



# INTERNATIONAL JOURNAL OF AYURVEDA AND PHARMACEUTICAL CHEMISTRY

(A peer reviewed journal dedicated to allied Sciences)

## PUBLISHED BY

**Greentree Group Publishers (GGP)**  
greentreegrouppublishers@gmail.com

Volume 10 Issue 2 | 2019

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- [www.ijapc.com](http://www.ijapc.com)
- e issn 2350-0204
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## INDEXED IN

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## A Critical Review on *Arka Kalpana* (Distillate Formulations) for *Shwasa* (Asthma)

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### ABSTRACT

*Arka kalpana* is one among the *Panchavidhakasaya kalpana* by *lankapati Ravna* and it is mentioned in detail in *Arka prakasha*. It is a classical text written in 16<sup>th</sup> century by *Lankapati Ravana* which deals primarily with different types of *Arkas* (formulations made by distillation) in the management of different diseases. There are 16 *Arka kalpana* mentioned in this book with *Shwasa* as one among their indications. *Shwasaroga* (Asthma) is the chronic conditions that affects the quality of life of the patient. Its symptoms are similar to Bronchial asthma. This review attempts to make a comprehensive compilation of *Arkas* indicated in *shwasa* and analyze their actions.

### KEYWORDS

*Arka Kalpana, Arka Prakasha, Shwasa, Asthma, Ayurveda*



**Greentree Group Publishers**

Received 20/10/19 Accepted 19/01/19 Published 10/03/19



## INTRODUCTION

*Arka kalpana* is described as one of the *panchavidhakasaya kalpana* by *Lankapati Ravana*<sup>1</sup> and *Arka* is a liquid preparation obtained by distillation of certain liquids or of drugs soaked in water using the *Arka Yantra* (distillation apparatus)<sup>2</sup>. The pharmaceutical aspect of *Arka kalpana* is mentioned in *Ravana's Arka Prakasha*. It is a classical text written in 16<sup>th</sup> century by *Lankapati Ravana*. There are 10 Chapters in the *Arka prakasha*, which are termed as *Shataka*. In the *thritiya shataka*, 16 *Arka* are indicated in *Shwasaroga*<sup>1</sup>.

### General method of *Arka* preparation:

The drug is coarsely powdered, if dry and crushed if wet, to soak it in sufficient quantity of water and kept overnight. Next day morning soaked drug is transferred to the *Arka yantra* and 10 parts of water added to it. The mixture is continuously heated till 60% of the distillate is collected. After cooling, the collected *Arka* is preserved in airtight bottles<sup>2</sup> or *Shwasa* means 'difficulty in breathing' – '*Shwasanaat Shwasaha*'<sup>3</sup>. *Shwasaroga* is one of the *pranavaha srota vikara*. The causative factors of *shwasa roga* are described as *raja* (Dust), *dhumavata* (Smoke-Wind), *shita sthana* (Cold water bath), *shita ambu* (Intake of cold water), *Vyayama* (Exercise)<sup>4</sup>. It is broadly divided into five types – *Kshudra*

*Shwasa*, *Maha Shwasa*, *Chinna Shwasa*, *Urdhva Shwasa* and *Tamaka Shwasa*<sup>5</sup>.

Asthma is defined as a chronic inflammatory disease of airway. And it is characterized by recurring symptoms, reversible airflow obstruction and bronchospasm. Symptoms include triad of dyspnea, Cough and Wheezing<sup>6</sup>.

Asthma is a very common disease with immense social impact. It occurs at all ages but predominantly in early life. According to the WHO, over 180,000 deaths worldwide are caused due to asthma annually. India, as of 2015, is the country with the highest number of deaths caused by respiratory causes. There has been an overall increase of incidence of respiratory disorders in India, prevalence of Bronchial Asthma is found around 100-150 millions of people. In India, it is about 15-20 millions of people that get affected by Asthma, among them 10- 15 % are noted for the children of age group 5-11 years old. The World-wide mortality rate is found to be increasing by 50 % in every decade<sup>7</sup>.

## MATERIALS AND METHODS

*Arka Kalpana*'s were enlisted given for *shwasa* from the *Arka prakasha*. Table (1) shows the list of *Arka Kalpana*<sup>1</sup>. Detailed literature review of *Arka kalpana dravyas* were also compiled from



Ayurvedic literature, Journals and Internet media for the information regarding the *Arka kalpana dravyas*. The *Arka kalpana* having *shwasaghna karma* are listed below with their Reference and Botanical source, Family, Part used, *Rasa panchaka*, *Doshangnata* along with Research studies done on these *Arka kalpana dravyas*. Table (2) and (3) shows the Drug description and *Rasapanchaka* of *Arka kalpana dravyas*<sup>8</sup>.

