


Review Article
ETHANO BOTANICAL PROPERTIES OF UNEXPLORED PLANT *KHANDU CHAKKA (EHRETIA LAEVIS ROXB.)*
Thakre Rushikesh^{1*}, Bhutada S², Chouragade B³, Khobragde P⁴, Harne Ketaki⁵
¹PG Scholar, ²Professor and Dean, ³Professor and HOD, Department of Sankrit-Samhita-Siddhant, ⁴Associate Professor, Department of Dravyaguna, ⁵Quality Control Rasashala, MGACH & RC Salod (H), Wardha (MS), India.

ABSTRACT

In India many Folklore plants are used traditionally for medicinal purposes. The present review summarizes the comprehensive information concerning the Ethano Botanical properties, Ayurvedic properties and Phytochemistry of *Ehretia laevis*. All references about this plant reviewed, along with local survey. Predominant chemicals from this plant are Naphthoquinone derivative named lewisone, n-octatricontane, baurenol acetate, baurenol, ursolic acid, Amino acids, Proteins, Lipids, Minerals like Ca, Na, NH₃, Mg, Fe, Mn, K, P, Zn, Cu and Si, Total phenolics (97.21mg gallic acid equivalent (GAE)/g) content in leaves, Tannins (64.12mg tannic acid equivalent (TAE)/g) in stem bark, flavonoids (57.23mg rutin equivalent (RE)/g) and Vitamin C (56.09mg ascorbic acid equivalent (AAE)/g) in fruits, leaves and fruits showed the presence of acontanes, decanoic acids, phthalic acid, phytol, α and β amyryn, piperazine, phenylephrine. Benzoquinones:- 1, 4naphthoquinone lewisone, Baueranol, Baueranol acetate, α -amyryn, Betulin, Lupeol, Betulinic acid, β -sitosterol. Dodecane, Tridecene, Tetradecane, n Octylcyclohexane, Tridecanol, Hexadecane, Decyl cyclohexane, Heptadecane, Nonadecane, Tetratetracontane, Di - n octyl phthalate. Amino acid- Butyric acid, Ornithine, Cysteine, Histidine, Arginine, Serine, Hydroxy proline, Glutamic acid, Proline, Lysine, Tryptamine having various therapeutic properties. In Ayurveda this plant is used for *Prameha* (Diabetics) and *Vishaghna* (Anti-venom). Leaves contain Di - n octyl phthalate chemical which has properties of anti venom while Amino acid -Cysteine, has anti diabetic properties. In Wardha district of Maharashtra India, *Ehretia laevis* plant is mainly used for wound healing, joint pain and minor fractures by local peoples with promising results and this plant commonly known as *Khandu Chakka*.

KEYWORDS: *Charmavriksha, Ehretia Laevis, Fracture, Joint Pain, Khandu Chakka, Wound Healing.*
INTRODUCTION

The Term Ethano botany comes from Greek word Ethnos, which mean 'people' and Botane which means herb, thus it is study of people and herb. Kirtikar and Basu (1935) stated", the ancient Hindus should be given the credit for cultivating what is now called Ethnobotany". Many plants are already explored for medicinal purposes, but more and greater still remains, which has great medicinal potential for social benefit. This plant contains medicinally useful chemicals. In Wardha district of Maharashtra India, One such folk tribal herbal plant *Ehretia laevis* was found to be very effective in wound healing. It was routinely employed by tribal for wound management with surprising output. Also used for minor fractures and joint pain and known as *Khandu Chakka* plant. From last three- four years due to drought condition in Wardha district, financial burden on patient increases day by day, hence this plant is taken for study to help needy patients. Also it would be one of the best options of crop cultivation for farmer in farmer suicidal area like Wardha.

