



Human Journals

## Review Article

April 2017 Vol.:9, Issue:1

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# *Achyranthes aspera* One of Important Medicinal Plant of Indian Flora



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**Submission:** 5 April 2017

**Accepted:** 10 April 2017

**Published:** 25 April 2017



HUMAN JOURNALS

[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

**Keywords:** *Achyranthes aspera*, pharmacological property, astringent, Ayurveda, purgative

## ABSTRACT

*Achyranthes aspera* is a weed belong to family (*Amaranthaceae*) commonly found throughout India is famous for its vast medicinal property. This plant commonly known as “Devil’s Horsewhip” by local people and its seeds, roots and shoots are being utilized by tribal people for various medicinal properties. It is taken as significant position in the all conventional system of medicine in India. In the present review article, we have made a humble effort to make update information on its numerous phytochemical and pharmacological property. This incredible medicinal plant has been used for astringent, cooling agent, abortifacient emetic, hepatoprotective, purgative, laxative, ant periodic, diuretic, antiasthmatic, anti-allergic and other miscellaneous medicinal problems. *Achyranthes aspera* is one of the influential Ayurvedic herbs and have been used to organize special medicine like Kshara. This current review attempt has been done to explain the botanical, ethnomedicinal, pharmacological and phytochemical property of *Achyranthes aspera* to medicinal science arena.

## INTRODUCTION

Mankind has been trying hard to hand down knowledge and information to the next generation. Information of herbs has been handed down from generation to generation from the evolution of mankind. Herbal medicine makes up a major part in all traditional systems of medicines. Herbal drug is an achievement of popular therapeutic diversity. Various medicinal plants are employed for cure of various diseases because of their safety and efficiency. Plants above all other stuff have been used for medicine because it is economical and free from major side effect. As per WHO (World Health Organization) worlds 70-80% people rely on natural conventional herbal medicine system<sup>1-2</sup>. *Achyranthes aspera* commonly known as Apamargai is one of the powerful Ayurvedic herbs used by Indian tribal people from ancient time. It is a plant considered as tropical weed scattered throughout tropical part of globe. This weed germinates in the tropical regions of America, Australia, Asia and Africa. The seeds of *Achyranthes aspera* Linn Apamarga have wide range of applications akin to antiperiodic, aphrodisiac, astringent, hemorrhoids, asthma, edema, bronchitis, dysentery, renal complication, leucoderma type health problem. Although approximately all of its parts are used but generally the seeds, roots and shoots are the most important medicinally<sup>3-5</sup>.

### ***Achyranthes aspera Linn (Apamarga)* plant Description:**

*Achyranthes aspera* L. is one of the therapeutically significant genera belongs to family Amaranthaceae that has approximately 160 genera and 2,000 species all over the world. It is common as weed throughout India and tropical region. *Achyranthes aspera* is considered as an annual or perennial herb. Plant aerial part is yellowish brownish in color, erect, branched and sometimes hairy. The leaves of this weed are thick, opposite oval or rounded<sup>6-7</sup>. The flowers of the plant in auxiliary or terminal spikes also bisexual greenish light. Fruits can easily imitate from plant. The seeds are subcylindrical like cumin seed. The flowering time of *Achyranthes aspera* L. is from June to September and the seeds ripen in the mid of October. It has an odorous smell and the taste is to some extent sweet and mucilaginous<sup>8-9</sup>. Various parts of *Achyranthes aspera* Linn (Apamarga) plant like aerial part, Root, seed and leaf foliage can be seen in the Figure-1 to Figure-4 and biological classification of plant is described in Table-1, various vernacular local names are mentioned in Table-2.

