International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 6 Nov-Dec 2021, pp: 1087-1093 www.ijprajournal.com ISSN: 2249-7781

Pharmacognostic, Ethnomedicinal , Phytopharmacological Review of Oxalis corniculata Linn.

*Arati Tamta, Chandra Shekhar Tailor
School of Pharmaceutical Sciences,
Shri Guru Ram Rai University, Dehradun (Uttarakhand) 248001.

Submitted: 15-12-2021 Accepted: 30-12-2021

ABSTRACT:- Many herbal remedies have been active in various medical systems for treatment and management of different diseases. The plant Oxalis corniculata Linn. has been used in different system of traditional medication for the treatment of diseases and ailments of human beings. The review reveals that wide ranges of phytochemical constituents have been isolated from the plant like flavanoids, tannins, phytosterols, phenol, glycosides, fatty acids, galacto-glycerolipid and volatile oil. It has been reported that the plant contains anti-inflammatory, wound healing activity, anti-microbial, anti-oxident, antibacterial, Hepatoprotective, anti-diarrhoeal, and anti-ulcer property. The article briefly reviews the to provide requisite Pharmacognostical, phytochemical and pharmacological detail about the plant.

Key words:- Oxalis corniculata, Ethnomedicinal uses, Pharmacognostic, Phytochemical, Pharmacological.

I. INTRODUCTION:-

The Ayurvedic system of medicine has been prevalent in India since the Vedic period, and still remains the mainstay of medical relief to over 60 per cent of the population of the nation[1]. The plant-based traditional medicine system continues to play an essential role in health care with about 80% of the world's inhabitants relying mainly on traditional medicines for their primary healthcare(2). There exists a excess of knowledge and information and benefits of herbal drugs in our ancient literature of Ayurvedic and Unani medicine. One of the earliest treatises of Indian medicine, the Charaka Samhita (1000 B.C.) mentions the use of over 2000 herbs for medicinal purpose[3].

There is a worldwide belief that herbal remedies are safer and less damaging to the human body than synthetic drugs. Therefore laboratories around the world are engaged in screening of plants for biological activities with therapeutics potential. One major criterion for the selection of plant for such a study is traditional healer's claim for its therapeutics usefulness. The traditional Indian medicinal system mentions herbal remedies for the treatment of variety of diseases. Ayurveda has emphasized importance of food in the management of diseases. Even practitioner of modern system has realized the significance of dietary items, in the form of Neutraceuticals elements, in the treatment of chronic diseases[4] .

There exists a plethora of knowledge and information and benefits of herbal drugs in our ancient literature of Ayurvedic and Unani medicine. One of the earliest treatises of Indian medicine, the Charaka Samhita (1000 B.C.) mentions the use of over 2000 herbs for medicinal purpose [5]. Herbal medicines are gaining growing interest because of their cost effective and eco-friendly attributes[6]

Oxalis corniculata Linn. is an annual or perennial herb with stem creeping and sometimes ascending [7]. It's also called procumbent yellow sorrel belongs to family Oxalidaceae [8]. Oxalis meaning greek oxys – acid, sharp, sour, referring to the taste of the leaves and stem. Corniculata means horn like appendages. The plant is an herb, the branchlets creeping and rooting at the nodes. It is distributed throughout the warmer parts of India, ascending up to an altitude of 3000 m in north – west Himalayas[9]. Herb is a good appetizer, removes kapha, vata, and piles; astringent cures dysentery and diarrhoeas, skin diseases and quarten fevers. An infusion of the small leaves is externally used to remove warts and opacities of cornea. The leaves are anti-inflammatory, refrigerant and antiscorbutic [10] .

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 6 Nov-Dec 2021, pp: 1087-1093 www.ijprajournal.com ISSN: 2249-7781

Fig 1:- Oxalis corniculata Linn (flower, root, fruit, leaf).

