



## PRELIMINARY PHYTOCHEMICAL INVESTIGATIONS ON THE ANTIRHEUMATIC PRINCIPLES IN *ANISOLMELES MALABARICA* R.Br., AND *CLERODENDRUM SERRATUM* L.

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### ABSTRACT

Phytochemical investigations were undertaken on the Antirheumatic principles of *Anisolmeles malabarica* R.Br., (Lamiaceae) and *Clerodendrum serratum* L. (Verbenaceae). Phytochemical analysis of the aerial parts of the plant extracts showed that both these plants have major Antirheumatic principles belonging to alkaloids, flavanoids and glycosides group. These compounds have been subjected to analysis using TLC techniques. Conformation of the chemical structure using modern analytical techniques is suggested to isolate and characterize the exact chemical compounds that may help in treating rheumatic complaints.

**Key words:** *Anisolmeles malabarica*, *Clerodendrum serratum*, Antirheumatic principles, Alkaloids, Flavanoids, Glycosides.

### INTRODUCTION

*Anisolmeles malabarica* R.Br., (Lamiaceae) (Figure 1) is distributed in major parts of India and especially in South India as a traditional medicinal plant commonly known as Peymarutti (Tamil), Gouzaban (Hindi), Chodhara (Marathi), Karithumbi (Kannada) and Malabar catmint (English)[1]. The herb is reported to possess anti-spasmodic, anti-periodic properties and used in Rheumatoid arthritis[2]. It is used

for the traditional treatment of snakebite as antidote[3] and plant leaves are used as carminative, astringent, stomachic, rheumatism and diaphoretic in Coimbatore district[4] and also used as dentifrice to cure various problems[5]. Preliminary phytochemical tests were carried out by Brindha *et al.*, (1977)[6] and used for the treatment of various infections.

***Figure 1. Anisomeles malabarica (Photographed from its natural habitat)***



***Figure 2. Clerodendrum serratum (Photographed from its natural habitat)***



*Clerodendrum serratum* L. (Verbenaceae) (Figure 2) is a deciduous shrub distributed in the forests of the Western Ghats of India [7]. In Indian system of medicine, the plant is well known as Bharangi(Sanskrit) and commonly known as Blue Glory(English) and Gantu Bharangi(Kannada). As per the traditional claims[8] roots are the potential source of drug for ailments such as asthma, bodyache, bronchitis, cholera, dropsy, eye diseases, fever, inflammations, malaria, ophthalmia, rheumatism, snakebite, tuberculosis, ulcers and wounds.

The word Rheumatism is derived from the Greek word 'rheuma', meaning swelling. This refers to an acute or chronic illness which is characterized by pain and swelling of the muscles, ligaments, tendons and the joints. The main cause of rheumatism is the presence of toxic waste products in the blood. The liberal consumption of meat, white bread, sugar and refined cereals leaves a large residue of toxic wastes in the system, the accumulation of which forms the basic cause of rheumatism. In certain cases, infection from the teeth and gall bladder may also produce rheumatism. If neglected, it may even affect the heart.

Arthritis can be very painful due to joints being surrounded by many nerves which are needed to make the complicated joints work properly. What we are looking at here is natural remedies. A lot of arthritis patients often turn to natural herbal remedies and methods to relieve the symptoms. But do these natural alternatives do what they promise? Can you find relief from herbal supplements? There are many herbs which have been enlisted to have the potential in the symptomatic treatment of rheumatoid arthritis, hence the present study has been proposed to evaluate the antirheumatic potential of some of them. The tools of biotechnology provide vast potential for the development of new inventions, particularly in the field of pharmaceuticals which are environmentally safe and do not require heavy investments. In this context, the herbal medicines have been proved to have tremendous scope. In the present study, efforts will be made to identify new plants which may have the potential to treat rheumatism, hence

characterization of bioactive compounds which are useful in treating rheumatism and commercialization of bioactive compounds will be the major thrust areas of the study.

