



Review Article

ISSN: 2454-5023
J. Ayu. Herb. Med.
2020; 6(4): 231-236
© 2020, All rights reserved
www.ayurvedjournal.com
Received: 01-12-2020
Accepted: 13-01-2021

Pharmacognostic review of *Astercantha longifolia* (L.) Nees, & its possible use in prevention of COVID-19

Shiva Prasad Mohanty¹, Kshirabdhii Tanaya Rautaray²

¹ MD(Ayu), Assistant Professor, Department of Dravyaguna, SSN Ayu College & RI, Paikmal, Odisha, India

² MD(Ayu), Professor, Department of Samhita, SSN Ayu College & RI, Paikmal, Odisha, India

ABSTRACT

Astercantha longifolia is an annual herb from Acanthaceae family found almost as weed throughout plainlands, all over India. It is very much important from Ayurveda point of view for its curative role in many disease conditions. It is called as Kokilakshya in Ayurveda & Talamakhanna in Unani system. Its importance in Ayurveda can be judged by its visibility in Samhitas & Nighantus. India is a young country with billion plus population & having second highest in COVID affected numbers. Being a viral disease, immunity boosting drugs are the need of the hour & *Astercantha longifolia* (L) Nees or Kokilakshya fits in this situation perfectly. It has many pharmacological activities and the best action is, its free radical scavenging activity. Viral infections unleash storms of cytokinin, which produces abundant free radicals & the complications of COVID 19 are mainly due to these free radicals^[1]. So, keeping all these qualities in mind, an honest attempt is made to enumerate those details and justify its perspective utility in Covid 19.

Keywords: Kokilakshya, Ayurveda, Free radicals, Chawan Prasha.

INTRODUCTION

The knowledge of medicines as well as diseases are dated back to thousands of years. Ayurveda believes using Plants and its parts as drugs to treat not only body but also mind and soul too^[2]. This is echoed by WHO in its prescribed definition of Health.

Many magical herbs with immunity boosting actions are mentioned in *Vedas, Samhitas and Nighantus* (Lexicons) and one such drug is Kokilakshya, *Astercantha longifolia* (L) Nees. It belongs to Acanthaceae family which also includes Vasa (*Adhatoda vasica* (L) Nees., Kalamegha (*Andrographis paniculata* (L) and Saireyaka (*Barleria prionites*(L) and few others^[3]. The present COVID 19 pandemics brought back the focus to Ayurveda and its herbs. In the context of Covid, Protocol issued by department of Ayush, categorically insisted for *Chawan Prasha* and other immunity boosting drugs^[4].

Chawan Prasha is advised for its immunity boosting ability which is denoted by the term Rasayana in Ayurveda. Chawan Prasha is a costly poly herbal compound due to unique preparation method, use of Ghee and other costly drugs^[5].

Whereas Kokilakshya is a single drug, available freely around India offering similar level of immunity boosting or rejuvenating capabilities, which could come handy in slowing infection & post infection complication rate for Covid 19. The seeds are usually used for treatment, which are black coloured, looking like eye of the Cuckoo (*Kokila*) So it's called Kokilakshya in Ayurveda. It is used in the treatment of neurodegenerative diseases, used as an aphrodisiac & a general-purpose health tonic^[6]. The present article explores its Pharmacological, Phytochemical & Ayurvedic aspect of the drug with emphasis on its perspective usefulness in COVID pandemic.

SYNONYMS (SANSKRIT)^[7, 8, 9]

Ikshura, Ikshuraka, Ikshubalika, Ikshugandhika, Vajrasthi, Vajrakantaka, Taila ganthika, Pichhila, Kshura.

Synonyms (Botanical)^[10]

Astercantha auriculata Nees, *Astercantha lindaviana* Wildem. & Th. Dur., *Astercantha macracantha* Hochst.ex A. Rich., Bahel schulli Hamilton, *Barleria cornigera* Very ex. Nees, *Barleria glabrata* Vahl ex Nees, *Barleria spinosa* Hook ex Nees, *Hygrophila lindaviana* (Wildem. & Th. Dur) Burkill, *Hygrophila auriculata* (Schumach), *Hygrophila spinosa* T. Anderson, *Barleria auriculata* Schumach, *Barleria longifolia* L,

***Corresponding author:**

Dr. Shiva Prasad Mohanty

MD(Ayu), Assistant Professor,
Department of Dravyaguna, SSN
Ayu College & RI, Paikmal,
Odisha, India

Email: spmohanty27@gmail.com

Hygrophila schulli M. R Almeida & S.M. Almeida, Ruellia longifolia (Nees)Roxb. Tenoria Undulata Dehnh.

