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INERMIS AREVIEWARTICLEONLAWSONIA

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ABSTRACT

Lawsoniainermisconsist of carbohydrate, flavonoids, saponins, terpenoids, quinones, coumarins, xanthones, resin, and tannins. It also consist of 2-hydroxy-1, 4-naphthoquinone. Many alkaloids, naphthoquinone derivatives, phenolics, and flavonoid, segregated from different parts of Lawsoniainermis. The pharmacological studies showed that Lawsoniainermishas antifungal, antibacterial, antiparasitic, antioxidant, analgesic, anti-inflammatory, molluscicidal hepatoprotective, wound and burn healing, immunomodulatory, antidiabetic, diuretic, antiulcer, antidiarrhoeal, diuretic, anticancer and other pharmacological effects. The current review will high point the chemical constituents and pharmacological effects of Lawsoniainermis.

KEYWORDS: Lawsonia inermis, Henna, Constituents, Napthoquinone, Lawsone.

INTRODUCTION

The Henna plant is a large flowering tree, 5 meters tall, indigenous to tropical and sub-tropical regions Asia, and Northern Australia. The use of henna leaves powder was used for colouring hair, nails and beautification parts of human body.[1] Different parts of plants especially leave including flowers, stem, bark, the root is used as traditional medicine for years, and have a large number of identified compounds, coumarins, flavonoids, alkyl phenones, terpenes, aliphatic hydrocarbons, and alkaloids.[2]

Phytochemist gave the compound the vernacular name lawsone due to its genesis. Henna is a whole glycosidase, able to break down the glycosidic bond when drawn in contact with hot water. Therefore lawsone has been extracted by maceration, infusion and digestion.[3] The main colouring agent of henna is lawsone (2-hydroxy- 1,4 naphthoquinone) which is

particularly undiffused in the leaves foliage. The dry powder leaves of henna consist of 0.5 — 1.5% lawsone. Besides lawsone, the plant also contains esculetin, Gallic acid, hennadiol, betulinic acid, hennatannic acid coumarin, laxanthone, etc.[4] Henna was used as a fungicidal and applied to hair to combat lice and dandruff in olden time, other uses like the treatment of rheumatoid arthritis, migraine, ulcers, diarrhoea, jaundice, spleen enlargement, and diabetic mellitus, etc.[5]

Henna leafs, flowers, seeds, stembark, and roots were used in the treatment of diarrhoea, diabetes, ulcer, leucorrhoea, arthritis, fever and colouring agent. The anticonvulsant, the anthelmintic and antibacterial activity of various extracts of Lawsonia inermis is carried out in present time.[6]

Common names

English: Samphire, Cypress shrub

Hindi: Hena, Mindi

Gujrat: Medi

Marathi: Mendhi, Mendi

Tamil: Alvanam, Avani

Telugu: Goranta, Kromm.[7,8]

ETHANOBOTANY OF PLANT

The research was carried out on the different species of medicinal plant in the Almora district of Uttarakhand in India, which is located in the central Himalaya. There are 35 species and 188 medicinal floras are studied for medicinal use in future. The researchers in south western, Nigeria was carried out ethnobotanical survey and found that 41% of the people were used Lawsonia inermis leaves as antimalarial drug (Idowu etal., 2010).[9,10,11]

MORPHOLOGICAL CHARACTERISTICS OF LEAF

L. inermis (Henna) is a tall shrub which height is about 6 to 25 ft. It has multi branches with paired leaves. It is a growing plant of the starting two years. The morphological studies showed that the leaf is sessile, lanceolate, opposite, ovate narrow at entire base. (Figure1).[12]

Figure 1: Morphology of lawsonia inermis leaf.

MICROSCOPIAL CHARACTERISTICS OF LEAF

When cutting the T.S of Henna leaf, the microscopically chemistry was showed that the external upper and lower epidermis was found to be present on the upper and lower portions of mid rib which is covered by the thin cuticle layer. 2- 4 layers of collenchymatous cells were present on the upper and lower surface of epidermal cells. These cells were angular and had a thick wall and it also contain isodiametric and intracellular space. In xylem vessels and tracheid were present along with the cambium cell its mid portion contain phloem tissues. In phloem, phloem fibres were present.

