



# A study on ethnomedicine floristics for treating Arthritis in Aneguli-Maradavalli village of Sharavathi river basin, Central Western Ghats, Karnataka

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## Research

### Abstract

**Background:** The study area lies in the Central Western Ghats which is one of the 36 biodiversity hotspots of the world. Over 4.5 billion people in developing countries and overall 60% of the world population rely on traditional medicine as components of their healthcare. Documentation of such traditional medicinal knowledge is important for conservation of medicinal plants and as well as future beneficiaries.

**Methods:** A purposive sampling method was adapted. A self-structured questionnaire was used to collect the feedbacks of patients. The information (plant parts, mode of usage, dosage) were collected through face to face interviews and discussions with the traditional practitioners. The medicinal plants used were collected for herbarium preparation and identified using standard regional and district floras.

**Results:** A total of 15 medicinal plant species belonging to 11 families for treating arthritis were found in this study. The dominant habit was climbing shrub. Leaves were used in higher proportion (63%). The members of Lamiaceae family were dominant. Three important formulations (pellet, decoction, oil) were used to treat different stages of Arthritis. The statistical outcome from the patients' feedback questionnaire is also mentioned in the paper.

**Conclusions:** Herbal preparations should only be prepared as remedy by a practitioner. The people in

and around the study area depend on traditional medicine given by practitioner for arthritis. The conservation of such traditional knowledge for treatment can only be accomplished through systematic documentation and scientific research.

**Keywords:** Diversity, Ethnobotany, Herbal medicine, Joint pain, Medicinal plants, Sharavathi valley, Traditional medicine.

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### Background

Ethnomedicine is a valuable cultural heritage that offers medical care through plant resources with the directions of herbal practitioners. Plants are the raw materials for major source of therapeutic drugs and

play a significant key role in providing health care all over the world. The plants used by herbal practitioners for controlling diseases & disorders are based on the consistent practical experiences and traditional knowledge gained by their elder generation.

A large number of medicinal plants have been tested and found to be containing active compounds with curative properties against arthritis (Shah et al. 2006). The efficacy of some valuable plants like *Commiphora wightii* (Arn.) Bhandari, *Semecarpus anacardium* L.f., *Zingiber officinale* Roscoe, *Withania somnifera* (L.) Dunal that have a history of human use and their anti-inflammatory or anti-arthritic properties have been evaluated pre-clinically and clinically. Basic scientific research has uncovered the mechanism by which some plants afford their therapeutic effects. Available data suggests that the extracts of most of these herbs may provide a safe & effective adjunctive therapeutic approach for the treatment of arthritis. Even though, critical investigations were undertaken in the medical field, no specific drug has not been determined for rheumatoid arthritis. The contemporary medicine has also started admitting that ayurveda and herbal medicine has lot of positive influence in the treatment of arthritis.

In most of the villages located in the vicinity of the forests of the Central Western Ghats (CWG) region, people mostly use on herbal medicine for their immediate relief. Most of the diseases and disorders get medicated by herbal medicine through practitioners and elders in the family. Serious ailments like cancers, diabetes, arthritis are also treated by local healers. Particularly, the practitioners in Aneguli-Maradavalli (A-M) village in the region of Sharavathi river basin (SRB), Shivamogga district treats arthritic patients to the best of his traditional knowledge using ethno-medicinal plants. The documentation of this folklore knowledge is very important for future beneficiaries. Hence, in the present study, an intensive medico botanical survey has been undertaken in the region of SRB at A-M village of Shivamogga district, Karnataka state, India to document the indigenous knowledge of treating arthritis.

## Materials and methods

### Data collection and questionnaire

The documentation of indigenous knowledge for treating Arthritis using plants was carried out in the time period of six months from October 2017 to March 2018 by following the Code of Ethics of the International Society of Ethnobiology (ISE, 2006). A

purposive sampling method was adapted. Frequent field surveys were conducted to collect the information from the practitioner Subbarao Aneguli who resides in A-M village of Sagar taluk, Shivamogga district, Karnataka, India. Local names of a plant, mode of medicinal usage, oil preparation methods etc. were documented through face-to-face interviews and discussions. Information like part of the plant used, dosage, mode of preparation (i.e., decoction, pellets, powder, oil etc.), form of usage either fresh or dried, and mixture of other plants used as ingredients/adjuvant were also documented.

