Review Article

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AMMANNIA BACCIFERA L AS A NOVEL WEAPON FOR BIOLOGICAL ACTIVITIES–A REVIEW

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Abstract

Ammannia baccifera L. is generally utilized in customary medication in India and China to bring rankles up in stiffness and in the treatment of scabies, ringworm, parasitic skin contaminations, basic cold, typhoid, strangury, spinal ailment, gastroenteropathy and sexual enhancerThese sources were investigated and assessed about its natural science, customary employments, natural viewpoints, synthetic constituents and pharmacological pertinence. The *in vivo* investigations of concentrating from Ammannia baccifera demonstrated antitumor, mitigating, antiarthritic, antianalgesic, antipyretic, antidiuretic, and wound recuperating pharmacological exercises which can be ascribed to the nearness flavonoids, tannins, polyphenols, triterpenes and sterols. The plant was assessed and approved for the customary therapeutic action against microorganisms and antimalarial properties utilizing in vitro examinations. Tetrolane subsidiaries were found to have antitubercular action and high harmfulness against saline solution shrimp.

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INTRODUCTION

Since the beginning of human progress, man used plants for their restorative and eatable worth. By experimentation, and before the presentation of synthetic meds, man recognized the useful and toxic plants. Every populace on the planet built up its own customary clinical information and encounters. World Health Organization gauges that about 80% of the world populaces depending solely on conventional medication for their essential medical services needs [1].

Introduction to plant Ammannia baccifera Linn [2-5]

Synonyms: Ammania vesicatoria Roxb. , ammonia salicifolia Hiren

BIOLOGICAL SOURCE

Annual herb of Ammania baccifera Linn.

FAMILY

Lythraceae.

HABIT

A Glabrous, erect, perennial, branching herb

HABITAT

Very common all over India, in rice fields and marshy localities.Ceylon, Afghanistan, Malaya, China, Australia, Tropical Africa.

ENGLISH NAME

Blistering ammonia

REGIONAL AND OTHER NAMES

Gujarati : Jala agio
Hindi : Aginbuti, ban mirich, dadmari, jungli mehendi, Kuranta
Bengali : Banmarich
Kannada : Kaadugida
Konkani : Dadmaria
Malayalam: Kallur vanchi, nirumelneruppu,
Marathi : Aginbuti, bharajambhula, dadmari

Nepalese : Ambar
Punjabi : Dadarbooti
Tamil : Kal-l-uruvi, nirummel neruppu
Telugu : Agnivendapaku

PARTS USED

Root, Stem, Inflorescence, Leaves, Whole plant.

TAXONOMY

Domain: Eukaryota- Whittaker & Margulis, 1978 - eukaryotes Kingdom: Plantae - Haeckel, 1866 - Plants Subkingdom: Viridaeplantae - Cavalier-Smith, 1981 Phylum: Tracheophyta - Sinnott, 1935 Ex Cavalier-Smith, 1998 - Vascular Plants Subphylum: Euphyllophytina Infraphylum: Radiatopses - Kenrick & Crane, 1997 Class: Magnoliopsida - Brongniart, 1843 - Dicotyledons Subclass: Rosidae- Takhtajan, 1967 Superorder: Myrtanae - Takhtajan, 1967 Order: Myrtales- Reichenbach, 1828 Suborder: Lythrineae Family: Lythraceae - Jaume Saint-Hilaire, 1805 - Loosestrife Family Genus: Ammannia - Linnaeus, Sp. Pl. 1: 119. 1753. - Redstem Specific epithet: baccifera - L. Botanical name: - Ammannia baccifera L.

AYURVEDIC DESCRIPTION

Sanskrit : agnigarbha,
Synonyms : brahmasoma, kshetrabhusha, kshetravashini, mahasyama, pasanabheda.
Properties : Rasa: Katu, tikta Guna: Laghu, tiksna, Sara Virya: Usna Vipaka: Katu Actions : Kaphavatahari, pittajanani, dipani, pacani.
Therapeutic Uses: Kasa, kustha, asmari.

