

## Special Report

### *Japanese Kampo Medicine after the Great East Japan Earthquake in Miyagi and Fukushima Prefectures (Kampo Medicine after Great East Japan Earthquake)*

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### Abstract

After the Great East Japan Earthquake and huge tsunami, traditional Japanese (Kampo) medicine was successfully used in the disaster-stricken areas in Miyagi Prefecture and in an outpatient clinic in Fukushima Prefecture. Here, we report the changes of patients symptoms in evacuation centers. Additionally, we present specific case reports of patients who were successfully treated with Kampo medicine. Infectious diseases, common cold, and hypothermia were the predominant immediately after the disaster. The incidence of allergies increased 2 weeks later, and after another 6 weeks, mental distress increased. Kampo preparations such as *kakkonto* and *keishito* were administered to patients with common cold, whereas *ninjinto* and *tokishigyakukagoshuyushokyoto* were used for hypothermia. Further, Kampo preparations with anti-allergic properties, such as *shoseiryuto*, and tranquilizing properties, such as *kamikihito*,

were prescribed. In the outpatient clinic in Fukushima Prefecture, patients diagnosed with stress disorder were treated with Kampo medicine, resulting in positive effects on both physical and mental/emotional symptoms. Thus, Kampo medicine is considered as a useful treatment that can be utilized along with Western medicine for various medical conditions that emerge after a natural disaster.

### Introduction

The coastal areas of eastern Japan were devastated by the massive earthquake and tsunami that occurred on March 11, 2011. Tsunami waves reached a maximum height of approximately 16 m at the Miyagi fishery port of Onagawa, sweeping away people, cars, houses, and even whole communities (Fig. 1). At first, it was reported that approximately 26,000 people died or were missing, and that at least 100,000 houses were completely or partially destroyed [1, 2]. More than 400,000 people were forced to evacuate to evacuation centers. Many schools and community centers converted into evacuation centers were isolated and prevented from communicating with other areas due to inundated and severed roads in Miyagi Prefecture.

The Nuclear Power Plant in Fukushima Prefecture was also destroyed by the huge tsunami, causing radiation problems in the east coast of Fukushima (Fig. 2). Severe problems on the supply of air, water, food, and shelter emerged due to radiation pollution. The government urged people living within 20- to 30-km radius of the Fukushima Nuclear Power Plant to evacuate to farther and safer areas (Fig. 2). Everyone in east Japan experienced anxiety, irritability, sadness, and despair.

After the disaster, the Department of Kampo medicine in Tohoku University Hospital provided treatment with traditional Japanese (Kampo) medicine in the severely stricken disaster areas in Miyagi Prefecture. Kampo medicine was also used for patients at the clinic of Fukushima Medical University (Fig. 2).

In this report, we describe the disaster medical relief operation and medical conditions that emerged after the natural disaster that struck Miyagi Prefecture, as well as some case reports that were successfully treated using Kampo medicine.

### **Medical relief operations using Kampo medicine at the coastal areas of Miyagi Prefecture (modified from ref. [3, 4])**

Based on the medical records and documents on the 12-day medical relief operations conducted at the evacuation centers in the Onagawa and Ishinomaki areas during the first 73 days after the disaster, we retrospectively investigated the data on symptoms and Kampo treatment (n = 236). Three periods were assessed: the acute period, starting from the day of the disaster up to the 14th day after the disaster; the sub-acute period, which includes the 15th to the 42nd day after the disaster; and the chronic period, which covers the 43rd to the 73rd day after the disaster. Data on symptoms and treatment were collected for each period. Kampo preparations used in this medical operation consisted of dried extract granules prepared from a boiled water extract of multiple raw materials. Quality control and assurance of these raw materials was performed by the Japanese pharmacopeia. These Kampo preparations were covered by the National Health Insurance of Japan. A list of Kampo preparations used in this operation is presented in Table 1.

We treated 72 patients during the acute period, 117 during the sub-acute period, and 47 during the chronic period. Figure 3 shows the treatment conducted at an evacuation center. Many of the patients had already received Western medications prescribed by the Ishinomaki Joint Medical Relief Team (IJMRT). A comparison of symptoms observed during the acute, sub-acute, and chronic periods is shown in Figure 4.