## OBSERVATION

In *Arka prakasha*, totally 10 chapters are mentioned. In *thrithiya shataka* 16 *Arka kalpana* mentioned as *Shwasagna karma*. All *Arka dravyas* contain mainly volatile principles which possess antioxidant, antiasthmatic, antitussive, anti-inflammatory, anthelmintic, anti-microbial, and anti-fungal activity. Among 16 *Arka*

*kalpana dravyas*, 13 drugs are have been proved as antiasthmatic activity on animal model and clinical trial.

**Table1** List of *Arka Kalpana*

S.N	<i>Arka kalpana</i>	Chapter/Shloka no
01	<i>Shunti Arka</i>	3/3
02	<i>Pippali Arka</i>	¾
03	<i>Maricha Arka</i>	¾
04	<i>Dhanyaka Arka</i>	3/10
05	<i>Thumburu Arka</i>	3/18
06	<i>Pushkaramula Arka</i>	3/25
07	<i>Bharangi Arka</i>	3/29
08	<i>Prsna parni Arka</i>	3/30
09	<i>Aragwadha Arka</i>	3/32
10	<i>Guduchi Arka</i>	3/41
11	<i>Jivanti Arka</i>	3/45
12	<i>Hapusha Arka</i>	3/47
13	<i>Gunja Arka</i>	3/49
14	<i>Mesha shrungi Arka</i>	3/62
15	<i>Drona pushpi Arka</i>	3/82
16	<i>Katphala Arka</i>	3/92

**Table 2** Drug description of *Arka kalpana dravyas*

S. N	Drug	Botanical name	Family name	Part used
01	<i>Shunti</i>	<i>Zingiberofficinale</i> Roscoe.	Zingiberaceae	<i>Kanda</i>
02	<i>Pippali</i>	<i>Piper longum</i> Linn.	Piperaceae	<i>Phala</i>
03	<i>Maricha</i>	<i>Piper nigrum</i> Linn.	Piperaceae	<i>Phala</i>
04	<i>Dhanyaka</i>	<i>Coriandrum sativum</i> Linn.	Apiaceae	<i>Phala</i>
05	<i>Thumburu</i>	<i>Zanthoxylum alatum</i> Roxb.	Rutaceaea	<i>Phala</i>
06	<i>Pushkaramula</i>	<i>Inula racemosa</i> Hook.f.	Asteraceae	<i>Mula</i>
07	<i>Bharangi</i>	<i>Clerodendron serratum</i> Linn.	Verbenaceae	<i>Mula</i>
08	<i>Prsna Parni</i>	<i>Uraria picta</i> Desv.	Papillionaceae	<i>Mula</i>
09	<i>Aragwadha</i>	<i>Cassia fistula</i> Linn.	Caesalpinaceae	<i>Phala</i>
10	<i>Guduchi</i>	<i>Tinospora cordifolia</i> Linn.	Menispermaceae	<i>Kanda</i>
11	<i>Jivanti</i>	<i>Leptadenia reticulate</i> Retz.	Ascalepidaceae	<i>Patra</i>
12	<i>Hapusha</i>	<i>Juniperus communis</i> Linn.	Pinaceae	<i>Twak</i>
13	<i>Gunja</i>	<i>Abrus precatorius</i> Linn.	Leguminoseae	<i>Beeja</i>
14	<i>Mesha Shrungi</i>	<i>Gymnema sylvestre</i> R.Br.	Ascalepidaceae	<i>Patra</i>
15	<i>Drona Pushpin</i>	<i>Leucas aspera</i> Willd.	Lamiaceae	<i>Pancanga</i>
16	<i>Katphala</i>	<i>Myrica nagi</i> Linn.	Myricaceae	<i>Kanda twak</i>