Vernacular Names:-

Oxalis corniculata known by different names in different countries i.e. Telegu- Ambotikura; Bengali- Amrul Shak; Assamese Changeritenga; English- Indian sorrel; Oriya- Sialthur; HindiKhatari; Arabic- Hememdab; Tamil- Puliakire; KannadaJulihunise gida; Malyalam- Puliyarila; Marathi- Bhinsarpati; Sanskrit- Shuklika. [11,12] The present review is dealing with medicinal importance of the Oxalis corniculata. Linn with reference to its Pharmacognosy, Phytochemistry and pharmacological activities :-

Taxonomic Classification :-

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Oxalidales
Family : Oxalidaceae
Genus : Oxalis
Species : Oxalis corniculata [13]

Distribution:- . It is distributed in ballast about the eastern seaport town of the United States and becomes quite abundant in Texas and Ontario. These weeds are found throughout Florida. They are common in the southeastern United States; from Newfoundland to North Dakota; and southward to Mexico. O. corniculata is a cosmopolitan weed occurring in the Old World and in temperate and tropical regions of North, Central and South America and the West Indies[14]. Oxalis corniculata Linn. is widely distributed in Asia, Europe, America and Africa. It is freely grows in human settled areas, roadsides, garden, yards, almost in all warmer parts of India, especially in the Himalayas up to 2500 m of height. It is a herbaceous plant which generally grows in dampened and dark places. In India it is a renowned plant and the biological benefits of this herbaceous medicinal plant is known in all over the world[15].

Description:-

Macroscopy

(1) Leaf:- Trifoliate, Light green, Obcordate , Margin – Entire, Emarginate , Base – Symmetrical, Charateristic, Pleasantly sour taste , Arrangement – Alternate , Size – Width about 1.4cm to 1.6cm , Length about 0.8cm to 0.9cm , Surface – Upper – Smooth dark green, Lower – Smooth pale green , Texture – Hairy [16,18]

(2) Root:-Taproot and presence of numerous fibrous roots at stem nodes. Without bulb.

(3) Flowers:- Bracts and bracteoles liner to triangular, ciliate. Small yellow flowers at the end of a pedicel, shorter than the peduncle and refracted at fruiting. Calaxy with five linear sepals, 3to4 mm long, with short hairs. Corolla with 5 yellow petals, unequal, oblong to spatulate, 4 to 6 mm long. 10 stamens within 5 long and short. The superior ovary is surmounted by a style as long as the stamens and stigma with two lobes.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 6 Nov-Dec 2021, pp: 1087-1093 www.ijprajournal.com ISSN: 2249-7781

(4) fruits and seeds:- Frits are dehiscent capsules, subcylindrical and angular and shaped. The apex is pointed, with relected hairs mixed more or less hairs glandular . it is long 10 to 15mm and includes five longitudinal valves, containing 5-11 seeds each. Seeds are ovoid red-brown, 1 to 1.5 mm long . the tegument has 7-9 transverse ribs marked[19].

Microscopy:- [20]

Root	**Stem**	**Leaf**
Cortex, thin-walled parenchymatous cells filled with simple starch grains, yellowish pigment and tannin. parenchyma, cambium not distinct; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels cylindrical, pitted some with tail-like projection at one end.	Shows single layered epidermis, composed of rectangular to oval cells, Unicellular covering trichomes, xylem composed of pitted vessels, tracheids, fibres and xylem parenchyma; central region occupied by pith composed of thin-walled, parenchymatous cells, round to oval starch grains	thin-walled cells; cortex 3-4 layers of thin-walled, circular, oval or polygonal parenchymatous cells, generally filled with green pigment, green pigment; stomata paracytic

Chemical Constituents:-

Phytochemical investigations of Oxalis corniculata Linn. have revealed the presence of tannins, palmitic acid, a mixture of 8 oleic, linoleic, linolenic and stearic acids. Methanolic and ethanolic extracts of this plant show the presence of carbohydrate, glycosides, phytosterols, phenolic compounds, flavonoids, proteins (12.5%), amino acids and volatile oil. Oxalis corniculata Linn. is locally used in various ailments. It is rich in niacin, vitamin C and β-carotene .

