



E-ISSN: 2707-2835
P-ISSN: 2707-2827
www.pharmacognosyjournal.com
IJPLS 2021; 2(1): 11-17
Received: 07-11-2020
Accepted: 15-12-2020

Chetna M Sangode
Smt. Kishoritai Bhoyar
College of Pharmacy,
Kamptee, Nagpur,
Maharashtra, India

Pranjal C Tidke
Smt. Kishoritai Bhoyar
College of Pharmacy,
Kamptee, Nagpur,
Maharashtra, India

Milind J Umekar
Smt. Kishoritai Bhoyar
College of Pharmacy,
Kamptee, Nagpur,
Maharashtra, India

Corresponding Author:
Chetna M Sangode
Smt. Kishoritai Bhoyar
College of Pharmacy,
Kamptee, Nagpur,
Maharashtra, India

A general appraisal of *Ehretia laevis* Roxb: An essential medicinal plant

Chetna M Sangode, Pranjal C Tidke and Milind J Umekar

DOI: <https://doi.org/10.33545/27072827.2021.v2.i1a.22>

Abstract

Ehretia laevis is a rare Indian medicinal plant used from ancient times. The plant is used for a variety of purposes, including ornaments, pot herbs, wood and stone dye, medicines, wines, and cosmetics. The inner bark of *Ehretia laevis* Roxb is used in the treatment of ulcers and headaches. Also useful in treatment for schizophrenia, absorption of calcium, muscle protein, post-surgery recovery, sports injuries, production of hormones, enzymes, antibodies. The plant has many uses that that many uses for different medicinal purposes. The fresh root is used in the treatment of syphilis, and the root is also used to treat diphtheria. Leaf powder mixed with sugar is divided into 10 equal doses. Each dose is taken daily along with goat milk curd to healing dysuria. The review focusing on the pharmacognostic parameters of *E. Laevis* and pharmacological uses.

Keywords: *Ehretia laevis*, boraginaceae, phytochemical, traditional medicine

Introduction

The invention and mass production of chemically synthesized medicines has revolutionized health care in most parts of the world over the last 100 years. Orthodox practitioners and herbal medicines are also used by significant segments of the population in developing countries for primary care. Herbal medicine is one of the most important branches of herbal medicine worldwide.

In developing countries like India, the bulk of the world's population also relies on herbal medicines to fulfil their health needs [1]. According to the World Health Organization, 80 percent of people use natural medicines for any aspect of their primary health care, exposing them to lesser-known side effects and dangers associated with chemically synthesized pharmacological drugs. As a result, bioactive extracts of medicinal plants, as well as their herbal medicine formulations, are a viable alternative to chemically synthesized medicines [2].

For the herb to be used more widely in medicinal practice, scientific confirmation of these claims is needed [3]. Long-term, seemingly unproblematic use of an herbal remedy will attest to its protection and efficacy. Herbal medicines with recorded experience from a long period of use should be distinguished from herbs whose conventional use has not been defined by research methods [4]. Plants have long been studied as a possible source of new agents. Since they include a variety of bioactive compounds with therapeutic potential. In Cameroon folk medicine, dietary plants have a long history of being used to treat infectious diseases due to their low toxicity.

Folk medicine lacks a theoretical foundation. Modern scientific studies on these medicinal plants are critical for the plants to be used as medicines more realistically and scientifically [5]. Folklore medicines are the mainstay of conventional medical systems, having been used in medical practice for thousands of years and contributing significantly to human health. The widespread application, like those described in old texts such as Vedas and the Bible, of herbal remedies and medicines has produced medicinal products from traditional herbs and medicinal plants commonly used. It is critical to research medicinal plants with a folklore reputation in greater depth to encourage proper use of herbal medicine and to establish their potential as sources for new medicines [6].

India is perhaps the most unique country in the world, with the richest tribal or folklore medicine practices. Orthodox practitioners use these drugs to treat a variety of diseases such as fractures, arthritis, hyperlipidemia, hypertension, kidney disorders, diabetes, and liver disorders, among others [3].

