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Research Article

PHARMACOLOGY OF HEMIDESMUS INDICUS FOR VARIOUS CNS ACTIVITIES

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Abstract:

The aqueous and ethanolic extracts of the plants viz., *H. indicus* (Stem & Leaves) and *L. camara* (Stem & Flowers) were evaluated for various CNS activity viz., anti-inflammatory activity, analgesic activity, antipyretic activity, central muscle relaxant property, anti- convulsant activity, CNS stimulant or depressant activity, anxiolytic activity and sedative- hypnotics activity in different animal models. The results obtained indicate that the extracts found to have significant ($P < 0.05$). Aqueous extracts at test doses 400 mg/kg body weight was found to be more effective in all most all of the biological activity screened in compared to other extracts at different dose and standard drug. Furthermore, all these activities of CNS are due to the presence of alkaloids, terpenoids and tannins which was also confirmed in preliminary phytochemical screening of the extracts of both plants.

Hence, it was proved and concluded from the present research work that Both Plant extracts were found satisfactory potent for CNS activities viz. to viz., analgesic effect, antipyretic effect, anti-inflammatory effect, central muscle relaxant property, anti-convulsant effect,

CNS depressant effect, anxiolytic effect and sedative-hypnotics effect in proper respective animal models.

Moreover, the test dose of 400 mg/kg has promising effects than other test doses in aqueous and ethanolic extracts of both plant parts.

Keywords: indigenous, native, Unani Ayurveda, medicine, irremediable resources, Analgesic, medial dose, micrometric, morphological, parametere

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INTRODUCTION:**Indigenous plants**

Indigenous plants are native to a specific area. India has many indigenous species. Indigenous plants are the natural inhabitants, as they are naturally occurring plants. Alternative names for indigenous plants are local native plants, Indian native plants.

It's essential to save indigenous species because they have often evolved to cope up with particular conditions and circumstances. Indigenous species found to contain unique properties, which have been used to develop specialized drugs to save lives. Once indigenous plants become extinct, they will lost forever.

Global concern is the fondness of plant origin medicines over chemical medicines, because of least or no side effects. India has extensive capacity of growing number of precious medicinal plants. Over 700 plants have been used in Unani and Ayurveda medicine. Globalized and modernized medicines derived from ayurveda are of alternative type of medicines. The annual value of medicinal plants in developing countries is about

Rs.1, 00,000 crores, out of this India's share is about Rs. 400 crores.

Plants have been used effectively as a source of food, clothes and shelter. Besides it, they provide timber, fuel, dyes, gum, resins, medicines etc. and had very notable role in human civilization. The dependence on plant-based material is increasing day by day. Plants provide a lot of biodiversity. Their contribution in biodiversity cannot be disregard. Due to their significance, people are reneging towards nature.

Indeed, the uses of plants were discovered by ancient people by trial-and-error method. Obviously, plants have been prized for their aromatic, flowering and drug yielding qualities.

Plants are alive and that are exhaustible, if over used and sustainable, if used with care and wisdom. However, presently plants are focuses not only as a source of health care but also as a source of primary need. In recent years attempts have been made to introduce drug plants to the common people. The cultivation practices have been developed and localized commercially across the nation. As per

WHO, herbal remedies usage throughout the world exceeds the conventional drugs twice or thrice. WHO is aware about the vitality of herbal medicines and therefore supports medicinal plants and their products use.

Benefits of Indigenous plants

Indigenous plants are alive, so maintaining their presence is essential as they:

- Have evolved to the local climatic conditions, so adapted to survive the seasonal changes and relied upon by native wild life for food and shelter.
- Give its unique visual character, support animals that control pest outbreaks, so help to foster an ecological balance.
- Have evolved to grow in local soils, so not require any additional fertilizers or frequent watering.
- Have avoided the weed issue that arises from exotic or non-local native plants which may spread into native bush land.