A self-structured questionnaire was prepared and used to collect patient's feedback about the herbal medicine. The practitioner revealed the contact of patients randomly who were treated by him in the past few years.

The medicinal plants used by the practitioner were listed and identified by local name, photographed and sample specimens were collected for the preparation of herbarium vouchers. The collected plant specimens were identified taxonomically using various regional and district floras of Karnataka namely, Flora of Shimoga (Ramaswami et al. 2001), A Synoptic Flora of Mysore District (Raghavendra and Basheer 1981), Flora of Davanagere (Manjunatha et al., 2004) and Flora of the Presidency of Madras (Gamble J S, 1925). Each specimen was allotted with a voucher number and deposited at Biodiversity laboratory, DBT-BUILDER Project, Kuvempu University.

### Study area

The study area was A-M village (14°08'29.97" N latitude 74°56'41.89" E longitude at an elevation of 643 m) located in SRB area of Sagar taluk, Shivamogga district, Karnataka state, India. The study area includes a part of Sharavathi Valley Wildlife Sanctuary. The forest type falls under tropical evergreen to semi-evergreen category. The area receives an average annual rainfall of 2000 mm. The study area is one of the important catchment areas of Linganamakki reservoir. The traditional medicine practitioner Subbarao Aneguli resides in Aneguli village of Sharavathi valley of the Central Western Ghats and recognized as a very good medicine practitioner, specifically for arthritis.

## Results and discussions

### Plants used to treat arthritis

The results of the study revealed that fifteen species belonging to eleven different angiosperm families were used by the traditional practitioner for treating arthritis (Table1). Among them, climbing shrub

species were dominated and a liana species, *Vallaris solanacea* (Roth) Kuntze was used as the main ingredient in the formulations. The family Lamiaceae contributed three species followed by Euphorbiaceae and Solanaceae. For the preparation of drugs, different parts of the plant such as leaf, root, bark and fruit were used. Among them leaves were used in higher proportion (63%).

The selection of the plant, dosage and mixing proportion of different plants with ingredients used for preparation of medicine was exclusively a practitioner's knowledge. In addition to the knowledge gained by his elders and by himself the practitioner developed knowledge in different way through long time experience. Traditional healing practice was originally an integral part of ethnic community, semi-nomadic and agricultural tribal societies. The archaeological evidence for its existence dates back to around 6000 BC, but its actual origins probably date back from well before

the end of the last Ice-age. The practice changes day by day evolving through the course of practical experience. Although there are many fundamental similarities, there were still some regional differences between the principles and philosophy of traditional medicine. (Ramashankhaer et al. 2012)

#### Form of preparation of medicine

Practitioner prepared three different forms of formulations such as pellet, decoction and oil (Fig. 1). In the initial stages of arthritis, the practitioner treated the patients by administering the pellets. In case of over fatigue conditions, practitioner medicated the patients using the decoction form of medicine, and oil was used for physiotherapy. Oil massages may frequently be used as a safe therapeutic modality without any major risks or side effects for instant pain relaxation (Saravana et al. 2013).

