INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

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Review Article

Plant Dicliptera bupleuroide is a source of Anti-oxidant, anti-inflammatory and some phytoconstituents which help in wound healing- Review

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ARTICLE INFO

Published: 18 Mar. 2025
Keywords:
Plant Dicliptera bupleuroide, Anti-oxidant, anti-inflammatory,
DOI:
10.5281/zenodo.15047163

ABSTRACT

Dicliptera bupleuroides is a perennial herb that is used medicinally and is a member of the Acanthaceae family. In local language , Dicliptera bupleuroides is referred to as kaalu or kirch. It is present in the planes of Afghanistan and Pakistan. Dicliptera bupleuroides has a wide range of pharmacological characteristics, including antioxidant , antidiabetic , antimicrobial, hepatoprotective and other biological activities. It contain phenols, lipids, flavonoids, starch, glycosides and ascorbic acid. The purpose of this review article is to document the latest data about its medicinal use, traditional use, phytochemicals, and pharmacological activities which help in wound healing. Thus, it is concluded that D. bupleroides could be a potential source of therapeutically active compounds, which would be helpful for the discovery of clinically effective and safe drugs.

INTRODUCTION

Herbs and plants with medical properties are known as medicinal plants or herbs. Human health and well-being have been the uses of these plants since ancient times. Over time, several pharmaceutical firms began to use these plants or herbs to manufacture herbal preparations, although their primary use was still in Ayurvedic treatment. These plants produce a formulation based on known medicinal efficaciousness investigated from crude extract (1)(2). Modern herbal preparations are widely used throughout various groups due to their therapeutic effectiveness, low cost, and little adverse effects. Conversely, because synthetic medications contain a variety of ingredients, they are more expensive and have more adverse effects (3)(4). Wound healing is one of the most complex processes in the human body. It involves the spatial and temporal synchronization of a variety of cell types with distinct roles in the phases of hemostasis, inflammation, growth, re-epithelialization, and remodeling. With the evolution of single cell technologies, it has been possible to uncover phenotypic and functional heterogeneity within

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

several of these cell types. 5 6 The *Acanthaceae* family includes about 250 genera and nearly 2500 species belonging to dicotyledonous flowering plants, whereas most of them are shrubs and tropical herbs (7). Traditionally, members of the family *Acanthaceae* were adopted to treat wounds externally; they play a crucial role in treating various lethal diseases, acting as an antioxidant, antipyretic, cytotoxic, antifungal insecticidal, immunomodulatory, and hepatoprotective, as well as antiviral agent (8) These promising activities are due to the presence of many secondary metabolites represented by naphthoquinone, benzenoids, flavonoids, triterpenoids, and glycosides. Local people of kadyala demonstrated that they used the fresh leaves of this plant to cure diabetes, poultice in eczema, juice to cure stomach troubles, as a tonic, in eye diseases, in treatment of GIT (gastrointestinal tract) problems, in cough, in fever, and inflammation of wounds (9,10,11,12)

Phases of Wound Healing

Wound healing occurs through four overlapping phases

1. Hemostasis: After the injury, it is ascertained that the blood vessels constrict, and there is aggregation of platelets that will eventually form a clot; this prevents excessive blood loss and provides a provisional matrix for incoming cells.
2. Inflammation: Inflammation sets in after hemostasis with inflammatory cells such as neutrophils and macrophages pouring into the wound site; the cells are very significant in clearing debris and pathogens while at the same time releasing cytokines and growth factors to promote healing. 13
3. Proliferation: The proliferation is characterized with multiplication of fibroblasts, synthesis of collagen and ECM with occurrence of angiogenesis to supply oxygen and nutrients necessary for healing the tissue. Epithelial cells migrates in order to cover the wound surface and consequently close it. 14
4. Remodelling: This phase lasts from months to years. The collagen matrix remodels as the wound begins to be stronger and more elastic. The resulting scar tissue is often less functional than the natural tissue (Martin et al., 2018). 15

Plant Profile

Botanical Name: *Dicliptera bupleuroides*
Kingdom: Plantae
Class: Equisetopsida
Family: Acanthaceae
Genus: Dicliptera
Species*:* *Dicliptera bupleuroides*
Plant Distribution
Dicliptera bupleuroides is a herbal plant which is grown in subtropical areas found in various region like Afghanistan, assam, Bangladesh, China, India, east Himalaya and more (16).