PORTRAYAL OF A. BACCIFERA [6]

It is a yearly herb, 6.5-60 cm tall, glabrous, with many climbing branches. Leaves lower inverse, upper once in a while exchange, praise oval or tight elliptic, base as a rule weakens once in a while subcordate or adjusted, 1-47mm lomg, 0.5-9mm expansive. Cymes sessile, glomerular, blossoms rosy in thick axillary bunches, about 2mm over, sessile or subsessile. Hypanthium 1-1.75 mm long, 1.5-2.5 mm wide. Epicalyx dark. apetalous or with minute petals. Container discouraged glabose, ruddy, separating unpredictably over the center and marginally surpassing the Hypanthium, many seeded. Seeds sub hemispheric unearthed on the plane-face.
Engendering: Reproduction by seeds.
Phenology: Flowering - May to October, Fruiting - July to November.

PHYSICOCHEMICAL PROPERTIES [7]

The physicochemical properties for stem and leaf of A. baccifera were : misfortune on drying at 105°C : 5.47 (% w/w) , debris esteem at 450°C :13.13 (% w/w) , corrosive insoluble debris at 450°C: 0.02 (% w/w) , water solvent extractive :18 (% w/w) and liquor dissolvable extractive:16 (% w/w)(5). The physicochemical properties for the root were: misfortune on drying at 105°C 0.5(% w/w) , debris esteem at 450°C 13.33(% w/w), corrosive insoluble debris at 450°C 0.03 (% w/w), water dissolvable extractive 7.4 (% w/w) and liquor solvent extractive 33.8 (% w/w).

SYNTHETIC CONSTITUENTS

The plant is accounted for to contain hentriacontine, dotriacontanol, betulinic corrosive, lupeol, ellagic corrosive, quercetin, and lawsone [8] . The root contained flavonoids, phenols and carbohydrate, the total amount of tannins were 0.42 and poly phenols were 4.04 %.Vitamin C, steroid, triterpenes, coumarines, flavanol, and tannin were also isolated from different parts of Ammannia baccifera. The plant is also reported to contain tetralone derivatives i.e. (-)-(4R)-Hydroxy-1tetralone, (-)-(4S)-acetoxy-1-tetralone, (-)-(4S)-hydroxy-1tetralone-4-O-β-D-glucoside, β-sitosterol and β-sitosterolβ-D-glucoside [9-10]. In any case, Tip-pyanget al secluded four mixes from the rough hexane and ethyl acetic acid derivation concentrate of Ammannia baccifera. There were 1, 4-naphthoquinone, 4-hydroxy-1tetralone, alkyl rans-4-hydroxycinnamte and siigmasteryl3-o-β-D-glucopyranside [11].

PROPERTIES AND UTILIZATIONS

Bitter, canapé, purgative, stomachic, love potion; expels "Kapha", "Vata," blood inconveniences, strangury; causes biliousness (Ayurveda). Severe and bitter; utilized as a tidbit (Yunani) [12-14].

CUSTOMARY USES

Leaves are exceedingly bitter; they are generally used to bring rankles up in rheumatic torments, fevers and so on. In the Konkan, the plant, new or dried, is regulated in decoction with ginger and Cyperus pull for irregular fevers and its remains are blended in with oil and applied to herpetic ejections. There is a lot of distinction of assessment with respect to the estimation of the plant as a rankling operator.

The innate legend of Himalayas utilizes the herb to fix dangerous development of skin, tongue and female parts. Leaves are rubifacient and hostile to pyretic and recommended in rheumatic agony, fever and in ringworm and other skin illnesses.

PHARMACOLOGICAL EFFECTS

ANTI OXIDANT ACTIVITY [15-16]

100g per bunch of powder of various pieces of Ammannia baccifera was removed with Methanol utilizing soxhlet contraption. DPPH free rummaging movement: Principle The cell reinforcement responds with stable free radical, DPPH and changes over it to 1,1-Diphenyl-2-Picryl Hydrazine. The capacity to rummage the free radical, DPPH was estimated at an absorbance of 517 nm.