Generally, there are two types of the plant

1. White apamarg(shweta): *Achyranthes aspera*

2. Red apamarg (rakta) – *Puppalia lappaceae*



**Figure.1:** *Achyranthes aspera* plant



**Figure.2:** *Achyranthes aspera* root



**Figure.3:** *Achyranthes aspera* plant seed



**Figure.4:** *Achyranthes aspera* plant leaf

**Table.1:** Classification of *Achyranthes aspera* plant

<b>Kingdom</b>	<b>Plantae</b>
<b>Sub-kingdom</b>	Tracheobinota
<b>Division</b>	Magnoliophyta
<b>Class</b>	Magnoliopsida
<b>Subclass</b>	Caryophyllidae
<b>Order</b>	Caryophyllales
<b>Family</b>	Amaranthaceae
<b>Genus</b>	<i>Achyranthes</i>
<b>Species</b>	<i>A. aspera (L.)</i>

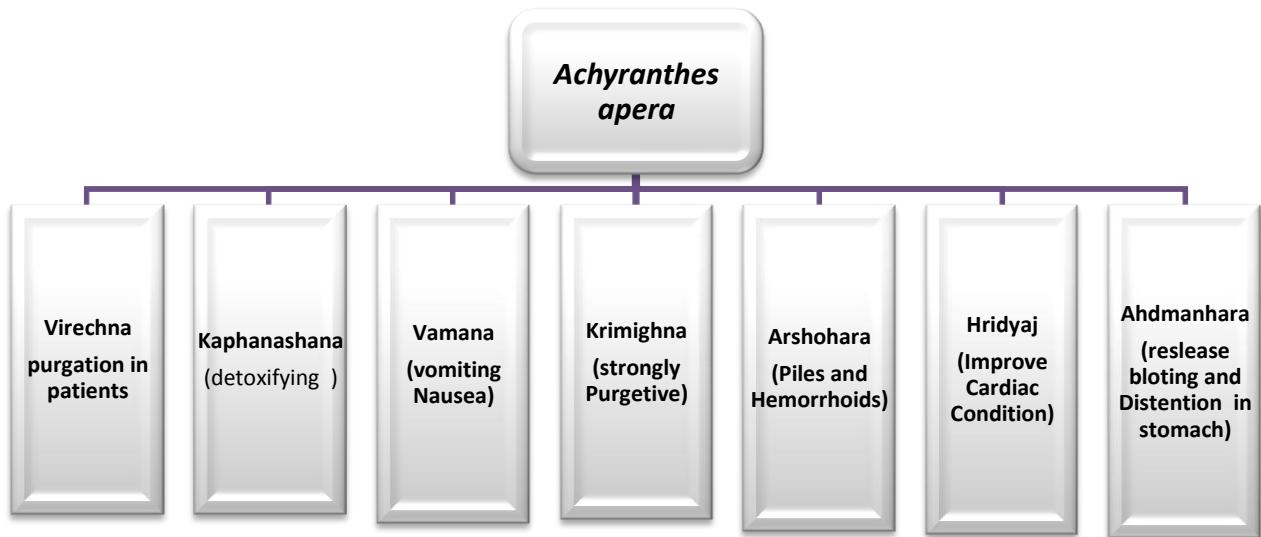
**Table.2: Vernacular name of *Achyranthes aspera* plant**

English name	Prickly Chaff flower
Hindi Name	Chirachinta, Chirchira; Chingchingi, Chirchita, Latjira, Onga
Kannada name	Uttrani, Uttarani
Telugu Name	Antisha; Apamargamu; Uttaraene
Malayalam Name	Katalati, Kadaladi
Bengali Name	Apang
Punjabi Name	Puthakanda, Kutri
Marathi Name	Aghada, Pandhara-aghada
Malagasy Name	Aghada, Pandhara-aghada
Tamil Name	Shirukadaladi, Nayuruvi
Sinhala	Karalheba
Indonesia	Jarong
Afrikaans	Grootklits, Langklitskafblom
French name	herbe à Bengalis, herbesergen, queue de rat.
Spanish name	Cadillochichoborugo, cadillo de mazorca, mazotillo

