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Achyranthus aspera L.: A TRIBAL INTERVENTION FOR OBESITY

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Abstract: In India, obesity is emerging as an important health problem, paradoxically co-existing with significant under nutrition prevailing in different sections of the population. The previous report on overall obesity prevalence in India from different published studies suggest that the prevalence varies from 10% to 50%, depending on the methodology and the cut-off points used for defining obesity. Considering the obesity multidirectional hazards and side effects of chemical formulation on human population, the requirement of herbal therapeutic measures is mandatory. The role of *Achyranthus aspera* on obesity management is well depicted in literature; however, detail study on this tribal medicine is required. This review is presenting potential of *A.aspera* on various variables of obesity and providing brief information on mechanism of action of this drug.

Keywords: Obesity, *Achyranthus aspera*, Tribal Medicine

Introduction: Traditional and folk remedies, having diverse medical information are being proved as treasure after scientific validation in current era. The indigenous information resided with ethnic and rural people of India may be translated as weapon for health management and may solve chronic intolerable implications of human. Tribal communities of India have preserved volume of traditional knowledge on medicinally important plants and are depending on them for the periods and generation to generations. In absence of specific documentation and serious effort these traditional information are being lapsed which are only being stored on mouth to mouth of local communities. In current era, little efforts are being done for validation of tribal therapies and the wild plants and weeds abundantly available in tribal areas are being explored for their medicinal importance by research communities. This green wealth of India may provide solution for glorified healthy world, if the research community would explore this traditional information in adherence to the “tribal medical practices and procedures”. Indian System of Medicine and specifically, “Ayurveda” has

documented important traditional knowledge, however, many more are still in communities but not on record.

One of them, “Apamarga” also known as *Chirchira* has occupied an important position in Indian culture and folk medicine having its wide use in most of the practices such as *Ayurveda*, *Unani* and *Sidha*. From the ancient time, the tribal communities and aboriginal people of our country commonly use this herb in various disorders. The present article is meticulously presented to brief this plant and its role in management of obesity in addition to other medicinal significance of this plant.

Obesity is a serious concern because it is associated with poorer mental health outcomes, reduced quality of life, and the leading causes of death worldwide, including diabetes, heart disease, stroke, and some types of cancer. The prevalence of obesity has increased with alarming speed over the past twenty years. It has recently been described by the World Health Organization as a 'global epidemic'. In the year 2000 more than 300 million people worldwide were obese. If current trends are maintained, it has been estimated to affect 20 – 40% of adults

and 10- 20% of children and adolescents in developed countries.

Botanicals

Morphology: The plants are widespread in the world as a weed, in Baluchistan, Ceylon, Tropical Asia, Africa, Australia and America. In the northern part of India it is known as a medicinal plant in different systems of folk medicine. *Achyranthes aspera* L, has been reported to possess medicinal properties. It is a stiff erect perennial herb of 1 to 3 feet with simple elliptic leaves. The stems are square, leaves elliptic ovate or broadly rhomb ate. The

Family	Amaranthaceae	Bio-active Markers
Genus	<i>Achyranthes</i>	D-Glucuronic Acid in Saponins A and D-galactopyranosyl ester in Saponins B, oleanolic acid, amino acids
Species	<i>aspera</i>	
Common Name	Apamarga (Sanskrit) Chirchira/Latjira (Hindi) Prickly chaff flower (English) Nayurivi (Tamil) Jarong (Indonesia)	

Microscopical Character

Transverse Section of Fruit: Transverse section of the fruit showed that the outer most pericarp made up of single layered epidermal cells with thick cuticle and some cells leads in to multicellular glandular trichomes. The Pericarp followed by testa, perisperm, inner endosperm cotyledons and the radical.

Powder Microscopy: Microscopic characters of fruit powder showed Prismatic crystals of calcium oxalate, Oil globules, Epidermal cells, Multi cellular glandular trichomes, tannin content, simple and compound starch grain and spiral vessels.

Transverse Section of Seed: Transverse section of seed shows outer most single layered testa consists rectangular shaped compactly arranged parenchyma cells. Perisperm cells loosely arranged somewhat elongated parenchyma cells greatly consisting oil globules, aleurone grains, some of the cells filled with yellow brown content and also prismatic crystals of calcium oxalate. Endosperm made up of compactly arranged parenchyma cells loaded by starch grains and oil globules. Cotyledons two consisting parenchyma cells rich with starch grains.

Powder Microscopy: Microscopic characters of seed powder showed prismatic crystals, oil globules, endosperm cells along with aleurone grains, Fragment of endosperm cells along with aleurone grains, fibres with luman, Endocarp cells, and epidermal cells with oil globules, yellow brown content may be tannins.

inflorescences are 8 - 30 cm long, with many single, white or red flowers, 3 – 7 mm wide. Fruit indehiscent dry utricle enclosed within persistence, perianth, and bracteoles. Minute egg shaped, shining and brownish green in colour. Ovule-single chambered, monocarpellary with basal placentation, outer most cells reddish and cup shaped with some oil globules. Inner single layered stone cells lead into loosely arranged parenchyma cells. Cotyledons - two rich in starch grains; Embryo –very minute. Seed-Sub-cylindric, truncate at the apex, round at the base, endospermic, brown.