The first recognized description of rheumatoid arthritis was made in 1800 by Dr Augustin Jacob Landré-Beauvais (1772–1840) of Paris. Rheumatoid arthritis (RA) is a chronic, systemic inflammatory disorder that may affect many tissues and organs, but principally attacks synovial joints. The process is an inflammatory response of the synovium (synovitis) secondary to hyperplasia of synovial cells, excess synovial fluid, and the development of pannus in the synovium. The pathology of the disease process often leads to the destruction of articular cartilage and ankylosis of the joints. Rheumatoid arthritis can also produce diffuse inflammation in the lungs, pericardium, pleura, sclera, and the nodular lesions, most common in subcutaneous tissue. Although the cause of rheumatoid arthritis is unknown, autoimmunity plays a pivotal role both in its chronicity and progression, and is considered as a systemic autoimmune disease.

About 1% of the world's population is afflicted by rheumatoid arthritis and women are three times susceptible compared to men. Onset of the disease is most frequent between the age groups of 40 and 50, but people of any age can be affected. It can be a disabling and painful condition, which can lead to substantial loss of functioning and mobility, if not timely and adequately treated. Various treatments are available for rheumatoid arthritis. Non-pharmacological treatment includes physiotherapy, orthoses, occupational therapy and nutritional therapy, but these do not stop the progression of joint destruction. Analgesics (painkillers) and anti-inflammatory drugs, including steroids are used to suppress the symptoms, while disease-modifying antirheumatic drugs (DMARDs) are required to inhibit or halt the underlying immune process and prevent long-term damage. In recent times, the newer group of biologics has increased the treatment options. In this regard, efforts will be made to explore newer biologics used to treat rheumatism very efficiently. Hence, this

proposal is made to produce bio-active compounds from select medicinal plants through isolation, identification and characterization using simple, cost-effective and easy recovery of the product.

A survey of available literature shows that *Anisolmeles malabarica* and *Clerodendrum serratum*, bio-active principle has not been identified for the treatment of rheumatism. Hence, the present study has been undertaken to isolate and characterize the antirheumatic principles of these plants.

## MATERIALS AND METHODS

### Plant materials

For the present study, the two following plants viz., *Anisolmeles malabarica* R.Br. belonging to the family Lamiaceae and *Clerodendrum serratum* L. belonging to the family Verbenaceae have been selected. These plants have been collected from Mysore, Nanjangud and surrounding areas where they were growing profusely. The plants have been identified and authenticated by experts from National Ayurveda Dietetics Research Institute, Bangalore (Ref. No. SMPU/NADRI/BNG/2010-11/550). Preliminary trials on experimental animals confirmed that these plants can be effectively utilized for the treatment of rheumatic diseases. All procedures described were reviewed and approved by the Institution animal ethical committee.

### Preparation of extract

The aerial parts of both the plants have been collected and shade dried ( $\pm 28^{\circ}$  C) and pulverized using a stainless steel mixer grinder. After pulverization, the powder has been sieved using a commercial sieve (mesh size approx. 1mm) to make the particle size uniform. This powder has been subjected to solvent extraction in a Soxhlet apparatus using various solvents viz., petroleum ether, chloroform, ethyl acetate, ethanol and aqueous alcohol to fractionate various organic principles. After fractionation, the extracts have been subjected to phytochemical analysis using the standard phytochemical methods [9]. The principles have

been confirmed by TLC using chloroform - acetone - ethanol - 25% ammonia (50:30:10:10 v/v) for alkaloids, ethyl acetate - formic acid - glacial acetic acid - water (100:11:11:26 v/v) for flavanoids.

### Preliminary phytochemical screening

All the extracts were screened for the presence of various active plant metabolites like steroids, alkaloids, carbohydrates, flavanoids, glycosides and tannins according to standard phytochemical methods [10]. Briefly, Dragendroff reaction was used to confirm the presence of alkaloids, alkaline reagent test for tannins, frothing test for saponins, legal's test for glycosides, Xanthoproteic test for proteins and Shinoda test for flavanoids respectively.