MATERIALS AND METHODS

The Ayurvedic literatures were scrutinized regarding the references of *Ehretia laevis* plant. Later references were studied from internet, research papers,

local peoples, folklore practitioners. Plant is indentified by Taxonomist and Head of the Dravyaguna Department MGACH & RC Salod (H) Wardha. *Ehretia laevis* is Commonly known as: ovate-leaved ivory wood, Gujarati: Vadhavaradi, Hindi: Bhairi, chamror, Konkani: kalo gamdo, Malayalam: Caranti, Marathi:, Datrangi (As it colors teeth in red, Ajaanvruksha (Sant Dnyaneshwar From Alandi Maharashtra India took Samadhi near the base of this tree).

In Ayurvedic literature, uses of this plant are for *Prameha* (Diabetics) and *Vishaghna* (Anti-venom) (Su.Chi 11/10, Su.Kal.5/46, and Cha.Chi.23/66)

Plant Description

Plantae
Tracheophyta
Magnoliopsida
Boraginales
Boraginaceae
Ehretia
Ehretia laevis (Roxb)

Native to: India, Pakistan, Laos, Myanmar, Vietnam, China, Bhutan.

Chemical composition and Medicinal uses

| Sr no | Name of chemical from <i>Ehretia laevis</i> | Medicinal uses |
|-------|---|--|
| 1 | Naphthoquinone [1] | Anti-bacterial and anti-tumor, increases the synthesis of prothrombin, vitamin K plays main role in cardiovascular health. Vitamin K2 is needed for activating the protein matrix Gla-protein, which is an inhibitor of vascular calcification injuries and fractures, vitamin K reduce neuronal damage and that giving vitamin K supplements to Alzheimer's patients may have benefits, Vitamin K, help diminish bruising from postoperative procedures, scarring, redness caused by broken blood vessels, skin irritations such as burns and sunburns, dark circles under the eyes and aid in the fading of hyper pigmentation.[2] |
| 2 | Ursolic acid[1] | Used both topically and internally. Used in many cosmetic preparations for its anti-inflammatory, anti tumor and antimicrobial properties, inhibits the growth of candida albicans and microsporium lenosum, used in ointment to treat burns. Topical application of ursolic acid inhibited TPA-induced initiation and promotion of tumor growth.[3] |
| 3. | Gallic acid [4] | Gallic acid extracted from grape seeds has been shown to inhibit the formation of amyloid fibrils, one of the potential causes of Alzheimer's disease and Parkinson's disease. Gallic acid is classified as mutagen and teratogen. [5] |
| 4. | Tannic acid [4] | The growth of many fungi, yeasts, bacteria, and viruses was inhibited by tannins. Accelerate blood clotting, reduce blood pressure, decrease the serum lipid level, produce liver necrosis, and modulate immunoresponses.[6] |
| 5. | Rutin [4] | Rutin inhibits platelet aggregation, decreases capillary permeability, making the blood thinner and improving circulation, anti-inflammatory, Inhibits aldose reductase activity. It helps to change glucose into the sugar alcohol sorbitol. Prevent blood clots, use full for heart attacks and strokes. Used to treat hemorrhoids, varicosis, and microangiopathy. High amount of rutin increases thyroid iodide uptake in rats and decreases serum T3 and T4 level. Antioxidant. Hydroxyethylrutosides, synthetic hydroxyethyl acetylations of rutin, are used in the treatment of chronic venous insufficiency. Rutin have a veterinary use in the management of chylothorax in dogs and cats. [43] |
| 6 | Decanoic acids [4] | Antiseizure [44] |
| 7 | Phthalic acid [4] | Antiviral against dengue (DENV2), chikungunya (CHIKV) and human parainfluenza (hPiV3) [7] |
| 8 | Phytol [4] | Arthritis, asthma, mosquito repellent may be useful for malaria. [8] |
| 9 | α and β amyrin [4] | Acute inflammation, prevent chronic periodontitis-associated bone loss.[9], hepatoprotection [10], antihyperglycemic and hypolipidemic [11], Used in inflammation, microbial, fungal, and viral infections and cancer cells.[12] |
| 10 | Piperzine [4] | anti-helmintic [45] |
| 11 | Phenylephrine [4] | Decongestant, Hemorrhoids, Pupil dilatation, Vasopressor, Priapism. [46] |
| 12 | Betulin [13] | Effective against tumors. Betulin inhibited the maturation of Sterol regulatory element-binding protein (SREBPs). Inhibition of SREBP by betulin decreased the biosynthesis of Cholesterol and fatty acid. In vivo, betulin ameliorated diet-induced obesity, decreased the lipid contents in serum and tissues, and increased insulin sensitivity. Reduce the size and improved the stability of atherosclerotic plaques[5]. Anti-inflammatory, Antipruritic, promotes differentiation of skin cells (keratinocytes), wound healing and cosmetic purposes[5]. Anti- malarial and anti-inflammatory activities, anti-HIV activity, immunomodulator, antipyretic, bile-expelling, skin cancer, respiratory syncytial virus (RSV), which can cause severe cold-like symptoms and pneumonia. [14] |
| 13 | Lupeol [13] | Antiprotozoal, Antimicrobial, Anti-inflammatory, Antitumor and chemo preventive properties. In Animal models an anti-inflammatory agent. It is an effective inhibitor in laboratory models of prostate and skin cancers. As an anti-inflammatory agent, lupeol functions on the interleukin system. Lupeol to decreases IL-4 (interleukin 4) production by T-helper type 2 cells [5]. Cholesterol lowering agent. Wound healing, diabetes, cardiovascular disease, kidney disease, and arthritis. [15] |
| 14 | Betulinic acid [13] | Antiretroviral, anti- malarial, and anti-inflammatory, anticancer agent properties.[47] |

