An Overview on *Achyranthes aspera linn.*

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Abstract- *Acyranthes aspera is a multipurpose medicinal plant with a broad range of therapeutic uses. The plant's pharmacological properties have been extensively explored, and it has earned a reputation as a versatile medicinal ingredient that is effective in treating a wide range of diseases. As a result, it has been shown to be effective in delivering a drug at site of action with increase in bioavailability of drug. In this review, we will focus on the current state of knowledge regarding the medicinal properties of the plant, to identify the active compounds responsible for the biological activity of the plants, and to clarify the precise mechanism of action by which they exert their biological effects.*

Keywords- *Achyranthes asrea linn*, botanical description, phytochemical constituent, pharmacological actions ,antimicrobial activity.

I. INTRODUCTION

Plants are indispensable to human being. It is essential to life food, clothing, shelter, and medicinal purpose are provide to a society by the kingdom plantae. chronicle of herbal medicine is as aged as human enlighetment. Herb were medicinally used in china, Greece, and egpt prolong to the origination of the christa era. Herbs include crude phyto materials such as leaves, flowers, fruits, seed, stems, wood rhizomes or other parts of plants which is fragmented or powered. Phytomedicines are plant derived preparation to heal, prevents a various disease caused by living beings. Herbal preparation may include finished herbage products and comminuted or powered herbal facts, tinctures, extracts, separation, purification, or other physical and biological process. Chemical constituents of herbage like a alkaloids, flavonoids, glycosides, phenol, tannins, terpenoids, volatile oils, and other metabolite ameliorate the efficacious of plants in medicate a heterogenicity of disorder ranging from headaches to life threatening disease these herbal remedies are economic and secure for human being than the present-day artificial medicine. Greene medicine as compared to allopathy drugs to be non-poisonous and out of harm's way because they are come by nature and their arrived prolong use as holistic medicines.[1] Ancient medicine always played major role in tweetup the international health case needs. They are unceasing to do so at present day and shall play important role in the future also. The traditional system of medicine which are considered to be India in origin or Indian system came from the outside of India and got assimilated in their culture.[2] India has idiosyncratic having six recognised system of traditional medicine in the category. They are Ayurveda, siddha, unnani, yoga, homeopathy, naturopathy. Phytoconstituens are hydrophilic in nature they are limited in their effectiveness and poorly absorbed, when they taken internally and topically. Novel drug delivery system (NDDS) overcome this demerit and useful in delivering a drug at site of action with increase in bioavailability of drug .[3]

Achyanthes aspera linn

The plant species Achyranthes aspera Linn. is a member of the Amaranthaceae family.In India, tropical Asia, and other countries throughout the world, the plant is widely cultivated as a weed.In fertile soil, it thrives.It is a perennial herb with erect, occasionally sprawling growth that can reach 2 cm in height.The use of various plant parts for therapeutic purposes includes the use of seeds, shoots, roots, and leaves.There are about 2400 species of shrubs, herbs, and climbers in it, divided into 160 genera.Up to a height of 2100 mm, it is found as a weed on roadsides, field borders, and waste spots across India, as well as in the southern Andaman Islands.[4,5,6,7]

II. TAXONOMICAL CLASSIFICATION.[8,9,10,11]

Kingdom	-Plantae
Sub kingdom	-Trachobinota
Super division	-Spermatophyta
Division	-Mangoliphsida
Subclass	-Caryophyllidae
Order	-Caryophyllaes
Genus	-Achyranthes
Species	-A.aspera

A. **Vernacular names;**[8,9,12,14,15,18]

Indian names	
Bengali	Apang
Hindi	Latjira, chichira
Gujarati	safs dahedo
Malayalam	Kadalad

Marathi	Aghada, pandhara-aghada
Punjab	Kurti
Odissa	Apamargamu,apamargo
Tamil	Shiru-kadaladi,nayuruvi
Telgu	uttarane

B.International names[5,9,17]

International names	
Africa	Mo-tswarak
Arabian	At kumah, wazer
English	Prickly chaff flower, devil's horse whip
French	Achyranth afeuillersudes
Kanada	Utlaranee
Latin	Achyranthes aspera
Spanish	Mostillo, rabodegato, rabodechango