Prismatic crystals of calcium oxalate were present near about parenchymatous zone. In this vascular bundle cells were present in the center which was irregular in shape the details are shown in Figure 2.[13,14]

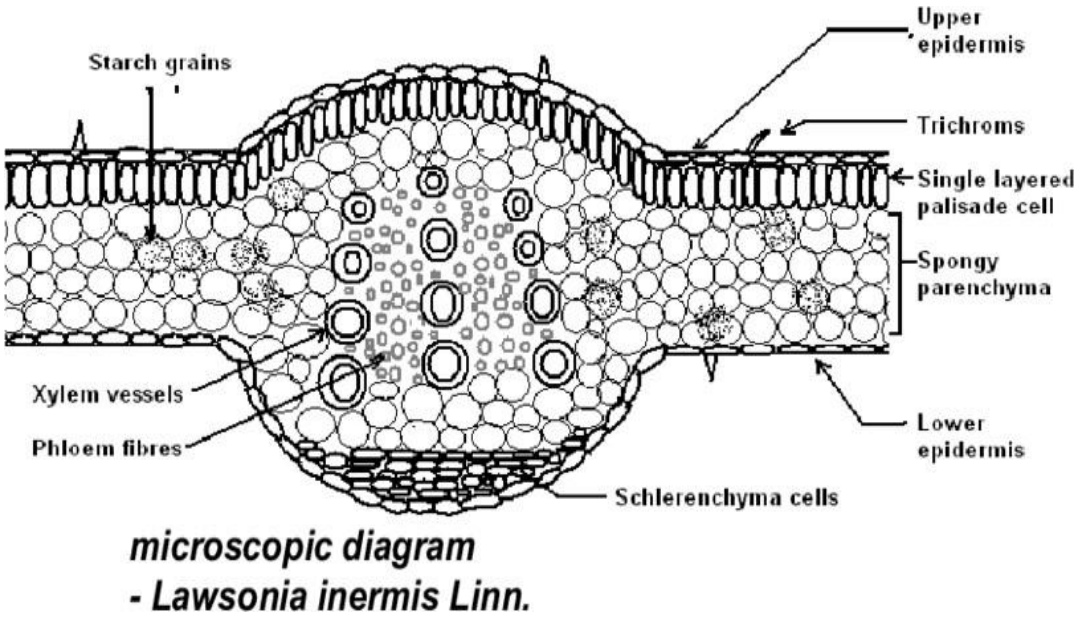
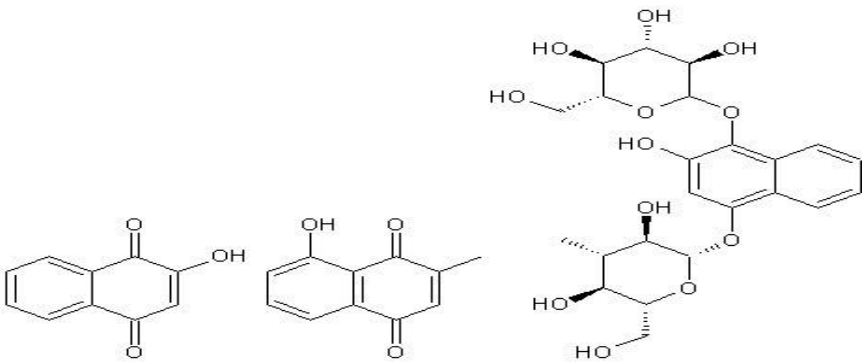
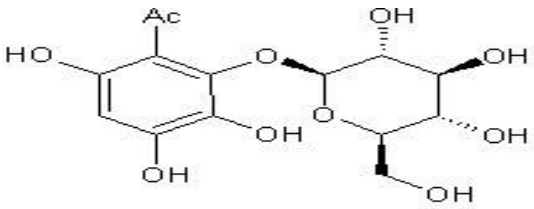


Figure 2: Photograph of T.S of Lawsonia inermis L., leaf.