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| 15 | β -sitosterol ^[13] | Beta-sitosterol is used in heart disease and high cholesterol. boosting the immune system and for preventing colon cancer, gallstones, the common cold and flu (influenza), HIV/ AIDS, rheumatoid arthritis, tuberculosis, psoriasis, allergies, cervical cancer, fibromyalgia, systemic lupus erythematosus (SLE), asthma, hair loss, bronchitis, migraine headache, and chronic fatigue syndrome. beta-sitosterol for enlarged prostate, for symptoms of menopause. Sexual activity. reduce pain and swelling, for treating wounds and burns. ^[16] |
| 16 | Di-n octyl phthalate ^[17] | Anti Venom ^[18] |
| 17 | Amino acid Ornithine ^[19] | Antifatigue effect, in increasing the efficiency of energy consumption and promoting the excretion of ammonia. Amino acid supplements, including L-ornithine which are available in market for bodybuilders and weightlifters. Through the claim that it will increase levels of human growth hormone (HGH). However, clinical study proved that these supplements do not increase levels of HGH with low dose (2 grams per day divided into two doses) supplementation. L-Ornithine L-aspartate (LOLA), a stable salt of ornithine and aspartic acid, used in the treatment of cirrhosis. ^[48] |
| 18 | Amino acid - Cysteine ^[19] | Cysteine is an amino acid, a building block of proteins used throughout the body. Cure acetaminophen poisoning, Angina, Chronic bronchitis and chronic obstructive pulmonary disease (COPD), Influenza, Acute respiratory distress syndrome (ARDS), HIV/AIDS. Reducing symptoms of Sjögren syndrome, an autoimmune disorder that causes dry mouth and dry eyes. In asthma, cystic fibrosis, and emphysema, Preventing colon cancer, Helping increase fertility when taken along with fertility drugs in people with polycystic ovary disease, In schizophrenia, In lung cancer for smokers, To control blood sugar levels among people with type 2 diabetes. ^[20] |
| 19 | Amino acid- Histidine ^[19] | Important in the myelin sheath that coat nervous cells to ensure the transmission of messages from brain to organs throughout body. Elevated histidine levels have been associated with physiological disorders like anxiety and schizophrenia. Low histidine levels are thought to lead to rheumatoid arthritis and deafness from nerve damage. Treatment of mental disorders and sexual dysfunction. Protecting the body from radiation damage and prevent the onset of AIDS. Due to its ability to naturally detoxify the body and produce both red and white blood cells. ^[21] |
| 20 | Amino acid- Arginine ^[19] | Important role in cell division, the healing of wounds, removing ammonia from the body, immune function, and the release of hormones. Precursor for the synthesis of nitric oxide (NO). Reduces healing time of injuries (particularly bone). Reduce repair time of damaged tissue. Decrease blood pressure. Arginine (8%) in dental products (e.g., toothpaste) provides effective relief from sensitive teeth by depositing a dentin-like mineral, containing calcium and phosphate, within the dentin tubules and in a protective layer for the dentin surface. An unproven claim is that a low ratio of arginine to lysine may be of benefit in herpes simplex virus. Intravenously-administered arginine stimulates the secretion of growth hormone. In MELAS syndrome, a mitochondrial disease. Reduces diastolic blood pressure and lengthens pregnancy for women with gestational hypertension, including women with high blood pressure as part of pre-eclampsia. It does not lower systolic blood pressure or improve the baby's weight at birth. ^[49] |
| 21 | Amino acid – Serine ^[19] | As a treatment for schizophrenia and L-serine is in FDA-approved human clinical trials as a possible treatment for ALS. D-Serine potential biomarker for early Alzheimer's disease (AD) diagnosis, due to a relatively high concentration of it in the CSF of probable AD patients. ^[50] |
| 22 | Amino acid-Hydroxy proline ^[19] | Proline hydroxylation requires ascorbic acid (vitamin C). The most obvious, first effects (gingival and hair problems) of absence of ascorbic acid in humans come from the resulting defect in hydroxylation of proline residues of collagen, with reduced stability of the collagen molecule, causing scurvy. ^[51] |
| 23 | Amino acid - Glutamic acid ^[19] | Neurotransmitter, Extracellular glutamate in <i>Drosophila</i> brains has been found to regulate postsynaptic glutamate receptor clustering, via a process involving receptor desensitization, GABA precursor, Flavour enhancer, Auxigro is a plant growth preparation containing 30% glutamic acid. ^[52] |

