Ethenoecological studies of *Oxalis corniculata*: A Updated Review

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Abstract

From times immemorial the plants and various plant extracts have been used in making cures for various diseases and ailments. Ancient medicine systems like Ayurveda, Siddha of India and the Chinese medicine system have used the plants as medicines from hundreds of years. This paper is on Ethenoecological studies of Oxalis corniculata. In this paper it will be discussed that Oxalis corniculata possesses various chemical constituents like tannins, glycosides and about 8 oleic acids like oleic acid, linoleic acid and stearic acid which are good at medicinal value and have various healthy properties. These will be discussed properly in the paper. In this paper traditional medicinal use of oxalis for curing various ailments like skin infections, piles, healing wounds and treating diarrhea will be discussed. In present times modern medicine has also acknowledged many properties like anti-oxidant properties, anti-microbial, anti-inflammatory, wound healing as well as hepato-protective properties associated with the extracts of Oxalis corniculata will also be discussed.

Keywords: ayurveda, Ethenoecological, linoleic acid, stearic acid, hepatoprotective

Introduction

From ancient times the use of plants and various plant extracts have been the central in making cures for various diseases and ailments. Ancient medicine systems like Ayurveda, Siddha of India and the Chinese medicine system have used the plants as medicines from hundreds of years. The Ayurveda basically talked about the concept of tridosha, that is vata, pitta and kapha. The imbalance of any of these doshas caused the ailments in the body. To cure these ailments the use of various plant products were done. One such plant that finds elaborate use in ancient medicine systems is Oxalis corniculata. This plant is indigenously called ‘amalki’ and is used to treat various ailments like skin infections, piles, diarrhea, fevers etc. This plant is known to have anti-oxidant, anti-inflammatory, anti-microbial as well as anti-cancer properties. Even the modern sciences are realizing the importance of these plants and many researches are going on to find out the key chemical constituents that are responsible for their medicinal value.

*Oxalis corniculata*Linn. (Family: Oxalidaceae) is a wide spectrum bio- active medicinal plant. This plant is used in India extensively because of its diverse usage in medicine preparation. Another name given to this plant is creeping wood sorrel. It comprises of all those useful constituents that make up the healthy human body. This plant is used as a medicinal herb to cure many diseases like piles, dysentery, diarrhea, skin diseases andfevers. It also promotes good appetite, reduceskapha, vata, and pitta doshas. The smaller leaves of this medicinal plant are effective in removing warts and even treating opacities of cornea because the leaves show anti-inflammatory, refrigerant andanti-scorbutic properties. *Oxalis corniculata*Linn. is asub-tropical plant that is native to India. The plant is herbaceous with delivate looking appearance and limited growth. It can be found in shady damp places, lawns, roadsides. Geographically it grows prominently in the warmer parts of the country and also in Himalayas with the height of this plant reaching upto 8000 ft. The detailed description and taxonomic classification of Oxalis is as follows:

Taxonomic Classification of Oxalis corniculata:

Kingdom : Plantae
Division :Magnoliophyta
Class : Magnoliopsida
Order :Oxalidales
Family :Oxalidaceae
Genus : Oxalis
Species : O. corniculata

Ethenoecological Distribution: The geographical distribution of this plant can be seen the most in the warmer parts of any country like India. They thrive better in damp and shady places like lawns, roadsides and plantations. They also commonly grow in the Himalayan region and have the height of 8000 ft. Other than India these plants grow abundantly in the easternsea-port towns of the United States of America like Texas and Ontario. They can be found easily in the entire region of Florida. In America they are mostly grown in the southeastern parts from NewFoundland to North Dakota and towards south to Mexico. Larger geographical distribution of *O. corniculata*can be seen in thetemperate and tropical regions of North, Central and South America and the West Indies.

Morphology of Oxalis corniculata:

Root: The root of this plant isdark brownish in color. It is thin and about 1-2 mm in width. The root has no odur or taste but it is branched and rough in texture.
Stem: The creeping stem of this plant is soft and thin which is fragile. The colour is brown-red with no odur or taste.
Leaf: The leaves are cylindrical, thin and 3-9 cm in length. They are palmately compound, trifoliate, petiole-green and pubescent. The smaller leaflets are also green in colour, 1-2 cm long. They areglabrous, obcordate, and sessile or sub sessile and have sour taste.
Flower: The flowers of this plant are yellow in colour. They are axillary and sub-umbellate in appearance.
Fruit: The fruits of this plant are in the shape of a cylindrical capsule and are also tomentose.
Seed: The seeds are small anddark brown in appearance. They are many in number and are broadly ovoid with transversely striates.

