ISSN: 0976-0172
Journal of Bioscience AndTechnology
www.jbstonline.com

APHARMACOLOGICALANDTOXICOLOGICALREVIEWOF *LAWSONIAINERMIS*

Mr. Asadulla khan[1], Mrs. Pajjoori Sravani[2], Mrs. Sayeeda Tabassum[3]

Assistant professor[1,2,3]

Department of Pharmacognosy,

Global College of Pharmacy, Hyderabad. Chilkur (V), Moinabad (M), Telangana- 501504.

ABSTRACT: For basic healthcare, herbal medicines are in high demand in both developed and developing nations due to their low cost, broad range of biological and therapeutic activities, and increased safety margins. Commonly known as Henna or Mhendiand, the plant Lawsonia inermis L. is widely found in tropical and subtropical regions.The genus Hennabelong is a member of the family Loosestrifeae.It also plays an important part in Ayurvedic and natural herbal therapy, as described in ancient Indian history.Healing and aesthetic uses of henna date back more than nine thousand years. Thanks to its many medicinal uses, lack of side effects, and accessibility, henna is enjoying a renaissance in popularity. This study aims to update the existing body of knowledge on several aspects of the globally utilized plant Lawsonia inermis (Linn). It provides a comprehensive overview of its pharmacological actions, including analgesic, anti-inflammatory, antipyretic, antiarthritic, antibacterial, antifungal, antiviral, antimalarial, antidiabetic, abortifacient, hepatoprotective, antioxidant, anticancer, antifertility, antiulcer, diuretic, wound healing, protein glycation inhibitory, enzyme inhibitory, antitrypanosomal, anticoagulant, antisickling, nematicidal, molluscicidal, immunomodulatory, nootropic, and tuberculostatic actions, as well as toxicological studies..

Keywords: *Lawsonia inermis*, Henna, Pharmacological activities Antibacterial, Antioxidant Toxicologicalstudies

INTRODUCTION: The use of plants in ancient medicine is the ancestor of many of today's pharmaceuticals.First, those who have practiced traditional herbal therapy have detailed the curative effects of several native plants for ailments.The main health care system is still based on natural goods, which are a major source of both synthetic and traditional herbal medication. The foundation of herbal medicine is the idea that plants possess inherent healing properties. There has been a recent uptick in plant research worldwide, and a mountain of data points to the tremendous therapeutic potential of plants with long histories of usage in alternative medicine.

Traditional Indian Medicine (Ayurveda), Siddha, Unani, and Chinese medicine all have extensive literature on the topic of herbal remedies and the many advantages they provide.

L. inermis Linn. is a plant that is utilized all over the globe. This current aim is to evaluate and assemble updated information on many elements of the plant. In tropical and subtropical regions, you may find this plant, which is also known as henna or mhendi, in plenty. It has a significant function in Ayurvedic natural herbal remedies and is described in ancient Indian history for its many benefits.

Perennial Lawsonia inermis Linn, sometimes known as henna, is a member of the lythraceae family, which includes the loosestrife plant. The whole plant, including the roots, stems, leaves, flower pods, and seeds, has significant medical value, and many farmers produce henna for its cosmetic and medicinal uses. to Southeast Asia and North Africa, and widely grown as a decorative plant in India, Persia, and the Mediterranean coast of Africa 6.

Commonnames:[7]

English : Henna, Samphire, Cypress shrub
Sanskrit :Mendi,Mendika,Timir,Rakigarbha
Telugu : Goranta, kormni

ISSN: 0976-0172
Journal of Bioscience AndTechnology
www.jbstonline.com

Hindi : Mehndi
Malayalam: Mailanchi
Tamil : Maruthani
Oriya : Benjati
Kannada :Mayilanchi
Bengali : Mehedi

Morphology: *Lawsonia inermis* is a glabrous branched shrub or small tree (2 to 6 m in height). Leaves are small, opposite, entire margin elliptical tobroadlylanceolate,sub-sessile,about1.5to 5cm long, 0.5 to 2 cm wide, greenish brown to dull green,petioleshortandglabrousacuteorobtuse apex with taperingbase. Newbranches are green in colour and quadrangular, turn red with age. Young barks are greyish brown, older plants have spine- tipped branchlets. Inflorescence has large pyramid shaped cyme. Flowers are small, numerous, aromatic, white or red coloured with four crumbled petals. Calyx has 0.2 cm tube and 0.3 cm spread lobes. The fruits are small, brown globose capsule, opening irregularly and split into four sections with a permanent style. Seeds have typical, pyramidal, hard and typical seed coat with brownish colouration [8-10].