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| 24 | Amino acid – Lysine ^[19] | Anxiolytic action, in cancer, by causing cancerous cells to destroy themselves when the drug is combined with the use of phototherapy, while leaving non-cancerous cells unharmed. Lysine deficiency results immunodeficiency in chickens. Moderating effect on blood pressure and the incidence of stroke Lysine is an important additive to animal feed because it is a limiting amino acid when increasing the growth of animals such as pigs and chickens for the production of meat. ^[53] |
| 25 | Amino acid - Tryptamine ^[19] | Tryptamine acts as a non-selective serotonin receptor agonist and serotonin-norepinephrine-dopamine releasing agent (SNDRA), with a preference for evoking serotonin and dopamine release over norepinephrine release. Tryptamine observed to be a noncompetitive inhibitor of serotonin <i>N</i> -acetyltransferase (SNAT) in mosquitoes. SNAT catalyzes the anabolic metabolism of serotonin into <i>N</i> -acetylserotonin, another neuromodulator and the immediate precursor formelatonin. ^[54] |

n-octatricontane, baurenol acetate, Acontanes, Dodecane, Tridecene, Tetradecane, N Octylcyclohexane, Tridecanol, Hexadecane, Decyl cyclohexane, Heptadecane, Nonadecane, Tetratetracontane, Amino acid –Proline uses are not available.

