PHARMACOLOGICAL ACTIVITIES OF *LAWSONIA INERMIS* LINN.: A REVIEW

Kamal M [1,*], Jawaid [2] T

[1] Faculty of Pharmacy, Integral University, Lucknow (U. P.), India

[2] Hygia Institute of Pharmaceutical Education and Research, Lucknow (U. P.), India

Corresponding author*: mailtomehnaz@gmaiL.com; mailtomehnaz@yahoo.co.in

ABSTRACT

Lawsonia inermis L. is a much branched glabrous shrub or small tree (2-6 m in height), cultivated for its leaves although stem bark, roots, flowers and seeds have also been used in traditional medicine. The plant is reported to contain Lawsone, Esculetin, Fraxetin, Isoplumbagin, Scopoletin, Betulin, Betulinic acid, Hennadiol, Lupeol, Lacoumarin, Laxanthone, Flavone glycosides, Two pentacytic triterpenes. The plant has been reported to have analgesic, hypoglycemic, antimalarial, hepatoprotective, nootropic, immunostimulant, anti-inflammatory, antibacterial, antimicrobial, antifungal, antiviral, antiparasitic, antitrypanosomal, antidermatophytic, antioxidant, anthelmintic, antifertility, tuberculostatic and anticancer properties. It is now considered as a valuable source of unique natural products for development of medicines against various diseases and also for the development of industrial products. This review gives a view mainly on the traditional uses, phytochemistry and pharmacological actions of the plant.

KEY WORDS: Henna; Pharmacological action; Phytochemistry

INTRODUCTION

Plants have played a significant role in maintaining human health and improving the quality of human life for thousands of years and have served humans well as valuable components of medicines, seasonings, beverages, cosmetics and dyes. Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. In recent times, focus on plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems. Today, we are witnessing a great deal of public interest in the use of herbal remedies. Further more many western drugs had their origin in plant extract. There are many herbs, which are predominantly used to treat cardiovascular problems, liver disorders, central nervous system, digestive and metabolic disorders. Given their potential to produce significant therapeutic effect, they can be useful as drug or supplement in the treatment / management of various diseases. Herbal drugs or medicinal plants, their extracts and their isolated compound(s) have demonstrated spectrum of biological activities. Such have been used and continued to be used as medicine in folklore or food supplement for various disorders. Ethnopharmacological studies on such herbs/medicinally important

plants continue to interest investigators throughout the world.

One such plant, Henna (*Lawsonia inermis* Linn) invites attention of the researchers worldwide for its pharmacological activities ranging from anti-inflammatory to anticancer activities. *Lawsonia inermis* Linn (Family: Lythraceae) is a much branched glabrous shrub or small tree (2-6 m in height), cultivated for its leaves although stem bark, roots, flowers and seeds have also been used in traditional medicine. This plant is a worldwide known cosmetic agent used to stain hair, skin and nails [1]. The plant is reported to contain Lawsone, Esculetin, Fraxetin, Isoplumbagin, Scopoletin, Betulin, Betulinic acid, Hennadiol, Lupeol, Lacoumarin, Laxanthone, Flavone glycosides, Two pentacytic triterpenes [2]. The plant has been reported to have analgesic, hypoglycemic, hepatoprotective, immunostimulant, anti-inflammatory, antibacterial, wound healing, antimicrobial, antifungal, antiviral, antiparasitic, antitrypanosomal, antidermatophytic, antioxidant, antifertility, tuberculostatic and anticancer properties. It is known as *Henna* in English, *Mehandi* in Hindi, *Shudi* in Bengali, *Goranta* in Kannada, *Mail-anschi* in malyalam, *Padchi-methi* in Marathi, *Dvivranta* in Sanskrit, *Gorata* in Telgu, *Aivanam* in Tamil, in oriya *Monjathi and in Tibetan Maduyanta.*

