Table 1: A summary of some of the human clinical trials published in the last 10 years fitting the search terms herbal/plant/phytomedicine and asthma in the NCBI database

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Double-blind, randomised controlled studies									
Wong, E. L. (2009) *J Altern Complement Med* [52]	Herbal formula CUF2 as complementary therapy	ICS	7 - 15	N.A.	Asthmatic children	85 patients assigned to receive treatment or placebo; study duration – 6 months	Steroid dosage; disease severity score; lung function; blood markers	Similar improvements were seen in both groups	No evidence to support the use of CUF2 in childhood asthma
Lindemann, J. (2009) *Curr Med Res Opin* [53]	EFF1009 (gamma-linolenic acid & eicosapentaenoic acid) & current asthma medication	Placebo & current asthma medication	N.A.	N.A.	Mild to moderate persistent adult asthmatics	Study duration – 28 days	Asthma symptom scores; disease control; ACQ	FEV improved in treatment group when compared to comparator; no difference in ACQ results between the groups	EFF1009 can improve lung function and disease management
Watson, R. R. (2008) *Nutr Res* [54]	Purple passion fruit peel (PFP) extract	Placebo	T: 36 ± 16 C: 36 ± 12	T: 9M 13F C: 7M 14F	Asthmatics aged 18 - 60	Parallel-group study; study duration – 4 weeks	Symptoms; spirometry	PFP reduced cough, wheeze and shortness of breath; no changes in symptoms were observed in comparator group; PFP improved FVC but not FEV	PFP is a safe alternative therapy to reduce asthma symptoms
Boskabady, M. H. (2007) *Fundam Clin Pharmacol* [55]	Boiled extract of Nigella sativa	Placebo	T: 36 ± 13 C: 48 ± 12	T: 4M 11F C: 2M 12F	Moderate to severe asthmatics	29 patients divided into two groups; study duration – 3 months	Symptom scores; severity & frequency of symptoms; lung function	Symptom scores improved in treatment group as did severity and frequency of symptoms and lung function. Treatment group also showed less need for steroids and β2 antagonists	Results suggest a prophylactic effect of N. sativa on asthma
Thomas, M. (2007) *BMC Pulm Med* [56]	AKL1, a combination of botanical components, add-on therapy	Placebo & current asthma medication	41 ± 15	18M 25F	Persistent asthmatics currently receiving ICS	43 patients divided into two groups; cross-over study; study duration – 12 weeks	PEFR; symptom scores; spirometry; ACQ	No difference in lung function between groups however the treatment group showed improved ACQ results	AKL1 is well tolerated in asthma patients and improves QOL however it has no effect on lung function

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Chan, C. K. (2006) *Pediatr Allergy Immunol* [57]	Ding Chuan Tang	Placebo	8 - 15	T: 19M 9F C: 12M 12F	Mild to moderate persistent asthma with a history of 1 – 9 years	58 patients divided into two groups; parallel study; study duration – 12 weeks	Symptom scores; medication scores; AM & PM PEFR; lung function; methacholine challenge; serum inflammatory mediators	Airway hyper-responsiveness significantly improved in treatment group compared to comparator group; no difference in lung function between the two groups	Ding Chuan Tang may improve hyper-responsiveness although had no bronchodilating effect
Murali, P. M. (2006) Respiration [58]	DCBT4567-Astha-15 plant based formula	Oral salbutamol; salbutamol & theophylline; placebo	15 - 50	Each group 55 – 65% female	Moderate asthma with stable symptoms	94 patients divided into four groups; study duration – 12 weeks	End point = 15% improvement in FEV; dyspnoea; wheezing; cough; expectoration; disability; sleep disturbances; respiratory rates	All groups other than placebo, had a 15% improvement in FEV. Symptoms were significantly reduced in treatment group compared to comparator groups	DCBT is as efficacious as salbutamol and has a significantly better effect on QOL
Wen M. C. (2005) J Allergy Clin Immunol [26]	ASHMI & placebo	Prednisone & placebo	T: 47 ± 11 C: 45 ± 12	T: 21M 24F C: 19M 27F	Non-smokers with moderate to severe, persistent, atopic asthma	92 patients divided into two groups; study duration – 4 weeks	Spirometry; symptom scores; side effects; serum cortisol, cytokines and IgE levels	Lung function improved in both groups however the comparator group showed significantly larger improvements; Symptom scores, β2 antagonist, serum IgE and Th2 cytokines levels were reduced in both groups; IFNγ and cortisol levels were lowered in comparator group but increased in treatment group	ASHMI intervention is a safe and effective therapy for asthma and exhibits modulatory effects on Th1/Th2 balance in asthma patients
Randomised studies									
Li, S. (2013) *J Tradit Chin Med* [59]	Chinese medicine (details N.A.)	Leukotriene receptor antagonist & bronchial relaxant	N.A.	N.A.	Asthmatic children	75 patients divided into two groups	IL4, cysLTR1, IFNγ mRNA levels; IL4, IFNγ, LTE4 levels in blood	Significant decrease in IL4 and cysLTR1 mRNA and increase in IFNγ mRNA in both groups. No significant difference between group changes; Significant decrease in blood IL4 and significant increase in blood IFNγ in treatment group. No change in LTE4 levels in either group	Chinese medicine has effect on leukotriene expression levels and Th1/Th2 imbalance in asthma patients