Folklore Medicinal Uses

Its bark, leaves and fruits are edible.^[22] Decoction of the fresh root is used in syphilis, stem bark diphtheria. The paste of tender leaves is used externally to healing eczema, and the powder of flowers with milk is used as an aphrodisiac ^[23]. The inner bark used as food ^[24]. Leaves are applied to ulcers and in headache. Fruit are used as, antihelmentic, diuretic, demulcent, expectorant and used in affections of urinary passages, diseases of lungs and spleen. Ringworm. Seeds are anthelmintic. ^[25]

The methanolic extract of the leaves, effective in arthritis ^[26]. Bark paste is applied for cuts and wounds ^[27]. Antioxidant ^[28]. The leaves paste is topically applied on wounds ^[29]. Effective in various microbial diseases of hard tissues in the oral cavity^[30]. Bark juice is given just after delivery to relive delivery pain; leaf paste is applied on cuts for early healing ^[31]. Root used in venereal diseases and as gargle in throat infections ^[32]. Bark paste is applied on cuts and wounds^[33]. Scabies, Ulcers. Syphilis. Dysentery, Intestinal worms^[34]. In Jaundice as hepatoprotective properties^[35]. Mouth ulcer, strengthens the teeth and gums ^[36]. Topical Malaria, fever, ear ache. ^[37]

Leaves are chewed to healing mouth blister. Leaf powder mixed with sugar is divided into 10 equal doses. Each dose is taken daily orally along with goat milk curd to healing dysurea. During the course of administration salt, chilly, tea, acidic food, acidic foods, oils are strictly prohibited ^[38]. activity against *Candida albicans* ^[39]. Juice of leaves used to healing dysentery, to treat intestinal worms and applied in wounds ^[40]. Root used in venereal diseases. A decoction of bark is as gargle in throat infections. Antifungal activity against *Candida albicans*^[41]. Ulcer and gums, brushed with stem pieces. ^[42]

RESULTS AND OBSERVATION

In view of above finding it may be used for various purposes, but its efficacy was observed in wound healing, a wonderful medicine with no side effects.

CONCLUSION

It is concluded that, this drug is very effective in wound healing and cheaper than surgical management. It is highly recommended that the study should be conducted in multi phases and multi centric form.

REFERENCES

1. Thapliyal, P.C. & Yadav, S.K., A new quinone from *Ehretia laevis*, J. Instt. Chem., 72, 2003, 13-15
2. Natural remedies Vitamin K available from <http://www.naturalremedies.org/naphthoquinone>. [cited 2016 May 18].
3. Phytochemicals, health benefits of ursolic acid available from <http://www.phytochemicals.info/phytochemicals/ursolic-acid.php> [cited 2016 May 18].
4. Sivasankari Velappan and Parimelazhagan Thangara, Phytochemical Constituents and Antiarthritic Activity of *Ehretia laevis* Roxb, 2014 Wiley Periodicals, Inc, 10 JUN 2014 DOI: 10.1111/jfbc.12071
5. Gallic acid From Wikipedia, the free encyclopedia available https://en.wikipedia.org/wiki/Gallic_acid. [cited 2016 May 18].
6. Chung KT, Wong TY, Wei CI, Huang YW, Lin Y. Tannins and human health: a review, Crit Rev Food Sci Nutr. 1998 Aug;38(6):421-64.
7. Shaikh J Uddin, Jayaram Bettadapura, Patrice Guillon, Darren Grice Suresh Mahalingam and Evelin Tiralongo., In-vitro Antiviral Activity of a Novel Phthalic Acid Ester Derivative Isolated from the Bangladeshi Mangrove Fern *Acrostichum aureum*, Journal of Antivirals & Antiretrovirals, Published October 31, 2013.
8. W. Okiei, M. Ogunlesi, E. Ofor and E.A.S. Osibote, Analysis of Essential Oil Constituents in Hydro-Distillates of *Calotropis procera* (Ait.) R.Br, research journal of Photochemistry, Year: 2009 | Volume: 3 | Issue: 3 | Page No.: 44-53.
9. Holanda Pinto SA, Pinto LM, Cunha GM, Chaves MH, Santos FA, Rao VS., Anti-inflammatory effect of alpha, beta-Amyrin, a pentacyclic triterpene from *Protium heptaphyllum* in rat model of acute periodontitis, Inflammopharmacology. 2008 Feb; 16(1):48-52.
10. Oliveira FA, Chaves MH, Almeida FR, Lima RC Jr, Silva RM, Maia JL, Brito GA, Santos FA, Rao VS,