Cultivation: Henna grows better in tropical savannah and tropical arid zones, in latitude between15°and25°NandS,produceshighestdye content in temperature between 35 - 45 °C. The optimal soil temperature range for germination is25 - 30 °C. Henna leaves are very popular natural dye to colour hand, finger, nails and hair. The dye molecule, lawsone is the chief constituents of the plant; its highest concentration is detected in the petioles (0.5-1.5 %) [11,12].

TraditionalUses:

TABLE1:TRADITIONALUSES

PlantParts	TraditionalUses(as/in)
Leaves[13-16]	Bitter, astringent, acrid, diuretic, emetic, edema, expectorant, anodyne, anti- inflammatory,constipating, depurative,livertonic,haematinic,styptic, febrifuge, trichogenous, wound, ulcers, strangury, cough, bronchitis,burningsensation,cephalalgia,hemicranias,lumbago,rheumatalgia,inflammations,diarrhoea, dysentery,leprosy,leucoderma,scabies,boils,hepatopathy, splenopathy,anemia,hemorrhages, hemoptysis,fever,ophthalmia,amenorrhoea,fallingofhair,greynessofhair,jaundice.
Flower[13]	Cardiotonic,refrigerant,soporific,febrifuge,tonic,cephalalgia, burning sensation, cardiopathy, amentia, insomnia, fever
Seed[13]	Antipyretic,intellectpromoting,constipating,intermittentfevers,insanity,amentia, diarrhea, dysentery and gastropathy.
Root[13]	Bitter, depurative, diuretic, emmenagogue, abortifacient, burning sensation, leprosy,skindiseases,amenorrhoea,dysmenorrhoeaandprematuregrayingofhair.

ChemicalConstituents:

Leaves: 2-Hydro xy-1, 4-napthoquinone (HNQ; Lawsone)istheprinciplenaturaldyecontainedat 1.0 -1.4 % in the leaves of Henna[17]. Other related compounds present in the leaves are: 1, 4dihydro xynaphthalene.1,4-naphthoquinone, 1,2-dihydroxy- glucoyloxy naphthalene and 2-hydroxy-1,4- diglucosyloxy naphthalene. Flavonoids (luteolins, apigenin, and their glycosides). Coumarins (esculetin, fraxetin, scopletin). Steroids (β- sitosterol) [18]. The leaves of *Lawsonia inermis* also reported to contain soluble matter tannin, gallic acid, glucose, mannitol, fat, resin and mucilage [2].

Bark: Barkcontainsnapthoquinone,isoplumbagin, triterpenoids, Hennadiol, aliphatics (3-methyl nonacosan-1-ol) [18].

Flower: Flowers on steam distillat ion gave an essential oil (0.02 %) rich in ionones (90 %) in which β-ionones predominated[18].

Root: Aqueous root extract of *L. inermis* contains alkaloids, saponins, steroids, cardiac glycosides, flavonoids, tannins and reducing sugars[19].

Pharmacological Activities: Several researchers have reported the different pharmacological activities of *L. inermis* which are discussed below.

ISSN: 0976-0172
Journal of Bioscience AndTechnology
www.jbstonline.com

Analgesic and Antipyretic Activity: Theethanolic extract of leaves of Lawsonia showed significant analgesic as well as antipyretic activity. The fixed oil obtained from seeds were screenedfor pharmacological activity both *in-vitro* and *in- vivo.* It was concluded that seed oil is devoid of behavioral and CNS effects and failed to produce any effect on isolated tissue though it possess significant analgesic activity [20].

Anti-Inflammatory Activity: Methanol extract of *Lawsonia inermis* flowers showed a good anti-inflammatory activity against 5-Lipoxygenase (IC_{50}=49.33mg/L) compared to references. It may be interpreted that the greatest anti-inflammatory activity was due to the high amounts of total phenolic compounds [21].

Isoplumbagin and lawsaritol, isolated from stem bark and root of *L. inermis* screened for anti-inflammatory activity against carrageenan induced paw edema in rats. The results showed that isoplumbagin exhibited significant activity, was compared to that of phenylbutazone [22].

Butanol and chloroform fractions showed potent anti-inflammatory, analgesic and antipyretic effects that aqueous fraction of crude ethanol extract of *L. inermis* in a dose dependent manner. Leaves showed significant anti-inflammatory effect with some active principles [20].