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Tang, B. (2013) *J Tradit Chin Med* [60]	"Yang – warming and kidney essence-replenishing" herbal paste & standard treatment	Standard treatment	T: 41 ± 12 C: 43 ± 12	T: 31M 44F C: 38M 40F	Moderate to severe persistent asthma & kidney-deficiency syndrome	151 patients divided into two groups; controlled study; study duration – 8 weeks	Cold & cold-related exacerbations; symptom scores; kidney deficiency syndrome	Frequency, duration and severity of cold and cold-related exacerbations were significantly lower in treatment in group; Kidney deficiency syndrome was also significantly improved in treatment group; No difference in symptom scores between groups	"Yang-warming and kidney essence-replenishing" herbal paste could reduce cold-related asthma exacerbations
Miao, Q. (2013) *Chin J Integr Med* [61]	Chinese medicine – details N.A.	Montelukast & theophylline	N.A.	N.A.	Cough variant asthma	94 patients assigned to treatment and comparator groups in 2:1 ratio	Syndrome efficacy – details of scores N.A.; cough efficacy – details N.A.; symptom scores; airway responsiveness	Treatment group showed 90.57% syndrome efficacy compared to 76.92% in comparator group, this difference is significant; Treatment group showed 98.11% cough efficacy compared to 80.77% in comparator group, this difference is significant; symptom scores were significantly improved in the treatment group compared to comparator; airway responsiveness was unchanged in both groups	Chinese medicine may help ease asthma and its related symptoms
Tahan, F. (2013) *Phytomedicine* [62]	Pelargonium sidoides root extract & paracetamol (when needed)	Paracetamol (when needed)	T: 1 – 12 C: 1 - 14	T: 15M 15F C: 19M 12F	Mildly asthmatic children aged 1 – 14 presenting with an upper respiratory viral infection	61 patients divided into two groups; P. sidoides drops taken 3 times daily for 5 days	Number of exacerbations and symptoms during upper respiratory tract infection	Significant improvement in cough and nasal congestion in treatment group but no differences in fever or muscle ache between groups; fewer exacerbations were experienced in treatment group	Pelargonium sidoides root extract may reduce exacerbations by shortening duration of infection as seen through improved cough and nasal congestion
Belcaro, G. (2011) *Panminerva Med* [63]	Pycnogenol, an extract from French maritime pine bark & ICS	ICS only	N.A.	N.A.	Stable, controlled allergic asthmatics	Study duration – 6 months; 76 patients were divided into two groups; treatment group received two 50 mg doses on Pycnogenol daily	ICS dosage; night wakening; symptom scores; need for other medication	Decrease in ICS dosage in treatment group with no deterioration of asthma control whereas 18% of comparator group required an increase in ICS dosage; less night wakenings, decreased symptom scores and less need for other medication was observed in treatment group when compared to comparator group	Pycnogel improved asthma control and reduced the need for increased medication dose

