

# Clinical Evaluation of *Justicia tranquebariensis* L. In the Management of Bronchial Asthma

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## ABSTRACT

**Objective:** The aim of the study was to assess the therapeutic efficacy of *Justicia tranquebariensis* (*Thavasu murungai*) in bronchial asthma.

**Materials and Methods:** 40 asthmatics were enrolled for the clinical trial. The patients were selected according to the patient subjective assessment scale, objective parameters and WHO GINA guideline. The patients with severe diseases such as AIDS, Malignancy, TB, Renal and CVS disorders were excluded from the study. This open labeled study was conducted at Government Siddha Medical College Hospital, Chennai-106. All the patients were administered 30 ml leaf juice of *Justicia tranquebariensis* for the period of 3 months. Clinical trial usually focuses on asthma control as measured by pulmonary function test (FEV1, FVC, PEF, Breath holding time and FVR), symptom scores and medication requirement. The study infers improvement on subjective and objective parameters of bronchial asthma. During the trial period, 4 patients were discontinued from the study due to need for parenteral and inhalation therapy. 36 patients were completed the study.

**Results:** There was a significant improvement in all parameters compared at each follow up visit. Based on the result out of 36 cases 29 had marked response, 5 had moderate response and only 2 cases had fair response. No side effects have been observed during the study period.

**Conclusion:** Thus we concluded that *Justicia tranquebariensis* (*Thavasu murungai*) is effective for the treatment of bronchial asthma.

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**Keywords:** Bronchial asthma, *Justicia tranquebariensis*, FEV1, FVC, PEFr, *Thavasu murungai*, WHO GINA guideline.

## INTRODUCTION

Asthma is a chronic inflammatory disease of the airways characterized by wheezing, dyspnea, narrowing of the airways and cough especially at night and early morning. It impairs not only respiratory function, but also physical, social and emotional components of life<sup>1</sup>.

The word asthma in ancient Greek meant "gasp for breath" coined by Hippocrates and was used as a synonym for dyspnea until the seventeenth century<sup>2</sup>. In later times, as was increasing awareness of heart and lung diseases, its meaning was explained and currently is used only to designate a respiratory disease characterized by airway obstruction. WHO estimates that some 235 million people currently suffer from asthma and most asthma related deaths occur in low and lower middle income countries<sup>3</sup>. Asthma as often under diagnosed and under treated it creates a substantial burden on low income groups<sup>4</sup>. It is estimated that an additional 100 million asthmatics could be expected in 2025. India has an estimated 15 to 20 million asthmatics and rough estimates indicate a prevalence of between 10% and 15% in 5-11 year old children<sup>5</sup>. Although the prevalence of asthma in India is somewhat similar to that seen in other Asian countries, the asthma incidences have increased significantly over the years in the country<sup>6</sup>.

According to the global burden of asthma report, over 50 million suffer from asthma in Central and Southern Asia and an absolute 2% increase in the prevalence of asthma in India would result in an additional 20 million people with this disease<sup>7</sup>.

In Siddha system of medicine, the concept and definition of asthma explained by its variable clinical presentation<sup>8</sup>. Based

on these, asthma was classified into 5 types. They are *Vali*, *Iyam*, *Iyavali*, *Mukkutram* and *Melnokku iraippu*. In any case they all dealt with mainly derangement of *Iya* humour and their combinations showed the indications like running nose, accumulation of phlegm in throat, tightness of the chest, disturbances in air flow and cough.

The important pathophysiological effects of bronchial asthma are the inflammatory process, secondary an immune response, which is induced by an allergen that causes the accumulation of inflammatory cells such as mast cells, eosinophil, lymphocytes, etc., and the release of their products. Therefore, the effective management of asthma is to control not only the clinical manifestations, but also the inflammatory process and pathophysiology of the disease and to achieve and maintain control for prolonged periods of time. Current treatment of asthma patients is aimed at reducing the inflammatory process. Even though efforts are being persistently made for a safe and effective treatment for asthma in modern system of medicine, there is no definite drug without adverse reaction could not be established. But the Siddha system offers effective herbal and poly herbal formulations for asthma. Also the plants containing flavanoids have been reported to exert antihistamine, mast cell degranulation properties<sup>9</sup>.

One of the herb which has been mentioned in Siddha literature for various types of asthma is *Thavasu murungai* (*Justicia tranquebariensis*). But it is yet remained unexplored for its exact clinical value in terms of scientific research. Hence, this present study was performed to show

the effectiveness of the Siddha herbal drug *Thavasu murungai* in patients with bronchial asthma.

