

# A Review on Antitumor Activity of *Achyranthesaspera* L.

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**Abstract**—*Types of cancer diseases are spreading every day in the whole world, therefore, many scientists are investigating to find the right treatment with the least complications for the patients.*

*Among these studies, the use of medicinal plants has been taken into consideration by many researchers and drug companies for their cheap and affordable and non-complicated properties.*

*The purpose of this study is to introduce a medicinal plant called *Achyranthesaspera*L. and its use in the treatment of various cancers that are referred to in this article.*

*It is hoped that with the efforts of researchers in the near future, we will see the eradication of this disease and the treatment of all cancer patients.*

**Keywords:** *Medicinal plants, *Achyranthesaspera* L., treatment of various cancers.*

## 1. INTRODUCTION

### Cancer

What we know as a "cancer" is in fact a group of more than 100 different disease models. The common point of all these diseases is the unusual and unusual growth of the cells in the body. This growth causes the surrounding tissues to disappear, and even in severe conditions, during the metastasis process, these cells also spread to other parts of the body and continue to grow in that area.

There are a variety of cancers at which most inclusive of this disease are included Skin cancer, lungcancer, brain cancer, lymph nodes or lymphoma, breast cancer, prostate cancer, colon cancer, Leukemia leukemia and ovarian cancer.

Cancer can develop and grow anywhere in the body, age does not exist. This condition occurs when the genetic material is damaged within a cell which occurs by causing a mutation in the genome cell or due to the entry of some carcinogenic viruses into the cell.

The components that are infected by cancer cells are called malignant cells. These cell types act differently from other parts of the body, and the type of cell division is completely out of habit.

After the chemotherapy, the person gets a temporary hair loss. The reason for this is the use of anticancer drugs that damage the hair follicle cells. These cells also have a high rate of growth, just like cancer cells. Also some other anticancer chemical drugs have some side effects on the body, for intense they can effect on immune system in the body and weak it.

Therefore, researchers have come to the idea of recognizing and using plants that are effective in treating various types of cancers which *Achyranthesaspera L.* is the one of these

plant that is considered by many researchers in all over the world. Because synthetic medicines have lots of side effects but plantdrugs which is made by natural components, are safer and cheaper (Baraik et al, 2014).

## 2. DISCUSSION

### -Plant introduction

**Nowadays 50 % of anticancer medicines are obtained from plants and their derivatives..(Glaucia et al, 2017). Among these plants, *Achyranthesaspera L.* is a famous medicinal plant in all over the world.**

*Achyranthesaspera L.* (Amaranthaceae) is a famous plant which is used for thousands years. (Dhale et al, 2013) and it is a roadside plant that grow as a weed in India and some other countries (Baraik et al, 2014) of Asia as well as Australia, Africa, America and Europe (de Lange et al, 2004 and Shafique et al, 2007)

It is traditionally called as Prickly chaff (Varuna et al, 2010) and growing up to 1000 m height. Stems are square, leaves elliptic, ovate or broadly rhombate (Rani et al, 2017). The inflorescences are 3 - 7 mm wide, with many single, red or white flowers, 8 - 30 cm long. Flowering time is in summer(). and all parts of the plant are used in folk medicine (Srivastav, 2011).

Gametophytic count was happened to be 21 (Bir et al, 1980 and Sharma et al, 1970), 24, 48 (Kumar et al, 1982 and Bir et al, 1979). Mitotic count was reported to be  $2n=42$  from seedling root tip (de Lange et al, 2004). In another study  $n=21$  and 42 were reported (Pal, 1964).

Also it includes some important compounds that are called secondary metabolites like flavonoids, alkaloids, phenols, saponins, glycosides, steroids, terpenoids (Baraik et al, 2014) saponin A and saponin B (Banerji et al, 1970). which passes anticancer activity feature in the plant (Varuna et al, 2010). Many phytochemical composition of the plant are known such as sapogenin (Khastgir et al, 1958), hexatriacontane, 10-octacosanone, 10-triacosanone and 4-triacontanone (Ali et al, 1993), betain, betalaine and

achyranthine(Basu et al, 1957 and Basu et al, 1957 and Basu, 1957 and Kapoor et al, 1966 and Bhom et al, 1992), ecdysterone(Ikan et

al, 1971 andBanerji et al, 1971 and Banerji et al, 1970 ), cardiac glycosides(Arunkumar et al, 2010) 4 methylheptatriacont-1-en-10-ol and tetracontanol-2 (Misra et al, 1996) from different organs like leaves, shoots, roots, fruits, seeds and inflorescence have been reported.

