

## Therapeutic Uses of *Vernonia cinerea* - A Short Review

Lakshmi Prabha.J

Saveetha Dental College, 162, Poonamalle High Rd, Rajankuppam, Maduravoyal, Chennai, Tamil Nadu 600095

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### ABSTRACT

The aim of this study is to evaluate and systematically review the medicinal properties of the plant *Vernonia cinerea* and to analyse pharmacological, phytochemical and pharmacochemical activities of the plant extract. The objective of this study is to analyse the properties like anti-oxidant, anti-cholinesterase, anti-bacterial, anti-diarrheal, anti-helminthic, anti-tumour and anti-diabetic activities of various parts of the plant. *Vernonia* is a genus of about 1000 species of herbs and shrubs in the family Asteraceae. The family Asteraceae is well distributed in Indian flora, by its floral structure and chemical composition it is considered one of the most advanced family from all the dicotyledons. Some species are known as Ironweed. Some species are edible and of economic value. They are known for having intense purple flowers. *Vernonia cinerea* is a potential medicinal plant. Use of drugs for pain relief and other reasons may produce side effects which are harmful to the body. Thus finding medicinal plants with the minimal side effect as the drug may be highly beneficial.

**Keywords:** pharmacological, phytochemical, pharmacochemical, antioxidant, antidiabetic, anti tumour

### INTRODUCTION

*Vernonia cinerea* (family Asteraceae) also called little iron weed is a perennial grass with erect stem seen in the mainland of China, Fujian, Guangdong, Guangxi, Jiangxi, Hunan, Sichuan, Yunnan and Vietnam, Myanmar, India, Bangladesh, Srilanka, Malay island, the Philippines, Australia, Africa, New Zealand, Asia and other places<sup>1-3</sup>. In other languages it is commonly called as sahadevi in sanskrit and hindi, kukshim in bengali, puvamkurunnel in malayalam<sup>4</sup>. The whole plant is edible and can be used as a medicine. These are plants which produce sesquiterpenes, lactones, pentacyclic, triterpene, alcohols, various alkaloids<sup>4-8</sup>. The traditional uses of Asteraceae plants include wound healing, asthma, dysentery, cold and diarrhoea. It is used for treating cancer gastrointestinal disorders and abortions<sup>10,5</sup>. It also cures urinary incontinence in children<sup>4</sup>. Certain species have leguminous property and hence enrich soil fertility<sup>9</sup>. It is used to control fever, inflammation, bleeding, swelling and detoxification<sup>1</sup>. It is also seen to have therapeutic effects against certain gastrointestinal and skin disorders and also some immunomodulatory effects<sup>10</sup>. It is seen to have supplementary effects on reducing smoking rate, beta endorphin release and oxidative stress biomarkers<sup>11</sup>. It has antibacterial activity against certain bacterial species like *E.coli*<sup>5</sup>. It has larvicidal activity against mosquito and other filarial species due to flavonoids and thiophene derivatives which are toxic to those species<sup>12</sup>. Methanolic extracts show antidiuretic property whereas chloroform extract shows diuretic activity<sup>4,3</sup>. The roots and leaves of this plant

is also known to cure fever, hiccups, kidney disease and stomach discomfort<sup>6</sup>. The plant is used to treat nerve disorders and is also a potent analgesic<sup>13</sup>. Thus this review is done to analyse the various therapeutic activities of the plant *Vernonia cinerea*.

#### *Phytochemical composition and characteristics*

The methanolic extract of the aerial parts of the plant showed the presence of steroids, glycosides, triterpenoids and esters during phytochemical screening<sup>14</sup>. The phytochemical screening of the whole plant extract revealed the presence of alkaloid, anthraquinone, coumarin, tannin, glycoside, xanthoprotein and sugar which have potent antibacterial activity against both gram positive and gram negative bacteria and also Antimicrobial activity against a wide range of pathogens. Alkaloids show emetic, amoebicides, expectorant, anaesthetic, antipyretic, analgesic, antihelminthic, Flavonoids have antihypertensive, antibiotic, antimicrobial, antitumour, astringent, anti inflammatory, antidiarrhoeal, antioxidant and antimicrobial effects<sup>7</sup>.

### THERAPEUTIC USES OF THE PLANT VERNONIA CINERIA

#### *Anti-hyperglycemic activity*

The ethanolic extract contains phytochemical bioactive compounds like glycosides, esters, flavonoids, steroids, tannins and terpenoids which have anti hyperglycemic activity<sup>5,4</sup>. In vivo studies in mice with crude extract and sesquiterpene lactone showed that the plant did not cause any significant toxicity nor any changes in alertness,

breathing, mental problems and motor activity including body weight. Decrease in blood glucose was seen in alloxan induced mice than normal mice was observed when treated with the plant for a period of fourteen days<sup>4</sup>. Time dependent reduction in diabetic activity of alloxan-induced rats is due to restoration of pancreatic function by increased insulin output or decreased intestinal absorption<sup>15</sup>.

