

Hair Growth Promoting Activity of *Wedelia chinensis*

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ABSTRACT

Hairs are the unique features of the human body. Now days hair fall is one of the major problems arises worldwide.¹ Hair loss is a distressing condition for an increasing number of men and women. Therefore, it is of great importance, to develop new therapies for the treatment of hair loss.² It is a dermatologic disorder, and the surge for discovering natural products with hair growth promoting potential is continuous hair loss, or alopecia, is a common patient complaint and a source of significant psychological and physical distress.³ Androgens are considered to be one of the most important causes for alopecia apart from a variety of other factors. *Wedelia Chinensis* is one of the richest sources of Wedelolactone (WDL). It is a coumestan compound extracted from *Wedelia Chinensis* plant. It shows the anti-oxidant property for hair growth promotion. A focus is placed on their mechanism of action and the review also covers isolated phytoconstituents possessing hair growth promoting effect. In the present study evaluation methods for hair growth activity and causes of hair loss are given.⁴

Keywords: Alopecia, hair growth, Wedelolactone, *Wedelia Chinensis*, herbal formulation.

1 INTRODUCTION:

Alopecia is a dermatological disorder that has been known for more than thousand years. It is seen all over the world and affects approximately 0.2-2% of the world population. In alopecia there are two types in that hair suffers aggression and alopecia areata.⁵ Alopecia is a non-scarring, autoimmune hair loss on the scalp, and/or body. In the traditional system of medicine, many plants and herbal formulations are reported for hair growth promotion but the lack of sound scientific backing and information limits their use.¹

Wedelia chinensis (*W. Chinensis*) belonging to family Asteraceae (sunflower family) has great importance in Ayurveda, Siddha and Unani Systems of Traditional Medicine. Chemical characterization of this plant has been carried out and several constituents were isolated such as alkaloids, flavonoids, tannins, polyphenols, vanilic acid, coumestan, gallic acid, and terpenoids, phytosterols, etc. The leaves are used in dyeing grey hair and in promoting the growth of hair. Various pharmacological activities were found in *W. Chinensis* such as antioxidant, anti-inflammatory, analgesic, sedative, ant stress, antiulcer genic, anticancer, antibacterial, antifungal, anticonvulsant, hepatoprotective and androgen suppressing activities.⁴ The presence of Wedelolactone and dimethyl Wedelolactone in *Wedelia Chinensis* promote hair growth. The review provides the recent therapeutic applications in hair promoting activity. The goal of the present article is to provide an overview of available treatment alternatives for hair loss. On the basis of a market survey carried out on crude drugs used presently for herbal hair, oils give us a clue for selection of drugs for the hair growth-promoting activity.⁵ Recently, various plant extracts have been patented for use in hair growth or hair tonics products, and for prevention of alopecia. Thus, it was decided that in present investigation phytochemical screening of *Wedelia Chinensis* and evaluated for hair growth.⁶



Fig. 1. Crude drug *Wedelia Chinensis*

It is scabrous procumbent perennial soft herb with high camphor like odour growth. It is also known by different vernacular names in different regions, Hindi, (Pilabhangra), Marathi (Pivala bhangra), Sanskrit (Birimagari), Bengali (Bhimra) and Kannada (Gargneri). *Wedelia chinensis* is also known as *Solidago chinensis*. *Wedelia chinensis* is found in plains district of Madras presidency, China. The leaves are used in dyeing grey hair and in promoting the growth of hair.⁶

Objective: This study was designed to investigate the potential *Wedelia Chinensis* (*Sphagneticola*) extracts in promotion of hair growth. This review presents an overview on plants identified to possess hair growth activity in various ethno-botanical studies and surveys of tradition medicinal plants.⁷

Chemical constituents: Rich in Wedelolactone and dimethyl Wedelolactone, tannins, phytosterols which provide nutrition's to hair and also causes darkening of hairs. Alpha pinene, Beta- caryophyllene, alpha phellandrene, limonene, polyphenols, Gallic acid, vanilic acid, etc.⁵

Phytochemical investigation of *Wedelia Chinensis*:

Table.1. Active constituents of *Wedelia Chinensis*

S. No	Compounds	Petroleum ether	Chloroform	Ethyl acetate	Methanol
1.	Alkaloids				
	Dragendorff reagent	-	+	+	+++
	Meyer's reagent	-	+	+	+++
	Wagner's reagent	-	+	+	+++
2.	Flavonoids	-	+	+	+++
3.	Saponins	-	-	-	-
4.	Phenols				
	Ferric chloride test	-	+	+	+++
	Lead acetate test	-	+	+	+++
	Liebarman's test	-	+	+	+++
5.	Steroids				
	Liebermann-Burchard's test	-	-	-	-
	Salkowski reaction	-	-	-	-
6.	Glycosides	-	-	-	-
7.	Tannins				
	Lead acetate test	-	+	+	+++
	Ferric chloride test	-	+	+	+++
8.	Cardiac glycosides	-	-	-	-
9.	Anthraquinones	-	-	-	-
10.	Resins	-	-	-	-