On the other hand, it is used for treating some diseases like dropsy, piles, skin eruptions, colic, as diuretic, astringent, purgative(Bhatnagar et al, 1973. Raj et al, 1978. Khanna et al, 1994)and cough and hydrophobia, as an antiasthmatic (Singh et al, 1989).

This plant is very valuable in Pharmaceutical industry because of its medical properties like antiinflammatory, antimicrobial, anti fungal, anti cancer, antifertility (Mishra et al, 1993 and Yu et al, 2004)and anti virus activities.

### **-Plant anticancer applications**

In this investigation anti cancer activity of the plant will be reviewed.

The plant was found to has cancer chemopreventive activity in many in vitro and in vivo experiments(Chakraborty et al, 2002)and its nonalkaloid fractions have shown antitumor avctivity(Jayakumar et al, 2009).

In an experiment methanol extract of the leaves of *A.aspera* has shown antitumor activity(Bhom et al, 1992).Also roots of the plant is used for abdominal tumor(Ghani, 2003).

On the other hand, methanol leaves extract of the plant has shown inhibitory activity against human pancreatic cancer cells suggestive its anti-cancer and anti-proliferative traits(Subbarayan et al, 2010).

And 70% alcoholic root extract of *Achyranthesaspera* L. was reported to has invitroantitumour activity against liver (HEP-2) and colon (HT-29) cell lines cancers.(Shivsharan Singh et al, 2017).

The methanolic extract, alkaloid, non-alkaloid and saponin fractions showed anticancer activities among which non-alkaloid fraction exhibited maximum inhibitory activity against the Epstein-Barr virus in mouse which these mice were affected by skin cancer .(Chakraborty et al, 2002)

In onother research, it became clear that ether leaves extract of the *A.aspera* can reduce the cancer symptoms in mouse with metastasize tumor in the head ( Geetha et al, 2010).

### **In vitro study of cytotoxicity**

In most of these in vitro research, it has been mentioned that the antitumor activity of the plant was specified by measuring the cytotoxicity potential of the plant extracts using human cancer cell lines which had grown on tissue culture media.The cell growth was measured using ELISA reader after staining with Sulforhodamine B dye (SRB) which binds to basic amino acid residues in the Trichloro- Acetic Acid (TCA) fixed cells .( Shivsharan Singh et al, 2017).

Also the anti tumour activity of the plant extracts on cell lines cancers can determine by the MTT (3-(4, 5-dimethyl thiazol-2yl)-2, 5-diphenyl tetrazolium bromide) assay which is used to evaluate the cytotoxicity .(Horiuchi et al, 1988).This methods is used for evaluating the ability of organs, cells or tissues to maintain or recover viability.

### 3. CONCLUSION

In today's societies, along with advances in technology and industry, the production of pathogenic waste by factories, the production of carcinogenic waves by some satellites, the use of various carcinogenic substances in food, hygiene and cosmetics is also increasing which leads the emergence of different types of cancer across the world.According to the materials collected in this article, *Achyranthesaspera* L. contains useful anti-cancer compounds that enable the plant to inhibit cancer cells.It is hoped that in the near future, using the anti-cancer compounds of this plant and other plants with similar properties, we will witness the definitive treatment of various types of cancers.