Table 1. Plants used for preparation of Arthritis medicine

Botanical name/ Herbarium Voucher number	Family	Vernacular name (Kannada)	Habit	Parts used	Form of medicine prepared
<i>Vallaris solanacea</i> (Roth) Kuntze No voucher	Apocynaceae	<i>Isamallige</i>	Liana	Leaves	Pellet
<i>Terminalia tomentosa</i> Wight & Arn. No voucher	Combretaceae	<i>Mattimara</i>	Tree	Bark	Decoction
<i>Bridelia stipularis</i> (L.) Blume KUBPHS23	Euphorbiaceae	<i>Akshathe balli</i>	Climbing Shrub	Leaves along with stem	Oil
<i>Ricinus communis</i> L. No voucher	Euphorbiaceae	<i>Haralu gida, Ovdala</i>	Shrub	Leaves, fruit	Oil
<i>Caesalpinia mimosoides</i> Lam. No voucher	Fabaceae	<i>Kendige</i>	Climbing Shrub	Leaves along with stem	Oil
<i>Clerodendrum inerme</i> (L.) Gaertn. No voucher	Lamiaceae	<i>Vishamadhaari</i>	Shrub	Leaves along with stem	Oil
<i>Gmelina arborea</i> Roxb. No voucher	Lamiaceae	<i>Shivane mara</i>	Tree	Leaves	Decoction
<i>Vitex negundo</i> L. No voucher	Lamiaceae	<i>Lakki soppu</i>	Shrub	Leaves along with stem	Oil
<i>Sida cordifolia</i> L. No voucher	Malvaceae	<i>Bala</i>	Herb	Root	Decoction
<i>Tinospora cordifolia</i> (Willd.) Miers No voucher	Menispermaceae	<i>Amrutha balli</i>	Climbing Shrub	Leaves along with stem	Oil
<i>Ziziphus xylopyrus</i> (Retz.) Willd. KUBPHS52	Rhamnaceae	<i>Gonagalu mara</i>	Tree	Leaves	Pellet
<i>Zanthoxylum rhetsa</i> (Roxb.) DC. No voucher	Rutaceae	<i>Jummana mara</i>	Tree	Fruit	Oil
<i>Allophylus cobbe</i> (L.) Raeusch. KUBPHS64	Sapindaceae	<i>Moorele</i>	Shrub	Leaves along with stem	Oil
<i>Capsicum frutescens</i> L. No voucher	Solanaceae	<i>Sooji menasu</i>	Shrub	Fruit	Oil
<i>Datura metel</i> L. No voucher	Solanaceae	<i>Umaatha</i>	Shrub	Leaves, fruit	Oil

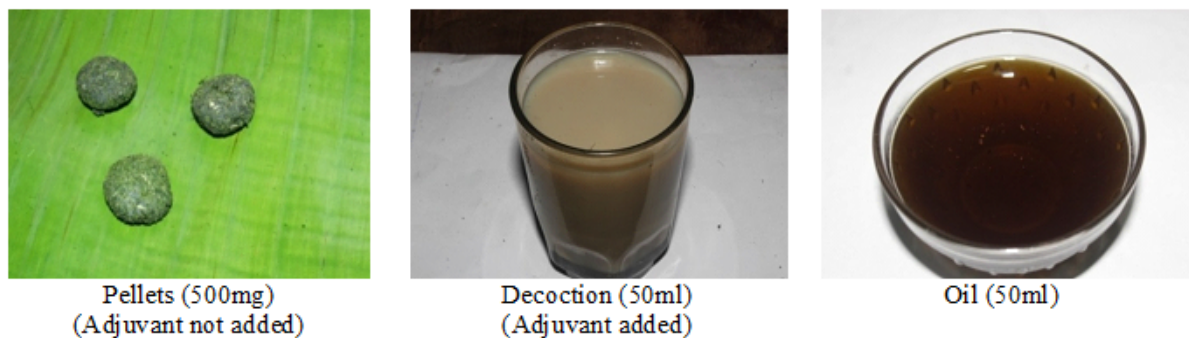


Figure 1. Forms of medicine.

#### **Pellet**

To prepare the pellets, the leaves of *Vallis solanacea* (Roth) Kuntze and *Ziziphus xylopyrus* (Retz.) Willd. were used (Fig. 2). The leaves were ground into paste by using stone or non-corrosive materials and made into pellets with cow's ghee (adjuvant). About 500 mg of pellet was administered to the patient at the empty stomach. From the leaves and seeds of *Vallis solanacea* (Roth) Kuntze, cardiac glycosides, fatty acids and tri-terpenes have been isolated. From the root bark, essential oils have been identified. Additionally, leaves and bark of *Vallis solanacea* (Roth) Kuntze have been reported to possess, analgesic, anti-inflammatory properties (Siu Kuin Wong & Eric Wei Chiang Chan 2013). Mishra *et al.* have examined the anti-inflammatory and analgesic potential of methanolic and chloroform extracts of *Ziziphus xylopyrus* (Retz.) Willd stem. It is also evidenced about substantial anti-inflammatory and analgesic potential of the methanolic extract (Mishra *et al.* 2012).