Achyranthes aspera linn

III. DISTRIBUTION

Locations of Achyranthes aspera Linn include roadside vegetation in India, the tropical regions of Nepal, Baluchistan, Ceylon, Asia, Africa, America, and Australia. [9,19]

IV. BOTANICAL DESCRIPTION[9,14]

A.aspera is a heavily branched, erect, and partially woody plant. It has a grey green colour and is velvety and shrubby. It can grow to a maximum length of 1.5 metres. Plant is upright, 0.3 to 0.9 m tall, with a stiff stem that is sparsely branched and branches that are mostly or entirely quadrangular, striate, and pubescent.

❖ **Leaves**

The leaves are sparse and can be up to 3.8-6.3 by 2.5-4.5 cm in thickness. Elliptic or obovate, occasionally almost orbicular, often rounded (rarely subacute) at the apex, delicately and softly pubescent on both sides, with whole petioles 6-20 mm long .[15]

❖ **Flowers**

Flowers are produced in elongated erminal spikes that are initially short but quickly get longer, sometimes reaching a length of 50 cm. The flowers are greenish-ehite, numerous, and stiffly deflexed against the woolypubescent rachis.

❖ **Stems**

The leaves are thick, 3.8-6.322.5-4.5cm, ovate elliptic or obovate-rounded, entire, peptiolate, and 6-20mm long. The stems are angular, ribbed, single or branched from the base, and frequently have a purple tint. The branches are terete or totally quadrangular, striate, pubescent.

V.MEDICINAL USE OF *ACHYRANTHES ASSPERA LINN*[16,21,22]

- Leaves of achyranthes aspera linn used in wounds, injuries, intermitten fever.
- It is used for toxic bities, and skin disease such as prutitis, scabies.
- The plant is utilised by the ethnic people for gynaecological issues and its leaves are used to treat dermatological disorders.[23,24,25]
- Asthma is treated with dry leaves.[26]
- For stomach pain, abdominal tumours, and wounds, roots are used as astringents[27,28].
- Alcholic extract act against the various bacteria species were found suspceptive to organism at higher concentration and also have antifungal activity.(E.coli, P.aeruginosa, P.vulgaris, S.arues and Klebsiella speies.
- Acyranthes aspera linn seeds shows mild to moderate antibiotic activity against, E.coli and P.aeruginosa.
- It as good antioxidant.
- Achyranthes aspera leaf paste externally applied for toxic bites.
- To clean the mouth, a root is used as a toothbrush.
- Root of Achyranthes aspera used as an eye drop for night blindness.
- Achyranthes aspera linn naturaly act as diuretic and use ful for dysuria.[21,22]
- Its one of the efficient herb to induce weight loss.

- Disorders of the liver and spleen benefit from it.[20]

VI. PHYTOCHEMICAL CONSTITUENTS OF *ACHYRANTHES APERA LINN.*

❖ **Roots**

Oleanolic acid,ecdysterone,bisdesmosidic saponin.[14]

❖ **Leaves**

Ecdysteone, Ecdysone,chrysin, quercetin, kaempferol,6-prenyl apigenin, taxifolin, genistein, kaempferol-3-O-glucoside, tilirside, bisdesmosidic saponin, β-sitosterol and spinasterol, hydroquinone.[14]

❖ **Steam**

Ecdystrone,3-acetoxy-6benzoyloxyapangamide

❖ **Shoots**

36,47-dihydroxyhenpentacosan-4-one,triacontanol,27-cycloheptacosan-7-ol, 16-hydroxy-26-methylheptacosan-2-one,4-methylheptatriacont-1-en-10-ol,tetracontanol-2,betasitosterol.[20]

❖ **Fruits**

Saponin A,B, oleanolic acid[14]

❖ **Seeds**

α-L-rhamnopyransoyl-(1-4)-(β-Dglucopyranosyluronicacid)-(1-3)-oleanolic acid, α –L rhamnopyransoyl-(1-4)-(β-Dglucopyranosyluronicacid)-(1-3)-oleanolic acid-28-O-β-D-glucopyranoside and α-Lrhamnopyransoyl-(1-4)-(β-D-glucopyyranosyluronic acid)-(1-3)-oleanolic acid-28-O-β-Dglucopyranosyl-(1-4)-β-Dglucopyranoside, 6 betaine, achyranthine, hentriacontane,achyranthes saponins A,B,C,D,oleanolic acid.[9,29]