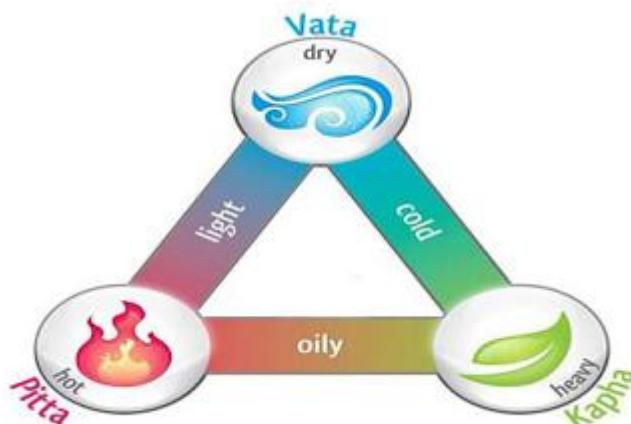
Ayurvedic Properties: *Achyranthes aspera* weed is one of the influential Ayurvedic aromatic plants. It is employed for the various Ayurvedic treatments and for that special medicine called Kshara is prepared from that. The plants various Ayurvedic therapeutic nature are classified in Table-3, traditional use of plant are shown in Figure -5. This weed help us to balance our Vata, pitta, Kapha of body shown in Figure-6

**Table.3: Ayurvedic Properties of *Achyranthes aspera***

Hindi/Sanskrit		English	
<b>Rasa</b>	Katu,Tikta	Taste	Pungent, Bitter
<b>Guna</b>	Laghu,Ruska,Tiksha	Physical property	Light,dry,sharp
<b>Virya</b>	Ushna	Potency	Hot
<b>Vipaka</b>	katu	Metabolic Property	pungent



**Figure.5: *Achyranthes aspera* Ayurvedic uses**



**Figure.6: *Achyranthes aspera* balance Vata,pitta,Kapha**

#### Dose of plant as per Ayurveda

**Dosage-** fresh juice – 5 – 10 ml in alienated dose per day.

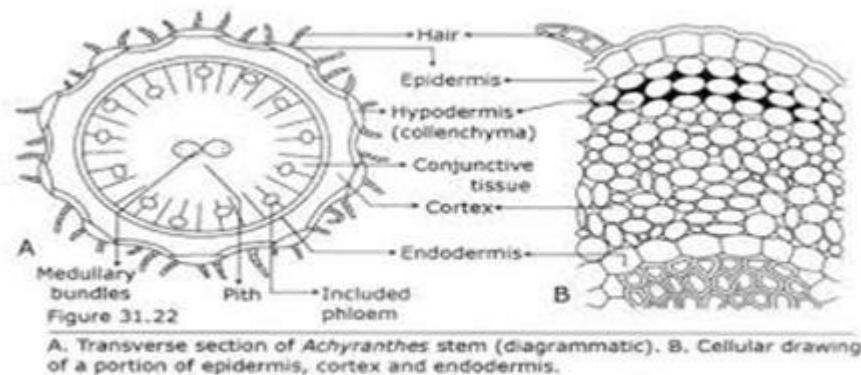
**Kshara** 0.5-2 g in separated dose per day.

#### Microscopy:

**Microscopic *Achyranthes aspera* Root:** Transverse section of root of this weed shows submerged cork cells almost 8-10 layers. Cortex contains 4-6 rows of conjunctive parenchymatous tissue. Vessels possess simple and bordered pits along with helical partenare. Existence of Tracheidsis also there<sup>10-11</sup>.