#### **Decoction**

To prepare a decoction, stem bark of *Terminalia tomentosa* Wight & Arn and leaves of *Gmelina arborea* Roxb were used in equal proportion (Fig. 3). The stem bark was peeled off from the healthy plants, cleaned, chapped into small pieces and shade dried. Then 50g of each of the plant bark and leaves were added to one liter of clean water and boiled till the volume of the extract reached 500 ml. Then the one gram each of coriander, white pepper, fenugreek powders were added to the extract and further boiling till the volume reached 100 ml. At the time of oral administration, 100 ml of decoction was stirred with jaggery and administered to the patients on the empty stomach. The investigation of anti-inflammatory potentials of *Terminalia tomentosa* Wight & Arn bark was reported by (Jitta *et al.* 2017).



*Ziziphus xylopyrus* (Retz.) Willd

*Vallis solanacea* (Roth) Kuntze

Figure 2. Plants used for preparation of pellet form of medicine.





Bark and fruiting twig of *Terminalia tomentosa* (Roxb.) Wight & Arn.



Bark and flowering twig of *Gmelina arborea* Roxb.

Figure 3. Plants used for preparation of decoction form of medicine.

### **Oil**

For the preparation of oil, tender shoots of *Allophylus cobbe* (L.) Raeusch, *Clerodendrum inerme* (L.) Gaertn, *Datura metel* L, *Ricinus communis* L, *Tinospora cordifolia* (Willd.) Miers, *Vitex negundo* L, were boiled with 2 liters of clean water. After 2 minutes, stem bark of *Bridelia stipularis* (L.) Blume & *Caesalpinia mimosoides* Lam and a handful of dried fruits of *Zanthoxylum rhetsa* (Roxb.) DC, and a few fruits of *Capsicum frutescens* L were added (Fig. 4). When the volume of the extract reached a syrup form, ingredients such as, mustard oil, fenugreek, camphor were added and the contents were boiled for 10 minutes, cooled, filtered and used for massage purposes three times daily as suggested by the practitioner. Reviews clearly described the anti-arthritic properties of these medicinal plants. *Tinospora cordifolia* (Willd.) Miers has been used in the treatment of rheumatoid arthritis. The major

constituents present in the plants are tinosporine, tinosporide, tinosporaside, cordifolide, cordifol, heptacosanol, clerodane furano diterpene, diterpenoid furanolactone tinosporidine, columbin and beta-sitosterol. This generally improves the immune system and the body's resistance to infections. The anti-periodic, anti-spasmodic, anti-inflammatory and antipyretic properties were proven. At the dose of 100 mg/kg it shows reduction of paw volume in collagen induced arthritic rats (Amandeep *et al.* 2012).

A study was carried out in the tribes in Madurai District of Tamil Nadu and reported that *Vitex negundo* L was used to cure headache (Ignacimuthu *et al.* 2006). In our study, the medicinal practitioner used *Vitex negundo* L as one of the herbs for the preparation of oil. A study on indigenous use and bio-efficacy of medicinal plants in the Rasuwa District, Central Nepal also revealed that the fruits of



*Zanthoxylum armatum* were used locally to relieve pain. In our study, it was observed that the fruits of *Zanthoxylum rhetsa* (Roxb.) DC are one of the important ingredients in oil preparation. The study conducted by Wilbur reported that the bark of

*Zanthoxylum* was widely used to relieve rheumatism (Wilbur *et al.* 1980). Similarly, the anti-arthritic property of *Ricinus communis* L was reported by (Chandra *et al.* 2003).