Chemical Constituents: It was depicted through a phytochemical investigations that*Oxalis corniculata*Linn. contains tannins, palmitic acid, a mixture of 8 oleic, linoleic,linolenic and stearic acids. The extracts taken from methanole and ethanoleexhibit the presence of carbohydrate, glycosides, phytosterols, flavonoids, proteins, amino acids phenolic compounds,and volatile oil. It also depicted theportions of calcium, fiber and tannin. The study of leaves of this plant shows the presence of tartaric acid and citric acids,calcium oxalate, flavones,glycoflavonesand phenolic acids which includes p- hydroxybenzoic, vanillic and syringic acids. The taste of this medicinal plant is acidic that is sour because of the presence of high concentration of oxate compound in the steam as well as leaves. The leaves of this herb also contain the three C-glycosylflavones which are - isoorientin, isovitexin and sertisin. It can be used as an alternative for vegetable in case of emergency because it contains total carbohydrate, moisture, crude protein and crude lipid. Additionally the leaves of *Oxalis corniculata*are rich in mineral like Sodium, Potassium, Calcium, Nitrogen and Magnesium. These rich components are essential for the human body as it helps in regulating various metabolic pathways.

Impact on human physiology

Traditional Use: Since traditional time O. corniculata Linn. has been used extensively for the medicinal purposes. In India in preparation of a**yurvedic** medicine this plant has been used to cure the diseases related to liver and digestive problems. In other countries like **Nepal**, the leaves of this plant are used for curing stomach problems. In **Zairean** pharmacopoeia this plant was even used as anti-venom. For the purpose of using it as the anti-venoma paste was prepared using the entire plant and it is applied on the snake bit wound. Then another method of using this plant as anti-venom is by making a salted paste using O. corniculata and Aframomumsanguineumand then covering the snake bit wound with it. Not only this but this herb is also used as a appetizer because of its medicinal properties that helps in treating any pitta, Kapa and vatadosha. It is also used to cure diseases likeanaemia, dementia, convulsion, dyspepsia, cancer and piles. This plant can be used as a home remedy for indigestion and diarrhea. For this the plant extracts are boiled with butter milk and then given to the person suffering from these diseases. It is mostly used for children. Another usage of this plant in traditional way is for curing headaches. The paste of the leaves of O. corniculata is made and applied on the forehead to cure headache. For curing the intoxication caused due to the consumption of Dhatura plant the O. corniculata plant juice can be used. For curing this intoxication the juice of the leaves of this plant is to be kept in mouth for some time. The leaves can also be crushed and appiled to the wound caused by the scorpio sting. It heals the wound by stopping the bleeding and helps in quicker recovery. For curing any skin disease this plant can be used by applying topically on warts, acne, corns etc. another method to remove warts by using this plant is by mixing its leaf juice with onion. To get the releaf from inflammation the poultice of O. corniculataleaves can be applied over the inflamed spot. Also if this paste is applied over boils it ripens them. The leaf juice can also be mixed with saturated fats like ghee and black pepper to provide relief from red spots and eruptions on the skin. For the treatment of insomnia castor oil and O. corniculata leaves juice can be mixed and heated to get rid of any water content. Then when the mixture cools down it can be stored in a container. Later this mixture of oil can be massaged to the scalp at the time of going to sleep to enhance sleep quality and smoothness to eyes. This herb is essentially used for curing jaundice. For this a daily dose of fresh *OxalisCorniculata* leaf juice is mixed with buttermilk for the treatment of jaundice.

Modern Utility in Medicine: There are multiple uses of this plant that are now even realized by the modern medicine. Certain such uses are as follows:

