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A review: *Aganosma dichotoma* (Roth) K. Schum.: Traditional use, phytochemical constituents and pharmacological properties

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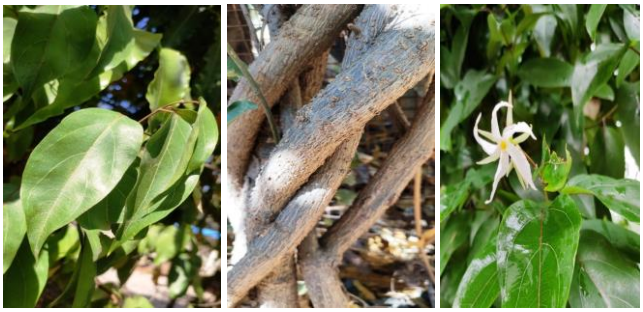
Abstract
Aganosma dichotoma (Roth) K. Schum, locally called Malati, has been traditionally used in the treatment in various ailments, including emesis, anthelmintic, bronchitis, leprosy, skin disease, ulcers, inflammation and disease of mouth while flowers are used in disease of eye and leaves are used in biliousness. It is also used as antiseptic, anodyne and also used as an ingredient in massage oils for paraplegia, neuralgia, sciatica. The previous phytochemical investigations on *A. dichotoma* led to the isolation of quercetin, rutin, kaempferol and phenolic acids as well as some other phytochemical constituents are tannin, flavonoid, flavonol, alkaloid and saponin. Antioxidant, hypoglycaemia, anti-inflammatory, anti-arthritis, anti-nociceptive, and anti-diarrheal are examples of pharmacological functions. The purpose of this review is to scientifically validate the traditional uses, phytochemical constituents and pharmacological properties of *A. dichotoma*.

Keywords: *Aganosma dichotoma*, traditional use, phytochemical constituents, pharmacological activity

Introduction
Herbal medicine refers to the study of traditional medical practise, which interacts with the social and cultural impacts of health, disease and illness, as well as the process of finding health care and healing practises [1]. The tradition of ethnomedicine is a complex multidisciplinary method consisting of the use of plants, medicine, spirituality and the natural environment has been a source of healing for people for cent [2]. Apocynaceae is one of the 10 largest angiosperm families (including Asclepiadaceae) and is made up of many popular medicinal plants. Today, this family has risen to 392 genera and 5140 species worldwide, mainly in tropical and subtropical areas, some of which have been found in torrid zones. The family consists of 30 genera and 60 species, in the form of trees, shrubs and vines in India[3, 4]. *Aganosma dichotoma* (Roth) K. Schum (Apocynaceae), is a large climber widely distributed across India, China, Philippines and Indonesia. In India, it extends throughout Madhya Pradesh, Uttar Pradesh, Bihar, Mizoram, Assam, West Bengal, Orissa, Andhra Pradesh and Kerala [5]. Over the last few decades, the demand for herbs as a medicine has increased due to its vast chemical diversity and, as a result, the need to ensure the quality, safety and efficacy of herbs has been felt. Standardization methods for herbs are designed to maintain the quality of the raw material used in the treatment of various diseases and disorders. It is important to standardise the content of active phytoconstituents in order to assess the quality of herbs.Some reported phytoconstituents in flowers includes β-sitosterol,ursolic, vanillic and ferulic acids, quercetin and itsglycosides, rutin, hyperin, isoquercetin and quercetin-3-arabinosides [6]. Leaves contain quercetin, kaempferol, glycoflavones, leucoanthocyanins and vanillic, syringic, protocatechuic, ferulic and sinapic acid [7]. The key objectives of this review are to examine the dispersed medicinal aspects of diverse literature and record the ethnicity of the *Aganosma dichotoma* community in India. Collective relevant data of this sort may simplify the search for new medications for the benefit of human illness.