- Protective effect of alpha- and beta-amyrin, a triterpene mixture from *Protium heptaphyllum* (Aubl.) March. trunk wood resin, against acetaminophen-induced liver injury in mice, *J Ethnopharmacol.* 2005 Apr 8;98(1-2):103-8.
11. Santos FA, Frota JT, Arruda BR, de Melo TS, da Silva AA, Brito GA, Chaves MH, Rao VS, Antihyperglycemic and hypolipidemic effects of α , β -amyrin, a triterpenoid mixture from *Protium heptaphyllum* in mice, *Lipids Health Dis.* 2012 Aug 6;11:98. doi: 10.1186/1476-511X-11-98.
 12. Edited by Rao Venketeshwer, *Phytochemicals – A Global Perspective of Their Role in Nutrition and Health*, Published by InTech Janeza Trdine 9, 51000 Rijeka, Croatia Copyright © 2012 InTech.
 13. Li Li, Peng Yong, Yao Xia, Xu Li-jia, Wu-lan Ta-na, Liu Yong, Shi Ren-bing, Xiao Pei-gen. *Chemical Constituents and Biological Activities of Plants from the genus Ehretia Linn.* *Chinese Herbal Medicine* 2010, 2(2), 106-111.
 14. Chaga and other natural extract from Russian available from <http://www.chagatrade.ru/betulin.html> [cited 2016 May 18].
 15. Siddique HR, Saleem M. Beneficial health effects of lupeol triterpene: a review of preclinical studies, *Life Sci.* 2011 Feb 14;88(7-8):285-93.
 16. Web med beta sitosterol overview information, available <http://www.webmd.com/vitamins-supplements/ingredientmono-939-beta-sitosterol.aspx?activeingredientid=939&activeingredientname=beta-sitosterol> [cited 2016 May 18].
 17. Torane R C., Kamble Gayatri S., Gadkari Tushar V., Tambe Amruta S. and Deshpande Nirmala R., - GC MS Study of Nutritious leaves of *Ehretia laevis*, *International Journal of ChemTech Research CODEN (USA): IJCRGG*, Vol. 3, No.3, pp 1589-1591, July-Sept 2011.
 18. S. Ibrahim, J.A. Nok, M.S. Abubakar and S. Sarkiyayi, Efficacy of Di-n-octyl phthalate anti venom isolated from *Ceiba pentandra* leaves extract in neutralization of *Echis ocellatus* venom, *Research Journal of Applied Sciences, Engineering and Technology* 4 (15):2382-2387 · January 2012
 19. Rasika C. Torane, Anjali D. Ruikar, Pranav S. Chandrachood and Nirmala R. Deshpande -Study of Amino Acids and Carbohydrates from The Leaves of *Ehretia laevis* *Asian Journal of Chemistry* Vol. 21, No. 2 (2009), 1636-1638.
 20. University of Maryland Home, Health Information, Medical Reference Guide, Complementary and Alternative Medicine Guide, Supplement, available from Cysteine. <http://umm.edu/health/medical/altmed/supplement/cysteine> [cited 2016 May 18].
 21. Live strong.com What Foods Contain Histidine? Last Updated: May 31, 2015 | By Erica Wickham, M.S., R.D., C.D.N. available from <http://www.livestrong.com/article/517676-what-foods-contain-histidine>