- not present, + - low presence, +++ - high presence

Hair disorders²:

- Alopecia (no scarring) involves hair loss all over or in circular areas, a receding hair line, broken hairs, a smooth scalp, inflammation, and possibly loss of lashes, eyebrows, or pubic hair.
- **Alopecia** (scarring) is limited to particular areas. Symptoms are inflammation at the edge and follicle loss toward the center of lesions, violet-colored skin abnormalities, and scaling.
- **Alopecia Areata:** Genetic Factor, Autoimmune disease, Circular patches of hair loss, Hairs grow back white.

❖ **Causes of hair loss³:**

- Medications and supplements.
- Radiation therapy to the head.
- Various factors contributing to hair loss includes genetic predisposition, hormonal factors, and disease states such as typhoid, malaria, jaundice and use of chemotherapeutic agents.
- Family history (heredity). The most common cause of hair loss is a hereditary condition that happens with aging.



Fig.2. Causes of hair loss

Management of hair loss: The management of hair loss, includes prevention and treatment of alopecia, baldness, and hair thinning, and regrowth of hair.

Hair growth factors²: Various cytokines and growth factors are involved in the regulation of hair morphogenesis and cycle hair growth. Several growth factors as FGF-1, FGF-2, FGF-7, FGF-10, IGF-1, IGF-2, and EGF can promote cell cycle and proliferation and have the potential to rescue hair loss and facilitate hair cell regeneration *In-vivo* and *In-vitro*.

Hair growth cycle: The hair growth cycle consists of three phases: anagen, catagen, and telogen. Anagen, the growth phase, lasts between 3 and 10 years.

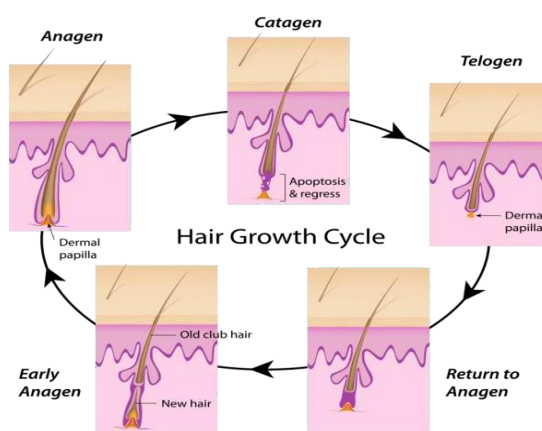
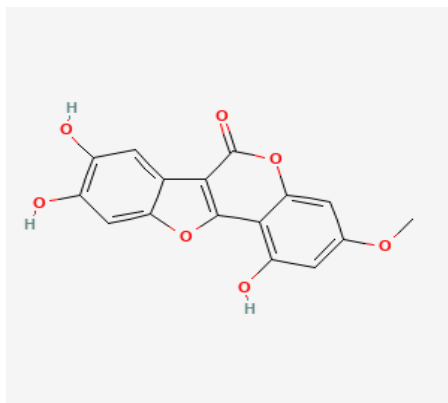


Fig. 3. Hair growth cycle

❖ **Wedelolactone for hair growth promoting⁴:**

Wedelolactone (WDL) is a coumestan compound extracted from the *Wedelia Chinensis* plant. Wedelolactone, has been reported to possess anti-inflammatory, antioxidant, antibacterial, antioxidant, etc. Wedelolactone (WDL), a major bioactive and phytochemical compound in *Wedelia Chinensis*. Wedelolactone a natural coumestan was first obtained from the *Wedelia Calandulacea* extract in 1956 and later isolated from Bhringaraj. The relevant experimental information on WDL from Scientific data bases such as PubMed. (PubMed CID: 5281813)



2 Methods

Table no. 2 Profile of Wedelolactone

Molecular formula	Molecular weight	Chemical name	Density	PubChem ID
C ₁₆ H ₁₀ O ₇	314.25	7-methoxy 5,11,12-trihydroxy-coumestan	1.655 g/cm ³	5281813

Plant material: Plant material of *Wedelia Chinensis* was collected and authenticate. The fresh leaves subjected to hot continuous Soxhlet extraction with methanol (35-45°C) for 72 hours. The filtrate was collected and marc was again subjected to extraction process for further 24 hours.