**Table 3** *Rasapanchaka* of *Arka kalpana dravyas*



S.N	Dravya	Rasa	Guna	Virya	Vipaka	Doshagnata
01	Shunti	Katu	Guru, Ruksha, Tiksha	Usna	Katu	Kaphavatasamaka
02	Pippali	Katu	Tikshna, Laghu, Snigdha	Anusna	Madhura	Kaphavatasamaka
03	Maricha	Katu	Tikshna, Laghu	Usna	Katu	Kaphavatasamaka
04	Dhanyaka	Katu, Tikta, Kasaya, Madhura	Snigdha, Laghu	Usna	Madhura	Tridoshasamaka
05	Thumburu	Katu, Tikta	Laghu, Ruksha, Tikshna	Usna	Katu	Vatakaphasamaka
06	Pushkaramula	Katu, Tikta	Tikshna, Laghu	Usna	Katu	Vatakaphasamaka
07	Bharangi	Katu, Tikta, Kasaya	Ruksha, Laghu	Usna	Katu	Kaphavatasamaka
08	Prsnaparni	Madhura, Katu	Laghu, Sara	Usna	Madhura	Tridosasamaka
09	Aragwadha	Madhura, Tikta	Guru, Snigdha	Sita	Madhura	Vatapittasamaka
10	Guduchi	Tikta, Kasaya	Laghu, Guru, Snigdha	Ushna	Madhura	Tridosasamaka
11	Jivanti	Madhura	Snigdha, Laghu	Sita	Madhura	Tridosasamaka
12	Hapusha	Katu, Tikta	Laghu, Ruksha, Tikshna	Ushna	Katu	Kaphavatsamaka
13	Gunja	Tikta, Kashaya	Tikshna, Laghu, Ruksha	Usna	Katu	Kaphavatahamaka
14	Meshashrunji	Tikta, Kasaya	Laghu, Ruksha	Usna	Katu	Kaphavatasamaka
15	Dronapushpi	Katu, Lavana	Guru, Ruksha, Tikshna	Usna	Madhura	Vatakaphasamaka
16	Katphala	Kashaya, Tikta	Laghu, Tikshna	Ushna	Katu	Vatapittasamaka

### Enumeration of Drugs with their Experimental /clinical study

**Shunthi:** (*Zingiber officinale* Roscoe.)

*Shunthi* is perennial herb with elongated leafy stems and leaves sessile, linear-lanceolate, acute or acuminate. Rhizome is stout and tuberous<sup>9</sup>. Gingerol, Zingerberenes, Zingiberol, Shogaol, isoproterenol, Essential oils are those which act on respiratory system. A clinical study reveals that 5ml of *Ardraka* arka nebulization reduces the chest tightness along with good expectoration and a reduction the intensity of ronchi and good broncho dilatation effect was found less than 20 minutes in reduction of symptoms and increase of PEFr whereas the changes were seen after 40 minutes

when one pala (48ml) of *Arka* administered internally<sup>10</sup>.

**Pippali:** (*Piper longum* Linn.)

*Pippali* is a slender aromatic Perennial climber with woody roots and creeping stem with ovate, cordate leaves. Fruits are ovoid, Yellowish orange, sunk in fleshy spike<sup>11</sup>. The essential oil of the fruit *P. longum* is a complex mixture, the three major components of which are caryophyllene, pentadecane and bisabolone, others include thujine, terpinoline, zingiberine, p-cymene and p-methoxy acetophenone which act on Respiratory system<sup>12</sup>. The extract of *P. longum* in milk reduced passive cutaneous anaphylaxis in rats and protected guinea pigs against antigen-induced bronchospasm<sup>13</sup>.



**Maricha:** (*Piper nigrum* Linn.)

It is a branched climbing shrub, rooting at the nodes, leaves are simple, alternate, cordate, fruits are ovoid or globose. Essential oil found to be thujene, dl-limonene, terpinene, dihydrocarveol, pinene, sabinene, myrcene, cymene, caryophyllene, and used as anti-pyretic, anti-oxidant, cough and asthma<sup>14</sup>.

The aqueous extract of *Piper nigrum* fruits significantly inhibited acetylcholine induced bronchoconstriction of isolated goat trachea which revealed anti-asthmatic potential<sup>15</sup>.

**Dhanyaka:** (*Coriandrum sativum* Linn.)

It is an aromatic, herbaceous annual, leaves pinnately or ternately decomposed, Fruits yellowish brown, globose, separating in to two halves and seeds compressed. And anti-bacterial, anti-fungal, anti-microbial, insecticidal activity, anti-oxidant activity reported from essential oil<sup>16</sup>.

The essential oil from seed is linalool (60% Y80%) followed by other alcohols, ketones and esters such as >-pinene (0.2% Y8%), F-terpinene (1% Y8%), geranyl acetate (0.1% Y4.7%) and camphor<sup>17</sup>.