Taxonomic Classification
Domain: Eukaryota
Kingdom: Plantae
Phylum: Spermatophyta
Class: Dicotyledonae
Order: Gentianales
Family: Apocynaceae
Genus: *Aganosma*
Species: *Aganosma dichotoma*

Description of plant
Large climbers, woody, pubescent, sap milky, bark brown, fissured. Leaves ovate or elliptic, 7-12 x 4-7 cm long, acute, obtuse or shortly acuminate at apex, glabrous or tomentose beneath, with 3 pairs of nerves. Flowers in lax, tomentose cymes, pedicels shorter than calyx-segments. Calyx-segments linear, spreading. Corolla white, ca 3.5 cm across; throat and tube cylindrical. Follicles 7.5-12.5 cm long, stout. Seeds ovoid or oblong ca 1.25 cm long [8] (Fig.1).



(A) (B) (C)

Fig 1: A. Leaf B. Stem and C. flower.

Traditional Uses

Traditionally, it uses: *A.Dichotoma* is used as an antiseptic, emetic, anthelmintic, bronchitis, leprosy, skin conditions, ulcers, fever, arthritis, purulent discharge of the ear and oral disease in India [9].Flowers are good for eye diseases and leaves cure biliousness. Plants are mentioned in Agni Purana for the treatment of semen. Root decoction is treated orally with a touch of pepper powder twice every day in fever for 3 days. Andhra people in India are using it for snake bite and diabetes [10, 11].

Phytochemical Constituents

The previous phytochemical investigations on *A. dichotoma* led to the isolation of quercetin, rutin,kaempferol and phenolic acids [12, 13]. Some phytochemical properties such as

The Phenolic content

The phenolic content present in the ethanolic extract of root of *A. dichotoma* was estimated by using Folin ciocalteau reagent method [14]. In the test tube, aliquots of differing concentrations of the extract were taken and up to 1 ml of distilled water was made. 0.5 ml of Folin-Ciocalteu reagent (1:1 with water) and 2.5 ml of sodium carbonate (20%) solution have been sequentially added to each tube. The tubes were then vortexed, put in the dark for 40 min, and the absorbance was registered at 725 nm. The overall phenolic content was measured as the tannic acid version of the calibration curve.

The Tannin content

The tannins are separated from rest of the mixture by adsorption on insoluble matrix polyvinylpolypyrrolidone (PVPP), and the total tannin content was determined by Folin–Ciocalteu procedure. Insoluble, cross-linked PVPP (100 mg) was taken in a test tubes and 1.0 ml distilled water and 1 ml tannin containing extract was added. Tubes were maintained at 4 °C for 15 min, then subsequently vortexed and centrifuged for 10 min and the supernatant was collected. Aliquots of supernatant (0.2 ml) were transferred into test tubes, and then non-absorbed phenolics were determined. Finally observed values were subtracted from total polyphenol contents, and the total tannin content is expressed as; mg Tannic acid/100 g dry plant material. All measurements were done in triplicate [15].

Flavonoid and Flavonol content

The gross flavonoid content of the ethanolic root extract was measured using aluminium chloride and the regular compound Rutin was used as a comparison. The approach for estimating the content of flavonoids is based on the creation of a flavonoid-aluminum complex (λmax 415 nm). 1 ml of alcoholic plant extract was blended in the test tube with 1 ml of aluminium chloride and 3 ml of sodium acetate. Absorption was estimated at 415 nm after 2.5 hours [16].

Alkaloid content

Total alkaloid content was estimated by gravimetric method [17]. 5 gm powdered substance was repeatedly removed with 0.1N H2SO4 in an ultrasonic wash (3x50 ml). The solvent was then diluted and the acid solution treated with chloroform in four consecutive amounts of 25 ml. The chloroform wash was refused and the acid solution was based on dilute ammonia and then separated with diethyl ether (20 ml x 5). The diethyl ether extract was washed with 5 ml of purified water and the residue was dried at a steady weight of 1050C.