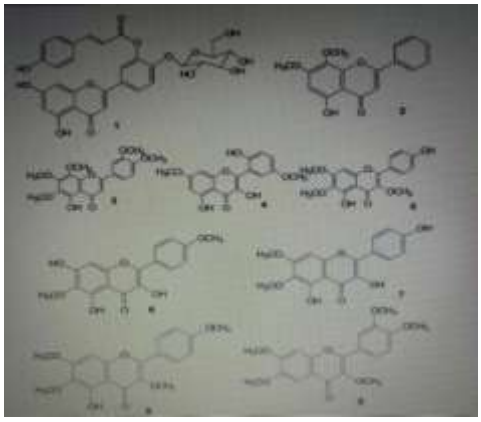

Fig. 2 Flavonoids 1-9 isolated from Oxalis corniculata.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 6 Nov-Dec 2021, pp: 1087-1093 www.ijprajournal.com ISSN: 2249-7781

The plant leaves are the huge source of vitexine-2-0- beta-D-glucopyrunoside and vitexine. Carbohydrates, proteins, amino acid, fiber and calcium are detected in methanolic and ethanolic extracts of the plant in previous investigations[21,22]

Ethnomedicinal activity :-

Oxalis corniculata Linn juice of this plant is traditionally used in liver disorders. It is also used in Changeri is Kapha vata haram, Deepanam. It is used in diseases like Grahani, Atisara, Arsa (piles) and Kushta (Skin diseases)[23]. The leaves are useful for cough, cold, fever and as antihelmintic. The leaves are useful for stomach ache, stop bleeding from wounds and as antihelmintic [24]. The juice of the plant is given in jaundice and in stomach troubles. The juice of the plant, mixed with butter, is applied to muscular swellings, boils and pimples. Oxalis corniculata Linn. is also used as antiseptic, refrigerant, diaphoretic, diuretic and anti diabetic. It is used as complementary medicine in wound healing, anemia, dyspepsia, cancer, piles, dementia and convulsions [25, 26].

Pharmacological activity:- Oxalis corniculata Linn. plant is anthelmintic, antiinflammatory, analgesic, astringent, depurative, diuretic, emmenagogue, febrifuge, relaxant, lithontripic, stomachic and styptic. It is used in the treatment of influenza, fever, urinary tract infections, enteritis, diarrhoea, traumatic injuries, sprains and poisonous snake bites. An infusion can be used as a wash to rid children of hookworms. An infusion can be used as a wash to rid children of hookworms. The plant is used as an antiscorbutic in the treatment of scurvy. The leaves are used as an antidote to poisoning by the seeds of Datura, arsenic and mercury. The leaf juice is applied to insect bites, burns and skin eruptions. It has an antibacterial activity. An infusion of leaves is used to remove opacities of the cornea and is dropped into the eyes for itching lids. A decoction of leaves is used as a gargle.

Wound healing activity:- The alcohol and petroleum ether of extract of whole plant of Oxalis corniculata has been evaluated for its wound healing activity by using excision, resutured incision and dead space wound models in rats. Both the extract showed significant wound healing activity by producing an increase in wound contraction and decrease in epithelization period in the wound models studied[27]. Data generated through systematic investigation, carried out on the evaluation of phyto-extracts on wound healing research during the last 20 years have been compiled. About 450 plant species having wound healing properties have been identified. The present knowledge of the wound healing process comprise coagulation, inflammation, proliferation, formation and accumulation of fibrous tissues, collagen deposition, epithelialization, contraction of wound with formation of granulation tissues, remodeling and maturation[28].

Antimicrobial activity:- Oxalis corniculata Linn (creeping wood sorrel) is a weed plant species traditionally widely used as a raw vegetable and in folk medicine to treat different human ailments by different Tanzanian ethnic groups. However, not many reports are available on the pharmacological rationale for its wide application in the country. This study presents the traditional use, cytotoxicity and antimicrobial activities of Oxalis corniculata indigenous from Tanzania. The study findings thus support its traditional medicinal use and envisage a purposeful thorough study for isolating the bioactive compounds, up scaling for possible developments into nutraceutics and drugs[29].