Botanical Description

The plant is around 90 cm long and leaves are 1-8 cm in green in colour on the both ends and the flowers are mainly pink in colour with purplish tinge and the flower is 1.2-1.5cm long. The flowering is November – June

Traditional Use

- This plant is use traditionally by the local people in various ways like the decoction of whole plant used as a tonic.
- The paste of the leaves of the plant helps in the treatment of eczema.
- This plant also use in ear drops.
- Dicliptera bupleuroides also use in snake bites, stomach disorders and bone fractions (17)

Medicinal Uses

Dicliptera bupleuroides also cure the eye diseases and freshly crushed leaves when applied gently on the body three times in a day for a week in eczema. Fresh leaves of this plant can cure the diabetes and

juice of this plant used to cure stomach problems which is used by local people of kadyala

Traditionally, members of the family *Acanthaceae* were adopted to treat wounds externally; they play a crucial role in treating various lethal diseases, acting as an antioxidant, antipyretic, cytotoxic, antifungal insecticidal, immunomodulatory, and hepatoprotective, as well as antiviral agent(18).

Phytochemicals

Dicliptera bupleuroides contains various phytoconstituents which helps in various activities like anti-oxidants, anti-diabetics, anti-inflammatory, hepatoprotective and many more.

Determination of primary metabolites of plant dicliptera bupleuroides contains lots of active chemical constituents like

Alkaloids

They have used to treat various disorders which includes inflammation, allergies, cancer, diabetes, and many others.(19)

Tannins

Tannins are used in the clarification of wine and beer, as a constituent to reduce viscosity of drilling mud for oil wells, and in boiler water to prevent scale formation.

Glycosides

Cardiac glycosides improve cardiac output in people who have heart failure.

Flavanoids

including anticancer, antioxidant, anti-inflammatory, and antiviral properties.(20)

Terpenoids

Terpenoids have been found to be useful in the prevention and therapy of several diseases, including cancer, and also to have antimicrobial, antifungal, antiparasitic, antiviral, anti-allergenic, antispasmodic, antihyperglycemic, antiinflammatory, and immunomodulatory properties.(21)(22)

Saponins

Saponins are used in the development of steroidal drugs.

Fats and oils

They are important in the diet as energy sources and as sources of essential fatty acids and fat-soluble vitamins.

Pharmacological Activity

Anti-Oxidants Activity

Anti-Oxidants activity of Dicliptera bupleuroides is performed by munish choudhary with different concentration i.e. 20µg/ml, 40 µg/ml, 60 µg/ml, 80 µg/ml, 100 µg/ml using DPPH method. Which shows absorbance 0.740, 0.623, 0.555, 0.485, 0.362 and % inhibition is 45, 53.5, 59, 64.1 and 73.2. This study shows that the plant has high antioxidants properties with IC_{50} value is 33.2 µg/ml.

Anti-inflammation Activity

This study aimed to evaluate the anti-inflammatory activity of Dicliptera bupleuroides methanol extract (DBM) and its fractions. The samples showed significant inhibition of cyclooxygenase where DBM showed the highest inhibitory potential at 100 µg/mL estimated by 67.86%. At a 400 mg/kg dose, all the samples showed pronounced results in carrageenan induced acute inflammation in rat model with DBM showed the highest efficiency displaying 65.32% inhibition compared to the untreated rats. Formalin model was also employed, DBM exhibited 65.33% and 69.39% inhibition at 200 and 400 mg/kg, respectively approaching the standard drug.

Antibacterial Activity

The antibacterial activity of Dicliptera bupleuroides is performed with different fractions like n-exane, CHCl3, EtOAc and n-BuOH (18). Against two Gram-positive bacteria i.e. B. subtilis and S. aureus and also against two Gram-negative bacteria that is E. coli and P. multocida by using disc diffusion method using streptomycin sulphate.

