

# Dyslipidemia Treatment by Traditional Chinese Medicine: A Systematic Review

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## ABSTRACT

Dyslipidemia is a significant non-communicable disease among adult populations globally. This systematic review focused on understanding current case management using traditional Chinese medicine (TCM) internal and external treatments, integrated TCM, and Western medicine, including other genomic research related to dyslipidemia. This could be used to understand the effectiveness of the care and management of patients with dyslipidemia based on different medical principles. Finally, the information can be used to support clinical decisions to choose the best approach for the care and management of patients.

**Keywords:** *Dyslipidemia; Traditional Chinese medicine treatment; Gene and protein expression*

## Introduction

Dyslipidemia generally refers to the levels of total cholesterol (TC), triglyceride (TG), and low-density lipoprotein cholesterol (LDL-C) higher than normal or the levels of high-density lipoprotein cholesterol (HDL-C) being lower than normal. Dyslipidemia is a common metabolic disease that is an important risk factor for atherosclerotic cardiovascular disease. The high-incidence group consists of middle-aged and elderly people. The modern Chinese medicine believes that dyslipidemia is mainly caused by phlegm, blood stagnation and heat, which is closely related to the dysfunction of liver, spleen, and kidneys, and mostly belongs to the deficiency in origin and excess in superficiality [1–3]. According to its clinical manifestations, it is classified as “phlegm,” “blood stasis,” “vertigo,” “stroke,” and other diseases.

With the improvement of living standards, the level of blood lipids in the Thai population is gradually rising. This leads to a significant increase in the number of patients with dyslipidemia. A cross-sectional study by the Medical Research Network of the Consortium of Thai Medical Schools between 2010 and 2014 showed that 88.9% of patients with diabetes had dyslipidemia [4]. Additionally, dyslipidemia has been associated with chronic kidney disease [5], hypertension [6], erectile dysfunction [7], preterm birth [8], and others.

In this review, we aimed to present the comparisons of several research findings in understanding dyslipidemia with respect to the treatment of internal and external traditional Chinese medicine (TCM), integrated TCM, western medicine

treatment, and related genes and proteins with the regulation mechanism of lipid metabolism.

## Dyslipidemia case management by internal TCM

Several studies have demonstrated the effectiveness of internal TCM in the management of dyslipidemia. A study conducted among 50 dyslipidemia patients with carotid atherosclerosis plaque treated using Erchen and Siwu decoctions for 8 weeks showed that the total effective rate was 88.0%, while that of the Diao zhibituo tablets treatment group was 82.0% ( $p < 0.05$ ) [9]. An 8-week treatment course on Jiangya Tiaozhi decoction among 30 patients with hypertension and dyslipidemia with phlegm-turbidity stagnation demonstrated that the total effective rate was 90.0% in the treatment group and 70.0% in the western medicine treatment group (nifedipine controlled release, irbesartan and hydrochlorothiazide, and atorvastatin calcium tablets), with a significant difference ( $p < 0.05$ ) [10].

The combination of Banxia baizhu tianma decoction and Xuefuzhuyu decoction to 45 patients who had hypertension and dyslipidemia with 8 months course, it was found that the total effective rate of blood lipid was 88.9%, while that of the western medicine treatment group (amlodipine besylate tablets, nifedipine, valsartan, betaloc, rosuvastatin, and atorvastatin) was 85.0% ( $p < 0.05$ ) [11]. Ke [12] used Tongyu huazhuo decoction to treat 64 cases of dyslipidemia for 4 weeks, and the results showed that the Tongyu huazhuo decoction and atorvastatin groups had equivalent curative effects, and the total effective rates were 90.6% and 82.3%, respectively. There was

no significant difference between the two groups ( $p > 0.05$ ); however, the improvement in TC, TG, and HDL-C in the Tongyu huazhuo decoction group was more obvious than the atorvastatin group, and the differences were statistically significant ( $p < 0.05$ ).