❖ Phytochemical screening:

Qualitative estimation of hydro alcoholic extract of *Wedelia Chinensis* were performed for the identification of various chemical constituents like carbohydrates, flavonoids, proteins, amino acids, phenols, tannins, glycosides and steroids, coumestan, phytosterols, stigmasterol, etc.

❖ Extraction methods of Wedelolactone⁴:

- Solvent or Soxhlet extraction method
- Ultra sound assisted extraction method
- Maceration Followed by percolation
- Supercritical CO₂ extraction
- Microwave assisted extraction
- Ultra-high pressure-assisted extraction
- Aqueous Two- phase system extraction method

❖ Hair evaluation method⁸:

Non-invasive method: daily hair counts, standardized wash test, 60-s hair count, hair weight. Semi- invasive methods: Trichogram and unit area Trichogram Invasive methods: e.g. scalp biopsy.

Preparation of hair formulation: Herbal hair oil is more preferred and is used in many ailments of hair. They promote hair growth, improve elegance of hair, and prevent hair fall. Hair oil not only promotes hair growth they also provide necessary moisture to the scalp rendering in beautiful hairs. The present review has aimed to give information about preparation and



evaluation of herbal formulation of *Wedelia Chinensis* for hair growth activity. Record all concentration of herbal extract % for preparing oil for hair growth activity.

There are three methods for herbal oil preparation:

1. Direct boiling method
2. Paste method
3. Cloth pouch method

❖ Physical evaluation:

In physical evaluation parameters like specific gravity, PH, refractive index, viscosity and acid value were determined and the formulations were subjected to biological evaluation.

3 Evaluation parameters of herbal hair formulation¹⁰:

1. **Skin irritation test:** for these tests the institute should cleared for the said biological evaluation by Animal Ethics Committee. Preliminary skin irritation test on albino rats, the skin from the back of six rats was shaved on both sides of the back using hair clipper and an electric shaver to exposed test areas. Six healthy rats were selected for the study. Each rat was caged individually food and water given during the test period 24 hrs prior to the test. After cleaning test sites, the prepared formulations are applied and visual observations were made for the appearance of any irritation for a total period of 72 hr.

2. **Hair growth initiation test:** The quantitative modified model for the study of hair growth initiation was followed. The rabbits were divided into four groups of one rabbit named as group A, B, C and D respectively. Eleven patches were developed on each rabbit. Rabbit of group A was treated with *Wedelia Chinensis* oil of 1-10% concentration on individual patches keeping first patch as control. This treatment was continued for 15 days and during the course the hair growth initiation pattern was observed and reported.

3. **Hair length:** Hair was plucked randomly from the depilated area with the help of electric clipper and measured the hair length with the help vernier caliper Or Scale and calculated the mean of hair length.

4. Hair density

5. Quantitative hair growth study

❖ Result and discussion⁹:

Herbal drugs generally exert their growth promotion effects by improving blood flow to scalp either by slight skin irritation or by angiogenesis. *Wedelia Chinensis* shows the hair growth promotion by improving blood flow to the scalp. In this present article we interpret emphasize on herbal option for treatment of hair loss. The study reviewed the beneficial effects of *Wedelia Chinensis* from genus *Wedelia* and their phytoconstituents or bioactive compounds on hair growth and their mechanism of action (growth factors, cytokines). Hair loss is a common and ever- increasing problem in primary health care practice. Hair loss occurs due to various reason mentioned in this article. Besides having hair growth promotion effect, therapy with the synthetic drug has become questionable due to their occasional lack of efficacy, safety and their potential side effect. This has led to increase interest in alternative remedies such as herbal medicine. Herbal drugs provide a new revolution for hair growth.

In this review we summarized that *Wedelia Chinensis* herbal plant that are believed to reduce of hair loss and at the same time stimulate new hair growth and also complied the isolated phytoconstituents that is Wedelolactone, dimethyl- wedelolactone, stigmaterol, phytosterols, etc. From this phytoconstituents Wedelolactone gives or shows the better activity, and believed to reduce rate of hair loss.

This article also covers the various extraction methods for Wedelolactone and also various hair oil formulation preparation methods. More scientific documentations and evidences are desirable for promotion of herbal treatment to hair loss which must be substantiated by reliable clinical trials with standardized material and formulation. The review may facilitate the case and cause of natural remedy for the distressing and disturbing problem of hair loss to world community. This information will serve as a basis for developing more effective therapeutic agents for the treatment of alopecia and improving our understanding of their mechanisms of action.



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Conflict of Interest Statement:

The authors have no conflicts of interest to declare.

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