 22. Sivasankari Velappan and Parimelazhagan Thangara, *Phytochemical Constituents and Antiarthritic Activity of Ehretia laevis* Roxb, *Journal of Food Biochemistry* Volume 38, Issue 4, pages 433-443,
 23. Sivasankari v, revathi p and Sarimelazhagan t, evaluation of in vitro antioxidant activity in edible fruits of *ehretia laevis roxb*, *International Journal of Pharma and Bio Sciences.* 2013 July; 4(3): (B) 847 – 857
 24. Torane rasika c, kamble gayatri s., eliza khatiwora, . ghayal nevedita a and. Deshpande nirmala r. Antioxidant capacity of leaves and stem of *Ehretia laevis*. *International Journal of Pharmacy and Pharmaceutical Sciences*, Vol 3, Issue 2, 2011,
 25. Joshi S. G; *Biotechnological strategies for the conservation of medicinal and ornamental Medicinal Plants*, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, 102 (2000)
 26. Sivasankari Velappan and Parimelazhagan Thangara, *Phytochemical Constituents and Antiarthritic Activity of Ehretia laevis* Roxb, 2014 Wiley Periodicals, Inc, Article first published online: 10 JUN 2014 DOI: 10.1111/jfbc.12071
 27. R. Kottaimuthu, *Ethnobotany of the Valaiyans of Karandamalai, Dindigul District, Tamil Nadu, India*, Ashoka Trust for Research in Ecology and the Environment (Atree), Bangalore, India, *Ethnobotanical Leaflets* 12: 195-203. 2008,
 28. Torane rasika c, kamble gayatri s., eliza khatiwora, . ghayal nevedita a and. Deshpande nirmala r. Antioxidant capacity of leaves and stem of *Ehretia laevis*, *International Journal of Pharmacy and Pharmaceutical Sciences*, Vol 3, Issue 2, 2011,
 29. Sharma J, Gairola S, Sharma YP, Gaur RD, *Ethnomedicinal plants used to treat skin diseases by Tharu community of district Udham Singh Nagar, Uttarakhand, India.*, *J Ethnopharmacol.* 2014 Dec 2;158 Pt A:140-206. doi: 10.1016/j.jep.2014.10.004. Epub 2014 Oct 14
 30. Deshpande Rahul, Kamath Ananth, Chaturvedi Srishty, Mutha Mayuri, Shep Snehal, Torane Rasika, and Deshpande Nirmala, *Comparative Evaluation of Antimicrobial Properties of Different Extracts of Ehretia laevis' Against Salivary Microflora.* *Research Journal of P harmaceutical, Biological and Chemical Sciences.* September - October 2014 RJPBCS 5(5).
 31. KL Meena, BL Yadav, some ethnomedicinal plant used by the Garacia tribe of district Sirohi Rajasthan, *Indian journal of traditional knowledge* Vol 10(2), April 2011, pp. 354-357.
 32. Samant et al. 1998; Khare 2007, *Indian Medicinal Plants: An Illustrated Dictionary*
 33. R. Kottaimuthu, *Ethnobotany of the Valaiyans of Karandamalai, Dindigul District, Tamil Nadu, India.* Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, India, *Ethnobotanical Leaflets* 12: 195-203. 2008, Issued 7 April 2008.
 34. Sayantan Tripathi, Souradut Ray, Amal Kumar Mondal, and N. K. Verma, *Rare Ethno Medicinal*