Vernacular names (Names in different local languages) ^[11]: Hindi-Talamakhanna, English-Hygrophila, Bengali-Kulimakada, Odia-Koilikhai, (Sambalpur: Koelkhia), Gujurati-Ekharo, Tamil-Nirmuli, Telegu-Neerugubbi, Malayalam-Nirmuli & Urdu-Talamakhanna.

Classification or Grouping position in Ayurveda ^[12]: Charka Samhita: Sukrasodhana, Bhava Prakash Nighantu: Guduchyadi verga, Kaiadeva Nighantu: Oushadhi verga.

Taxonomical classification ^[13]

Class : Equisetopsida C. agardh
Subclass : Magnoliidae Novak ex Takht.
Superorder : Asterales Bromhead
Family : Acanthaceae Juss.
Genus : Astercantha Nees.
Species : *Astercantha longifolia* (L.) Ness

Geographic distribution ^[14 & 15]

The herb is distributed all over India, Sri Lanka & Nepal, specially found near moist and marshy places and unused land patches. In Odisha this is found in Puri, Khordha, Sambalpur, Baripada, Dhenkanal, Jajapur & Nabarangapur districts etc.

Plant Morphology ^[16]

Astercantha longifolia is a small herb growing to a height of 1-3 feet with rough hair follicles covered all over the plant body and presence brownish coloured spines at stem nodes in a typical pattern. The leaves are simple, Opposite & oblong lanceolate. The stem looks like a thin piece of Sugarcane. Seeds are black, ovate 0.2cmx0.1cm sized, became slime when come in contact with Saliva or Water. It is slightly bitter and with no specific odour. Flowers are Purple coloured and seen in September to December.

Identity, Purity & Strength ^[17]

Foreign matter: Not more than 2%, Total ash: Not more than 9%, Acid soluble ash: Not more than 1%, Alcohol soluble extractive: Not more than 4%, Water soluble extractive: Not more than 20%.

Classical uses ^[18 & 19]

It is useful in prevention & treatment of Inflammation, calculus, diarrhoea, poisoning, pain, anaemia, abdominal disorders, flatulence, retention of urine, generalized neuritis, rheumatoid arthritis, diabetic conditions, ocular disorders, & diseases related to blood. Seeds are used as generalized health tonic (Rasayana) and promotor of conception. Leaf is specifically used to treat anaemia, urine disorders & constipation. Root is coolant, aphrodisiac & used in generalized oedema of body. (BP Ni & Raj Ni)

Ayurvedic pharmacology ^[20]

Rasa (Taste): Madhura(sweet), Guna (Attributes/properties): Guru, Snigdha (Heavy & Slimy), Veerya (Thermogenic potential): Seeta(cool),

Vipaka (Post digestion effect): Madhura (Sweet), Karma (Pharmacological action): Vata-Pitta Shamaka.

Pharmacological studies:

a) **Anti-fungal activity** ^[21]: Two fungi namely *C. capsici* & *S. rolfssii* were screened for their susceptibility to extracts of *Astercantha longifolia* by poisoned food techniques. In brief Potato dextrose agar medium was prepared, poisoned with extracts of *A. longifolia* (1mg extract/ml of medium), sterilizing by autoclaving, cooled & dispensed into sterile Petri dishes. The test fungi were inoculated at the centre of control (without extract) and poisoned plates were incubated for 5 days at 28^o C. After incubation, the diameter of fungal colonies on control & poisoned plates were measured in mutual perpendicular directions. Antifungal activity, in terms of reduction in cell mycelial growth (%), was determined using the formula:

Inhibition of cell mycelial growth (%) = $(C-T/C) \times 100$, Where 'C' is the average diameter of fungal colony on control plates and 'T' is the average diameter of fungal colony on poisoned plates.