Saponin content

The maximum saponin content has been calculated using Diosgenin as a reference compound. The plant content was initially centrifuged with aqueous methanol and subsequently treated with anisaldehyde-ethyl acetate reagent and H2SO4 and eventually its absorbance is assessed at 430 nm [18].

The preliminary phytochemical screening of EAD, PEF, CF, EAF and AF of *A. dichotoma* and its successive fraction is given table 1.

Table 1: Preliminary phytochemical screening of ethanolic extract of *A. dichotoma* and its successive fraction (Data source: Pandey *et.al.*, 2015).

Phytoconstituents	EAD	PEF	CF	EAF	AF
Flavanoids	+	-	-	-	-
Phenolics & Tannins	+	-	-	-	+
Steroids	+	+	+	+	-
Coumarins	-	+	+	+	-
Cardiac Glycosides	+	-	-	-	+
Anthraquinone Glycosides	+	-	-	-	-
Alkaloids	-	-	+	-	+
Saponin	+	+	-	-	+
Carbohydrate	+	-	+	+	+
Reducing Sugar	+	-	+	+	-

Note: EAD- Ethanolic extract of *A. dichotoma* root powder, PEF-Petroleum ether fraction, CF-Chloroform fraction, EAF-Ethyl acetate fraction, AF-Aqueous fraction.

Pharmacolgical Acivities

Antioxidant activity

The free radical scavenging activity of the plant extractives was determined on thestable radical produced by 1,1-diphenyl-2-picrylhydrazyl (DPPH) [19, 20]. *A. dichotoma* significantly scavenged the free radicals generated by DPPH to demonstrate its antioxidant activity [21]. The maximum antioxidant efficiency of the *A.dichotoma* root extract of ethanol demonstrated a possible antioxidant effect relative to the normal Ascorbic acid. Absorption of ethanolic plant extract (100 µg/ml) was 0.356 at 695 max. As a result, the maximum antioxidant potential was estimated to be 57.75 µg/ml of *A.dichotoma* ethanol extract equal to 100 µg/ml of normal [22].

Hypoglycemic activity

Hypoglycemia is a disorder in which the blood sugar (glucose) content is smaller than average. Hypoglycemia is also associated with the treatment of diabetes. In animals treated with *Aganosma dichotoma* (MESF-1 & MESF-2) and Glibenclamide (STD), there was a substantial decrease in serum glucose levels relative to the control group (CTL). The results of methanolic leaf extract *Aganosma dichotoma* at 200 mg/kg and 400 mg/kg at lower blood glucose levels were observed as follows to determine their hypoglycemic function [23].

Anti-inflammatory activity

The radiological study of the ankle joint revealed that the FCA-induced community developed an identifiable sign of inflammation represented as ankylosis, osteophyte

formation, bone degradation and subchondral cyst formation. EAD, PF and CF demonstrated reduction of inflammation and resulting joint production of arthritis.

Antiarthritic activity

Arthritis is the stiffness and tenderness of one or more of the joints. The major signs of arthritis are joint pain and weakness, which normally intensify with age. The most popular forms of arthritis are osteoarthritis and rheumatoid arthritis. In *Aganosma dichotoma*, some of them have contributed to antiarthritis activity. EAD, PF and CF greatly suppress all indices relative to the control group in a dose-dependent way. Methotrexate (MTX), curcumin, EAD, PF and CF-treated groups did not demonstrate substantial weight loss [5, 24].