Antiarthritic Activity: Aqueous and ethanol leaf extract demonstrated anti-arthritic activity, as reflected by a reduction in paw oedema, paw diameter and body weight loss in both Freund's adjuvant-induced and formaldehyde-induced arthritis mice models, at doses of 200 and 400 mg/kg p.o., respectively. In this study, an oral dose of 10 mg/kg of diclofenac sodium was used as the positive control [23].

Anti-ulcer Activity: Aqueous, ethanol and chloroform leaf extracts showed a strong anti-ulcer activityinpylorusligation-andaspirin-inducedrats when compared to ranitidine, the positive control. In addition, significant reductions (p.o. = 0.001) in gastric acid secretions, total acidity and ulcer index were observed [24]. Aqueous, ethanolic and chloroform extracts produced significant activity against acute and chronic gastric ulcers in two rat modelsatdosesof200and400mg/kgp.o.when compared to the negative control gum acacia (2%, w/v). Sucralfate (250 mg/kg) served as the positive control. Aqueous, ethanolic and chloroformextracts were found to reduce ethanol-induced ulcers by up to 81, 94 and 88%, respectively, and cold-restraint stress-induced ulcers by up to 56%, 30% and 56%, respectively [25].

Ethanolic leaf extract showed antiulcer activity in indomethacin-induced gastric ulcers in pylorus ligation rat models by reducing the ulcer index for allthreedoses (100,200and400mg/kgp.o.)tested [26].

Antidiabeticactivity: Theethanolicextractof leaves of *Lawsonia inermis* linn (400mg/kgBW) in alloxaninduceddiabeticratsshowedsignificant hypoglycaemic activity after oral administration [27]. Ethanolicextractof*Lawsoniainermis*(500mg/kg body weight)significantly decreased level of blood glucose in streptozotocin induced diabetic rats [28].

Ethanol (70 %) extract of *L. inermis* showed significant hypoglycemic and hypolipidemic activitiesinalloxaninduceddiabeticmiceafteroral administration. The feeding of 0.8 g/kg of *L. inermis* extract decreased the concentration of glucose, cholesterol and triglycerides to normal. Methanol (95 %) extract of leaves of *L. inermis* showed significant *in-vitro* antihyperglycemic effect [29].

Antibacterial activity: The agar diffusion and minimum inhibitory concentration (MIC) assays were used to assess the antibacterial activity of aqueous and methanol extracts of Yemeni henna (Lawsonia inermis) leaves against three different bacterial species: Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa. Alkaloids, quinones, glycosides, tannins, and saponins were identified in the preliminary phytochemical screening. The methanolic extract showed promise as an antibacterial agent, outperforming the aqueous extract against

ISSN: 0976-0172
Journal of Bioscience AndTechnology
www.jbstonline.com

every single type of bacteria.

At an inhibition zone of about (27 ± 1 mm), the methanolic extract showed the highest activity against Staphylococcus aureus, whereas the aqueous extract showed the lowest activity against Escherichia coli at an inhibition zone of about (8.6 ± 1.2). at a concentration of 2.5 mg/ml for all of the currently available extractsStaphylococcus aureus and Pseudomonas aeruginosa at a concentration of 10 milligrams per milliliter each

30. Using the Agar well diffusion technique, researchers examined the antibacterial properties of an ethanolic extract of Lawsonia leaves. A. niger, Fusarium oxysporum, Streptococcus sp., and Staphylococcus aureus were all seen to have their growth patterns inhibited by it (31).

The antibacterial activity of an ethanolic extract of the Lawsonia inermis plant was tested against many dangerous pathogenic microbes. Its antibacterial properties were discovered to be effective against both gram-positive (Bacillus subtilis, Bacillus megaterium, Bacillus fusiformis, Streptococcus faecalis, Streptococcus pyogenes, Streptococcus pneumonia, Staphyloccus aureus) and gram-negative (Salmonella typhi, Pseudomonas aerogenosa, Escherichia coli, Shigella flexneri, Vibrio cholera, Enterobacter aerogenes, Klebsiella pneumoniae) bacteria 32.

The antimicrobial potential of both the dried leaves (HL) and processed powder (HP) of commercially available henna was tested against various microorganisms. The results showed that Bacillus subtilis (ATCC6633) was the most sensitive to the extracts from both the HL and HP, with MBC values of approximately 165.8±3.7 µg/ml (HP) and 454.3±42 µg/ml (HL). Other antioxidant and phytotoxic properties of the two types of henna were also examined.33.

