitations of Western medicine, the advantages of Chinese medicine patch such as smaller adverse reactions and lasting curative effect gradually appear.

### 4.2. Mechanism of Action of TCM Patch

Motion sickness Patch adopts modern science and technology - transdermal drug delivery, which is a scientific processing of the topical patch, composed of a variety of natural Chinese herbal ingredients. Acting on the human meridians, through the patch to stimulate ear nerve endings, regulate the neurohumoral and endocrine system to improve local meridians Qi and blood circulation, in order to relax the liver and regulate the qi, spleen and stomach function, balance the internal and external, and finally treat the disease. At the same time, ginger patchouli and other drug extracts enter the subcutaneous tissue through the auricle skin, which has a strong pharmacological effect in terms of local drug concentration, and has a good therapeutic effect on dizziness, nausea, vomiting and other symptoms caused by bumpy movement as an inducing factor [25].

### 4.3. Selection of Acupoints for the Action of TCM Patch

In the study of anti-motion sickness treatment methods, the theory of meridians and acupoints of traditional Chinese medicine, reasonable selection of meridians and acupoints and effective anti-motion sickness patch are anti-motion sickness measures with Chinese traditional characteristics. According to TCM, the etiology of motion sickness includes "no wind, no dizziness", "no phlegm, no dizziness", and "spleen and stomach Qi deficiency theory" and other theoretical results [26].

Motion sickness has the onset of nausea and vomiting, dizziness, stomach discomfort, lethargy headache and other symptoms. Clinical treatment of motion sickness mostly uses the treatment principle of slow cure, urgent cure, both symptoms and root causes. Combined with the theory of "the head is the meeting of the Yang, the brain is the house of the gods, and God can control the qi", the treatment of the top of the head acupoint [26] is selected to regulate the meridians of Qi and blood, and the internal and external communication, this is the urgent cure method. Combined with the symptoms of attack, Neiguan point was selected as the attending acupoint, which is commonly used in the clinical treatment of nausea and vomiting, motion sickness, pain and other points [27], and is actually the only choice for the treatment of motion sickness. With other therapies to strengthen the spleen and stomach, improve the function of the spleen and stomach, this is a slow treatment of symptoms. Only by treating

symptoms and root causes can we obtain good therapeutic effects.

## 5. Summary

There are a variety of clinical treatments for motion sickness, but a variety of treatments cannot completely cure motion sickness, only to prevent or temporarily alleviate the effect. Taking drugs and using patches are favored by the public as a more convenient treatment, but at the same time, it is necessary to pay attention to the adverse effects of drugs on the human body. Eye needle, ear needle and head needle, moxibustion, psychological therapy to the operator of higher requirements. The clinical therapeutic effect has its own advantages and disadvantages, and the effect varies from person to person. Therefore, continuous innovation should be made to create a convenient, less side effects, can completely cure motion sickness method to meet people's needs. This aspect needs further research and development.

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