REFERENCES

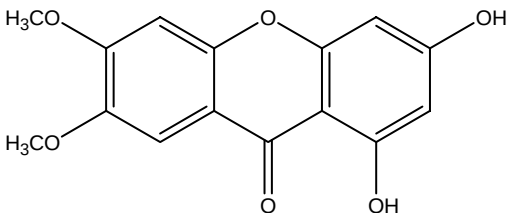
1. Hanna R, Maciej JN, Lapinsky L, Adamowicz L. Molecular structure and infra red spectra of 2-hydroxy-1,4-naphthaquinone; Experimental matrix isolation and theoretical Hatree-Fock and post Hatree-Fock study. Spec Act 1998; 54:1091-103.
2. Chaudhary G, Goyal S, Poonia P. *Lawsonia inermis* Linnaeus: A Phytopharmacological Review**.** Int J Pharm Sci & Drug Res 2010; 2(2): 91-8**.**
3. Hosein HKM, Zinab D. Phenolic Compounds and Antioxidant Activity of Henna Leaves Extracts (*Lawsonia inermis*). World J Dairy & Food Sci 2007; 2(1): 38-41.
4. Ling LT, Radhakrishnan AK, Subramaniam T, Cheng HM, Palanisamy UD. Assessment of antioxidant capacity and cytotoxicity of selected Malaysian plants. Molecules 2010; 15(4): 2139-51.
5. Mikhaeil BR, Badria FA, Maatooq GT, Amer MM. Antioxidant and immunomodulatory constituents of henna leaves. Z Naturforsch C 2004; 59(7-8): 468-76.
6. Endrini S, Rahmat A, Ismail P, Hin TYY. Anticarcinogenic properties and Antioxidant Activity of Henna (*Lawsonia inermis*). J Med Sci 2002; 2(4): 194-7.
7. Oladele AT, Adewunmi CO. Medicinal plants used in the management of malaria among the traditional medicine practitioners (TMP'S) in south western Nigeria. Afr J Infect Dis 2008; 2(1): 51-9.
8. Babu PD, Subhasree RS. Antimicrobial Activities of *Lawsonia inermis* - A Review. Acad J Plant Sci 2009; 2 (4): 231-2.
9. El-Hag AG, Al-Jabri AA, Habbal OA. Antimicrobial properties of *Lawsonia inermis* (henna): a review. Australian J Medical Herbalism 2007; 19(3): 114-25.
10. Malekzadeh F. Antimicrobial Activity of *Lawsonia inermis* L. Applied Microbiology 1968; 16(4): 663-4.
11. Habbal OA, Al-Jabri AA, El-Hag AH, Al-Mahrooqi ZH, Al-Hashmi NA. In-vitro antimicrobial activity of

