

## Research Article

# General Use of Chinese Herbal Products among Female Patients with Mastitis in Taiwan

Shu-Huey Chou <sup>1</sup>, Chun-Che Huang <sup>2</sup>, Ching-Heng Lin <sup>3,4,5,6</sup>, Kun-Chang Wu <sup>7</sup>,  
and Pei-Jung Chiang <sup>1,8</sup>

<sup>1</sup>Department of Traditional Chinese Medicine, Taichung Veterans General Hospital, Taichung, Taiwan

<sup>2</sup>Department of Healthcare Administration, I-Shou University, Kaohsiung, Taiwan

<sup>3</sup>Department of Medical Research, Taichung Veterans General Hospital, Taichung, Taiwan

<sup>4</sup>Department of Public Health, Fu-Jen Catholic University, New Taipei, Taiwan

<sup>5</sup>Department of Health Care Management, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan

<sup>6</sup>Department of Industrial Engineering and Enterprise Information, Tunghai University, Taichung, Taiwan

<sup>7</sup>School of Pharmacy, College of Pharmacy, China Medical University, Taichung, Taiwan

<sup>8</sup>Graduate Institute of Chinese Medicine, School of Chinese Medicine, China Medical University, Taichung, Taiwan

Correspondence should be addressed to Pei-Jung Chiang; [aerin.chiang@vghtc.gov.tw](mailto:aerin.chiang@vghtc.gov.tw)

Received 23 June 2021; Accepted 22 February 2022; Published 25 March 2022

Academic Editor: Eliana Rodrigues

Copyright © 2022 Shu-Huey Chou et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Objectives.** Little information is available regarding the use of Chinese herbal medicine to treat mastitis. This study evaluated the prescription patterns of Chinese herbal medicine products in women with mastitis in Taiwan. **Design.** This is a population-based cross-sectional study. **Setting.** 8,531 women aged 20–49 years, who received a diagnosis of mastitis between 2004 and 2013, were identified from the Longitudinal Health Insurance Database in Taiwan. We collected data on demographic characteristics, including age, monthly insurance premium, and urbanization level. The ten most Chinese herbal medicines prescribed for mastitis were assessed, including frequency, percentage, average daily dose, and average duration of prescription. **Main outcome measures.** We analysed the ten most single Chinese herbs and Chinese herbal formulae prescribed for mastitis. **Results.** Overall, 437 (5.1%) women received Chinese herbal medicine to treat mastitis. Mai Men Dong (*Ophiopogon japonicus* (Thunb.) Ker Gawl.; 22.3%), Pu Gong Yin (*Taraxacum mongolicum* Hand.-Mazz.; 7.8%), and Wang Bu Liu Xing (*Vaccaria hispanica* (Mill.) Rauschert; 3.5%) were three of the most commonly prescribed single Chinese herbs for mastitis. Xian-Fang-Huo-Ming-Yin (18.2%), Jia-Wei-Xiao-Yao-San (9.1%), and Chai-Hu-Shu-Gan-San (8.4%) were three of the most commonly prescribed Chinese herbal formulae. **Conclusion.** Xian-Fang-Huo-Ming-Yin can clear heat, detoxify body, alleviate swelling, activate blood, and relieve pain. It was the most frequently prescribed Chinese herbal formula in patients with mastitis.

## 1. Introduction

Mastitis is an inflammation of the breast, which may or may not involve an infection. It is usually related to lactation. The World Health Organization reported that incidence of mastitis in lactating women ranged from 3% to 33% [1]; it usually occurs in the first six weeks postpartum, and the incidence gradually declines thereafter [2]. The major causes of mastitis are milk stasis and infection [1]; other factors

include genetic factors, immune factors, trauma, etc. However, women with nonlactational causes of mastitis are less common [3]. A previous study reported the frequency of nonlactational mastitis among biopsies for benign breast diseases to be 3% [4].

Mastitis diagnosis is usually based on clinical symptoms and signs, such as breast pain, heat, swelling, fever, and chills [2]. In 946 breastfeeding women, Foxman et al. [5] found that the most common mastitis symptoms were breast

tenderness (98%), malaise (87%), fever (82%), chills (78%), redness (78%), and a hot spot on the affected breast (62%).

Mastitis should be treated immediately, as a delay in treatment or inappropriate management can lead to breast abscess, which occurs in 5 to 11% of mastitis cases [6]. The treatments for mastitis usually include effective milk removal, counselling, as well as antibiotic and symptomatic treatment. Other therapies include the use of cabbage leaves and herbal treatment [1]. Cabbage leaves, with both antibiotic and anti-irritant properties, can reduce pain and increase breastfeeding duration [1, 7]. *Gleditsiae Fructus* extract has also been reported to be effective in treating mastitis [1]. Wu et al. [8] found that *Taraxaci Herba*, *Glycyrrhizae Radix et Rhizoma*, *Paeoniae Radix Alba*, and *Citri Reticulatae Semen* were the most commonly prescribed Chinese medicines for mastitis.

Mastitis and breast abscess are known as “Ru Yong” (breast carbuncle) in Chinese medicine. *Ge Zhi Yu Lun*, an ancient Chinese medical text, states that the breasts itself belong to the stomach meridian, and the nipples belong to the liver meridian. If a nursing mother is angry, depressed, or eats excessive amounts of greasy food, the *Qi* will stagnate and milk ducts will become blocked, causing milk stasis, which may transform into heat and possibly also an abscess. If the infant has interior heat, they might pass the heat to the mother through breastfeeding, which can cause breast lumps [9]. Chinese medicine is widely used in Taiwan. However, very few studies have investigated the application of Chinese herbal medicine (CHM) in the treatment of mastitis. Therefore, the aim of the study is to assess the patterns of CHM prescriptions to treat mastitis in women in Taiwan from the Longitudinal Health Insurance Database (LHID).

