Review Article

Advances in Experimental and Clinical Research of the Gouty Arthritis Treatment with Traditional Chinese Medicine

Huan Liang 1, Pin Deng 1, Yu-Feng Ma 2, Yan Wu 1, Zhan-Hua Ma 2, Wei Zhang 2, Jun-De Wu 2, Yin-Ze Qi 2, Xu-Yue Pan 2, Fa-Sen Huang 1, Si-Yuan Lv 1, Jing-Lu Han 1, Wen-Da Dai 2, and Zhaojun Chen 2

1School of Graduates, Beijing University of Chinese Medicine, Beijing 100029, China
2Department of Hand and Foot Surgery, Beijing University of Chinese Medicine Third Affiliated Hospital, Beijing 100029, China

Correspondence should be addressed to Zhaojun Chen; 269245186@qq.com

Received 28 June 2021; Revised 12 September 2021; Accepted 20 September 2021; Published 20 October 2021

Academic Editor: Samuel Silvestre

Copyright © 2021 Huan Liang 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.

Gouty arthritis (GA) is a multifactorial disease whose pathogenesis is utterly complex, and the current clinical treatment methods cannot wholly prevent GA development. Western medicine is the primary treatment strategy for gouty arthritis, but it owns an unfavorable prognosis. Therefore, the prevention and treatment of GA are essential. In China, traditional Chinese medicine (TCM) has been adopted for GA prevention and treatment for thousands of years. Gout patients are usually treated with TCM according to their different conditions, and long-term results can be achieved by improving their physical condition. And TCM has been proved to be an effective method to treat gout in modern China. Nevertheless, the pharmacological mechanism of TCM for gout is still unclear, which limits its spread. The theory of prevention and treatment of gout with TCM is more well acknowledged in China than in abroad. In this article, Chinese herbs and ancient formula for gout were summarized first. A total of more than 570 studies published from 2004 to June 2021 in PubMed, Medline, CNKI, VIP, Web of Science databases and Chinese Pharmacopoeia and traditional Chinese books were searched; the current status of TCM in the treatment of GA was summarized from the following aspects: articular chondrocyte apoptosis inhibition, antioxidative stress response, inflammatory cytokine levels regulation, uric acid excretion promotion, immune function regulation, uric acid reduction, and intestinal flora improvement in subjects with gout. The literature review concluded that TCM has a specific curative effect on the prevention and treatment of GA, particularly when combined with modern medical approaches. However, lacking a uniform definition of GA syndrome differentiation and the support of evidence-based medicine in clinical practice have provoked considerable concern in previous studies, which needs to be addressed in future research.

1. Introduction

Gout is a crystal-related disease aroused by the sedimentation of monosodium urate (MSU), directly related to hyperuricemia caused by decreased uric acid excretion or purine metabolic disorders [1]. Gout incidence rate and prevalence have risen steadily over the past few decades due to lifestyle changes, westernized diets, and an aging population [2]. Typical acute gouty arthritis is more common in middle-aged, older men, and obese postmenopausal women. It is usually manifested as redness, bright, and significant tenderness in the single affected joints, especially when the first metatarsophalangeal joint is involved [3]. A considerable part of the global population experiences gout every year [4]. According to World Health Organization (WHO) estimates, 3.9% of the people in the world suffer from gout [5]. Gout owns multiple risk factors such as obesity, coronary heart disease, hypertension, diabetes or glucose intolerance, and lipid metabolism disorders. Acute episodes of arthritis, chronic joint injury, and joint malformations can decrease the living quality and cause disablement in some severe cases [6, 7].

Western medicine is the primary treatment strategy for gout (such as uric acid-lowering drugs, pain relief, primary disease treatment, physical therapy, and surgical treatment). These drugs have certain adverse effects on liver, kidney, and
gastrointestinal tract, thus influence patients' treatment compliance [8]. However, the overall prognosis of gout is still not optimistic. TCM is considered a treasure trove of clinical practice for thousands of years and a significant contributor to global medical care. TCM originated in ancient China. Therefore, it has been applied to the prevention and treatment of gout for many centuries in China. Chinese medicine, with unique efficacy, has the long clinical practice and a lot of clinical experience in preventing and treating gout [9]. No matter TCM is used alone or combined with other therapies, it is the most commonly used complementary and alternative medicine (CAM) in modern China and is beneficial to subjects with gout [10]. TCM contains rich culture and literature, which is mainly reflected in two parts: Chinese medicine itself and the theoretical system of TCM. “Disease prevention” is the principle of TCM for disease treatment. TCM has emphasized the prevention and treatment of diseases. For the prevention and treatment of gout disease, we can combine the theory of “treating pre-disease” and “the principle of a holistic view of TCM” according to the characteristics of the development of the disease.

As early as 2000 years ago, the authoritative work of TCM “Huangdi Neijing-Suwen” made a detailed discussion on the etiology, pathogenesis, syndrome classification, and prognosis of gout [11]. Etiology is the core of TCM theory, which studies gout syndrome based on holism. According to the theory of TCM, gout is associated with congenital deficiency and dysfunction of the spleen and kidney. Holism holds that the spleen is the root of after birth and the source of qi and blood, which transports the essence of water and grain to nourish the whole body. The kidney is often considered as the congenital foundation, which can store substances and regulate water metabolism [12]. TCM practitioners in China emphasize the intrinsic balance of the body. Consequently, TCM works not just by treating gouty arthritis itself but also by curing the patient as a whole in an indirect way [13].

For GA, it is proven that many effective fang-ji (formulations) can clinically delay gout's progress and prevent the occurrence of it. The fang-ji was designed according to the theory of spleen and kidney disorders and qi and blood in TCM [14]. In this review, the Chinese herbs and ancient formulas with remedial effects on GA were summed up first. Then, the current research situations of TCM in modern medicine were analyzed, coming up with existing issues in the development of TCM. Lastly, the future of TCM in the circumstance of integrated medicine and precision medicine was concluded. After the review was completed, it was convinced that TCM is a progressive GA therapy despite its development since ancient times; it has curative effects, although the controversy still exists. The theory of TCM also needs to be precisely analyzed and confirmed by systematic research methods.

2. History of TCM for GA Prevention and Treatment

Classical TCM formulas applied to prevent and treat gouty arthritis for thousands of years are the most popular utilization of TCM. Gout originated in the late Western Han Dynasty. In the ancient books about TCM, there is no clear concept of “gouty arthritis” as it is in the modern medicine. The symptoms and pathogenesis of “Li-Jie disease,” “white tiger disease,” and “gout” in TCM have many similarities with gouty arthritis. Gouty arthritis belongs to the category of “Bi syndrome” in TCM, and the TCM disease name “Bi syndrome” was observed for the first time in Huangdi’s Internal Canon (Huang Di Nei Jing in Chinese) [15]. In TCM ancient literature, the scope of “Bi syndrome” is extensive, which includes many Western medicine diseases.

Following Huangdi’s Internal Canon, Zhang Zhongjing of the Han Dynasty was the first to elaborate gout systematically. Zhang Zhongjing discussed gout treatment in “jin-gui-yao-lue” and proposed using “Ramulus Cinna-momi, Paeoniae and Anemarrhena decoction” to treat gout syndrome of wind-damp associated with pathogenic heat. “Wu-tou decoction” treats gout syndrome of cold dampness. Since the Han Dynasty (over 2000 years ago), TCM physicians inherited and developed Zhongjing’s doctrine and gained a deeper and more comprehensive understanding of the causes and mechanisms of Li-Jie disease, and the therapeutic methods and typical recipes were more abundant [16].

Cao Yuanfang of the Sui Dynasty emphasized the effects of deficient qi and blood and alcohol consumption on gout in his “General Treatise on the Cause and Symptoms of Diseases,” stressing the deficiency in origin and excess in the superficiality of Bi’s disease [17]. Wang Tao of the Tang Dynasty emphasized that the pathogenesis of gout was “dampness and heat, phlegm hinder the meridians” in his “Wai-tai-mi-yao,” which is basically consistent with the view of the Huangdi’s Internal Canon (Huang Di Nei Jing in Chinese) [18]. Zhu Danxi, one of the four schools of the Jin-yuan Dynasty, officially proposed the name of gout. In his book “Danxi’s Mastery of Medicine-Gout,” he pointed out that the pathogenesis of gout is “phlegm, wind-heat, wind-damp, blood-insufficiency, blood heat, and blood stasis, which are blocked in the meridians and collaterals [19].

The primary treatment is related to the specific pathogenesis of the patient. For people with blood-insufficiency symptoms, Chuanxiong Rhizoma (Chuan xiong) and Angelicae Sinensis Radix (Dang gui) are mostly used accompanied by Persicae Semen (Tao ren), Carthami Flos (Hong hua), and Radix Clematidis (Wei ling xian). In case of people with damp evil retention syndrome, consider adding Atractylodes Lancea (Cang zhu), Atractylodes Macrocephala Koidz (Bai zhu), and Bamboo Juice (Zhu li) based on Erchen decoction to invigorating the spleen and removing dampness. In the case of phlegm blockage, it is considered to add Scutellariae Radix (Huang qin), Notopterygii Rhizoma Et Radix (Qiang huo), and Atractylodes Lancea (Cang zhu) to Er Chen decoction to dissolve phlegm and clear the collaterals.