Antinociceptive activity

Nociceptive pain is the most prevalent form of pain. It is triggered by potentially dangerous stimuli that are sensed by nociceptors throughout the body. Nociceptors are a type of receptor that exists to sense all the discomfort that is going to be caused by the body being affected. Nociceptive pain is a form of pain caused by body tissue injury. Nociceptive pain sounds intense, unpleasant, or throbbing. *Aganosma dichotoma* root extract contains indometacin, which is used as antinociceptive action. Is give a experimental work data that show the effects of indomethacin as Percentage inhibition of writhes exhibited by EAD at the dose of 400mg/kg, p.o. (82.87%) was comparable to the standard drug indomethacin 5 mg/kg, p.o. (80.69%), whereas higher than curcumin 100 mg/kg p.o. (60.37%) treated animals [5].

Acute toxicity study

The oral acute toxicity tests of EAD, PF and CF did not reveal any signs of toxicity and mortality of up to 2 g/kg during the desired observation period. Acute oral toxicity trials of EAD, PF and CF have been undertaken and delivered orally up to 2000 mg/kg body weight. Pets were closely monitored for the initial 4 h after administration, and then once daily for up to 14 days [25].

Anti-diarrheal activity

Diarrhea is a passage of three or more loose or liquid stools every day, or more regularly than is usual for a person. It is typically a symptom of gastrointestinal infection that can be caused by a variety of bacterial, viral and parasitic organisms [26]. About 1.7 to 5 billion cases of diarrhea occur per year [27, 28]. The leaves of *A. dichotoma* have substantial anti-diarrheal activity as a dose-dependent form. Anti-diarrheal has been demonstrated by suppression of hypersecretion, gastrointestinal motility and improvement of gastric transit period. The leaves of *A.dichotoma* can be involved in diarrhea. Further analysis will lead to the isolation of active lead compounds for certain biological activities as well as anti-diarrheal lead compounds [29].

Conclusion

This article discusses the importance of *A. dichotoma* in traditional and therapeutic medicine. Only a few reviews of *A. dichotoma* were found so far. This provided the impetus for a comprehensive review of *A. dichotoma* based on the information available at the time. The scientific study has only exceeded the preliminary screening for the uses of plant as a drug source. The majority of the work must be done to exploit the plant on a pharmaceutical level. A proper standardisation protocol for the successful use of the plant and its phytoconstituents for medicinal and other commercial purposes are necessary for a standardised research platform. This will lead to development of new drugs of herbal origin for the benefit of human society.

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Reference

1. Krippner S. Models of ethnomedicinal healing. In: *Ethnomedicine Conferences, Munich, Germany,2003:*2003:26-27.
2. Lowe H, Payne-Jackson A, Beckstrom-Sternberg SM, Duke JA. Jamaica's Ethnomedicine: Its potential in the healthcare system. In: *Jamaica's ethnomedicine: its potential in the healthcare system.* edn,2001:14:250-14.
3. Endress ME, Bruyns PVJTBR: A revised classification of the Apocynaceae sl, 2000, 66(1):1-56.
4. Devi NJIJoGP. Indian tribe's and villager's health and habits: Popularity of apocynaceae plants as medicine, 2017, 11(02).
5. Pandey D, Joshi A, Mishra S, Sairam K, Hemalatha S: Antinociceptive, anti-inflammatory and antiarthritic activity of ethanol root extract and fraction of Aganosma dichotoma (Roth) K. Schum, 2018.
6. Chandra Sekhar P, Lakshmi D, Venkata Rao E, Venkata Rao DJF. Chemical constituents of the flowers of Aganosma caryophyllata, 1985.
7. Pandey D, Joshi A, Hemalatha SJPJ. Quality Control Standardization and In-Vitro Antioxidant Activity of Aganosma dichotoma K. Schum Root, 2015, 7(1).
8. Singh N, Khanna K, Mudgal V, Dixit R. Flora of Madhya Pradesh. *Botanical Survey of India, Calcutta,*2001:3:587.
9. Kirtikar K, Basu B: Indian Medicinal Plants: Bishen Singh Mahendrapal Singh. *Dehradun, India,*1994:3:2186-2188.
10. Payyappallimana U. Role of traditional medicine in primary health care: an overview of perspectives and challenging, 2010.
11. Jain SK. Dictionary of Indian folk medicine and ethnobotany: Deep publications, 1991.
12. Khare CP. Indian medicinal plants: an illustrated dictionary: Springer Science & Business Media, 2008.
13. Subramanian G, Subramania Nainar M, Yamjala K, KN A, S Palanisamy D. Development and validation of HPLC method for the simultaneous estimation of quercetin and rutin in Aganosma dichotoma [Roth] K. Schum. *International journal of pharmacy and pharmaceutical sciences,*2014:6(2):606-608.
14. Makkar HP. Quantification of tannins in tree and shrub foliage: a laboratory manual: Springer Science & Business Media, 2003.
15. Makkar HP, Hagerman A. Quantification of tannins in tree foliage–A laboratory manual. *FAO/IAEA Working Document, Vienna, Austria,* 2000, 1-26.