## 2. Materials and Methods

**2.1. Data Source and Study Population.** This retrospective, population-based, cross-sectional study used data from the Longitudinal Health Insurance Database (LHID), where one million beneficiaries were randomly selected from the National Health Insurance Research Database (NHIRD) in Taiwan. The LHID sample and all NHIRD enrollees had no differences in age, gender, or average insured payroll-related premiums. The LHID database contains information about outpatient visits, hospital admissions, prescriptions, disease status, and patient demographics. To protect confidentiality, all identification numbers of patients and medical institutions were encrypted and maintained by Taiwan’s National Health Research Institutes before extracting and analysing data. The diagnostic codes used in the LHID were according to the International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) coding. In addition, this study was approved by the Institutional Review Board of Taichung Veterans General Hospital (IRB No. CE15069A-3, Taiwan), and the requirement for informed consent was waived.

A sample of one million patients was randomly selected from the National Health Insurance Research Database (NHIRD). All patients without mastitis (ICD-9-CM code 611.0) were excluded ( $n = 989,359$ ). A total of 10,641 women

who received a diagnosis of mastitis (ICD-9-CM code 611.0) between 2004 and 2013 were identified. We excluded patients aged  $<20$  or  $\geq 50$  years of age ( $n = 1,900$ ) and those who were diagnosed with mastitis before 2004 ( $n = 210$ ). The date of the initial mastitis diagnosis was defined as the index date. The final sample included 8,531 newly diagnosed patients with mastitis who were classified into those who did and did not use CHM to treat mastitis. Figure 1 shows a flow diagram of the study selection process.

**2.2. Chinese Herbal Medicine Use.** The primary variable of interest was whether patients received CHM treatment for mastitis (ICD-9-CM code 611.0). Chinese herbal medicine products are prescribed for outpatient treatment by traditional Chinese medicine (TCM) physicians according to Taiwan’s National Health Insurance program guidelines. Chinese herbal medicine use was defined as patients who had been prescribed CHM for treating mastitis at least once after the index date, whereas non-CHM use was defined as those who did not visit TCM physicians. The possible pharmacological effects of single Chinese herbs were searched from scientific literature published between July 2006 and January 2019, and the retrieval database is PubMed.

**2.3. Variables.** The demographic variables compared between the CHM and non-CHM groups were age at mastitis diagnosis, monthly insurance premium, and urbanization level.

Age was classified into groups of 20–29, 30–39, and 40–49. Individual monthly insurance premium was determined according to work salary, and premiums (in Taiwan dollars (TWD)) were classified into  $\geq 45,801$ , 28,801–45,800, 15,841–28,800,  $<15,840$ , and dependent groups. The dependent group included students, stay-at-home parents, and family members without a fixed salary. The urbanization level was classified as urban, suburban, and rural.

**2.4. Statistical Analyses.** Distribution of the characteristics between patients with mastitis, with and without CHM, was examined using chi-square or Fisher’s exact tests for categorical variables and Student’s *t*-test for continuous variables. The prescription patterns of the 10 most prescribed single Chinese herbs and Chinese herbal formulae for mastitis treatment were analysed, including frequencies, percentages, average use duration (days/visit), and average daily dose (g). The threshold for statistical significance was set at  $p < 0.05$ . All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA).

## 3. Results

We included 8,531 women who were newly diagnosed with mastitis between 2004 and 2013. Of these, 437 (5.1%) were CHM users and 8,094 (94.8%) were non-CHM users. The demographic characteristics of CHM users and nonusers are shown in Table 1. The mean age at diagnosis was 33.3 and

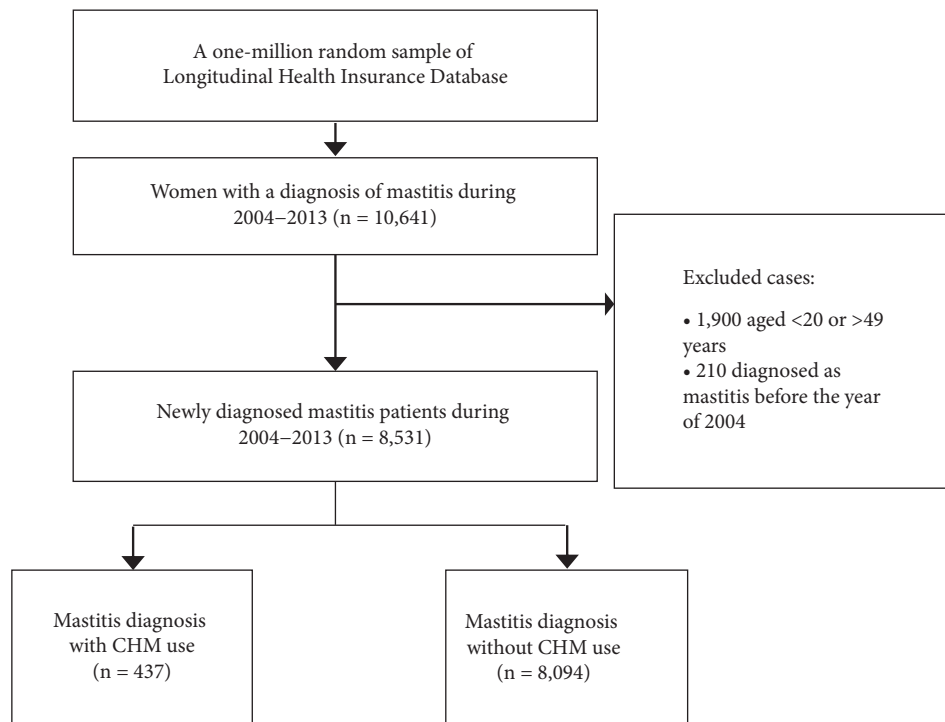


FIGURE 1: Flow diagram of sample selection. CHM, Chinese herbal medicine.