For patients with blood stasis symptoms, Saposhnikoviae Radix (Fang feng) and Notopterygii Rhizoma Et Radix (Qiang huo) are added to Siwu decoction to activate blood circulation and dissipate blood stasis. For patients with obvious blood stasis symptoms, add Scutellariae Radix
Evidence-Based Complementary and Alternative Medicine

(Huang qin) and *Phellodendri Chinensis Cortex* (Huang bai) to Si Wu Tang to nourish the blood, promote blood circulation, clear heat, and dry dampness. During the Ming and Qing dynasties, Wang Kentang’s classic work “zheng-zhi-zhun-sheng” attributed the cause of gout to wind-dampness invading the kidney meridian, causing stagnation in the blood vessels [20]. Zhang Jingyue pointed out in his “Jing-Yue-Quan-Shu” that the wandering arthritis syndrome in TCM is gout [21]. Wang Qingren of the Qing Dynasty proposed a Chinese medicine prescription to treat gout by invigorating Qi, promoting blood circulation, and creating a new way of thinking for clinical practice in his “Yilin Gaicuo” [22].

Zhu Liangchun, a modern physician, believes that the pathogenesis of gout is caused by the dysmetabolism of spleen and kidney metabolic disorders, which leads to turbid damp originating from interior blood stasis and obstruction of main and collateral channels [23]. In the acute attack phase, it is recommended to use Smilacis Glabrae Rhizoma (Tu fu ling) and Dioscoreae Septemflorae Bae Rhizoma (Bixie) with a significant dose to clear away heat, eliminating dampness, and discharging phlegm turbidity. For patients with apparent joint redness and swelling, it is recommended to use *Radix Rehmanniae* (Sheng Di), *Gypsum rubrum* (Han shui shi), *Anemarrhenae Rhizoma* (Zhi mu), and *Cape buffalo* (Shui niu jiao) to clear away heat and dredge collaterals.

For patients with obvious pain symptoms, add scorpion (Quan xie), centipede (Wu gong), and Corydalis Rhizoma (Yan hu suo) to disperse stasis and relieve pain. If the disease progresses in chronic or intermittent stage, *Raw Atractylodes Macrocephala Koidz* (Sheng bai zhu), *Poria cocos* (Fu ling), Fructus Ligustri Lucidi (Nv zhen zi), and *Polygoni Multiflori Radix* (He shou wu) can regulate the spleen and kidney. The ancient Chinese medical literature on preventing and treating gout is very plentiful and has provided valuable experience for later generations of physicians to study gouty arthritis (Figure 1). Based on the experience of our predecessors and modern medical methods, a more in-depth study of gouty arthritis can be conducted.

3. **Therapeutic Effect Stimulated the Development of TCM for GA in Ancient China**

3.1. **Herbs for Prophylaxis and Treatment of GA.** Herbal medicines include thousands of plants species. They are used for GA treatment, and many of them are widely used. Single Chinese medicine is mainly used to clear heat and promote dampness in treating gout. The following ten Chinese herbal medicines are the most commonly used ones *Coix Seed* (Yi ren), *Phellodendri Chinensis Cortex* (Huang bai), *Atractylodes Lancea* (Cangzhu), *Plantaginis Semen* (Che qian zi), *Alisma Orientalie* (Ze xie), *Chuanxiong Rhizoma* (Chuan xiong), *Achyranthis Bidentatae Radix* (Niuxi), *Polygoni Cuspidati Rhizoma Et Radix* (Hu zhang), *Saposhnikoviae Radix* (Fang feng), and *Radix Angelicae Biseratae* (Du huo) influence jian-pi-li-shi, huo-xue-hua-yu, and qing-re-jie-du; the detailed information is shown in Table 1.

3.2. **Herbal Formulas for the Prophylaxis and Treatment of GA.** Herbal formulas are the most popular application of TCM, and some typical herbal formulas have significantly prophylactic and therapeutic effects on GA. TCM can benefit patients through treatment based on syndrome differentiation, which is the characteristic and advantage of Chinese medicine. TCM treats gouty arthritis with great emphasis on the causative factors of “dampness” and “heat” [24]. Simiao-tang and Dang-gui-nian-tong-fang are herbal formulas used for restraining gouty arthritis through invigorating the spleen and dispelling dampness. Invigorating the spleen is an essential principle for GA treatment, and Simiao decoction is a notable herbal formula for invigorating the spleen to remove dampness and for detoxification.

Straightly removing pathogenic elements is another vital principle to treat GA with herb-ju-zhi-cha-fang. *Smilacis Glabrae Rhizoma* (Tu fu ling) and *Dioscoreae Septemflorae Bae Rhizoma* (Bixie) are the classical herbal composition to treat GA by removing dampness and detoxification in addition to conditioning therapy, such as Si-huang-san and Ju-zhi-duihuang-wan. After analyzing the literature obtained through searching, it was found that the treatment principle with TCM prescriptions for the treatment of gouty arthritis mainly was invigorating the spleen and removing dampness, clearing away heat, and detoxifying; the prescriptions that appeared frequently were summarized and classified according to the mentioned treatment principle. Due to content limitations, Table 2 only lists the most common and classic prescriptions for the treatment of gouty arthritis. The details are illustrated in Table 2.

3.3. **The Disadvantages of TCM Theory and Chinese Medicine.** The theory of TCM is not broadly accepted, which is the main obstacle to the modernization of TCM. Practices of TCM depend on the integration of TCM theory and individual experiences of physicians. The pharmacological mechanism of Chinese medicine for treating gout is still unclear, and it still needs to be thoroughly explored and studied whether Chinese medicine has effective methods to promote the dissolution and removal of urea salt deposits. Therefore, molecular and cellular biology in modern medicine have offered valuable perspectives for the mechanisms of GA and provided anti-inflammatory strategies. Although Chinese medicine has been documented and demonstrated to be available for the treatment of GA [25–27], the critics still indicate that the toxicity of Chinese medicine (CHM) is indistinct [28]. Consequently, exploring the molecular signal transduction mechanism of CHM and removing toxic components may help to increase the acceptance of TCM in modern society [29].

4. **Research Status and Application of Chinese Medicine for GA in Current Medicine**

4.1. **GA Treatment with Chinese Medicine.** The curative rate of GA is not satisfactory. In China, TCM has been used to prevent and treat gouty arthritis for a long time and is regarded as an available disease-preventing method [30].
TCM treatment of gout has the effect of lowering uric acid and can effectively inhibit inflammation, relieve gout symptoms, avoid recurrence, and avoid the potential risk of low serum uric acid (SUA) controlling. One of the clinical trials showed that TCM formula named Skin-patch of Xin Huang Pian, which mainly consisted of Panax Notoginseng (San Qi), Concha Margaritifera Usta (Zhen Zhu Ceng Fen), Herba Sarcandrae (Zhong Jie Feng), Urena lobata Linn (Xiao Fan Tian Hua), and calculus bovis artifactus (Ren Gong Niu Huang) seemed to be efficacious and safe to alleviate joint symptoms of patients with acute gouty arthritis. The mechanism might be C-reactive protein and ESR decreasing [31]. RBXG formula stemmed from “Bixie Fenqing Yin” in “Medical Insights” have been demonstrated to reduce the risk of acute gouty arthritis recurrence. The classic decoction such as “Yellow-dragon Wonderful-seed Formula” and Simiao Pill is also efficacious for uric acid, erythrocyte sedimentation rate, and other inflammatory factors and have a clinical efficacy for gout patients [32, 33].

4.2. Anti-GA Therapy with Chinese Medicine. TCM is usually applied as an herbal formulation clinically based on TCM theory. Chinese medicine has unique advantages in preventing and treating gout due to its “multitarget” effect and has achieved good results in the treatment of gouty arthritis in recent years. Shi et al. reported 29 cases of gout patients