A study on 30 dyslipidemia patients with spleen deficiency and phlegm stasis treated using Sanshen tiaozhi decoction for 8 weeks showed that the total effective rate was 93.3%, while that using atorvastatin calcium tablets was 80.0%, and the difference was statistically significant ( $p < 0.05$ ) [13]. A study using Huatan jiangzhi decoction to treat 48 patients with dyslipidemia for a 1-month showed that it could reduce TC, TG, and LDL-C, increase HDL-C, and was significantly better than the simvastatin tablets in reducing TG ( $p < 0.05$ ) [14].

These clinical trials using the TCM approach have shown that several drugs or herbs are effectively used to reduce lipids in patients with dyslipidemia.

#### Dyslipidemia case management by external TCM

The following are the studies on the effectiveness of external TCM in reducing lipid levels among patients with dyslipidemia.

The acupoint catgut embedding therapy (Ganshu [BL18], Pishu [BL20], Shenshu [BL23], Danzhong [RN17], Guanyuan [RN04], Zhongwan [RN12], Tianshu [ST25]) combined with acupuncture (Fenglong [ST40], Zusanli [ST36], Sanyinjiao [SP06], Neiguan [PC06]) was used to treat 35 cases of dyslipidemia with phlegm dampness obstruction, while the control group was only treated using acupuncture for 8 weeks, and the results showed that TC, TG, LDL-C, and HDL-C were improved, and the curative effect of the combined group was significantly better than that of the control group ( $p < 0.05$ ) [15]. A clinical study among 29 obese female patients with dyslipidemia, after 3 months of treatment, the TC, TG, LDL-C, and HDL-C of ear acupuncture (Sanjiao [CO17], Jiaogan [AH6a], Pi [CO13], Shen [CO10], Shenshangxian [TG2p], Neifenmi [CO18], pizhixia AT4) combined with warming needle moxibustion (Fenglong [ST40], Taixi [KI03], Shenshu [BL23], Pishu [BL20], Zhongwan [RN12], Guanyuan [RN04], Taibai [SP03], Yinlingquan [SP09], and Zhongji [RN03]) groups were significantly improved compared to those who were treated only by warming needle moxibustion, and the difference was statistically significant ( $p < 0.05$ ) [16].

Tao et al. [17] used acupoint catgut embedding (Xinshu [BL15], Geshu [BL17], Ganshu [BL18], Pishu [BL20], Shenshu [BL23], Zusanli [ST36], Zhongwan [RN12], and Guanyuan [RN04]) combined with thunder-fire moxibustion to treat 30 patients with the spleen and kidney yang deficiency type dyslipidemia. The course of the treatment was 8 weeks. The results showed that the curative effect of acupoint catgut embedding combined with thunder fire moxibustion was equivalent to that of atorvastatin

calcium tablets, and the total effective rate of blood lipid index was 90.0% vs. 93.3%. There was no significant difference between the two groups ( $p > 0.05$ ); however, the acupoint catgut embedding combined with thunder fire moxibustion improved the mental status, abdominal distension, anorexia, stool, and other TCM symptoms more significantly ( $p < 0.05$ ) than the atorvastatin calcium tablets.

A study on a 49 patients with dyslipidemia who received mild moxibustion using moxa stick (Zusanli [ST36], Shenque [RN08], Sanyinjiao [SP06]) as the main acupoints for 8 weeks showed that the moxibustion and fenofibrate groups had equivalent curative effects, and the total clinical effective rates were 71.4% and 66.7%, respectively [18]. There was no significant difference between the two groups ( $p > 0.05$ ); however, the alanine transferase in the moxibustion group decreased significantly after treatment, and the differences were statistically significant ( $p < 0.05$ ).

A study on electroacupuncture (Quchi [LI11], Zusanli [ST36], Xiajushu [ST39], Shangjushu [ST37], Neiting [ST44], Qianggu [SI02], Erjian [LI02], Tianshu [ST25], Fenglong [ST40]) combined with ear-acupuncture (Waibi [TG1.2i], Pi [CO13], Wei [CO4], Xin [CO15], Xiaochang [CO6], Fei [CO14], Dachang [CO7], Sanjiao [CO17], Neifenmi [CO18]) treated 65 cases with obesity of stomach-intestine excessive heat type complicated with dyslipidemia [19], and the control group treated using only electroacupuncture for 3 months, the results showed that TG, TC, LDL-C, and HDL-C were significantly better than those in the control group ( $p < 0.05$ ).