TABLE 1: Demographic characteristics of the patients with mastitis by Chinese herbal medicine use.

	CHM user (n = 437)		Non-CHM user (n = 8,094)		p
Age at diagnosed mastitis (years), mean (SD)	33.3	(5.7)	32.9	(6.8)	0.173
20–29	110	(25.2)	2,648	(32.7)	<0.001
30–39	267	(61.1)	4,011	(49.6)	
40–49	60	(13.7)	1,435	(17.7)	
Monthly insurance premium (TWD)					0.014
≥45,801	8	(1.8)	139	(1.7)	
28,801–45,800	17	(3.9)	349	(4.3)	
15,841–28,800	59	(13.5)	1,460	(18.0)	
<15,840	48	(11.0)	1,155	(14.3)	
Dependent	305	(69.8)	4,991	(61.7)	
Urbanization level					0.257
Urban	276	(63.2)	4,896	(60.5)	
Suburban	63	(14.4)	1,097	(13.5)	
Rural	98	(22.4)	2,101	(26.0)	

CHM, Chinese herbal medicine; TWD, Taiwan dollars.

32.9 years in CHM and non-CHM users, respectively. The monthly insurance premium results revealed that over 60% of participants belong to the dependent group, which included students, stay-at-home parents, and those without a fixed salary. There was no difference in the urbanization level between the two groups.

The prescription patterns of CHM and the 10 most prescribed single Chinese herbs and Chinese herbal formulae for mastitis are presented in Tables 2 and 3, respectively. Mai Men Dong (*Ophiopogon japonicus* (Thunb.) Ker Gawl.; 22.3%), Pu Gong Yin (*Taraxacum mongolicum* Hand.-Mazz.; 7.8%), and Wang Bu Liu Xing (*Vaccaria hispanica* (Mill.) Rauschert; 3.5%) were three of the most commonly prescribed

single Chinese herbs for mastitis. The most commonly prescribed Chinese herbal formula was Xian-Fang-Huo-Ming-Yin (18.2%), followed by Jia-Wei-Xiao-Yao-San (9.1%) and Chai-Hu-Su-Gan-San (8.4%). Furthermore, Jin Yin Hua (*Lonicera japonica* Thunb.), Tian Hua Fen (*Trichosanthes kirilowii* Maxim.), Zhe Bei Mu (*Fritillaria thunbergii* Miq.), Xiang Fu (*Cyperus rotundus* L.), and Pu Gong Ying (*Taraxacum mongolicum* Hand.-Mazz.) were not only part of the ten most single Chinese herbs prescribed for mastitis but also part of the ingredients of the ten most formulae prescribed for mastitis. The Chinese herbal medicine effects are summarized in Tables 2 and 3; most of these Chinese herbs can clear heat, resolve toxin, reduce swelling, and relieve pain. The possible

TABLE 2: Ten most prescribed single Chinese herbs for mastitis (total prescription numbers = 7,693).

Chinese name	CHM Scientific name	English name	Frequency	%	Average duration for prescription (days/visit)	Average daily dose (g)	CHM effects	Possible pharmacological effects	Reference
Mai Men Dong	<i>Ophiopogon japonicus</i> (Thunb.) Ker Gawl.	Dwarf lilyturf root	63	22.3	7.0	1.2	Nourishes vital essence, removes heat from the heart, and removes dryness from the lung	Anti-inflammation	[10]
Pu Gong Yin	<i>Taraxacum mongolicum</i> Hand.-Mazz.	Mongolian dandelion herb	22	7.8	6.	1.8	Clears heat, resolves toxins, and expels node	Anti-inflammation, analgesic effects	[11]
Wang Bu Liu Xing	<i>Vaccaria hispanica</i> (Mill.) Rauschert	Cowherb seed	10	3.5	6.3	1.0	Activates blood, promotes milk secretion, disperses swelling, and reduces sores	Anti-inflammation, analgesic effects	[12]
Xiang Fu	<i>Cyperus rotundus</i> L.	<i>Cyperus</i> rhizome	9	3.2	6.7	1.1	Soothes the liver and rectifies Qi	Anti-inflammation	[13]
Chuan Lian Zi	<i>Melia azedarach</i> L.	Sichuan chinaberry fruit	8	2.8	6.0	1.3	Rectifies Qi, relieves pain, and clears liver-heat	Anti-inflammation, analgesic effects	[14]
Lu Lu Tong	<i>Liquidambar formosana</i> Hance	Beautiful sweetgum fruit	8	2.8	6.1	1.3	Dispels wind and frees the channels	Anti-inflammation	[15]
Yu Jin	<i>Curcuma phaeocaulis</i> Valetton	Curcuma root	7	2.5	6.9	1.0	Promotes blood circulation for relieving pain, invigorates the flow of Qi for soothing depressed liver, and clears away heat in the blood and heart	Anti-inflammation, analgesic effects	[16]
Tian Hua Fen	<i>Trichosanthes kirilowii</i> Maxim.	<i>Trichosanthes</i> root	6	2.1	5.7	1.1	Clears heat and engenders fluid, disperses swelling, and expels pus	Anti-inflammation	[17]
Zhe Bei Mu	<i>Fritillaria thunbergii</i> Miq.	Thunberg fritillary bulb	6	2.1	6.2	1.4	Resolves heat-phlegm	Inhibits IL-6, IL-8, TNF-alpha, and MAPK pathways	[18]
Jin Yin Hua	<i>Lonicera japonica</i> Thunb.	Honeysuckle flower bud	6	2.1	6.3	2.2	Dispels wind-heat and removes heat and toxic substances	Antiviral	[19]