## MATERIALS AND METHODS

This open labeled prospective clinical study was carried out at the Arignar Anna Hospital of Indian Medicine, Arumbakkam, Chennai from November 2012 to January 2013. The study period was about thirty days with three month follow-ups. This study was approved by the Institutional Ethical Committee (IEC) and this clinical study was conducted in complete accordance with the Declaration of Helsinki<sup>10</sup>.

### Inclusion and exclusion criteria

Forty asthmatics of either sex aged between 13 to 65 years were enrolled from Post graduate Out-patient and In-patient departments. The patients requiring steroid therapy, borne to severe diseases such as AIDS, Malignancy, TB, Renal and CVS disorders were excluded from the study. Patients were removed from the study when deterioration of vital signs, exacerbations of symptoms, intercurrent illness, unacceptable adverse event and the patient decided to withdraw from the study.

Study participants were required to have a primary diagnosis of asthma, which was confirmed on the basis of the assessment of signs and symptoms such as recurrent wheezing, cough, dyspnea, chest tightness, symptoms worsen at night, symptoms triggered by cold air, exercise, exposure to allergens, family history etc., and lung function tests.

The patients were classified by the severity of asthma, according to the criteria of the Global Initiative for Asthma (GINA)<sup>11,12</sup>. The plant properties, treatment plan in detail and the total period of treatment, follow ups were informed to all the participants and written informed consent was obtained before entry into the present study.

Clinical assessment of asthma usually focuses on relief of asthmatic control which was measured by objective parameters such as pulmonary function test (FEV1, FVC and PEFr) and subjective parameters such as symptom scores. After taking a short history of the patient, all the selected cases were carefully examined and records were maintained. In addition to the above parameters the routine hematological investigation, sputum examination, urinalysis, fecal analysis, ECG and chest X-ray were done.

### Drug formulation, dosage regimen and dietary advice

The plant *Thavasu murungai* (*Justicia tranquebariensis*) was collected from in and around Arakkonam, Tamilnadu, India. After collection, it was identified and authenticated by the Botanist, Government Siddha Medical College, Chennai, Tamilnadu, India. The specimen sample has been kept in the department for future reference. Then the plant was cleaned well and crushed in the stone mortar and the juice thus obtained was filtered with white cloth and kept in a glass jar. This plant juice is water soluble, astringent and acrid in taste which was given at a dosage of 30 ml mixed with equal quantity of lukewarm water twice a day for one month<sup>13</sup>.

All the patients were instructed to attend the clinic every day. During the visit, the patients were inquired about any adverse effects, improvement in the signs and symptoms they felt which were recorded. All the patients were advised to avoid cold drinks, chill foods, sweets, exposure to allergic atmosphere, smoking and follow light supper, a few hours before bedtime.

### Clinical assessment

The clinical efficacy of the trial drug was assessed by subjective and objective parameters which were adopted by criteria

recommended by the American Thoracic Society (ATS)<sup>14</sup>. The subjective parameters such as dyspnea (Gr.1 to Gr.4), cough (Gr.0 to Gr.3), wheezing (Gr.0 to Gr.3) and objective parameters such as respiratory rate, FEV1 (Forced Expiratory volume in one second), FVC (Forced vital capacity) and PEFr (Peak expiratory flow rate) were assessed using the standard method of Pulmonary Function Tests and recorded every week until the end of the study period.

### Statistical analysis

An intention to treat type of analysis was used. Subjective and objective parameters were analyzed and compared statistically between pre and post treatment by means of 1 way ANOVA followed by Dunnett's Multiple comparison test. Where \* $P < 0.05$ , \*\* $P < 0.01$  and \*\*\* $P < 0.001$ .

## RESULTS AND DISCUSSION

### Subjects

Forty cases met the entry criteria of asthma trial and a total of 36 participants completed the entire study successfully. The remaining 4 participants were withdrawn from the study due to need for parenteral and inhalation therapy.

Table No. 1 is represented by gender distribution and age group of the participants with a grade of severity. From the result, it was observed that higher incidence of asthma in males with 22 cases (61.11%) and also evidenced a predominant age group between 26-59 years with 28 patients (77.77 %). Severe asthma more observed in 26-40 age group with male dominance.

