



ISSN: 2231-3354  
Received on: 04-01-2012  
Revised on: 20-01-2012  
Accepted on: 27-01-2012

## Anti-inflammatory activity of medicinal plants native to Bangladesh: A review

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### ABSTRACT

Inflammation is characterized by redness, pain and swelling. Anti-inflammatory drugs are agents that reduce inflammation. It has been found that conventional synthetic NSAIDs accelerate damage and erosion of joint cartilage, advancing the osteoarthritis process. These NSAIDs are also known to cause liver and kidney damage with long-term use. Experimental research have shown that the use of proven natural anti-inflammatory herbal agents have not been shown to cause erosion injury to the intestinal tract, acceleration of cartilage destruction or production of liver and kidney toxicities. This enables practitioners to use these substances in a safe and responsible way. In this overview the medicinal plants reported to have anti-inflammatory activity available in Bangladesh are summarized to assess the research advancements.

**Keywords:** Anti-inflammatory, Inflammation, Bangladesh, NSAID, Medicinal plants, Pain.

### INTRODUCTION

Inflammation is a severe response by living tissue to any kind of injury. There can be four primary indicators of inflammation: pain, redness, heat or warmth and swelling. When there is injury to any part of the human body, the arterioles in the encircling tissue dilate. This gives a raised blood circulation towards the area (redness) (Burke *et al.*, 2005). Vasoactive chemicals also increase the permeability (increase pore size) of these arterioles which allows blood cells, chemical substance, blood proteins and fluid to accumulate in that region. This fluid accumulation causes swelling and may compress nerves in the area resulting in pain. In addition, prostaglandins, that might also result in 'irritation' of the nerves and further contribute to pain. Most people who take anti-inflammatory drugs have no side-effects, or only minor types. When taken appropriately, the advantage usually far outweighs the possible harms. In particular many people have a short course of an anti-inflammatory for all sorts of painful conditions. However, side-effects, and also occasionally very severe possible adverse effects, can occur. There are a number of anti-inflammatory herbs that could help to achieve similar results without the harmful effect (Burke *et al.*, 2005).

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**Table 1:** Bangladeshi medicinal plants with anti-inflammatory activity and their traditional use(s).