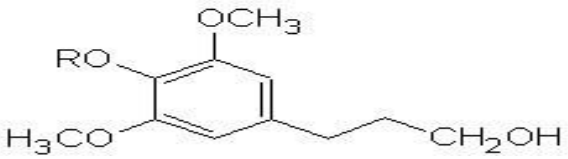
PHYTOCHEMISTRY

Lawsonia inermis contains naphthoquinones derivatives, Phenolic Compounds, Terpenoids, Sterols, xanthones, coumarins, Flavonoids, Essential oils, and chemical constituents.



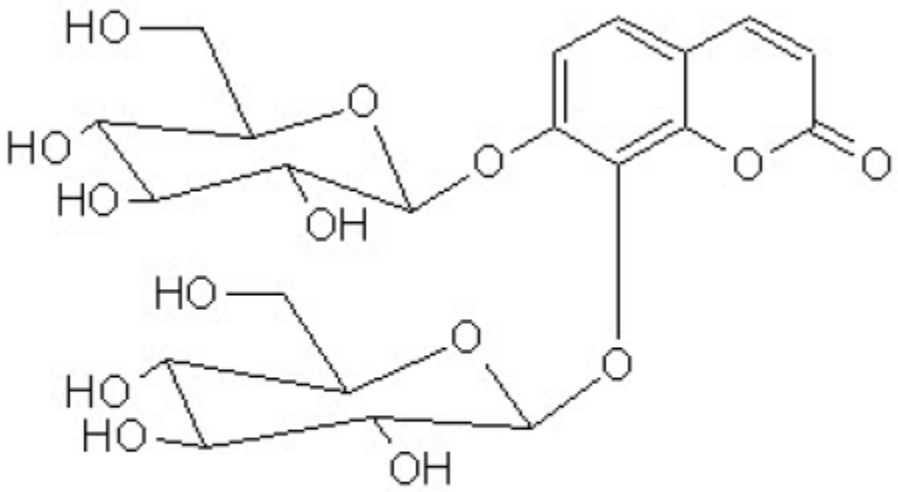


Lalioside

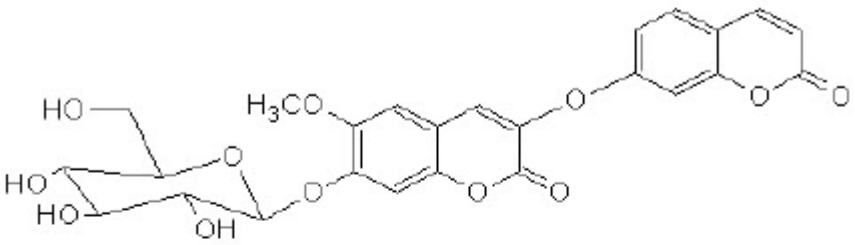


Lawsoniaside B, R = α-D-glucopyranoside

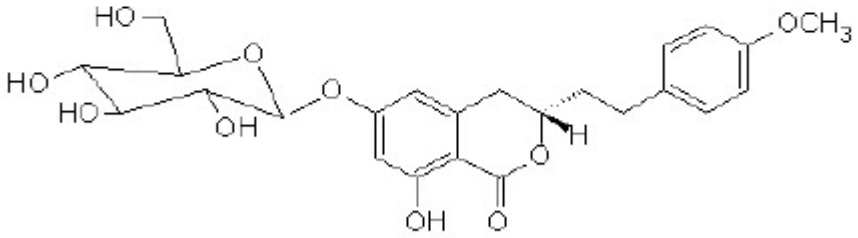
Syringinoside, R = β-D-glucopyranosyl-(1 6)-β-D-glucopyranoside