V. PHARMACOLOGICAL STUDIES

- **Antiviral and anti-carcinogenic;**

According to reports, achyranthes aspera linn. leaves' methanolic extract significantly inhibits the epstein-barr virus early antigen produced in raji cells by the tumour promoter 12-O-tetradecanoylphorbol-13-acetate.The majority-non-polar chemical fraction displayed the strongest inhibitory activity (96.9% and 60% survivability).The entire methanolic extract had a declared anti-carcinogenic activity in the in vivo two-stage mouse skin cancer test.Both the entire extract and the fraction are thought to be effective antitumor promoters in the development of cancer. [28]

- **Antidiabetic activity;**

Achyranthes aspera seed ethanolic extract significantly reduced blood sugar levels in streptozotocin-induced diabetic mice.studied the powered whole plant's aqueous and methanolic extracts, which exhibit hypoglycemic action.After varying doses of oral alloxan were administered, the blood glucose levels of healthy and diabetic rabbits were measured. [30]

- **Anti-inflammatory;**

Male albino rats were used to examine the effects of an achyranthes aspera alcohol extract at doses of 375 and 500 mg/kg on cotton pellet granuloma and carrageenan-induced hind paw oedema.After three hours, the alcholic extract demonstrated a maximal suppression of rat paw oedema of 65.38% and 72.37%.In a chronic test, the extract reduced the weight of the granuloma in the sub-acetate cotton pellet granuloma model by 40.03% and 45.32%, respectively. [32]

- **Anti-parasitic ativity;**

It has been demonstrated that acyranthes aspera linn ethyl actetate extracts contain anti-parasitic.Achyranthes aspera dried leaf, blossom, and seed extract has been shown to have anti-cattle tick rhipicephalus microplus and anti-sheep internal parasite activity in studies. [33]

- **Hepatoprotective Activity:**

The methanolic extract of Achyranthes aspera's aerial parts exhibits hepatoprotective effect against rifampicin-induced hepatotoxicity in albino rats. SGPT, SGOT, ALKP, and total bilirubin levels in the methanolic extract decreased in a dose-dependent manner. [38]

- **Cardiac activity:**

When the saponin from Achyranthes aspera seed was shown to raise the power of contraction of an isolated and undamaged hypodynamic heart, it was revealed to have cardiac stimulant activity.Cardiovascular toxicity was documented from a leaf decoction.The water-soluble alkaloid achyranthine decreased blood pressure, depressed the heartbeat, and increased the pace and amplitude of respiration in dogs under anaesthesia.Rat heart phosphorylase activity was affected by Achyranthes aspera saponin, it was

discovered.The herb was discovered to have effects on the cardiovascular system in tropical West Africa.

- **Spermicidal Activity:**

According to research done by, extracts from the roots of Achyranthes aspera have been shown to have spermicidal action in rat and human sperm. The most efficient extracts for sperm immobility, sperm viability, acrosome status, 5'-nucleotidase activity, and nuclear chromatin decondensation were determined to be hydroethanolic, n-hexane, and chloroform extracts. The Achyranthes aspera root's ethanolic extract has been reported to have post-coital antifertility effects in female albino rats. When administered orally at 200 mg/kg body weight, the extract displayed 83.3% antiimplantation activity, according to their study. [37]

- **Nephroprotective Activity:**

As reported, nephroprotective efficacy against lead acetate-induced nephrotoxicity was produced by a methanolic extract of the entire Achyranthes aspera plant in male albino rats. [39]

- **Immunomodulatory:**

A diet comprising 0.01%, 0.1%, and 0.5% of Achyranthes aspera seeds was fed to the native Indian fish Labeo rohita. The fish were then experimentally infected with live Aeromonas hydrophila after receiving a heat-killed Aeromonas hydrophila vaccination. Up until the day after infection, mortality was lower in Achyranthes aspera treated groups than in controls. In Achyranthes-treated groups, there was an increase in the generation of super oxide anion, serum bactericidal activity, lysozyme, serum protein, and albumin/globulin ratios. The researchers arrived to the conclusion that Achyranthes aspera boosts the fish's immune system and raises its resistance to illness.[40]