During the acute period, many patients presented with the common cold, hypothermia, and enterocolitis (Fig. 4). For patients with recent onset of symptoms of the common cold, Kampo

preparations such as *kakkonto* and *keishito* were used, whereas *ninjinto* and *tokishigyakukagoshuyushokyo* were used for the treatment of hypothermia. Moreover, for patients with prolonged symptoms despite under the treatment of Western medicine, we prescribed *shosaikoto* and other similar Kampo preparations. *Goreisan* was prescribed for the treatment of enterocolitis accompanied by diarrhea or vomiting which were not relieved by anti-diarrheal agents or intestinal regulators (Table 1).

During the sub-acute period, allergic symptoms such as persistent cough, pharyngeal pain, runny nose, and itchy eyes were common (Fig. 4). Although many patients had already received antihistamines and other anti-allergy medications, many complained of adverse drug reactions such as drowsiness and impaired attention. Thus, we prescribed Kampo preparations with anti-allergy properties such as *shoseiryuto* for these patients (Table 1).

During the chronic period, an increase in psychiatric symptoms such as irritability, anxiety, lightheadedness, and insomnia were observed, as well as somatoform disorders (Fig. 4). For these symptoms, we prescribed Kampo preparations with tranquilizing properties, such as *yokukansan* and *kamikihi*. Moreover, many patients complained of constipation, *mashingan* or *junchoto* were prescribed (Table 1).

### **Cases who received Kampo treatment at an evacuation center in Miyagi Prefecture**

#### ***A case of fever and shivering***

Case patient: A 60-year-old man

Chief complaint: Chills and fever

History of the present illness: Chills and sore throat developed 2 days prior; the patient was treated by IJMRT the day before. The result of an influenza test was negative, an anti-inflammatory analgesic was prescribed. Intense chills and languor persisted until the next day, and the patient's body temperature showed over 38°C. Although the patient felt chills, no

fuel for heat to keep him warm was available. Then, he requested Kampo treatment.

Physical findings: Body temperature showed 38.1°C; face slightly pale; shivering; mild redness in the tonsils but no swelling; no rales in chest auscultation

Tongue diagnosis: The tongue was pale and showed a thin white coating

Pulse diagnosis: A sinking pulse

Prescription: Kampo preparation of *maobusisaishinto* (TJ-127, 7.5 g/day, for 2 days), taken orally 3 times a day with hot water before each meal

Progression: 30 min after administration, the patient sweated and were relieved from chills. After oral administration for a day, the patient's fever declined to 36.8°C the following day, as well as dissipation of malaise. He expressed gratitude that he "received the most effective cold medicine he had ever taken."

#### **A case of hypothermia**

Case: A 80-year-old man

Chief complaints: Feeling of malaise and decline in motivation

History of the present illness: The patient was at home when the disaster struck, and nearly drowned when a portion of the first floor was flooded by tsunami waves. Somehow, his family was able to rescue him and they were evacuated and stayed in the evacuation center; he was wrapped in blankets while still wearing his dirty clothes. Although the patient ate his meals during the next several days, he gradually felt fatigue and appetite loss. He experienced intense malaise and was lying in the corner of a room in evacuation center.

Physical findings: Body temperature showed 34.8°C; no abnormal sounds heard in chest auscultation; face was pale; no shivering despite complaints of feeling cold; coldness in the trunk and limbs; redness in the third and fourth toes of both feet

Tongue diagnosis: The tongue was pale and showed a thin white coating

Pulse diagnosis: A sinking, slow pulse

Prescription: Kampo preparation of *ninjinto* (TJ-32, 7.5 g/day, for 2 days) and *tokishigyakukagoshuyushokyoto* (TJ-38, 7.5 g/day, for 2 days), taken orally 3 times a day with hot water before each meal

Progression: Approximately 30 min after administration, the patient's feeling of coldness was alleviated and claimed that his vitality had returned. That day, he walked on his own to receive a meal, and the patient was able to consume the food. Administration of Kampo preparations for 2 days could improve the patient's symptoms of hypothermia and malaise.