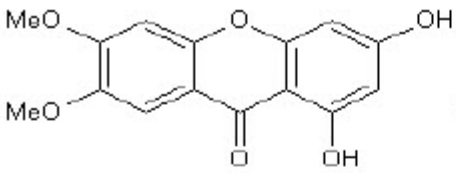
Daphneside



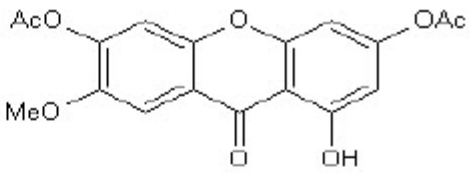
Daphnorin



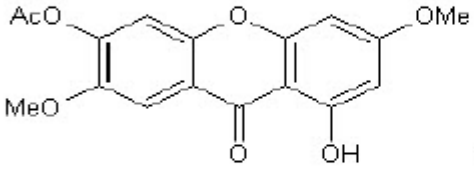
Agrimonolide 6-O-β-D-glucopyranoside



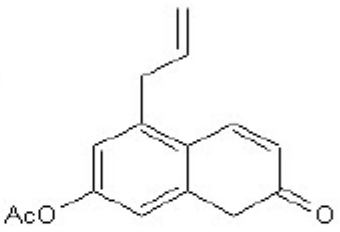
Laxanthone - I



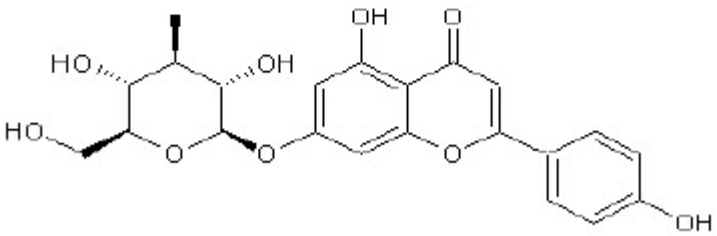
Laxanthone - II



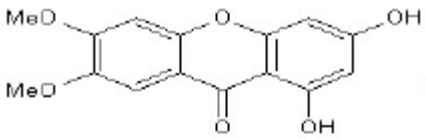
Laxanthone – III



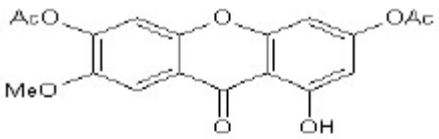
Lacoumarin



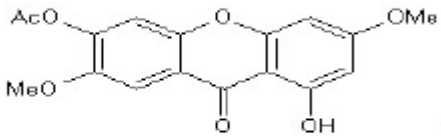
Apigenin-7-glucoside



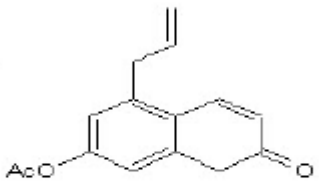
Laxanthone - I



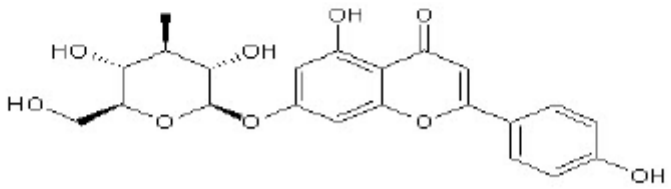
Laxanthone - II



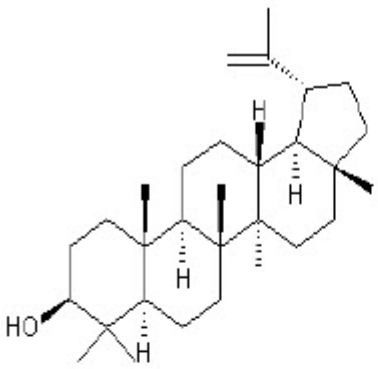
Laxanthone – III