b) **Anti-microbial activity** ^[22]: The test bacteria viz., *S aureus*, *E faecalis*, *K pneumoniae*, *P aeruginosa* & *E. coli* were inoculated in test tubes containing sterile nutrient broth medium (HiMedia, Mumbai) and incubated at 37^oC for 24 hours. The broth cultures were aseptically swabbed on Sterile Nutrient agar (HiMedia, Mumbai) plates using sterile cotton swabs. Wells of 6mm diameter were punched in the inoculated plates using sterile cork borer. 100 μ l of extracts (20mg/ml of 25% Dimethyl sulfoxide), standard(streptomycin, 1mg/ml) and DMSO (25%) were transferred into labelled wells. The plates were incubated at 37^o C for 24 hours in upright position and the zone of inhibition formed around the wells were measured.

c) **Analgesic activity** ^[23]: Analgesic activity of *H. spinosa* leaves was studied using hot plate and tail flick method and Acetic acid - induced writhing test in mice. The petroleum ether, Chloroform, Alcohol, and Aqueous extracts of leaves at a dose of 200mg/kg & 400mg/kg of body weight, significantly increased the pain threshold of mice towards the thermal source in dose dependent manner and also inhibited the abdominal constriction produced by Acetic acid.

d) **Hepatoprotective activity** ^[24 & 25]: The aqueous extract of whole plant & root of *A. longifolia* possesses hepatoprotective properties against CCL4 and Paracetamol induced hepatotoxicity.

e) **Haematopoietic activity** ^[26]: Petroleum ether extract of *A. longifolia* significantly increases WBC count. Ethanolic extract of the aerial parts of *A. longifolia* (100 and 200mg/kg/ oral) significantly increased the Haemoglobin, haematocrit, RBC and total WBC as compared to the controlled group in experimental study.

f) **Anti-tumour activities** ^[27]: Methanol extract of seed shows inhibition of hepatocarcinogenesis in Wistar rats. Petroleum ether extract of *A. longifolia* root demonstrated anti-tumour activities.

g) Radical Scavenging activity ^[28]: The radical scavenging potential of extracts was tested by DPPH radical scavenging assay. 2ml of different concentrations of extracts (3.12 to 100ug/ml) was mixed with 2 ml of DPPH solution (0.004% in methanol) in labelled tubes. The tubes were incubated in dark for 30 minutes at room temperature and the optical density was read at 517nm using UV-Vis Spectrophotometer (ELICO, SL-159). The absorbance of the DPPH control (2ml DPPH+2ml methanol) was noted. Ascorbic acid was used as reference standard.

Scavenging activity (%) = $[(A_0 - A_e) / A_0] \times 100$, where A_0 is absorbance of DPPH in the presence of extracts /standard ^[28]. The Ic_{50} value for each of the extracts was calculated. Ic_{50} denotes the concentration of extracts required to scavenge 50% of DPPH free radicals.

h) Aphrodisiac activity ^[29]: The ethanolic extracts of *A. longifolia* seeds shows androgenic as well as improvement of sexual behaviour of Albino rats in dose dependent manner. It also increases the sperm count, motility, & histoarchitecture of testis. (Chauhan *et al.* 2009, 2010)

i) Hypoglycaemic activity ^[30]: Ethanolic extract (Al Eth) of aerial parts of *A. longifolia* (100 & 200 mg/kg body weight) when administered to rats for three weeks showed significant reduction in blood glucose level. There is also decrease in Thiobarbituric acid reactive substance (TBARS) and hydroperoxide in both liver kidney. The treatment with Ethanolic extract improves Glutathione (GSH), Glutathione peroxidase (GPx), glutathione S transferase (GST) and catalase (CAT) in the drug treated group, which is comparable to the control group. (Vijayakumar *et al.*, 2006). Administration of aqueous extracts of *A. longifolia* whole plants to rats prior to glucose loading showed hypoglycaemic action. (Fernando *et al.*, 1998, 1989).

j) Diuretic activity ^[31 & 32]: The screening was performed as per description given by Lipschitz *et al.* Male Wister albino rats (150-200gms) were used for this purpose. The rats were divided into 3 groups, Group A(Control group), Group B(Trial drug) & Group C(Standard drug). The control group receives normal saline in the dose of 25ml/kg body weight, the trial drug was aqueous extracts of *A. longifolia* in the dose of 200mg/kg body weight and the standard group received Frusemide in dose of 10mg/kg body weight. All drugs are given in oral route through feeding dropper. Urine is collected after 5 hours and its measured to assess its

volume & Concentration of Na^+ , K^+ and Cl^- . The experimental study showed a significant increase in the total urine volume and concentration of Na^+ , K^+ and Cl^- in the urine of rats.