#### **A case of allergic symptoms**

Case: A 35-year-old man

Chief complaint: Persistent nasal discharge

History of the present illness: Following the earthquake, the patient left the evacuation center to go to his home each day to remove rubble and debris. Two weeks prior to presentation, he complained of persistent nasal discharge; he received treatment from the IJMRT, which prescribed him an anti-allergy agent, but it failed to relieve the symptoms. He felt drowsiness after administration, which he thought was a side effect of the anti-allergy agent. He thus requested Kampo treatment.

Physical findings: A slender body type; body temperature showed 36.2°C; no redness or swelling in the tonsils or throat; no abnormal sounds heard in chest auscultation

Tongue diagnosis: Tongue was swollen and showed tooth marks

Pulse diagnosis: A thin, fast pulse

Prescription: Kampo preparation of *shoseiryuto* (TJ-19, 9.0 g/day, for 7 days), taken orally 3 times a day with hot water before each meal

Progression: One day after oral administration, the

patient relieved from the symptom of nasal discharge, despite the cessation of the anti-allergy agent. Further, the patient no longer felt drowsiness, and thus showed an increase in work efficiency.

### **Cases who received Kampo treatment at the outpatient clinic of Fukushima Medical University**

#### **A case of insomnia, anxiety, dizziness, and floating sensation**

Case: A 41-year-old woman

Chief complaints: Insomnia, anxiety, floating sensation, and palmar sweating

Occupation: Nurse

History of the present illness: The disaster struck while the patient was working at a hospital. As frequent aftershocks continued, she took rounds checking the safety of patients in each ward. On the day of the disaster, she was unable to return home and stayed at the hospital overnight; however, she began to feel as though her body was constantly shaking. The sight of herself shaking caused her to experience anxiety, fear, palmar sweating, and palpitations. After she returned home, she had to get back to work at the hospital for the night shift, where she felt the same symptoms. Thus, she developed a fear of going to work and was concerned that this fear would interfere with her work; hence, she joined the consultation 2 weeks after the disaster.

Physical findings: Body temperature showed 36.2°C; blood pressure, 150/90 mmHg; favorable appetite; frequently dreams while asleep; languor and swelling in the legs; no redness or swelling in the throat and tonsils; no abnormal sounds in chest auscultation

Tongue diagnosis: Reddish at the tip, some tooth indentations, and showed a thin white coating

Abdominal diagnosis: Abdominal examination indicative of kyokyokuman (chest side painfulness), saijoki (palpitations above the umbilicus), and saikafujin (numbness below the umbilicus)

Prescription: She was prescribed the Kampo preparation of *saikokaryukotsuboreito* (TJ-12, 7.5 g/day, for 7 days), taken orally 3 times a day before each meal

Progression: 2 days later, she returned to work on the day shift. Despite having some anxiety, she no longer felt a sensation of floating and her palpitations stopped. On day 4, she had to visit her relative's home that had been heavily damaged by the disaster, and complained of being very anxious, but later reported that she was able to go and return home without flashback sensation. Presently, she has resumed her normal workload without taking any medications.

### **Discussion**

During our medical relief operations in various evacuation centers, we have observed that the most common symptoms occurring in the first 2 weeks after the natural disaster included the common cold, hypothermia, and enterocolitis. The incidence of these symptoms may be related to the cold, winter weather and the unavailability of electricity, gas, and hot water to keep them warm. In addition, the evacuees were laid on cardboard and tarpaulin sheets placed on the floor; these evacuation centers had obviously depleted supply of blankets and bedding for them. Enterocolitis accompanied by vomiting or diarrhea was prevalent mainly in children. During this period, it was difficult to obtain drinking water; no water was available for washing hands. Occasionally, impure water from swimming pools was drawn for use, and thus, the unsanitary conditions in the evacuation centers could have influenced to the increase of enterocolitis cases.

Approximately 2 weeks after the disaster, complaints of persistent cough, pharyngeal pain, runny nose, and itchy eyes increased. At this time, the outside temperature gradually increased. Further the sludge and dirt that were brought in by the tsunami had dried and polluted the air. This period also coincided with the pollen allergy season.

