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PORTULACA OLERACEA L.: A REVIEW OF PHYTOCHEMISTRY AND PHARMACOLOGICAL EFFECTS

***Shital D. Godse**

Department of Pharmaceutical Chemistry, Smt. Kashibai Navale College of Pharmacy, Kondhwa-Saswad Road, Kondhwa (Bk.), Pune. 411048, Maharashra State, India.

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***Corresponding Author**
Prof. Shital D. Godse
Department of Pharmaceutical Chemistry, Smt. Kashibai Navale College of Pharmacy, Kondhwa-Saswad Road, Kondhwa (Bk.), Pune. 411048, Maharashra State, India.

ABSTRACT

Portulaca oleracea it is an aromatic, perennial, evergreen creeper of the mint family *Lamiaceae*. It is also called as ground-ivy, gill-over-the-ground. *Glechoma* is also widely used in beer as flavoring, clarification, and preservative. Sesquiterpenes; flavonoids, including quercetin, hyperoside, and apigenin; saponins; bitter principle, glechomine. it used as a diagestive, stimulant, expectorant, abortificient, apetize, pectoral, diuretic, tonic, astringent, vermifuge. However, few molecular mechanisms of action are known. This review gives a summary of phytochemistry and pharmacological effects of *Portulaca oleracea*.

KEYWORDS: *Portulaca oleracea (Glechoma hederacea)*, pharmacology, Phytochemistry, antioxidant.

INTRODUCTION

Portulaca oleracea of the mint family Lamiaceae. Which regularly known as *Glechoma hederacea* (syn. *Nepeta glechoma* Benth., *Nepeta hederacea* (L.) Trevir.). it is found throughout the Old World extending from North Africa through the Middle East and the Indian Subcontinent to Malesia and Australasia. Vernacular name of the plant are ghol in Marathi and hindi, in Sanskrit ghotaka, lonika, in Gujarati luni people language. The synonyme of portulaca oleracia is ground-ivy, gill-over-the-ground, creeping charlie, alehoof, tunhoof, catsfoot.

It is an aromatic, perennial, evergreen creeper, field balm, and run-away-robin.[1] It is also known as creeping jenny. It is widely used as medicinal plant and is used as a salad green in many countries.

Glechoma hederacea L. (Labiatae) is used in folk medicine to treat different disease for centuries.[1] *portulaca oleracia* has culinary and medicinal uses. Glechoma hederaceae L., two triterpene carboxylic acids, ursolic acid (UA) and oleanolic acid (OA) have been isolated.[2] The fresh herb is also used to prepare an herbal tea which contain vitamin C in a large amount, which is very useful for ageing factor and skin. It has a distinctive, mildly peppery flavor; it can be cooked as a pot herb, in some of the country fresh leaves is eat as green salad.

Glechoma was also widely used by the Saxons in brewing beer as flavoring, clarification, and preservative, Sesquiterpenes; flavonoids, including quercetin, hyperoside, and apigenin; saponins; bitter principle, alkaloids, hederacine A (1) and hederacine B (2), isolated from *Glechoma hederaceae*.[3]

Glechoma hederacea contained only small amounts of squalene.[4] Since long time past periods it used as a diagestive, stimulant, expectorant, abortificient, apetize, pectoral, diuretic, tonic, astringent, vermifuge. However, few molecular mechanisms of action are known. In this study, we provide detailed information on traditional uses, phytochemistry, pharmacological uses, of *portulaca oleracia*.

Portulaca oleracea leaf

TAXONOMY

Kingdom	**Plantae**
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Caryophyllidae
Order	Caryophyllales
Family	Portulacaceae
Genus	Portulaca
Species	***P. oleracea***

Geographical Abstract

A) whole plant

B) Flower

c) Trichomes

d) Seed

É) Root

F) leaf

Different parts of *Portulaca oleracia.*

[(a) whole plant, (b) flower, (c) trichomes, (d) roots, (e) leaf]

MEDICINAL USE *portulaca oleracia* is given to treat chronic catarrh, bronchitis, cystitis, and tinnitus. It is also used to help reduce the symptoms of mild diarrhoea, piles, and gastritis. The Chinese prescribe it for flu, kidney stones, trauma, rheumatoid arthritis, and skin sores. *Glechoma hederacea* were selected as common European medicinal herbs and sources for tea infusion preparations.[4] It is act as antioxidant, anti-inflammatory, antibacterial etc.[6-8]

3. Pharmacology

Over the past decades, many researchers have studied the pharmacological activities of *Glechoma hederacea* this review gives information about a comprehensive summary of the main pharmacological properties which are presented below. *P. oleracea* has been an astringent, and a remedy for headaches, inflammation of the eyes and other organs, burning of the stomach, erysipela, disorders of the bladder, numbness of the teeth, excessive sexual desire, burning fevers, worms, dysentery, hemorrhoids, eruptions of blood, and bites.[5]

Phytochemistry

The *Glechoma hederacea* cells rich in caffeic, chlorogenic and rosmarinic acid.

