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# URTICA DIOICA (STINGING NETTLE): A REVIEW OF ITS CHEMICAL, PHARMACOLOGICAL, TOXICOLOGICAL AND ETHNOMEDICAL PROPERTIES

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**ABSTRACT**

Medicinal plants existing even before human being made their appearance on the earth. The raw materials for ayurvedic medicine were mostly obtained from plant sources in the form of crude drugs .There has been a rich heritage of ethnobotanical usage of herbs by various colorful tribal communities in the country. Plants are rich source of many natural products, most of which have been extensively used for human welfare. Owing to rich medicinal properties, *Urtica dioica* (L) commonly known as stinging nettle of family urticaceae has a long history of use in the home as an herbal remedy since ancient times.Various parts of the plant have been used in ayurvedic preparations by vaidyas for curing various ailments. As a useful first-aid remedy it is used in the treatment of ailments such as bites and stings, burns, hives and breast feeding problems. Nettle is not only a weed but an important medicinal herb and this present review deals with chemical,pharmacological,ethnomedical and toxicological aspects of this medicinal herb and it also provides supportive evidence about the therapeutic effects.

**Key words:** *Urtica dioica* ,Urticaceae, Chemical,Pharmacological, Ethnomedical,Toxicological.

## INTRODUCTION

*Urtica dioica*, nettle or stinging nettle belongs to family Urticaceae. It occurs as a perennial plant in temperate zones of Asia, America and Europe.[4] It is of great medicinal value but the plant is undervalued by almost all of us. The plant has great economic potential due to its multi-utilitarian nature. It is commonly found growing in rich soils in forest clearings, old fields and wasted places. It is adapted to a wide range of climatic conditions in Asia and Europe and is known by various vernacular names such as Nettle, big string nettle, common nettle, stinging nettle, gerrais, isirgan etc [1].Nettle is an annual growing to 0.6m.tall shrub which bears opposite, cordate, deeply serrate, pointed leaves which are downy underneath. Flowering and fruiting time is from June to October. Flowers are monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and are pollinated by wind. The stem and leaves of the plant are covered with stinging trichomes. The plant prefers to grow on loose soil with organic matter rich in nitrogen and high phosphate levels for rapid growth. This plant can be propagated through seeds or vegetative by divisions. It is a relief that nettles can be established from cuttings so there is potential to cultivate both male and female forms.[1,2]

**Ethnomedicinal or Traditional Uses:** [2]

*Urtica dioica* is a well known ethnomedicinal plant that is also used in Ayurveda. Its use in the Indian traditional folk medicine is also well documented. Nettle root was mentioned as herbal medicine first by

**Paracelsus and Matthiolus** . In folk medicine, nettle herb and leaves were of higher importance than nettle root.

- In the Russian folk medicine, the powder of the root and seed was used against dropsy, diarrhoea and worms.

- In the Lithuanian folk medicine, the infusion of the aerial parts and roots was applied to treat atrophy.
- The Eclectics used leaf and root as a blood purifier, styptic, stimulating tonic and diuretic to treat diarrhoea, dysentery, discharges, chronic diseases of the colon and chronic skin eruptions . Syrup made from the juice of root or leaves was said to relieve bronchial and asthmatic troubles .
- In African medicine, nettle root is used to treat diarrhoea and as an anthelmintic to expel intestinal worms.
- Nettle root was first used in urinary tract disorders in the 1950s. The Commission E approved the use of nettle root for problems in urination in benign prostatic adenoma stages I and II .
- The British Herbal Pharmacopoeia reported prostatic action (BHP 1996). According to the wording of the British Herbal Compendium, nettle root is suitable for the symptomatic treatment of micturition disorders in the early stages of benign prostatic hyperplasia (BPH) .
- The French Herbal Remedies Notice to Applicants for Marketing Authorization allows two uses of nettle root: as an adjunctive treatment for the bladder outlet obstruction symptoms of prostatic origin, and to enhance the renal elimination of water .
- ESCOP indicates its use for symptomatic treatment of micturition disorders (nocturia, pollakisuria, dysuria, urine retention) in BPH at stages I and II .
- In the USA, it is used similarly, although as a dietary supplement. Its indications for use are limited.