Based on the above information, many external TCM approaches could significantly reduce lipid levels among patients with dyslipidemia.

#### Dyslipidemia case management by integrated TCM and western medicine

Many studies have demonstrated the effectiveness of controlling and reducing lipid levels in patients with dyslipidemia.

The study on Jianpi Huashi therapy combined with simvastatin tablets was used to treat 53 patients with dyslipidemia in spleen deficiency with phlegm-dampness type [20] for 3 months. The results showed that the total effective rate was 90.6%, while that of the simvastatin tablets treatment group was 75.5%, and the difference was statistically significant ( $p < 0.05$ ). An interesting study was conducted using the Banxia Baizhu Tianma decoction combined with amlodipine besylate and atorvastatin calcium tablets in 58 patients with hypertension combined with dyslipidemia of phlegm-dampness stagnation type [21]. The course of treatment was 2 months, and the total effective rate was 91.4%, while that of the amlodipine besylate and atorvastatin calcium tablets treatment group was 75.9%. Systolic blood pressure (SBP), diastolic blood pressure (DBP), TG, TC, LDL-C, and HDL-C were

improved, and the difference was statistically significant ( $p < 0.05$ ).

In a study among 37 patients with dyslipidemia, Qutan huazhuo decoction combined with atorvastatin tablets and atorvastatin tablets alone were used for 8 weeks, with the total effective rate of 91.2% and 69.1%, respectively and the difference was statistically significant ( $p < 0.05$ ) [22]. Another study was conducted in China [23] by using resolving phlegm and promoting blood circulation methods with simvastatin dispersible tablets to treat 40 patients with dyslipidemia for 8 weeks. The results showed that TC, TG, LDL-C, apolipoprotein B (Apo-B), endothelin, and nitric oxide were improved, and the difference was statistically significant ( $p < 0.05$ ).

Huoxue huayu jiangzhi decoction combined with simvastatin capsules was used to treat 48 patients with dyslipidemia; after treatment, the total effective rate was 93.8%, which was significantly better than that using simvastatin capsules (81.3%) ( $p < 0.05$ ) [24]. A study among 48 patients with spleen deficiency and phlegm stasis type dyslipidemia by using Dantian Shenzhu decoction combined with atorvastatin calcium dispersible tablets demonstrated that TG, TC, LDL-C, and HDL-C were improved, and the effective rate was 93.8%, which was significantly better than that using atorvastatin calcium dispersible tablets (77.8%) ( $p < 0.05$ ) [25]. Additionally, Hedan zhaze decoction combined with atorvastatin calcium tablets was used to treat 30 patients with dyslipidemia for 4 weeks showed that the total effective rate was 93.3% in the treatment group and 73.3% in the atorvastatin calcium tablets treatment group ( $p < 0.01$ ). The levels of HDL-C, LDL-C, TG, and TC decreased significantly [26]. Many studies have shown that integrative TCM and Western medicine can effectively control lipid levels in dyskinesia.

### **Correlation between the expression of related genes and proteins with the regulation mechanism of lipid metabolism**

In this study, we presented the mechanism of lipid metabolism based on several studies.

Danhong injection could inhibit the activation of the nucleotide-binding domain-like receptor protein 3 inflammatory complex pathway, reduce the expression of Caspase-1, interleukin (IL)-1 $\beta$ , and IL-18, and regulate the levels of TC and TG in hyperlipidemic rats with cerebral ischemia-reperfusion injury [27]. Thirty patients with hyperlipidemic pancreatitis were treated using oral liquid of *Rosa roxburghii* Tratt and *Crataegus pinnatifida* based on routine pancreatitis treatment [28]. The results showed that the levels of TC, TG, LDL-C, and HDL-C were improved, and the expression of LPL mRNA and protein in liver tissue was significantly increased. The mRNA expression of nuclear factor erythroid 2-related factor 2 (Nrf2) and gamma-glutamylcysteine synthetase ( $\gamma$ -GCS) in the liver tissue of

hyperlipidemic rats was determined using quantitative real-time polymerase chain reaction, and it was found that Hedan Sanqi Jiangzhi tablet could regulate the levels of TC, TG, and LDL-C in serum and significantly increase the expression of Nrf2 and  $\gamma$ -GCS mRNA in liver tissue [29].