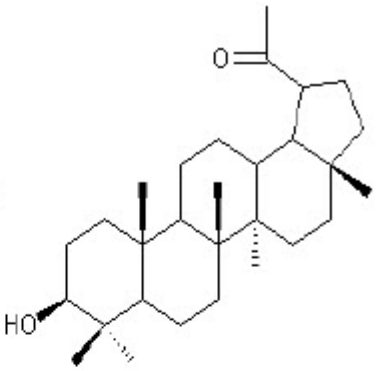
Lacoumarin



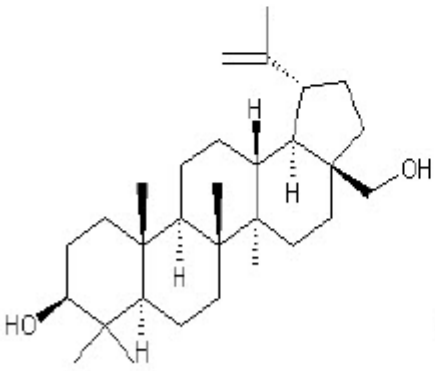
Apigenin-7-glucoside



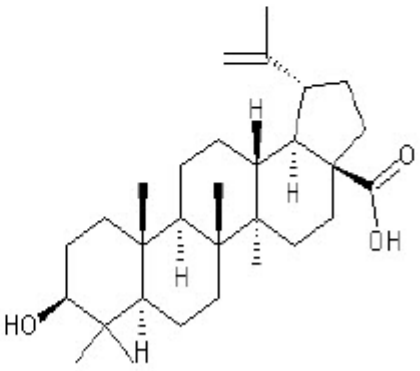
Lupeol



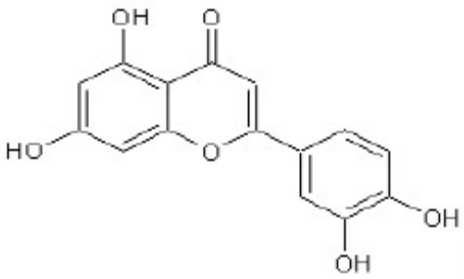
30-*nor*-lupan-3β-ol-20-one



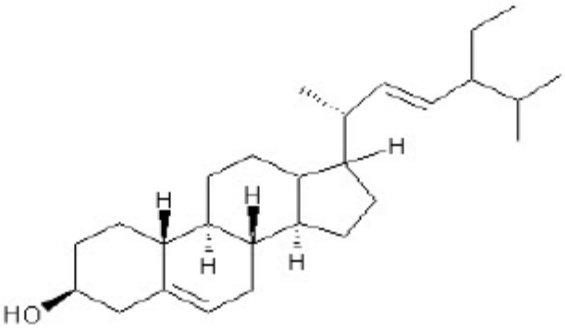
Betulin



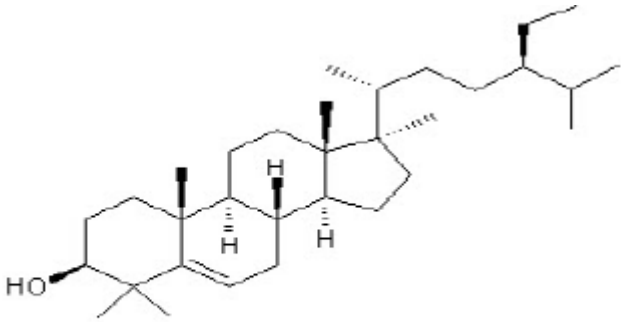
Betulinic acid



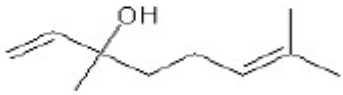
Luteolin



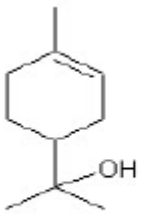
Stigmasterol



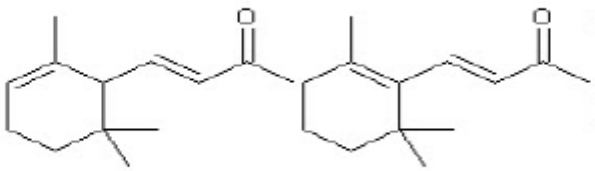
β-sitosterol



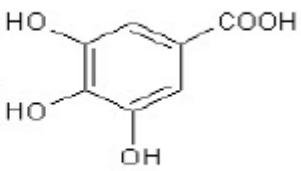
Linalool



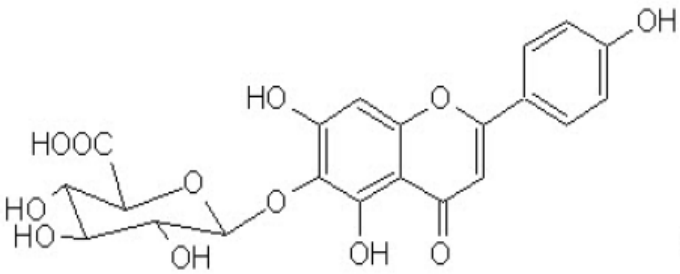
α-terpineol



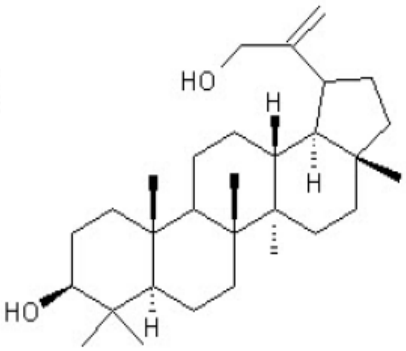