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Observational Studies									
Park, C. S. (2012) *Korean J Intern Med* [50]	Combination of NDC-052, an extract from the herb Magnoliae flos, & ICS	None	45 ± 14	56M 92F	Mild to moderate adult asthma patients with symptom history of >3 months	Multi-centre study; study duration – 8 weeks; 148 patients	FEV; AM & PM PEFR; AM & PM symptom scores; visual analogue symptom score; night wakening; frequency of β2 antagonist use	AM & PM PEFR improved; symptom scores, night wakenings and β2 antagonist use decreased	Addition of NDC-052 is beneficial when used alongside ICS treatment
Kalhan, R. (2008) *Clin Exp Allergy* [64]	Soy isoflavone genistein (In vitro: eosinophil stimulation in presence of genistein; in vivo: high soy diet)	In vitro: eosinophil stimulation in the absence of genistein; in vivo: no soy intake	38 ± 12	6M 7F	In vitro: blood taken from patients with history of atopic disease & a peripheral eosinophilia of >3% In vivo: Asthmatics aged 18 - 65	In vivo: Randomisation and blinding not mentioned; study duration – 4 weeks	In vitro: LTC4 synthesis; 5-lipoxygenase nuclear translocation; MAPK activation In vivo: FE(NO) Ex vivo: LTC4 synthesis	In vitro: Genistein inhibited LTC4 synthesis, blocked the phosphorylation of p38 and its downstream targets and reduced 5-lipoxygenase translocation In vivo: LTC4 synthesis and FE(NO) were decreased in treatment group compared to the comparator group	Genistein inhibits LTC4 synthesis at physiologically relevant concentrations possibly via blocking p38-induced translocation of 5-lipoxygenase
Hoang et al. (2007) *Phytother. Res.* [65]	Sophora flavescens root extract	None	22 - 70	6M 8F	Moderate to severe asthma	Selective study; study duration – 3 years	Symptom diary; PEF; medication use; QOL	Compared to measurements taken before study patients saw a 97% reduction in daytime symptoms, 98% reduction in night time symptoms, 97% dose reduction in β_2 agonists, 100% reduction in corticosteroid use, 21% increase in PEF	S. flavescens demonstrated dramatic clinical and functional results in asthma patients and is highly effective without the development of tolerance, side effects or the need for increased dosages

Legend: ACQ - asthma control questionnaire, C – comparator group, F – female, FE(NO)- fractional exhaled nitric oxide, FEV – forced expiratory volume, FVC – forced vital capacity, ICS – inhaled corticosteroids, IFN – interferon, Ig – immunoglobulin, IL – interleukin, LT – leukotriene, M – male, N.A. – information not available, PEFR – peak expiratory flow rate, T – treatment group, Th – T helper cell.

Table 2: A summary of some of the human clinical trials published in the last 10 years fitting the search terms herbal/plant/phytomedicine and COPD in the NCBI database

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Double-blind, randomised controlled studies									
Guo, S. (2014) J Tradit Chin Med [49]	Bu-fei granules	Placebo	40 - 75	N.A.	Stable COPD with deficiency of lung, spleen and kidney accompanied with phlegm retention and blood stasis	140 patients divided into two groups; multiceltre clinical study; study duration – 12 weeks	Frequency of exacerbations; symptom scores; lung function; serum inflammatory mediators	All measurements taken were significantly better in treatment group when compared to comparator group except for IL6 levels in serum	Bufei granules reduces the frequency of COPD exacerbations, improves QOL and attenuates of systemic inflammation
Liu, M. (2014) BMC Complement Altern Med [66]	Xuan Bai Cheng Qi formula & current medication	Placebo & current medication	18 - 85	T: 88M 34F C: 82M 40F	COPD patients with the syndrome type of phlegm-heat obstructing the lungs	244 patients divided into two groups; multicentre study; study duration – 10 days	Symptom scores; lung function; arterial blood gas; serum inflammatory cytokines; oxidation & antioxidation index	Symptom scores and lung function were significantly improved in treatment group compared to comparator group; PaO2 & PaCO2 were improved in treatment group; cytokine levels and oxidation/antioxidation index were lower in treatment group than comparator group	Xuan Bai Cheng Qi is a safe and effective ad-on therapy for COPD
Xie, Y. (2013) Chin J Integr Med [67]	Bu-fei Yishen & Shufei Tie acupoint sticking therapy & placebo	Oral Theophylline & placebo acupoint sticking therapy	N.A.	N.A.	Stable COPD	244 patients divided into two groups; multicentre, double-dummy study; study duration – 4 months	QOL questionnaire	Treatment group experienced less exacerbations and lower in the physiological, psychological and social aspects of QOL questionnaire	Bu-fei Yishen & acupoint sticking therapy appears safe and improves the QOL of COPD patients
Li, J. S. (2012) J Ethnopharmacol [68]	Bu-Fei Yi-Shen granules & acupoint sticking therapy & oral placebo	Oral theophylline & placebo acupoint sticking therapy	T: 67 ± 10 C: 66 ± 8	T: 76M 42F C: 71M 45F	Stable COPD with lung-kidney qi deficiency	244 patients divided into two groups; multicentre, double-dummy study; study duration – 2 months	Frequency & duration of exacerbations; lung function; symptom scores; 6 min walking distance; dyspnoea; QOL	The treatment group experienced fewer & shorter duration of exacerbations than the comparator group; symptom scoresand QOL improved more in treatment group than in comparator group; no significant difference in lung function between the two groups	Bu-Fei Yi-Shen can improve QOL and decrease the number of exacerbations experienced by COPD patients