Gypenoside granules could promote the protein expression of ABCA1, increasingly regulate the gene expression of ABCA1, CYP7A1, and SR-BI, and regulate the level of blood lipids [30]. Combined with atorvastatin, Gypenoside granules could synergistically reduce blood lipids. Moreover, modified rhizoma alismatis decoction can reduce serum TG, TC, and LDL-C, significantly increase the content of HDL-C, and regulate the expression of AQP3 gene protein in colon tissue [31]. Additionally, Sini powder can prevent the increase in serum TG and LDL-C levels, increase HDL-C and ApoA-I levels, and significantly increase ApoA-I mRNA expression in the liver [32].

### **Conclusion**

According to many factors that cause these effects, the incidence rate of dyslipidemia is continuously increasing, which affects our health and quality of life. Statins are commonly used in clinical practice. It significantly helps to regulate blood lipid levels. It reduces LDL and TC levels. Statins appear to have a fast-healing efficacy and reduce mortality owing to cardiovascular diseases. Therefore, statins are widely used in clinical practice; however, researchers have also found that using statins alone or in combination with other drugs can cause adverse reactions in patients. It effects the treatment and overall results, namely statin-associated muscle symptoms [33], new-onset diabetes [34], and drug-drug interactions [35].

The role of modern Chinese medicine in regulating blood lipids has become increasingly prominent, with fewer adverse reactions and a high effective rate [36]. TCM believes that dyslipidemia is mainly caused by external factors such as inappropriate diet, excessive consumption of fatty and sweet foods, emotional stress, and exhaustion. The accumulation of phlegm and blood stasis is an internal cause of dyslipidemia. The deposition in the blood vessels after the transformation of lipids appears to be the main factor that causes dyslipidemia to develop into cardiovascular disease. Dyslipidemia is closely related to liver, spleen, and kidney dysfunction. In clinical practice, the treatment of dyslipidemia mainly involves invigorating the spleen to eliminate dampness, promoting qi and resolving phlegm, promoting blood circulation by removing blood stasis, and tonifying the liver and kidney [37].

The treatment of TCM is individualized. TCM choose the appropriate treatment according to the different patients' conditions, such as those with spleen deficiency and excess dampness should be treated by

invigorating the spleen to eliminate dampness. The method of promoting blood circulation by removing blood stasis should be used in patients with phlegm and blood stasis. The treatment methods can change during the disease progression, and dyslipidemia has its own characteristics from mild to severe conditions. Therefore, different treatment methods should be used during dyslipidemia treatment at different stages.

The speed of disintegration and absorption for various TCM dosage forms differ. The time and interval of medication use are also different. The absorption of the pill is slow; therefore, the effect is mild, and the action can last longer. Decoction, liquor, and syrup have faster absorption, and rapid effect. The time of Chinese prescription or the number of times of acupuncture and moxibustion treatment was determined according to the patient's condition, drugs, and other specific conditions. In patients with adverse reactions [38, 39], treatment should be discontinued immediately, and other treatment methods should be used with caution after the symptoms are relieved.

The existing literature is limited, often focusing on the treatment of dyslipidemia using Chinese medicine; the curative effect of Chinese herbal medicine, acupuncture, moxibustion, and acupoint catgut embedding; and only a few studies have integrated treatment of TCM and western medicine using modern scientific methods. TCM treatment of dyslipidemia has the highest degree of development, and there are still many effective reports in the literature to be studied.

Additionally, some challenges persist in treatment using Chinese medicine, such as international nomenclature, body and auricular acupuncture point location in the body area appear to be generally well-defined, quality and safety of Chinese herbal medicines, and lack of standards and specifications that reduce the credibility of TCM. Therefore, a standard treatment for dyslipidemia in TCM must be established to develop and grow globally.

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