ArvinMed International

Complementary and Alternative Medicine: Open Access

Case Report

László A, et al. Com Alt Med: CAM-105.
doi: 10.9016/CAM-105/1000105.

Treatment of Therapy Resistant Dyspnea with Traditional Chinese Medicine

Andrea László MD[1], Sabine Albrecht MD[1], Stefan Hager MD[1], János Nemcsik MD, PhD[2,3], Peng Shiqiao[1,4], Dai Jingzhang MD[1,4] Gabriella Hegyi MD. PhD[5*]

[1]First German Hospital for Traditional Chinese Medicine, Germany
[2]Department of Family Medicine, Semmelweis University Budapest, Hungary
[3]Health Service of Zugló (ZESZ), Budapest, Hungary
[4]University Hospital at Beijing University of Chinese Medicine, China
[5]University Pecs, TCM Confucius Institute, Hungary

[*]**Corresponding author:** Gabriella Hegyi, 82340 Bahnhofstraße 35, Feldafing, Germany. Tel: +491799787070; Email: laszloandrea@gmail.com

Citation: László A, Albrecht S, Hager S, Nemcsik J, Shiqiao P, et al. (2018) Treatment of Therapy Resistant Dyspnea with Traditional Chinese Medicine. Com Alt Med: CAM-105. doi: 10.9016/CAM-105/10000105

Received Date: 13 October, 2018; **Accepted Date:** 16 October, 2018; **Published Date:** 24 October, 2018

Abstract

Background: *Asthma and chronic obstructive pulmonary disease (COPD) are the leading causes for dyspnea. Guidelines suggest many therapeutic options for the treatment of these respiratory symptoms with Western medicine. However, there is still a lack in therapy control, and the side effects of the used drugs are also not neglect able. Traditional Chinese Medicine might offer an individual, safe and effective complementary therapy option.*

Case presentation: *A 60-year-old Caucasian man suffering from asthma and COPD had a recourse to our clinic. His chronic exertional breathlessness was diagnosed as having no other origin but his primary diseases. The use of Western medicine left his symptoms unchanged. After three weeks of therapy with Traditional Chinese Medicine containing a combination of herbal extracts and acupuncture, his dyspnea disappeared, enabling the patient to cope with his workload. Altogether three months later his pulmonary function test has notably improved compared to the previous one (Maximal vital capacity 102% vs. 51%, Forced expiratory volume in 1 second 106% vs. 52%, Total lung capacity 107% vs. 69%, respectively).*

Conclusions: *Chinese medicine appears to be a good integrative method, especially in therapy resistant anhelation or poorly controlled respiratory diseases. A high number of patients suffering from such conditions might be affected, to whom complementary medicine could be helpful.*

Keywords: Dyspnea, Asthma, COPD, Traditional Chinese Medicine

Background

Dyspnea is defined by the American Thoracic Society as a subjective experience of breathing discomfort that consists of qualitatively distinct sensations varying in intensity [1]. A peak incidence of the symptoms of breathlessness is between 55 and 69 years of age [2]. In 85 percent the causes of anhelation are asthma, chronic obstructive pulmonary disease (COPD), pneumonia, interstitial lung disease, congestive heart failure, cardiac ischemia or psychogenic conditions [3, 4]. If the symptom lasts for longer than one month, they are defined as a chronic dyspnea [5]. Chronic dyspnea usually appears due to one of the following causes: mostly bronchial asthma, COPD, congestive heart failure, interstitial lung disease, pneumonia, or mental disorders like anxiety disorders, panic disorders or somatization disorders [6, 7].

Asthma as one of the most common causes of anhelation, affects 24 million people worldwide [8]. The chronic inflammation of the respiratory tract is associated with airway hyper responsiveness leading to recurrent episodes of breathlessness, wheezing, chest tightness, and coughing [9]. Another important cause of dyspnea is COPD. Around 2% of the whole population – 4.5% of all people aged over 40 – suffer from diagnosed COPD [10]. This disease is characterized by persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities. Next to breathlessness, the most frequent symptoms are coughing and/or sputum

production, although the symptoms are commonly under-reported by patients [11].