- **Antimicrobial Activity:**

Achyranthes aspera seed extracts in ethanol and chloroform exhibit little to moderate antibiotic activity against B. subtilis, E. coli, and P. aeruginosa. The plant's callus and several leaf extracts have been investigated, and both exhibit antibacterial action. Solvent leaf extracts have reportedly been studied for their ability to combat the likes of E. coli, P. aeruginosa, P. vulgaris, S. aureus, and Klebsiella species. The main component of the essential oil of the plant's shoots, 17-pentatriacontanol, exhibits antifungal action against Aspergillus carneus. The alcoholic extract that demonstrates the triterpenoid saponin's presence and dose-dependent inhibitory effect against Staphylococcus aureus, a bacterium that causes human skin disease.The highest minimum inhibitory concentration was discovered. [41,42,4,44,45]

- **Anthelmintic activity:**

When tested on earthworms, the leaf crude extract was initially evaluated for anthelmintic activity (Pheretima posthuma).[46]

- **Anti-obesity:**

Clinical research on the plant's effectiveness against obesity produced favourable findings.[47]

- **Broncho protective activity;**

As reported, toluene diisocyanate (TDI)-induced occupational asthma in Wistar rats was treated by an ethanolic extract of Aspera aspera. Blood and bronchoalveolar (BAL) fluid leucocyte counts, both total and differential, were performed. The oxidative stress of the liver was evaluated using liver homogenate, and the inflammatory condition of the airways was investigated using lung histology. The findings imply that rats treated with A. aspera did not exhibit any abnormalities of the airways. [48]

- **Antiallergic activity;**

According to research, the plant's petroleum ether extract (200 mg/kg, i.p.) significantly reduces mouse milk-induced leukocytosis and milk-induced eosinophilia. Consequently, the presence of steroids may be the cause of A. aspera's antiallergic activity. [49]

- **Anti-oxidantactivity;**

the ethanolic and aqueous extracts have been shown to have free radical scavenging action in studies. DPPH radical scavenging activity and superoxide scavenging activity were used to evaluate both extracts. In the two models under study, the plant demonstrated strong antioxidant activity by reducing the production of free radicals. It is widely known that the seeds of the plant Achyranthes aspera contain antioxidants due to the presence of phytoactive components. The presence of phytoconstituents causes the rate of lipid peroxidation to decrease and the free radical scavenging activity of the herbal seed powder to increase.[50,51]

VI. CONCLUSION

The medicinal and pharmacologically active elements found in Achyranthes aspera are derived from a significant source. Since the plant's pharmacological properties have been extensively explored, it has earned a reputation as a multipurpose herb with a broad range of therapeutic uses. Worldwide, scientists are looking to plants as a potential source of limitless therapeutic medicines and are in urgent need of isolating molecules. Considering all of its medical characteristics, A. aspera is a very significant plant, as can be observed from the literature.As a result, Acyranthes aspera has been shown to be a versatile medicinal ingredient that is effective in treating a wide range of diseases. These work provides the door for additional attention and study to describe the active molecules responsible for the biological activity of the plants, to identify the active compounds, and to clarify the precise mechanism of action by which they exert their biological effects.

REFERENCES

[1] Reena gupta, Bhupinder kapoor, Gagandeep kaur, Mukta gupta, Inadian medicinal plants useful in treatment of gout: A review for current status and future prospetive, Asian journal of pharmaceutical and clinical research, issue 11,2017, vol 10;407-416.

[2] B.Ravishankar, VJ.Shukla, Indiansystem of medicine: A biref profile, African journal of traditional, complementory and alternative medicine: AJTCAM, FEB06 2007;4(3): 319-337.

[3] Suvarna.G,Bhokare, chaitali C. Dongaonkar, surekha V. Lahanel, pushpa. B,Herbal novel drug develivery review,WJPPS.2016;2(16):955-954.

[4] Dravyaguna vijnana,by prof P.V. Sharma volume-2, reprint, chaukhambha bharati academy,varanasi,2003.

