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# Fasting Therapy of Chinese Medicine for Rheumatoid Arthritis and Multiple Comorbidities: A Case Report

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## Abstract

Fasting therapy of Chinese Medicine was put forward by Professor Qin Jian based on the theory of fat and grease from The Yellow Emperors Internal Classi and modified on the basis of Buchinger fasting therapy. Here we try to report a female patient with the chief complaint of arthralgia who was diagnosed as rheumatoid arthritis, non-alcoholic fatty liver disease and suspected type 2 diabetes mellitus, also diagnosed by Chinese medicine with Bi disease of spleen deficiency and phlegm dampness syndrome. After admission, the patient was treated with fasting therapy of Chinese Medicine for a week. Considering that she was in the menstrual period, she was given a very-low-calorie diet during that time. Moreover, she was given L-carnitine injection, health education and traditional Chinese medicine treatment, including foot massage, acupuncture and acupoint application everyday. After discharge, she was asked to take low-calorie diet and modified Linggui Zhugan Decoction for another week. After that, she followed the doctor's instructions for long-term caloric control. A year later, the reexamination showed that her condition was improving.

**Keywords:** Fasting therapy of Chinese Medicine; Rheumatoid arthritis; Type 2 diabetes mellitus; Non-alcoholic fatty liver disease; Bi disease; Spleen deficiency and phlegm dampness syndrome

## 1. INTRODUCTION

Rheumatoid arthritis (RA) is a systemic immune disease characterized by arthritis and is more common in women[1]. The main treatment of RA is disease-modifying anti-rheumatic drugs (DMARDs), which costs high and the efficacy and safety still need to be verified[2]. Type 2 diabetes mellitus (T2DM) is a group of metabolic abnormalities characterized by fasting and postprandial hyperglycemia due to insulin resistance and insulin -cell deficiency[3].

Currently, the first choice for T2DM is Metformin, which needs long-term use and is prone to cause gastrointestinal symptoms and hypoglycemia[4].

The guidelines of the Buchinger fasting therapy proposes that medically supervised modified fasting is effective in the treatment of rheumatic diseases, chronic pain syndromes, and metabolic syndromes[5]. Based on Buchinger fasting therapy and the theory of fat and grease from The Yellow Emperors Internal Classi [6], Professor Qin Jian from the Seventh Affiliated Hospital of Sun Yat-sen University used traditional Chinese medicine and intravenous L-carnitine to eliminate hunger, hypoglycemia and other adverse reactions during fasting, gradually formed the fasting therapy of Chinese Medicine. The expert consensus on fasting therapy of Chinese Medicine has proposed clinical indications for fasting therapy of Chinese Medicine including metabolic diseases, digestive system diseases and connective tissue diseases[7].

Here we try to introduce a case of RA and some complications treated with fasting therapy of Chinese Medicine from the Seventh Affiliated Hospital of Sun Yat-sen University.

## 2. CASE REPORT

### 2.1 General condition

A 46-year-old female was admitted to hospital on January 11, 2020, with the chief complaint of "recurrent multi- arthralgia for 20 years and aggravate for a month". The main symptoms were the pain of bilateral metacarpophalangeal joint and proximal interphalangeal joint, with no cold and fever, no dyspnea, no abdominal pain and diarrhea, and normal urine and feces. She felt general fatigue and weakness. Her last menstrual period was December 13, 2019. Vital signs of the patients were in the normal ranges with 36.4 body temperature, 106/60 arterial blood pressure, 20/min respiratory rate, and 76/min heart rate. Her body mass index (BMI) was 24.2kg/m<sup>2</sup>. Physical examination showed Bilateral metacarpophalangeal joint and interphalangeal joint, bilateral knee joint, lumbosacral joint, cervical spine 1-4, bilateral shoulder joint symmetry tenderness, no articular deformity, arthrocele, no rheumatoid nodules. No abnormality was found in other system. Her tongue was dark, the moss was white and greasy, the pulse was smooth. Laboratory investigations showed the following results: RF was <20 (normal range: <30 IU/ml), ASO was 95 (normal range: 0-200 IU/ml), CRP was 2.58 (normal range: <5.0 mg/L), HbA1c was 5.4(normal range: 4.0-6.4

### 2.2 Diagnoses

The diagnosis of Chinese medicine (CM) was Bi disease( ) of spleen deficiency and phlegm dampness syndrome( ) [8]. According to the 2010 American College of Rheumatology/European League of Rheumatology diagnostic criteria for rheumatoid arthritis[9] and the American Diabetes Association (ADA)[10] diagnostic criteria for diabetes, the patient was diagnosed as RA and suspected T2DM. The patient was overweight according to BMI, and was diagnosed as moderate non-alcoholic fatty liver disease.