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Isbaniah, F. (2011) J Clin Pharm Ther [69]	1. Echinacea purpurea & ciproflaxin OR 2. Echinacea purpurea & ciproflaxin & selenium & ascorbic acid	Ciproflaxin & placebo	>40	Mostly male	COPD with an acute exacerbation episode	120 patients divided into three groups; single-centre, three-armed, parallel-group study; study duration – 2 weeks	Serum TNFα, IL1β, IL6, IL10; symptom scores	Treatment group 2 experience fewer and shorter exacerbations than the other groups following an infective exacerbation; changes in serum inflammatory mediator levels appeared to be unrelated to treatment	Echinacea purpurea when taken with selenium and ascorbic acid may help alleviate exacerbation symptoms following an upper respiratory tract infection in patients with COPD
Worth, H. (2009) Repir Res [70]	Cineole	Placebo	T: 62 ±9 C: 63 ± 10	T: 66M 44F C: 75M 35F	Stable stage 2 and 3 COPD	242 patients divided into two groups; multicentre study; study duration – 6 months	Frequency, duration & severity of exacerbations; lung function; symptom scores; QOL	Frequency, duration and severity of exacerbations were significantly improved in the treatment group compared to comparator group; lung function, symptom scores and QOL were also significantly in treatment group compared to comparator group	Cineole reduces symptoms and exacerbation and also improves lung function and QOL in COPD patients
Cerda, B. (2006) Eur J Clin Nutr [71]	Pomegranate juice (polyphenol)	Placebo	T: 60 ±11 C: 63 ± 9	N.A.	Stable COPD	30 patients divided into two groups; study duration – 5 weeks	Blood parameters; lung function; bioavailability of polyphenols in blood & urine; urinary isoprostane	No polyphenols were detected in the blood or urine of either group; no differences seen in blood parameters or lung function in either group	Pomegranate juice shows no clinical benefit or anti-inflammatory effect in patients with COPD
Murali, P. M. (2006) Respir Med [72]	DCBT1234-lung KR (plant-based formula)	Placebo or salbutamol & theophylline bromhexine	35 - 85	N.A.	Moderate, stable COPD	105 patients divided into two groups; study duration – 24 weeks	Lung function; arterial blood gases; symptom scores	DCBT significantly improved FEV1 & PaO2 when compared to comparator groups; dyspnoea, cough & wheeze, were improved in all groups apart from placebo groups	DCBT has comparable bronchodilatory effects to conventional bronchodilators in this study in COPD patients
Randomised, controlled studies									
Zhao, Y. L. (2012) J Tradit Chin Med [73]	Chinese Yam & epimedium & current treatment	Placebo & current treatment	T: 80 ± 9 C: 81 ± 7	46M 3F	Moderate or severe COPD	49 patients divided into two groups; study duration – 3 months	BMI; airway obstruction; dyspnoea; exercise capacity; symptom scores	Significant improves were seen in the treatment group in dyspnoea, symptom scores and exercise tolerance but not in comparator group	Chinese Yam & epimedium can improve COPD symptoms, increase exercise tolerance and QOL