[5] Dr.Shristi balbhadra, Dr. Anshuman rajnala and shubham balbhadra, Review on the ancient drug apamarga-(Achyranthes asper), World journal of pharaceutical research, 2020;issuse 7,vol9: 512-519.

[6] Gupta RK:Medicinal & Aromatic plants, CBS publishers & distributors 2009;1-15.

[7] Bhattaraj NK:Fitoterapia 1992;63(6):497-506.

[8] http://healingearth.co.in/apamargaprickly-chaff-floweer-plant/.

[9] Vishal thorat, Harinath. N, Firoj tamboli, Asha jadhav, Ravindra gaikwad and Deep rangari, Pharmacognostic account and medicinal uses of Achyranthes aspera linn. IJP International journal of pharmacognosy,2021;issuse8,vol8(8):338-345.

[10] Janmajoy banerjee,Kamana ghimire, Amit kumar gupta and praanna dahal, Phytochemical contituents and pharmacological uses of medicinal plant Achyranthesasspera:A review, World journal of pharmaceutical research,2014;issuse 01,vol4:470-489.

[11] Ashwini S k. Medicinal proprties of apamarg (Achyranthesaspera linn.). int. j. ayur. Pharma research 2013;1(3): 4-12.

[12] S.Shinde ganesh, P.S.Rao, D.H. Nandal and Rahul kunkulol, A review on pharmacological and phytochemical constituent of Achyranthes aspera linn, IJP International journal of pharmacognosy, 2021;issuse 2,vol.8(2): 58-64

[13] Vijayaraj R: Asian journal of biochemical and pharmaceutical research 2019;1(6):82-92.

[14] Fegade S.A, Kolhe R.C., Review on Achyranthes aspera (amaranthaceae), Indian research journal of pharmacy and science; (15)2017;1124-1130.

[15] Kirtikar, K.R. & Basu, B.D., Indian medicinal plants, lalit M.Basu, Allahabad, 1991,3:2066.

[16] Vijai Lakshmi, abbs Ali mahadi, dilutpal, santhosh kumar agarwal, 11 April2018, An overview of Achyranthes aspera linn,Journal of scientific and innovative research, vol(1),27-29.

[17] Shodhala nighantu, by prof. P.V. Sgarma, 1st edition, orientalia institute, baroda.

[18] Database on medicinal plants used in Ayurveda, volume-1, C.C.R.A.S. Department of I.S.M and ministry of health and family welfare, Govt. of india, New delhi.

[19] Dey A: International journal of pharmaceutical sciences review & research 2011; 9(2):172-82.

[20] V. Mali, Dr. Chetan, Dr. S. V. Annapure, Ayurvedic approach preparation of apamarga kshar, pharmaceutical study, its benefits and side effects- A literature review, 2018;issuse 16,vol7:560-567.

[21] https://www.google.co.in/amp/s/ayuemedinfo.com/2012/06/19/apamarga-kshara-benefits-dosage-ingredients-side-effects/amp/

[22] https://www.google.co.in/amp/s/easyurveda.com/2014/11/20/apamarga-achyranthes-aspera-uses-dose-side-effects-/amp/

[23] Jayaweera DMA, Medicinal used plants in Ceylon , part4. Colombo, sri lanka, national science council of sri lanka, 1982; 234-236

[24] Khan AV,Khan AA, Ethno medicinal uses of Achranthes aspera l.(Amaranthaceae) in management of gynaecological disorders in western uttar Pradesh (India), The ouranal of reproductive and fertility, 2006;43(1): 127-129.

[25] Shukla R, Chakravarty M, Gautam MP, Indigenous medicine used for treatment of gynaecological disorders by tribal of Chhattisgarh, India, Journal of medicinal plants research, 2008;2(12):356-360.