CHM, Chinese herbal medicine.

pharmacological effects of the 10 most prescribed single Chinese herbs for mastitis are summarized in Table 2; most of these Chinese herbs have anti-inflammation and analgesic effects. The average duration for prescription of single Chinese herbs and Chinese herbal formulae are between 5.0 and 8.2 days.

#### 4. Discussion

Mastitis is a common problem faced by breastfeeding women. However, this is the first study to investigate TCM prescription patterns among female patients with mastitis in Taiwan. For this, we used data from the LHID on

TABLE 3: Ten most prescribed Chinese herbal formulae for mastitis (total prescription numbers = 7,693).

Chinese herbal formulae name	Ingredients	Frequency	%	Average duration for prescription (days/visit)	Average daily dose (g)	Effects
Xian Fang Huo Ming Yin	<i>Lonicera japonica</i> Thunb., <i>Fritillaria thunbergii</i> Miq., <i>Gleditsia sinensis</i> Lam., <i>Angelica sinensis</i> (Oliv.) Diels, <i>Trichosanthes kirilowii</i> Maxim., <i>Boswellia sacra</i> Flueck., <i>Saposhnikovia divaricata</i> (Turcz.) Schischk., <i>Paeonia lactiflora</i> Pall., <i>Commiphora myrrha</i> (Nees) Engl., <i>Manis pentadactyla</i> Linnaeus, <i>Citrus reticulata</i> Blanco, <i>Glycyrrhiza uralensis</i> Fisch., <i>Paeonia suffruticosa</i> Andrews, <i>Gardenia jasminoides</i> J.Ellis, <i>Paeonia lactiflora</i> Pall., <i>Bupleurum chinense</i> DC., <i>Mentha haplocalyx</i> Briq., <i>Angelica sinensis</i> (Oliv.) Diels, <i>Atractylodes macrocephala</i> Koidz., <i>Poria cocos</i> (Schwein.) F.A.Wolf, <i>Glycyrrhiza uralensis</i> Fisch., <i>Zingiber officinale</i> Roscoe	28	18.2	6.4	4.5	Clears heat, resolves toxins, disperses swelling, promotes suppuration, invigorates blood, and relieves pain
Jia Wei Xiao Yao San	<i>Bupleurum chinense</i> DC., <i>Ligusticum striatum</i> DC., <i>Cyperus rotundus</i> L., <i>Paeonia lactiflora</i> Pall., <i>Citrus reticulata</i> Blanco, <i>Glycyrrhiza uralensis</i> Fisch., <i>Citrus × aurantium</i> L., <i>Paeonia lactiflora</i> Pall., <i>Bupleurum chinense</i> DC., <i>Mentha haplocalyx</i> Briq., <i>Angelica sinensis</i> (Oliv.) Diels, <i>Atractylodes macrocephala</i> Koidz., <i>Poria cocos</i> (Schwein.) F.A.Wolf, <i>Glycyrrhiza uralensis</i> Fisch., <i>Zingiber officinale</i> Roscoe	14	9.1	6.6	6.9	Clears heat to cool the blood, soothes the liver, and releases depression
Chai Hu Shu Gan San	<i>Bupleurum chinense</i> DC., <i>Ligusticum striatum</i> DC., <i>Cyperus rotundus</i> L., <i>Paeonia lactiflora</i> Pall., <i>Citrus reticulata</i> Blanco, <i>Glycyrrhiza uralensis</i> Fisch., <i>Citrus × aurantium</i> L., <i>Paeonia lactiflora</i> Pall., <i>Bupleurum chinense</i> DC., <i>Mentha haplocalyx</i> Briq., <i>Angelica sinensis</i> (Oliv.) Diels, <i>Atractylodes macrocephala</i> Koidz., <i>Poria cocos</i> (Schwein.) F.A.Wolf, <i>Glycyrrhiza uralensis</i> Fisch., <i>Zingiber officinale</i> Roscoe	13	8.4	6.3	3.4	Soothes the liver and regulates <i>Qi</i>
Xiao Yao San	<i>Angelica sinensis</i> (Oliv.) Diels, <i>Aucklandia lappa</i> DC., <i>Ligusticum striatum</i> DC., <i>Magnolia officinalis</i> Rehder & E.H.Wilson, <i>Platycodon grandiflorus</i> (Jacq.) A.DC., <i>Areca catechu</i> L., <i>Astragalus membranaceus</i> (Fisch.) Bunge, <i>Citrus × aurantium</i> L., <i>Panax ginseng</i> C.A.Mey., <i>Lindera aggregata</i> (Sims) Kosterm., <i>Cinnamomum cassia</i> (L.) J.Presl, <i>Perilla frutescens</i> (L.) Britton, <i>Angelica dahurica</i> (Hoffm.) Benth. & Hook.f. ex Franch. & Sav., <i>Saposhnikovia divaricata</i> (Turcz.) Schischk., <i>Glycyrrhiza uralensis</i> Fisch., <i>Paeonia lactiflora</i> Pall.	8	5.2	8.2	5.2	Soothes the liver and resolves constraint, nourishes blood, and fortifies the spleen
Shi Liu Wei Liu Qi Yin	<i>Lonicera japonica</i> Thunb., <i>Taraxacum mongolicum</i> Hand.-Mazz., <i>Chrysanthemum indicum</i> L., <i>Viola philippica</i> Cav., <i>Malva verticillata</i> L., <i>Ligusticum striatum</i> DC., <i>Angelica sinensis</i> (Oliv.) Diels, <i>Paeonia lactiflora</i> Pall., <i>Rehmannia glutinosa</i> (Gaertn.) DC.	4	2.6	6.2	6.5	Promotes the movement of <i>Qi</i> and blood, disperses stagnation, expels pus, and dissipates swelling
Wu Wei Xiao Du Yin	<i>Lonicera japonica</i> Thunb., <i>Taraxacum mongolicum</i> Hand.-Mazz., <i>Chrysanthemum indicum</i> L., <i>Viola philippica</i> Cav., <i>Malva verticillata</i> L., <i>Ligusticum striatum</i> DC., <i>Angelica sinensis</i> (Oliv.) Diels, <i>Paeonia lactiflora</i> Pall., <i>Rehmannia glutinosa</i> (Gaertn.) DC.	4	2.6	8.2	4.9	Clears heat, relieves toxicity, cools the blood, reduces swelling, and reduces external carbuncles and furuncles
Su Wu Tang	<i>Angelica sinensis</i> (Oliv.) Diels, <i>Paeonia lactiflora</i> Pall., <i>Rehmannia glutinosa</i> (Gaertn.) DC.	4	2.6	6.5	4.6	Tonifies and harmonizes blood