**Tumburu:** (*Zanthoxylum alatum* Roxb.)

A Small tree, flattened prickles on trunk, bark pale brown, furrowed, leaves unequally pinnate, lanceolate, flowers small yellow in colour<sup>18</sup>.

The major essential oil constituents such as 3-borneol, isobornyl acetate, dihydrocarveol, linalool,  $\alpha$ -limonene diepoxide,  $\alpha$ -pinene and geraniol. And anticonvulsive, antinociceptive, anti – bacterial, antifungal and antispasmodic activity reported from essential oil.

The essential oil of *Z. armatum* provides evidence as bronchodilator and antiasthmatic properties in histamine and OVA-induced allergens in guinea pigs and mice<sup>19</sup>.

**Pushkaramoola:** (*Inula racemosa* Hook.f.)

A stout herb with rough grooved stem, leaves simple, alternate, radicle or cauline, root is brownish externally and white internally, on drying it becomes greyish and it is aromatic and irregularly wrinkled<sup>20</sup>. Root contains inulin (10%) and an essential oil (1.3%) containing alantolactone. And essential was found anti-microbial, anti-fungal and anthelmintic activity<sup>21</sup>.

Extract of dried roots of *Inula racemosa* revealed antiasthmatic activity as noticed by antagonistic effect on histamine induced contraction, milk- induced eosinophilia and leukocytosis, and protection against mast cell degranulation<sup>22</sup>.

**Bharangi:** (*Clerodendron serratum* Linn.)

*Bharnagi* is a shrub with Leaves opposite, acute and usually coarsely and sharply serrate. The roots are used as Anti-inflammatory, Anti-spasmodic, Cough and



Asthma etc<sup>23</sup>. Essential oil was found serratin and lupeol<sup>21</sup>. A clinical study reveals that 5ml of *Bharangi arka* nebulization was effective in *vegaavastha* of *Tamaka shwasa* immediately after administration<sup>24</sup>. The anaphylactic bronchoconstrictor response in sensitized isolated guinea pig lung was found to be inhibited after continuous perfusion of the alcoholic fraction of aqueous extract of the root of *Clerodendrum serratum* suggesting antiasthmatic potential<sup>25</sup>.

**Prisnaparni:** (*Uraria picta* Desv.) A suffruticose herb or undershrub, woody with leaves imparipinnate, lanceolate, acute and blotched with white. Flowers are pink or purple and seed ovate light brown, reniform<sup>26</sup>. Alkaloids, triterpenes, Saponin, flavonoids and steroids were isolated from the root of *Uraria picta*, shows anti-microbial and analgesic activity<sup>27</sup>.

**Aragvadha:** (*Cassia fistula* Linn.) *Aragvadha* is a moderate sized deciduous tree, Leaves pinnately compound, ovate, acute, bright green glabrous above and slightly pubescent beneath and said to be antitussive, antipyretic, anti-inflammatory and analgesic etc<sup>28</sup>. Essential oils found to be aldehydes, eugenol and pinene<sup>29</sup>. saponins and sapogenins was found to be effective against asthma and its Cf-3 active fraction at 150 mg/kg body weight with

Acacia gum showed 78.35±1.29% intact mast cells and 21.65±1.34 % disrupted mast cells during mast cells de-granulation process<sup>30</sup>.

**Guduchi:** (*Tinospora cordifolia* Linn.) *Guduchi* is a Climbing Shrub, Leaves Cordate, Flowers are Greenish- yellow and said to be anti-allergic, anti-oxidant, anti-pyretic<sup>31</sup>. It contains alkaloids, diterpenoid, glycosides, steroids, sesquiterpenoid and polysaccharides<sup>32</sup>.

*Tinospora* extract shows therapeutic potential for management of asthmatic inflammation and other lung inflammatory conditions against oxidative stress, pro-inflammatory mediator release and redox signaling in the murine model of asthma<sup>33</sup>.

**Jivanti:** (*Leptadenia reticulata* Retz.)

*Jivanti* is a branched twining shrub, leaves thinly coriaceous, ovate and cordate. Flower greenish-yellow and seeds narrowly ovate-oblong. And it is an antibacterial, antimicrobial, respiratory stimulant and depressant<sup>34</sup>.

Gas chromatography-mass spectrometry (GC-MS) analysis of the ethanolic extract of whole plant of *L. reticulata* revealed the presence of 32 phytochemicals<sup>35</sup>.