Sl. No.	Local name (Uddin, 2006; Ghani, 2003)	Traditional use(s) (Uddin, 2006; Ghani, 2003)	Scientific name	Family	Part(s) used for the study	Reference
1	Bishkatali	Diuretic, analgesic	<i>Persicaria stagnina</i>	Polygonaceae	Whole plant	Ahmed <i>et al.</i> , 1997
2	Misridana	Antidiabetic, gastric ulcer	<i>Scoparia dulcis</i>	Scrophulariaceae	Leaves	Ahmed <i>et al.</i> , 2001
3	Ti plant	Antipyretic, lung infection	<i>Cordyline terminalis</i>	Agavaceae	Not found	Ahmed <i>et al.</i> , 2004
4	Athalo Bishkatali	Diuretic, analgesic	<i>Polygonum viscosum</i>	Polygonaceae	Aerial parts	Datta <i>et al.</i> , 2004
5	Bakkan	Stomachic, diuretic, antiasthmatic	<i>Lippia nodiflora</i>	Verbenaceae	Leaves	Ahmed <i>et al.</i> , 2004
6	Ulu	Fever	<i>Imperata cylindrica</i>	Poaceae	Not found	Saha <i>et al.</i> , 2005
7	Dhandul, Amur	Dysentery, skin diseases	<i>Amoora cucullata</i>	Meliaceae	Leaves	Das <i>et al.</i> , 2005
8	Bhant	Bronchitis, asthma	<i>Clerodendron viscosum</i>	Verbanaceae	Aerial parts	Khatry <i>et al.</i> , 2005
9	Choi	Paralysis, schizophrenia	<i>Piper chaba</i>	Piperaceae	Stem	Rahman <i>et al.</i> , 2005
10	Raktodrone	Tonic, febrifuge	<i>Leonurus sibiricus</i>	Lamiaceae	Aerial part	Islam <i>et al.</i> , 2005
11	Lajkari	Antiasthmatic, antimigraine, antiallergic	<i>Polygonum lanatum</i>	Polygonaceae	Whole plant	Saha <i>et al.</i> , 2005
12	Kulaliya	Eye diseases, stomach trouble	<i>Desmodium triflorum</i>	Fabeceae	Whole plant	Chowdhury <i>et al.</i> , 2005
13	Dolon Champa	Antirheumatic, febrifuge	<i>Hedychium coronarium</i>	Zingiberaceae	Rhizome	Shrotriya <i>et al.</i> , 2007
14	Brela	Tonic, astringent, emollient	<i>Sida cordifolia</i>	Malvaceae	Aerial parts	Sutradhar <i>et al.</i> , 2007
15	Chitki, Panjuli	Antidiabetic	<i>Phyllanthus reticulatus</i>	Euphorbiaceae	Aerial parts	Saha <i>et al.</i> , 2007
16	Keu, Kemak	Osteoarthritis, otitis	<i>Costus speciosus</i>	Zingiberaceae	Aerial parts	Alam <i>et al.</i> , 2008
17	Neem	Rheumatic disorders, antiallergic	<i>Azadirachta indica</i>	Meliaceae	Leaves	Mosaddek <i>et al.</i> , 2008
18	Sirish, Koroi	Toothache, gum diseases	<i>Albizia lebeck</i>	Fabaceae	Bark	Saha <i>et al.</i> , 2009
19	Neem	Arthritis, gout, fever, pain	<i>Azadirachta indica</i>	Meliaceae	Leaves	Mahabub-Uz-Zaman <i>et al.</i> , 2009
20	Monphal, Belong	Bronchitis, asthma	<i>Xeromphis spinosa</i>	Rubiaceae	Bark	Das <i>et al.</i> , 2009
21	Aam	Antiasthmatic	<i>Mangifera indica</i>	Anacardiaceae	Leaves	Islam <i>et al.</i> , 2010
22	Muktajhuri	Bronchitis, asthma, arthritis	<i>Acalypha indica</i>	Euphorbiaceae	Whole plant	Rahman <i>et al.</i> , 2010
23	Rakta kombol	Asthma, gout, rheumatism	<i>Adenanthera pavonina</i>	Fabaceae	Barks	Ara <i>et al.</i> , 2010
24	Bara Bishkatali	Diuretic, analgesic	<i>Polygonum stagninum</i>	Polygonaceae	Aerial parts	Mazid <i>et al.</i> , 2010
25	Bitarak	Boils	<i>Argyrea argentea</i>	Convolvulaceae	Leaves	Uddin <i>et al.</i> , 2010
26	Kalo Sarisha, Rai Sarisha	Rheumatism, toothache	<i>Brassica nigra</i>	Brassicaceae	Leaves	Alam <i>et al.</i> , 2011
27	Mankachu	Abdomen & spleen diseases	<i>Alocasia indica</i>	Araceae	Rhizomes	Rahman <i>et al.</i> , 2011
28	Nagesar	Cough, rheumatism	<i>Mesua nagassarium</i>	Clusiaceae	Leaves	Rashid <i>et al.</i> , 2011
29	Haritaki	Wounds, abscesses	<i>Kigelia pinnata</i>	Bignoniaceae	Leaves	Rashid <i>et al.</i> , 2011
30	Sadi urisha	Rheumatoid arthritis	<i>Clausena suffruticosa</i>	Rutaceae	Root	Chakma <i>et al.</i> , 2011
31	Jhau	Sore throat, ulcerating piles	<i>Tamarix indica</i>	Tamaricaceae	Root	Rahman <i>et al.</i> , 2011
32	Alkushi	Rheumatism, snakebite	<i>Mucuna pruriens</i>	Fabaceae	Aerial parts	Bala <i>et al.</i> , 2011
33	Potol	Antidiabetic, skin disorders	<i>Trichosanthes dioica</i>	Cucurbitaceae	Fruit	Alam <i>et al.</i> , 2011
34	Lalmesta	Rheumatic fever, ulcer	<i>Hibiscus sabdariffa</i>	Malvaceae	Calyx	Ali <i>et al.</i> , 2011
35	Gima shak	Arthritis	<i>Glinus oppositifolius</i>	Molluginaceae	Whole plants	Hoque <i>et al.</i> , 2011
36	Supurn	Boils, fevers, gout	<i>Cymbidium aloifolium</i>	Orchidaceae	Leaves	Howlader <i>et al.</i> , 2011