TABLE 3: Continued.

Chinese herbal formulae name	Ingredients	Frequency	%	Average duration for prescription (days/visit)	Average daily dose (g)	Effects
Shao Yao Gan Cao Tang	<i>Paeonia lactiflora</i> Pall., <i>Glycyrrhiza uralensis</i> Fisch.	4	2.6	6.2	4.5	Relaxes tension to relieve pain
Xiao Chai Hu Tang	<i>Bupleurum chinense</i> DC., <i>Scutellaria baicalensis</i> Georgi, <i>Panax ginseng</i> C.A.Mey., <i>Pinellia ternata</i> (Thunb.) Makino, <i>Glycyrrhiza uralensis</i> Fisch., <i>Zingiber officinale</i> Roscoe, <i>Ziziphus jujuba</i> Mill.	3	2.0	5.0	6.0	Harmonizes and releases the lesser yang (shaoyang)
Si Ni San	<i>Bupleurum chinense</i> DC., <i>Citrus × aurantium</i> L., <i>Paeonia lactiflora</i> Pall., <i>Glycyrrhiza uralensis</i> Fisch.	3	2.0	5.7	4.2	Soothes the liver and regulates the spleen

prescriptions made by registered TCM practitioners who had been trained by the Health Promotion Administration as breastfeeding instructors. Our results showed a higher proportion of CHM use for mastitis treatment in women aged 30–39 years. This may be partially due to an increasing proportion of mothers with advanced age at childbirth and they may suffer from mastitis during breastfeeding. According to the annual report of the Health Promotion Administration, Taiwanese women gave birth to their first child at an average age of 27.4 years in 2004 and 30.5 years in 2014. In addition, since 2009, more than half of the women giving birth in Taiwan have been aged between 30 and 40 years [20].

In TCM, “Ru Yong” is caused by liver *Qi* depression, stomach heat, infections, inadequate breastfeeding, or *Qi* counterflow during pregnancy, which can lead to milk accumulation. In the initial stage of treatment, the aim is to relieve symptoms, mainly by soothing the liver and regulating *Qi*, clearing stomach fire, dispersing nodules, and letting the milk flow. If mastitis progresses to an abscess, the aim is to expel pus and toxins.

The three most prescribed Chinese herbal formulae were Xian-Fang-Huo-Ming-Yin (18.2%), Jia-Wei-Xiao-Yao-San (9.1%), and Chai-Hu-Shu-Gan-San (8.4%). The three most prescribed Chinese herbs were Mai Men Dong (22.3%), Pu Gong Yin (7.8%), and Wang Bu Liu Xing (3.5%).

Xian-Fang-Huo-Ming-Yin is a well-known Chinese herbal formula that can clear heat, detoxify body, alleviate swelling, activate blood flow, and relieve pain. It has been widely applied to treat sores, carbuncles, and abscesses. Although it is commonly prescribed for mastitis, no research has yet documented the effect of Xian-Fang-Huo-Ming-Yin on mastitis. The formula is composed of 12 single Chinese herbs. Among them, Jin Yin Hua (*Lonicera japonica* Thunb.) has been reported to have an antiviral effect [19], and Tian Hua Fen (*Trichosanthes kirilowii* Maxim.) has been reported to have anti-inflammatory effects and the ability to clear heat, alleviate swelling, and expel pus [17, 21]. Zhe Bei Mu (*Fritillaria thunbergii* Miq.) is thought to inhibit interleukin-6, interleukin-8, tumour

necrosis factor- $\alpha$ , and the mitogen-activated protein kinase pathway [18]; indeed, mastitis is characterized by increased interleukin-8 concentrations in milk [22]. It is worth noting that Xian-Fang-Huo-Ming-Yin does not contain Chuan Shan Jia (*Manis pentadactyla* Linnaeus) nowadays. Though it can stimulate lactation, disperse swelling, and expel pus, excessive hunting has led to becoming endangered. In 2000, the Department of Health in Taiwan banned the use of products obtained from protected species (e.g., pangolin, bear bile, musk, and Saiga antelope horn) from medical use [23]. The committee on Chinese Medicine and Pharmacy revealed that Wang Bu Liu Xing could replace Chuan Shan Jia to help increase lactation [24]. The Dean of the American College of Traditional Chinese Medicine, Steve Given, mentioned that there are 125 alternatives for Chuan Shan Jia, depending on the diagnosis, since alternatives of TCM could be composed of various products instead of a one-to-one replacement. Moreover, what was reasonable a few decades ago may not be reasonable today [25].