This genus' plants have medicinal value and are used in herbal medicine to treat diarrhoea, cough, cachexia, syphilis, toothache, stomach and venereal diseases, as well as an antidote to vegetable poisoning (The wealth of India raw materials 1952). The *E. laevis* plant is used for a variety of medicinal purposes. The fresh root decoction is used to treat syphilis, and the stem bark decoction is used to treat diphtheria. Externally, tender leaf paste is used to treat eczema, and the powdered flowers mixed with milk are used as an aphrodisiac. The plant is used for a variety of purposes, including ornaments, pot herbs, wood and stone dye, medicines, wines, and cosmetics. In periods of shortage, the tree's inner bark and fruit are consumed.

Plant description

Ehretia laevis is a rare Indian medicinal plant used from the ancient period, it belonging to a member of the Boraginaceae or *Borage* family, and is native to India, Pakistan, Laos, Myanmar, Vietnam, China, and Bhutan. The *Ehretia laevis* Roxb. Is high valued medicinal plant and becoming rare in the state of Maharashtra. It has religious importance among Hindus. It is growing luxuriantly growing at Alandi near the Dnyaneshwar temple. The use of medicinal plants is increasing worldwide. The general information of *Ehretia laevis* given below^[7, 8].



Fig 1: *Ehretia laevis* Roxb.

Kingdom: Plantae
 Division: Tracheophyta
 Class: Magnoliopsida
 Order: Boraginales
 Family: Boraginaceae
 Genus: *Ehretia*
 Species: *Ehretia laevis* (Roxb)

Botanical name : *Ehretia laevis* Roxb.

Synonyms : *Ehretia laevis* Var. *platyphylla* Merrill.
 Common/Local Name: Khanduchakka.
 Regional and Other Names:
 English: *Ehretia*,
 Gujarati: Vadhavaradi,
 Hindi: Bhairi, Chamror, Datranga, Tamoriya
 Nepali: Datingal
 Konkani: Kalo Gamdo
 Marathi: Ajaanvruksha, Datrang
 Tamil: Kuruviccai, Kalvirasu
 Telugu: Tellajuvvi, Paldattam

Malayalam: Harandi
 Sanskrit: Charmavriksha.
 Plant : Boraginaceae (borage)
 Family :
 Habit and : Small deciduous tree, with short stem and grey
 Habitat : bark, occasionally common.
 Native : India, China, Bhutan, Pakistan, Laos,
 Myanmar.
 Flowering : January to April
 and
 Fruiting
 Time
 Flowers : White, up to 8 mm
 Fruits : A small drupe, at first red, at length black.
 Properties : The inner bark of *Ehretia laevis* Roxb is used
 and Uses : as food. Leaves are applied to ulcers and in
 headaches. Fruits are astringent, anthelmintic,
 demulcent, expectorant, diuretic, and used in
 the affection of urinary passages, diseases of
 lungs, and spleen. Powdered kernel mixed
 with oil is a remedy for ringworm. Seeds are
 anthelmintic.

The plant has many such chemicals which are useful in malignancy, obesity, blood sugar, cardiovascular diseases, blood pressure, and lipids, and muscle wasting to minimize the risk of viral infection because maximum death in COVID-19 is associated with secondary complications. The plant has the property to fight infections of fungus and bacteria which may associate with viral infections^[23].

This herbal plant has chemicals that have a very good effect on neural diseases like brain ischemia, and useful for the promotion of neural crest cell survival, sedative, anticonvulsant, anti-Alzheimer, Antiseizure, antidepressant, stroke^[24].

The plant has thyroid uptake promotion property which will be useful for thyroid patients. Anticoagulant, the antiplatelet property is useful in old age patients and bedridden patients, also this will reduce the risk in heart patients. Beneficial chemicals to treat the peptic ulcer and cataract are available in this plant. This will help with the prevention of diseases^[25].

The plant contains Lysine which reduces the recurrence, severity, and healing period of herpes simplex virus infections hence can be used in other viral infections^[26]. Also, this is useful in treatment for schizophrenia, absorption of calcium, muscle protein, post-surgery recovery, sports injuries, and production of hormones, enzymes, antibodies, osteoporosis, anxiety, and disturbances of mood, migraine, and Alzheimer's dementia, loss of hairs, shingles, malignancy, heart diseases, and aging.

