

A review over medicinal plants and their anti-inflammatory activity. A Review

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Abstract

Medicinal plants are considered as the most ancient type of medication used for the treatment against diseases and acts as orthodox medicines. These plants derived substances are not considered to be

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authentic and safe in crude form due to improbability in the effects and the presence of its active constituents. The aptitude of the effectiveness of plants is correlated with many factors that includes the occurrence of active ingredient, which depend on the area of cultivation time and the season of collection of plant. The vast knowledge is available that is reviewed again and again and the results and views of these revision proved that the use of medicinal plant are the safe, cost effective as well as the natural process in management of many pathological conditions and diseases. Many of the active ingredients present in medicinal plants have been ranked as the trade mark of preparing lifesaving drugs that are being developed synthetically. This review focusses the plants that are useful for anti-inflammatory activity. It found many plants beneficial as anti-inflammatory activity.

Keywords: Medicinal Plants, Inflammatory Diseases, Anti-Inflammatory Activity

INTRODUCTION

Inflammation is referred as the protective response that defense the body against the foreign, toxic or noxious stimuli like injury of the tissues, allergens, pollens or microbes. Contrary, unrestrained or abrupt inflammation is the basic cause of number of abnormal pathological conditions that includes metabolic syndrome, allergies, cardiovascular dysfunctions, autoimmune diseases and even cancer. These diseases are supposed to be the major burden economically on the patients as well as the national burden and causing huge impact on the life style of the society [1]. There is a variety of medicines available for suppressing and controlling the crisis of inflammation. These drugs are immunosuppressant steroids and non-steroid anti-inflammatory drugs. The drugs which have narrow therapeutic index and are used in management of inflammation caution must be taken before taking the medicine. Our goal should be to use minimum amount of drug having the maximum effects and should have the minimal toxic effects. Thus, the need of the hour is to opt toward the natural anti-inflammatory

drugs in therapy to get maximum pharmacological results and with minimum toxic and adverse reactions [1, 2]. Herbal medicines are now gaining much more attention in the fields of medicine. So, indeed attention must be given for attaining vast and authentic knowledge regarding herbal medicines.

Alternative, Complementary and traditional medicines are the fundamental resource for the guidance of herbal medication, but definitely recent medicine must provide authentic and valid data through scientific methods before the practical implication of herbal drugs. In this review, we have assessed the use of medicinal plants and the clinical verification of their anti-inflammatory effects.

Natural Products

The vegetables, fruits, spices and legumes that have high contents of diets are useful to reduce the chronic inflammation as a result of which the spread of fatal diseases are adjourned [3, 4]. Particular foods that contain different classes of compounds chemically are thought to be very effective against inflammations. These compounds are carbohydrate that are indigestible, Omega-3 fatty acids, polyphenols etc. N-acetyl-5-methoxytryptamine is a compound that has also been prepared from plants. This compound is also beneficial for the use of anti-inflammatory activity [5, 6].

Many authors have reported about the characters of melatonin in the physiology of plants [7, 8, 9, and 10]. Melatonin has been found effective against biotic & stress and abiotic stressors. Abiotic stressors may include salinity, acute temperature changes, toxic chemical agents, drought and intensive UV radiations while biotic & stress may include microbial infections [9, 11]. Melatonin has been found fruitful in different aspects of plants such as the seed germinations, better growth of plants, and better production of crops. Melatonin helps when the plants are under stress condition. It helps in the photosynthesis of plants [12].

Achillaea millefolium:

The plant, *Achillaea millefolium*, is a medicinal plant that plays very important role against inflammation due to having anti-inflammatory

characters. Wounds, swollen, irritated skin and burns are cured with this plant. According to the reports, this plant contains two types of metabolites such as isoprenoids and phenolic. These both are secondary metabolites and have characteristics of anti-inflammatory activity [13].

Medicines are prepared from the extract of this plants traditionally. Gastro-intestinal, hepato-biliary etc. are cured with medicines of the plant. The extract of this plant contains three flavonoids. They are rutin, luteolin-7-Oglucoside and aspigenin-7-O-glucoside. These stop the neutrophil elastase and metalloproteinases in human beings. According to vitrostudies, these are concerned with the process of anti-inflammatory. Arachidonic acid retardation brings to sesquiterpenes to show anti-inflammatory activity [14].



Figure 1: *Plant Achillaes millefolium*

Aconitum heterophyllum:

Aconitum heterophyllum plant has been found to play an important role in the healing of digestive system, fever, rheumatism and nervous system. The presence of alkaloids, flavonoids, sterols and glycosides have been reported in the ethanolic root extract of the plant. This plant contains the compounds that inhibit the prostaglandin pathways which is main cause of inflammation. The components of chronic inflammation such as proliferative and transudative are evaluated with use of cotton pellet-induced granuloma. The quantity of granulomatous tissue assesses the wet cotton pellets weight. The bulk of wet cotton pellet is controlled with use of *Aconitum heterophyllum* plant extract. It depends upon the manner of dose. The high dose has controlled the inflammation very near to inhibitory effect of diclofenac

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sodium. According to a report, the root extract of *A. heterophyllum* plant stop the metabolism of arachidonic acid due to which sub-acute inflammation is inhibited [15].