Microorganisms (Gram positive; B. subtilius, S. aureus, and S. epidermidis; Gram negative; E. coli, S. flexneri, and P. aeruginosa bacteria) are inhibited in a dose-dependent manner by methanolic leaf extracts of Lawsonia inermis Linn. Lawsonia inermis extracts in water, ethanol, methanol, ethyl acetate, and chloroform have antibacterial action because the plant's leaves contain flavonoids and glycosides, two of its most prominent elements. The Linnaeus leaves were examined for their ability to withstand various bacterial strains, including reference strains such as Escherichia coli, Klebsiella pneumoniae, Pseudomonasaeuroginosa, Proteus mirabilis, Salmonella typhi, Vibrio cholerae, Staphylococcus aureus, Methicillin Resistant Staphylococcus aureus, and clinical isolates from Staphylococcus aureus and Amp C β-lactamases producing Proteus mirabilis.The bacterial pathogens studied were significantly inhibited by the solvent extracts of L. inermis leaves. Gram positive species showed extracts with minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) ranging from 34 to 64 µg and 39 to 74 µg, respectively. Gram negative bacteria had MICs and MBCs ranging from 46-71 µg and 51-75 µg, respectively, in the extracts. Resistant to routinely prescribed antibiotics used to treat infections caused by uropathogens, the development of clinically significant AmpC β-lactamases generating Proteus mirabilis might be inhibited by the plant material. 35.

Notable antibacterial activity against gram positive and gram negative bacterial strains were shown by Lawsonia inermis. The minimum inhibitory concentration (MIC) for several bacterial strains varied between 2.31 and 9.27 mg/ml. After 6 hours of medication treatment at 1x MIC of each bacterial isolate, there was a 3log10 drop in CFU, and after 24 hours of exposure, practically all examined bacteria showed no growth 36.

Antimicrobial activity against gram positive and gram negative bacteria was tested in ethanol extracts of twenty plant species used by traditional healers in Yemen to treat infectious disorders. Of all the bacteria tested, the one from L. inermis that showed the strongest

ISSN: 0976-0172
Journal of Bioscience AndTechnology
www.jbstonline.com

activity against them was the one extracted with ethyl acetate 37,38.

Henna samples collected from several parts of Oman showed antibacterial effectiveness against many bacterial strains, the most potent of which were P. aeruginosa organisms. 39.

With the exception of the aqueous extract, which had the least impact on the majority of the tested bacterial samples, the extracts of henna leaves demonstrated significant antimicrobial activity against nearly all of the microorganisms. Using the agar-disc diffusion method, the in-vitro antibacterial activities of various leaf fractions, ethanol extracts, and aqueous extracts were examined against a variety of bacteria, including Staphylococcus aureus, Proteus vulgaris, Streptococcus pneumoniae, Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae, Streptococcus pyogenes, Salmonella typhi, and Shigella dysenteriae. Antibacterial activity against the 40 test isolates were shown by the aqueous extract, the fractions, and the fractionation residues.

Lawsonia inermis leaf crude extracts in water, methanol, and chloroform were bioassayed in vitro for their bioactivity to prevent the development of four species of bacteria and six human pathogenic fungi. Increasing the concentration of the extract suppressed the development of all pathogens to varied degrees. After methanol and chloroform, the aqueous extract had the highest level of activity. 41.

Using S. aureus (MTCC 087), E. coli (MTCC 729), K. pneumonia, and the agar well diffusion technique, the antibacterial activity of methanolic extract of L. inermis was examined. It's possible that henna might help with wound infections. (332), Pseudomonas aeruginosa (1688), and Pseudomonas mirabilis (425). 42.

Using in-vitro agar incorporation and well diffusion procedures, the following primary invaders of burn wounds were treated with aqueous and chloroform extract taken from the leaves of L. inermis: Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans, Fusarium oxysporum, and Aspergillus niger.Except for Candida albicans, the extract inhibits the growth pattern of all microorganisms. Research has shown that henna has potential as a wound infection treatment.1.

The antibacterial activity of crude extracts from dried henna leaves and seeds was tested against three reference strains.The most effective in-vitro antibacterial action was shown by hennadry leaves, especially against Shigella sonnei. 43. While 45 species from 29 plant families used in traditional Iranian medicine shown antibacterial activity against 11 bacterial species, hennashowed a particularly high effect against Bordetella bronchiseptica.L. inermis was shown to be effective in treating bacterial infections 43.

The primary henna component was shown to be a modest bacterial mutagen for the Salmonella typhimurium strain TA98 and a more potent mutagenic agent for the strain TA2637, according to genotoxic investigations. According to the results, hydroxyl napthaquinone does not pose any genotoxic danger to humans.