| TCM treatment principles                        | Herbs                                                                 |
|-----------------------------------------------|----------------------------------------------------------------------|
| Activating blood circulation and eliminating stasis | Chuanxiong Rhizoma (Chuanxiong), Achyranthis Bidentatae Radix (Niuxi), Radix Salviae (Danshen), Persicae Semen (Taoren), Carthami Flos (Honghua), Cortex Moutan (Danpi), Leounuri Herba (Yimucao) |
| Activating blood circulation and relieving pain  | Pollen Typhae (Pohang), Troopers Dung (Willingham), myrrh (Moyao), Radix Paeoniae Rubra (Chishao), Angelicae Sinensis Radix (Danggut), Panax Notoginseng (Sanqi), Siphonostegiae Herba (liujinu) |
| Clearing away heat and removing dampness       | Phellodendri Chinensis Cortex (Huangbai), Poria cocos (Fuling), Scutellariae Radix (Huangqin), Plantaginis Semen (Cheqianzi), Artemisiae Scopariae Herba (Yinchen), Atractylodes Lancea (Cangzhu), Coicis Semen (Yiren) |
| Expelling wind and activating meridians         | Radix Clematidis (Weilingxian), Radix Angelicae Biseratae (Duhuo), Spaltholobus Suberecetus Dunn (Jixueteng), Fructuslipuidambaris (Lulutong), Radix Puercariae (Gegen), Trachelospermumjasminoides (luoshiting), Lumbicrus (Dilong), Ramulus Mori (Saxgizi), Angelica dahurica (Baizhi) |
| Herbal formulas       | Ingredients                                                                 | TCM efficacy                                                                 | Provenance            | Author            |
|----------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------|-------------------|
| Si-Miao-Wan          | Phellodendri Chinensis Cortex (Huangbai), Atractylodes Lancea (Cangzhu), Coix Seed (Yiren), Achyranthes bidentata (Niuxi) | Clearing away heat and removing dampness                                  | Cheng-fang-bian-du    | Zhang bing cheng  |
| Long-Dan-Xie-Gan-Tang| Gentiana radix (Longdancao), Glycyrrhiza uralensis (Gancao), Scutellariae Radix et Rhiza (Huangqin), Gardeniae Fructus (Zhisizhi), Rehmannia glutinosa (Shengdihuang), Radix Bupleuri (Chaihu), Caulis Akebiae (Mutong), Angelicae Sinensis Radix (Danggui), Plantaginis Semen (Cheqianzi), Alisma Orientale (Zexie) | Clearing away heat and dampness; detoxification | Tai-ping-hui-min-he-ji-ju-fang | Liu jing yuan  |
| Bi-Xie-Shen-Shi-Tang | Dioscoreae Septemlo Bae Rhizoma (Bixie), Coix Seed (Yiren), Red Poria Cocos (Chifuling), Phellodendri Chinensis Cortex (Huangbai), Cortex Moutan (Danpi), Alisma Orientale (Zexie), Talc (Huashi), Tetrapanacis Medulla (Tongcao) | Clearing away heat and removing dampness                                  | Yang-ke-xin-de-jii     | Gao bing jun     |
| Qing-re-Hua-Tan-Tang | Ginseng Radix et Rhizoma (Renshen), Rhizoma Atraylodis Mac-rocephalae (Baizhu), Poria Poria Cocos (Fuling), Glycyrrhiza Radix et Rhiza (Gancao), Red tangerine ree (Juhong), Pinellia (Banxia), Ophiopogon (Maidong), Grass-leaved sweetflag (Shichangpu), Fructus Aurantii Immaturus (Zhisizhi), Banksia rose (Muxiang), Caulis bambusae (Zhuhu), Scutellariae Radix (Huangqin), Coptis chinensis (Huangqin), Arisaema wisonii (Nanxing), Succus bambusae (Zhuili) | Clearing away heat and removing phlegm                                     | Jing-lue-quan-shu     | Zhang jing yue   |
| Dang-gui-Nian-tong-Tang | Notopertegii Rhizoma Et Radix (Qiangqiu), Ginseng Radix et Rhiza (Renshen), Sophorae Flavescentis Radix (Kushen), Cimicifugae Rhizoma (Shengma), Radix Puerariae (Gegen), Atractylodes Lancea (Cangzhu), Glycyrrhiza uralensis (Gancao), Scutellariae Radix (Huangqin), Artemisiae Scopariae Herba (Yincheng), Saposhnikoviae Radix (Fangfeng), Angelicae Sinensis Radix (Danggui), Anemarrhenae Rhizoma (Zhimu), Alisma Orientale (Zexie), Polyporus umbellatus (Zhuling), Atractylodes Macrocephala Koidz (Baizhu) | Clearing away heat and removing dampness, dispelling wind and relieving pain | Dan-xi-xin-fa         | Zhu dan xi       |
| Yin-Chen-Wu-ling-San | Artemisiae Scopariae Herba (Yincheng), Alisma Orientale (Zexie), Polyoporus umbellatus (Zhuling), Atractylodes Macrocephala Koidz (Baizhu), Poria Cocos (Fuling), Cinnamomum Ramulus (Guizhzi) | Clearing away heat and removing dampness                                  | Jin-gui-yao-lue        | Zhang zhong jing  |
| Ba-Zheng-San         | Radix Rhei Et Rhizome (Dahuang), Plantaginis Semen (Cheqianzi), Dianthi Herba (Qumai), Polygoni Avicularis Herba (Bianxu), Gardeniae Fructus (Zhisizhi), Caulis Akebiae (Mutong), Glycyrrhiza uralensis (Gancao), Talc (Huashi) | Clearing away heat and purging fire, promoting urination                 | Wai-ke-zheng-zong      | Chen shi gong    |
| Wu-Wei-Xiao-Du-Tang  | Lonicerae Japonicae Flos (Jinyinhua), Chysanthemi Flos (Juhua), Dandelion (Pugongying), Violaee Herba (Zhuahuiding), Begonia fimbristipula (Zhehuitiankui) | Clearing away heat and toxin, resolving carbuncle and node               | Wai-ke-zheng-zong      | Chen shi gong    |
| Xuan-Bi-Tang          | Stephaniae Tetrandrae Radix (Fangli), Amygdalus Communis Vas (Xingren), Talc (Huashi), Forsythiae Fructus (Lianqiao), Gardeniae Fructus (Zhisizhi), Coicis Semen (Yiren), Arum Ternatnum Thueb (Baxia), Silkworm excrement (Cansha), Phaseoli Semen (Chixiaodou) | Clearing away heat and dampness, promoting channels and collaterals      | Wen-bing-tiao-bian     | Wu ju tong       |
| Dang-Gui-Shao-Yao-Tang | Angelicae Sinensis Radix (Danggui), Paoniae Radix Alba (Baishao), Poria Cocos (Schw.), Wolf (Fuling), Atractylodes Macrocephala Koidz (Baizhu), Alisma Orientale (Zexixe), Chuanxiong Rhizoma (Chuanxiong) | Invigorating the spleen, nourishing the blood and regulating the liver | Jin-gui-yao-lue        | Zhang zhong jing  |
with dampness heat turbid blood stasis syndrome who were
treated with private (self-prescribed) herbal formula, and it
showed that the levels of inflammatory factors such as
Interleukin-1beta (IL-1β), IL-6, Visual Analogue Scale
(VAS) score, and Tumor necrosis factor (TNF)-α were
significantly decreased [34]. Wang et al. found that the
incidence of the adverse reaction of Chuanhu antigout
mixture was lower than that of colchicine treating acute
gouty arthritis. In addition, Chuanhu antigout mixture also
had the function of protecting kidney and renal function
[35]. Combined treatment is more familiar in clinic
practice for GA patients. Ren et al. found that the allergic
risk for acute gouty arthritis patients treated with external
application of compound Qingbi granules combined with
oral loxoprofen sodium was lower than that treated with
Diclofenac Diethylamine Emulsion externally [36], and the
adverse reactions were reduced and the curative effects
were improved after Qinbi granules combined with
Indomethacin [37], colchicine or Celecoxib [38] and allo-
purinol tablet [39].

4.3. Patients’ Symptoms Improve with Chinese Medicine.
The followings are the most common Chinese medicines
used for swollen joint and higher skin temperature treat-
ment: Phellodendri Chinensis Cortex (Huang bai), Coicis
semen (Yi ren), Anemarrhenae Rhizoma (Zhi mu), Talc (Hua
shi); the most commonly used Chinese medicines for arthritis
pain: Aconiti Lateralis Radix Praeparata (Wu tou),
Curcuma longa Rhizoma (Jiang huan); and the most
widely used Chinese medicines for gouty tophi: Radix
Clematidis (Wei ling xian), Cinnamomi Ramulus (Gui zhi),
and Lycopi Herba (Ze lan) [40]. Gouty tophi is also a
common complication of advanced gouty arthritis. External
application of compound Qingbi granules can effectively
relieve pain and reduce synovium thickness caused by ar-
thritis. Meanwhile, external application of Chinese herbal
compounds can also avoid adverse effects, reducing GA
patients’ reliance on analgesic medicine [41]. External
application of compound TCM to the affected area or ac-
upuncture point can directly work on the affected area,
reducing swelling and relieving pain and improving the
clinical symptoms and signs of patients with acute gouty
arthritis (AGA) significantly [42]. The clinical trial results
showed that Chinese medicine combined with cupping
therapy had satisfactory results in treating 34 patients with
gouty arthritis. It was very effective in improving Budzyuski
pain index, lowering blood uric acid, and lowering joint
swelling index [43]. The meta-analysis of the compound TCM
Simiao San treating gouty arthritis showed that Simiao San, as
a traditional Chinese medicine decoction, can improve the
clinical symptoms and signs of patients with AGA [44].

5. Research Status of Anti-GA
Mechanisms in TCM

5.1. Various Herbal Formulas Are Generally Illustrated in the
Theory of TCM. Herbal medicine has many active ingre-
dients. Many formulations and their active

ingredients have significant effects on articular chondrocytes
apoptosis inhibition, anti-inflammation, antioxidation stress
reaction, inflammatory cytokine levels regulation, uric acid
excretion promotion, immune function regulation (cellular
immunity regulation), uric acid levels reduction and in-
testinal flora improvement for gout patients [45–48], body
resistance enhancement [49], purine metabolism regulation
[50], renal damage prevention for gout patients, etc. [51]
(Figure 2).

5.2. Articular Chondrocyte Apoptosis Inhibition. Gouty ar-
thritis is characterized by joint inflammation and uncon-
trolled articular chondrocytes apoptosis. Articular
chondrocytes apoptosis inhibition is a new method for the
treatment of gouty arthritis. Formulas such as Jiawei Simiao
powder [52] and Guizhi Shao Yao Zhimu decoction [53] and
herbs including Phellodendri Chinensis Cortex (Huang bai)
[54] and Rhizoma Atac-tyloids Lanceae (Cang zhu) [55] can
significantly inhibit articular chondrocytes apoptosis and
have an antigout effect. The compounds isolated from Radix
Rhei Et Rhizome (Da huang) [56] and Stephaniae Tetrandrae
Radix (Fang ji) [57] can inhibit the inflammatory reaction of
cells and regulate the immunity and metabolism of the
human body. Simiao pill can inhibit articular chondrocytes
apoptosis and improve cartilage lesions by reducing IL-1β
expression, upregulating B-cell lymphoma (Bcl)-2 gene
expression, and downregulating Bax gene expression [58].
Compound TCM with the function of clearing away heat,
promoting diuresis, and dredging collateral methods may
treat acute gouty arthritis by promoting apoptosis, inhibiting
cell proliferation, and blocking cell cycle of fibroblast-like
synovocytes (FLS) to alleviate the inflammatory reaction
regionally [59].