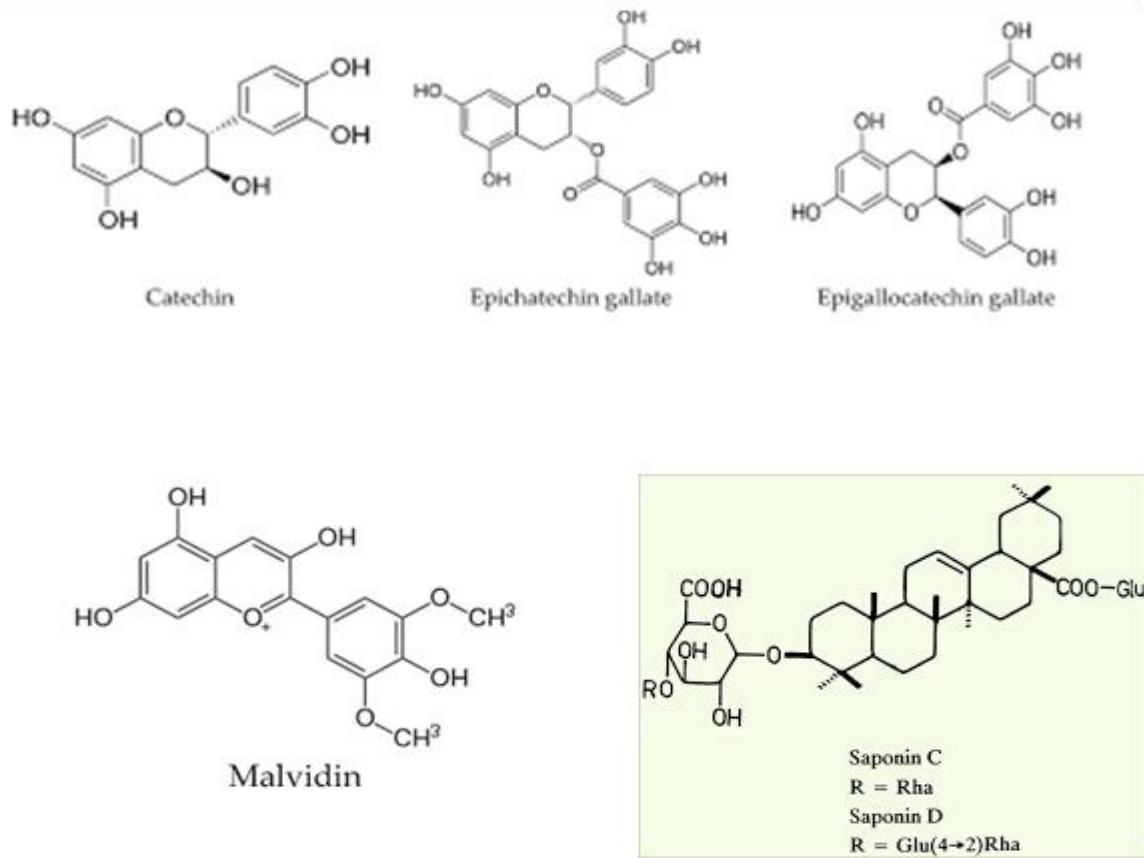
**Microscopic *Achyranthes aspera*Stem:** TS of *Achyranthes aspera*Stem are quadrangular in shape unevenly with 8-10 well-known ridges. Under each ridge, collenchymas are there. Rosette crystals of calcium oxalate are there in the phloem parenchyma. Cut off and radial rows of pitted xylem vessels show its appearance.

**Microscopic *Achyranthes aspera*Leaf:** TS of leaf through the midrib shows trichomes of covering and glandular types on upper and lower epidermis. The trichomes are more prominent on lower epidermis shown in Figure-7. Anomocytic types of stomata are there in higher as well as lower epidermis, higher epidermis is enclosed by cuticle. Calcium oxalate crystals in rosette shape are scattered in ground tissue. Palisade layer and spongy mesophyll are also present<sup>12-13</sup>.