Antioxidant activity:- study provides essential antioxidant potentialities of the plant Oxalis corniculata Linn (creeping wood sorrell) indigenous from Tanzania and the associated precursors of biochemical compounds responsible for its folkloric pharmacological rationales. The results indicated that Oxalis corniculata could be an important dietary source of antioxidants with high scavenging abilities as well as rich in biomolecules that are precursors of most biologically active chemicals of medical importance. These findings may thus, justify their wide usage in traditional medicine and envisage a purposeful thoroughly study for possible developments into nutraceutical and drugs[30].

Antibacterial activity:- in-vitro antibacterial phytochemical screening of the weed plant Oxalis corniculata was performed to find out its therapeutic potential. The results obtained showed the broad spectrum methanol extracts of Oxalis corniculata and inhibited the growth of both standard gram positive bacterial stains and standard gram negative strains. The diameter of zone of inhibition of aqueous similar to that of zone of inhibition of tetracycline disc used against

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 6 Nov-Dec 2021, pp: 1087-1093 www.ijprajournal.com ISSN: 2249-7781

Chloroform extract of plant showed little antibacterial activity observed is negligible as compared to other. The findings of the present study indicated that the extract of the oxalic corniculata have several phytochemical constituents who possess the antibacterial activity[31].

Hepatoprotective activity:- The present study was carried out to evaluate the hepatoprotective activity of aqueous and ethanolic leaves extracts of Oxalis corniculata L., Oxalidaceae, against thioacetamide-induced hepatotoxicity. Hepatotoxicity was induced in Wistar rats of either sex by subcutaneous injection of thioacetamide. An aqueous and ethanolic extract of aerial parts of O. corniculata (200 and 400 mg/kg/day) were evaluated. Oral administration of O. corniculata aqueous and ethanolic leaves extract resulted in a significant reduction in SGOT. Histology of the liver sections of the animals treated with the extract also showed dose dependent reduction of necrosis. Hence the study concluded that O. corniculata has potential hepatoprotective activity[32].

Anti-diarrhoeal activity: The anti-diarrhoeal activity of aqueous and methanolic extracts of Oxalis corniculata
Linn. was evaluated on castor oil induced diarrhoea in rats and on small muscle intestinal transit. At orally administered doses of 160,320 and 640 mg/kg of body weight. The two plant extracts significantly [33].

Anti-inflammatory activity: Methanol extract of whole plant of Oxalis corniculata Linn. was assessed for its antioxidant and anti- inflammatory activity by in-vitro methods. In-vitro anti- inflammatory activity was evaluated using albumin denaturation assay, membrane stabilization assay and proteinase inhibitory activity at different concentrations. Aspirin was used as a standard drug for the study of antiinflammatory activity. Linear regression analysis was used to calculate IC50 value. Results showed that, the extract exhibited significant DPPH and nitric oxide radical scavenging activity with IC50 value of 302.93±4.17 and 73.07±8.28µg/ml respectively. Lipid peroxidation induced by the Fe2+, was inhibited by the extract with IC50 value 58.71±2.55µg/ml. Total phenol content was estimated as 25.62±0.10mg of gallic acid equivalents of dry extract. Total flavonoids and flavonols were found to be 150.88±12.61 and 150.16±2.16 mg of rutin equivalents per gram of dry extract respectively. Extract also showed in-vitro anti- inflammatory activity by inhibiting the heat induced albumin denaturation and Red Blood Cells membrane stabilization with the IC50 values of 288.04±2.78 and 467.14±9.56µg/ml respectively. Proteinase activity was also significantly inhibited by the extract (IC50=435.28±5.82µg/ml). From the results, it is concluded that flavonoids and related polyphenols present in the O. corniculata extract may be responsible for the activity[34].