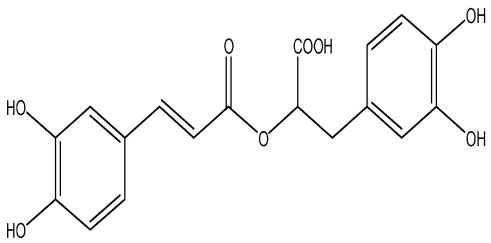
Qualitative Phytochemical analysis

- Alkaloid
- Carbohydrate
- glycoside
- Tannin and phenolic compound
- Flavonides
- Fixed oil
- saponin
- Protein and amino acid
- steroids

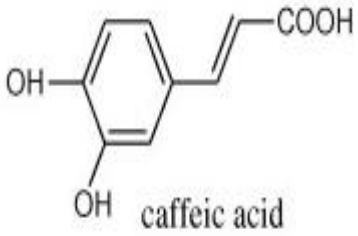
Table 1: Phytochemical screening of *P.oleracea.*

Sr. No	Test	Methanol extract
1.	Alkaloid	+
2.	Carbohydrate	+
3.	glycoside	-
4.	Tannin and phenolic compound	+
5.	Flavonides	+
6.	Fixed oil	-
7.	saponin	+
8.	Protein and amino acid	+
9.	steroids	+

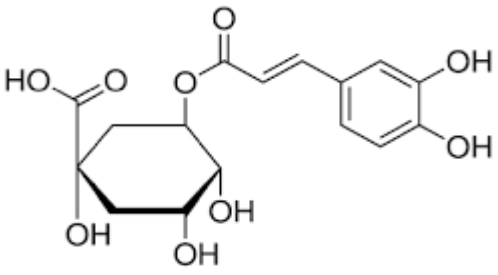
Chemical constituents



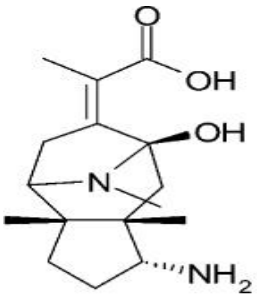
Rosmarinic acid



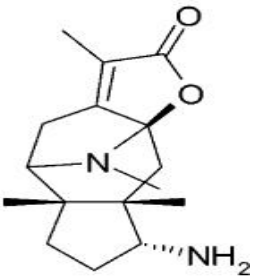
caffeic acid



Structure of chlorogenic acid



Hederacine A



Hederacine B

hydroxycinnamoyl-CoA:shikimate hydroxycinnamoyltransferase (HST), an important enzyme of monolignol formation, in leaves, flowers, stems and roots of naturally grown *G. hederacea* were proved. The expression of RAS and HST genes was found in all organs only not in roots. Flowers contain 12.5% RA in their dry mass, leaves, stems and roots about 1%. Chlorogenic Acid was found in leaves (2.0%), while it was at 1.6% in flowers, 1.3% in stems and almost undetectable in roots, means chlorogenic acid found highest in leaf. The caffeic acid content remained at or below 0.4% of the dry weight in all organs.

Antitumor

To know the effect of P. Oleracea two triterpene carboxylic acids, oleanolic acid (OA) and ursolic acid (UA) has been isolated as inhibitors of 12-O-tetradecanoylphorbol-13-acetate (TPA) induced Epstein-Barr virus (EBV) activation in Raji cells. Both acids strongly inhibited the activation at a 1000-fold molar ratio to 12-O-tetradecanoylphorbol-13-acetate TPA, and also teleocidin B-4. The effect of P. oleracaea as an antitumor was very similar to the antitumor promoters, retinoic acid (RA) and glycyrrhetinic acid (GA).[1] Ursolic acid (UA) and oleanolic acid (OA), which has been isolated from *Glechoma hederacea* as inhibitors of Epstein-Barr virus (EBV) activation induced by 12-O-tetradecanoylphorbol-13-acetate (TPA), were tested against inhibitory effect on tumor promotion by TPA in vivo. They inhibited strongly the tumor promotion in mouse skin and the activities were comparable to that of a known inhibitor of tumor promotion, retinoic acid (RA) which having

the antitumor property.[6] Three new sesquiterpene lactones namely, 1 α,10 β-epoxy-4-hydroxy-glechoma-5-en-olide (1), 1 β,10 α-epoxy-4,8-dihydroxy-glechoma-5-en-olide (2), and 1 β,10 α;4 α,5 β-diepoxy-8-methoxy-glechoman-8 α,12-olide (3), has been isolated from the whole plant of *Glechoma hederacea*, together with four known sesquiterpene lactones. The structures of the three new sesquiterpene lactones were determined by spectroscopic evidence. Cytotoxic effects of the isolated compounds were examined against MDA-MB-231 (breast), HCT116 (colon), SW620 (colon), and DU145 (prostate) human cancer cell lines. And in this study it was conclude that *Glechoma hederacea* contain antitumor property.[17] kim lee.