- Plants of South West Bengal, India with their Different Medicinal Uses: 2013 > Volume 2, No.2, April, 2013.
35. Jyotsana Sharma a, n, Sumeet Gairola b, R.D. Gaur c, R.M. Painuli c, T.O. Siddiqi, Ethnomedicinal plants used for treating epilepsy by indigenous communities of sub-Himalayan region of Uttarakhand, India, Journal of Ethnopharmacology 150 (2013) 353–370.
36. Zahoor Ahmad, Shaukat Saeed Khan, Aijaz Ahmad Wani and Fatima Khan, Ethnomedicinal plants used for different ailments by the tribals of district Raisen (M.P.), India, Journal of Medicinal Plants Research Vol. 7(7), pp. 298-303, 17 February, 2013.
37. M. Punnam Chander, C. Kartick & P. Vijayachari, Herbal medicine & healthcare practices among Nicobarese of Nancowry group of Islands - an indigenous tribe of Andaman & Nicobar Islands, Regional Medical Research Centre (ICMR), Port Blair, Received March 28, 2014, Indian J Med Res 141, May 2015, pp 720-744.
38. Anita Jain, S S Katewa, Praveen Galav & Ambika Nag, Some therapeutic uses of biodiversity among the tribal of Rajasthan, Indian journal of traditional knowledge Vol 7 (2), April 2008, pp 256-262.
39. C.P. Khare. Indian Medicinal Plants An Illustrated Dictionary, Springer Science & Business Media, 22-Apr-2008.
40. Pijush Kanti Das and Amal Kumar Mondal, Report to the Rare and Endangered Medicinal Plants Resources in the Dry Deciduous Forest Areas of Paschim Medinipur district, West Bengal, International journal of drug discovery and herbal research (IJDDHR) 2(2): April–June: (2012), 418-429A.
41. Healthy life live Ehretia Laevis/Indian Medicinal Plants /Ehretia Laevis available from <http://www.medicinalpedia.com/ehretia-laevis/> [cited 2016 May 18].
42. S L Patil and D A Patil, Ethnomedicinal plant of Dhule District, Maharashtra, natural product radiance, Vol 6(2) 2007 pp 148-151.
43. Rutin From Wikipedia, the free encyclopedia available from <https://en.wikipedia.org/wiki/Rutin> [cited 2016 May 18].
44. Decanoic acids From Wikipedia, the free encyclopedia available from https://en.wikipedia.org/wiki/Decanoic_acid [cited 2016 May 18].
45. Piperzine From Wikipedia, the free encyclopedia available From <https://en.wikipedia.org/wiki/Piperazine> [cited 2016 May 18].
46. Phenylephrine From Wikipedia, the free encyclopedia available From <https://en.wikipedia.org/wiki/Phenylephrine> [cited 2016 May 18].
47. Betulinic acid From Wikipedia, the free encyclopedia available From https://en.wikipedia.org/wiki/Betulinic_acid [cited 2016 May 18].
48. Amino acid Ornithine From Wikipedia, the free encyclopedia available From <https://en.wikipedia.org/wiki/Ornithine> [cited 2016 May 18].
49. Amino acid-Arginine From Wikipedia, the free encyclopedia available from <https://en.wikipedia.org/wiki/Arginine> [cited 2016 May 18].
50. Amino acid –Serine From Wikipedia, the free encyclopedia available from <https://en.wikipedia.org/wiki/Serine> [cited 2016 May 18].
51. Amino acid-Hydroxy proline From Wikipedia, the free encyclopedia available from <https://en.wikipedia.org/wiki/Hydroxyproline> [cited 2016 May 18].
52. Amino acid -Glutamic acid From Wikipedia, the free encyclopedia available from https://en.wikipedia.org/wiki/Glutamic_acid [cited 2016 May 18].
53. Amino acid –Lysine From Wikipedia, the free encyclopedia available from <https://en.wikipedia.org/wiki/Lysine> [cited 2016 May 18].
54. Amino acid –Tryptamine From Wikipedia, the free encyclopedia available from <https://en.wikipedia.org/wiki/Tryptamine> [cited 2016 May 18].

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***Address for correspondence**

Dr. Rushikesh Thakre

PG Scholar,

Department of Sankrit-Samhita-Siddhant, MGACH & RC Salod (H), Wardha (MS) India.

Email: dr.rushu@gmail.com

Ph: 9765404039/9923089064