Hepatoprotective activity: The hepatoprotective activity of aqueous and ethanolic leaves extracts of Oxalis corniculata Linn. (200 and 400 mg/kg) were evaluated against thioacetamide-induced hepatotoxicity. Oral administration of O. corniculata aqueous and ethanolic leaves extract at 400 mg/kg resulted in a significant reduction in SGOT (146.42±2.54 and 136.75±1.37 IU/L respectively), SGPT (81.96±3.15 and 72.05±2.33 IU/L respectively), GGTP (16.6±0.49 and 15.02±0.68 IU/L respectively), ALP (241.86±3.94 and 202.42±5.37 IU/L respectively) and total bilirubin (0.226±0.00 mg/dL 0.288±0.01 mg/dL respectively) content that were lesser than positive control, thioacetamide damaged rats. Histology of the liver sections of the animals treated with the extract also showed dose dependent reduction of necrosis[35].

Anti-ulcer activity: The aqueous and ethanolic extract of Oxalis corniculata linn. leaves at a doses of 200 and 400mg/kg body weight were screened for anti-ulcer activity by using ethanol induced gastric mucosal ulcers and pylorus ligated ulcers. There was a decrease in gastric volume and reduction in free and total acidity treated with both extracts and the catalase and SOD levels was increased and lipid peroxide was decreased in both extracts [36].

II. CONCLUSION:-

From the time immemorial, plants have been widely used as curative agents for variety of ailments. It is believed that detailed information as presented in this review on its phytochemistry and various biological properties of the extract and the constituents might provide incentive for proper evaluation of the use of the plant in medicine. This is an attempt to compile and document information on different aspects of Oxalis corniculata Linn. and highlight the need for research and development.

International Journal of Pharmaceutical Research and Applications
Volume 6, Issue 6 Nov-Dec 2021, pp: 1087-1093 www.ijprajournal.com ISSN: 2249-7781