Many categories of drugs were developed to treat asthma and COPD. These are bronchodilators (β-adrenergic agonists, anticholinergics and methylxanthines) and anti-inflammatory agents (corticosteroids, antileukotrienes and mast cell stabilizers) [12] against asthma. Short-and long-acting bronchodilators are the mainstays of therapy for COPD, inhaled corticosteroids are reserved for patients with refractory or severe disease [13].

Current synthetic drugs used in the pharmacotherapy are unable to act during all stages and towards all targets of asthma [14], and there is no curative therapy available. Pharmacologic therapy for COPD reduces symptoms and the frequency, as well as the severity of exacerbations. It improves exercise tolerance and health status of the patients [11], but there is no existing medication that could modify the long-term decline in lung function [15-18]. Moreover, side effects from chronic use of current drugs are an issue of concern [19, 20].

Hence, it is not surprising, that at least one-fifth of patients with respiratory disorders, such as asthma and COPD are longing for complementary and alternative treatments, including acupuncture, herbal medicine, and lifestyle advice [21, 22]. Recently, multiple clinical studies showed that Traditional Chinese Medicine (TCM) is safe and effective for the treatment of asthma [23, 24]. As reviewed by Li et al., several clinical studies showed an improvement in lung functions, were all addressed safety and well tolerated. Although demonstrating significant improvement in asthmatic symptoms, all studies have limitations such as short follow-up periods or small sample size in the placebo arm [24]. On the other hand, there is accumulating evidence proving that TCM -including internal and external therapies – might have potential advantages in COPD as well [25-33]. Thus, the frequency of acute exacerbation was found to be reduced, leading to an improvement of life quality [34]. However, to our knowledge there are so far no reports available providing data on the effectiveness of TCM therapy in asthma-COPD overlap syndrome.

Case Presentation

Our clinic received a 60-year-old male patient suffering from asthma and COPD, with chronic dyspnea lasting for the past eight months. Symptoms occurred after even as little as 1-2 minutes walking or speaking. In the medical history hypertension, benign prostatic hyperplasia, hypercholesterinaemia, low-grade aortic insufficiency, hepatic steatosis, pollenosis and penicillin allergy were mentioned. The patient was operated for right-side inguinal hernia, left ankle ligament rupture and left medial meniscus rupture. The patient's medication consisted of amlodipin (2x5mg), pantoprazol (2x40 mg), beclometason/ formoterol spray (100 µg/6 µg 2-0-2), salbutamol (1,25 mg/2,5 ml 1-0-1), ebastin (20 mg 1-0-1), atorvastatin (20 mg 0-0-1), and bisoprolol (5 mg 1-0-1).

The non-smoking patient suffered from recurrent respiratory tract infection with anhelation for the past 30 years. Returning to Germany from the Caribbean in February 2016, his new dyspnea was provoked even after minimal load. No infections were detected. The intermittent coughing was accompanied by no, or only little sputum of white color. Hemoptysis, fever, night sweating or weight loss were not present. The thorax X-ray from March 2016 did not show any infiltrate, only some light chronically increased bronchovascular markings due to the primary asthmatic disease were present. The pulmonary function test showed a moderately obstructive and restrictive ventilatory defect. In the computed tomography of May 2016, accented paratracheal lymph nodes on the right side and around the right hilus with its maximal intensity next to the right primary bronchus (maximal height: 12 mm) were visible. An examination by a cardiologist in an outpatient clinic failed to show any cardiologic origin of the breathlessness. The ENT specialist diagnosed gastroesophageal reflux disease and recommended to continue the PPI therapy. The ergospirometry in May 2016 failed to show any restriction of the lung function, but showed an increased basal heart rate; the cardio workout was about 160/min (140 Watt). The renin, aldosterone and aldosterone/renin ratio and the urine catecholamines were in normal range.

