ANTI-INFLAMMATORY ACTIVITY OF SOME MEDICINAL PLANTS: A REVIEW

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ABSTRACT

Inflammation is a part of the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells or irritants. It is characterized by redness, swollen joints, joint pain, its stiffness and loss of joint function. The herbal products are rich source for discovery of new drugs because of its chemical diversity. Herbal products from medicinal plants are playing a major role to cure many diseases associated with the inflammation. The conventional drugs are available in the market to treat the inflammation which produces various side-effects. Due to these side-effects there is need for the search of newer drugs with less or no side-effects. The review analyses extracts and phytochemicals derived from the Indian herbal plants evaluated for the possible anti-inflammatory activity.

Keywords: Anti-Inflammatory, Medicinal Plants, Phytoconstituents.

INTRODUCTION

Inflammation

Inflammation is the reaction of vascularized living tissues to local injury. Inflammation comprises a series of changes in the terminal vascular bed, in blood and in connective tissues with the purpose of eliminating the offending irritant and to repair the damaged tissue.

Acute inflammation

Acute inflammation is usually of sudden onset, marked by the classical signs in which vascular and exudative processes predominate.

Chronic inflammation

Chronic inflammation is prolonged and persistent inflammation marked chiefly by new connective tissue formation; it may be a continuation of an acute form or a prolonged low-grade form

Inflammation is the common clinical conditions and rheumatoid arthritis is a chronic debilitation auto immune disorder [1].

NATURE OF ANTI-INFLAMMATORY AGENTS

Unlike modern Allopathic drugs which are single active compounds that can specifically target one pathway, herbal remedies work in a way that depends on orchestral approach. A plant contains a multitude of several molecules that synergistically act on targeted elements of the cellular complex pathway. Medicinal herbs have been source of wide range of biologically active compounds for many centuries and they have been used extensively as crude drugs or as pure components for treating varieties of disease conditions. When compared to synthetic ones, natural remedies are having less side effects and toxicity. So,

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now days the usages of herbal remedies are increased when compared to allopathic drugs [2].

In the development of potential therapeutic agents, medicinal plant plays an important role. There are over 1.5 million practitioners of traditional medicinal system using medicinal plants in preventive, promotional and curative applications. India with its biggest repository of medicinal herbs in the world may maintain an important position in the production of raw materials either directly for crude drugs or as the bioactive components in the formulation of pharmaceuticals [3].

In India is one of the 12 mega biodiversity centers having over 45,000 plant species. About 1500 plants with medicinal uses are mentioned in ancient texts and around 800 plants have been used in traditional medicine. However, India has failed to make an impact in the global market with drugs derived from plants and the gap between India and other countries is widening rapidly in the herbal field. The export of herbal medicine from India is negligible despite the fact that the country has a rich traditional knowledge and heritage of herbal medicine [4].

**IMPORTANCE OF INDIAN HERBAL PLANTS**

The present review is dedicated to herbal formulations, extracts and the bioactive or active constituents isolated and identified from the Indian plants, which have been previously reported to have an anti-inflammatory activity. The role of natural products as remedies has been recognized since ancient times. A medicinal plant is any plant used in order to relieve, prevent or cure a disease or to alter physiological and pathological process or any plant employed as a source of drugs or their precursors. 80% of the world’s population till relies upon plants for primary health care. Even today in western medicine and despite in synthetic chemistry 25% of prescription medicines are still derived either directly or indirectly from plants.

Despite the progresses in modern medicine, it has been reported that more than 70% of the developing world's population still depends on complementary and alternative systems of medicine, otherwise known as traditional medicine [30]. Some herbs possess anti-inflammatory properties and have the ability to reduce both internal and external swelling and inflammation. Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness. In India there are several indigenous medicinal plants available that have anti-inflammatory activity. The role of natural products in inflammatory properties and have the ability to reduce pathological process or any plant employed as a source of remedies has been recognized since ancient times. A number of medicinal plants, which have been previously reported to have an anti-inflammatory activity. The role of natural products as remedies has been recognized since ancient times. A medicinal plant is any plant used in order to relieve, prevent or cure a disease or to alter physiological and pathological process or any plant employed as a source of drugs or their precursors. 80% of the world’s population till relies upon plants for primary health care. Even today in western medicine and despite in synthetic chemistry 25% of prescription medicines are still derived either directly or indirectly from plants.