Have cultural uses for existing community such as traditional bush foods and medicines

The legality of herbal / traditional products

Traditional medicines is the sum of total knowledge, skills and practices, based on theories, beliefs and experiences; indigenous to cultures that are used to maintain health and also to cure, prevent, diagnose, improve and to treat physical and mental illnesses.

A traditional medicine that has been adopted by other populations (outside its indigenous culture) is often termed alternative or complementary medicine.

Current challenges facing herbal / traditional products

The revitalization of herbal / traditional plants in health care brings higher demand for products; however more analysis is required to verify health advantages.

- In post recessionary atmosphere, several analysis centers have seen their budgets cut as grants and funding come in alternative areas.
- The teaching information of ancient medication is restricted in most medical colleges.
- A weak or non-existent legal framework is exploited to patent herbs and ingredients native to an area for the profit of many international firms.

- Higher demand for seasoning products burdens agricultural and animal resources.

PLAN OF WORK

In order to achieve these objectives following studies have been undertaken:

1. Exhaustive literature survey.
2. Selection of plants based on their ethnomedical/ traditional uses.
3. Collection and authentication of plants.
4. Preliminary Phytochemical Screening
5. Acute toxicity study LD₅₀
6. Pharmacological Screening by using:

- *Hemidesmus indicus* L.
- Stem (ethanol and water extract)
- Leaves (ethanol and water extract)
- *Lantana camara* L.
- Stem (ethanol and water extract)
- Flowers (ethanol and water extra

Followed by CNS activities:

- a) Analgesic activity
- b) Anti-inflammatory activity c) Anti-pyretic activity
- d) Central / skeletal muscle relaxant property e) Anti-convulsant activity
- f) CNS stimulant or depressant activity g) Anxiolytic activity

- h) Sedative-Hypnotics activity

7. Computation of data.

8. Summary and Conclusion.

9. References

RESULTS AND DISCUSSION:

General Overview

Medicinal plants have curative properties due to the presence of various complex chemical substance of different composition, which are found as secondary plant metabolites in one or more parts of these plants. These plant metabolites, according to their composition, are grouped as alkaloids, glycosides, saponins, corticosteroids, essential oils etc. However, it should be stated in all fairness that our knowledge is still less about the biosynthetic pathway, leading to the formation of active constituents for which these plants are valued. The forest and remote rural places have been the traditional sources of herbs. During the past decade, a dramatic increase in exports of medicinal plants attests the worldwide interest in traditional health system. Most of these plants being taken from the wild, hundreds of species are now threatened with extinction because of over-exploitation.

Pharmacognostical Evaluation

Macroscopic Examination

The macroscopic examination of the plant viz., *H. indicus* L. (Stem & Leaves) were carried out.

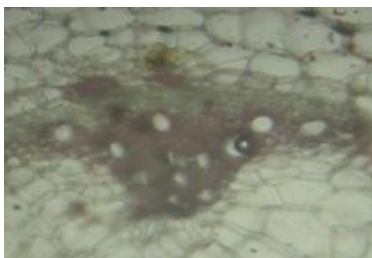
The results are reported in the table given below

Morphological Parameters of *Hemidesmus indicus* (Stem & Leaves)

S. No.	Parameters	<i>Hemidesmus indicus</i> L.	
		Stem	Leaves
1.	Size	-	10-12 cm long
2.	Shape	Cylindrical	Cylindrical, Irregular
3.	Color	Light green	Yellowish brown
4.	Odor	Odorless	Odorless
5.	Taste	Acrid	Acrid

Microscopic Examination**Stem anatomy of *Hemidesmus indicus* L.**

Stems are usually above ground organs and grow towards light (positively phototropic) and away from the ground (negatively geotropic), except in the case of certain metamorphic (modified) stems. The main stem develops from the plumule of the embryo, while lateral branches develop from auxillary buds or from adventitious buds. In normal stems clearly, defined internodes and nodes can be distinguished, the latter being the regions where the leaves are attached. In younger stems stomata are found in the epidermis while in the mature stem lenticels are evident.