Lawsonia inermis Linn (henna). A pilot study on the Omani henna. Saudi Med J 2005; 26(1): 69-72.
12. Al-Rubiay KK, Jaber NN, Al-Mhaawe BH, Alrubaiy LK**.** Antimicrobial Efficacy of Henna Extracts. Oman Medical Journal 2008; 23(4): 253-6
13. Ahmed S, Rahman A, Alam A, Saleem M, Athar M, Sultana S. Evaluation of the efficacy of Lawsonia alba in the alleviation of carbon tetrachloride-induced oxidative stress. Journal of Ethnopharmacology 2000; 69(2): 157-64.
14. Anand KK, Singh B, Chand D, Chandan BK. An evaluation of Lawsonia alba extract as hepatoprotective agent. Tubercle 1990; 71(4): 293-5.
15. Sanni S, Thilza IB, Ahmed MT, Sanni FS, Talle M, Okwor GO, The effect of aqueous leaves extract of henna (*Lawsonia inermis*) in carbon tetrachloride induced hepato-toxicity in swiss albino mice, Academia arena 2010; 2(6): 87-89.
16. Nayak BS, Isitor G, Davis EM, Pillai GK. The evidence based wound healing activity of *Lawsonia inermis* Linn. Phytotherapy Research 2007; 21(9): 827-831.
17. Ghosh A, Das BK, Roy A, Mandal B, Chandra G. Antibacterial activity of some medicinal plant extracts. J Nat Med 2008; 62(2): 259-62.
18. Singh VK, Pandey DK. Fungitoxic studies on bark extract of *Lawsonia inermis* against ringworm fungi. Hindustan Antibiot Bull 1989; 31(1-2): 32-5.
19. Ali BH, Bashir AK, Tanira MO. Anti-inflammatory, antipyretic, and analgesic effects of *Lawsonia inermis* L. (henna) in rats. Pharmacology 1995; 51(6): 356-63.
20. Gupta A, Saifi AQ, Modi NT, Mishra N**.** Anti-inflammatory activity of some active principles of *Lawsonia inermis* leaves. Indian Journal of Pharmacology 1986; 18(2): 113-4.
21. Iyer MR, Pal SC, Kasture VS, Kasture SB. Effect of *Lawsonia inermis* on memory and behaviour mediated via monoamine neurotransmitters. Indian J Pharmacol 1998; 30:181-5.
22. Eguale T, Giday M. In vitro anthelmintic activity of three medicinal plants against Haemonchus contortus. Inter J green pharm 2009; Jan-march: 29-34.
23. Munshi SR, Shetye TA, Nair RK. Antifertility activity of three indigenous plant preparations. Planta Med 1977; 31(1): 73-5.
24. Arayne MS, Sultana N, Mirza AZ, Zuberi MH, Siddiqui FA. In vitro hypoglycemic activity of methanolic extract of some indigenous plants. Pak J Pharm Sci 2007; 20(4): 268-73.
25. Dikshit V, Dikshit J, Saraf M, Thakur V, Sainis K. Immunomodulatory activity of naphthoquinone fraction of *Lawsonia inermis* Linn. Phytomedicine (Jena) 2000; 7: 102-3.
26. Atawodi SE, Ameh DA, Ibrahim S, Andrew JN, Nzelibe HC, Onyike EO, et aL. Indigenous knowledge system for treatment of trypanosomiasis in Kaduna state of Nigeria. J Ethnopharmacol 2002; 79(2): 279-82
27. Singh A, Singh DK. Molluscicidal activity of *Lawsonia inermis* and its binary and tertiary combinations with other plant derived molluscicides. Indian J Exp Biol 2001; 39(3): 263-8.

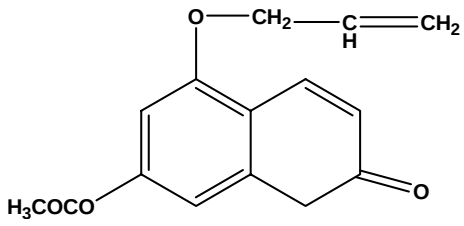
Table 1- Traditional uses of *Lawsonia inermis* Linn**.**

Parts and its form	Pharmacological activities
Ethanolic extract of dried and powdered leaves Aqueous extract of dried and powdered leaves, Whole plant extract with methanol and water	Antioxidant [3-6]
Chloroform extract of dried leaves Aqueous and alcoholic extract of dried and powdered leaves	Anticarcinogenic [4,6]
Leaves infused with Senna alata, Senna podocarpa leavesand juice of Citrus aurantifolia	Antimalarial [7]
Crude extract of fresh and dried leaves	Antimicrobial [8-12]
50% ethanolic extract of the bark Ethanol water(1:1) extact of leaves	Hepatoprotective [13-15]
Ethanolic extract of leaves	wound healing [16]
Aqueous and methanolic extract of leaves	Antibacterial [17]

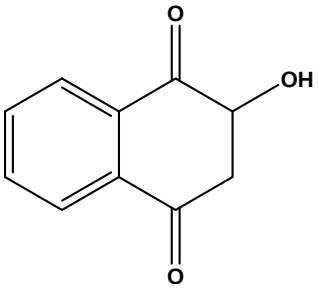
Leaves extract Bark extract	Antifungal [18]
Ethanolic extract of leaves	Virucidal [8]
Crude ethanolic extract of leaves	Antiinflammatory, analgesic, antipyretic 19-20
Acetone fraction of petroleum ether extract of leaves	Nootropic [21]
Aqueous and hydroalcoholic extract of leaves	Anthelmintic [22]
Leaves extract	Antifertility [23]
Methanolic extract of leaves	Hypoglycemic [24]
Methanolic extract of leaves	Immunomodulatory [5, 25]
Extract of leaves	Antitrypanosomal [26]
Leaves, Bark and Seed extract	Molluscicidal [27]



