

Effect of Yiqi Gubiao Pill on Metabolic Inflammation in COPD Mice by Promoting Brown Browning of White Fat Through SIRT1/PPAR γ /UCP1

Qianqian Liang¹, Yide Wang¹, Zheng Li^{1, 2, 3, 4, *}

¹Department of Integrated Pulmonology, Fourth Clinical Medical College of Xinjiang Medical University, Urumqi, China

²Xinjiang National Clinical Research Base of Traditional Chinese Medicine, Urumqi, China

³Xinjiang Key Laboratory of Respiratory Disease Research, Urumqi, China

⁴Xinjiang Clinical Medical Research Center of Respiratory Obstructive Diseases, Urumqi, China

Email address:

149668116@qq.com (Zheng Li)

*Corresponding author

Abstract

Objective: To study the effects of Yiqi Gubiao Pill on metabolic inflammation in COPD model mice by promoting white fat Browning of visceral fat through SIRT1/PPAR γ /UCP1. **Methods:** Thirty male C57BL/6 mice aged 6-8 weeks and weighing 18-22g were randomly divided into normal group, COPD group, COPD+ Yiqi Gubiao pill group, SIRT1 inhibitor (nicotinamide) group and SIRT1 inhibitor + Yiqi Gubiao pill group with 10 mice in each group. Western Blot assay of silencing information regulator 1 (SIRT1) in white adipose tissue around epididymis Peroxisome proliferator-activated receptor γ (PPAR γ), enzyme conjugated protein 1 (UCP1), peroxisome proliferator-activated receptor γ -coactivator 1 α (PGC-1 α), PR domain protein 16 (PRDM16), tumor necrosis factor α (TNF- α), interleukin-6 (IL-6), interleukin-1 α Protein expression of 8 (IL-8). The mRNA levels of IL-6, IL-8 and TNF- α in mouse visceral adipose tissue were detected by Real-time PCR. The expression of IL-6, IL-8 and TNF- α in peripheral blood was detected by enzyme ELISA. HE staining was used to observe the pathological morphology and adipose cell size of lung tissue and adipose tissue, and immunofluorescence was used to observe the expression levels of UCP1, IL-6, IL-8 and TNF- α in adipose tissue. **Results:** (1) Compared with normal group, the lipid-body ratio and Lee's index ratio of COPD mice were increased, the difference was statistically significant ($P < 0.05$), Compared with COPD group, the lipid-body ratio and Lee's index ratio in COPD+ Yiqi Gubiao pill group were decreased, and the difference was statistically significant ($P < 0.05$). (2) HE results showed that compared with the normal group, the volume of white fat and brown fat cells and the content of intracellular vacuoles increased in COPD group, and lipid droplets decreased significantly in Yiqigupiwang group after intervention. (3) Yiqigutable pills could inhibit the expression of inflammatory factors such as IL-6, IL-8 and TNF- α in visceral fat and peripheral blood serum of COPD mice, and the differences were statistically significant ($P < 0.05$). (4) Yiqi Gupiao pill could promote the expression of SIRT1, PPAR γ , UCP1, PGC-1 α and PRDM16, and the differences were statistically significant ($P < 0.05$). (5) Immunofluorescence showed that Yiqi Gubiao pill could enhance the fluorescence intensity of UCP1 in white adipose tissue (WAT) and brown adipose tissue (BAT) in COPD group, and the difference was statistically significant ($P < 0.05$). **Conclusion:** (1) The abnormal accumulation of visceral fat in COPD mice may be an important factor leading to the high level of inflammation in COPD. (2) The

intervention of Yiqi Gubiao pill can significantly reduce the visceral fat accumulation in COPD mice, and promote the energy consumption of adipocytes by targeting SIRT1/PPAR γ /UCP1 pathway, promote the Browning process of white fat, and thus reduce the level of metabolic inflammation in vivo, thus playing a therapeutic role.

Keywords

Yiqi Gubiao Pills, Chronic Obstructive Pulmonary Disease, SIRT1/PPAR γ /UCP1 Signaling Pathway, White Fat Brown, Inflammation