Antioxident

Glechoma hederacea, once popular as a medicinal plant and as a bitter beer supplement because it is a rich in phenolic antioxidants such as rosmarinic acid and flavonoids. Antioxidant property of *Glechoma hederacea* can use in traditionally in phytotherapy and to their preventive value in diseases. the effects of *Glechoma hederacea* Antioxidant property has been determined by Species to test their antioxidant capacity by using three types of assays. Primary screening for total polyphenols and phenolic acids was also performed to find correlations with the activity. Fractionation of the *Glechoma hederacea* crude extracts were carried out to know the contributions of compounds of different polarity to total antioxidant property. In the stated study the extracts were fractionated using liquid-liquid extraction by using with petroleum ether (PE), dichloromethane (DCM), ethyl acetate (EA), and n-butanol (BuOH). All extracts and fractions were studied for their antioxidant activity using UV-Spectrophotometric assays: DPPH scavenging, phosphomolybdenum reduction, and deoxyribose degradation assay.[7] In the present study they extracts *Glechoma hederacea* plants in water by infusion, maceration, and decoction for characterization of their polyphenol content and antioxidant capacity. Based on the extraction efficiency of polyphenols, the final extract was obtained whose polyphenolic profile, polysaccharides, mineral content, and cytoprotective activities were determined. The content of polyphenols and antioxidant capacity was determined in *Glechoma hederacea*.[8] In the present study they made Ethanol-water (8:2, v/v) and purified ethyl acetate extracts of the plan results showed that it possess significant antioxidant activity. Tests were performed on, prime steam pork lard and active-carbon-treated edible sunflower oil, using Schaal oven test storage conditions at 60 degrees C. The ethanol-water and purified ethyl acetate extracts of *Glechoma hederacea* showed strong antioxidant activity.[9] milo anti.

Antinflammetry

In the released study indicate that the effects of *Glechoma hederacea*, has been widely used in folk remedies for get ride symptoms of inflammation.[10] *Glechoma hederacea* is an herbal plant used in medicine to treat inflammation. Its anti-inflammatory effect, by inhibition of NO synthesis and the pro-inflammatory cytokine TNF-α, have been demonstrated.[11] In this study, the effect of *Glechoma hederacea* on interferon-gamma (IFN-gamma) and lipopolysaccharide (LPS)-induced production of nitric oxide (NO), interleukin (IL)-12p70, IL-12p40, tumor necrosis factor-alpha (TNF-alpha), and IL-6 were examined using mouse peritoneal macrophages. *Glechoma hederacea* inhibits IFN-gamma/LPS-induced NO in a dose-dependent manner.[18] milo anti.

Anti-melanogenesis

In the released study indicate that the effect of *G. hederacea* extract regarding to melanogenesis in B16 melanoma cells effects was examined. The result states the It significantly reduced both the cellular melanin content and tyrosinase activity in a concentration-dependent manner. *G. hederacea* extract inhibits melanin synthesis in B16 melanoma cells but is not cytotoxic. Hence it prove a useful therapeutic agent for treating pigmentation and an effective component of skin whitening cream.[1] The **Anti-melanogenesis** effect of *G. hederacea* demonstrate that it inhibiting the secretion of pro-inflammatory cytokines and melanogenic paracrine factors from keratinocytes, than to direct inhibition of melanogenic activities in melanocytes.[10]

Insecticidal

In the released study indicate that the leaves of ground ivy *(Glechoma hederacea)* contain a lectin it is also called as Gleheda, Insect feeding trials proveded that Gleheda is a potent insecticidal protein for larvae of the Colorado potato beetle (Leptinotarsa decemlineata).[11], the present study states that the potent insecticidal lectin, Gleheda, from the leaves of *Glechoma hederacea* (ground ivy).[12]

Bactericidal

The antibacterial potential of *Portulaca oleracea*. was assessed release studies indicated that the *Glechoma hederacea* L. is most toxic; with the EC50 of 0.4073 g dried plant/l. LC50 values identified by the standard bioassay proved that it is a good indicator of the bactericide property of plant. In the released study indicate that the a microbial ecotoxtest was evaluated to quantify the aggregate bactericide capacity of Labiatae species, based on the

bioluminescence inhibition of the bacterium Vibrio fischeri. Striking differences were found amongst herbs, reaching even 10-fold toxicity.[13]

CONCLUSION

The objective of this review is to study the recent advances in the exploration of the plant *Portulaca oleracea.* The information helpful to search the use of p. Oleracea in various disease. The plant is reported to contain mainly caffeic, chlorogenic and rosmarinic acid which might be useful in the development of new drugs entity of versatile nature to treat various diseases because of their potent antioxidant and antinflammatory property. Hence; there is scope for research work leading to commercial utilization of the *Plant oleracea* in future.

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