**Quantitative microscopy**

The fresh leaves of the plant viz., *H. indicus* L. was evaluated for leaves constant such as stomatal number, stomatal index, palisade ratio and vein-islet number were determined and presented in the table given below:

Leaf constant of Leaves of *H. indicus* L.

S. No.	Parameters	Value (1 mm) ²
		<i>H. indicus</i> L.
1.	Stomatal number	
	□ Upper epidermis	2.8-6.9
	□ Lower epidermis	1.4-3.8
2.	Stomatal index	
	□ Upper epidermis	2-6
	□ Lower epidermis	6-107-12
3.	Palisade ratio	
	Base:middle:apex	4:3:8
4.	Vein-islet number	22

Fluorescence analysis of *H. indicus* L. Stem

S.N	Powdered Crude Drug + Reagents	Day Light	UV (Short) 254 nm	UV (Long) 366 nm
1.	Powder crude drug	Brown	Light brown	Dark Brown
2.	Drug + 5% FeCl ₃	Light brown	Light brown	Grey
3.	Drug + 1M H ₂ SO ₄	Green	Yellowish green	Dark green
4.	Drug + Dil. HNO ₃	Green	Green	Light green
5.	Drug + 5%NaOH	Light brown	Light brown	Dark brown
6.	Drug+5%NaOH+ Water	Light green	Light green	Light green
7.	Drug + 5% Iodine	Brown	Light brown	Dark Brown
8.	Drug + Conc. HNO ₃	Light brown	Light brown	Grey
9.	Drug + Ethanol	Green	Yellowish green	Dark green
10.	Drug + Dil. HCl	Green	Green	Light green

Fluorescence analysis of *H. indicus* L. Leaves

S.N	Powdered Crude Drug + Reagents	Day Light	UV (Short) 254 nm	UV (Long) 366 nm
1.	Powdered crude drug	Brown	Brown	Black
2.	Drug + 5% FeCl ₃	Yellow brown	Light brown	Light brown
3.	Drug + 1M H ₂ SO ₄	Violet	Violet	Dark violet
4.	Drug + Dil. HNO ₃	Light green	Dark green	Dark green
5.	Drug + 5%NaOH	Brown	Brown	Black
6.	Drug + 5%NaOH + H ₂ O	Violet	Violet	Dark violet
7.	Drug + 5% Iodine	Light brown	Brown	Brown
8.	Drug + Conc. HNO ₃	Light brown	Yellow	Yellow
9.	Drug + Ethanol	Dark brown	Dark brown	Dark brown
10.	Drug + Dil. HCl	Yellow brown	Light brown	Light brown

Analgesic activity

An analgesic or painkiller is any member of the group of drugs used to achieve analgesia, relief from pain. Analgesic drugs act in various ways on the peripheral and central nervous systems. They are distinct from anesthetics, which temporarily affect, and in some instances completely eliminate, sensation. Analgesics include paracetamol (known in North America as acetaminophen or simply APAP), the non-steroidal anti-inflammatory drugs (NSAIDs) such as the salicylates, and opioid drugs such as morphine and oxycodone. In choosing analgesics, the severity and response to other medication determines the choice of agent; the WHO pain ladder specifies mild analgesics as its first step. Analgesic choice is also determined by the type of pain: For neuropathic pain, traditional analgesics are less effective, and there is often benefit from classes of drugs that are not normally considered analgesics, such as tricyclic antidepressants and anticonvulsants.