PLANNING OF DPPH ARRANGEMENT

4.3 mg of DPPH was broken up in 3.3ml methanol. It was shielded from light by covering the test tubes with aluminum foil.

READINESS OF TEST ARRANGEMENT

Accurately weighed 50mg dried methanolic separate was broken down in 50 ml methanol to give 1 mg/ml stock arrangement. Diverse weakening were set up to give 160, 180, 200, 220 µg/ml focus.

PLANNING OF STANDARD ARRANGEMENT

Required amount of Ascorbic corrosive was broken down in methanol to give the grouping of 5, 10, 20, 30, 40 and 50µg/ml.Different volume level of extract were screened and made 150µl of each dose level by dilution with methanol.150µl DPPH was added to each test tube.150µl DPPH solution was added to 3ml methanol and absorbance was taken immediately at 517nm for control reading.

ANTIBACTERIAL ACTIVITY [17]

The orchestrated mixes were tried for their enemy of bacterial action by in-vitro against four pathogenic microorganisms viz. Escherichia coli, Pseudomonas auriginosa (Gram negative) and Staphylococcus aureus, Bacillus subtilis (Gram positive).The screening was finished by the strategy for utilizing standard supplement agar medium.

meat extricate was taken and made up the volume to 100 ml with water, and to this was included gauged amounts of peptone, salt agar were broken down by warming and the blend is separated. The pH was acclimated to 7.5. It was cleaned via autoclaving at 1210C for 15 minutes at 15 p.s.i. pressure, cooled to 450C and afterward poured in 20 ml amounts to petridishes. A loopful of an over-night stock culture was spread equitably over the entire plate with a sterile cotton fleece swab. The way of life plates were dried in the hatchery with the top until its surface was liberated from noticeable dampness.Immediately known groupings of the medication was applied as the circles with aliquot separating to the outside of the way of life plates with clean fine pointed forceps and afterward squeezed delicately to guarantee full contact with the medium. It was then moved rapidly to the hatchery and brooded for 24 hrs at 370C. Toward the finish of 24 hrs the plates were evacuated and the widths of zone of restraint delivered were estimated contrasting and the standard medication.

ANALGESIC ACTIVITY [18-19]

The pain relieving reaction of the given example of oil was assessed by utilizing "Hot Plate Method utilizing Medicraft, Heated Plate, Analgesiometer. In this technique the mice were gauged and checked likewise, which were partitioned into 3 gatherings of 6 creatures each. The mice are dropped on the hot plate kept up at 550C and the time until the creature licks its feet or leaps out of the chamber is recorded. They are kept on the hot plate for a maximal time of 30 seconds. The standard test and control (dark) portions are regulated into the creature orally and the response times are noted at 30, 60, 90 and 120 minutes. The't' qualities and 'p' values were determined and the degree of pain relieving impact was looked at among standard and test drugs. The standard here utilized was Aspirin 100mg/kg body weight, the concentrate was emulsified utilizing CMC as indicated by test portion of 50mg per kg body weight.

ANTI-INFLAMMATORY AND ANTIARTHRITIC [20-21]

The ethanol concentrate of entire plant showed critical portion subordinate action in both intense what's more, incessant incendiary models. Gopalakrishnan et al. assessed that 100mg/kg bw and 200mg/kg bw of concentrate created 38.27% and 43.39% hindrance in calmin model (carrageenan initiated paw oedema in pale skinned person rodents) that was practically identical with

the standard medication indomethacin (48.52%) Loganayaki et al. detailed that high portion of methanol extricate created critical non-fiery movement. In frend's adjuvant initiated joint pain model, the portion of 100mg/kg bw and 200mg/kg bw of ethanol extricate delivered 38.83% and 44.08% restraint, separately. Though, 55.47% hindrance was accounted for the medication

ANTIUROLITHIC [22]

The plant A.baccifera demonstrated promising antiurolithiatic movement. Ethanolic remove (2gm/kg/day po.) was seen as powerful in lessening the arrangement of urinary stones(prophylactic) just as dissolving pre-framed ones (corrective) that were actuated by implantation of zinc plates in the urinary bladders of rodents that came about in the critical increment of calcium, magnesium and oxalate during pee discharge. The stones shaped were for the most part of magnesium ammonium phosphate with hints of calcium oxalate. Treatment with A.baccifera likewise fundamentally diminished calcium and magnesium levels.