To protect other organs from infection or for maintenance of proper health by its gastro & hepatoprotective, anti-pancreatitis, anxiolytic, anti-diabetic & hypolipidemic effects are very useful^[23].

This medicinal plant has a light grey or white bark with an irregular trunk. The leaves in size and form are variable. The length varies between 2 and 6.3 cm and 1.3 to 3.8 cm. These plants' flowers are coloured white.

The calyx of the flowers is 2.5 mm long and the corolla 3-lobed and 5 corollas lobed is 6-8 mm long. Smaller than calyx the corolla tube and lobe are longer^[9, 10].



Fig 2: Microscopic characteristic of *Ehretia laevis* (a. Parenchyma fibre, b. Crystal, c. Phloem, d. Epidermis, e. Anomocytic stomata, f. Reticulately vessels, g. Trichome)

Authentication on chemical and genetic levels of medicinal plants is a key move for the scientific and business processes respectively. In addition to morphological markers, recent morphologic, biochemical, cytological, and molecular markers have been used to identify species. Due to growing conditions, such as temperature, soil fertility, harvest time, leaves age, drying method, etc., the chemical

components and the quantities they contain in the herb will differ^[32].

Phytochemical screening

The different qualitative chemical tests were performed for establishing a profile of the given extract for its chemical composition. The tests show the following results.

Table 1: Phytochemical screening of *E. laevis*

Sr. No.	Test name	Test for	Aqueous extract	Ethanollic extract	Ethyl acetate extract	n-Hexane extract
1	Alkaline reagent test	Flavonoids	+	+	+	-
2	Dragendoff's test	Alkaloids	-	+	-	-
3	Fehling's test	Carbohydrates	++	+	-	-
4	Benedict's test	Reducing Sugar	+	-	-	-
5	Keller Killiani test	Glycosides	-	++	+	-
6	Foam test	Saponins	++	+	-	-
7	Biuret test	Proteins	-	-	-	-
8	FeCl ₃ test	Phenolic compounds	+	+	-	-
9	Salkowaski test	Triterpenoids	-	-	+	-
		Sterols	-	+	+	+