16. Kumaran A, Karunakaran RJ. In vitro antioxidant activities of methanol extracts of five Phyllanthus species from India. *LWT-Food Science and Technology*,2007:40(2):344-352.
17. Wagner H, Bladt S: Plant drug analysis: a thin layer chromatography atlas: Springer Science & Business Media, 1996.
18. Baccou J, Lambert F, Sauvaire Y: Spectrophotometric method for the determination of total steroidal sapogenin. *Analyst*,1977:102(1215):458-465.
19. Parvin MN, Rahman MS, Islam MS, Rashid MA: Chemical and biological investigations of Dillenia indica Linn. ||| *Bangladesh Journal of Pharmacology*,2009:4(2):122-125.
20. Chowdhury A, Alam A, Rahman MS, Hassan A, Rashid MA. Antioxidant, antimicrobial and cytotoxic activities of Corypha taliera Roxb. *Latin American Journal of Pharmacy*, 2010, 29.
21. Dey SC, Khan MF, Rahman MS, Rashid MA. Preliminary Free Radical Scavenging, Brine Shrimp Lethality, Antimicrobial and Thrombolytic Activities of Aganosma dichotoma (Roth) K. Schum. *Bangladesh Pharmaceutical Journal*,2014:17(2):177-181.
22. Pandey D, Joshi A, Hemalatha S. Quality Control Standardization and In-Vitro Antioxidant Activity of Aganosma dichotoma K. Schum Root. *Pharmacognosy Journal*, 2015, 7(1).
23. Khan MZI, Reyad-ul-Ferdous M, Hussain MI, Islam MA, Sultana J, Islam MN, *et al*. potential biological evaluation of hypoglycemic activity of leaves of aganosma dichotoma,2014.
24. Obiri DD, Osafo N, Ayande PG, Antwi AO. Xylopia aethiopica (Annonaceae) fruit extract suppresses Freund′ s adjuvant-induced arthritis in Sprague-Dawley rats. *Journal of ethnopharmacology*,2014:152(3):522-531.
25. Cooperation Of E, Development: Guidelines for testing of chemicals. In.: Organization for Economic Cooperation and Development Paris, 1981.
26. Viswanatha GLS, Hanumanthappa S, Krishnadas N, Rangappa S. Antidiarrheal effect of fractions from stem bark of Thespesia populnea in rodents: Possible antimotility and antisecretory mechanisms. *Asian Pacific journal of tropical medicine*,2011:4(6):451-456.
27. Organization WH. Medical devices and eHealth solutions: Compendium of innovative health technologies for low-resource settings 2011-2012: World Health Organization, 2013.
28. Abdelmalak B, Doyle J. Anesthesia for otolaryngologic surgery: Cambridge University Press, 2012.
29. Al Faruk M, Khan MF, Mian MY, Rahman MS, Rashid MA. Analgesic and anti-diarrheal activities of Aganosma dichotoma (Roth) K. Schum. in Swiss-albino mice model. *Bangladesh Pharmaceutical Journal*,2015:18(1):15-19.