5.3. Antioxidation Stress Reaction. Oxidative stress refers to
the state of imbalance between oxidative and antioxidative
effects in the body, which tends to be oxidized, resulting in
the inactivation of antioxidant (superoxide dismutase
(SOD), glutathione peroxidase (GSH-Px), reduced gluta-
thione, etc.) and aggravation of joint tissue damage [60].
Many kinds of Chinese medicine and effective ingredients
have anti-inflammation, antioxidant, and other pharma-
cological effects [61]. Tongfeng Kangning formula [62] and
Zisheng Shenqi Pill can also relieve the oxidative stress state
of the body and protect the joints from damage [63].
Quercetin [64] and papaya extract [65] can increase the
activity of GSH-Px and superoxide dismutase (SOD) in GA
animal model, reduce the level of malondialdehyde (MDA),
and improve joint tissue damage through antioxidiant effect.
Resveratrol [66] is a polyphenol compound in Veratrurn,
which can regulate oxidative substances and reduce oxida-
tive stress by activating Nrf2-mediated induction of heme
oxygenase-1 (Nrf2/HO-1) signaling pathway. The ethanol
extract of Chinese medicinal materials Gentiana macro-
phylla [67] can upregulate the expression of Sirtuin1 (SIRT1)
and p53 protein acetylation (ac-p53) and downregulate the
expression of p53 and MicroRNA 34a (miR-34a) protein in
GA rats by regulating the SIRT1/p53 signaling pathway, so as
to regulate antioxidants and reduce the oxidative damage to the body. Herba Ephedrae Sinicae (Mahuang) can remove reactive oxygen species (ROS) and has an obvious antioxidant effect [68].

5.4. Inflammatory Cytokine Levels Regulation. The inactivation of anti-inflammatory factors and the release of proinflammatory factors play an important role in the inflammatory response. Excessive release of inflammatory factors can induce a large number of neutrophils to infiltrate into the joint cavity and stimulate the activation of neutrophils, causing tissue inflammation [69]. The chemical components of TCM can regulate inflammatory cytokines. Berberine isolated from Coptidis Rhizoma (Huanglian) can inhibit the production of LPS (lipopolysaccharide)-mediated IL-1β and swelling of monosodium urate (MSU) mediated paw by blocking NOD-like receptor (NLR) family, pyrin domain-containing protein 3 (NLRP3) signaling pathway [70]. The ethanol extract of Rhizoma Dioscoreae Nipponicae (Chuanshanlong) can act on MAPK/JNK pathway and inhibit the secretion of inflammatory factors in GA rats [71]. Emodin can reduce the release of inflammatory factors by inhibiting the activation of extracellular signal regulated kinase (ERK) 1/2 and p38 mitogen-activated protein kinase (MAPK) signaling pathways [72]. Gallic acid can inhibit the migration of MSU-induced macrophages and neutrophils to synovitis by inhibiting the activation of NLRP3 inflammasomes and apoptosis of nuclear factor erythroid-2 related factor 2 (Nrf2) signals [73]. Chinese Medicine Huzhen Tongfeng Formula (HZTF) can downregulate cyclooxygenase (COX) 1, COX-2, and 5-lipoxygenase, inhibit gouty arthritis cell infiltration significantly, improve the swelling of the affected joints, and increase pain threshold by inhibiting the inflammatory mediators and the arachidonic acid metabolism [74]. Simiao decoction has the effect of reducing blood uric acid levels, reducing myeloperoxidase (MPO), xanthine oxidase (XOD), adenosine deaminase (ADA) activity, and alleviating gout-related symptoms (such as foot swelling and pain). In addition, it can also reduce certain specific proinflammatory cytokines in serum, including IL-1β, IL-9, interferon (IFN) g, macrophage inflammatory protein (MIP) 1a, and MIP-1b [75].

5.5. Uric Acid Excretion Promotion. It has been reported that Achyranthis Bidentatae Radix (Niuxi) can promote the excretion of uric acid, improve cellular and humoral immunity, as well as nonspecific immune function [76]. Fucoidan can promote uric acid excretion and relieve symptoms of uric acid nephropathy (UAN) by upregulating the expression of protein kinase A (PKA) and organic cation transporters.
transporter 2 (OCT 2) in the kidney tissue surface [77]. Verbascoside is a phenylethanoid glycoside in Plantago asiatica, and it has been proved that it can inhibit XOD activity and decrease the expression of uric acid transporter 1 (URAT1) and glucose transporter (GLUT) 9 protein, reducing the production of uric acid and promoting the excretion of uric acid [78]. Eucommiae cortex alcohol extract [79] and anthocyanin [80] can enhance the expression of ATP-binding cassette subfamily G member 2 (ABCG2), OAT1, and organic anion transporter (OAT3) protein in hyperuricemia (HUA) and GA animal models and accelerate uric acid excretion by regulating the mechanism of renal reabsorption for uric acid. Gypenosides [81] and ethanol extracts of polygonum sibiricum [82] can lower the expression of URAT1 and GLUT9 protein, affect the mechanism of uric acid reabsorption, and thus regulate uric acid balance. Water extracts of Wudang Cherry can increase the expression of OCT1, OCT2, OCTN1, and OCTN2 protein in HUA animal models, mediate the absorption, reabsorption of various organic cations and carnitine transport, and participate in the excretion of uric acid [83]. Liliodendron chinense, commonly known as the Chinese tulip tree, and ethanol extract of the barks of Liliodendron chinense (EELC) can significantly increase the excretion of uric acid in hyperuricemic nephropathy (HN) mice, reduce the infiltration of inflammatory factors, and the accumulation of uric acid in the kidney. The progress of HN is reduced by upregulating organic anion transporter 1 (OAT1), OAT3, and ABCG2 protein [84]. Erding granule (EDG) is a kind of Chinese medicine that has the effect of reducing uricemia discovered in recent years. A study has found that 50% ethanol extract (EDG-50) has a significant effect on lowering blood uric acid, which may be related to the downregulation of expression of GLUT9 and URAT1 and upregulation of the expression of OAT1, thus reducing blood uric acid concentration [85]. Berberine can successfully reduce the serum uric acid level of rats with hyperuricemia by increasing the level of uric acid and the excretion fraction of urate in rats [86].

5.6. Immune Function Regulation. T cell subsets play an important role in the pathogenesis of gouty arthritis [87]. Isoglycyrrhizizin can promote Treg cell induction in vitro and in vivo and inhibit inflammation by reducing IL-2 expression [88]. Simiao powder can improve T cell subsets, upregulate cluster of differentiation (CD3)+ and CD8+ levels, downregulate CD4+ and CD4/CD8 levels, inhibit inflammation, and improve immune resistance [89]. The activation of NLRP3 inflammasome is related to the tilted differentiation of Th subsets for a long time, and it is involved in the occurrence and development of the autoimmune attack. Dolonioside A can inhibit both LPS-induced macrophage initiation and inflammatory body activation by inhibiting the caspase-1 dissociation and IL-1β secretion [90]. Icarin (ICA) can inhibit nuclear translocation of NF-κB pathway-associated protein and reduces the expression of NALP3 inflammasome in rats [91]. Total glucosides of herbaceous peony (TGPF) can reduce the weight of rats with hyperuricemia nephropathy, reduce serum uric acid (SUA), creatinine (Cr), blood urea nitrogen (BUN), xanthine oxidase (XOD), MCP-1, and TNF-α, downregulate kidney URAT1 and GLUT9, upregulate kidney OAT1, and reduce renal pathology associated with hyperuricemia [92]. Compound Shui Niu Jiao granules can significantly inhibit the protein expression of TNF-α and IL-8 by injecting sodium urate solution into the articular cavity of model rats with acute gouty arthritis (AGA), reducing inflammatory tissue [93]. Macroporous resin extract of Dendrobium candidum leaves is effective in uric acid production inhibition and anti-inflammation in rats with hyperuricemia, and it can inhibit the expression of nuclear factor (NF)-κB, Toll-like receptor (TLR) 4 protein and reduce inflammation [94]. The Selaginella moellendorffii prescription (SMP) can significantly reduce the level of uric acid in mice with hyperuricemia and reduce the levels of prostataglandin (PG)E2, IL-8, nitric oxide (NO), and IL-1 in rats with gouty arthritis. This anti-inflammatory effect may be related to the inhibition of NF-κB p65 nuclear translocation and the expression of NLRP3 protein [95]. An extract of Tu-Teng-Cao (TTC) can inhibit the secretion of cytokines TNF-α and IL-6 in synovial fluid of rats, reduce ankle joint damage, and control uric acid and inflammation to treat gouty arthritis [96]. Berberine reduces monosodium urate crystals-induced inflammation by downregulating the expression of NLRP3 and IL-1. The regulation of berberine may be related to the inactivation of NLRP3 inflammasome [97]. Sanmiao wan (SMW) can partially regulate purine metabolism, arginine and proline metabolism, citric acid cycle, phenylpropanoid metabolism, and tryptophan metabolism, reversing the pathological process of hyperuricemia [98]. Modified-Simiao wan (MSW) can protect human umbilical vein endothelial cells (HUVECs) by reducing cell apoptosis and inhibiting the expression of intercellular cell adhesion molecule-1 (ICAM-1) [99]. The ethanolic extract of Polygonum cuspidatum can prevent and treat acute gouty arthritis in mice, and its mechanism may be related to the regulation of the expression of the NLRP3/ASC/caspase-1 axis in the gene and protein level [100].