These environmental factors may have influenced to the symptoms such as coughing and allergic reactions.

Approximately one month after the disaster, an increase in psychiatric symptoms such as insomnia, irritability, lightheadedness, and anxiety, as well as somatoform disorders was observed. This may be attributable to fatigue that was related to the extended stay of the evacuees at the evacuation centers and to the stress that they experienced from recurring aftershocks. In addition, many patients complained of constipation, possibly related with the composition of the meals, which mainly consisted of carbohydrates.

In this disaster medical relief operation, we observed that Kampo treatment relieved the symptoms of the patients. Kampo treatment is generally applicable after taking the history of the patient's illness and conducting a physical examination [5]; it was a useful tool for this particular natural disaster, when commonly used medical supplies were insufficient. The powder extract preparations of Kampo medicine have been used widely in Japan. Oral Kampo preparations administered to treat cold sensitivity and to ultimately increase the feeling of warmth in the body, which are based on the unique concepts of Kampo medicine, were effective to treat patients of hypothermia. Moreover, Kampo preparations for severe cold symptoms, anti-allergic agents that do not cause drowsiness, and antitussive agents for persistent cough were effective treatments that complement Western medicine. There were also occasions in which Kampo preparations were also used to treat symptoms during the chronic period, such as psychiatric disorders and constipation. Kampo therapy imparted beneficial effects on both physical and mental/emotional symptoms in patients.

Clinical evidence for the effectiveness of Kampo

medicines administered to patients affected by this particular natural disaster, such as *maoto* for common colds or influenza, *shosaikoto* for prolonged common colds, *shoseiryuto* for rhinitis, and *yokukansan* for psychiatric diseases, have been previously reported [5-9]. *Ninjinto* has been used to treat hypothermia and diarrhea [10], and *goreisan* has been administered to patients with nausea and diarrhea [11]. According to the book, "Discussion of Cold Damage," originally edited by Zhang Zhong-Jing, *kakkonto*, *maoto*, *ninjinto*, *shoseiryuto*, *shosaikoto*, and *goreisan* have been used as treatment for infectious diseases or hypothermia since ancient times [12]. The efficacy of Kampo medicines has thus been proven by its extensive history of clinical use. Kampo preparations are included in future medical relief supplies for disaster victims and that Kampo treatments are applied for treating a wide range of medical conditions.

## Conclusion

Kampo medicine is a useful treatment that may complement Western medicine during extensive natural disasters.

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Table 1: A list of Kampo preparations mainly prescribed during the current medical relief operation