Percentage yield of various extracts of Hemidesmus indicus L

S	Extract	Estimated percentage	Color of extract	Nature of extract	pH
1	Stem extract (Ethanol)	2.98	Light brown	Semi Solid	7.01
2	Stem extract (Aqueous)	4.11	Brown	Solid Powder	7.02
3	Leaves extract (Ethanol)	3.92	Green	Semi Solid	7.02
4	Leaves extract (Aqueous)	9.94	Dark green	Solid Powder	7.00

Drugs

All drugs have been obtained from Pallav Chemicals Pvt. Ltd., Bombay. All extracts were suspended with the help of gum acacia in distilled water at the time of oral administration.

Experimental Protocols

All experimental protocols were reviewed and accepted by the Institutional Animal Ethical Committee (IAEC) prior to the initiation of allied experiments.

Experimental Animals

Adult rats of Westar strains of 150-250 grams and Swiss albino mice of 18-25 grams of either sex have been obtained from local market of Indore. The animals have been placed in a controlled room, with normal room temperature $25 \pm 3^{\circ}\text{C}$ and humidity 35 - 50 %. Normal rat feeds and water *ad libitum* have been provided at regular interval of time. Animals have been housed in polypropylene cages. The animals have been allowed to acclimatize to laboratory conditions prior to experimental procedures.

Administration of Dose

The test extract has been administered in a single dose by gavages using a stomach tube or suitable feeding canula. If single dose is not possible in unfavourable conditions, then dose has been given in smaller fractions over a period not exceeding to 24 hours. Only water *ad libitum* has been provided to animals, rest they were fasted overnight, before dosing. Following the period of fasting, the animals were weighed and the test substances were administered. The dose level used as the starting dose has been selected from one of four fixed levels 5, 50, 300 and 2000 mg/kg body weight.

Acute toxicity studies have been performed with three animals and observations found after studies are:

- Maximum 2000 mg/kg body weight of dose has been given.
- Depends on LD₅₀ determination, 1/10th of the dose has been fixed as the medial dose for further pharmacological screenings.
- At maximum level of dose, no mortality rate has been found.

PHARMACOLOGICAL SCREENING FOR CNS**EXPERIMENTAL DESIGN**

60 healthy & adult Swiss albino mice & 60 Westar rats were assigned to randomly to 10 groups as follows:

Group	Category	Drug administered <i>H. indicus</i>
1.	Normal Control	Normal saline or Normal water
2.	Positive control	Standard drug as per activity
3.	Test 1 (200 mg/kg)	5% W/V <i>H. indicus</i> stem extract (ethanol)
4.	Test 2 (400 mg/kg)	10% W/V <i>H. indicus</i> stem extract (ethanol)
5.	Test 3 (200 mg/kg)	5% W/V <i>H. indicus</i> stem extract (aqueous)
6.	Test 4 (400 mg/kg)	10% W/V <i>H. indicus</i> stem extract (aqueous)
7.	Test 5 (200 mg/kg)	5% W/V <i>H. indicus</i> leaves extract (ethanol)
8.	Test 6 (400 mg/kg)	10% W/V <i>H. indicus</i> leaves extract (ethanol)
9.	Test 7 (200 mg/kg)	5% W/V <i>H. indicus</i> leaves extract (aqueous)
10.	Test 8 (400 mg/kg)	10% W/V <i>H. indicus</i> leaves extract (aqueous)

CONCLUSION:

Nature is always been a major source of medicinal plants since long ago and plethora modern drugs have been taken from them. Lots of medicinal plant species used in treatment of diseases and disorders which affects number of people globally. Medicinal plants generate commercial demand of drugs and their products worldwide. Continue efforts made in recent years for introduction of drugs obtained from these plants, to common people. The agronomical practices for growing of medicinal plants have been developed. Herbal medicines are widely used by all community, either directly as folk remedies or medicaments. It are evident that many viable herbal drugs have been identified, evaluated and validated by their ancient folk healers for treatment of particular illness. It is the most prominent way for treating several illnesses, mostly in tribal and rural societies. The need of hour is the development of action plan for escalates awareness about importance and values of plants as their healing effects. We should link indigenous traditional knowledge with modern technology.

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