k) Antimotility activity ^[33]: This experimental study was done with formation of 4 groups of healthy albino rats, each 150-200gms, Group A1(Trial drug 1), Group A2(Trial drug 2), Group B(Standard drug) and Group C(Control). For Trial drug 1, The Petroleum ether extracts of *A. longifolia* is used in dose of 200mg/kg body weight & for Trial drug 2, aqueous extracts of *A. longifolia* is used in the dose of 400mg/kg body weight. Loperamide, dissolved in water is used as standard anti-motility study. Both the trial drugs showed a significant dose dependent decrease in the distance travelled by the charcoal meal in the gastrointestinal tract.

l) Anti-convulsant activity ^[34]: Mazumdar *et al.* (1999) carried out an experimental study to assess the anti-convulsant activity of the crude extract of *A. longifolia* in strychnine induced convulsion. It is observed that the intra peritoneal administration of crude extract of *A. longifolia* increases the sedative-hypnotic action of chlorpromazine, diazepam, phenobarbitone & chlordiazepoxide.

m) Anti-pyretic activity ^[35 & 36]: Petroleum ether, Chloroform, Alcoholic extract & Aqueous extract of *H. spinosa* leaves were evaluated for their antipyretic activity in Brewer's yeast-induced pyrexia in rats at dose of 200mg/kg and 400mg/kg body weight. The result showed that the Chloroform & Alcoholic extracts were significantly antipyretic but petroleum and aqueous extracts failed to lower the raised core body temperature. Chloroform extracts significantly decreased the elevated rectal temperature 3 hours after the administration of 400mg/kg dose whereas the alcoholic extracts reduced the hypothermia after 1 hour.

Phytochemicals ^[37, 38 & 39]: The root of the plant contain essential oil, alkaloids, waxy substances, gum, minerals as Ca, Mg, K, Fe, Cu, Mn, Zn, Co & Cr and Phyto sterols. Alkaloids and sterols are present in the aerial parts, Seed contain mucilage, potassium salts, diastases, lipase, protease, sterols, alkaloids, fixed oil. Leaf contain protein, nitrogen, polyphenols, reducing sugar, glycosides, acacetin, proanthocyanins, phenolic acid, hydrocarbons, flavonoids, terpenoids, manganese salt, potassium chloride and sulphate. The ash of the plant contains abundant potassium salts. Some of the phytoconstituents are summarized.

Table 1: List of Phytochemicals obtained

Sr. No.	Constituent	Obtained from
1	Myristic acid	Seed
2	Palmitic acid	Seed
3	Stearic acid	Seed
4	Linoleic acid	Seed
5	25-oxo-hentriacontanyl acetate	Root
6	Hygosterol	Whole plant
7	Stigmasterol Lupeol	Whole plant
8	Betulin	Aerial part
9	β carotene	Leaf
10	Phytosterol maltose	Root
11	Oleic acid	Root
12	Hentriacontane	Seed
13	Xylose	Leaf, stem
14	Glucuronic acid	Seed
15	Apigenin-7-O-glucuronide	Seed
16	Apigenin-7-O-glucoside	Flower
17	3-methylnonacosane	Flower
18	23-ethylcolesta-11(12), 23(24)-dien-3 β -ol	Aerial parts
19	Maltose	Aerial parts
20	Astercanthin	Aerial parts
21	Astercanthacin	Seed
22	Luteolin	Seed
23	Luteolin -7 -rutinoside	Leaf
24	Methyl-8-n-hexyletetracosanoate.	Leaf
25	Rhamnose	Aerial parts
26	Arabinose	Seed
27	B sitosterol	Seed
28	Histidine	Root, Stem, Leaf, Seed
29	Phenylalanine	Seed
30	Lysine	Seed
31	Polysaccharides	Seed
32	Ascorbic acid	Seed
33	Nicotinic acid	Leaf
34	n-triacontane	Leaf
35	Glucose	Whole plant
36	Mannose	Seed
37	Vanillic acid	Seed
38	Syringic acid	Leaf
39	Apigenin	Leaf