Wound healing [23]

The utilization of leaf concentrates of Ammannia baccifera L cream to the tainted injury in rodents improved the recuperating movement and diminished the danger of further disease. The utilization of ethanolic leaf concentrates of A. baccifera was found to improve the various periods of wound fix, including collagen union and development, wound withdrawal and epithelialization.

Gastroprotective activity [24-25]

The entire Ammannia baccifera was separated with ethanol and the ethanolicextract was fractionated with oil ether, methanol, chloroform and water. All the portions were tried for their antiulcer property at a portion of 400 mg/kg bwpo against pyloric ligation and indomethacin incited gastric ulcer model in pale skinned person rodents. All the parts of Ammannia baccifera were essentially hindered ulcer file. The parts decreased gastric volume, complete causticity and free corrosiveness. The methanolic part delivered increasingly noteworthy ($p<0.001$) antiulcer action followed by watery, oil ether and chloroform divisions in pylorus ligation model. The antiulcer movement was practically equivalent to that of reference standard ranitidine (20 mg/kg bwpo). All portions demonstrated comparative outcomes (decrease in ulcer list and expanded percent hindrance) in indomethacin prompted ulcer model[22]. The chloroform and ethanol concentrates of Ammannia baccifera were assessed for cancer prevention agent, gastric antisecretory, and gastroprotective properties. Ethanol concentrate of ammannia baccifera (EAB) at a portion of 200 mg/kg decreased the free corrosiveness to 142.66 mEq/L and all out acridity to 451.22 mEq/L. It decreased the gastric emission. It likewise decreased the ulcer list by 92.2% in headache medicine and pylorus ligation actuated gastric ulcer models. EAB expanded the bodily fluid emission and disciple bodily fluid in the tissues with a 71.43% decrease of ulcer in HCl-ethanol prompted ulcer models, at a portion of 200 mg/kg.

Toxicity [26]

Intense harmfulness examines uncovered no mortality up to the portion of 4000 mg/kg bw. Notwithstanding, intense and sub intense toxicological impacts of Ammannia baccifera were assessed on rodents. Intense oral toxicological examinations uncovered that all the creatures endured the test portions up to 2000 mg/kg body weight. In subacute toxicological investigation, no noteworthy portion related changes in hematological, biochemical boundaries and histopathology of crucial inner organs with the utilizing of 50, 100, 250 and 500 mg/kg body weight/day.

LARVICIDAL ACTION [27]

Ethanol concentrates of aeronautical pieces of the plant caused larval mortality of fourth instar larval in aedes aegypti and Culex quinquefasciatus. The probit examination of methanol remove for 24h what's more, 48h delivered LC50 estimation of 164.00 and 107.00 (mg/L) and LC90 estimations of 310.00 and261.00 (mg/L) on C. quinquefasciatus. LC50 values for A. aegypti were 226.00 and 186.00 (mg/L) and LC90values were 476.00 and 309.00 (mg/L). Methanol remove indicated powerful lavicidal movement than the ethyl acetic acid derivation and chloroform[87]. The fluid concentrate of airborne parts additionally indicated action against Anopheles subpictus (LC50=257.61) and Culex quinquefasciatus (LC50 = 210.88). The green blended silver nanoparticles indicated huge poisonous impacts against the hatchlings of A.

subpictus (LC50 = 29.54 ppm) and C. quinquesfasciatus (LC50 = 22.32ppm).

ANTI-STEROIDOGENIC ACTIVITY [28]

Dhanapal et al. evaluated the steroidogenic activity in mature female albino mice ovaries. The ethanol extract significantly reduced the weight of ovaries, increased the cholesterol and ascorbic acid content in ovaries and significantly inhibited the key enzyme Δ5-3β hydroxy steroid dehydrogenase (Δ5-3β-HSD) and glucose-6-phosphate dehydrogenase (G-6-PD) which are involved in the ovarian steroidogenisis.