**Figure.7: Transverse section of *Achyranthes aspera* plant stem**

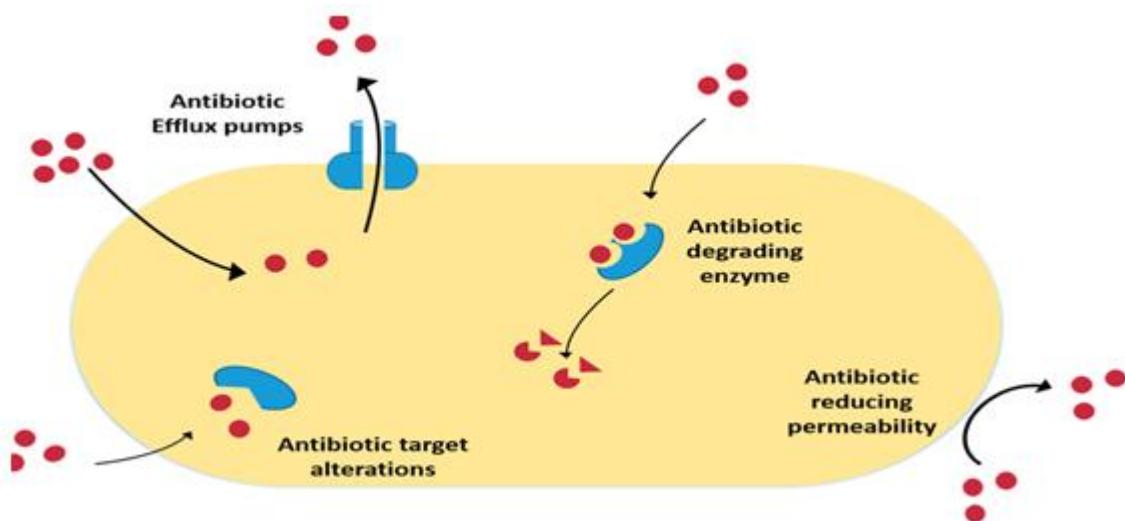
***Achyranthes Aspera L, Phytochemical constituent:*** Main constituent of *Achyranthes Aspera L* are Betaine, Achyranthine, Hentriaccontane, Ecdysterone; achyranthessaponins A,B,C,D. 27-Cyclohexylheptacosan-7-ol, 16-hydroxy-26-methylheptacosan-2-one, a long chain alcohol and 17-pentatriacontanol,  $\beta$ -sitosterol, spinasterol, 3-Acetoxy-6-benzyloxyapangamide, n-hexacos-17-enoic acid, flavonoids and alkaloids, oleanolic acid, sapogenin. the seeds of *Achyranthes aspera* were identified as  $\alpha$ -L-rhamnopyranosyl-(1 $\square$ 4)( $\beta$ -Dglucopyranosyluronic acid)-(1 $\square$ 3}oleanolic acid,  $\alpha$ -L-rhamnopyranosyl-(1 $\square$ 4)( $\beta$ -Dglucopyranosyluronic acid)-(1 $\square$ 3}oleanolic acid-28-O- $\beta$ -D-glucopyranoside and  $\alpha$ -Lrhamnopyranosyl-(1 $\square$ 4)( $\beta$ -D- glucopyranosyluronic acid)-(1 $\square$ 3}oleanolic acid-28-O- $\beta$ -Dglucopyranosyl-(1 $\square$ 4) $\beta$ -D- glucopyranoside<sup>14-15</sup>. phytoconstituent of *Achyranthes aspera* plant Catechin, Epicatechingallate, Epigallocatechingallate, Malvidin and saponin C structure are shown in Figure-8.



**Figure.8: Phytoconstituent of *Achyranthes aspera* plant Catechin, Epicatechingallate, Epigallocatechingallate, Malvidin and saponin C**

#### **Medicinal and pharmacological property of *Achyranthes Aspera L.*:**

Conventionally, the plant is employed for healing of asthma and cough. It is pungent, anti-phlegmatic, antiperiodic, diuretic, purgative and laxative also helpful in edema, dropsy, piles, boils and eruptions of skin etc. compressed aerial part of plant is boiled in water and is used for pneumonia. It is used to organize a particular medicine called Kshara, used widely in surgical measures to care for fistula, and as oral medicine for obesity, tumors etc<sup>16-17</sup>. This plant always have tendency for antibiotic action and Figure-9 shows *Achyranthes aspera* plants various reception to antimicrobial agent this weed traditional action are shown in Figure-10.