Table 2: Poly herbal formulation ^[40]

Sr no.	Poly herbal formulations	Type of formulations	Indications
1	Kokilakshya Ks.	Decoction	Hepatic disorders.
2	Chopachinyadi Choorna,	Powder	Arthritis & Insect bite.
3	Biogest capsules	Capsule	Immunity improving
4	Ashwamed capsules	Capsule	Male sexual dysfunction
5	Rathi capsules	Capsule	Premature ejaculation
6	Cardiraksha capsules	Capsule	Hypertension.
7	Speman capsules	Capsule	Improved sperm count.

Usefulness of *A. longifolia* Ness. in COVID 19:

Corona virus disease 2019 is an infectious respiratory disease caused by novel coronavirus SARS-CoV-2, spreading by droplet inhalation and emerged from Wuhan, China at the end of 2019, resulting in worldwide pandemic. The current treatment approach to novel corona virus SARS-CoV-2 & resulting severe acute respiratory syndrome is in complete disarray. Without proper treatment protocol, the current focus is aimed to contain the virus itself and for this purpose use of N95 mask and social distancing are advised. Few antiviral drugs are present but are associated with drug induced serious liver toxicities [41]. Due to lack of safe antiviral drugs, patients are advised to take immune boosting drugs and Ayurveda has shown the only way in form of Chawan Prasha. It is just one formulation among thousand others prescribed by Ayurveda. Many single drugs with similar qualities are also mentioned and one among them is Kokilakshya i.e. *Astercantha longifolia* (L.) Nees. which is a proven free radical scavenger.

It is known that viruses attack starts massive dumping of free radicals in our systems. The free radicals such as Superoxide, hydroxyl radicals, nitric oxide (NO) and Peroxynitrites are highly active chemical substance, destructing and causing deterioration to proteins, damaging cell membranes, damage to host DNA, apoptosis, multiorgan failure & death [42]. The pathogenic roles of free radicals in viral infections are proven but current treatment aspect is not going in that way.

To determine the exact role of free radicals in respiratory viral disease such as influenza, In an experimental study was conducted where lab mice were infected with influenza virus. The replication of virus peaked on 4th day, then dropped down to baseline on 8th day. The lungs consolidation scores (lungs damage index) raised from day 2 and peaked from day 8 to day 10. Mice began to die from day 8 to day 14 [43]. Reactive oxygen species (ROS) in the infected mice began generating from day 5 and peaked on day 8, another important free radical NO raised at the same time, peaked on day 8. From above results, it is evident that a free radical storm occurred in the influenza virus infection. By simply applying free radical scavengers such as superoxide dismutase (SOD) [5] or L-NMMA [44], the infected mice were protected and recovered. Those lab mice treated with free radical scavengers, exhibited reduced morbidity & mortality when exposed to influenza latter also [45]. These results explicitly tell us that the free radicals are the main culprits in the virus induced complications such as hypotension, vascular leak, fluctuating blood sugar, gastroenteritis and lastly pneumonia induced death.

CONCLUSION

Utility of free radical scavengers' action shown by *Astercantha longifolia* Nees. is a game changer strategy in the treatment, prophylaxis and managing post Covid 19 complications. The highlight of this plant is its free radical scavenging activity in aqueous extract form due to presence of flavonoids, alkaloids & steroids along with tannins. These free radicals are responsible for many life-threatening complications in Covid 19.

It is a freely available drug with proven anti-pyretic activity, hepato protective activity, free radicle scavenging activity along with hosts of other pharmacological actions, which can be explored in the approach

to Covid 19. The disease spread rapidly and became a pandemic with more than 15 million confirmed cases and over 760,000 deaths worldwide by sept 2020 [32]. As the global mass is showing interest for Ayurvedic drugs for its cost effectiveness and higher safety index, it's the need of the hour to validate *A. longifolia* as a most suitable drug to treat Covid 19 cases pending further in-depth clinical trials.

Conflict of interest: Nil.

Source of support: Nil.