α-ionone β-ionone



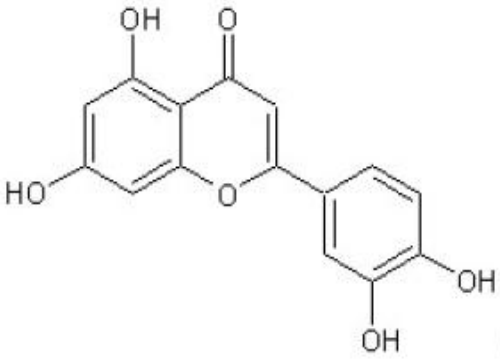
Gallic acid



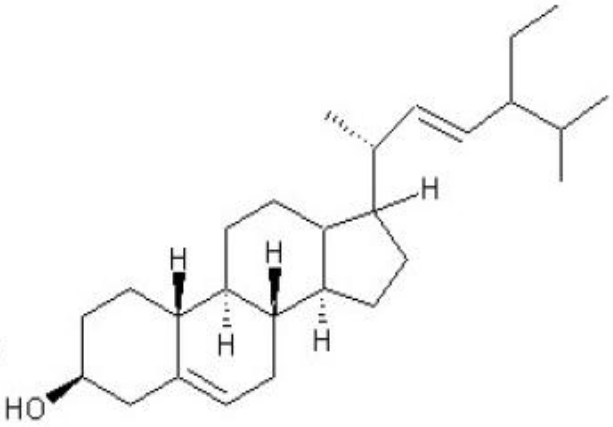
Isoscutellarin



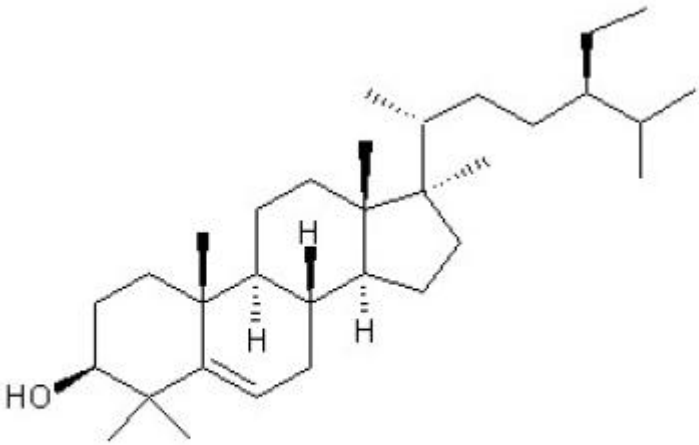
Hennadiol



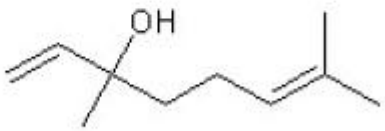
Luteolin



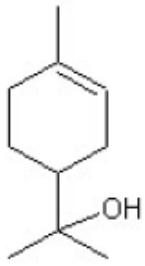
Stigmasterol



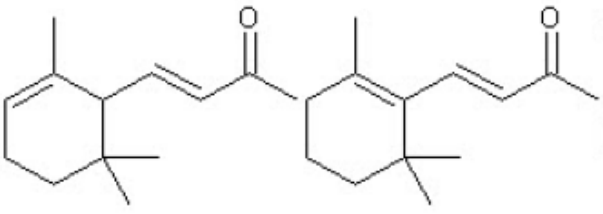
β-sitosterol



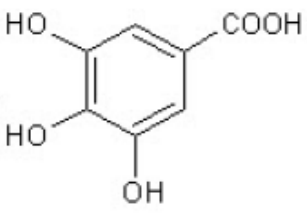
Linalool



α-terpineol



α-ionone β-ionone



Gallic acid

CONVENTIONAL APPLICATIONS

In Charak samhita this plant is defined to be used in the cure of aundice, colouring hair and epilepsy and In Sushruta samhita this plant is described to be used in the remedy of cancerous