The findings of the physical examinations were normal except for slightly reduced respiratory sounds – during speaking a light dyspnea was obvious. Physical parameters were in normal range: the ranges of systolic and diastolic blood pressures were 120-150/70-90 mmHg, the heart rate between 60-82/min, and the oxygen saturation between 94-97%. Laboratory findings showed a slightly increased serum glutamic-pyruvic transaminase level (GPT=86.9 U/l), while the other parameters were in the normal range. In the psychological conversations there were no signs of depression, schizophrenia, anxiety-, panic-, mental- or somatization disorders.

When he was observed in our clinic, the patient's tongue was pale and fissured with a white tongue coating. The pulse was deep, chordal; the kidney (chi) pulse was weak. The Chinese diagnosis was 'Spleen-Lung-Qi-deficiency'. The therapy consisted of Chinese herbal tea two times per day, acupuncture three times per week and a daily qigong therapy. The first prescription to be ingested for seven days consisted of: Astragali radix (Huangqi) 6 g Codonopsis pilosulae radix (Dangshen) 6 g, Atractylodis macrocephalae rhizoma (Baizhu) 6 g, Poria (Fulingkuai) 6 g, Polygonati rhizoma (Huangjing) 6 g, Lycii fructus (Gouqizi) 6 g, Ophiopogonis radix (Maidong) 6 g, Schisandrae fructus (Wuweizi) 3 g.

After one week the prescription was changed based on the purple tongue with thin greasy and yellow tongue coating adding 'blood stasis' and 'phlegm' to the Chinese diagnosis. Additional night sweating appeared. The second recipe consisted of: Poria (Fulingkuai) 6 g, Schisandrae fructus (Wuweizi) 3 g, Ephedrae herba (Mahuang) 3 g, Persicae semen (Taoren) 6 g, Armeniacae amarum semen (Kuxingren) 6 g, Luffae fructus retinervus (Sigualuo) 6 g,

Magnoliae officinalis cortex (Houpo) 6 g, Curcumae radix (Yujin) 6 g, Mori radicis cortex (Sangbaipi) 6 g, Bambusae caulis in taeniam (Zhuru) 6 g, Phragmitis rhizoma (Lugen) 6 g, Imperatae rhizoma (Baimaogen) 6 g, Lycii radicis cortex (Digupi) 6 g, Rhizoma sparganii tuber (Sanleng) 6 g.

The following points were targeted with acupuncture: Conception Vessel 4, 12, 17; Spleen 6, 15; Large intestine 4, 11; Stomach 37.

Ingestion of this second prescription for 2 days reduced the anhelation. 9 days later the patient could walk without limits (10 km daily were reported). The salbutamol medication could be stopped on the 14thday of the therapy and five days later the beclometason/formoterol doses could be halved. On the 22nd day of the therapy the GPT level was reduced to 58.3 U/l.

After four complete weeks of therapy in the clinic, the patient was discharged in a very good condition without any signs of dyspnea and even with reduced respiratory medication. Treatment with the applied Chinese herbs was continued for two months after the discharge with a reduced dose of only 3 g each. The difference between the two lung function tests before and after Chinese medicine treatment is shown in Table 1. In November 2016 the patient visited or outpatient department without any symptoms of breathlessness; further therapy was found not to be necessary.

Discussion

In our case report a patient with treatment-resistant asthma and COPD was demonstrated, for whom excellent results could be achieved by a combination therapy of herbal extracts and acupuncture.

According to TCM, dyspnea mainly occurs due to the energetic problems of functional circles like lung, spleen and kidney. The aim of the therapy is to restore the function of these functional circles, enhancing the circulation of Qi. To that aim TCM uses herbs and acupuncture asits main two therapy methods.

The use of herbal medicine is increasing dramatically in the last decades worldwide [14, 35-37]. Thus, more than 400 medical plant species are known with applications in traditionally and ethanopharmacologically to treat the symptoms of asthmatic disorders [12].