REFERENCES

1. T. Akaike, M. Suga, H. Maeda, Free radicals in viral pathogenesis: molecular mechanism involving superoxide and NO, Proc. Soc Exp. Biol. Med. 1998; (1):64-73.
2. WHO Publications, Official record no 2, New York, 1984, 100p.
3. <https://www.britannica.com/plant/Acanthaceae>.
4. <https://www.ayush.gov.in>
5. Agnevesha, Charka, Charka Samhita Uttaradha, Ed Kashinath Sastry and Dr Gorakhnath Chaturvedi. Reprint ed, Chaukhamba Bharati Academy, Varanasi, 2013; 1:17.
6. Bhava Prakash Nighantu, Hindi Commentary by KC Chunekar, Chaukhamba Sanskrit Sansthan, Varanasi, Guduchyadi verga, 5th edition, 2009, p 417.
7. Raj Nighantu, Dr Indradeo Tripathi, Chaukhamba KrishnaDas Academy, Varanasi, 2nd Ed, 1988.
8. Anonymous, Quality standards of Indian medicinal plants, ICMR Publications. 2003; 1:212-218.
9. Nadkarni AK. Indian Materia Medica, Popular Prakashan Private Limited, Bombay, India, 1978; 1:667-669.
10. [http://www.catalogueoflife.org/Astercantha longifolia](http://www.catalogueoflife.org/Astercantha_longifolia).
11. http://www.easyayurveda-com.cdn.ampproject.org/v/s/2017/03/07/kokilaksha-astercantha-longifolia/?amp_js_v=a/1
12. http://www.easyayurveda-com.cdn.ampproject.org/v/s/2017/03/07/kokilaksha-astercantha-longifolia/?amp_js_v=a/4
13. [http://www.catalogueoflife.org/Astercantha longifolia](http://www.catalogueoflife.org/Astercantha_longifolia)
14. <http://www.indiabiodiversity.org/observation/show/270568>
15. http://www.easyayurveda-com.cdn.ampproject.org/v/s/2017/03/07/kokilaksha-astercantha-longifolia/?amp_js_v=a/4
16. Nagendra Singh Chauhan, Dixit VK. *Astercantha longifolia* (L.), Nees, Acanthaceae: Chemistry, Traditional, Medicinal uses and its pharmacological activities-a review, Revista Brasileira de Farmacognosia Brazilian Journal of Pharmacognosy. 2010; 20(5):812-817.
17. Ayurvedic Pharmacopeia of India, Ministry of AYUSH, Government of India, Edition 1. 2006; 2(1):94-96.
18. Chopra RN, Nayer SL, Chopra IC. Glossary of Medicinal plants, National Institute of Science & communication, CSIR Publication, New Delhi, India, 1956; 330-332.
19. Agnivesh, Charka, Charka Samhita Uttaradha, Ed Kashinath Sastry and Dr Gorakhnath Chaturvedi. Reprint ed, Chaukhamba Bharati Academy, Varanasi, 2013; 1:17.
20. Ayurvedic Pharmacopeia of India, Ministry of AYUSH, Government of India, Edition 1. 2006; 2(1):94-96.