Anti-asthmatic activity experiment was done on a Guinea pig, and rat. A result of the experiment was histamine (10 µg/ ml) produced dose-dependent contraction of guinea pig ileum. Pre-treatment with hydro



alcoholic extract of *L. reticulata* (0.8 mg/ml) significantly inhibited ( $p < 0.01$ ) the contractile effect of histamine<sup>36</sup>.

**Hapusha:** (*Juniperus communis* Linn.)

An evergreen dense diffuse shrub leaves sharply pointed, linear, flowers axillary, fruit globose berries, blue-black and seed usually 3 and ovoid. It is said to be Anti-microbial, anti-fungal, anti-malarial, and Anti-hypercholesterolemic activity<sup>37</sup>.

Essential oil is largely comprised of monoterpene hydrocarbons such as  $\beta$ -pinene (5.0%),  $\alpha$ -pinene (51.4%), sabinene (5.8%) and limonene (5.1%)<sup>38</sup>.

Juniper oil is useful to inhale the steam for respiratory infections, colds, asthma, bronchitis, etc<sup>39</sup>.

**Gunja:** (*Abrus precatorius* Linn.)

*Gunja* is a deciduous wiry climber, leaves abruptly pinnate with many pairs of leaflets, Seeds ovoid, scarlet with a black spot round the hilum and glossy<sup>40</sup>. The volatile oil found in shell oil limonene (19.08%), ocimene (8.94%) and myrcene (8.60%) and zingiberene (6.02%). In seed oil the dominant monoterpenes are sabinene (10.93%) and camphene (6.45%), while were zingiberene (10.75%), farnesene (5.30%), sesquiphelladrene (4.47%) and curcumene (4.41%) were the prominent sesquiterpenes, and good ant-oxidantal property<sup>41</sup>.

The ethanol extract of *A. precatorius* leaves

significantly decreased milk induced leukocytosis and eosinophilia in mice in a dose dependent manner<sup>42</sup>.

**Meshashrunji:** (*Gymnema sylvestre* R.Br.)

A large woody climber leaves simple, opposite and root bark light brown cracking horizontally<sup>43</sup>. Alkaloids, terpenoids, tannin, saponin, flavonoid, phenol and anthraquinones found in *G. Sylvestre*, and it shows antioxidant and antimicrobial activity<sup>44</sup>.

Ethanol ext. of *G. sylvestre* leaves was evaluated for antiasthmatic activity using histamine and acetylcholine-induced bronchospasm, mast cell degranulation and histamine induced constriction on isolated guinea pig tracheal chain at different dose levels and concludes that the antiasthmatic activity of ethanolic ext. of *G. Sylvestre* leaves may be due to the presence of flavonoids or steroids<sup>45</sup>.

**Dronpushpi:** (*Leucas aspera* Willd.) is an annual erect, stout, hairy, aromatic herb having quadrangular stem, leaves simple, opposite, ovate-lanceolate, flowers white, terminal or axillary whorls, and it shows Anti-microbial activity<sup>46</sup>. The essential oil identified from the leaf is  $\alpha$ -farnesene (26.4%),  $\alpha$ -thujene (12.6%) and menthol (11.3%) were the major constituents and among the 10 compounds identified from the flower volatiles, amyl propionate (15.2%) and isoamyl propionate (14.4%)





were dominant<sup>47</sup>. Methanolic extract of dried whole plant of *Leucas aspera* reported antiasthmatic activity *in-vivo* models like histamine induced bronchospasm in guinea pigs, passive paw anaphylaxis in rats and milk induced eosinophilia mice and *in vitro* model like mesentric mast cell degranulation by egg albumin etc<sup>48</sup>.

**Katphala:** (*Myrica nagi* Linn.)

An evergreen dioecious tree, bark rough with deep vertical wrinkles, grey or brownish grey, leaves simple, lanceolate, acute or obtuse<sup>49</sup>. The volatile compounds found to be Nerolidol,  $\alpha$ -pinene,  $\alpha$ -selinene,  $\beta$ -caryophyllene,  $\beta$ -selinen,  $\alpha$ -caryophyllene,  $\alpha$ -cadinol, linalool in the leaves and in the bark n-Hexadecanol; eudesmol acetate; palmitic acid; cis- $\beta$ -caryophyllene; n-pentadecanol; n-octadecanol. Volatile oil reported to antimicrobial activity. The antiasthmatic potential of ethanol extract of the bark (75 mg/kg and 150 mg/kg, p.o.) was further supported by exhibiting antiallergic activity due to marked inhibition of eosinophil accumulation ( $p < 0.05$ ) in allergic pleurisy test as well as significant inhibition in the rise in plasma exudation ( $p < 0.05$ ) in acetic acid-induced vascular permeability<sup>50</sup>.