5.7. Uric Acid Reduction. Elevated uric acid is the biochemical basis of gout. Uric acid is excreted mainly by filtration, reabsorption, secretion, and other processes involved in transport through the kidneys and intestines. In total, 10% of uric acid is excreted by glomerular filtration and finally discharged from the urine. Totally, 90% of uric acid is reabsorbed by the renal tubules and finally got into blood [101]. Hu et al. found that Simiao pill could promote uric acid excretion and protect the kidney by adjusting urate transporter protein in the kidney of rats with high uric acid [102]. Luteolin and luteolin-4-0-glucoside can act on hyperuricemia mice by lowering mouse urate transporter (mURAT)-1 levels and inhibiting XOD activity [103]. Paeonol is an effective component isolated from Cortex Moutan, which can inhibit the expression of proinflammatory cytokines and the activation of NF-κB, significantly decreasing the expression of TNF-α, IL-1β, and IL-6 in synovium of MSU-induced arthritis (MIA) rats and reducing the formation of uric acid [104]. Compound tufuling oral liquid can reduce gout-
induced recurrent joint swelling and pain, significantly reducing serum uric acid (SUA) levels. Besides, the incidence of leukopenia in the treatment group was lower than that in the control group [105]. Polydatin, the natural precursor of resveratrol, can reduce the levels of serum uric acid, creatinine, and urea nitrogen in hyperuricemia rats by interfering with the differential metabolites [106]. Chuanhu antigout mixture (CAGM) and its modified formulation can significantly improve potassium oxonate (PO) induced hyperuricemia in mice, which may be partly due to a decrease in liver XO and kidney URAT1 levels [107]. Compound Tufuling granules (CTG) have a significant effect on lowering blood uric acid and protecting renal function, which may be related to CTG’s ability to regulate the lymph node molecules against inflammation, lower uric acid levels, and protect kidneys [108]. Ethanol extract from Polyrhachis vicina Roger (EEPR) can reduce the serum uric acid level of model mice with hyperuricemia. Modified Simiao decoction (MSD) monotherapy is superior to anti-inflammatory drugs and/or uric acid-lowering drugs in treating gouty arthritis, and it can reduce uric acid (UA) and C-reactive protein (CRP) levels; regulate human metabolic disorders; and has no side effects [109–111]. Total flavonoids of Humulus lupulus (TFHL) can lower uric acid in hyperuricemia mice by inhibiting the activity of xanthine oxidase (XOD) [112]. Dampness-removing pill (Huashi pills) can inhibit the formation of calculi by regulating urine biochemical indicators and reducing the expression of osteopontin (OPN) in the kidney tissue of rats with kidney stones [113].

5.8. Improving Intestinal Flora of Gout Patients. Intestinal flora is associated with the development of many diseases, and intestinal microecology plays an important role in uric acid metabolism and inflammatory response. When the intestinal balance is imbalanced, the status of health will be disrupted, which leads to various diseases, such as gout [114]. After analyzing the diversity of intestinal flora in patients with primary gout and a healthy population, Shi et al. found that E. faecalis and xylose-degrading mimics were more abundant in the intestine of patients with gout, whereas E. faecalis and Bifidobacterium were absent [114]. Meng et al. found that the application of Chinese herbal medicine to strengthen the spleen and drain turbidity can significantly improve a series of symptoms such as joint redness and pain by reducing the activation of NLRP3 inflammasome in gout patients and regulating the intestinal microecology to increase uric acid excretion [115]. Lin et al. found that the traditional Chinese medicine (TCM) formula, Si-miao-tang, could reduce intestinal apoptosis by inhibiting the expression of NLRP3 inflammatory vesicles, regulating the expression of TNF-α, caspase 8, and AIFM1 proteins, and regulating the expression of APOB, LPL, and PPARα proteins to affect lipid metabolism and restore intestinal flora [116]. Gao et al. found that the TCM formula, CoTOL, could reduce body weight and uric acid in mice with hyperuricemia models by regulating intestinal flora [117]. The herbal chicory extract can reduce the activity of key enzymes of uric acid metabolism in hyperuricemic quail, which may be related to regulating intestinal flora and intestinal tight junction protein occludin, increasing the number of beneficial intestinal flora and reducing the number of pathogenic bacteria [118].

5.9. Shortcomings of TCM as GA Therapy

5.9.1. TCM Safety for GA Patients. CHM represents an enormous and remarkable treasure trove for new drug development, but the evaluation for the safety of CHM is also required. The oral Chinese medicine formulas have developed quickly and have their own diversity. The safety and efficacy of oral Chinese-patented medicines in treating GA have been confirmed in many clinical studies initiated by Chinese and Western medical researchers [119–124]. Besides, the clinical application of Chinese herbal medicine injection also has attracted attention [125, 126]. Nevertheless, due to the uncertainty of CHM composition, the safety of CHM is still questioned, and the toxic components in CHM have also been described [127]. With the widespread use of TCM worldwide, the safety problems/events of TCM have gradually raised [128]. Especially in recent years, it is reported that serious adverse reactions/events are caused by TCM or its ingredients, such as renal failure caused by Gentian and Liver Pill and liver damage caused by He Shou Wú, and these events have caused great concern both at home and abroad [129–131] and seriously affected the healthy and sustainable development and internationalization of TCM. Some researchers thought that long-term treatment with CHM is still risky, and Chinese medicine still requires massive clinical and basic trials to assess its safety [132, 133].

5.9.2. CHM’s Efficacy in Anti-GA Is Still Being Questioned. Great progress has been made in the research of TCM on anti-GA, and some clinical studies have also achieved exciting results [134–138]. Nevertheless, some formulas have a good effect on gouty arthritis, but monotherapy or isolated components can weaken effects or even has no effect at all [139]. The components of CHM are very complicated, but many bioactive ingredients of CHM show only a strong anti-GA, and some clinical studies have also achieved exciting results [134–138]. Nevertheless, some formulas have a good effect on gouty arthritis, but monotherapy or isolated components can weaken effects or even has no effect at all [139]. The components of CHM are very complicated, but many bioactive ingredients of CHM show only a strong anti-GA effect in vitro, or the anti-GA arthritis effect is lost or weakened after purification from the formula. In addition, deficiency of clinical research with high-level evidence seriously restricts CHM’s development [140].

5.10. Molecular Network Integration for the TCM Modernization TCM in GA Treatment. The pathogenesis of gout is complex. Under the guidance of TCM theory, through long-term application practice, numerous Chinese medicines are effective, safe, cheap, and easily available for the treatment of gout. TCM formulas, consisted of many Chinese traditional herbs, have good efficacy and the least adverse reaction for GA prophylaxis and therapy. Although herbal formulas are widely used in TCM clinical practice, the integration principles based on the theory of TCM are very challenging to identify. In the international community, it is advocated molecular typing of pathogenic genes and the application of
precise targeted therapeutic drugs in gout treatment. However, its curative effect is limited, and a single target is not enough to change the prognosis of gout arthritis. Shifting the focal point of anti-GA treatment from accuracy to integration can benefit patients, and it is believed Chinese medicine has the intrinsic strengths for multiingredients strategy [141].

Traditional Chinese medicine has unique advantages in treating gout, but the composition of TCM is complex, and therapeutic targets are various and it is difficult to elucidate the therapeutic targets. Therefore, the specific therapeutic target is an important part of the pharmacodynamic evaluation [142]. Based on modern bioinformatics and network analysis technology, network pharmacology explores the relationship between medicines and gout from the aspects of multitarget and complex diseases, macroscopic and microscopic, fuzzy and visualization, and then clarifies its mechanism of action in treating gout. At the systematic level, network pharmacology promotes drug discovery in an accurate way, establishes a “drug-to-gene-to-target-to-disease subtype” network, and expounds the principle of herbal formula design guided by the theory of TCM, which provides a new way for the modernization of TCM in the future [143, 144].

As an emerging discipline, network pharmacology has made innovative breakthroughs in predicting the genes causing gout and identifying new targets of Chinese medicine. It also provides strong evidence for the development of new drugs, efficacy evaluation, safety evaluation, and quality evaluation of TCM. It will play an important role in all fields of TCM so as to promote the modernization of TCM.

6. Conclusions and Prospectives

TCM advocates the preventive treatment of diseases. Under the guidance of TCM theory, targeted rectification can reverse the condition of the disease as soon as possible and prevent the occurrence of diseases. The theory of TCM is often questioned due to its complexity, integrated concept, and symptomatic research. TCM holds that the human body is a complex and dynamic system, which pays more attention to the balance of the internal and external environment. Chinese medicine is a multicomponent, multitarget, and complex mixed system. There are many obstacles in the development of TCM under the background of modern medicine. The unidentified quality of TCM is a shortcoming for it; the necessity of accurate toxicological mechanisms and pharmacodynamic analysis impede the acceptance of TCM in modern times. Besides, antagonistic or synergistic effects of the components in TCM remain unknown. Only after resolving the above problems can TCM truly go abroad. TCM is an essential component of traditional Chinese culture. As Youyou Tu, the first Chinese woman who won the 2015 Nobel Prize in Physiology or Medicine, described, “TCM represents a great treasure house of China. We should make good use of it and create more valuable achievements, so as to bring benefit to human health.”