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Randomised studies									
Liu, J. (2014) J Tradit Chin Med [48]	Yiqibushenhuoxue herbal mixture and seretide (ICS/LABA fixed dose combination	Seretide only	T: 63 ±6 C: 65 ± 6	T: 17M 15F C: 17M 16F	Patients with mild or moderate COPD and lung and kidney qi deficiency and blood stasis	70 patients divided into two groups; study duration – 12 weeks	FEV; FEV1/FVC; symptom scores	Symptoms scores were significantly lower in both groups but the treatment group showed a larger improvement than the comparator group; FEV was higher in both groups	Yiqibushenhuoxue may help relieve symptoms of COPD
Li, J. S. (2013) Complement Ther Med [47]	Current medication & Bu-Fei Jian-Pi granules or Bu-Fei Yi-Shen granules & Yi-Qi Zi-Shen granules	Current medication	T: 66 ± 10 C: 64 ±9	T: 122M 54F C: 131M 43F	Mild to severe, stable COPD patients	352 patients divided into two groups; study duration – 6 months	Symptom scores; QOL	Cough, sputum, chest tightness, shortness of breath were improved in both treatment groups compared to comparator groups; Total symptom scores were improved in treatment groups rather than comparator group; QOL was better in treatment groups than comparator group	Herbal treatments had beneficial effects on QOL in COPD patients
Li, S. Y. (2012) BMC Complement Altern Med [74]	Bu-Fei Jian-Pi granules & Bu-Fei Yi-Shen granules & Yi-Qi Zi-She granules & conventional medication	Conventional medication	T: 66 ± 10 C: 64 ± 9	T: 122M 54F C: 131M 43F	Mild to severe, stable COPD patients with lung-spleen and lung-kidney qi deficiency and lung-kidney qi and yin deficiency	352 patients divided into two groups; multicentre, open-label study; study duration – 6 months	Frequency & duration of exacerbations; lung function; symptom scores; 6 minute walking distance; dyspnoea; QOL	Treatment group experienced significantly less exacerbation and duration of exacerbations was shorter than the comparator group; treatment group showed improved FEV, symptom scores, 6 min walking distance, dyspnoea and QOL in comparison to comparator group; FVC and FEV% remained the same in both groups	Traditional Chinese medicine has a beneficial effect on symptoms and the QOL in COPD patients
Li, W. (2010) Chin J Integr Med [75]	Tanreqing injection & conventional medicine	Ambroxol hydrochloride & conventional medicine or conventional medicine only	N.A.	N.A.	Acute exacerbation COPD	90 patients divided into three groups; study duration – 10 days	Symptom scores; plasma IL8 & neutrophil elastase	Symptom scores improved in treatment when group when compared to the group receiving conventional medicine only; IL8 levels decreased in all groups however there was significant difference between the groups; neutrophil elastase decreased the most in the group receiving ambroxol hydrochloride & conventional medicine however the difference amongst the groups was not significant	Tanreqing injection as an ad-on therapy can help improve COPD symptoms possibly via decreasing IL8 and neutrophil elastase levels

Author (Year) *Journal*	Treatment	Comparator	Age	Gender	Study Population	Study Details	Outcomes	Results	Conclusions
Shinozuka, N. (2007) J Am Geriatr Soc [76]	Hochuekkito & bronchodilators	Bronchodilators	73 ± 1	N.A.	Stable COPD	35 patients divided into two groups; study duration – 6 months	FEV1%predicted; serum inflammatory mediators	C reactive protein and TNFα levels decreased in treatment group whereas no change was seen in comparator group	Hochuekkito may reduce systemic inflammation in COPD patients

Legend: BMI – body mass index, C –comparator group, F – female, FEV – forced expiratory volume, FVC – forced vital capacity, IL – interleukin, M – male, Pa – partial pressure of (gas) in arterial blood, QOL – quality of life, T – treatment group, TNF – tumor necrosis factor.

Table 3: A summary of the herbal compounds mentioned in some of the human clinical trials published in the last 10 years and their beneficial effects in patients with asthma and COPD.

Effect	Herbal Compound
Anti-inflammatory	*Magnolia flos*; pycnogenol; EFF 1009; PFP extract; *Nigella sativa*; Akl1; ASHMI; Bufei granules; Xuan Bai Cheng Qi; Tanreqing; Hochuekkito.
Anti-oxidant	Pycnogel; PFP extract; soy isoflavone genistein; Xuan Bai Cheng Qi; polyphenol.
Immune stimulatory	*Pelargonium sidoides*; *Magnolia flos*; CUF2; Yang – warming and kidney essence replenishing – herbal paste.
Antimicrobial	*Pelargonium sidoides*.
Cough/symptom suppressant	PFP extract; *Nigella sativa*; Akl1; Ding Chuan Tang; DCBT4567 – astha – 15; Yiqibushenhuoxue; Bufei granules; *Echinacea purpurea*; Tanreqing; Cineole.
Smooth muscle relaxant	*Nigella sativa*; *Sophora flavescens;* DCBT.
Decongestant/expectorant	Ding Chuan Tang; Cineole.