21. Kambar Y, Manasa M, Vivek MN, Kekuda PTR, Nawaz ASN, Inhibitory effect of some plants of western Ghats of Karnataka against *Colletotrichum Capsica*. *Sci Technol Arts Res Journal*, 2014; 3(2).
22. Kekuda PTR, Manasa M, Poornima G *et al*, Bacterial, Cytotoxic, & Anti-oxidant potential of *Vitex negundo var negundo* and *vitex negundo var purpurascens* -A comparative study *Science Technology, Arts Journal* 2013; 2(3):59-68.
23. Patra A *et al*, Anti-inflammatory, analgesic & antipyretic activities of *A. longifolia* leaves (Acanthaceae), *Tropical journal of Pharma Research*.2009; 8:133-7. [Google scholar].
24. Singh A, Handa SS. Hepatoprotective activity of *Apium graveolens* and *H. auriculata* against paracetamol and thioacetamide intoxication.
25. Usha K *et al*. Hepatoprotective effects of *Hygrophila spinosa* and *Cassia occidentalis* on CCL4 induced liver damage in experimental rats. *Indian Journal of Clinical Biology*, 2007; 22:132-5. [Google scholar]
26. Pawar RS *et al*. Haematopoietic activity of *Astercantha longifolia* on Cyclophosphamide induced bone marrow depression, *Indian Journal of Pharma Science*, 2006; 3:337-40. [Google Scholar]
27. Mazumdar UK, *et al* Antitumour activity of *H. spinosa* on Ehrlich ascities carcinoma & sarcoma -180 induced mice. *Indian journal of Experimental biology*. 1997; 35:473-7. [Google scholar]
28. Ashwini U, *et al*, Anti-microbial & radical scavenging activity of *Astercantha longifolia* (L.) Nees (Acanthaceae), *Pharmanest*, 2014; 5(4):2178-2183.
29. Chauhan NS, Sharma V, Dixit VK, Effects of *Astercantha longifolia* seeds on the sexual behaviour of male rats. *Natural Reproductive research*, 2010; 14:1-9.
30. Fernando MR. *et al* Preliminary investigation of possible hypoglycaemic activity of *A longifolia*. (L.) Nees, *Journal of Ethnopharmacology*, 1989; 27:7-14.
31. Kumari GS, Iyer GY Preliminary studies on the diuretic effects of *Hygrophila spinosa* and *Tribulus terrestris*. *Indian Journal of Medical Research*. 1967; 55:714-716.
32. Ahmed N. *et al* Preliminary studies on the diuretic effect of *Hygrophila auriculata* (Schum) Heine in rats. *International Journal of Health & Research*, 2009; 2:59-64. [Google Scholar]
33. Patra A. *et al*, Analgesic & Antimotility activity of leaves of *Hygrophila spinosa* T Anders. *Pharmacologyonline*. 2008; 2:821-8. [Google Scholar]
34. Mazumdar UK, *et al*, Pharmacological & Chemical evaluation of *Hygrophila spinosa* T. Anders, *Indian Journal of Pharma Sciences*, 1999; 61(3):181-183. [Google Scholar]
35. Biswas S. *et al* Antidiarrhoeal activity of *Strychnous potatorum* seeds extracts in rats. *Fitoterapia*. 2002; 73:43-7. [Google Scholar]
36. Patra A. *et al*, Anti-inflammatory & antipyretic activity of *Hygrophila spinosa* T. Anders leaves (Acanthaceae), *Tropical Journal on Pharma. Research*, 2009; 8:133-7. [Google Scholar]
37. Chopra RN, Nayer SL, Chopra IC. *Glossary of Medicinal plants*, National Institute of Science & communication, CSIR Publication, New Delhi, India, 1956; 330-332.
38. Nadakarni AK. *Indian Materia Medica*, Popular Prakashan Private Limited, Bombay, India, 1978; 1:667-669.
39. Hussain MS, Sheeba F, Ali M Preliminary Phytochemical & Pharmacognostical Screening of the *Hygrophila auriculata* (K. Schum) Heine. *Recor of Nat Prod* (Manuscript number RNP-0011)
40. http://www.easyayurveda-com.cdn.ampproject.org/v/s/2017/03/07/kokilaksha-astercantha-longifolia/?amp_js_v=a/1
41. Boeckmans J, *et al.*, COVID 19 and drug induced liver injury: a problem of plenty or a petty point? *arch Toxicology*, 2020; 94(4):1367-1369.
42. Akaike T, Suga M, Maeda H. Free radicals in viral pathogenesis: Molecular mechanism involving superoxide and NO, *Proc Soc Exp Biol. Med*. 1998; 217(1):64-73.
43. Akaike T, *et al*. Molecular mechanism of complex infections by bacteria and virus, analysed by a model using serratial protease and influenza virus in mice, *Journal of virology*, 1989; 63(5):2252-2259.
44. Akaike T, *et al*, Pathogenesis of Influenza virus -induced pneumonia: involvement of both nitric oxide and oxygen radicals, *Proc National Academy of Science, USA*, 1996; 93(6):2448-2453.
45. Perrone LA, *et al*, Inducible nitric oxide contributes to viral pathogenesis following highly pathogenic influenza virus infection in mice, *Journal of infectious Disease*, 2013; 207(10):1576-1584.

HOW TO CITE THIS ARTICLE

Mohanty SP, Rautaray KT. Pharmacognostic review of *Astercantha longifolia* (L.) Nees, & its possible use in prevention of COVID-19. *J Ayu Herb Med* 2020;6(4):231-236.