### 2.3 Treatments

After admission on January 11, 2020, the patient was given Chinese medicine fasting therapy. Since she was in the menstrual period, in order to avoid abnormal blood coagulation function,

she was given very-low-calorie diet (300-500kcal/d) on day 1-5 and 7, and completely fasting on day 6. She was asked to drink 2-3 L water per day. On day 2-7, L-carnitine injection was injected 2g/d. Moreover, she was given traditional Chinese medicine treatment, including foot massage for 40min/d, acupuncture for 20-30min/d and acupoint application for 4-8h/d. The Chinese medicine for foot massage( )were as follows: *Loranthus parasiticus* 15g, *Eucommia ulmoides* 15g, *Safflower* 15g, peach seed 15g and *Cyathula officinalis* 15g. They were placed in the foot bath together with 1500ml hot water. Acupuncture points include Zhongwan, Xiawan, Qihai, Guanyuan, Tianshu, Daheng, Daimai, fujie, binao, Shousanli, Zhigou, Fengshi, Xuehai, Zusanli, Yinlingquan, Fenglong, Taichong. Six points were applied for acupoint application: Zusanli, Pishu, Shenshu. She was asked to exercise for about an hour and receive health education for another hour every day.

After discharge, she was asked to have low-calorie diet(1200-1500kcal/d) combined with modified Linggui Zhugan Decoction consolidation treatment for a week. The components of modified Linggui Zhugan Decoction( )were as follows: *Astragalus membranaceus* 30g, *Morinda officinalis* 12g, *Codonopsis pilosula* 15g, *Licorice* 6g, *Atractylodes* 20g, *Cassia twig* 10g, *Coix seed* 20g, *Chinese yam* 15g, *Pinellia ternata* 10g, *Poria cocos* 15g, *Tangerine peel* 6g, which were diluted into 1000ml with boiling water. It was consumed twice doses per day frequently in small quantities when hungry.

After one week, she followed the doctor's advice and underwent caloric control—low-carbon diet and do exercise more than 100 minutes per week.

#### 2.4 Therapeutic Effect

During fasting therapy of Chinese Medicine, the blood glucose monitoring values were in normal range. After a week of therapy, her arthralgia was relieved, and her mental state was good. Vital signs were in the normal ranges. Her BMI was 22.5kg/m<sup>2</sup>. Articular tenderness was significantly reduced, and no articular deformity, arthrocele, no rheumatoid nodules were observed. Laboratory investigations showed the following results: RF was <20 (normal range: <30 IU/ml), ASO was 96 (normal range: 0-200 IU/ml), CRP was 2.69 (normal range: <5.0 mg/L), fasting blood glucose was 3.1mmol/L, total cholesterol was 7.83(normal range: <5.18 mmol/L), HDL was 0.77(normal range: 1.04-1.55 mmol/L), LDL was 6.14(normal range: <3.37 mmol/L), Uric acid was 673.5mmol/L(normal range: 150.0-350.0 mmol/L).

The patient got a reexamination on April 25, 2021. Vital signs were in the normal ranges. Her BMI was 23.7kg/m<sup>2</sup>. No articular tenderness, arthrocele and articular deformity was observed. Laboratory investigations showed the following results: HbA1c was 5.4(normal range: 4.0-6.4 %), OGTT 0h, 1h, 2h were 3.82 (normal range: 3.9-6.1 mmol/L), 9.25 (normal range: <11.1 mmol/L), 9.16 (normal range: <7.8mmol/L), total cholesterol was 7.08(normal range: <5.18 mmol/L), HDL was 0.82(normal range: 1.04-1.55 mmol/L), LDL was 4.97(normal range: <3.37 mmol/L). Her abdominal ultrasonography reported the B-ratio was 1.31.

After a week of fasting therapy, her arthralgia relieved, BMI returned to normal, mental state improved, and blood sugar was controlled within the normal range. After a year, the decrease of B-ratio indicated that the non-alcoholic fatty liver disease was improved. OGTT test indicated that the T2DM had reversed to prediabetes.

### 3. Discussion

#### 3.1 Fasting Therapy Theory in Traditional Chinese

The Yellow Emperors Internal Classic pointed out that insufficient or redundant fat and grease ( ) are harmful to human body, and maintaining proper ratio of fat and grease is important to maintain health. Redundant fat and grease will gather and generate into dampness, phlegm, turbidity, causing disease. Fat and grease can be considered as lipids in modern medicine. Excessive fat and grease will lead to abnormal glucose and lipid metabolism, insulin resistance, and then induce hyperlipidemia and diabetes[11]. Professor Qin Jian put forward the Chinese medicine fasting therapy from the theory of "Strong flavor causing malfunction and light taste causing normal functioning" ( ) in "Su Wen· The Great Theory of Yin Yang Ying Xiang" ( ). He believed that the excessive intake of fat and sweet will lead to excessive accumulation of fat and grease, resulting in functional disorders, which can be eliminated as long as light taste, namely "bo" ( ). The ultimatum of "bo" ( ) is fasting therapy.