## DISCUSSION

*Arka Kalpana* from the *Arka prakasha* was screened for *Shwasagna karma*. Total 16 *arka kalpana* are mentioned for *Shwasa roga* mainly caused by *KaphaVatadosha*. *Arka* indicated for *shwasa* are *Kaphavatahara dravyas* with *Shwasaghna karma*. *Kaphahara* because of *Usna veerya*, *Katu Vipaka* and *Katu, Tikta, Kasaya Rasa*. *Vatahara* because of its *Usna Virya*. So the drugs having these properties help in the management of *Shwasa roga*. Among 16 drugs, 13 drugs are proven as antiasthmatic as per studies done on animal models and human. Studies upon *Dhanyaka*, *Hapusha* and *Prisnaparni* aren't proved as anti-asthmatic activity but in classical text mentioned as expectorant. A clinical study revealed that *Ardraka* and *Bharangi arka* Nebulization was effective in *vegavastha* of *tamaka shwasa*. Essential oil or Volatile oil is generally extracted by distillation process. The volatile oil when administered orally or inhalation increases the respiratory secretions probably by direct stimulation. They act like expectorant and liquefy by increasing the secretions, expel out and relax the irritated mucosa.

## CONCLUSION

In the present review on *Shwasaghna dravyas* of *Arka prakasha*, 16 *Arka kalpana* are mentioned, the *dravyas* were indicated for *Shwasa*. Recent experimental and



clinical studies reveal the effect of these herbs on respiratory system and hence open an avenue for clinical research on these *Arka kalapana*.



## REFERENCES

1. Tripathi Indradeva. Arka Prakasha of Lankapathy Ravana. 2nd ed. Chowkambha Krishnadas Academy. Varanasi. 2006.
2. The Ayurvedic Formulary of India. Part I. Vol I. 2nd ed. New Delhi: Ministry of Health and Family Welfare, Govt. of India; 2003; p.27, 53.
3. Acharya Baladeva Uadhy. Garuda Purana. Chaukhambha Sanskrit series. 1966. PP 488.
4. Trikamji Yadvaji Acharya. Sushruta Samhita Nibandhadangarha commentary of Dalhanacharya. Uttarantra. Chapter 51. Shwasa Pratishedha Adyaya. Verse no 4. Chaukhambha orientalia. Varanasi. Reprint 2009. P 761.
5. Trikamji Yadvaji Acharya. Agnivesha Charaka Samhita Chakrapani Commentary. Sutrastana. Chapter 19. Ashtaodariya Adyaya. Verse no 4. Chaukhambha Surbharati Prakashana. Varanasi. Reprint 2011. P 110.
6. Crompton GK, McHardy GFR. Diseases of the respiratory system. In Edwards CRW, Bouchier IAD(ed). Davidson's Principles and practice of Medicine. 16th ed. Edinburgh. 1994. P 376.
7. <http://www.who.int/mediacentre/factsheets/fs206/en/>
8. Shastry J.L.N. Dravyaguna Vignana. Volume 2. Chaukhambha orientalia. Varanasi. 2014.
9. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 5. Central Council for Research in Ayurveda and Siddha. New Delhi. P 315.
10. Sushma Pujari, Mamatha K.V, Kiran M Goud, Baidyanath Mishra. Role of Dhumapana (nebulization) and pana with Ardraka arka in the management of Tamaka shwasa. An International Journal of Research in Ayush and Allied Systems. Ayushdhara, Sept-Oct 2014, Vol 1, Issue 1.
11. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 3. Central Council for Research in Ayurveda and Siddha. New Delhi. Reprinted 2005. P 472.
12. Maitreyi Zaveri, Amit Khandhar, Samir Patel, Archita Patel. Chemistry and Pharmacology of piper longum. International Journal of Pharmaceutical Sciences Review and Research. Volume 5. Issue 1. November – December 2010. Article-010.
13. Kulshresta VK, Singh N, Shrivastava RK. A study of central stimulant effect of Piper longum. Indian J Pharmacol. 1969. 1(2):8-10.
14. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 5.



Central Council for Research in Ayurveda and Siddha. New Delhi. P 187.