Figure 2: Plant *Aconitum heterophyllum*

***Adhatoda vasisca*:**

The plant *adhatoda vasisca* L belongs to the family of Acanthaceae. Medicine have been prepared from the plant domestically at global level for the treatment of various disease such as whooping, cough, asthma, cold, rheumatic painful inflammatory swelling etc. The medicine is used in the form of powder, decoction, and infusion. It can also be used in the form of fresh juice. Liquid extract or Syrup has also been reported to be given the patient which is the form of medicine made from this plant [16]. The presence of Glycoside, sugars, trepans, flavonoids, tannins and alkaloids have been reported [17]. The use of carrageenan-induced paw edema assay, formalin-induced paw edema assay in albino rats detected the effect of ethanolic extract as anti-inflammatory activity. The stoppage of carrageenan and formalin-induced paw edema depends upon the manner of dose of ethanolic extract of the plant [18].



Figure 3: Plant *Adhatoda vasica* L

Mangifera Indica:

Tropical and subtropical regions are found rich with *Mangifera indica* plant. Various traditional medicines are prepared for a variety of therapies from various parts of this plant [19]. Different diseases such as leucorrhoea, menorrhagia, haemorrhage from the lungs and bleeding piles are treated with domestic medicines made from the bark of the plant and fluid extract. The eyelids warts are treated with Idibs of leaves of the plant and diabetes are treated with dried powder of the leaves. While, diarrhea, gleet and chronic dysentery are cured with the dried powder of flowers of the plant [20]. It has been found that the roots extracts of the plant showed more effective anti-inflammatory activity than Diclofenac sodium [21]. Flavonoids have been indicated by the analysis of phytochemicals. Flavonoids are very effective for anti-inflammatory activity in the form of stoppage of prostaglandin development [22].



Figure 4: plant *Mangifera indica*

Mechanisms involved in anti-inflammatory responses

The anti-inflammatory activities possessed by medicinal plants have been explained by different types of mechanism which are given as follows.

15-Lipoxygenases (LOX) Inhibition

The enzymes groups (#5, #8, #12, and #15 LOX) which belong to lipoxygenase perform a key role in different inflammatory conditions. The major enzyme that is involved in the production of leukotrienes excreted from arachidonic acids is Isomeric enzyme 15-LOX. Leukotrienes act as the main initiators of many allergic reactions and pro-inflammatory responses. So, the inhibition in the production and production of substance like leukotrienes by 15-LOX is considered as the medical major planning in the treatment against many inflammation responses [23].

NOS Inhibition

The broad-spectrum feature of plant flavonoids is the Inhibition of NOS nevertheless flavonoids of the plants are reported to have the inhibitory activity against the production of nitric oxide (NO). The expression of NOS is down regulated by this mechanism. Amino-substituted flavones and the flavones have the ability to inhibit production of NO [24]. [4].

COX Inhibition

Flavonoids which belongs to the polyphenols group has capability to restrain the production, biosynthesis and release of the prostaglandins.

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The generally known isomeric forms of COX are two that are named as (COX-1 & COX-2). The molecular target of various anti-inflammatory herb-derived compounds and herbal extracts is the inhibition in production of COX-1 & COX-2 [25] [5].

Phospholipase A₂ Inhibition

The precursor of eicosanoids is Arachidonic acid which is by phospholipase released from lipids membrane. A₂ synthesize thromboxane, prostaglandins, and leukotrienes. Phospholipase inhibition acts by blocking LOX and COX by the use of any therapeutic agent shows to be effective results in the management and treatment of inflammatory diseases. The phospholipase A₂ inhibitor is found in plant quercetin that is involved in inhibition of neutrophils. The medicinal plants. E.g. *A. cepa*, *Allium sativum*, *Xylopi frutescens*, *Curcuna longa*, inhibit phospholipase A₂ [26, 27].

Pro-inflammatory cytokines Inhibition

Many types of pro-inflammatory cytokines legalize the inflammation responses by the induction in the production of cellular adhesion molecules and other type of cytokines [28, 29].

CONCLUSION

The main aim purpose to review this was to inspect on anti-inflammatory activities of medicinal plant carried out by scientific studies that are gamely accessible and used in management and treatment of various disease conditions. A variety of studies are performed in different regions of many countries to assess the medicinal plants for containing any anti-inflammatory activity. Inflammation is a multifaceted process that imparts in host defense. Excessive release of inflammation mediation substance can cause chronic disease. This review reveals that extracts of plants be capable of imparting any anti-inflammatory behavior at different steps of the development involved in process of inflammation, inhibition of formation of cytokines, and inflammatory reaction prevention flow origination from the reduction in itching, flare and extreme exfoliation.

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Research conducted on medicinal plants having anti-inflammatory activities is the most rising topic in current bio-drugs. The need of the hour is to explore more medicinal plants for the assessment of anti-inflammatory activities.

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