ulcers.[17] The use of Heena leaves in dysuria and skin disorder is showed in Indian Ayurvedic Pharmacopoeia.[18]

Heena leaves taste is sour and it is use in the treatment of urinary disorer, bronchitis, amenerrhoea and scurvy, spleen disorder and help in the expansion of hair.[15] In refigeration and sleeplessness.[19]

Heena flowers are used the woof of lawsonia inermis has been given in the enlongation of spleen, jaundice and also used in calculous affectivity, and it is also used as a substituent in skin disorders.[16] Heena was commounly used as meicinal plant due to its antifungal, sedative, hypotrnsive and antibactarial activity.[20]

PHARMACOLOGICAL ACTIVITIES OF LAWSONIA INERMIS IN PLANT

1. Antioxidant activity

The chief component of L.inermisis Lawsone (2-hydroxy-1, 4 Napthoquinone) By guineapigoxidationof phenanthridine by superoxide, aldehyde oxidase and peroxide synthesis was taken and detected to be 6-10% and 85-90% individually. The action modes were concluded to be flavin adenine dinucleotide. Highest plasma concentration of lawsone is over 15 fold and IC50 value of lawsone was found to be 9.3 ± 1.1 µm, which shows high level of protective factor.[21] Within the liver of albino mice, the modulation effect of 80% ethanolic extract of L.Inermisleaveswere studied on phase-I and phase-II drug-metabolism enzymes like glutathione content, antioxidant enzyme, lactate dehydrogenase and lipid peroxidation. Antioxidant enzymes controlled doses were productive in increasing the hepatic glutathione reductase, catalase and superoxide dismutase activities markedly at both dose levels. Reduced glutathione (GSH) was found to be considerably raised in the liver. On investigation of stomach, liver, renal, the enzyme glutathione S-transferase and DT-diaphorase levels were found to be increased in a dose-independent mode.[22] By using IC50 different constituents separated from the L.inermisleaves were tested for their antioxidant activity. This conclusion showed that all separated compounds revealed antioxidant activity compared to that of ascorbate (2.5).

2. Antifungal activity

Trichophyton mentagrophytes, M. canis. Tonsurans, T. verrucose, Epidermophyton floccosum, M. ferrugineum, showed strong sensitivity against L.Inermis. Ethanolic, methanolic and aqueous extract of L. inermis leaves was engaged in defence mechanism

against germination of spore of Drechslera oryzae.[25] Lawsonia inermis barks extract showed positive toxicity against Microsporum gypseum and Trichophyton mentagrophytes during the screening for activity of 30 species of plant. When extract tested against 13 other fungi species it is found that it has wide fungi toxic spectrum.

Further, the extract fungi toxicity remained unchanged on autoclaving at high temperature and after long time storage.[26] A flavus inscribed highly sensitive and hence solvent extracts, chloroform, benzene, methanol, petroleum ether and ethanolic extract of plant represented antifungal activity.[27] These findings concluded that henna extract used as antifungal for the safe keeping of plants or crops against fungal disease.

3. Antibacterial activity

Henna showed strong activity against Bordetella. This conclude that L. inermis used for the remedy of bacterial infections.[22] For testing antimicrobial activity of dried leafs and seeds of L.Inermis for their antimicrobial activity against three standard strains and eleven isolated strains. The dried leaves of L.Inermis showed the better antimicrobial activity and have a specific against Shigella sonnei.[23] To treat infectious disease used ethanolic extracts of 20 plant species due to their antibacterial activity.[24] Primary offender of burn wounds e.g., Pseudomonas aeruginosa and Staphylococcus aureus were treated with aqueous extract and chloroform extract acquired from. L.Inermis, leaves by using well diffusion methods. Overall, the study recommended that L. inermis is productive in the control of wound disorder.[20]