15. Parganiha R, Velma S, Chandrakar S, Pal S, Sawarkar HA, Kashyap P. In vitro anti- asthmatic activity of fruit extract of *Piper nigrum* (Piperaceae). International Journal of Herbal Drug Research. 2011. 1(1):15-18.

16. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 4. Central Council for Research in Ayurveda and Siddha. New Delhi. P 90.

17. Vd. Sunita J. Gadekar and Guide Vd. Asmita U. Jadhav. Review of spices as a medicine, world journal of pharmacy and pharmaceutical sciences. Volume 6. Issue 8. 413-425.

18. Billore K.V, Yelne M.B, Dennis T.J, Chaudhari B.G. Database on Medicinal plants. Volume 7. Central council for Research in Ayurveda and Siddha. New Delhi. 2005. P 486.

19. S. Sharma, V. P. Rasal, R. K. Joshi and P. A. Patil. In Vivo Evaluation of Antiasthmatic activity of Eessential oil of *Zanthoxylum armatum*. Indian journal of Pharmaceutical sciences. DOI: 10.4172/pharmaceutical-sciences.1000369.

20. PK Warriar, V P K Nambiar, C Ramankutty (editors). Illustrations- R Vasudevan Nair. Indian Medicinal Plants. Volume 3. Orient Longman Private Limited. Chennai. Reprinted 2003. P. 214.

21. Kajaria Divya, Tripathi J.S., Tiwari S.K. Study of Antiasthmatic Properties and Chemical Characterization of Indigenous Ayurvedic Compounds (Polyherbal Formulations). American Journal of Phytomedicine and Clinical Therapeutics. AJPCT 1, 6, 2013, 457-466.

22. Gautam P. Vadnere, Ram S. Gaud, Abhay Kumar Singhai, Somani RS. Effect of *Inula racemosa* root extract on various aspects of asthma. Pharmacologyonline. 2009. 2:84-94

23. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 3. Central Council for Research in Ayurveda and Siddha. New Delhi. Reprinted 2002. P 73.

24. J.P.Chintuja. A Clinical Study On The Efficacy Of Bharangimoola Arka Nebulization in The Management of Tamaka Shwasa(Acute Exacerbation Of Bronchial Asthma). Thesis for M.D in Kayachikitsa. Rajiv Gandhi University of Health Science. 2015.

25. Gupta AK, Tandon N, Sharma M. Review on Indian Medicinal Plants. Volume 7. Indian Council of Medical Research. New Delhi. 2008. P 126.

26. Billore K.V, Yelne M.B, Dennis T.J, Chaudhari B.G. Database on Medicinal plants. Volume 6. Central council for Research in Ayurveda and Siddha. New Delhi. P 314.



27. Hari Om Saxena, Anjana Soni, Naseer Mohammad, Santosh Kumar Choubey. Phytochemical screening and elemental analysis in different plant parts of *Uraria picta* Desv: A Dashmul species. Journal of Chemical and Pharmaceutical Research. 2014. 6(5):756-760.
28. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 2. Central Council for Research in Ayurveda and Siddha. New Delhi. Reprint 2005. P 29.
29. Shivjeet Singh, Sandeep Kumar Singh, Ashutosh Yadav. A Review on Cassia species: Pharmacological, Traditional and Medicinal Aspects in Various Countries. American Journal of Phytomedicine and Clinical Therapeutics. 1, 3, 2013, 291-312.
30. Agnihotri V. K. Isolation and structural elucidation of saponins from a medicinal plant of Leguminosae and evaluation of their antiasthmatic activity. Thesis for Ph. D. in Chemistry. Barkatullah University. Bhopal. Madhyapradesh. 2012.
31. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants. Volume 3. Central Council for Research in Ayurveda and Siddha. New Delhi. Reprint 2005. P 256.
32. Avnish K, Upadhyay, Kaushal Kumar, Arvind Kumar, and Hari S. Mishra. *Tinospora cordifolia* (Willd.) Hook. f. and Thoms. (*Guduchi*) – Validation of the Ayurvedic pharmacology through experimental and clinical studies. International journal of Ayurveda and Research. 2010 Apr-Jun; 1(2): 112–121.
33. Tiwari M., Kakkar P., Dwivedi UN. *Tinospora cordifolia* extract modulates COX-2, iNOS, ICAM 1, pro-inflammatory cytokines & redox status in murine model of asthma. Journal of Ethnopharmacology. 2014. 28: 326-37.
34. Sharma P.C, Yelne M.B, Dennis T.J. Database on Medicinal plants, Volume 2. Central council for Research in Ayurveda and Siddha. New Delhi. Reprint 2005. P 270.
35. Rajeswari J, Rani, S. GC-MS analysis of whole plant of *Leptadenia reticulata*. *Int. J. PharmTech Res.* 2014. 6, 2043–2050.
36. Jagdish B, Sandip A. Antiasthmatic activity of *Leptadenia reticulata* (Retz) Wt. & Arn. Leaves. 3<sup>rd</sup> International Conference on Applied Mathematics and Pharmaceutical Sciences. 29-30 April, 2013, Singapore.
37. Chandra kailash, Dhar B.P, Mangal A.K, Dabur rajesh, Gurav M. Arun, Yelne M.B, Joseph G.V.R, Chaudhari B.G, Mandal k. Tushar, Singh S.P. Database on Medicinal plants. Volume 8. Central council for Research in Ayurveda and Siddha. New Delhi. 2007. P 105.