## RESULTS AND DISCUSSIONS

### Phytochemical studies

As shown in Table 1 for the aerial parts of the plant of *Anisolmeles malabarica*, alkaloids are present in all the extracts except ethyl acetate and flavanoids are present in all the extracts. Glycosides are present only in ethyl acetate extract. Steroids, saponins, tannins, diterpenes and triterpenes are present in only some extracts, whereas phenols, oils & fats and proteins are totally absent in all the extracts.

Table 2 for the aerial parts of the plant of *Clerodendrum serratum*, alkaloids are present in chloroform, ethanol and in aqueous extracts. Flavanoids are present in chloroform, ethyl acetate and aqueous extracts and glycosides are present only in ethyl acetate and aqueous extracts respectively. Proteins, saponins and oils and fats are totally absent.

Flavanoids have been reported to exert multiple biological effects such as anti-inflammatory, anti-allergic, anti-viral and anti-cancer activities [11]. The steroids and flavones present in the various extracts of *Anisolmeles malabarica* and *Clerodendrum serratum* are responsible for its action. Alkaloids are important for defense of the plant against pathogenic organisms and herbivores [12]

Results of analysis of extracts from *Anisolmeles malabarica* and *Clerodendrum serratum* are presented in Table 1 and Table 2.

**Table 1: Preliminary phytochemical screening of aerial parts of *Anisolmeles malabarica***

<b>Chemical Constituents (Present/Absent)</b>	<b>Petroleum Ether extract</b>	<b>Chloroform extract</b>	<b>Ethyl Acetate extract</b>	<b>Ethanol extract</b>	<b>Aqueous extract</b>
<i>Carbohydrates</i>	P	P	A	P	P
<i>Akaloids</i>	P	P	A	P	P
<i>Steroids</i>	P	A	A	P	A
<i>Tannins</i>	P	A	A	A	P
<i>Phenols</i>	A	A	A	A	A
<i>Saponins</i>	A	A	A	P	P
<i>Oils and Fats</i>	A	A	A	A	A
<i>Proteins &amp; Amino Acids</i>	A	A	A	A	A
<i>Diterpenes</i>	A	A	P	P	P
<i>Triterpenes</i>	A	A	P	P	A
<i>Flavanoids</i>	P	P	P	P	P
<i>Glycosides</i>	A	A	P	A	A

P: Present; A: Absent

**Table 2: Preliminary phytochemical screening of aerial parts of *Clerodendrum serratum***

<b>Chemical Constituents (Present/Absent)</b>	<b>Petroleum Ether extract</b>	<b>Chloroform extract</b>	<b>Ethyl Acetate extract</b>	<b>Ethanol extract</b>	<b>Aqueous extract</b>
<i>Carbohydrates</i>	P	P	A	P	P
<i>Akaloids</i>	A	P	A	P	P
<i>Steroids</i>	A	A	A	P	A
<i>Tannins</i>	P	A	A	A	P
<i>Phenols</i>	A	P	A	A	A
<i>Saponins</i>	A	A	A	A	A
<i>Oils and Fats</i>	A	A	A	A	A
<i>Proteins &amp; Amino Acids</i>	A	A	A	A	A
<i>Diterpenes</i>	A	A	A	A	P
<i>Triterpenes</i>	A	A	A	A	A
<i>Flavanoids</i>	A	P	P	A	P
<i>Glycosides</i>	A	A	P	A	P

P: Present; A: Absent



## CONCLUSION

Phytochemical screening of the aerial parts of the plants of *Anisolmeles malabarica* and *Clerodendrum serratum* revealed the presence of flavanoids and these natural products are responsible for anti-inflammatory and antioxidant activity. The results of the present study support the folklore use of both these plants in rheumatic diseases.

Thus, the results of this study confirmed the traditional uses, claiming that the plants viz., *Anisolmeles malabarica* and *Clerodendrum serratum* have potent antirheumatic and antipyretic properties. However, to know the exact mechanism of action of both these plants, further studies are being undertaken to isolate and characterize the specific chemical components that can be effectively used for the treatment of rheumatism.

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