## PHYTOCHEMICAL STATUS OF URTICA DIOICA

***Lectins-*** *Urtica dioica* agglutinin (UDA) is an unusual plant lectin that differs from all other known plant lectins with respect to its molecular structure and its extremely low specific agglutination activity. It is recently reported that this small lectin (8.5 kDa) is a T cell mitogen distinguishable from classical T cell lectin mitogens by its ability to discriminate a particular population of CD4+ and CD8+ T cells as well as its capacity to induce an original pattern of T cell activation and cytokine production. UDA is a small monomeric protein , consisting of 89 amino acid residues including two 43-amino acid, glycine- and cysteine-rich domains. UDA is a mixture of at least 6 similar isolectins.[4]

***Polysaccharides*** - While searching for the antiprostatic active principle of the roots of *Urtica dioica* , ethanol-precipitated a polysaccharide mixture from an aqueous root extract and obtained chemically defined acidic polysaccharides with molecular masses of 15-210 kDa***:*** Approximately 0.85%. Five polysaccharides have been isolated (RP1-RP5), of which two are glucans with [1→4]-linked glucose units but differing in MW (15 and 50 kDa), degree of branching and acidity; two are rhamnogalacturonans of MW 18 and 210 kDa; and the fifth is an acidic arabinogalactan of MW 70 kDa consisting of a [1→3]-linked galactan chain with arabinose side chains.Investigations suggest that Urtica polysaccharides and also the N-acetyl-glucosamine specific lectin UDA play a major role in the antiprostatic activity of the drug and phytopreparations containing it. [17]

***Lignans-*** Polar extracts of the stinging nettle (Urtica dioica L.) roots contain the ligans (+)-neoolivil, (-)-secoisolariciresinol, dehydrodiconiferyl alcohol, isolariciresinol, pinoresinol, and 3,4-divanillyltetrahydrofuran. These compounds were either isolated from Urtica roots, or obtained semisynthetically. All lignans except (-)-pinoresinol developed a binding affinity to SHBG in the in vitro assay. The affinity of (-)-3,4-divanillyltetrahydrofuran was outstandingly high. These findings are discussed with respect to potential beneficial effects of plant lignans on benign prostatic hyperplasia (BPH). (+)-Neo-olivil from roots of Urtica dioica also isolated.The all-trans configuration of (+)-neo-olivil from *Urtica dioica* was also established by NMR-spectroscopy[12] .

***Sterols-*** Steryl derivatives are isolated from the roots of urtica dioica. 0.2-1% β-sitosterol, 0.032-0.2% β-sitosterol-3-O-β-glucoside (in *Urtica dioica* roots the ratio of the former two compounds is between 2:1 and 1:1, 0.003% (6'-O-palmitoyl)-sitosterol-3-O-β-D-glucoside,0.001% 7β –hydroxysitosterol, 0.001% 7α-hydroxysitosterol, 0.0005% 7β -hydroxysitosterol-β-D-glucoside, 0.0005% 7α-hydroxysitosterol-β-glucoside, 0.0015% 24*R*-ethyl-5α-cholestane-3β,6α-diol, stigmasterol, campesterol, stigmast-4-en-3-on, hecogenin.[59]

***Phenylpropanes:*** Reports suggested that it contain two derivative phenylpropanes i.e 0.002%, homovanillyl alcohol and its 4'-glucoside (0.003%). [17]

***Ceramides***: In methanolic extracts of stinging nettle roots (*Urtica dioica)* a special class of ceramides was detected.Two groups of ceramides, consisting of a sphingoid base (2-amino-1,3,4-trihydroxy-8-octadecene) with an amido link from the amino group to an unbranched C20-C25 fatty acid or corresponding 2-hydroxy fatty acid, have been identified.[61]

***Hydroxy fatty acids:*** Aqueous-methanolic extracts from roots of *Urtica dioica* ,the most active fraction was separated by GC/ MS. Besides common fatty acids (10*E*,12*Z*)-9-hydroxy-10,12-octadecadienoic acid (**1**) was identified as a main component and confirmed to be the active principle as an aromatase Inhibitor [62]

***Triterpenes:*** The whole herb of *Urtica dioica* L. grown in Nyingchi area, China's Tibet Autonomous Region, resulted in the isolated of nine compounds: beta-sitosterol, trans-ferulic acid, dotriacotane, erucic acid, ursolic acid, scopoletin, rutin, quercetin and p-hydroxylbenzalcohol. Dotriacotane, erucic acid, scopoletin, rutin and p-hydroxylbenzalcohol were obtained from Urtica L. for the first time. Their structures were confirmed by modem spectral analysis (NMR, MS, etc). [63]