38. Souravh Bais, Naresh Singh Gill, Nitan Rana, and Shandeep Shandil. A Phytopharmacological Review on a Medicinal Plant: *Juniperus communis*. *International scholarly research notices*. 2014 Nov 11. doi: [10.1155/2014/634723](https://doi.org/10.1155/2014/634723).
39. [www.emedicinal.com](http://www.emedicinal.com)>Herb Database, Hapusha cited on june20, 2018.
40. PK Warriar, V P K Nambiar, C Ramankutty(editors). Illustrations- R Vasudevan Nair, Indian Medicinal Plants. Volume 1.Orient Longman Private Limited. Chennai Reprinted 2003. P 10.
41. Sunday O. Okoh, Olayinka T. Asekun, Oluwole B. Familoni and Anthony J. Afolayan. Antioxidant and Free Radical Scavenging Capacity of Seed and Shell Essential Oils Extracted from *Abrus precatorius* (L), Antioxidants (Basel). 2014 Apr 15; 3(2):278-87.
42. Dnyaneshwar J Taur, Ravindra Y Patil. Effect of *Abrus precatorius* leaves on milk induced leukocytosis and eosinophilia in the management of asthma. *Asian Pacific Journal of Tropical Biomedicine*. 2012; 1(1): S40-S42.
43. Billore K.V, Yelne M.B, Dennis T.J, Chaudhari B.G. Database on Medicinal plants. Volume 7. Central council for Research in Ayurveda and Siddha. New Delhi. 2005. P 265.
44. Shobha Rupanar, Shirish Pingale. Review: Phytochemical and Pharmacological Profile of *Gymnema Sylvestre*. *International Journal of Engineering Technology Science and Research*. ISSN 2394 – 3386 Volume 5, Issue 3, March 2018.
45. Vijayabhaskar K, Prasad KC, Himabindu G, AbdulMateen, M, Paramesh P, Hemanth, K. Evaluation of antiasthmatic activity of ethanolic extract of *Gymnema sylvestre* leaves. *European Journal of Biomedical and Pharmaceutical Sciences*. 2015; 2(4):558-568.
46. Chandra kailash, Dhar B.P, Mangal A.K,Dabur rajesh, Gurav M. Arun,Yelne M.B, Joseph G.V.R,Chaudhari B.G, Mandal k.Tushar, Singh S.P. Database on Medicinal plants. Volume 8. Central council for Research in Ayurveda and Siddha. New Delhi. 2007. P 74.
47. Kalachaveedu M, Ghosh a, Ranjan R, Vedam venkat K. Volatile constituents of *leucas aspera* (wild). *J Essent oil res* 2006.
48. Limbasiya KK, Modi VR, Tirgar PR, Desai TR, Bhalodia PN. Evaluation of antiasthmatic activity of dried whole plant extract of *Leucas aspera* using various experimental animal models. *International Journal of Phytopharmacology*. 2012. 3(3):291-298.
49. Chandra kailash, Dhar B.P, Mangal A.K,Dabur rajesh, Gurav M. Arun,Yelne M.B, Joseph G.V.R,Chaudhari B.G,Mandal k.Tushar,Singh S.P.Database on Medicinal



plants. Volume 8. Central council for Research in Ayurveda and Siddha. New Delhi. 2007. P 207.

50. Patel KG, Rao NJ, Gajera VG, Bhatt PA, Patel KV, Gandhi TR. Antiallergic activity of stem bark of *Myricaesculenta* Buch.-Ham (Myricaceae). J Young Pharm. 2010. 2:74-8.