Methodology

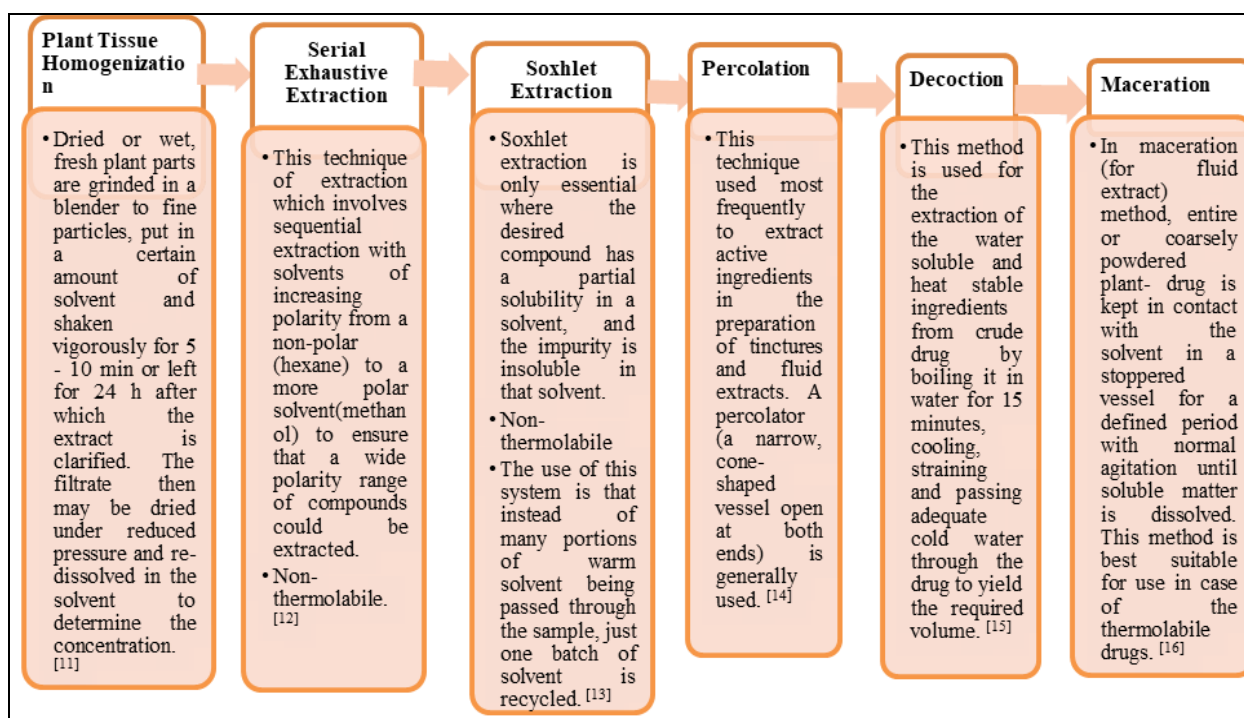


Fig 3: Methods used for extraction of plant

Table 2: Chemical Composition of *Ehretia laevis*

Sr. No.	Chemical constituents	References
1	Naphthoquinone derivative: Lewisone	[17]
2	n-octatricontane	[17]
3	Baurenol	[17]
4	ursolic acid	[17]
5	α -amyrin,	[18]
6	Lupeol,	[18]
7	Betulin,	[18]
8	Betulinic acid	[18]
9	β -sitosterol	[18]
10	Di – noctyl phthalate	[19]
11	3, 7, 11, 15-Tetramethyl-2-hexadecen-1-ol	[20]
12	Hexadecanoic acid, 15-methyl-, methyl ester	[20]
13	Tridecanoic acid	[20]
14	2 (4H)-Benzofuranone, 5, 6, 7, 7a-tetrahydro-4, 4, 7a-trimethyl	[20]
15	5-Chloro-3beta-hydroxy-6beta-nitro-5alphaandrostan-17-one	[20]
16	1, 2-Benzenedicarboxylic acid, butyl octyl ester	[20]
17	isobutyl octadecyl ester	[20]
18	Methyl 6, 10-octadecadienoate	[20]
19	Phthalic acid, octyl 2-propylpentyl ester	[20]
20	9, 12, 15-Octadecatrienoic acid, (Z, Z, Z)-Z, Z-4, 16-Octadecadien-1-ol acetate	[20]
21	4- (Dimethylaminomethyl-5-hydroxybenzofuran-3yl) (4-methoxyphenyl) methanone	[20]
22	2-Trimethylsiloxy-6-hexadecenoic acid, methyl ester	[20]
23	5, 8, 11, 14-Eicosatetraynoic acid, trimethylsilyl ester	[20]
24	2, 7-Diphenyl-1, 6-dioxypyridazino[4, 5:2', 3']pyrrol[4', 5'-d]pyridazine	[20]
25	2, 15-Heptadecadiene, 9- (ethoxymethyl)	[20]
26	4-Methoxyphenoxyformamide N-methyl-N-[4- (1-pyrrolidinyl)-2-butynyl]	[20]
27	Phthalic acid, butyl oct-3-yl ester;	[20]
28	Methyl 4, 7, 10, 13, 16, 19-docosahexaenoate;	[20]

Proteins, Amino acids, Lipids Minerals such as Ca, Mg, Na, Fe, NH₃, Mn, P, K, Zn, Cu and Si, Gallic acid, tannins, Vit C, rutin, decanoic acids, acontanes, phthalic acid, phenylephrine, α and β amyryn, phytol, piperazine [21].
Amino acid- Butyric acid, Ornithine, Cysteine, Arginine,

Serine, Histidine, Lysine, Glutamic acid, Proline, Hydroxyproline, Tryptamine having various therapeutic properties [22].