Chinese herbs form one of the most important and effective pillars of TCM, with reports on physiological effects in several studies. They do not only enable the improvement of asthmatic symptoms for example through direct spasmolytic effects, inhibiting the airway hyper-responsiveness and blocking the acetylcholine-induced tracheal ring constriction [38-41], but also impact the regulation of the immune system, inhibiting the inflammatory cell infiltration of eosinophils, neutrophils, lymphocytes and macrophages into lung tissue or into the bronchoalveolar lavage fluids [42-44]. Furthermore, some Chinese herbs inhibit the production of Immunoglobulin E and the expression of inflammatory cytokines (such as TNF-alfa, IL-1β, IL-6, and macrophage-inflammatory peptide-2 by attenuating the activation of nuclear factor-kappa B) [45-49]. Herba ephedrae is the most commonly used Chinese herb to treat dyspnea. Interestingly, of the most frequently used Chinese herbs treating respiratory diseases, like Radix glycyrrhizae, Semen armeniacae amarum, Fructus schisandrae chinese, Herba ephedrae and Radix ginseng (including in the prescriptions 47.2%, 36.7%, 21.2%, 20.6%, 19.4%, respectively), only Herba ephedrae was used in our prescription [50]. Said herb can improve the flow of Lung Qi in order to relieve cough and anhelation, and has been used in China for thousands of years. It was reported to have anti-inflammatory, anti-tussive and anti-asthmatic effects [27]. Ephedrine was identified as its active component; D-pseudephedrine has anti-inflammatory action which could reduce vasopermeability. Additionally, several flavonoids isolated from Herba ephedrae were reported to exhibit radical scavenging activity [50, 51].

Mostly applied in combination with the use of Chinese herbs, the second important and effective pillar of TCM is acupuncture. Animal experiments showed improvements in the pulmonary function and lung pathology in COPD. The COPD rats, treated with the so-called Bufei Yishen granule together with acupoint-sticking showed better outcomes than acupoint-sticking or treatment with aminophylline alone [52]. In another rat model, Li et al. showed that acupuncture treatment appeared to reduce the COPD-induced inflammatory response by decreasing cell inflammation. Furthermore, it reduced the production of TNF-α and IL-8 in the bronchoalveolar lavage fluid in smoke-induced COPD by modulating Histone deacetylase 2. The pulmonary function test showed that reductions in peak expiratory flow, inspiratory capacity and minute volume in COPD were normalized after acupuncture treatment [53]. In human studies, COPD patients receiving traditional acupuncture experienced improvement in dyspnea on exertion and 6-min walking distance, indicating better exercise tolerance. In patients receiving standard medication, acupuncture was superior to placebo in improving breathlessness [54, 55]. Geng et al. suggested that acupuncture may reduce lung injury associated with COPD, possibly through downregulation of inflammatory cytokines. Anti-inflammatory and antioxidant effects have been implicated in the clinical benefit of electro-acupuncture [56].

In conclusion, in our case Chinese medicine was an effective complementary way to treat chronic dyspnea based on asthma and COPD. The improvement of the symptoms seemed to be long-lasting and was confirmed objectively with spirometry test.

This case suggests that additive complementary medicine could improve the condition of patients suffering from uncontrolled respiratory diseases. Such a complementary treatment can be a promising strategy for a high number of patients, especially for those, for whom Western medicine alone fails to result in dissolution of symptoms.

Acknowledgements

The authors acknowledge the contribution of Oleg Pogrebnyak and Veronika Friederike Sophia Pape for their linguistic support.