***Phenols*:** Free radicals are involved in many disorders like neurodegenerative diseases, cancer and AIDS etc. Antioxidants through their scavenging power are useful for the management of those diseases. Flavonoid and phenol contents in *urtica dioica* has been identified for their anti oxidant potential.[60]

***Coumarins:*** 0.0001-0.01% scopoletin in *Urtica dioica* roots has been identified.

***Fatty acids and carotenoids* :** $\alpha$-linolenic acid was the pre-dominant fatty acid in leaves, while seeds were richer in linoleic acid. Nine carotenoids were identified in the leaves. For all leaf maturity levels, lutein, lutein isomers, $\beta$-carotene and $\beta$-carotene isomers were the major carotenoids. Neoxanthin, violaxanthin and lycopene were also important contributors in specific leaf maturity stages.[64]

***Flavonoids***: The major compounds isolated from the aerial parts of *Urtica dioica* L. were determined as quercetin-3-*O*-rutinoside (**1**), kaempherol-3-*O*-rutinoside (**2**) and isorhamnetin-3-*O*-glucoside (**3**) by chromatographic, chemical (acidic hydrolysis) and spectral (UV, IR, $^{1}$H-NMR, $^{13}$C-NMR) methods.[16]

***Amines*:** Small amounts of histamine, choline, acethylcholine and serotonin (5-hydroxytryptamine), particularly in the stinging hairs.[1]

***Acids:*** Carbonic acid, formic acid, silicic acid, citric acid, fumaric acid, glyceric acid, malic acid, oxalic acid, phosphoric acid, quinic acid, succinic acid, threnoic acid and threono-1,4-lactone caffeic acid esters, principally caffeoylmalic acid in Urtica dioica (up to 1.6%); chlorogenic acid (up to 0.5%) small amounts of neochlorogenic acid and free caffeic acid . Free amino acids (30 mg/kg) .[2]

***Others*:** Chlorophylls a and b, chlorophyll degradation products and carotenoids (including β-carotene and xanthophylls). [65]

## PHARMACOLOGICAL STATUS OF URTICA DIOICA:

### *In vivo studies*

***Anti-Allergy Actions*** :*Urtica dioica* agglutinin:A superantigenic lectin from stinging nettle rhizome has antiallergic activity. It has been also reported that Nettle extract (Urtica dioica) affects key receptors and enzymes which are associated with allergic rhinitis ,chronic rhinosinusitis and perennial allergic rhinitis[3,4]**.** An open trial of 69 patients with allergic rhinitis found 600mg freeze dried nettle leaf daily was effective for symptom relief. Fifty-eight percent reported relief of most symptoms and 48 percent stated it was more effective than other over-the-counter medications.[5]

***Hormonal Modulation & Anti-BPH Action*:** . Available evidences suggested that the hydrophilic components of nettle, including lectins and polysaccharides, appear to be important, particularly in prostate disease; however, hydrophobic constituents have not been ruled entirely unimportant[17]. The importance of nettle root lignans, such as (-)-3,4-divanillyltetrahydrofuran, in benign prostatic hyperplasia(BPH) and other androgen- and estrogen-sensitive conditions may be due to interference with binding of sex hormone binding globulin (SHBG) to testosterone, the testosterone receptor, and/or the SHBG receptor. The steroidal compounds stigmasterol, stimast-4-en-3-one, and campesterol have been shown to inhibit the prostatic sodium/potassium pump, which might contribute to nettle's effects in BPH. At least four double-blind clinical trials confirm the efficacy of nettle root for BPH symptoms alone or in combination[6]. Uncontrolled trials have also demonstrated nettle's effectiveness for BPH. Combined extract of Sabal

palm /sabal serrulata /pygeum africanum and nettle in the treatment of patients with lower urinary tract symptoms in double blind, placebo-controlled trial[7,10,11]. Stinging nettle root extract in long term treatment of benign prostatic syndrome (BPS) by significant inhibition on adenosine deaminase activity in prostate tissue from patients with prostate cancer[8] and Lignans present in the roots of *Urtica dioica* and their metabolites bind to human sex hormone binding globulin thereby affect interaction of SHBG with its receptor on human prostatic membrane has been reported[12]. Significant inhibition on adenosine deaminase (ADA) activity of prostate tissue ,It might be one of the mechanisms in the observed beneficial effect of urtica dioica in prostate cancer.[9]