Some of the chemical constituent's structure are shown below: Figure. 4

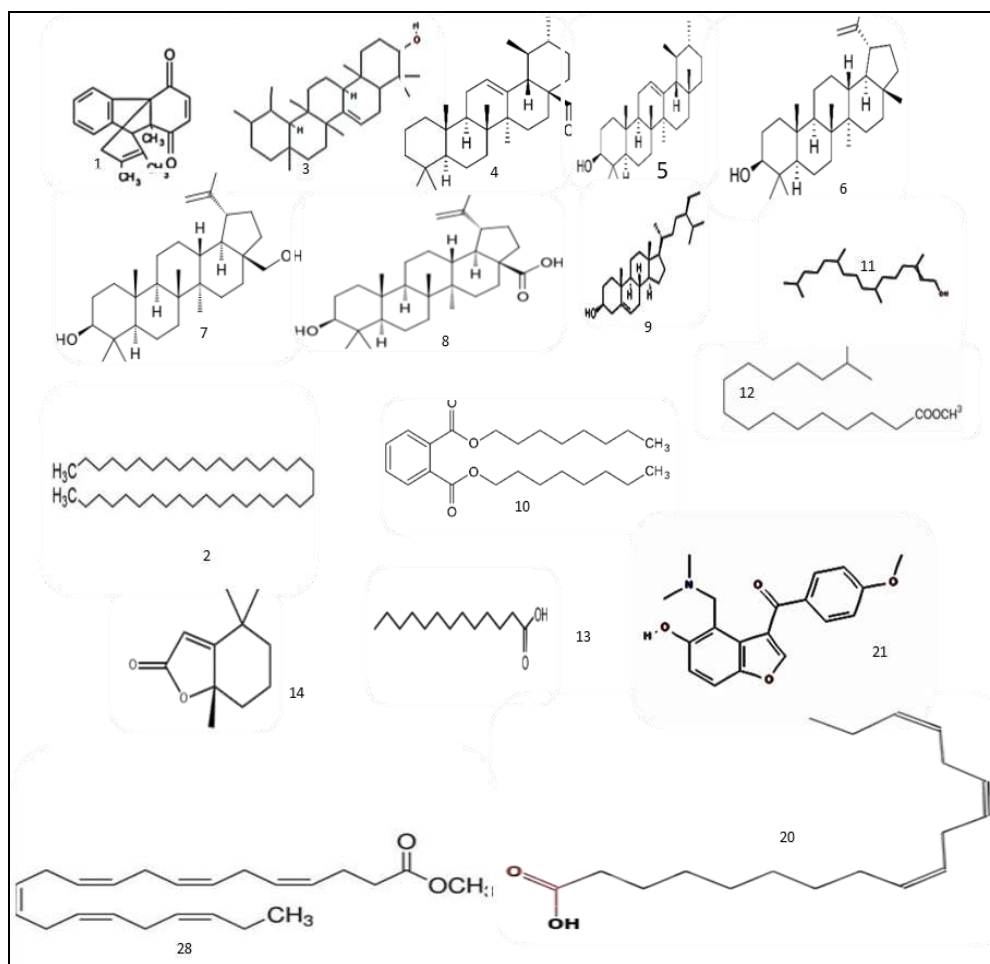


Fig 4: Few important compounds structure of *Ehretia laevis*

Biological activity of *Ehretia laevis*

These medicines are both costly and symptomatic but usually short-lived. In this research, the science behind this marvelous plant was evaluated, its properties demonstrated on the scientific level, an economic and safe way was offered, and its therapeutic uses being taken effectively and needy patients being helped. Also, it would be one of the best options of crop cultivation to farmers for financial support.

Exclusion criteria ^[27]

1. Patients with rheumatic arthritis, tubercular arthritis, infective arthritis, syphilitic arthritis, gout, traumatic arthritis, and gonorrhoeal arthritis.
2. Patient with any systemic illness (Hepatic failure, renal failure, ischemic heart disease, and malignancy) and structural deformities.
3. Patient with uncontrolled diabetes.
4. Pregnant and lactating women.