**Figure.9:** *Achyranthes aspera* plant various reception antimicrobial agent



**Figure.10:** Traditional use of *Achyranthes aspera* plant

#### Various Pharmacological Activity study:

- 1. Antioxidant and antibacterial activity Study:** the antioxidant and antibacterial behavior of the *Achyranthes aspera* plant extract in unusual organic solvents was studied by the author. The radical scavenging doings of the divergent extracts of root, stem, leaf and inflorescences

wasevaluated by DPPH assay technique and the antibacterial activity against *Staphylococcus aureus*gram-positive bacteria and*Escherichia coli* a gram-negative bacteria was calculated by Agar well cut diffusionmethod.Study revealed that there is a superior antioxidant and antimicrobial activity for the Plant *Achyranthes aspera*was there the experimental study supports the conventional usage as antiulcer and antimicrobial agents in novel drugs for the treatment of infectious diseases broke down by pathogens<sup>18</sup>

**2. Antimicrobial Properties of *Achyranthes aspera*:** Author conducted the experiment with chloroform and methanol root and shoot extracts of *Achyranthes aspera* showed high-quality antibacterial activity against Klebsiella sp. While pet. Ether (60-800)root extract reveledthe activity against B. Substilis. Methanol and aqueous shoot extracts were feeblydynamic against Penicillium. Phytophthora and Scleroum sp. consequencespropose that extract has important antibacterial and antifungal activities against experienced microorganisms. The present study acceptable theclaimed uses of *A. aspera* in the traditional system of medicine to treat various infectious diseases<sup>19</sup>.

**3. Antimicrobial Properties of *Achyranthes aspera* leaf.** Sunlight-induced green synthetic technique for the grounding of spherical silver nanoparticles (AgNPs) was established using leaves extract of *Achyranthes aspera*by the authors, this process excludes the use of outer stabilizing/capping agents. Spherical and monodispersedAgNPs were fashioned in 1 min experience to sunlight and the amount of AgNPs shaped was also much superior. The silver ion and reductant concentrations, pH and interaction time had profound influence on the constancy and dimension of silver nanoparticles. The bimolecular in attendance in the *A. aspera*, probably, saponins were accountable for the reduction of silver to silver nanoparticles. *A. aspera* might be an outstanding bioreductant and with no trouble available plant source for the great scale green mixture of silver nanoparticles<sup>20</sup>

**4. Phytochemical investigation of seeds of *Achyranthes aspera* Linn:** By using maceration procedure whole or coarsely powdered plant material of seeds was subjected to diverse solvents like benzene, acetone, and methanol and the extraction in a stopper container kept for a definite period with recurrent agitation until soluble matter is dissolved and remain for further study. Benzene, acetone and methanol solvent extracts of seeds of *Achyranthes aspera* were employed to various chemical tests by author. Benzene and acetone solvent e extracts exposed alike positive results but not methanol. Seeds of *Achyranthes aspera* were hand cool; air dried and it was subjected to size decline. The obtained powder material was subjected to

solvent extraction by means of polar and non-polar solvent extracts and subjected to a variety of chemical tests the reports of chemical tests of benzene, acetone and methanol extracts show that the attendance of alkaloids, saponins, glycosides (especially C-glycosides), flavonoids, proteins, amino acids and terpenoids<sup>21</sup>

**5. Analgesic and Neuropharmacological Investigations of the Aerial Part of *Achyranthes aspera* Linn.** Analgesic and central nervous system depressant action of the methanol extract of *Achyranthes aspera* Linn. assessed by means of acetic acid induced writhing test, thiopental sodium-induced sleeping timedetermination, hole cross test and open field test in albino mice was studied by author. The extract (250 and 500mg/kg) showed adose dependent reserve of writhing response generation by acetic acid compared to reference drugdiclofenac sodium (50mg/kg). Methanol (70%) extract of *Achyranthes aspera* (500 mg/kg) also formed rapid onset and maximize the period of sleeping time when administered with thiopental sodium. So decrease spontaneousmotor activity and potentiating of pentobarbitone-induced sleep might be credited to the CNSdepressant activity of the extracts. Lastly overall results obtained from this study suggestedanalgesic and CNS depressant activity of the extracts on experimental animal models. Among the extracts of *Achyranthes aspera* higher dose show more important analgesic and CNS depressant action compared with added groups of laboratory animal<sup>22</sup>.