Abbreviations

GA: Gouty arthritis
TCM: Traditional Chinese medicine
CHM: Chinese medicine
MSU: Monosodium urate
CAMs: Complementary and alternative medicines
WHO: World Health Organization
IL-6: Interleukin-6
VAS: Visual Analogue Scale
TNF-α: Tumornecrosis factor-α
AGA: acute gouty arthritis
Bcl-2: B-cell lymphoma
GSH-Px: Glutathione peroxidase
SOD: superoxide dismutase
B C: Before Christ
MDA: Malondialdehyde
Nrf2/2: Nrf2-mediated induction of heme oxygenase-1
HO-1: (HO-1)
SIRT1: Siruin1
miR-34a: MicroRNA 34a
ROS: Reactive Oxygen Species
LPS: Lipopolysaccharide
NLRP3: NOD-like receptor (NLR) family, pyrin domain-containing protein 3
ERK1/2: Extracellular signal regulate kinase 1/2
Nrf2: Nuclear factor erythroid-2-related factor 2
COX: Cyclooxygenase
MPO: Myeloperoxidase
XOD: Xanthine oxidase
ADA: Adenosine deaminase
IFN: Interferon
MIP-1a: Macrophage inflammatory protein-1a
PKA: Protein kinase A
OAT3: Organic anion transporter 3
HUA: Hyperuricemia
TLR 4: Toll like receptor 4
NO: Nitric oxide
(PG)E-2: Prostaglandin E-2
MIA: MSU-induced arthritis
SUA: Serum uric acid
UA: Uric acid
RBXG: Rebixiao granules
MSU: Monosodiumurate
GSH-Px: Glutathione peroxidase
GSH: Reduced glutathione.
UAN: Uric acid nephropathy.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.
Authors’ Contributions

Huan Liang and Pin Deng drafted the manuscript. CZJ designed and revised the manuscript. All authors read and approved the final manuscript. Huan Liang and Pin Deng contributed equally to this work.

Acknowledgments

This research project was mainly supported by the project “Capacity building project of Chinese and western medicine clinical collaboration on major difficult disease in 2019” funded by the National Administration of Traditional Chinese Medicine (no. 201803190106).

References

[1] K.-H. Yu, D.-Y. Chen, J.-H. Chen et al., “Management of gout and hyperuricemia: multidisciplinary consensus in Taiwan,” International Journal of Rheumatic Diseases, vol. 21, no. 4, pp. 772–787, 2018.
[2] E. Roddy and H. K. Choi, “Epidemiology of gout,” Rheumatic Disease Clinics of North America, vol. 40, no. 2, pp. 155–175, 2014.
[3] C. M. Burns and R. L. Wortmann, “Gout therapeutics: new drugs for an old disease,” The Lancet, vol. 377, no. 9760, pp. 165–177, 2011.
[4] N. Mbuyi and C. Hood, “An update on gout diagnosis and management for the primary care provider,” The Nurse Practitioner, vol. 45, no. 10, pp. 16–25, 2020.
[5] H. K. Choi and G. Curhan, “Gout: epidemiology and lifestyle choices,” Current Opinion in Rheumatology, vol. 17, no. 3, pp. 341–345, 2005.
[6] P. Richette, M. Doherty, E. Pascual et al., “2018 updated European league against rheumatism evidence-based recommendations for the diagnosis of gout,” Annals of the Rheumatic Diseases, vol. 79, no. 1, pp. 31–38, 2020.
[7] Y. Zhang, H. Zhang, D. Chang, F. Guo, H. Pan, and Y. Yang, “Metabolomics approach by H NMR spectroscopy of serum reveals progression axes for asymptomatic hyperuricemia and gout,” Arthritis Research and Therapy, vol. 20, no. 1, Article ID 29871692, 2018.
[8] N. Xiao, H. Chen, S. Y. He, and C. X. Xue, “Evaluating the efficacy and adverse effects of clearing heat and removing dampness method of traditional Chinese medicine by comparison with western medicine in patients with gout,” Evidence-Based Complementary and Alternative Medicine, vol. 2018, Article ID 8591349, 2018.
[9] Y. H. Zhang, J. Lv, W. Gao et al., “Practitioners’ perspectives on evaluating treatment outcomes in traditional Chinese medicine,” BMC Complementary and Alternative Medicine, vol. 17, no. 1, p. 269, Article ID 28521826, 2017.
[10] L. Jia, R. S. Wang, and D. Y. He, “Traditional Chinese and western medicine understanding of gout pathogenesis,” Rheumatoid Arthritis, vol. 7, pp. 61–68, 2018.
[11] Y. Zhang, Huangdi Neijing Suwen Collection Note, p. 378, Xueyuan Publishing House, Beijing, China, 2004, in Chinese.
[12] H. Tian and D. Gu, “Introduction to professor Zhu Liangchun’s experience in treating gouty arthritis,” New Chinese Medicine, vol. 42, no. 9, pp. 132-133, 2010, in Chinese.
[13] Y. Zhang, B. Li, and L. Ji, “Re-analysis of the overall concept of traditional Chinese medicine,” Forum on Traditional Chinese Medicine, vol. 33, pp. 61–63, 2018.
[14] S. B. Fang, “Research on the mechanism of Guishaozhimu decoction in treatment of gouty arthritis in rats via Toll-MyD88 and NLRP3 inflammasome signaling pathway,” Hubei University of Chinese medicine, pp. 461–473, 2016, in Chinese.
[15] Z. C. Zhang, Collection of Suwen’s Notes on Huangdi Neijing, Xueyuan Publishing House, Beijing, China, 2002.
[16] L. Ke Guang, Lecture Notes on the Synopsis of the Jin-Gui-Yao-Lue, Shanghai Science and Technology Press, Shanghai, China, 1985.
[17] C. Yuanfang, General Treatise on the Cause and Symptoms of Diseases, People’s Army Medical Publishing House, Beijing, China, 2006.
[18] C. C. Qian, “After reading annotation of Wai-tai-mi-yaoo,” Chinese Journal of Medical History, vol. 25, no. 4, pp. 249–250, 1995.
[19] Y. Wu, “A preliminary investigation of Zhu Danxi’s doctrine of gout,” Traditional Chinese Medicine, no. 1, pp. 35–37, 1995.
[20] Y. Zhao, “A brief discussion of the characteristics of syndrome differentiation and treatment of the Zheng-zhi-zhunsheng for the treatment of miscellaneous diseases,” Journal of Guiyang College of Traditional Chinese Medicine, vol. 29, no. 2, pp. 11–12, 2007.
[21] I. B. Zhang, Jing-Yue-Quan-Shu, People’s Medical Publishing House, USA, 2007.
[22] A. Chen, “Explanation of the view of blood stasis in Yi Lin Gaicuo,” Beijing Journal of Traditional Chinese Medicine, vol. 35, no. 11, pp. 1046–1047, 2016.
[23] Q. Meng, Z. Zhang, and X. Miao, “Zhu Liangchun’s experience in treating gouty arthritis by draining turbidity and resolving blood stasis,” Journal of Traditional Chinese Medicine, vol. 58, no. 16, pp. 1368–1370, 2017.
[24] S. T. Wu, “Phased treatment of gout caused by internal toxicity,” China Journal of Traditional Chinese Medicine and Pharmacy, vol. 36, no. 7, pp. 4116–4118, 2021.
[25] L. Li, X. X. Zhu, and Y. Y. Dai, “Multidisciplinary expert consensus on the diagnosis and treatment of hyperuricemia-related diseases in China,” Chinese Journal of Internal Medicine, vol. 56, pp. 235–248, 2017, in Chinese.
[26] Chinese Medical Association Endocrinology Branch, “Guidelines for the diagnosis and treatment of hyperuricemia and gout in China (2019),” Chinese Journal of Endocrinology and Metabolism, vol. 36, pp. 1–13, 2020, in Chinese.
[27] Y. F. Liu, S. H. Tu, and Z. Chen, “Effects of modified simiao decoction on IL-1β and TNF α secretion in mononcytic THP-1 cells with monosodium urate crystals-induced inflammation,” Evidence-Based Complementary and Alternative Medicine, vol. 2014, Article ID 406816, 2014.
[28] L. Gu, X. Wang, Z. Liu et al., “A study of Semen Strychni-induced renal injury and herb-herb interaction of radix glycyrrhizae extract and/or rhizoma ligustici extract on the comparative toxicokinetics of strychnine and brucine in rats,” Food and Chemical Toxicology, vol. 68, pp. 226–234, 2013.
[29] R. Liu, X. Li, N. Huang, M. Fan, and R. Sun, “Toxicity of traditional Chinese medicine herbal and mineral products,” Pharmacological Advances in Natural Product Drug Discovery, vol. 87, pp. 301–346, 2020.
[30] C. Zhu, C. Yang, and W. Ni, “Current status of research based on syndrome differentiation by Chinese medicine on treating gout,” Pharmacy Information, vol. 5, no. 2, 2016.
controlled trial,” Journal of Advanced Nursing, vol. 76, no. 6, pp. 1416–1424, 2020.

[32] Y. X. Ning, H. Y. Wu, and Y. P. Deng, “Yellow-dragon wonderful-seed formula for hyperuricemia in gout patients with dampness-heat pouring downward pattern: a pilot randomized controlled trial,” Trials, vol. 19, no. 1, Article ID 30314508, 2018.