Table 3: Biological Activity of *Ehretia laevis*

Plant origin	Biological activity	References
Antioxidant activity	Fruits	[26]
Anti-inflammatory activity	Leaves	[28]
Antibacterial activity	Leaves	[28, 30]
Antiarthritic activity	Leaves	[21, 27]
Antidiabetic activity	Leaves	[31]

All parts of the *E. laevis* plant are used for different medicinal purposes. Decoction of the fresh root and stem

bark for diphtheria treatment is used for syphilis treatment. Tender leaves paste is used for external eczema cure and milk flowers powder for aphrodisiac treatment. The plant has many applications, including decorations, spices, wood colour, stone, drugs, wines, and cosmetics. The inner bark of the tree and fruit are eaten in times of scarcity and as an antidote to vegetable poison (The wealth of India raw materials 1952).

Leaves are applied to ulcers and in headaches. Fruit is used as, anthelmintic, diuretic, demulcent, expectorant and used in affections of urinary passages, diseases of lungs and spleen. Seeds are anthelmintic ^[6].

The methanolic extract of the leaves, effective in arthritis ^[33]. Bark paste is applied for cuts and wounds ^[34]. The leaves paste is topically applied on wounds ^[35]. Effective in various microbial diseases of hard tissues in the oral cavity ^[29]. Bark juice is given just after delivery to relieve delivery pain. Root used in venereal diseases (Scabies, Ulcers, Syphilis, Dysentery, Intestinal worms) and as a gargle in throat infections ^[36]. In Jaundice as hepato-protective properties ^[37]. Mouth ulcer strengthens the teeth and gums ^[38]. Topical Malaria, fever, earache ^[39]. 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 dysuria. During the course of administration salt, chilly, tea, acidic food, acidic foods, oils are strictly prohibited ^[40]. Juice of leaves is used to healing dysentery, to treat intestinal worms ^[41]. A decoction of the bark is a gargle in throat infections. Antifungal activity against *Candida albicans* ^[42]. Ulcer and

gums brushed with stem pieces^[44].

Silver nanoparticles were also synthesized from *Ehretia laevis* Roxb. Leaf extract by one-step green synthesis method. The nanoparticles demonstrated antimicrobial, larvicidal, and cytotoxic activity. At a concentration of 25 µg/mL, it killed 70 ± 10.24% of *Culex quinquefasciatus* larvae after 72 h treatment. The median lethal concentration of the nanoparticles versus HeLa, human cervical cancer cells, and MCF-7 human breast cancer cells, were calculated to 12.7 µg/mL and 14.5 µg/mL, respectively. It possessed biological activities like cytotoxicity, larvicidal activity, and antimicrobial activity to some extent^[43].

Conclusions

These medicinal activities of the plant will open the door for further research and will provide good opportunities for employment and farming to strengthen the economy of the world. This spiritual plant may pave the way for humanity.