### Subjective parameters

This was represented in Table No.2. From the result, it was observed that after the 4<sup>th</sup> week of treatment, the mean dyspnea value ( $1.41 \pm 0.55$ ) was significantly ( $P < 0.001$ ) reduced when compared to the initial value ( $2.67 \pm 0.75$ ).

Treatment of *Justicia tranquebariensis* juice showed improvements in cough symptom scores after third and fourth weeks of the study period ( $1.55 \pm 0.84$  and  $1.03 \pm 0.79$  respectively) showed significant results ( $P < 0.001$ ) when measuring clinical improvement compared to baseline level ( $2.13 \pm 1.05$ ).

Wheezing is the most common symptomatic expression that leads the patient to seek solution to their ailment. Relief of wheezing and dyspnea brought about by the improvement in severity of the asthmatic attack which would further mitigate against the direct bronchodilator effect of *Justicia tranquebariensis* that helped improve breathing.

As for the respiratory rate, all the patients reported significant falls in respiratory rate after two weeks, three and fourth week of drug treatment compared to the initial values as shown in Table no 2.

There were significant differences between the pre and post treatment score in respect to breathe holding time (BHT) which was improved towards normal value ( $P < 0.001$ ). The pre-treatment score was  $7.53 \pm 1.65$  and post-treatment score was  $33.19 \pm 3.95$ . However, it would require a longer-term monitoring to establish whether this effect is sustainable beyond the 4-week duration of this study. Figure 1 and 2 showed the data for all subjective parameters during the trial period. Figure 1 and Figure 2 showed the data for all subjective parameters during the trial period.

### Objective parameters

We presented the following measures regarding objective parameters in Table No.3 include Forced Expiratory Volume in one second (FEV1), Peak Expiratory Flow Rate (PEFR) and Forced vital capacity (FVC). Even though no significant difference of all the above objective parameters in this outcome in the first week, there were

significant difference in the treatment of the leaf juice of *Justicia tranquebariensis* after 2, 3 and 4 weeks compared to the initial stage ( $P < 0.05$ ,  $P < 0.01$  and  $P < 0.001$  respectively).

After 4 weeks of drug treatment, the FEV<sub>1</sub> had improved in all the patients ( $p < 0.01$ ) comparing the values before and after treatment in the course of the study period ( $63.58 \pm 10.79$  and  $105.64 \pm 11.13$  respectively). FEV<sub>1</sub> has a great importance as outcome measures.

FVC, which demonstrated a greater improvement when compared to the initial level (the initial value;  $793.06 \pm 64.84$  and after treatment;  $1016.67 \pm 49.91$ ) which is statistically significant ( $P < 0.01$ ). Treatment with the leaf juice of *Justicia tranquebariensis* twice a day was shown to increase the average PEFR compared to the initial value (initial value-  $189.5 \pm 84.67$  to value at the end-  $321.17 \pm 76.04$ ). The change was the greatest for 4 weeks treatment followed by 3 weeks treatment. The difference in the PEFR between the first week and second week did not reach statistical significance. Figure 3 showed the data for all objective parameters during the trial period.

From Table 2 and Table 3, study of the subjective and objective improvement can be compared and from these tables it is clearly observed that the subjective improvement is more than 90%. Along with that the FEV<sub>1</sub>, FVC, and PEFR are found to be increased in all cases at the end of treatment. The improvement of these objective criteria's i.e. increase in FEV, FVC and PEFR indicates improvement of the functional capacity of the lungs. Forced expiratory volume in one second (FEV<sub>1</sub>), Forced vital capacity (FVC) and PEFR are the most useful spirometric index for assessing respiratory impairment and prognosis of drug treatment.

The goal of herbal treatment in asthma is the suppression of the asthmatic inflammation decreases the allergic reaction

and prevents the airway obstruction (bronchodilator). Phytochemical studies of the leaf of the plant of *Justicia tranquebariensis* revealed the presence of phytosterols, flavonoids, glycosides and absence of triterpenoids, alkaloids, saponins and tannins<sup>15</sup> and possesses anti-inflammatory, anti-histamine and bronchodilator activity which favor the above good response in asthma.

The responses of the patients at the end of the study revealed that 15 patients (42%) showed a marked response, 19 patients (53%) showed moderate response and only 2 patients (5%) showed mild response. No one registered with unfavorable responses (Table 4).

#### Safety of the treatment

There were no adverse reactions or side effects observed during the study period, which reflected the safety profile of the trial drug *Justicia tranquebariensis*.