- **Pharmacological activities:** *Oxalis Corniculata*plant shows properties likediuretic, emmenagogue, febrifuge, relaxant, anthelmintic, anti-inflammatory, analgesic, astringent, depurative, lithontripic, stomachic and styptic. It is extensively used for curing multiple diseases like fever, urinary tract infections, influenza, enteritis, diarrhoea, traumatic injuries, sprains and even snake bites. These plant extracts can be used to wash off hookworms from the human body. The plant is used in treating scurvy disease as it contains anti-scorbutic properties. The leaves of this plant are highly beneficial in treating intoxication from the seeds of Dhatura, mercury and even arsenic. The juice of this plants leaf is used to treat insect bites, skin eruption and burns. It also possesses antibacterial property. The infusion made from the leaves can be used to get rid of cornea opacities also it can be used to cure itchy eyes by pouring few drops in the eye. Another way that its leaves can be used is by making a decoction to be used as gargle for throat infections.
- **Wound-healing activity:** A study done on rats depicted that Oxalis corniculata plant can be used as wound healer due to the alcoholic and petroleum ether extract present in it. The model used was excision, resutured incision and dead space wound. Throughout the study it was found that the use of this herbal plant resulted in quick healing of the wound through increased wound contraction rate, wound breaking and decreases in epithelization period of the wound.
- **Cardio relaxant activity:** A dose dependant study done on rabbit ileum depicted that the methanol extract of *Oxalis corniculata*have relaxing effect on the rabbit. The study also showed that this herb has cardio relaxant property which relaxed the cardiac activity on rabbit's heart. Another study done on rats depicted that this plant extract shows a fall in diastolic pressure with a lesser fall in systolic pressure.
- **Nematocidal activity:** In a study it was found that *Oxalis corniculata*plant contains ethanolic extract which possessnematotoxic activity against phytoparasitic nematodes. Yet another studydepicted that ethanolic extract of *Oxalis corniculata*have the same propertyas detected on Meloidogyne incognita. In this study it was observed that the nematode showed immobility after 7 days of incubation period. This was studied under the light microscope which confirmed the nematocidal properties of this plant.
- **Anti cancer activity:** In a research done on the ethanolic extract of *Oxalis corniculata*it was found that these extracts are highly beneficial in inhibition of growth of tumor cells and also act as preventive measure against excessive cell growth.
- **Antimicrobial activity:** The studies done on the methanolic and ethanolic extracts of *Oxalis corniculata*plant showed that these extracts possess significant antibacterial activity against Xanthomonas. These extracts also show the similar property against almost fourteen human pathogenic bacteria. In the assay of the compounds taken it was found that the methanolic extract had more profound antimoicrobial property, almost similar to the streptomycin drug.
- **Antifungal activity:** A study conducted on four different types of plants to check their anti-fungal activity. One of the plamnts among them being Oxalis corniculata showed anti-fungal properties against pathogenic fungi. The aqueous extract of this plant was tested which showed significant effect against pathogenic fungi. The extract of *Oxalis corniculata*depicted 31 % antifungal potency against some of the fungi.

- **Antiamoebic activity:** A study conducted on theaxenic cultures of E. histolytica *revealed that Oxalis corniculatacontains several* components that possess antiamoebic activity. Their characterization was based on infrared and mass spectrometry and nuclear magnetic resonance. All the components that depicted antiamoebic activity the galacto-glycerolipid showed the strongest activity.
- **Antioxidant activity:** The study done on rats depicted that at different dose levels the ethanolic extract of *Oxalis corniculata*exhibited antioxidant activity. When themethanolic extract of *oxalis corniculata*was compared with the ascorbic acid it exhibited much better potency of antioxidant activity than ascorbic acid. The study revealed that the concentration of this herb extract required for 50% inhibition of DPPH radical scavenging effect were recorded as 30 mg/ml for methanolic extract and 37 mg/ml for ascorbic acid. Hence it proved that methanolic acid possess more anti-oxidant properties than standard ascorbic acid.
- **Anti-ulcer activity:** Various studies done on the plant extract of Oxalis have shown that it is highly effective in curing ulcers in the gut. It was found that extracts from this plant produce soothing effect and has healing property on the aberrated region or the ulcer in the specific area.
- **Anti-inflammatory activity:** Oxalis corniculata is known for its anti-inflammatory properties. It is used in traditional medicine as topical ointment for curing skin inflammations. Certain extracts from this plant are also used in curing inflammations inside the body. But substantial research is still needed to find out the exact compound responsible for the anti-inflammatory action.
- **Hepato-protective activity:** The various active components of the Oxalis corniculata plant are highly effective in acting as a protective agent for the liver. It protects the liver from several infections and potential ailments and acts as a potent preventive measure for the liver and helps to keep the liver healthy and free from infections.

Conclusion

This paper is on Ethenoecological studies of Oxalis corniculata. From time immemorial plants have been used as medicines to treat various diseases. Through this paper it can be concluded that Oxalis corniculata possesses various chemical constituents like tannins, glycosides and about 8 oleic acids like oleic acid, linoleic acid and stearic acid which are good at medicinal value and have various healthy properties. Through this paper it can be concluded that Oxalis have been extensively used in traditional medicine for curing various ailments like skin infections, piles, healing wounds and treating diarrhea. In present times modern medicine has also acknowledged many properties like anti-oxidant properties, anti-microbial, anti-inflammatory, wound healing as well as hepato-protective properties associated with the extracts of Oxalis corniculata. Though it is a beneficial plant but still toxicity of plant based medicine should also be researched upon. Therefore to draw any concrete conclusions about the usefulness of Oxalis in modern medicine still extensive research is required in this area.

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