ANTI-TUBERCULAR ACTIVITY [30]

80% ethanolic concentrate of the entire plant displayed antimycobacterial movement Upadhyay et al. announced the phytocompound 4-hydroxy-α-tetralone and 4-o-myricitoyl-α tetralone to have in vitro enemy of tubercular movement against Mycobacterium tuberculosis H37RV by BACTEC-460-radiometric helplessness test with MIC as 50µg/ml. The lower convergence of bioactive compound hindered the development of the living being and displayed noteworthy antitubercular action.

CONCLUSION

The broad writing review uncovered A.baccifera to be a significant therapeutic plant archived for assorted applications and utilized in ethnomedical medicines. Pharmacological reads completed for the rough concentrates and disengaged mixes of A.baccifera give a down to earth support for its various customary employments. Ongoing investigations have been centered around assessing action against malignant growth, fiery, ligament, pain relieving, tubercular, larvicidal, microbial exercises. The referenced medicines are possible by the nearness of phytochemical constituents like alkanes, coumarins, flavonoids and sesquiterpenes. Some of the referenced pharmacological investigations were pointed on approving its conventional employments. It was discovered that, a portion of its customary uses like calming, antimicrobial, and so on had been broadly investigated by research gatherings. In any case, no exploratory proof is accessible proving its customary use in blood clusters, gonorrhea, and so forth., which can be investigated furthermore, there is a need of phytochemical normalization and bioactivity guided distinguishing proof of bioactive metabolites. Further examination is important to decide the potential advantages on detailing of A.baccifera concentrates to phytotherapeutic operators against urinary stone, basic cold, skin ejections, gastroenteropathy and hemorrhoids issues. Studies on the method of activity is foreseen to lead the route for new specialists with improved and fascinating pharmacological properties. The result of these investigations will additionally extend the current remedial capability of A.baccifera and offer a persuading help to its future clinical use in present day medication.

REFERENCES

1. Ali Esmail Al-Snafi. / *International Journal of Pharmacy,* 5(1), 2015, 28-32.
2. Wealth of India; *dictionary of Indian raw material and industrial products*, 2nd supplement series 2006, vol-I A-F, pg-53.
3. Wealth of India1985, vol-IA, pg-224.
4. Kirtikhar K.R., Basu B.D., *Indian medicinal plant, Lalit molan basu publication* 1993, vol-II, 2nd edition, 1072-1073.
5. Nadkarni K.M.*, Indian materia medica, Popular prakasion* Ltd. Bombay 1976, vol-I&II, 91-92 5.
6. Review on Indian medicinal plants, *Indian council of medical research,* New Delhi, Vol-II (Alli-Ard), 205-207.
7. Jani S, Shukla VJ and Harisha CR. Comparative pharmacognostical and phytochemical study on BergenialigulataWall. And AmmaniabucciferaLinn*. AYU,* 34(4), 2013, 406-410.
8. Joshi SG. Medicinal Plants. *Oxford & IBH Publishing Co. Pvt. Ltd*. New Delhi. 2007, 243.
9. Upadhyay HC and Thakur JP. Anti-tubercular agents from Ammannia baccifera (Linn). *Med Chem Res*, 22, 2013, 16-21.
10. Upadhyay HC, Verma RK and Srivastava SK. Quantitative determination of bioactive 4-hydroxy-α-tetralone, tetralone-4O-β-D-glucopyranoside and ellagic acid in ammonia baccifera (Linn.) by reversed-phase high-performance liquid chromatography. J ChromatogrSci, 51 (1), 2013, 21-25.