***Immune Modulation Actions*:** *Urtica dioica* agglutinin (UDA) is a heat- and acid-resistant lectin found in stinging nettle, primarily the root. UDA induces a pattern of T-lymphocyte activity not seen with any other known plant lectin.[14]The effect of Urtica dioica leaf extract in immune system by Stimulation of lymphocyte proliferation, cytokine secretion and inhibition of nitric oxide production in whole blood of healthy subjects has shown.[15] *Urtica dioica* agglutinin, a new mitogen for murine T lymphocytes: unaltered interleukin-1 production but late interleukin 2-mediated proliferation has been also demonstrated. [18]

***Anti-inflammatory, Pain-relieving & Anti-arthritic Actions:*** Although a number of steroidal or non-steroidal anti-inflammatory drugs have been developed, researchers are changing their focus to natural products to develop new anti-inflammatory agents due to the side-effects of chemical drugs . As a result, the search for other alternatives seems necessary and beneficial. *U. dioica* is an open door for new and effective compounds. Previous research had established that 1340 mg of powdered extract of nettle leaves (*Urtica dioica*) allows a 50% reduction in the dose of non-steroidal anti-inflammatory analgesics (NSAID) used to treat arthritis. Leaf extracts from *U. dioica* acts by switching Th1 derived responses to Th2; therefore it may inhibit inflammatory events of rheumatoid arthritis [20].Lipophilic stinging nettle extracts possess potent anti-inflammatory activity but not having cytotoxic activity[19] The effect of stinging nettle *(Urtica dioica)* seed oil on experimental colitis in rats [21] and cream for osteoarthritis[22] ,sting for chronic knee pain[23], hox alpha–a new stinging nettle leaf extract–on matrix metalloproteinases in human chondrocytes[24] and inhibition of proinflammatory transcription factor NF-kappa B in rheumatism[25] has been reported in articles.

***Hypoglycemic, Anti-diabetic & Anti-cholesterol Actions*:** The most animal studies are in favour of the use of *urtica dioica* in diabetes .The blood suger lowering effect of *urtica dioica* has been mentioned in old script such as those written by Avicenna. There has been some reports indicating the benefit of plant in diabetes such as antidiabetic effect of hydroalcholic urtica dioica leaf extract in rats with fructose-induced insulin resistance, Streptozocin-Induced Type 1 Diabetes Mellitus[26] and in patients with type 2 diabetes by Inhibition of alpha-glucosidase and Induction of insulin secretion in perifused Islets of Langerhans[29,30,35]etc. A randomized double-blind control trial of hydro alcoholic Nettle (*Urtica dioica*) extracts on insulin sensitivity and some inflammatory indicators in patients with type 2 diabetes[27] and Protective role on hepatocytes and astrocytes in the dentate gyrus of diabetic rats was reported[31].Effects of *Urtica dioica* extract on lipid profile in hypercholesterolemic rats by activation of the human peroxisome proliferator-activated receptor[32,33] has been reported in articles. Consideration all these findings as well as data in review , it is apparent that urtica dioica decrease blood glucose level by both pancreatic and extrapancreatic pathway. Moreover some flavanoids has been also found in this plant such as rutin which is positively important component for carbohydrate metabolism and for protection of functional β cells furthermore compounds which are structurally related to cyclic peptides have shown to facilitate the glucose uptake by forming the permeable pores. One of the main bioactive phenolic compound cholorogenic has been found ,has been potent hypoglycemic activity.[60]

***Hypotensive & Cardiovascular Actions*:** *Urtica Dioica* (U.D) has widely been used in traditional medicine as hypotensive in Iran and Turkey .The negative inotropic, hypotensive and vasodilatory effects of U.D extract has been reported in another study . It has been concluded that vasorelaxing effect of U.D has been mediated by nitric oxide[37].Animal studies indicate UD extracts markedly inhibit platelet aggregation and improve lipid profiles. Inhibition of platelet aggregation[36] and cardiovascular effects like Acute diuretic, natriuretic and hypotensive effects of a continuous perfusion of aqueous extract of *Urtica dioica* in the rat has been also demonstrated[36].