[26] Singh V, Traditional remedies to treat the asthma in the north west and trans- Himalayan region in J. and K. State, Fitoterapia, 1995;66:507-509.
[27] Ghani A, Medicinal plant of baglaesh with chemical constituents and uses, 2nd ed., Asiatic society of banglaesh, Dhaka, 2003;71-72.
[28] A.Chakraborty, A. Brantner, T. Mukaninaka et al., canc. 2002; 177(1).pubmed11809524.
[29] Roshan khetade, Neha gupta, Ashivini ramteke and Dr. M.J. Umekar, A review biological activity of Achyranthes aspera linn and phytoconstituents,World journal of pharmaceutical research,2019;volume 8,issue 12:257-279.
[30] R.Vijayaraj,K.N.Kumar,P.Mani , J.Senthil, T.Jayaseelan and G.D.Kumar,International journal of biological & pharmaceutical research, 2016;7(1):23-28.
[31] M.S.Akhtar and J.Iqbal, journal of ethno pharmacology, 1991;31(1):49-57.
[32] S.Sharma, P.N.Srivastava and R.C.Saxena, Asian journal of chemistry, 2008;20(1):2766-2770.
[33] Gupta SS, Bhagwat AW, Ram AK, Cardiac stimulant activity of the saponin of Achyranthes aspera (Linn.), Indian Journal of Medical Research, 1972; 60(3): 462-471.
[34] Han, ST, Un, CC, Cardiac toxicity caused by Achyranthes aspera. Vet. Hum. Toxicol, 2003; 45(4): 212-213.
[35] Neogi NC, Garg RD, Rathor RS, Preliminary pharmacological studies on achyranthine, Indian Journal of Pharmacy, 1970; 32(2): 43.
[36] D. Paul, D. De, K. M. Ali, K. Chatterjee, D. K. Nandi and D. Ghosh, Contraception, 2010; 81(4): 355-361.
[37] N. Vasudeva and S. K. Sharma, Journal of Ethno pharmacology, 2006; 107(2): 179-181.
[38] A. R. Bafna and S. H. Mishra, Ars. Pharmaceutical, 2004; 45(4): 343-351.
[39] T. Jayakumar, M. P. Sridhar, T. R. Bharathprasad, M. Ilayaraja, S. Govindasamy and M. P. Balasubramanian, Journal of Health Science, 2009; 55(5): 701-708.
[40] T. Vetrichelvan and M. Jegadeesan, Phytother Res., 2003, 17(1): 77-9.
[41] 41. R. Y. Vasudeva, B. K. Das, P. Jyotyrmayee et al., Fish Shellfish Immunol., 2006; 20(3): 263-73.
[42] M. T. J. Khan, K. Ahmad, M. N. Alvi, Noor-Ul-Amin, B. Mansoor, M. Asif Saeed, F. Z. Khan and M. Jamshaid, Pakistan Journal of Zoology, 2010; 42(1): 93-97.
[43] S. H. K. R. Prasad, N. L. Swayne, K. Anthonamma, Rajasekhar and D. Madan Prasad, Biosciences Biotechnology Research Asia, 2009; 6(2): 887-891.
[44] P. Saravanan, V. Ramasamy and T. Shiva Kumar, Asian Journal of Chemistry, 2008; 20(1): 823825.
[45] T. N. Misra, R. S. Singh, H. S Pandey, C. Prasad and B. P. Singh, Phytochemistry, 1992; 31(5): 1811-1812.
[46] Sujitha K, Phani Sri A, Mohan Rao PM, Lal Mahammed, Srinivasarao K, Karuna Sree V, Preliminary screening of Syzygium cumini and Achyranthes aspera for their anthelmintic activity, Research Journal of Pharmacognosy and Phytochemistry, 2010; 2(6): 441-445.
[47] Mangal A, Sharma MC, Evaluation of certain medicinal plants for anti-obesity properties, Indian Journal of Traditional Knowledge, 2009; 8(4): 602-605.
[48] Goyal BR, Mahajan SG, Mali RG, Goyal RK, Mehta AA. Global Journal of Pharmacology. 2007; 1(1):6-12.
[49] A. A. Zahir, A. A. Rahuman, C. Kamaraj, A. Bagavan, G. Elango, A. Sangaran and B. S. Kumar, Parasitology Research, 2009; 105(2): 453-461.
[50] S. Edwin, E. Jarald, D. L. Edwin, A. Jain, H. Kinger, K. R. Dutt and A. A. Raj, Pharmaceutical Biology, 2008; 46(12): 824-828.
[51] T. Malarvili and N. Gomathi, Biosciences Biotechnology Research Asia, 2009; 6(2): 659-664.