## DESCRIPTION

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 (Shaikh *et al.*, 2005). 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 Bangladesh there are several indigenous medicinal plants available that have anti-inflammatory capabilities. Lists of these medicinal plants are given in table 1.

## 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 (Mosaddek *et al.*, 2008), serotonin and egg albumin (Alam *et al.*, 2008) or carrageenan (Saha *et al.*, 2007) induced paw edema in the rat and the result was compared with

various positive controls. Cotton pellet implantation model (Das *et al.*, 2005; Bala *et al.*, 2011) or xylene-induced ear edema in mice (Ali *et al.*, 2011) for anti-inflammatory activity was also used by the researchers. As a positive control researchers used various standard anti-inflammatory compounds like phenylbutazone (Datta *et al.*, 2004), dexamethasone (Mosaddek *et al.*, 2008), diclofenac sodium (Ahmed *et al.*, 2004), indomethacin (Alam *et al.*, 2008), etc. *In vitro* anti-inflammatory activity was evaluated using protease enzyme inhibition method (Alam *et al.*, 2011). In a study (Rashid *et al.*, 2011), researchers revealed the significant *in vitro* membrane stabilizing effect of two Bangladeshi medicinal plants namely *Mesua nagassarium*, *Kigelia pinnata*, which indicates the anti-inflammatory activity of the medicinal plants. From *Persicaria stagnina* (Ahmed *et al.*, 1997), *Scoparia dulcis* (Ahmed *et al.*, 2001), *Polygonum viscosum* (Datta *et al.*, 2004) and *Sida cordifolia* (Sutradhar *et al.*, 2007) researchers isolated potent anti-inflammatory compounds and tested using standard methods. The compounds were of sesquiterpene, diterpene, flavonoid glycoside and alkaloid types. In case of the rest of the medicinal plants the researchers conducted the anti-inflammatory study using the crude extracts and found significant activity.

## CONCLUSION

The advancement of allopathic medication shifted scientific and general people's interest from conventional medicinal preparations. However, in recent years, a significant paradigm change has taken place. Attraction has re-focused in traditional medicine, simply because of the higher cost of modern drugs, time and expenditure which is essential to bring a drug to market after proper clinical tests, severe side-effects of a variety of modern drugs, and drug-resistance developing in both microorganisms and parasites. So, researchers are currently taking an active interest in traditional medicinal preparations of native peoples, which are plant-based. In recent years researcher are working on anti-inflammatory plants. Inflammatory diseases are common in the aging society of developed and developing countries; yet, the drugs used to combat inflammatory diseases like rheumatoid arthritis often have serious side-effects. Several leads from plant sources, like curcumin, resveratrol, baicalein, boswellic acid, betulinic acid, ursolic acid and oleanolic acid are now studied as possible drugs for the future against inflammatory (Gautam *et al.*, 2009). This review will help the recent and future researchers in their research work as they could select the anti-inflammatory medicinal plants from which they can isolate active constituents by using various separation techniques. These types of research works may unveil some new molecules which help us to fight against inflammatory disorders.

Most of the researchers concluded their study by mentioning that the anti-inflammatory activity may be due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis. But more extensive study could be conducted to determine exact mechanism(s) of action.

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