Period	Symptoms	Application of Kampo extract granules	Dried extract granules in daily dosage (g)	Contents ratio (JP: The Japanese Pharmacopoeia)
Acute	Common cold	Keishito	3.0	JP Cinnamon Bark(4.0g) JP Peony Root(4.0g) JP Jujube(4.0g) JP Glycyrrhiza(2.0g) JP Ginger(1.5g)
		Kakkonto	3.75	JP Pueraria Root(4.0g) JP Jujube(3.0g) JP Ephedra Herb(3.0g) JP Glycyrrhiza(2.0g) JP Cinnamon Bark(2.0g) JP Peony Root(2.0g) JP Ginger(2.0g)
		Maobushisaishinto	1.5	JP Ephedra Herb(4.0g) JP Asiasarum Root(3.0g) JP Powdered Processed Aconite Root(1.0g)
	Tonsillitis	Kikyoto	1.25	JP Glycyrrhiza(3.0g) JP Platycodon Root(2.0g)
		Shosaikotoka-kikyosekko	5.0	JP Gypsum(10.0g) JP Bupleurum Root(7.0g) JP Pinellia Tuber(5.0g) JP Scutellaria Root(3.0g) JP Platycodon Root(3.0g) JP Jujube(3.0g) JP Ginseng(3.0g) JP Glycyrrhiza(2.0g) JP Ginger(1.0g)
	Hypothermia	Tokishigyakuka-goshuyushokiyoto	4.0	JP Jujube(5.0g) JP Cinnamon Bark(3.0g) JP Peony Root(3.0g) JP Japanese Angelica Root(3.0g) JP Akebia Stem(3.0g) JP Glycyrrhiza(2.0g) JP Evodia Fruit(2.0g) JP Asiasarum Root(2.0g) JP Ginger(1.0g)
Subacute	Ploranged common cold	Shosaikoto	4.5	JP Bupleurum Root(7.0g) JP Pinellia Tuber(5.0g) JP Scutellaria Root(3.0g) JP Jujube(3.0g) JP Ginseng(3.0g) JP Glycyrrhiza(2.0g) JP Ginger(1.0g)
	Enterocolitis	Rikkunshito	4.0	JP Atractylodes Lancea Rhizome(4.0g) JP Ginseng(4.0g) JP Pinellia Tuber(4.0g) JP Poria Sclerotium(4.0g) JP Jujube(2.0g) JP Citrus Unshiu Peel(2.0g) JP Glycyrrhiza(1.0g) JP Ginger(0.5g)
		Goreisan	2.0	JP Alisma Rhizome (4.0g) JP Atractylodes Lancea Rhizome(3.0g) JP Polyporus Sclerotium(3.0g) JP Poria Sclerotium(3.0g) JP Cinnamon Bark(1.5g)
		Ninjinto	2.5	JP Processed Ginger(3.0g) JP Glycyrrhiza(3.0g) JP Atractylodes Lancea Rhizome(3.0g) JP Ginseng(3.0g)
	Rhinitis	Shoseiryuto	5.0	JP Pinellia Tuber(6.0g) JP Processed Ginger(3.0g) JP Glycyrrhiza(3.0g) JP Cinnamon Bark(3.0g) JP Schisandra Fruit(3.0g) JP Asiasarum Root(3.0g) JP Peony Root(3.0g) JP Ephedra Herb(3.0g)

	Itchy eyes	Eppikajutsuto	3.25	JP Gypsum(8.0g) JP Ephedra Herb(6.0g) JP Atractylodes Lancea Rhizome(4.0g) JP Jujube(3.0g) JP Glycyrrhiza(2.0g) JP Ginger(1.0g)
	Dry cough	Bakumondoto	6.0	JP Ophiopogon Tuber(10.0g) JP Pinellia Tuber(5.0g) JP Jujube(3.0g) JP Glycyrrhiza(2.0g) JP Ginseng(2.0g) JP Brown rice(5.0g)
Chronic	Constipation	Mashinginan	2.25	JP Hemp Fruit(5.0g) JP Rhubarb(4.0g) JP Immature Orange(2.0g) JP Apricot Kernel(2.0g) JP Magnolia Bark(2.0g) JP Peony Root(2.0g)
		Junchoto	1.5	JP Rehmannia Root(6.0g) JP Japanese Angelica Root(3.0g) JP Scutellaria Root(2.0g) JP Immature Orange(2.0g) JP Apricot Kernel(2.0g) JP Magnolia Bark(2.0g) JP Rhubarb(2.0g) JP Peach Kernel(2.0g) JP Hemp Fruit(2.0g) JP Glycyrrhiza(1.5g)
	Insomnia	Sansoninto	3.25	JP Jujube Seed(10.0g) JP Poria Sclerotium(5.0g) JP Cnidium Rhizome(3.0g) JP Anemarrhena Rhizome(3.0g) JP Glycyrrhiza(1.0g)
	Irritation	Yokukansan	3.25	JP Atractylodes Lancea Rhizome(4.0g) JP Cnidium Rhizome(3.0g) JP Uncaria Hook(3.0g) JP Japanese Angelica Root(3.0g) JP Bupleurum Root(2.0g) JP Glycyrrhiza(1.5g)
	Anxiety	Kamiki hito	5.0	JP Astragalus Root(3.0g) JP Bupleurum Root(3.0g) JP Jujube Seed(3.0g) JP Atractylodes Lancea Rhizome(3.0g) JP Ginseng(3.0g) JP Poria Sclerotium(3.0g) JP Longan Aril(3.0g) JP Polygala Root(2.0g) JP Gardenia Fruit(2.0g) JP Jujube(2.0g) JP Japanese Angelica Root(2.0g) JP Glycyrrhiza(1.0g) JP Ginger(1.0g) JP Saussurea Root(1.0g)
	Fatigue	Hochuekito	5.0	JP Astragalus Root(4.0g) JP Atractylodes Lancea Rhizome(4.0g) JP Ginseng(4.0g) JP Japanese Angelica Root(3.0g) JP Bupleurum Root(2.0g) JP Jujube(2.0g) JP Citrus Unshiu Peel(2.0g) JP Glycyrrhiza(1.5g) JP Cimicifuga Rhizome(1.0g) JP Ginger(0.5g)