Jia-Wei-Xiao-Yao-San is usually prescribed to treat insomnia, depressive disorder, anxiety disorder, and functional dyspepsia [26, 27]. It can decrease serotonin and interleukin-6 and has been reported to have an antidepressant-like effect [28, 29]. Chai-Hu-Shu-Gan-San can soothe the liver and regulate *Qi* and is also used to treat anxiety and depression, especially poststroke depression and postpartum depression, according to Yan Sun’s research [13, 30]. In addition, Chai Hu (*Bupleurum chinense* DC.), Xiang Fu (*Cyperus rotundus* L.), and Chuan Xiong (*Ligusticum striatum* DC.), which are part of the composition of Chai-Hu-Shu-Gan-San, also have anti-inflammatory effects [13]. Cooklin et al. [31] investigated the link between physical health, breastfeeding problems, and maternal mood and found that the presence of breastfeeding problems was associated with poorer maternal mood. Fallon et al. [32] reviewed the relationship between postpartum anxiety and infant-feeding outcomes, and their results indicated that postpartum anxiety increases breastfeeding difficulties. Webber and Benedict [33] investigated the relationship

between inflammation, breastfeeding, and postpartum depression and reported a negative correlation between postpartum depression and breastfeeding. Furthermore, stress can cause inflammation and increase the risk of depression. According to the *Ge Zhi Yu Lun*, the classics of traditional Chinese medicine, the liver can regulate *Qi* and is associated with emotion. Emotion may cause the stagnation of *Qi*, resulting in milk stasis and mastitis. As a result, mastitis can be treated by soothing the liver and regulating *Qi*.

When it comes to the most prescribed Chinese herbs for mastitis, many of these prescription herbs are used to rectify *Qi*, clear heat, resolve toxins, disperse swelling, and relieve pain. The possible pharmacological effects of Chinese herbs are obtained from the scientific literature by PubMed and are listed in Table 2.

Mai Men Dong nourishes Yin and generates fluid and, therefore, is used as a typical treatment for Yin deficiency, dry mouth, fluid depletion, and constipation [34]. Women's constitution transferred throughout the perinatal period. A previous study revealed that Yin-Xu constitution worsened during pregnancy and did not recover at six months postpartum [35]. The use of Mai Men Dong may also ameliorate some postpartum physical symptoms, such as sweating, thirst, and constipation [36, 37]. Furthermore, *Yi Xue Qi Yuan*, an ancient Chinese medical text, describes that Mai Men Dong is also used to treat lactation. In addition, Mai Men Dong had been proved to have anti-inflammation effects [10].

Pu Gong Ying can clear heat toxins and relieve swelling. It has anti-inflammatory and analgesic effects and has been used to treat upper respiratory tract infections, urinary tract infections, hepatitis, and dyspepsia [11]. Wang Bu Liu Xing is effective in activating blood circulation and reducing swelling, has analgesic and anti-inflammatory effects [12], and is used to treat female mammary gland diseases and promote lactation.

Chuan Lian Zi (*Melia azedarach* L.), Lu Lu Tong (*Liquidambar formosana* Hance), and Yu Jin (*Curcuma phaeocaulis* Valetton) have anti-inflammatory effects [14–16]. Chuan Lian Zi and Yu Jin have analgesic effects [14, 16].

In this study, we found that the mastitis rate in Taiwan was much lower compared with that reported by previous studies. This underestimation might be due to the use of health care services. In Taiwan, women with mastitis usually opt for Western medicine, breast massage, or consultation with international board-certified lactation consultants. Among these treatments, the National Health Insurance does not cover breast massage or international board-certified lactation consultants; therefore, these women were not included in the study.

This study was designed to explore the prescription of TCM for mastitis in Taiwan. We found that certain Chinese medicines have anti-inflammation and analgesic effects for treating mastitis, similar to Western medicine. Furthermore, Chinese medicine rarely causes stomach pain, diarrhoea, or indigestion and may be a possible alternative for treating mastitis.

## 5. Limitations

There are two limitations to this study. First, due to the feature of the LHID, we could not differentiate the aetiology of mastitis. Nevertheless, the 10 most prescribed CHM products were compliant with the clinical treatment of lactation mastitis. Second, mastitis is diagnosed by clinical symptoms and signs, and most patients had a good prognosis after receiving appropriate treatment, so it is hard to evaluate the efficacy of the treatment.

## 6. Future Perspectives and Priorities

This study discussed the prescription patterns of Chinese herbal medicine products in women with mastitis in Taiwan. However, a well-conducted, randomized controlled trial should be conducted to further evaluate the efficacy of TCM treatment for mastitis.

## 7. Conclusions

The present study provides preliminary clinical evidence supporting the prescription patterns of CHM products in women with mastitis. Approximately 5.1% of women with mastitis received CHM as complementary treatment. Xian-Fang-Huo-Ming-Yin is the most frequently prescribed Chinese herbal formula in these cases. Further well-designed, clinical trials could be developed to evaluate the effectiveness of TCM for mastitis.