Traditional Chinese medicine believes that the pathogenesis of RA is based on spleen deficiency and phlegm dampness. Spleen deficiency caused by Qi and blood insufficiency. Yingwei disorder leads to sputum and stasis knot together, and cause arthralgia. Studies have shown that obese T2DM patients are mostly of spleen deficiency and phlegm dampness syndrome, and the treatment needs to tonify the spleen and remove phlegm, dampness and turbidity[12]. Modified Linggui Zhugan Decoction used in fasting therapy of Chinese Medicine is beneficial to tonify Yang, qi, spleen and eliminate the water dampness phlegm fluid, getting a therapeutic effect[13]. Modified Linggui Zhugan Decoction can also reduce the patient's hunger and fatigue, thereby improving the patient's treatment compliance.

Intravenous administration of L-carnitine during fasting can promote lipid metabolism, let T2DM patients with phlegm-dampness lose weight effectively. It also reduce insulin resistance, and effectively improve the energy deficiency manifestations such as fatigue, tiredness, heavy head and sleepiness during fasting[14]. Acupuncture and acupoint application can tonify qi and spleen, remove dampness and Phlegm, relieve arthralgia, promote recovery[15], assist fat reduction and avoid adverse reactions. Foot massage can tonify the kidney and spleen, promote blood circulation, relieve muscle soreness and other discomfort caused by exercise during fasting. Carry out health education for patients and improve their cognition is an important part of fasting therapy of Chinese Medicine. Learning healthy diet, food nutrition, correct exercise, obesity hazards and other knowledge during hospitalization can improve patients' self-discipline after discharge. The patient mentioned above got better one year later was due to her long-term adherence to caloric control.

#### 3.2 Molecular Mechanisms of fasting therapy for clinical treatment

A randomized controlled trial have shown that fasting reduces the activity of RA[16]. The patient's symptoms of RA alleviated after Chinese medicine fasting therapy, which was consistent with our expectation. Fasting can reduce the release of proinflammatory mediators from RA neutrophils, thereby reducing the inflammatory response and alleviating symptoms[17]. Chronic inflammation in RA is associated with dyslipidemia, fasting may alleviate the symptoms of RA by improving lipid metabolism[18]. Nonalcoholic fatty liver

disease also got better after treatment in this patient, which may be related to the fact that fasting increases AMP-activated protein kinase (AMPK) activity and inhibits the mTOR pathway, thereby inhibiting adipogenesis[19].

A previous study found that carbohydrate tolerance improves in obese diabetic (NIDDM) women after a three-day fasting. The mechanism of fasting therapy in alleviating T2DM is mainly reflected in reducing insulin resistance and improving islet  $\beta$ -cell function. Firstly, fasting can up-regulate AMPK pathway to improve glucose uptake in liver and muscle[ ]. It can also up-regulate the phosphatidylinositol 3-kinase (PI3K)- protein kinase B (PKB/Akt) signal to enhance glucose metabolism, and then reduce insulin resistance[ ]. Moreover, fasting can inhibit the inflammatory response[ ], so as to enhance the body's sensitivity to insulin. Secondly, fasting can significantly reduce  $\beta$ -cell dedifferentiation and increase the expression of  $\beta$ -cell specific transcription factors[ ]. It also reduces proinflammatory mediators, increases anti-inflammatory cytokines, and reduces inflammation, thereby reducing  $\beta$ -cell damage[ ]. The patient developed hyperuricemia after fasting, which was related to ketoemia caused by fasting. The increased organic acid inhibited the secretion of uric acid from renal tubules and reduced uric acid excretion.

#### 4. SUMMARY

Rheumatoid arthritis, non-alcoholic fatty liver disease and type 2 diabetes all need long-term treatment to prevent complications. The combination of multiple chronic diseases will undoubtedly bring a lot of pain and heavy economic burden to patients. This case of a female has achieved good therapeutic effect through fasting therapy of Chinese Medicine, which provides a new option for such patients. The safety and effectiveness of fasting therapy of Chinese Medicine have been confirmed by clinical trials, which is worthy of further promotion in clinical practice. However, many molecular mechanisms of fasting therapy, such as anti-inflammatory, anti-oxidative stress and immune regulation, still need to be further studied. Fasting therapy of Chinese Medicine requires long-term cooperation from patients and long-term follow-up and observation from medical and nursing staff. Therefore, how to improve patients' self-discipline and compliance is our future direction.

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#### STATEMENT

Zhu Ji-ying and Cao Nan participated in the treatment of this patient and drafted the manuscript; Cao Nan, Chen Hongda and Qin jian developed the treatment plan for this patient. All authors read and approved the final manuscript.

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