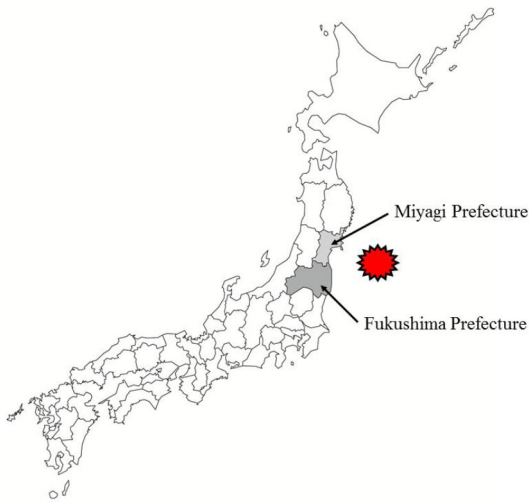


Figure 1: The seismic center of the Great East Japan Earthquake and the location of Miyagi and Fukushima prefecture



Figure 3: Kampo treatment at an evacuation center

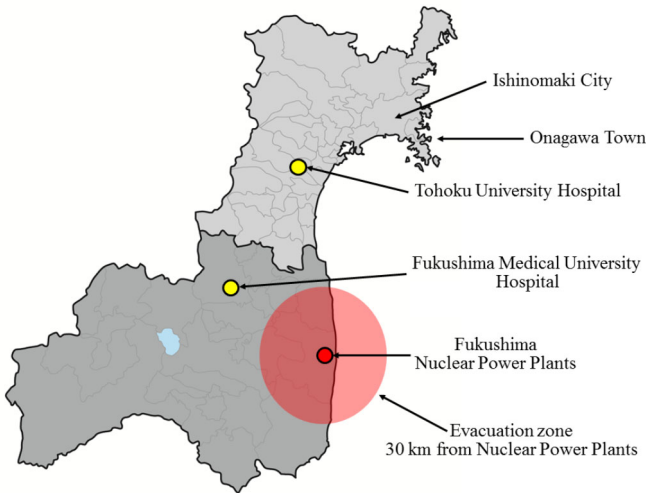


Figure 2: The location of Tohoku University Hospital in Miyagi prefecture and Fukushima Medical University Hospital in Fukushima prefecture

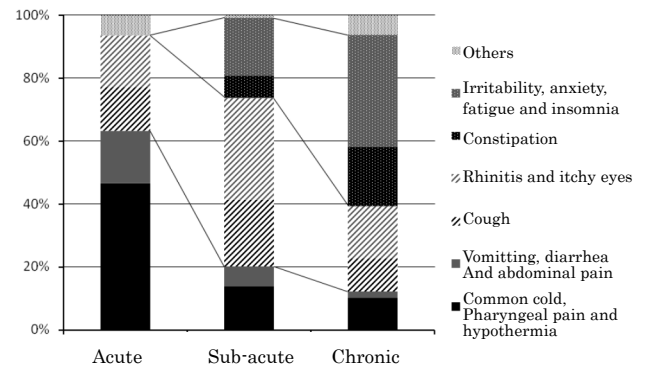


Figure 4: Comparison of symptoms during the acute (1st to 14th day after the disaster, n = 72), sub-acute (15th to 42nd day, n = 117), and chronic (43rd to 73rd day, n = 47) periods, modified from the references 3 and 4