#### *Antioxidant activity*

Alkaloids are a major component present in the plant and are said to have antioxidant and immunomodulatory effect<sup>7</sup>. It is due to the DPPH scavenging activity of the carbon tetrachloride fraction of methanolic extract of the plant. These extracts are used for medicinal and preservative purposes. The antioxidant activity of the plant is due to its phenolic activity and may also play a role in neurofibrillary tangles and neurotic plaques<sup>16</sup>. Higher antioxidant property is shown by methanolic extract of leaf when compared to flower<sup>6</sup>.

#### *Antitumour activity*

Antitumour activity is significantly seen in ethanolic and chloroform extracts of aerial parts of *Vernonia cinerea* against Dalton's ascitic lymphoma. In vivo studies in mice showed a decrease in cancer cell count with the injection of extracts and this protective effect is also concluded by hematological parameters<sup>17</sup>.

#### *Ameliorative activity*

Ethanolic extract has ameliorative effect against chronic constrictive injury of sciatic nerve induced neuropathic pain in rats which may be due to the presence of flavonoids. Flavonoids present in the plant has antioxidant, neuroprotective and calcium channel modulatory actions. This disease in rats induced behavioral changes which were attenuated with ethanolic extracts of the plant<sup>13</sup>.

#### *Sedative Activity*

This plant contains a centrally acting depressant agent primarily involved in short term analgesia. The active ingredient is water soluble and heat stable preparations against insomnia and other related ailments. It can be used in relatively low doses for controlling pain. In vivo studies in mice showed that After approximately 4mins of lethal dose injection it was known to cause reduction in motor activity, depressant action, convulsions followed by death. Sublethal doses showed same effects but in a milder form approximately after 10mins of injection. 1000mg/kg of the mice caused significant reduction in locomotor activity which was significant only for 20 mins<sup>18</sup>.

#### *Antidiarrhoeal activities*

The methanolic extract of *Vernonia cinerea* is seen to have antidiarrhoeal activity. Although the carbon tetrachloride fraction of this extract did not show such properties. Antidiarrhoeal activity is due to polar groups which enhances fluid and electrolyte absorption through gastrointestinal tract<sup>15</sup>. In vivo studies in mice, diarrhoea is induced by castor oil which prevents fluid and electrolyte

absorption<sup>15,3</sup>. 50mg/kg of the methanolic extract when given orally to mice does not significantly change the number of wet faeces and total faeces<sup>3</sup>.

#### *Antimicrobial activity*

Saponins present in flower extracts and flavonoids present in leaf and flower extracts are known to have antimicrobial activity. Hexane and crude extracts of flower shows maximum inhibition against *B.cereus*, *E.aerogenus* and *S.aureus* whereas leaf extracts showed activity against *B.cereus* and *E.aerogenus* but not against *S.aureus*. Ether extracts also showed antibacterial against *B.cereus*, *E.aerogenes* and *S. aureus*. Antibacterial activity of various extracts of the plant against both gram positive and gram negative bacteria exhibited different effects with a maximum antibacterial activity in case of methanolic extract than hexane extract<sup>6</sup>. The whole plant shows good anti-bacterial activity against *E.coli* and *Klebseilla pneumoniae* species. This activity can be tested using agar disk diffusion method<sup>5</sup>. The antibacterial activity was shown by petroleum ether, chloroform, acetone, methanol and ethanol extracts of the whole plant and the greatest effect was shown by petroleum ether and ethanolic extracts<sup>7</sup>.

#### *Anti helminthic activity*

In general, the chloroform extract and the alcoholic extracts have been known to potentiate its effects against helminthiasis or worm infection<sup>19</sup>.

## CONCLUSION

The plant has antibacterial, antimicrobial, antihelminthic, antitumour, antioxidant and anti-hyperglycemic effects. These potential effects of this plant may be used for further studies and treatment purposes in living individuals instead of the drugs used which may have various side effects. Thus the whole plant is said to have potent actions which can give actions similar to the drugs with minimal side effects.

## REFERENCES

1. Guan-Rui Lai and Chiao-Song Wu ;Analyzing of Major Active Luteolin in *Vernonia Cinerea* ; (2013) International Journal of Bioscience, Biochemistry and Bioinformatics, Vol. 3, No. 4, July 2013
2. P. Dhanalakshmi, A. Jaya Prakash Priya, E. Sagadevan, Yamini Sudha Lakshmi, A. Manimaran, S. Sindhu and P. Arumugam; Evaluation of inhibitory effect of *Vernonia cinerea* L. leaf extracts on different fungal species; (2013) International Journal of Pharmacy and Pharmaceutical Sciences ISSN- 0975-1491 Vol 5, Issue 2, 2013 Research
3. Pandey Ganesh, Kasana Virendra Kumar, and Hore Surendra Kumar; (2011) Antidiarrhoeal activity of methanolic extract of *Vernonia cinerea* L. Less on female albino rats; IRJP 2 (5) 211-213
4. Sheetal Choudhary, Manik Sharma, Jagrati Tripathi, Pramod Mishra; (2013) Antihyperglycemic activity of