**Table 1. List of Indian Herbal Plants having Anti-Inflammatory Activity**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Plant Name</th>
<th>Family</th>
<th>Part used</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Acacia Catechu</td>
<td>Leguminosae</td>
<td>Bark and stem</td>
<td>[5]</td>
</tr>
<tr>
<td>3.</td>
<td>Abutilon Indicum</td>
<td>Malvaceae</td>
<td>Leaves</td>
<td>[7]</td>
</tr>
<tr>
<td>4.</td>
<td>Andrographis Paniculata</td>
<td>Acanthaceae</td>
<td>Aerial plant</td>
<td>[8]</td>
</tr>
<tr>
<td>5.</td>
<td>Achyranthes aspera Linn</td>
<td>Amarnthaceae</td>
<td>Seeds</td>
<td>[9]</td>
</tr>
<tr>
<td>6.</td>
<td>Azadirachta Indica</td>
<td>Meliaceae</td>
<td>Leaves</td>
<td>[10]</td>
</tr>
<tr>
<td>8.</td>
<td>Berberis Asiatica</td>
<td>Berberidaceae</td>
<td>Stem</td>
<td>[12]</td>
</tr>
<tr>
<td>10.</td>
<td>Beta vulgaris</td>
<td>Amaranthaceae</td>
<td>Fruits</td>
<td>[14]</td>
</tr>
<tr>
<td>12.</td>
<td>Bryonopsis Laciniosa</td>
<td>Cucurbetaceae</td>
<td>Whole Plant</td>
<td>[16]</td>
</tr>
<tr>
<td>13.</td>
<td>Bauhinia Racemosa</td>
<td>Caesalpini Aceae</td>
<td>Stem bark</td>
<td>[17]</td>
</tr>
<tr>
<td>14.</td>
<td>Adhatoda vasica</td>
<td>Acanthaceae</td>
<td>Whole plant</td>
<td>[18]</td>
</tr>
<tr>
<td>15.</td>
<td>Cassia fistula Linn</td>
<td>Caesalpini Aceae</td>
<td>Roots, Leaves, Bark</td>
<td>[19]</td>
</tr>
<tr>
<td>17.</td>
<td>Parthenium hysterophorus L.</td>
<td>Asteraceae</td>
<td>Leaves</td>
<td>[21]</td>
</tr>
<tr>
<td>18.</td>
<td>Phyllanthus polyphyllus</td>
<td>Euphorbiaceae</td>
<td>Whole plant</td>
<td>[22]</td>
</tr>
<tr>
<td>19.</td>
<td>Sida acuta</td>
<td>Malvaceae</td>
<td>Leaves Roots</td>
<td>[23]</td>
</tr>
<tr>
<td>22.</td>
<td>Myrtus communis</td>
<td>Myrtaceae</td>
<td>Leaves</td>
<td>[26]</td>
</tr>
<tr>
<td>23.</td>
<td>Elephantopus Scaber</td>
<td>Asteraceae</td>
<td>Leaves</td>
<td>[27]</td>
</tr>
<tr>
<td>24.</td>
<td>Curcuma Longa</td>
<td>Zingiberaceae</td>
<td>Rhizome</td>
<td>[28]</td>
</tr>
<tr>
<td>25.</td>
<td>Ocimum sanctum L.</td>
<td>Labiatae</td>
<td>Leaf</td>
<td>[29]</td>
</tr>
</tbody>
</table>
Figure 1. Chemical structure of some phytoconstituents responsible for anti-inflammatory activity

- Supinine
- Columbin
- Monocrotaline
- Febleucin
- 4-O-methylgallic acid
- Lycopodine
- Isocolumnin
- Thespone
- Mansonone – D
- Mansonone – H
- Thespesone
- Sedumosine E2
- Sedumosine E3
- Sedumosine F1
- Sedumosine F2
- Cacalol
- Cacalone
- Cynaropicrin
- Saussureamine A
DISCUSSION

The crude extracts of the various parts or the whole plants of the medicinal plants and isolated compounds from the medicinal plants showed statistically significant anti-inflammatory activity both in in vivo and in vitro assay. The in vivo bioassay was conducted on formalin [31, serotonin and egg albumin [32] or carrageenan [33] induced paw edema in the rat and the result was compared with various positive controls. As a positive control researchers used various standard anti-inflammatory compounds like phenylbutazone [34], diclofenac sodium [35], indomethacin etc. In vitro anti-inflammatory activity was evaluated using protease enzyme inhibition method [36]. In a study, researchers revealed the significant in vitro membrane stabilizing effect of india medicinal plants namely Mesua nagassarium, Kigelia pinnata, which indicates the anti-inflammatory activity of the medicinal plants[37].

However, the core chemical classes of anti-inflammatory agents from natural sources have been reported to engage a vast range of compounds such as polyphenils, flavnoids, terpenoids, alkaloids, anthraquinones, lignans, polysaccharides, saponins and peptides [38]. Alkaloids in asserted skeletal type based on pyridine ring system have been reported to have striking anti-inflammatory activity, e.g Berberine from Berberis is traditional remedy against rheumatism [39]. Terpenoids significantly inhibit the development of chronic joint swelling. Terpenoids may affect different mechanism relevant to inflammations arising in response to varied etiological factors [40].

Biochemical investigations have been also shown that flavonoids are able to inhibit both cyclo oxygenase and lipoxygenase pathways of arachidonic metabolism depending upon their chemical structures. Alkaloids containing pyridine ring system have been reported to have striking anti-inflammatory activity. Eg. Berberine from Berberis is traditional remedy to treat rheumatism. Significantly terpenoids inhibit the development of chronic joint swelling. However, still many herbal plants have not undergone through scientific investigations for inflammation and rheumatism. Hence it is need of time that all such herbal medicines should be considered for determination of their pharmacological activities by isolation of single entity responsible for antiinflammatory activity and development of suitable formulation which would be beneficial against inflammatory disorders.

CONCLUSION

Much of the current research trend is towards the isolation, purification, identification and characterization of active principles from crude extracts. However, there is a hidden fact that the different components present in the crude plant drugs may be more efficient and potent than any of the single purified compound which may help to nullify the toxic effects of individual constituents. Most of the commonly used modern medicines have originated from the plant sources. The incidence of arthritis and related diseases is increasing now due to the drastic changes that happened in the present life style. The quest for new botanicals as relief for these life style disorders would be a welcome step for the local and urban health care. Majority of the anti-inflammatory and analgesic compounds isolated from the above discussed medicinal plants are prone to some side effects for which addition of modern medicines or antidotes from plant sources are recommended. At the same time plants like Bosewellia, Callophyllum and Mesua yield such compounds free from side effects. The development of nutraceuticals from them could substitute the present generic market to a great extent.

REFERENCES