### REFERENCES

- [1] D.A. Dhale and SonalBhol, Pharmacognostic Characterization and Phytochemical Screening of *AchyranthesAspera* Linn, Current Agriculture Research Journal, 2013, Vol. 1(1), 51-57.
- [2]Bhatnagar L. S, Singh V. K, Pandey G. Medicobotanical studies on the flora of Ghaigaon forests, Gwalior, Madhya Pradesh. J Res Indian Med., 1973, 8: 67-100.
- [3] Raj K. P. S, Patel M. R. Some medicinal plants of Cambay and its immediate vicinity and their uses in Indian indigenous system of medicine.Indian Drugs.1978, 15: 145-152.
- [4] Khanna K. K, Mudgal V, Shukla G, Srivastava P. K. Unreported ethno medicinal uses of plants as aphrodisiac from the folklores of Uttar Pradesh plains, India. Bull Bot Surv India. 36: 91-94 (1994).
- [5]Singh V. K, Ali Z. A. Folk medicines of Aligarh (Uttar Pradesh), India. Fitoterapia., 1989, 60: 483- 490
- [6] BinitBaraik, Paras Jain\* and H.P. Sharma, *Achyranthesaspera* L.: As a Source of Biofungicide, American Journal of Advanced Drug Delivery, 2014, AJADD.2 .6.686-696.
- [7]Srivastav S. *Achyranthesaspera*-An important medicinal plant: A review. J. Nat. Prod. Plant Resour. 2011; 1(1): 1-14.
- [8] TP KumariPushpa Rani, A Doss, Phytochemical Screening and GC MS analysis of *Achyranthesaspera*Linn., International Journal of Chemistry Studies, November 2017, Volume 1; Issue 2 ; ; pp. 05-08
- [9]Varuna KM, Khan M.U., Sharma P.K., Review on *AchyranthesAspera*, Journal of Pharmacy Research, April 2010, Vol.3.Issue 4.
- [10]Banerji A, Chadha MS, Insect moulting hormone from *Achyranthesaspera*Phytochemistry 9, 1970, 1671.
- [11]Bhom, K.H., 1992. *Achyranthes*. In: Liersch, R., Haensel, R., Keller, K., Rimpler, H., Schneider, G. (Eds.), *HagersHandbchderPharmazeutischen Praxis*, V.SpringVerlag, Berlin, 1992, 54–59.
- [12] Mishra TN, Singh RS, Pandey HS, Prasad C, Singh BP, Two long chain compounds from *Achyranthesaspera*, phytochemistry, 1992, 1, 33, pp. 221-223.

- [13] Yu, C.C. Lin, J.L. and Lin-Tan, D.T. Environmental exposure to lead and progression of chronic renal disease a four year prospective longitudinal study *J.Am. Soc. Nephrol* 15, 2004, 1016-1022
- [14] de Lange PJ, Scofield RP, Greene T, *Achyranthesaspera* (Amaranthaceae), a new indigenous addition to the flora of the Kermadec Islands group. *New Zealand J. Bot.*, 2004, 42, pp. 167-173.
- [15] Shafique S, Javaid A, Bajwa R, Shafiqe S, Biological control of *Achyranthesaspera* and *Xanthium strumarium* in Pakistan, *Pak. J. Bot.*, 2007, 39(7), pp. 2607-2610.
- [16] Bir SS, Sidhu M, Cyto-palynological studies on weed flora of cultivable lands of Patiala district (Punjab), *Journal of Palynology*, 1980, 16, pp. 85-105.
- [17] Sharma AK, Annual report, 1967-1968, Research Bulletin of the University of Calcutta (Cytogenetics Laboratory) 1970, 2,, 1-50.
- [18] de Lange PJ, Murray BG, Datson PM, Contributions to a chromosome atlas of the New Zealand flora-38. Counts for 50 families, *New Zealand J. Bot.*, 2004, 42, 873-904.
- [19] Pal M, Chromosome numbers in some Indian angiosperms—I, *Proceedings: Plant Sciences*, 1964,, 60(5), pp.347-350.
- [20] Kumar A, Polyploidy in *Achyranthesaspera* and *Chrysanthemum leucanthemum*, *Acta Bot. Indica.*, 1982, 10, pp.141-142.
- [21] Bir SS, Sidhu, Cytological observations in weed flora of orchards of Patiala district, Punjab, *Recent Res. Pl. Sci. (New Delhi)*, 7, 1979, 261-271.
- [22] Ghani A, Medicinal plant of Bangladesh with chemical constituents and uses, 2nd ed., Asiatic Society of Bangladesh, Dhaka, 2003, 71-72.
- [23] Misra TN, Singh RS, Pandey HS, Prasad C, Singh S, Isolation and characterization of two new compounds from *Achyranthesaspera* Linn., *Ind. J. Chem.* 35B, 1996, 637-639.
- [24] Ali M, Chemical investigation of *Achyranthesaspera*Linn., *Oriental J. Chem.* 9, 1993, 84-85.
- [25] BasuNK, Singh HK, Aggarwal OP, A chemical investigation of *Achyranthesaspera* Linn. *J. Proc. Inst. Chem.*, 1957, 29, pp. 55-58.
- [26] Basu NK, Neogi NC, Srivastava VP, Biological investigation of *Achyranthesaspera* Linn.and its constituent achyranthine. *J. Proc. Inst. Chem.*, 1957, 29, pp.161-165.
- [27] Basu NK, The chemical constitution of Achyranthine, *J. Proc. Inst. Chem.* 29, 1957, 73-76.
- [28] Kapoor VK, Singh H, Isolation of betaine from *Achyranthesaspera* Linn. *Indian J. Chem.*, 1966, 4, pp.461-463.
- [29] Bhom KH, *Achyranthes*, In: Liersch R, Haensel R, Keller K, Rimpler H, Schneider G (Eds.), *HagersHandbuch der Pharmazeutischen Praxis*, V, Springer-Verlag, Berlin, 1992, 54-59.
- [30] Khastgir HN, Sengupta SK, SenguptaP, Thesapogenin from seeds of *Achyranthesaspera* Linn., *J. Indian Chem. Soc.*, 1958, 35, pp. 693-694.
- [31] Ikan R, Ravid U, Trosset D, Shulman E, Ecdysterone: an insect moulting hormone from *Achyranthesaspera* (Amaranthaceae), *Cellular And Molecular Life Sciences*, 1971, 27(5), pp.504-505.
- [32] Banerji A, Chintalwar GJ, Joshi NK, Chadha MS, Isolation of ecdysterone from Indian plants, *Phytochemistry*, 1971, 10(9), 2225- 2226.
- [33] Banerji A, Chadha MS, Insect moulting hormone from *Achyranthesaspera* Linn.,