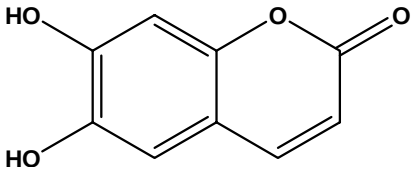
Laxanthone I



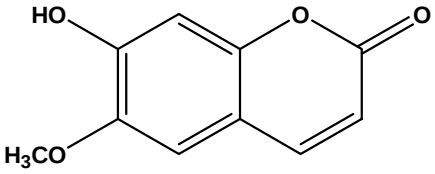
Lacoumarin



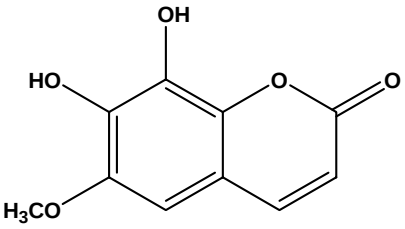
Lawsone



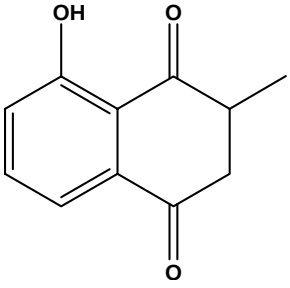
Esculetin



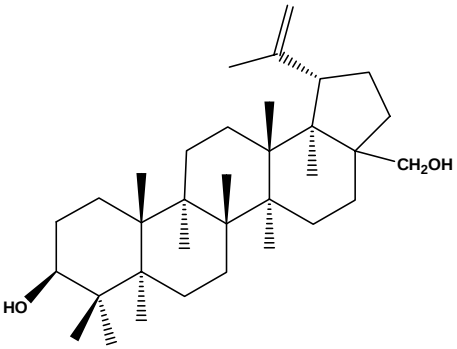
Scopoletin



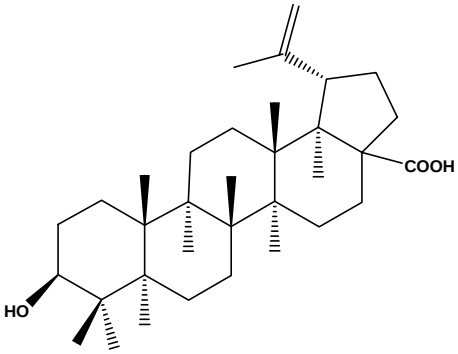
Fraxetin



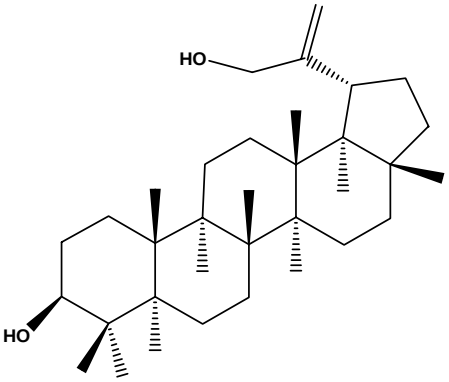
Isoplumbagin



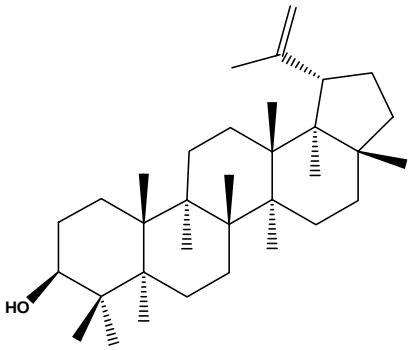
Betulin



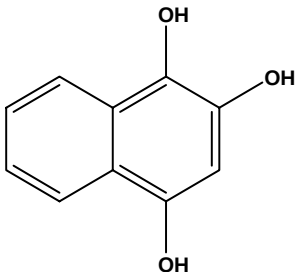
Betulinic acid



Hennadiol



Lupeol



Lawsoniaside

Fig: 1 Structures of selected phytochemicals from *Lawsonia inermis* [2]

Fig 2: Henna Leaves