- Vernonia cinerea* L. on alloxan-induced diabetic mice; ISSN NO 2320-5407 International Journal of Advanced Research , Volume 1, Issue 2, 35-42 35
5. Chethan J, Sampath Kumara K. K, Shailasree Sekhar, Prakash H.S; Antioxidant, antibacterial and DNA protecting activity of selected medicinally important asteraceae plants; International Journal of Pharmacy and Pharmaceutical Sciences ISSN- 0975-1491
  6. Syed Mohd. Danish Rizvi, Deboshree Biswas , Jamal M. Arif and Mohd. Zeeshan; (2011) Invitro antibacterial and antioxidant potential of leaf extracts and flower extracts of vernonia conerea and its phytochemical constituents; Volume 9, Issue 2, July – August 2011; ISSN 0976 – 044X International Journal of Pharmaceutical Sciences Review and Research
  7. Edison Dalmeida Daffodil, Packia Lincy and Veerabahu Ramasamy Mohan; Pharmacochemical Characterization, FT-IR and Antibacterial Activity of *Vernonia cinerea* Less.
  8. E.M. Ilondu; Phytochemical composition and efficacy of ethanolic leaf extracts of some *Vernonia* species against two phytopathogenic fungi
  9. Traditional uses of medicinal plants among the rural people in Sivagangai district of Tamil Nadu, Southern India; S Shanmugam, K Rajendran, K Suresh; Asian Pacific Journal of Tropical Biomedicine 2012. S429S434
  10. Thitiporn Laosim, Siriporn Chuchawankul and Tewin Tencomnao; (2011) Immunomodulatory effect of hexane extract of *Vernonia cinerea* Less. trunk on human peripheral blood mononuclear cells; ISSN No: 0975-7384 Coden(USA): JCPRC J. Chem. Pharm. Res., 3(4):188-195
  11. Donrawee Leelarungrayub, Sainatee Pratanaphon, Prapas Pothongsunun, Thanyaluck Sriboonreung, Araya Yankai, and Richard J Bloomer; (2010) *Vernonia cinerea* Less. supplementation and strenuous exercise reduce smoking rate: relation to oxidative stress status and beta-endorphin release in active smokers; J Int Soc Sports Nutr.; 7: 21.
  12. S. Arivoli, Samuel Tennyson and J. Jesudoss Martin; (2011) Larvicidal efficacy of *Vernonia cinerea* (L.) (Asteraceae) leaf extracts against the filarial vector *Culex quinquefasciatus* Say (Diptera: Culicidae) ; Journal of Biopesticides, 4 (1): 37 - 42
  13. Thiagarajan V R, Shanmugam P, Krishnan U M, Muthuraman A; (2014) Ameliorative potential of *Vernonia cinerea* on chronic constriction injury of sciatic nerve induced neuropathic pain in rats; An Acad Bras Cienc. 2014 Aug 29;0:0.
  14. Md. Ahsanul Haque, Md. Musfizur Hassan, Atanu Das, Bilkis Begum, Md. Yousuf Ali and Helal Morshed; (2012) Phytochemical investigation of *Vernonia cinerea* (Family: Asteraceae); Journal of Applied Pharmaceutical Science 02 (06); 79-83
  15. Md. Ahsanul Haque, Chowdhury Sayef Abdullah, Bilquis Romana, Md. Bodruddoza Rafique , Gazi Md. Zia-ulHuda , Sarder Fahim Hossain; (2013) Journal of Applied Pharmaceutical Science Vol. 3 (01), pp. 069-072, January, 2013
  16. Md. Ahsanul Haque, Chowdhury Sayef Abdullah, Md Musfizur Hassan, Most. Nazma Parvin, Md. Bodruddoza Rafique and A.G.M. Mostofa; (2012) Evaluation of the Antioxidant and Anti-cholinesterase activities of the Stem, Barks and Leaves of the Plant *Vernonia cinerea* (Family: Asteraceae); Journal of Applied Pharmaceutical Science 02 (05); 174-176.
  17. Sangeetha.T., Venkatarathinakumar.T; (2011) Antitumor activity of aerial parts of *Vernonia cinerea*(L) Less. against Dalton's ascitic lymphoma; International Journal of PharmTech Research coden (USA): IJPRIF ISSN : 0974-4304 Vol.3, No.4, pp 2075-2079, Oct-Dec 2011
  18. C. K. Muir; (1981) Depressant action of an extract of *Vernonia cinerea*; Med J Malaysia. 1981 Jun; 36 (2):119-21.
  19. S.Ushasri\*, K. Nagaraju, D. Prasanthi, K. Ramadevi; (2012) In-vitro antihelmintic activity of *Vernonia cinerea* roots; An International Journal of Advances in Pharmaceutical Sciences; Volume 3 Issue 6 November-December 2012.