REFERENCES

[1]. The Ayurvedic Pharmacopoeia Of India, Part - II (Formulations) Volume - I First Edition, Government Of India Ministry Of Health And Family Welfare Department Of Ayurveda, Yoga & Naturopathy, Unani, Siddha And Homoeopathy, 2007, Page No.:-XXX
[2]. Sharma R,A, Kumari A,Phytochemistry, Pharmacology And Therapeutic Application Of Oxalis Corniculata Linn. - A Review, 2014, Page No. 6-12,
[3]. Srikanth M, Tadigotla S, Phytochemistry And Pharmacology Of Oxalis Corniculata Linn.: A Review, 2012, 4077-4085
[4]. Elizabeth M. Williamson, D. T. Okpako, Fred J. Evans. Selection, Preparation and Pharmacological Evaluation of Plant Material, 1996,1-5
[5]. Kubde M.S, Khadabadi S S, Farooqui I A, Deore S L. Report and Opinion. 2010,24-31.
[6]. Siddiqui A.M, phytochemical screening and antibacterial activity against human pathogens, 2017, 62114-62118.
[7]. Achola K.J, Pharmacological Activity Of Oxalis Corniculata, 1995, Page No.:-241-249.
[8]. Peterson A L,. Edible Wild Plants, Houghton Miffin Company,1977, 104
[9]. Jadhav D, Kumar P, Medicinal plants of India, Scientific publisher Jodhpur, 2008, pg no : 182-183
[10]. Kirtikar K. R., Basu B. D. Indian Medicinal Plants, 1st edition. The Indian Press, Allahabad, 1988,437-438
[11]. /search?fr=mcafee&type=E210US91125G91419&p=ttp%3A%2F%2Fwww.ayurvedaconsultants.com%2Fimages%2Fdoctor%2Fayurveda%2Fayurvedic-herb%02changeri.aspx.&guccounter=1
[12]. Badwaik H, Singh M K, Thakur D. The Botany, Chemistry, Pharmacological and Therapeutic Application of Oxalis corniculata Linn. - a review. International Journal of Phytomedicine. 2011, 301
[13]. Hemant B, Mukesh Kumar Singh, Deepa Thakur, Tapan Kumar Giri, D.K Tripathi. The Botany, Chemistry, Pharmacological and Therapeutic Application of Oxalis Corniculata Linn– A Review. 2011, 01-08
[14]. David W. Hall, Vernon V. Vandiver and Brent A. Sellers. Creeping Wood Sorrel, Oxalis corniculata L. Southern Yellow Wood Sorrel, Oxalis florida Salisb. SP 37, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.1996,01-02
[15]. Sarkar T, Ghosh P, Poddar S, Choudhury S, Sarkar A and Chatterjee S, Oxalis corniculata Linn. (Oxalidaceae): A brief review, 2020,651-655
[16]. The wealth of india 2003, Council of Scientific and Industrial Research, pg no 259.
[17]. Wallis T.E, Text book of Pharmacognosy, 1985,
[18]. Narasiman S N, Medicinal plants of India, 2000, pg no : 715
[19]. Oxalidaceae - Oxalis corniculata L. (plantnet-project.org) (10 /june/ 21), 1:29.
[20]. Hall DW, Vandiver VV, Sellers BA. Creeping Wood Sorrel, Oxalis corniculata L..1996, 01-02.
[21]. Shalini Karunanith, Pharmacognostical and phytochemical studies on leaves of Oxalis corniculata Linn, 2016,225-229
[22]. Sarkar T, Oxalis corniculata Linn. (Oxalidaceae): A brief review, 2020,651-655
[23]. Verma S, Hepatoprotective effect of hydroalcoholic extract of oxalis corniculata L. On carbon tetrachloride induced hepatotoxicity in mice, 2015 ,52-55
[24]. Mohammad I S, Mir A K. Folk use of medicinal herbs of Margalla Hills National Park, 2000, 48-56.
[25]. Taranalli AD, Tipare SV, Kumar S, Torgal SS. Wound healing activity of Oxalis corniculata whole plant extract in rats. 2004,444-446.
[26]. Madhavachetty K, Sivaj JK, Tulasi RK. Flowering plants of Chittoor district, Andhra Pradesh, India, 1st ed. Student offset printers, Tirupati. 2008, pp. 54-55.
[27]. A.D.Taranalli, wound healing activity of Oxalic corniculata whole plant extract in rats, 2004, 444-446
[28]. Prasanta K Ghosh, Phyto-Extracts in Wound Healing, 2013,760 - 820.
[29]. Donatha Damian Tibuhwa, Oxalis corniculata L. in Tanzania: traditional use, cytotoxicity and antimicrobial activities, 2016,10055-10063.
[30]. Tibuhwa D D, Antioxidant potentialities and Antiradical Activities of Oxalis corniculata Linn from Tanzania, 2017, 11590-11600
[31]. SiddiquiM.A, phytochemical screening and antibacterial activity of Oxalic corniculata

against human pathogens, 2017, pp.62114-62118,

[32]. Das K, Kathiriya A K, Evaluation of hepatoprotective activity of aqueous and ethanolic extract of Oxalis corniculata against intoxication of thioacetamide induced rats, 2012.412-417,

[33]. Watcho P, Nkouathio E, Telesphore B., Nguelefack, S.l. Wansi and Albert kamanyi. Anti diarrhoeal activity of aqueous and methanolic extracts of Oxalis corniculata klotzch. in rats..2005,6-49

[34]. Sachin S Sakat, Archana R Juvekar and Manoj N Gamphire. Invitro anti-oxidant and anti- inflammatory activity of methanolic extract of Oxalis corniculata linn. 2010,146-155

[35]. Das K, Kathiriya A.K, Kumar E. P., Benson M.K., John Wilking Einstein. Evaluation of hepatoprotective activity of aqueous and ethanolic extract of Oxalis corniculata against intoxication of thioacetamide induced rats.2012,412-417

[36]. Senthil Kumar K.K and Raj Kapoor B. Effect of Oxalis corniculata linn. extracts on antioxidant enzymes levels in rat brain after induction of seizures by MES and PTZ International Journal of Biopharmaceutics. 2010,58-61.