[33] Y. Liu and J. Liu, “The therapeutical effect of simiao pills on gouty arthritis and the influence on laboratory indicators,” World Chinese Medicine, vol. 13, no. 6, pp. 1428–1431, 2018, in Chinese.

[34] X.-d. Shi, G.-c. Li, Z.-x. Qian, Z.-q. Jin, and Y. Song, “Y. X. Ning, H. Y. Wu, and Y. P. Deng, “Yellow-dragon decoction on IL-1β and TNFα secretion in monocytes THP-1 cells with monosodium urate crystals-induced inflammation,” Evidence-based Complementary & Alternative Medicine, vol. 2014, Article ID 406816, 2014.

[35] X. Chi, H. Zhang, S. Zhang, and K. Ma, “Chinese herbal medicine for gout: a review of the clinical evidence and pharmacological mechanisms,” Chinese Medicine, vol. 15, no. 1, p. 117, 2020.

[36] W. Shu-Jun, Q. Zhang, and Y.-J. Xiang, “Guizhi-Shaoyao-Zhimu decoction attenuates bone erosion in rats that have collagen-induced arthritis via modulating NF-κB signalling to suppress osteoclastogenesis,” Pharmaceutical Biology, vol. 59, no. 1, pp. 262–274, 2021.

[37] X. Chi, H. Zhang, S. Zhang, and K. Ma, “Chinese herbal medicine for gout: a review of the clinical evidence and pharmacological mechanisms,” Chinese Medicine, vol. 15, no. 1, p. 17, 2020.

[38] Z. Wang, H. Zheng, and H. Q. Hao, “Research on treatment of rheumatoid arthritis with traditional Chinese Medicine Ermiao San,” World Journal of Integrated Traditional and Western Medicine, vol. 14, pp. 590–592, 2019.

[39] W. Liu, Z. Wang, and P. Zhu, “Knotweed extract on xanthine oxidase,” Chin Med, vol. 14, no. 1, pp. 15–21, 2018.

[40] Y. Q. Fan, S. Zhang, and Z. Chen, “Research on treatment of acute gouty arthritis and the influence on laboratory indicators,” World Journal of Traditional Chinese Medicine, vol. 39, no. 3, pp. 297–306, 2019.

[41] W. Zhao, B. J. Wang, and C. R. Wang, “Research on treatment of acute gouty arthritis by blood-letting cupping plus herbal medicine,” Journal of Traditional Chinese Medicine, vol. 30, no. 1, pp. 1–8, 2010.

[42] H. Wang, H. Duan, S. Chen et al., “Chinese herbal medicine simiao-san decoction for acute gouty arthritis: a protocol for systematic review and meta-analysis of randomized controlled trials,” Medicine, vol. 99, no. 32, Article ID e21510, 2020.
Evidence-Based Complementary and Alternative Medicine

Inhibitors,” Oxidative Medicine and Cellular Longevity, vol. 2021, Article ID 1470380, 15 pages, 2021.

[61] F. Guan, W. Lam, and R. Hu, “Majority of Chinese medicine herb category “Qing Re Yao” have multiple mechanisms of anti-inflammatory activity,” Scientific Reports, vol. 8, no. 1, p. 7416, Article ID 29743639, 2018.

[62] Z. Lin, C. Wang, and Y. Wang, “Effects of Tongfeng Kangning recipe on serum inflammatory factors and oxidative stress in rats with acute gouty arthritis,” Chinese Journal of Traditional Chinese Medicine, vol. 34, no. 06, pp. 2710–2713, 2019, in Chinese.

[63] J. Han, Y. Xie, and C. Fei, “Effects of Zishengshenqi Pills on the expression levels of GSH and NF-κB in rats with gout,” World Chinese Medicine, vol. 14, pp. 3178–3181, 2019, in Chinese.

[64] J. Huang, W. Sun, and S. Wang, “Anti-inflammatory and antioxi
dant activity of quercetin on gouty arthritis in rats,” Chinese Journal of Experimental Traditional Chinese Medicine, vol. 18, pp. 169–173, 2012, in Chinese.

[65] R. Zhang, S. Zhan, S. Li et al., “Anti-hyperuricemic and nephroprotective effects of extracts from Chaenomeles sinensis (Thouin) Koehne in hyperuricemic mice,” Food & Function, vol. 9, no. 11, pp. 5778–5790, Article ID 30327809, 2018.

[66] F. Jia, H. Xia, and H. Li, “The mechanism of resveratrol in inhibiting monosodium urate-induced oxidative damage of RAW264.7 macrophages,” Acta Pharmacuetica Sinica, vol. 55, pp. 2368–2374, 2020.

[67] B. Yang, J. Huang, and Q. Meng, “Study on the effect of ethanol extract of Gentiana macrophylla on oxidative stress damage and miR-34a/Sirt1 axis in gouty arthritis rats,” Pharmacology and Clinics of Chinese Materia Medica, vol. 35, no. 5, pp. 64–69, 2019, in Chinese.

[68] X. Jiang, S. F. Sun, and Y. Wang, “Progress on constituents and pharmaceutical effects of ephedra,” Chemical Industry Times, vol. 31, no. 5, pp. 28–31, 2017, in Chinese.

[69] M. C. Cleophas, T. O. Cripsan, and L. A. B. Joosten, “Factors modulating the inflammatory response in acute gouty ar-
thritis,” Current Opinion in Rheumatology, vol. 29, no. 2, pp. 163–170, 2017.

[70] J. Wu, Y. Luo, Q. Jiang et al., “Coptisine from Coptis chinensis blocks NLRP3 inflammasome activation by inhibiting caspase-1,” Pharmacological Research, vol. 147, Article ID 104348, 2019.

[71] F. Lu, L. Liu, D.-h. Yu, X.-z. Li, Q. Zhou, and S.-m. Liu, “Therapeutic effect of Rhizoma Dioscoreae Nipponicae on gouty arthritis based on the SDF-1/CXCR 4 and p38 MAPK pathway: an in vivo and in vitro study,” Phytotherapy Research, vol. 28, no. 2, pp. 280–288, 2014.

[72] S. Luo, X. F. Rong, and F. F. Peng, “Effects of emodin on the expression of ERK1/2 and p38MAPK in RA fibroblast-like syncytiocytes,” Journal of Immunology, vol. 33, pp. 113–117, 2017.

[73] Y. Lin, T. Luo, A. Weng et al., “Gallic Acid Alleviates Gouty Arthritis by Inhibiting NLRP3 Inflammasome Activation and Pyroptosis Through Enhancing Nrf2 Signaling,” Frontiers in Immunology, vol. 11, Article ID 580593, 2020.

[74] J. Deng, Z. Wu, and C. Chen, “Chinese Medicine Hu zheng tongfeng formula effectively attenuates gouty arthritis by inhibiting arachidonic acid metabolism and inflammatory mediators,” Mediators of Inflammation, vol. 2020, Article ID 33132756, 2020.

[75] X. Lin, T. Shao, L. Huang et al., “Simiao decoction alleviates gouty arthritis by modulating proinflammatory cytokines and the gut ecosystem,” Frontiers in Pharmacology, vol. 11, p. 955, Article ID 32670069, 2020.

[76] Y. N. Chen, J. L. Xu, W. Chen, and B. Yang, “The studies of Cyathula polysaccharides on immune function in mice,” Strait Pharmaceutical Journal, vol. 24, pp. 17–8, 2012.

[77] X. Wu, M. Yan, T. Liu et al., “Fucoidan elevates surface organic cation transporter 2 expression via upregulation of protein kinase A in uric acid nephropathy,” Experimental and Therapeutic Medicine, vol. 14, no. 5, pp. 4153–4159, 2017.

[78] J. Zeng, B. Xu, and J. Wang, “Verbascum glycosides and isomeric mullein glycosides in Plantago chinensis reduce serum uric acid levels in mice with acute hyperuricemia and its mechanism,” Chinese Patent Medicine, vol. 38, pp. 1449–1454, 2016, in Chinese.

[79] C. Fang, L. Chen, M. He et al., “Molecular mechanistic insight into the anti-hyperuricemic effect of Eucommia ulmoides in mice and rats,” Pharmaceutical Biology, vol. 57, no. 1, pp. 112–119, 2019.

[80] X. Qian, X. Wang, J. Luo et al., “Hypouricemic and nephroprotective roles of anthocyanins in hyperuricemic mice,” Food & Function, vol. 10, no. 2, pp. 867–878, 2019.

[81] M. Pang, Y. Fang, S. Chen et al., “Gypenosides inhibits xanthine oxidoreductase and ameliorates urate excretion in hyperuricemic rats induced by high cholesterol and high fat food (lipid emulsion),” Medical Science Monitor, vol. 23, pp. 1129–1140, Article ID 28258276, 2017.

[82] X. Wang, H. Wang, and Y. Zhang, “The effect of alcohol extract of Polygonum siberia on the production and exer-
cription of uric acid in hyperuricemia mice,” Chinese New Drugs and Clinical Pharmacology, vol. 26, pp. 626–631, 2015, In Chinese.

[83] J. Zhou and F. Li, “Wudang cherry ameliorates urate underexcretion and renal dysfunction in hyperuricemic mice,” Chinese Journal of Pharmacology and Toxicology, vol. 31, no. 10, pp. 1010–1011, 2017.

[84] J. Pan, C. Zhang, M. Shi et al., “Ethanol extract of Liriodendron chinense (Hemsli.) Sarg barks attenuates hyper-
uricemic nephropathy by inhibiting renal fibrosis and inflammation in mice,” Journal of Ethnopharmacology, vol. 264, Article ID 113278, 2021.