4. Hepatoprotective activity

L. inermis dried leaves extract in petroleum ether; ester and butanol showed that ethanolic extract have hepatoprotective activity against CCL4 used in mice which showed hepatotoxicity. The ethanolic extract and its portion remarkably decreased SGOT and SGPT, activities, and decreased the weight of liver in comparison to LIV-52.[28,29]

5. Antidiabetic activity

L. inermis 70% ethanolic extracts remarkably showed hypolipidemic and hypoglycemic activities when it is tested in alloxan-induced diabetic mice. It is found that glucose and cholesterol level is decreased 0.8 g/kg from normal level L.[30]

6. Anti-inflammatory activity

L. inermis chemical constituent lawsaritol and Isoplumbagin were separated from stem bark and root which is used in carrageenan-induced paw edema in mice. 100 mg/kg oral dose of 61, 60 an 40% of chemical constituent of compounds phenylbutazone, Isoplumbagin and lawsaritol. It was conclude that in comparison to phenylbutazone, the plumbagin showed important activity, as compared to that of phenylbutazone.[32] Chloroform and butanol fractions represent powerful analgesic, antipyretic, and anti-inflammatory activity that aqueous portion of ethanolic extract of L.inermis in a dose-dependent mode.[33]

7. Tuberculostatic activity: To study in-vitro and in-vivo tuberculostatic activity of Lawsonia inermis in which Lowenstein Jensen medium is used, Tubercle bacilli and M. tuberculosis H37Rv growth in sputum was inhibited by 6 μg/ml of the herb. In-vivo experiment on mice and guinea pig showed that 5 mg/kg dose of plant is effective in the bacterial infection especially in M. tuberculosis H37Rv.[34]

8. Antidermatophytic activity

Testing antidermatophytic activity of ethanol, hexane, and ethyl acetate extracts of L. inermis on 5 strains of the Tinea rebrand Tinea mentagrophytes. All these extract in-vitro study displayed antidermatophytic activity of lawsonia inermis.[35]

9. Immunomodulatory activity

L. inermis extract of 1mg/ml dose showed immuno regulatory activity. Total methanolic extract of L.inermis leaves leaded by the compounds which are segregated acquire the lymphocyte transformation of test.[21] Naphthoquinone portion displayed immuno regulatory activity.[36]

10. Nootropic activity

To studied the activity of the extract of L. inermis leaves in petroleum ether and acetone on the behavioural change of memory and tension. The nootropic activity of extract initiated clonidine produced hypothermy, and decreased lithium-induced bob head. Though the haloperidol-induced narcolepsy was unchanged.[37]

11. Anticonvulsant activity

The albino mice which are adult, healthy, whole night fast of weight 20-25 gm. were used to study the anticonvulsant activity. The mice were differentiated into six different groups.

Water and standard diet were also provided to the mice. Each group were contains six animals. Later half an hour of dose administration, for 0.2 sec animals were provoked through electrodes with 50Ma current. The hind leg tonic extensor spasm abolishment was recorded for anticonvulsant activity. The given method was repeated after 60 and 90 minutes of dose administration.[38]

12. Anthelmintic activity

All extracts were made, by using the earthworm embryo used for checking anthelmintic activity. Collected worms were washed with saline solution. The test samples of all the extracts were made in the concentration of 10, 20, 50 and 100mg by using tween 80 which is diluted.

Same size three worms were place in a 9cm Petridis which contain above solutions. Albendazole in the concentration of 10, 20, 50 and 100 mg/ml were used as a standard solution and normal solution were used as a control. Paralysis time and death time of worms were recorded in this experiment.[39]

CONCLUSION

This study showed that lawsonia inermis have several important phytoconstituents, which are responsible for various pharmacological activities. It mainly contains carbohydrate, phenols, saponins & flavonoids. In this review also studied morphology and microscopy of Lawsonia inermis. This study concluded that henna have several therapeutically activity, it showed antibacterial, anticonvulsant, antitubercular and antidiabetic along this it also showed antifungal activity.

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