References

1. Wachtel-Galor S, Benzie IFF. Herbal Medicine: An Introduction to Its History, Usage, Regulation, Current Trends, and Research Needs. In: Benzie IFF, Wachtel-Galor S, editors. Herbal Medicine: Biomolecular and Clinical Aspects. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis 2011.
2. WHO Traditional medicine. World Health Organization 2008. (Accessed on 11 September 2015).
3. Mori Hardhikumar. Jamanadas-Antihyperlipidemic Activity of Kukutnakhi (*Aspidum acutarium* SW - Dryopteridace). A folklore Herb. D-G, IPGT & RA, Jamnagar, Gujarat 2014, 1.
4. Guidelines for the assessment of herbal medicine program on traditional medicine Geneva World Health Organization, document (WHO/TRM/91, 4) 1991.
5. Md. Mahabub Nawaz AH *et al.* An ethnobotanical survey of Rajshahi district in Rajshahi division, Bangladesh, Am. Eurasian J Sustain. Agric 2009;3(2):143-150.
6. Joshi SG. Biotechnological strategies for the conservation of medicinal and ornamental Medicinal Plants, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi 2000, 102.
7. Thakre R, Harne K. Comparative Antimicrobial Study of Polar and Non-Polar Extracts of *Ehretia laevis* Roxb. (Khandu Chakka) Plant. Aayushi International Interdisciplinary Research Journal (AIIRJ) 2019;10(6):7-9.
8. Shukla A, Kaur A. A systematic review of traditional uses bioactive phytoconstituents of genus *Ehretia*. Asian Journal of Pcal and Clinical Research 2018;11(6):88-100.
9. Ahmad UV, Abbasi MA, Hussain H, Akhtar MN, Farooq U, Fatima N *et al.* Phenolic glycosides from *Symplocos racemosa*: natural inhibitors of phosphodiesterase -I. Phytochemistry 2003;63(2):217-220.
10. Goodarzi M, Russel PJ, Heyden YV. Similarity analyses of chromatographic herbal fingerprints: A review. Analytical Chemical Acta 2013;804:16-28.
11. Borkar A, Karande N, Rathi L. Role of *Ehretia laevis* leaves roxb in wound healing activity- a review. World Journal of Pharmaceutical Research 2000;9(11):211-218.
12. Das K, Tiwari RKS, Shrivastava DK. Techniques for evaluation of medicinal plant products as antimicrobial agents: current methods and future trends. Journal of medicinal plants research 2010;4(2):104-111.
13. Nikhal SB, Dambe PA, Ghongade DB, Goupale DC. Hydroalcoholic extraction of *Mangifera indica* (leaves) by Soxhletion. International Journal of Pharmaceutical Sciences 2010;2(1):30-32.
14. Handa SS, Khanuja SPS, Longo G, Rakesh DD. Extraction Technologies for Medicinal and Aromatic Plants. International center for science and high technology, Trieste 2008, 21-25.
15. Remington JP. Remington: The science and practice of pharmacy, 21st edition, Lippincott Williams & Wilkins 773-774.
16. Rakshya Shrestha, Roshan Ghimire, Nirajan Bhattarai. Study of farmer's attitude and consent towards consumption of goat milk and milk product in eastern Chitwan, Nepal. Int J Vet Sci Anim Husbandry 2020;5(3):17-20.
17. Thapliyal PC, Yadav SK. A new naphthoquinone from aerial parts of *Ehretia laevis*. J Inst Chem India 2003;75:13-15.
18. Li Peng Y, Yao X, Xu L, Wulan TN, Liu Y, Shi R, Xiao P. Chemical constituents and biological activities of plants from the genus *Ehretia* Linn. Chin Herb Med 2010;2:106-1.
19. Ibrahim S, Nok JA, Abubakar MS, Sarkiyayi S. 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 2012;4(15):2382-7.
20. Joshi UP, Wagh RD. GC-MS Analysis of Phytochemical Compounds present in the bark extracts of *Ehretia laevis* Roxb. International Journal of Research and Development in Pharmacy & Life Sciences (IJRDPL) 2018;7:3150-4.
21. Velappan S, Thangaraj P. Phytochemical Constituents and Antiarthritic Activity of *Ehretia laevis* Roxb. Journal of Food Biochemistry 2014;38(4):433-43.
22. Torane RC, Ruikar AD, Chandrachud PS, Deshpande NR. Study of amino acids and carbohydrates from the leaves of *Ehretia laevis*. Asian Journal of Chemistry 2009;21(2):1636.
23. Rushikesh Thakre *et al.* Role of Ajan Vruksha/Khandu Chakka Plant (*Ehretia laevis* Roxb.) in Covid-19 Pandemic Int. J Res. Pharm. Sci 2020;11(SPL)(1):224-233.
24. Rushikesh T, Bhutada S, Chouragade B, Khobragade P, Ketaki H. Evaluating the systematic position of *Ehretia asperula* Zoll. & Moritzi based on ITS1, matK and trnL-trnF DNA sequences. International Journal of Research in Ayurveda and Pharmacy 2012;36(2):93-102.
25. Rushikesh T, Bhutada S, Chouragade B, Khobragade P, Ketaki H. Ethano Botanical Properties of Unexplored Plant Khandu Chakka (*Ehretia laevis* Roxb.). International Journal of Ayurveda and Pharma Research 2016;4(7):68-73.
26. Sivasankari V, Revathi P, Parimelazhagan T. Evaluation of *In Vitro* Antioxidant Activity in Edible Fruits of *Ehretia laevis* Roxb. Int J Pharm Bio Sci 2013;4:847-57.