Table 1: ZOI (mm) MIC value of various fractions of Dicliptera bupleuroides against Gram-positive and Gram-negative bacteria.

Plant	Sample	Zones of Inhibition (mm)				MIC (µg/mL)			
		S. aureus	B. subtilis	P. multocida	E. coli	S. aureus	B. subtilis	P. multocida	E. coli
Dicliptera bupleuroides	n-Hexane fr.	-	-	14	12	-	-	251	276
	$CHCL_3$ fr.	14	20‡	14	16	250	126	251	226
	EtOAc fr.	16	18	20‡	22‡	225	199	125	118
	n-BuOH fr.	12	14	12	14	278	251	278	251
	Aqueous fr.	16	14	18	14	225	226	202	252

Anthelmintic Activity

To check the anthelmintic activity of the plant Dicliptera bupleuroides the experiment is performed on earthworm which is collected from crops field of Sialkot. The activity is carried out according to the method of Ajaiyeoba (23).

Table 2: Anthelminthic activity of Dicliptera bupleuroides

Treatment	Concentration (mg/ml)	Paralysis Time (min)	Death Time (min)
+ve control	-	-	-
Standard (Albendazole)	25	48.2 ± 3.96	80 ± 7.90
	75	45.4 ± 3.64	70.2 ± 5.76
	100	37.4 ± 3.43	55.2 ± 6.37
Methanolic Extract	25	65.8 ± 2.58	133 ± 3.46
	75	62 ± 2.12	128.4 ± 5.94
	100	58 ± 4.30	112.6 ±7.98
Hexane fraction	25	186 ± 8.39	514.4 ± 11.26
	75	175 ± 4.12	493.6 ± 11.61
	100	167.8 ± 1.92	473 ± 8.36
Ethyl acetate fraction	25	65 ± 2.23	142.6 ± 7.98
	75	60.4 ± 2.07	122.6 ± 7.98
	100	53 ± 2.91	92.4 ± 10.01
Chloroform fraction	25	84 ± 3.08	193.2 ± 8.34
	75	75 ± 4.12	184.8 ± 4.43
	100	66.2 ± 5.71	173.6 ± 3.04
n-Butanol fraction	25	62.8 ± 3.96	137.6 ± 5.59
	75	59.8 ± 2.86	126.6 ± 5.45
	100	54.6 ± 4.21	108.8 ± 7.39
Aqueous fraction	25	238.6 ± 12.03	676 ± 9.61
	75	223.6 ± 8.50	666.8 ± 7.12
	100	194.8 ± 10.13	617 ± 12.04

Insecticidal Activity

To check the insecticidal activity of the plant Dicliptera bupleuroides the experiment is performed on test insects which are Tribolium castaneum, Sitophilus oryzae, and Rhyzopertha dominica of same size and age of each species. Permethrin is use as standard insecticidal (24).

Table 3: Insecticidal activity of different fractions of Dicliptera *bupleuroides* nees.

Extract/Fraction	% Mortality (Mean ± SD)		
	Tribolium castaneum	Sitophilus oryzae	Rhyzopertha dominica
-ve Control	0	0	0
+ve Control (Permethrin) (20 mg / 3 ml)	100	100	100
Methanol (200 mg / 3 ml)	0	0	0
n-Hexane (100 mg / 3 ml)	0	0	0
Ethyl acetate (100 mg / 3 ml)	0	0	0
Chloroform (100 mg / 3 ml)	0	0	0
Butanol (100 mg / 3 ml)	10	0	0
Aqueous (100 mg / 3 ml)	0	0	0

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HOW TO CITE: Ankit Sharma*, Dr Dev Prakash Dahiya, Anchal Sankhyan, Vishal, Plant Dicliptera bupleuroide is a source of Anti-oxidant, anti-inflammatory and some phytoconstituents which help in wound healing-Review, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 3, 1718-1723. https://doi.org/10.5281/zenodo.15047163