References

1. Parshall MB, Schwartzstein RM, Adams L, Banzett RB, Manning HL, et al. (2012) An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. Am J Respir Crit Care Med 185: 435-452.
2. Pratter MR, Curley FJ, Dubois J, Irwin RS (1989) Cause and evaluation of chronic dyspnea in a pulmonary disease clinic. Arch Intern Med 149: 2277-2282.
3. DePaso WJ, Winterbauer RH, Lusk JA, Dreis DF, Springmeyer SC (1991) Chronic dyspnea unexplained by history, physical examination, chest roentgenogram, and spirometry. Analysis of a seven-year experience. Chest 100: 1293-1299.
4. Michelson E, Hollrah S (1999) Evaluation of the patient with shortness of breath: an evidence based approach. Emerg Med Clin North Am 17: 221-237.
5. Karnani NG, Reisfield GM, Wilson GR (2005) Evaluation of chronic dyspnea. Am Fam Physician. 71: 1529-1537.
6. Ewert R, Glaser S (2015) Dyspnea. From the concept up to diagnostics. Internist (Berl) 56: 865-871.
7. Ray P, Birolleau S, Lefort Y, Becquemin MH, Beigelman C, et al. (2006) Acute respiratory failure in the elderly: etiology, emergency diagnosis and prognosis. Crit Care 10: R82.
8. Asthma facts. United States Environmental Protection Agency. 2016. https://www.epa.gov/sites/production/files/201605/documents/asthma_fact_sheet_english_05_2016.pdf
9. Bateman ED, Hurd SS, Barnes PJ, Bousquet J, Drazen JM, et al. (2008) Global strategy for asthma management and prevention: GINA executive summary. Eur Respir J 31: 143-78.
10. Chronic obstructive pulmonary disease (COPD) statistics. British Lung Foundation. 2017. https://statistics.blf.org.uk/copd.
11. Vogelmeier CF, Criner GJ, Martinez FJ, Anzueto A, Barnes PJ, et al. (2017) Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease 2017 Report: GOLD Executive Summary. Arch Bronconeumol 53: 128-149.
12. Mali RG, Dhake AS (2011) A review on herbal antiasthmatics. Orient Pharm Exp Med 11: 77-90.
13. Spencer S, Evans DJ, Karner C, Cates CJ (2011) Inhaled corticosteroids versus long-acting beta(2)-agonists for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 10: CD007033.
14. Li J, Zhang F, Li J (2015) The Immunoregulatory Effects of Traditional Chinese Medicine on Treatment of Asthma or Asthmatic Inflammation. Am J Chin Med 43: 1059-1081.
15. Anthonisen NR, Connett JE, Kiley JP, Altose MD, Bailey WC, et al. (1994) Effects of smoking intervention and the use of an inhaled anticholinergic bronchodilator on the rate of decline of FEV1. The Lung Health Study. JAMA 272: 1497-1505.
16. Burge PS, Calverley PM, Jones PW, Spencer S, Anderson JA, et al. (2000) Randomised, double blind, placebo controlled study of fluticasone propionate in patients with moderate to severe chronic obstructive pulmonary disease: the ISOLDE trial. BMJ 320: 1297-1303.
17. Pauwels RA, Lofdahl CG, Laitinen LA, Schouten JP, Postma DS, et al. (1999) Long-term treatment with inhaled budesonide in persons with mild chronic obstructive pulmonary disease who continue smoking. European Respiratory Society Study on Chronic Obstructive Pulmonary Disease. N Engl J Med 340: 1948-1953.
18. Tashkin DP, Celli B, Senn S, Burkhart D, Kesten S, et al. (2008) A 4-year trial of tiotropium in chronic obstructive pulmonary disease. N Engl J Med 359: 1543-1554.
19. Price D, Yawn B, Brusselle G, Rossi A (2013) Risk-to-benefit ratio of inhaled corticosteroids in patients with COPD. Prim Care Respir J 22: 92-100.
20. Wedzicha JA, Calverley PM, Seemungal TA, Hagan G, Ansari Z, et al. (2008) The prevention of chronic obstructive pulmonary disease exacerbations by salmeterol/fluticasone propionate or tiotropium bromide. Am J Respir Crit Care Med 177: 19-26.
21. George J. I-DLL, Santamaria NM, Kong DC, Stewart K (2004) Use of complementary and alternative medicines by patients with chronic obstructive pulmonary disease. Med J Aust 181: 248-251.
22. Slader CA, Reddel HK, Jenkins CR, Armour CL, Bosnic-Anticevich SZ (2006) Complementary and alternative medicine use in asthma: who is using what? Respirology 11: 373-387.
23. Li XM (2011) Treatment of asthma and food allergy with herbal interventions from traditional chinese medicine. Mt Sinai J Med 78: 697-716.
24. Li XM, Brown L (2009) Efficacy and mechanisms of action of traditional Chinese medicines for treating asthma and allergy. J Allergy Clin Immunol 123: 297-306.
25. Zhong Y, Mao B, Wang G, Fan T, Liu X, et al. (2010) Tanreqing injection combined with conventional Western medicine for acute exacerbations of chronic obstructive pulmonary disease: a systematic review. J Altern Complement Med 16: 1309-1319.
26. An X, Zhang AL, May BH, Lin L, Xu Y, et al. (2012) Oral Chinese herbal medicine for improvement of quality of life in patients with stable chronic obstructive pulmonary disease: a systematic review. J Altern Complement Med 18: 731-743.
27. An X, Zhang AL, Yang AW, Lin L, Wu D, et al. (2011) Oral ginseng formulae for stable chronic obstructive pulmonary disease: a systematic review. Respir Med 105: 165-176.
28. Gao Z, Liu Y, Zhang J, Upur H (2013) Effect of Jianpi therapy in treatment of chronic obstructive