27. Subodh Karluke G, Pramod Khobragade. Efficacy of Folklore Plant Khanduchakka (*Ehretia laevis* Roxb) Patra Siddha Tail In Sandhivata. International Ayurvedic Medical Journal, (ISSN: 2320 5091) 2017, 5(10).
28. Jyothirmai N, Nagaraju B, Deepika MY, Kumar JN, Rani GS. Evaluation of anti-inflammatory and antibacterial activities of different solvent extracts of *Ehretia laevis* Roxb. J Pharm Sci Res 2016;8:715-20.
29. Deshpande R, Kamath A, Chaturvedi S, Mutha MM, Shep S, Torane R *et al.* Comparative evaluation of antimicrobial properties of different extracts of '*Ehretia laevis*' against salivary microflora. Res J Pharm Biol Chem Sci 2014;5:489.
30. Dr. Thakre Rushikesh, Khobragade Pramod, Harne Ketaki. Anti-Microbial Activity of *Ehretia laevis* Roxb. (Khandu Chakka) Plant, Wjpls 2018;4(7):112-116.
31. Mohiuddin M, Arbain D, Islam AK, Rahman M, Ahmad MS, Ahmad MN. Electrochemical measurement of the antidiabetic potential of medicinal plants using multi-walled carbon nanotubes paste electrode. Russ J Electrochem 2015;51:368-75.
32. Tarke Santosh Rangnathrao, Dr. P Shanmugasundaram. Preliminary phytochemical screening and HPTLC method for qualitative determination of phytochemical compounds in extract of *Ehretia laevis* Roxb Journal of Pharmacognosy and Phytochemistry 2018;7(6):867-874.
33. Sivasankari Velappan1, Parimelazhagan Thangara. Phytochemical Constituents and Antiarthritic Activity of *Ehretia laevis* Roxb, 2014 Wiley Periodicals, Inc, Article first published online 2014.
34. Kottaimuthu R. 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 2008;12:195-203.
35. 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;158. Pt A Epub 2014, 140-206.
36. Samant *et al.* Khare 2007, Indian Medicinal Plants: An Illustrated Dictionary 1998.
37. Jyotsana Sharma A, Sumeet N, Gairola BRD, Gaur CRM, Painuli C, Siddiqi TO. Ethnomedicinal plants used for treating epilepsy by indigenous communities of sub-Himalayan region of Uttarakhand, India, Journal of Ethnopharmacology 2013;150:353-370.
38. Zahoor Ahmad, Shaukat Saeed Khan, Aijaz Ahmad Wani, Fatima Khan. Ethnomedicinal plants used for different ailments by the tribals of district Raisen (M.P.), India, Journal of Medicinal Plants Research 2013;7(7):298-303.
39. Punnam Chander M, Kartick C, Vijayachari P. 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, Indian J Med Res 2014;141:720-744.
40. Anita Jain, Katewa S, Praveen Galav, Ambika Nag. Some therapeutic uses of biodiversity among the tribal of Rajasthan, Indian journal of traditional knowledge 2008;7(2):256-262.
41. Pijush Kanti Das, 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) 2012;2(2):418-429A.
42. Healthy life live *Ehretia laevis*/Indian Medicinal Plants/*Ehretia laevis*. <http://www.medicinalpedia.com/ehretia-laevis/> [cited 2016 May 18].
43. Sudipata Panja, Indranil Choudhuri, Kalyani Khanra, BikasRanjan Pati, Nandan Bhattacharyya. Biological and Photocatalytic Activity of Silver Nanoparticle Synthesized from *Ehretia laevis* Roxb. Leaves Extract. Nano Biomed. Eng 2020;12(1):104-113.
44. Patil SL, Patil DA. Ethnomedicinal plant of Dhule District, Maharashtra, natural product radiance 2007;6(2):148-151.
45. Ncube NS, Afolayan AJ, Okoh AI. Assessment techniques of antimicrobial properties of natural compounds of plant origin: current methods and future trends. African journal of biotechnology 2008, 7(12).