CONCLUSION:

In addition to its use as a food dye, Lawsonia inermis has a wide range of pharmacological effects and is thus a general herbal remedy. The many chemical components that provide this medicinal plant its many uses come from its one-of-a-kind source. Despite the long history of medical use of crude plant extracts, the development of contemporary pharmaceuticals is dependent on thorough research into their bioactivity, mechanism of action, pharmacotherapeutics, and toxicity, followed by appropriate standardization and clinical trials.The creation of contemporary pharmaceuticals from L. inermis should be prioritized for the management of different illnesses, since the worldwide scene is now shifting towards the use of non-toxic plant products with traditional therapeutic usage.

To further understand the hidden regions and

ISSN: 0976-0172
Journal of Bioscience AndTechnology
www.jbstonline.com

their potential therapeutic uses for the benefit of humanity, more research into L. inermis L. is required.

REFERENCES:

1. 1. Muhammad S. and H.S. Muhammad's research on the efficacy of Lawsonia inermis Linn. (Henna) in treating infections caused by burns. The citation is from the 2005 issue of the African Journal of Biotechnology, volume 4, pages 934–960.

2. Second, Nayak B.S., Isitor G., Dav is E.M., and Pillai G.K. Lawsonia inermis Linn's wound-healing properties as supported by scientific research. Publication: 2007 in the journal Phytotherapy Research, volume 21, pages 827–831.

3. 3. Biju Goyal, Ravi Goyal, and Aakash Mehta. A Review of the Pharmacognosy of Arcthosaspera: A Review of the Pharmaceutical Review, 2008, 1:1.

4. Pavate MS, Mishra SH (4). Review article: Ailanthus exzelsa's nutritional and medicinal potential. PharmacogRev. 2007; 1(1): 105-113.

5. 5. The Antimicrobial, Antifungal, and Synergistic Effect of Lawsonia inermis, Punica granatum, and Hibiscus sabdariffa by Abdelraouf, Amany, Alyazji, and Nedaa A. “Annals of Alquds Medicine” (2011), volume 7, pages 33–41.

6. The antimicrobial activity of Lawsoniainermis L. was reported by Malekzadeh F. in 1968 in the American Society for Microbiology, vol. 16, no. 4, pp. 663–634.

7. 7. The Indian Medicinal Plants by Kirtikar and Basu, 2nd edition. Volume II, 2005, pages 1076–1086, published by International Book Distributors in Dehradun.

8. BN Sartri. The Wealth of India: Raw Materials. CSIR, New Delhi: 1962. Pages 47–50.

9. 5. Chauhan MG, Pillai APG. Jamnagar, Gujarat: 2007 (pp. 84–85), microscopic profile of a powdered remedy used in Indian traditional medicine.

10. 10. Herbal drug microscopy, Vasudevan TN, Laddha KS, Dombivli: Yucca Publishing House, 2003, pp. 68–69.

11. 11. Agrotechniques for the production, development, and commerce of henna (Lawsonia inermis L.) by Rao SS, Regar PL, and Singh YV. Press, Pali-Marwar, 2005; 25-27. Central Arid Zone Research Institute.

12. 12. Crasher, Simon, Chadwick, and Simon, JE. This article is part of the Herbsanindexed bibliography, which compiles research on aromatic and medicinal plants native to temperate regions. Archon Books, Hamden, 1984, pp. 1971–1980.

13. Volume 3, pages 303–304, in Warrier PK (ed.), Indian medicinal plants: a dictionary of 500 species. Chennai: Orient Longman Private Limited, 2004.

14. Mohammed Saleem, Athar M., Sultana S., Ahmed S., Rahman A., Alam A. Assessment of Lawsonia alba's ability to reduce oxidative stress caused by carbon tetrachloride. Journal of Ethnopharmacology, 2000, 69(2), 157–164.

15. Reddy KR. Folk Medicine from Chittoor District, Andhra Pradesh, India, Used in the Treatment of Jaundice. Hanoi, Vietnam: Science and Technology Publishing House, 2004. 15. Bich DH, Chung DQ, Chuong BX, Dong NT, Dam DT, HienPV, LoVN, MaiPD, ManPK, NhuDT, TapN, Toan T. Article published in 1988 in the International Journal of Crude Drug Research, volume 26, issue 3, pages 137–140.

16. 17. Kirkland and Marzin (2003) evaluate the genotoxicity of 2-hydro xy-1, 4-naphthoquinone, a natural color component of hemp. Mutation Research, 537, 183–199.