pulmonary disease: a systematic review. J Tradit Chin Med 33: 1-8.
29. Guo R, Pittler MH, Ernst E (2006) Herbal medicines for the treatment of COPD: a systematic review. Eur Respir J 28: 330-338.
30. Wu L, Chen Y, Xu Y, Guo X, Li X, et al. (2013) Oral huangqi formulae for stable chronic obstructive pulmonary disease: a systematic review and meta-analysis. Evid Based Complement Alternat Med 2013: 705315.
31. Wu R, Fengjie Z, Li Y, Yan S, Miao L, et al. (2013) Modified dachengqi decoction combined with conventional treatment for treating acute exacerbation of chronic obstructive pulmonary disease: a systematic review based on randomized controlled trials. Evid Based Complement Alternat Med. 2013: 323715.
32. Xie Y, Li JS, Yu XQ, Li SY, Zhang NZ, et al. (2013) Effectiveness of Bufei Yishen Granule combined with acupoint sticking therapy on quality of life in patients with stable chronic obstructive pulmonary disease. Chin J Integr Med 19: 260-268.
33. Chen HY, Ma CH, Cao KJ, Chung-Man Ho J, Ziea E, et al. (2014) A systematic review and meta-analysis of herbal medicine on chronic obstructive pulmonary diseases. Evid Based Complement Alternat Med 2014: 925069.
34. Xie Y, Li JS, Yu XQ (2014) [Thinking on the junction point of Chinese medicine in comparative effectiveness research on chronic obstructive pulmonary disease]. Zhongguo Zhong Xi Yi Jie He Za Zhi 34: 611-616.
35. Li C, Li Q, Liu R, Niu Y, Pan Y, et al. (2014) Medicinal herbs in the prevention and treatment of osteoporosis. Am J Chin Med 42: 1-22.
36. Shergis JL, Zhang AL, Zhou W, Xue CC (2013) Quality and risk of bias in Panax ginseng randomized controlled trials: a review. Am J Chin Med 41: 231-252.
37. Yang M, Xu DD, Zhang Y, Liu X, Hoeven R, et al. (2014) A systematic review on natural medicines for the prevention and treatment of Alzheimer's disease with meta-analyses of intervention effect of ginkgo. Am J Chin Med 42: 505-521.
38. Chan CK, Kuo ML, Shen JJ, See LC, Chang HH, et al. (2006) A Chinese herb decoction, could improve airway hyper-responsiveness in stabilized asthmatic children: a randomized, double-blind clinical trial. Pediatr Allergy Immunol 17: 316-322.
39. Huang TP, Liu PH, Lien AS, Yang SL, Chang HH, et al. (2013) Characteristics of traditional Chinese medicine use in children with asthma: a nationwide population-based study. Allergy 68: 1610-1613.
40. Srivastava K, Sampson HA, Emala CW, Sr., Li XM (2013) The anti-asthma herbal medicine ASHMI acutely inhibits airway smooth muscle contraction via prostaglandin E2 activation of EP2/EP4 receptors. Am J Physiol Lung Cell Mol Physiol 305: L1002-L1010.
41. Shi Q, Liu Z, Yang Y, Geng P, Zhu YY, et al. (2009) Identification of anti-asthmatic compounds in Pericarpium citri reticulatae and evaluation of their synergistic effects. Acta Pharmacol Sin. 30: 567-575.