11. Tip-pyang S, Deeseenthum S, Wattanasirmkit K and Samarak N. Bioactive compounds from Ammannia baccifera. 27 th Congress on Science and Technology of Thailand. *Technical Information Services (TIS*) / KMUTT.
12. Warier P.K., Nambia P.K., Ramankutty C., Vasudevan nair R., *Indian medicinal plants a compendium of 500 species, Orient longman limited* 1994, vol-I, pg.125-127.
13. Pullaiah T., *Medicinal plants in India*, Vol-I, pg-48.
14. Kaviraj Nagendra nath sen gupta, *Ayurvedic system of Indian medicine*, VolIII, pg. 63-64.
15. Matkowski A and Piotrowska M, Antioxidant and free radical scavenging activities of some medicinal plants from Lamiaceae, *Fitoterapia* 2006, (77); 346- 353
16. Ahmed F and Shahid I Z, Free radical scavenging activity of some Mangroves available in Bangladesh, *Oriental Pharmacy and Experimental Medicine 2006*, 6 (1); 58-64.
17. Collee F.G., 1996, Mackie and McCartney *Practical Microbiology*, Chapter 5, Collee J.G., Fraser A.G., Marmimon B.P., Simmons A. (Eds), Churchill Livingstone: New York, 105-107pp.
18. Turner R.A., Screening Methods in Pharmacology, London: *Academic Press*, 1965, Vol-1, 100-117 and 61-53pp.
19. Kulkarni S.K., *Hand Book of Experimental Pharmacology,* Delhi: Vallabh Prakashan, 1993, 2nd Edition, 50-53pp.
20. Gopalakrishnan S, Kamalutheen M, Ismail ST, Vadivel E. (Pharmacological evaluation of Ammannia baccifera Linn). *Journal of Pharmacy Research*, 2010; 3(7): 1547-1549.
21. Loganayaki N, Siddhuraju P, Manian S. (Antioxidant, anti-inflammatory and antinociceptive effects of Ammannia baccifera L. (Lythrecceae), a folkore medicinal plants). *Journal of Ethnopharmacology*. 2012; 140(2): 230-233.
22. Prasad KV, Bharathi K, Srinivasan KK. (Evaluation of Ammannia baccifera Linn. for antiurolithic activity in albino rats). *Indian J Exp Biol,* 1994; 32:311-3.
23. Rajasekaran A, Sivakumar V and Darlinquine S. Evaluation of wound healing activity of ammonia baccifera and Blepharismaderaspatensis leaf extracts on rats.*Rev Bras Farmacogn,* 22(2), 2012.
24. Latha BM. Preliminary Phytochemical Investigation and Antiulcer activity of the whole plant of Ammannia bacciferaLinn. MSc dissertation, *Rajiv Gandhi University of Health Sciences,* Karnataka, Bangalore, 2011.
25. Rajasekaran A, Sivakumar V and Darlinquine S. Role of Blepharismaderaspatensis and Ammannia baccifera plant extracts on in vitro oxygen radical scavenging, secretion of gastric fluid and gastroprotection on ulcer induced rats. *Pharm Biol*, 50(9), 2012, 1085-1095.
26. Lavanya G, Manjunath M, Sivajyoti R, Parthasarthy RP. Safety evaluation ofthe ethanol extract of Ammannia baccifera(Lythraceae): assessment of acute and sub acute toxicity. *Journal of Pharmacy Research,* 3(11), 2010, 26342637.
27. Suman TY, Elumalai D, Kaleena PK, Radhika Rajasree SR. (GC-MS analysis of bioactive components and synthesis of silver nanoparticle using Ammanniabacciffera aerial extract and its larvicidal activity against malaria and filariasis vectors*). Industrial crops and products*, 2013; 47:239-245.
28. Dhanapal R, Kavimani S, Bhyrapur Matha VR, Gupta M, Basu SK. (Antisteroidgenic
29. activity of ethanol extract of ammannia baccifera (L.) whole plant in female albino mice(ovaries). Iranian journal of pharmacology and therapeutics, 2005; 4(1):43-45.
30. Upadhyay HC, Thakur JP, Saikia D, Srivastava SK. (Anti-tubercular agents from Ammannia baccifera (Linn.)). *Medicinal Chemistry Research*, 2012; 1-6.