#### CONCLUSION

Based on the evidence presented in this study, the authors concluded that the majority of asthmatics can be effectively controlled and profiled, even if no cure is possible. The goal of treatment is a control and prevents acute and chronic asthma symptoms and maintains the normal lung function which favors the normal activities. The present data suggested a treatment trial with *Justicia tranquebariensis* for asthma appear to be useful. This herbal juice has proven to lower symptom scores and improve lung function significantly. Even though the encouraging results which we have observed so far during the present study, the trial has reported only small sample size and short duration. Further work such as for large scale, well designed trials are needed with adequate statistical work to further evaluate the efficacy of the trial drug which will pave the path for future researchers.

## ACKNOWLEDGEMENT

We are grateful to the Principal and HOD, Government Siddha Medical College, Arumbakkam, Chennai for their guidance and help to carry out this work successfully.

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**Table 1.** Showing the sex and age distribution of the patients treated with *Justicia tranquebariensis*

Category	13-25 years	26-40 years	41-59 years	Above 60 years
Severe	Male: 2 Female: 1	Male: 3 Female: 3	Male: 2 Female: 1	Male: Nil Female: Nil
Moderate	Male: 2 Female: 1	Male: 5 Female: 4	Male: 6 Female: 3	Male: 1 Female: Nil
Mild	Male: Nil Female: Nil	Male: Nil Female: Nil	Male: 1 Female: Nil	Male: Nil Female: 1
Total cases	Male: 22 Female: 14			

**Table 2.** Showing the effect of *Justicia tranquebariensis* on subjective features of Bronchial asthma

Subjective criteria	Before Treatment N=36	After Treatment (n=36)			
		1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
Dyspnea	2.67 ± 0.75	2.64 ± 0.76	2.33 ± 0.71	1.88 ± 0.70 <sup>***</sup>	1.41 ± 0.55 <sup>***</sup>
Wheezing	2.25 ± 0.65	2.14 ± 0.59	1.89 ± 0.57 <sup>*</sup>	1.38 ± 0.58 <sup>***</sup>	1.05 ± 0.53 <sup>***</sup>
Cough	2.13 ± 1.05	1.97 ± 1.03	1.72 ± 0.91	1.55 ± 0.84 <sup>*</sup>	1.03 ± 0.79 <sup>***</sup>
RR	33 ± 3.48	31.61 ± 3.53	28.94 ± 3.02 <sup>***</sup>	26.75 ± 2.82 <sup>***</sup>	21.47 ± 2.00 <sup>***</sup>
BHT	7.53 ± 1.65	12.58 ± 1.79 <sup>*</sup>	19.42 ± 2.66 <sup>*</sup>	26.28 ± 3.55 <sup>**</sup>	33.19 ± 3.95 <sup>***</sup>

Values are expressed in Mean ± SD (n= 36) 1Way ANOVA followed by Dunnett's Multiple comparison test. Where \*P< 0.05, \*\*P< 0.01 and \*\*\*P< 0.001.

**Table 3.** Showing the effect of *Justicia tranquebariensis* on objective features of Bronchial asthma

Objective criteria	Before treatment N=36	After treatment (n=36)			
		1 <sup>st</sup> Week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week
FEV <sub>1</sub>	63.58 ± 10.79	72.17 ± 11.21	82.42 ± 10.45 <sup>*</sup>	91.72 ± 9.95 <sup>**</sup>	105.64 ± 11.13 <sup>**</sup>
FVC	793.06 ± 64.84	840 ± 64.98	894.17 ± 71.05 <sup>*</sup>	948.06 ± 62.09 <sup>**</sup>	1016.67 ± 49.91 <sup>**</sup>
PEFR	189.5 ± 84.67	218.06 ± 85.70	246.83 ± 85.39	279.22 ± 80.48 <sup>**</sup>	321.17 ± 76.04 <sup>***</sup>

Values are expressed in Mean ± SD (n= 36) One way ANOVA followed by Dunnett's Multiple comparison test. Where \*P< 0.05, \*\*P< 0.01 and \*\*\*P< 0.001.

**Table 4.** Showing the gradation of results

Category	No. of patients (n=36)	% of improvement
Marked	15	42
Moderate	19	53
Mild	02	05
Fair	00	00
Total	36	100

Percentage of Improvement was assessed based on the subjective and objective criteria.