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Phytochemistry, 1970,, 9, 1671.

- [34]Arunkumar S, Muthuselvam M, Rajasekaran R, Analysis of phytochemical constituents and antimicrobial activity of some Southern India medicinal plants, *Journal of Pharmacy Research*, 2010, 3(8), 1841-1843.
- [35]Chakraborty A, Brantner A, Mukuinaka T, Nobukuni Y, Kuchido M, Konoshima T, Cancer chemo preventive activity of *Achyranthesaspera* leaves on Epstein-Barr virus activation and two stage mouse skin carcinogenesis. *Cancer Letters*, 2002, 177, 1-5.
- [36] Jayakumar T, Sridhar MP, BharathPrasad TR, Ilayaraja M, Govindasamy S, Balasubramanian MP, Experimental studies of *Achyranthesaspera* (L) preventing Nephrotoxicity induced by lead in Albino rats, 2009, 55(5), pp.701-708.
- [37]Subbarayan PR, Sarkar M, Impellizzeri S, Raymo F, Lokeshwar BL, Kumar P, Agarwal RP, Ardalan B, Anti-proliferative and anti-cancer properties of *Achyranthesaspera*: Specific inhibitory activity against pancreatic cancer cells, *J. Ethnopharmacology*, 2010, 131(1), pp.78-82.
- [38]GlaucaGlauca C. Pereira BożenaMuszyńskaJyothei Abraham PavlinaSashevaAshita Sharma Verity I. P. LoakeTriptiTewariAla'a Al-Hrout J. F. Buyel Aly Farag El SheikhaBadriyaBaigKatarzynaKała Marisol Ochoa-Villarreal T. Dennis Thomas Rajwant Kaur Iliana IonkovaRuchi Singh Jatinder Kaur Katnoria Ali Hilal-AlnaqbiKatarzynaSułkowska-ZiajaVartika Pant Ajit Kumar Amr Amin Rajinder Kaur PreetiChaturvediAvinash Kaur Nagpal. *Anticancer Drugs from Plants, Biotechnology and Production of Anti-Cancer Compounds*, 2017,, pp 121-142.
- [39]Elisha Solowey, Michal Lichtenstein, Sarah Sallon, Helena Paavilainen, Elaine Solowey, and Haya Lorberboum-Galski, *Evaluating Medicinal Plants for Anticancer Activity*, *The Scientific World Journal*, 2014, 12 pages.
- [40] Chakraborty A1, Brantner A, Mukainaka T, Nobukuni Y, Kuchide M, Konoshima T, Tokuda H, Nishino H., Cancer chemopreventive activity of *Achyranthesaspera* leaves on Epstein-Barr virus activation and two-stage mouse skin carcinogenesis., *Cancer Lett* 8 March 2002, 177(1):, Pages 1-5.
- [41]Geetha. P1, Narayanan. K.R2 and A.G. Murugesan, Screening the Anti-Cancerous Efficacy of *Achyranthesaspera* Linn.using Animal Model Swiss Albino Mice, *J Biomed Sci and Res.*, 2010, 2 (4), pp.231-235.
- [42]Horiuchi N, Nakagava K, Sasaki Y, Minato K, Fujiwara Y, Nezu K, et al. In vitro antitumor activity of mitomycin C derivative (RM49) and a new anticancer antibiotic (FK973) against lung cancer cell linesdetermined by tetrazolium dye (MTT) assay. *Cancer ChemotherPharmacol* 1988;22:246-50.