Phytochemistry: The seeds of *Achyranthes aspera* L. shows presence of Saponins A and B which can also be isolated and identified ^[1]. The D-Glucuronic Acid in Saponin A and D-galactopyranosyl ester in saponins B was isolated from the seeds. Some other acids like oleanolic acid, amino acids were also isolated from *Achyranthes aspera* L. A new cyclic chain aliphatic fatty acid was isolated from the seeds of *Achyranthes aspera* L ^[2].

Ayurvedic Properties

Rasa : Katu, Tikta

Guna : Laghu, Ruksha, Tikshna

Virya : Usna

Vipaka : Katu

Traditional Uses: *Achyranthes aspera* L. is a common plant of the study area abundantly found in wastelands. The plant is highly esteemed by traditional healers and used in treatment of asthma, bleeding, in facilitating delivery, boils, bronchitis, cold, cough, colic, debility, dropsy, dog bite, dysentery, ear complications, headache, leucoderma, pneumonia, renal complications, scorpion bite, snake bite and skin diseases etc ^[3]. Traditional healers claim that addition of *A. aspera* would enhance the efficacy of any drug of plant origin.

Ayurvedic Importance: According to Ayurveda, 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. ^[4]. In Ayurveda, two varieties, red and white are mentioned. It is described in 'Nighantas' as purgative, pungent,

digestive, a remedy for inflammation of the internal organs, piles, itch, abdominal enlargements and enlarged cervical glands. Hindus used ashes for preparing caustic alkaline preparations^[5]. The diuretic properties of the plant are well known to the natives of India and European physicians. Different parts of the plant form ingredients in many native prescriptions in combination with more active remedies^[6].

Pharmacology

Antidiabetic Potential: The present study, aims to evaluate the antidiabetic potential of aqueous extract of *Achyranthes aspera* Linn. against alloxan induced diabetic rats. Wistar strain of albino rats of either sex were divided into five groups comprising of six rats each. Group I served as normal control, group II served as disease control (alloxan induced), group III & IV animals, received aqueous extract of *A. aspera* Linn at a dosage of 250 mg/kg body weight and 500 mg/kg body weight for 45 days, group V served as standard drug control (glibenclamide 1mg/Kg body weight). After the experimental period the blood and tissue samples were collected and subjected to various biochemical and enzymic parameters. There were profound alteration in fasting blood glucose, serum insulin, glycosylated hemoglobin (HbA1C) and liver glycogen levels in alloxanized rats. Glucose-6-phosphatase, glucokinase, and glucose-6-phosphate dehydrogenase activity were also altered in diabetic rats. The alterations were observed to resume ($P < 0.05$) back to normal on treatment with plant drug. The effect of plant extract was found to be dose dependent. The present investigation reveals the antidiabetic potential of aqueous extract of whole plant of *Achyranthes aspera* L.^[7].

Wound-healing activity: The floral richness of the North-East Indian region cannot be neglected in context to its medicinal importance. *Achyranthes aspera* Linn. is an indigenous plant species of this region. Ethanolic and aqueous extracts of leaves of *Achyranthes aspera* for wound healing activity investigated^[8].

Diuretic: *Achyranthes aspera* Linn (Amaranthaceae), commonly known as Apamarga in Ayurveda and is found as a weed that has been traditionally used for a number of ailments. The plant is indigenously used as diuretic, spermicidal, anti-allergic, cardiovascular, nephroprotective, antiparasitic, hypoglycemic, analgesic and antipyretic. In the present study the methanolic extract of whole

plant of *Achyranthes aspera* was investigated for its diuretic potential. The diuretic effect was found out by Lipschitz et al method using furosemide as standard drug. The methanolic extract treated rats showed high diuretic effect as compared to control but this effect was less than furosemide. Significant increase in renal clearance of sodium, potassium and chloride ions was observed in treated and standard groups^[9].

Anti-Oxidant Activity: Anti-oxidant activity of *Achyranthes aspera* L leaves extracts was reported^[10] and the same was reported on leaves and roots^[11]. The anti-oxidant activity of *Achyranthes aspera* L seeds was studied^[12].

Cancer Chemo Preventive Activity : The cancer chemo preventive activity study on Epstein-Barr virus early antigen activation induced by tumor promoter 12-O-tetradecanoylphorbol-13-acetate in Raji cells was studied by using methanolic extracts of leaves, alkaloid, non-alkaloid and saponin fractions^[13].

Hepatoprotective Activity: Hepatoprotective activity on rifampicin induced hepatotoxicity in albino rats was studied by using methanolic extract of the aerial parts of *Achyranthes aspera* L.^[14].

Anti Obesity Activity: Assessment of anti obesity potential of *Achyranthes aspera* linn. Seed take 20-50 g. of the drug for decoction its give significant result as anti obesity^[15].

Antifertility: The extracts of leaves, roots, and seeds of the plant have been used for control of fertility, in placental retention, and in postpartum bleeding locally is one of the most important traditionally used antifertility plants in the indigenous health care delivery system of Ethiopia^[16].

Conclusion: The review of previous study on a has been presented in this paper with additional emphasis on its role on Antidiabetic Potential, Wound-healing activity, Diuretic, Anti-Oxidant Activity, Cancer Chemo Preventive Activity, Hepatoprotective Activity, Anti Obesity Activity, Antifertility. Further study on clinical evaluation of antiobesity property of this drug with major sample size is wanted.

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