## Abbreviations

CHM:	Chinese herbal medicine
ICD-9-	International Classification of Diseases, 9th
CM:	Revision, Clinical Modification
LHID:	Longitudinal Health Insurance Database
NHIRD:	National Health Insurance Research Database
TCM:	Traditional Chinese medicine
TWD:	Taiwan dollars.

## Data Availability

The data used to support the findings of this study are included within the article.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

## Authors' Contributions

SHC designed the study, and PJC supervised the project. CCH performed the data analysis. SHC drafted the manuscript. PJC, CCH, CHL, and KCW gave feedback on the manuscript.

## Acknowledgments

This study is based in part on data from the National Health Insurance Research Database, provided by the National

Health Insurance Administration and Ministry of Health and Welfare and managed by National Health Research Institutes.

## References

- [1] World Health Organization, "Mastitis: causes and management," World Health Organization, Geneva, Switzerland, 2000, [https://www.who.int/maternal\\_child\\_adolescent/documents/fch\\_cah\\_00\\_13/en/](https://www.who.int/maternal_child_adolescent/documents/fch_cah_00_13/en/).
- [2] L. H. Amir, "Academy of breastfeeding medicine protocol C. ABM clinical protocol #4: mastitis, revised March 2014," *Breastfeeding Medicine*, vol. 9, no. 5, pp. 239–243, 2014.
- [3] M. M. Blackmon, H. Nguyen, and P. Mukherji, *Acute Mastitis*, StatPearls, Treasure Island, FL, USA, 2021.
- [4] C. Gopalakrishnan Nair, Hiran, P. Jacob, R. R. Menon, and Misha, "Inflammatory diseases of the non-lactating female breasts," *International Journal of Surgery*, vol. 13, pp. 8–11, 2015.
- [5] B. Foxman, H. D'Arcy, B. Gillespie, J. K. Bobo, and K. Schwartz, "Lactation mastitis: occurrence and medical management among 946 breastfeeding women in the United States," *American Journal of Epidemiology*, vol. 155, no. 2, pp. 103–114, 2002.
- [6] C. Barbosa-Cesnik, K. Schwartz, and B. Foxman, "Lactation mastitis," *Journal of American Medical Association*, vol. 289, no. 13, pp. 1609–1612, 2003.
- [7] T. M. K. El-Saidy and R. M.-N. Aboushady, "Effect of two different nursing care approaches on reduction of breast engorgement among postnatal women," *Journal of Nursing Education and Practice*, vol. 6, no. 9, pp. 18–28, 2016.
- [8] D. Wu, X. Zhang, L. Liu, Y. Guo, and C. M. M. Key, "Combinations in prescriptions for treating mastitis and working mechanism analysis based on network pharmacology," *Evidence-based Complementary and Alternative Medicine*, vol. 2019, Article ID 8245071, 11 pages, 2019.
- [9] G. Maciocia, *Obstetrics and Gynecology in Chinese Medicine*, Churchill Livingstone, New York, NY, USA, 2nd edition, 2011.
- [10] M. H. Chen, X. J. Chen, M. Wang, L. G. Lin, and Y. T. Wang, "Ophiopogon japonicus—a phytochemical, ethnomedicinal and pharmacological review," *Journal of Ethnopharmacology*, vol. 181, pp. 193–213, 2016.
- [11] K. Schütz, R. Carle, and A. Schieber, "Taraxacum—a review on its phytochemical and pharmacological profile," *Journal of Ethnopharmacology*, vol. 107, no. 3, pp. 313–323, 2006.
- [12] L. Wang, D. Cui, X. Wang et al., "Analgesic and anti-inflammatory effects of hydroalcoholic extract isolated from semen vaccariae," *Pakistan Journal of Pharmaceutical Sciences*, vol. 28, no. 3, pp. 1043–1048, 2015.
- [13] Y. Sun, X. Xu, J. Zhang, and Y. Chen, "Treatment of depression with Chai Hu Shu Gan San: a systematic review and meta-analysis of 42 randomized controlled trials," *BMC Complementary and Alternative Medicine*, vol. 18, no. 1, p. 66, 2018.
- [14] F. Xie, M. Zhang, C. F. Zhang, Z. T. Wang, B. Y. Yu, and J. P. Kou, "Anti-inflammatory and analgesic activities of ethanolic extract and two limonoids from *Melia toosendan* fruit," *Journal of Ethnopharmacology*, vol. 117, no. 3, pp. 463–466, 2008.
- [15] K. F. Hua, T. J. Yang, H. W. Chiu, and C. L. Ho, "Essential oil from leaves of liquidambar formosana ameliorates inflammatory response in lipopolysaccharide-activated mouse macrophages," *Natural Product Communications*, vol. 9, no. 6, pp. 869–872, 2014.
- [16] Y. Zhou, M. Xie, Y. Song et al., "Two traditional Chinese medicines *Curcumae radix* and *Curcumae rhizoma*: an ethnopharmacology, phytochemistry, and pharmacology review," *Evidence-based Complementary and Alternative Medicine*, vol. 2016, Article ID 4973128, 30 pages, 2016.
- [17] R. J. Lim, W. N. Nik Nabil, S. Y. Chan et al., "Effects of herbal medicine for xerostomia in head and neck cancer patients: an observational study in a tertiary cancer hospital," *Supportive Care in Cancer*, vol. 27, no. 9, pp. 3491–3498, 2019.
- [18] I. H. Cho, M. J. Lee, J. H. Kim et al., "Fritillaria ussuriensis extract inhibits the production of inflammatory cytokine and MAPKs in mast cells," *Bioscience, Biotechnology, and Biochemistry*, vol. 75, no. 8, pp. 1440–1445, 2011.
- [19] T. Li and T. Peng, "Traditional e medicine as a source of molecules with antiviral activity," *Antiviral Research*, vol. 97, no. 1, pp. 1–9, 2013.
- [20] Health Promotion Administration, "2018 annual report of health promotion administration," Health Promotion Administration, Taipei, Taiwan, 2018, <https://www.hpa.gov.tw/Pages/List.aspx?nodeid=1248/>.
- [21] C. Cheon, S. Kang, Y. Ko et al., "Single-arm, open-label, dose-escalation phase I study to evaluate the safety of a herbal medicine SH003 in patients with solid cancer: a study protocol," *BMJ Open*, vol. 8, no. 8, Article ID e019502, 2018.
- [22] K. M. Hunt, J. E. Williams, B. Shafii et al., "Mastitis is associated with increased free fatty acids, somatic cell count, and interleukin-8 concentrations in human milk," *Breastfeeding Medicine: The Official Journal of the Academy of Breastfeeding Medicine*, vol. 8, no. 1, pp. 105–110, 2013.
- [23] S. Pantel and S. Y. Chin in *Proceedings of the Workshop On Trade and Conservation Of Pangolins Native to South and Southeast Asia*, Petaling Jaya, Malaysia, 2009.
- [24] C.-C. Hsieh, "The lactation performance, immunomodulation and antitumor effects in the replacement drugs of Squama Manitis," *Yearbook of Chinese Medicine and Pharmacy*, vol. 23, no. 5, pp. 93–126, 2005.
- [25] National Geographic Society, "Will mainstreaming traditional Chinese medicine threaten wildlife?" National Geographic Society, Washington, DC, USA, 2018, <https://www.nationalgeographic.com/animals/2018/12/traditional-medicine-decision-threatens-wildlife/>.
- [26] Y. L. Chen, C. Y. Lee, K. H. Huang, Y. H. Kuan, and M. Chen, "Prescription patterns of Chinese herbal products for patients with sleep disorder and major depressive disorder in Taiwan," *Journal of Ethnopharmacology*, vol. 171, pp. 307–16, 2015.
- [27] D. M. Park, S. H. Kim, Y. C. Park, W. C. Kang, S. R. Lee, and I. C. Jung, "The comparative clinical study of efficacy of Gamisoyo-San (Jiaweixiaoyaosan) on generalized anxiety disorder according to differently manufactured preparations: multicenter, randomized, double blind, placebo controlled trial," *Journal of Ethnopharmacology*, vol. 158, pp. 11–17, 2014.
- [28] T. Yasui, M. Yamada, H. Uemura et al., "Changes in circulating cytokine levels in midlife women with psychological symptoms with selective serotonin reuptake inhibitor and Japanese traditional medicine," *Maturitas*, vol. 62, no. 2, pp. 146–52, 2009.
- [29] S. Zhang, X. Liu, M. Sun et al., "Reversal of reserpine-induced depression and cognitive disorder in zebrafish by sertraline and Traditional Chinese Medicine (TCM)," *Behavioral and Brain Functions: BBF*, vol. 14, no. 1, p. 13, 2018.
- [30] S. Chen, T. Asakawa, S. Ding et al., "Chaihu-Shugan-San administration ameliorates perimenopausal anxiety and