**6. Antimicrobial activity of leaf extracts of Indianmedicinal plants against clinical and phytopathogenicbacteria:** *Achyranthes aspera* and other plant were examined using agar disc diffusion method against clinical bacteria like *Escherichia coli*and *Staphylococcus aureus* phytopathogenic bacteria (*Xanthomonasvesicatoria*and *Ralstoniasolanacearum*). For the experimental study Leaves were extracted using different solvents such as methanol, ethanol, ethyl acetate and chloroform. Among treatment, utmost *in vitro* inhibition was scored in methanol extracts of *C. odorata*which obtainable inhibition zone of 10, 9, 12 and 12 mm against *E. coli*, *S. aureus*, *X. vesicatoria* and *R. solanacearum*, respectively, followed by chloroform extract of the of plant leaf with inhibition zone of 8, 4, 4 and 4 mm, respectively noticed and tested for various pathogenic bacteria<sup>23</sup>.

**7. *Achyranthes aspera* Linn. (Chirchira)** A Magic Herb in Folk Medicine:Author given a review on *Achyranthes aspera* Linn. (Chirchira). Chirchira has engaged an essential position in Indian civilization and folk medicine. It has been used in each and every one most all the conventional system of medicine such as Ayurveda, Unani and Siddha on or following the

ancient time the tribal, rural and aboriginal people of our country usually use this herb in a variety of disorders. This plant, botanically known as *Achyranthes aspera* Linn. It grows as wasteland herb everywhere. Since time immemorial, it is in use as folk medicine. It holds a reputed position as medicinal herb in different systems of medicine in India. Ayurveda reveals that it is bitter, pungent, heating, laxative, stomachic, carminative and useful for the treatment of vomiting, bronchitis, heart disease, piles, itching abdominal pains, ascites, dyspepsia, dysentery, blood diseases etc<sup>24</sup>.

**8. *Achyranthes Aspera* Leaf Extracts Inhibited FungalGrowth:** The aim of the experimental study was to investigate antifungal activity of the various leaves extracts of *Achyranthes aspera* Linn plant. Various solvent extract like aqueous, ethanol and methanol leaves extracts of *Achyranthes aspera* Linn. (Family: Amaranthaceae) were evaluated for antifungal activity for certain important fungal spp. The results of experimental studies support the conventional usage of the plants and explain that some of the plant extracts possess compounds with antimicrobial properties that be able to be used as antimicrobial agents in novel drugs for the therapy of infectious diseases caused by various pathogens<sup>25</sup>.

**9. *Achyranthes aspera*(Apamarg) leaf extract protection against human pancreatic tumor growth in athymic mice by apoptosis.** *Achyranthes aspera* (Family Amaranthaceae) is employed for treatment of cancer therapy by ayurvedic medical practitioners in India. For the *in-vivo* antitumor activity study of leaf extract (LE) was experienced by intraperitoneal (IP) injections into athymic mice harboring human pancreatic tumor subcutaneous xenograft. Toxicity was checked by recording alteration of behavioral, histological, hematological and body weight parameters. And experiment shown that it have potent anticancer activity<sup>26</sup>

## CONCLUSION

After studying all scientific manuscript it is concluded that *Achyranthes Aspera* species have significant medicinal value. Mother Nature is a reserve of therapeutic (Medicinal) agents for hundreds of years and an extraordinary number of recent or novel drugs have been cut off from natural sources. This plant extract powder material, when subjected to solvent extraction by using polar and non-polar solvent of chemical tests of benzene, acetone and methanol extracts, indicates that the presence of alkaloids, saponins, glycosides (especially C-glycosides), flavonoids, proteins, amino acids and Terpenoids. Review reveals that the herb *Achyranthes Aspera* is used in treating a variety of ailments. It elicits on all the aspects of the

herb and encourages to do further research of this incredible plant set the mind of the researchers to hold the research work for mounting its various formulations, which can eventually be helpful for the human beings as well as animals.

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