***Liver, Kidney, & Gastro-Protective and Other Cellular Protective Actions:*** Some studies revealed that *urtica dioica* has some protective role. *U. dioica* exhibited liver protection effect by increasing the activity of paraoxonase, arylesterase, and liver tissue

catalase activity.[40,45] Also, it was found that treatment with *U. dioica* decreased the lipid hydroperoxide activity, indicating that the antioxidant effect of *U. dioica* had prevented the emergence of an oxidant agent such as LOOH with creation of hepatic ischemia-reperfusion[43].Protective effect of Urtica dioica on renal ischemia, hepatic ischemia, liver damage induced by biliary obstruction[40] ,peptic ulcer [42]and in brain lesion and memory in rat, Ameliorative influence against cisplatin-induced toxicity in mice bearing Ehrlich ascites carcinoma has been reported[41]. Recently, it is observed that *U. dioica* has a significant hepatoprotective effect in CCl4-administrated rat and that hepatocellular degenerative and necrotic changes are slight without advanced fibrosis[46,45]

***Antioxidant Actions*:** Antioxidants from natural original are extensively on use over the past years. Effect of hydro alcoholic nettle (Urtica dioica) extract on oxidative stress in patients with type 2 diabetes[47] and modulatory effect on biotransformation enzyme systems, antioxidant enzymes, lactate dehydrogenase in mice has been demonstrated[48].

***Cytotoxic & Anticancerous Actions*:** Various extracts of *U. dioica* were commonly used in the treatment of prostatic disease. Some extracts from *U. dioica* roots were demonstrated to exert proliferation-reducing effects in an *in vivo* animal model. It has been observed that some sterols and hydroxyl fatty acids, even they exist at low concentrations in this plant can inhibit aromatase, which is a key enzyme in steroid hormone-metabolism mediation the conversion of androgens into estrogens[6]. The aqueous extract of *U. dioica* roots demonstrated a dose dependent inhibition of the binding globulin to its receptor [12,13]and directly inhibits cell proliferation of HeLa cells and block binding of epidermal growth factor to its receptor. Antiproliferative effect on human prostate cancer cells by a stinging nettle root (*Urtica dioica*) extract has been also reported[49].

***Antimicrobial Actions*:** Currently, The German Commission E approves the use of nettle leaf as supportive therapy in patients with lower urinary tract infections (combined with immune and antimicrobial therapy) and to prevent and treat formation of urinary gravel. High-antibacterial activity of Urtica spp. seed extracts on food and plant pathogenic bacteria[50] plants extracts on virulence factors expression and biofilm formation by the uropathogenic Escherichia coli[51],inhibitory effects against rotavirus infection[52] and severe acute respiratory syndrome coronavirus replication in a lethal SARS-CoV BALB/c mouse model by stinging nettle lectin. *Urtica dioica* agglutinin has been reported[53].Antifungal[54],anticandidal[55]and antiviral activity (1) By Inhibition of cell-to-cell transmission of human T-cell lymphotropic virus type 1 in vitro by Glycan deletions in the HIV-1 gp120 V1/V2 domain (2) sensitizing the mutant virus strains to carbohydrate-binding agents and represent a specific target for therapeutic intervention[56].(3) By Inhibition of the protease activity of the light chain of type A botulinum neurotoxin[57].The mannose-specific plant lectins from *Cymbidium* hybrid and *Epipactis helleborine* .(N-acetylglucosamine)n-specific plant lectin are potent and selective inhibitors of human immunodeficiency virus and cytomegalovirus replication has been also reported[58].

**IN VITRO STUDIES:**

***Anti-inflammatory activity:*** An aqueous extract of nettle herb produced 93% inhibition of platelet activating factor (PAF)-induced exocytosis of elastase from human neutrophils has been reported[36].

***Immuno-modulatory activity:*** The major compounds isolated from the methanolic extract of the aerial parts of *Urtica dioica* L. were determined as quercetin-3-O-rutinoside (1), kaempherol-3-O-rutinoside (2) and isorhamnetin-3-O-glucoside (3) by chromatographic, chemical (acidic hydrolysis) and spectral (UV, IR, H-NMR, C-NMR) methods[16]. Their immuno-modulatory activities were studied *in vitro* by chemotaxis (Boyden Migration Chamber) and intracellular killing activity (nitroblue tetrazolium (NBT) reduction test). According to the results of the NBT reduction test, high intracellular killing activity by all flavanoids has been reported.