42. Chang TT, Huang CC, Hsu CH (2006) Inhibition of mite-induced immunoglobulin E synthesis, airway inflammation, and hyperreactivity by herbal medicine STA-1. Immunopharmacol Immunotoxicol. 28: 683-695.
43. Fu PK, Yang CY, Tsai TH, Hsieh CL (2012) Moutan cortex radicis improves lipopolysaccharide-induced acute lung injury in rats through anti-inflammation. Phytomedicine 19: 1206-1215.
44. Kao ST, Chang CH, Chen YS, Chiang SY, Lin JG (2004) Effects of Ding-Chuan-Tang on bronchoconstriction and airway leucocyte infiltration in sensitized guinea pigs. Immunopharmacol Immunotoxicol 26: 113-124.
45. Li XM, Wang QF, Schofield B, Lin J, Huang SK, et al. (2009) Modulation of antigen-induced anaphylaxis in mice by a traditional chinese medicine formula, Guo Min Kang. Am J Chin Med. 37: 113-125.
46. Shi D, Zheng M, Wang Y, Liu C, Chen S (2014) Protective effects and mechanisms of mogroside V on LPS-induced acute lung injury in mice. Pharm Biol 52: 729-734.
47. Wei M, Chu X, Guan M, Yang X, Xie X, et al. (2013) Protocatechuic acid suppresses ovalbumin-induced airway inflammation in a mouse allergic asthma model. Int Immunopharmacol 15: 780-788.
48. Wei M, Chu X, Jiang L, Yang X, Cai Q, et al. (2012) Protocatechuic acid attenuates lipolysaccharide-induced acute lung injury. Inflammation 35: 1169-1178.
49. Zhong WT, Jiang LX, Wei JY, Qiao AN, Wei MM, et al. (2013) Protective effect of esculentoside A on lipopolysaccharide-induced acute lung injury in mice. J Surg Res 185: 364-372.
50. Fu XJ, Song XX, Wei LB, Wang ZG (2013) Study of the distribution patterns of the constituent herbs in classical Chinese medicine prescriptions treating respiratory disease by data mining methods. Chin J Integr Med 19: 621-628.
51. Okawa M, Kinjo J, Nohara T, Ono M (2001) DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity of flavonoids obtained from some medicinal plants. Biol Pharm Bull 24: 1202-1205.
52. Tian Y, Li Y, Li J, Xie Y, Wang M, et al. (2015) Bufei Yishen granule combined with acupoint sticking improves pulmonary function and morphormetry in chronic obstructive pulmonary disease rats. BMC Complement Altern Med 15: 266.
53. Li J, Wu S, Tang H, Huang W, Wang L, et al. (2016) Long-term effects of acupuncture treatment on airway smooth muscle in a rat model of smoke-induced chronic obstructive pulmonary disease. Acupunct Med 34: 107-113.
54. Jobst K, Chen JH, McPherson K, Arrowsmith J, Brown V, et al. (1986) Controlled trial of acupuncture for disabling breathlessness. Lancet 2: 1416-1419.
55. Suzuki M, Muro S, Ando Y, Omori T, Shiota T, et al. (2012) A randomized, placebo-controlled trial of acupuncture in patients with chronic obstructive

56. pulmonary disease (COPD): the COPD-acupuncture trial (CAT). Arch Intern Med 172: 878-886.
57. Geng WY, Liu ZB, Song NN, Geng WY, Zhang GH, et al. (2013) Effects of electroacupuncture at Zusanli (ST36) on inflammatory cytokines in a rat model of smoke-induced chronic obstructive pulmonary disease. J Integr Med 11: 213-219.