[85] W. Zhang, W. Du, G. Li et al., “Constituents and anti-hy-
peruricemia mechanism of traditional chinese herbal for-
mulae erding granule,” Molecules, vol. 24, no. 18, p. 3248, 2019.

[86] X.-L. Fu, J. Zhou, W.-W. Tang et al., “Study on the compati-
bility effect and active constituents of atractylodis rhiz-
oma in ermiao wan against acute gouty arthritis,” Journal of Ethnopharmacology, vol. 279, Article ID 114353, 2021.

[87] B. Xu, S. Chen, and H. Qian, “Role of T cell subsets, hemorheology and inflammatory factors in Tcell induction by immunomodulatory herbal medicine licorice and its two constituents,” Scientific Reports, vol. 5, no. 1, Article ID 14046, 2015.

[88] L. Guo, J. Ji, and Q. Bai, “Effects of Modified Simiao Powder on T cell subsets, hemorheology and inflammatory factors in AGA patients,” World Science and Technology-Modernization of Traditional Chinese Medicine, vol. 22, pp. 3023–3029, 2020.

[89] T. Wei, C. Hu, J. Xie et al., “Dolichos A attenuates monosodium urate crystals-induced inflammation by targeting NLRP3 inflammasome,” Journal of Pharmacology and Toxicology, vol. 740, pp. 321–8, 2014.
Evidence-Based Complementary and Alternative Medicine

[91] Y. Cao, “Icariin alleviates MSU-induced rat GA models through NF-κB/NALP3 pathway,” *Cell Biochemistry and Function*, vol. 39, no. 3, pp. 357–366, 2021.

[92] L. Kang, J. X. Miao, L. H. Cao et al., “Total glucosides of herbaceous peony (Paeonia lactiflora Pall.) flower attenuate adenine- and ethambutol-induced hyperuricemia in rats,” *Journal of Ethnopharmacology*, vol. 261, Article ID 113054, 2020.

[93] K. Yang, Y. Lou, and C. Yuan, “Effect of Compound Buffalo Horn Granule on the Expression of TNF-α and IL-8 in Serum of Rats with Acute Gouty,” *Arthritis Journal of Traditional Chinese Medicine*, vol. 43, no. 4, pp. 50–51, 2015, In Chinese.

[94] L. Xiao-Jing, Y.-Z. Wang, and L. Shan-Shan, “Dendrobium candidum beneficial effects of macroporous resin extract of leaves in rats with hyperuricemia induced by a high-purine diet,” *Evidence-Based Complementary and Alternative Medicine*, vol. 2020, Article ID 3086106, 2020.

[95] X.-Y. Zhang, J. Cheng, and P. Zhao, “Selaginella moellen-dorffii Screening the best compatibility of prescription on hyperuricemia and gouty arthritis and its mechanism,” *Evidence-Based Complementary and Alternative Medicine*, vol. 2019, Article ID 7263034, 2019.

[96] R. Yao, Z. Geng, X. Bao et al., “Tu-Teng-Cao extract alleviates monosodium urate-induced acute gouty arthritis in rats by inhibiting uric acid and inflammation,” *Evidence-Based Complementary and Alternative Medicine*, vol. 2020, Article ID 3095624, 2020.

[97] Y. F. Liu, Y. H. Huang, C. Y. Wen et al., “The Effect of Modified Simiao Tang on Acute Gouty,” *Biomedical Chromatography*, vol. 39, no. 3, pp. 357–366, 2021.

[98] T. Jiang, J. Qian, J. Ding et al., “Metabolomic profiles delineate the effect of Sanmiao wan on hyperuricemia in rats,” *Biomedical Chromatography*, vol. 31, 2017.

[99] F. Zhao, L. Guochun, Y. Yang, L. Shi, L. Xu, and L. Yin, “A network pharmacology approach to determine active ingredients and rationality of herb combinations of modified-simiao wan for treatment of gout,” *Journal of Ethnopharmacology*, vol. 168, no. 2015, pp. 1–16, Article ID 25824593, 2015.

[100] T. Ma, Shengtao, C. Tian, and Xingmengyu, “Effect of ethanolic extract of Polygonum cuspidatum on acute gouty arthritis in mice through NLRP3/ASC/caspase-1 axis,” *Chinese Journal of Traditional Chinese Medicine*, vol. 44, no. 3, pp. 546–552, 2019, in chinese.

[101] P. K. Tan, J. E. Farrar, E. A. Gaucher, and J. N. Miner, “Coevolution of URAT1 and uricase during primate evolution: implications for urate urateoestasis and gout,” *Molecular Biology and Evolution*, vol. 33, no. 9, pp. 2193–2200, 2016.

[102] Q.-H. Hu, R.-Q. Jiao, X. Wang, Y.-Z. Lv, and L.-D. Kong, “Simiao pill ameliorates urate underexcretion and renal dysfunction in hyperuricemic mice,” *Journal of Ethnopharmacology*, vol. 128, no. 3, pp. 685–692, 2010.

[103] Y. Lin, P. G. Liu, W. Q. Liang et al., “Luteolin-4’-O-glucoside and its aglycone, two major flavones of Gnaphalium affine D. Don, resist hyperuricemia and acute gouty arthritis activity in animal models,” *Phytotherapy*, vol. 41, pp. 54–61, 2018.

[104] G. Chen, P. Jia, Z. y. Yin, S. z. Kong, Z. b. Xiang, and X. x. Zheng, “Paenol ameliorates monosodium urate-induced arthritis in rats through inhibiting nuclear factor-xB-mediated proinflammatory cytokine production,” *Phytotherapy Research*, vol. 33, no. 11, pp. 2971–2978, 2019.

[105] Z. Xie, H. Wu, X. Jing et al., “Hypouricemic and arthritis relapse-reducing effects of compound tufuling oral-liquid in intercritical and chronic gout: a double-blind, placebo-controlled, multicenter randomized trial,” *Medicine*, vol. 96, no. 11, Article ID e6315, 2017.

[106] B. Han, M. Gong, Y. Qiu, and Z. Zou, “NMR-based metabolomic study reveals intervention effects of polydatin on potassium oxonate-induced hyperuricemia in rats,” *Oxidative Medicine and Cellular Longevity*, vol. 2020, Article ID 6943860, 2020.

[107] W. You, J. Wang, Y. Zou et al., “Modified Chuanhu anti-gout mixture, a traditional Chinese medicine, protects against potassium oxonate-induced hyperuricemia and renal dysfunction in mice,” *Journal of International Medical Research*, vol. 47, no. 5, pp. 1927–1935, Article ID 30832523, 2019.

[108] P. Wu, J. Li, X. Zhang, F. Zeng, Y. Liu, and W. Sun, “Study of the treatment effects of compound tufuling granules in hyperuricemic rats using serum metabolomics,” *Evidence-Based Complementary and Alternative Medicine*, vol. 2018, Article ID 3458185, 2018.

[109] G. N. Wei, S. U. Qi-Biao, and H. E. Fei, “Screening and chemical component analysis of anti-hyperuricemic active fraction of ethanol extract from polyrhachis vicina roger in hyperuricemia model mice,” *Chinese Journal of Pharmacology & Toxicology*, vol. 27, no. 4, pp. 673–677, 2013.

[110] Y. F. Liu, Y. Huang, C. Y. Wen et al., “The effects of modified simiao decoction in the treatment of gouty arthritis: a systematic review and meta-analysis,” *Evidence-Based Complementary and Alternative Medicine*, vol. 2017, Article ID 6037037, 2017.

[111] R. Qiu, R. Shen, and D. Lin, “Treatment of 60 cases of gouty arthritis with modified Simiao Tang,” *Journal of Traditional Chinese Medical Sciences*, vol. 2, pp. 94–97, Article ID 18652113, 2008.

[112] Z. J. Li, Z. Li, X. Y. Dong, L. F. Lu, and C. L. Wang, “Hypouricemic and nephroprotective effects of total flavonoids from the residue of supercritical CO2 extraction of Humulus lupulus in potassium oxonate-induced mice,” *Pakistan Journal of Pharmaceutical Sciences*, vol. 30, pp. 493–497, 2017.

[113] A. Yang, H. Guo, M. Fu, and M. Liu, “Inhibitive effects of huashi pill on formation of renal stones by modulating uric biochemical indexes and osteopontin in renal stone rat models,” *Medical Science Monitor*, vol. 25, pp. 8335–8344, 2019.

[114] Z. Guo, J. Zhang, Z. Wang et al., “Intestinal microbiota distinguish gout patients from healthy humans,” *Scientific Reports*, vol. 6, no. 1, Article ID 20602, 2016.

[115] B. Meng and C. Huang, “Effects and efficacy of spleen-strengthening and releasing turbidity method on the intestinal microecology of gout patients,” *Rheumatism and Arthritis*, vol. 10, no. 2, pp. 1–4, 2021.

[116] X. Lin, T. Shao, L. Huang et al., “Simiao decoction alleviates gouty arthritis by modulating proinflammatory cytokines and the gut ecosystem,” *Frontiers in Pharmacology*, vol. 11, p. 955, 2020.

[117] Y. Gao, J. Sun, Y. Zhang et al., “Effect of a Traditional Chinese Medicine Formula (CoTOL) on serum uric acid and intestinal flora in obese hyperuricemic mice inoculated with intestinal bacteria,” *Evidence-Based Complementary and Alternative Medicine*, vol. 2020, Article ID 8831937, 2020.