***Cardiovascular effects:*** In the isolated Langedorff perfused rat heart, AEN (1 and 2 g/l) markedly decreased heart rate and increased left ventricular pressure. Higher concentration (5 g/l) even led to cardiac arrest. That AEN produces a vasoconstriction of the aorta which is due to activation of α1-adrenergic receptors.and also induces a strong bradycardia through non-cholinergic pathways which might compensate for its vascular effect and account for the hypotensive action of *Urtica dioica* L[37].

***Effect on platelet aggregation:*** Aqueous nettle extract demonstrated weak inhibition of thrombin 1 U/ml and ADP 10 μM-induced platelet aggregation (IC50 15.5 and 12.8 mg/ml, respectively .and methanolic extract had only weak antithrombotic activity. A phospholipid fraction that was able to induce platelet aggregation in dose-dependent

manner, five orders of magnitude less potent than the platelet-aggregating factor (PAF). The effect was not inhibited by indomethacin but by a PAF receptor-specific agent indicating that a receptor is involved in the effect mechanism.[36]

***Antioxidative effect:*** An aqueous nettle extract was lyophilized and 20 mg of this was dissolved in 20 ml water. 50, 100 and 250 µg amounts of this water extract showed 39, 66 and 98% inhibition on peroxidation of linoleic acid emulsion, respectively, while 60 µg/ml of α-tocopherol, exhibited only 30% inhibition[2]. Moreover the aqueous nettle extract had effective reducing power, free radical scavenging, superoxide anion radical scavenging, hydrogen peroxide scavenging, and metal chelating activities at the same concentration.and also inhibit lipopolysaccharide-stimulated NO2-production without affecting cell viability[67] .

***Uterine muscle activity:*** An aqueous extract of nettle herb caused slight contraction followed by relaxation in isolated uterine smooth muscle from the non-pregnant mouse and a diametrically opposed effect on pregnant mouse.The authors concluded that extracts had adrenolytic activity, similar to the action of dihydroergotamine (40 mg extract = 0.132 mg dried plant = 0.8 mg dihydroergotamine). [2]

***Inhibition of α-Glucosidase:*** Investigation of water extracts of medicinal herb *Urtica dioica* with α-glucosidase inhibitor activity against the enzyme source (baker's yeast, rabbit leaver and small intestine) has been found in vitro studies[30].

***Inhibition on adenosine deaminase activity in prostate tissue:*** Reports suggested that the aqueous extract of *Urtica dioica* results in significant inhibition on adenosine deaminase (ADA) activity of prostate tissue. It might be one of the mechanisms in the observed beneficial effect of *Urtica dioica* in prostate cancer[9].

***Inhibit the proinflammatory transcription factor NF-Kb:*** Activation of transcription factor NF-κB is elevated in several chronic inflammatory diseases and is responsible for the enhanced expression of many proinflammatory gene products. Extracts from leaves of stinging nettle (*Urtica dioica*) are used as antiinflammatory remedies in rheumatoid arthritis[25].

**ACUTE TOXICITY STUDIES-**

The safety index of crude drug was assessed by carrying out the acute and sub acute toxicity for the period of 14 days in wistar rats at the dose of 250,500,1000,2000 mg/kg body weight .It was found that there were no significant change in haematological parameter and liver function markers in all experimental animals with respect to controlled group.[66]

**CONCLUSION**

In conclusion ,considering all available evidences present review suggested that , U. dioica has multiple pharmacological functions including anti-inflammatory, analgesic, antiandrogenic, antihyperglycemia, anti-hyperlipidemia, antiviral and anticancer activities, among others . Therapies developed along the principles of western medicine (allopathic) are often limited in efficacy, carry the risk of adverse effects, and are often too costly, especially for the developing world. In this review article, an attempt has been made to compile the reported mechanism, phytochemical status and therapeutic and traditional uses of urtica dioica in India and abroad and It may be useful to the health professionals, scientists and scholars working in the field of pharmacology and therapeutics to develop evidence-based alternative medicine to cure different kinds of disease in man and animal without any toxic effects and also provide the basis for future research on the application of transitional medicinal plants.

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