- depression in rats,” *PLoS One*, vol. 8, no. 8, Article ID e72428, 2013.
- [31] A. R. Cooklin, L. H. Amir, C. D. Nguyen et al., “Physical health, breastfeeding problems and maternal mood in the early postpartum: a prospective cohort study,” *Archives of Women’s Mental Health*, vol. 21, no. 3, pp. 365–374, 2018.
- [32] V. Fallon, R. Groves, J. C. Halford, K. M. Bennett, and J. A. Harrold, “Postpartum anxiety and infant-feeding outcomes,” *Journal of Human Lactation*, vol. 32, no. 4, pp. 740–758, 2016.
- [33] E. Webber and J. Benedict, “Postpartum depression: a multi-disciplinary approach to screening, management and breastfeeding support,” *Archives of Psychiatric Nursing*, vol. 33, no. 3, pp. 284–289, 2019.
- [34] J. Fang, X. Wang, M. Lu, X. He, and X. Yang, “Recent advances in polysaccharides from *Ophiopogon japonicus* and *Liriope spicata* var. *prolifera*,” *International Journal of Biological Macromolecules*, vol. 114, pp. 1257–1266, 2018.
- [35] S. H. Kuo, H. L. Wang, T. C. Lee et al., “Traditional Chinese medicine perspective on constitution transformations in perinatal women: a prospective longitudinal study,” *Women and Birth: Journal of the Australian College of Midwives*, vol. 28, no. 2, pp. 106–111, 2015.
- [36] D. K. Gjerdingen, D. G. Froberg, K. M. Chaloner, and P. M. McGovern, “Changes in women’s physical health during the first postpartum year,” *Archives of Family Medicine*, vol. 2, no. 3, pp. 277–283, 1993.
- [37] E. Amabebe, F. O. Robert, and L. F. O. Obika, “Osmoregulatory adaptations during lactation: thirst, arginine vasopressin and plasma osmolality responses,” *Nigerian Journal of Physiological Sciences: Official Publication of the Physiological Society of Nigeria*, vol. 32, no. 2, pp. 109–116, 2017.