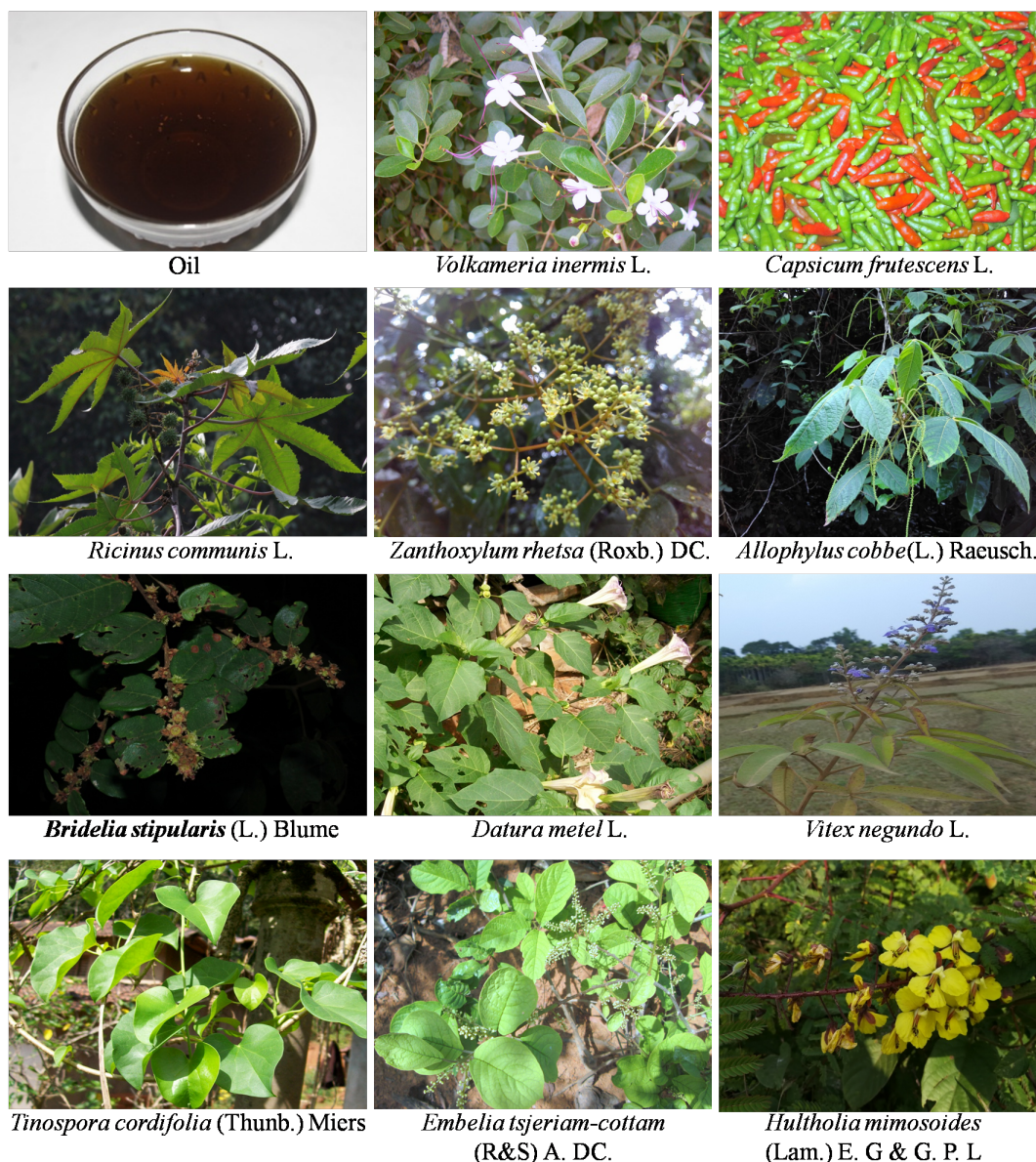


Figure 4. Plants used for the preparation of oil form of medicines

#### Advice given to the patients

The practitioner advised the patients that pellets should be taken in empty stomach. In case of over fatigue condition, a pinch of pepper powder was added to adjuvant ghee and mix with pellets. If the patient is suffering from high *Vaatha* condition, two leaves of *Embelia tsjeriam-cottam* was advised to be taken along with pellets. The practitioner recommends honey to the patients who were suffering from early morning joint pain. Depending upon the arthritic condition of the patients, in the

initial stage the practitioner recommends only pellets for three-day course.

Decoctions as medicine have been recommended for those who were suffering from severe arthritis from long duration with severe joint pain and excess fatigue condition. Based on the experience, the practitioner noticed that the decoction will strengthen the joint and also enhance the energy of the whole body. The practitioner suggests decoction form of medicine thrice a day for 21 days. The practitioner

directed all patients to use oil only for external massaging of joints daily for three times.

#### Notes on Ayurvedic usage of Plants

In ayurveda, *Tinospora cordifolia* (Willd.) Miers is used for Vataraktha (Gouty arthritis) (Huded *et al.* 2013) and also its usage mentioned in Nighantu of Sri Bhavamisra for Vataraktha (Pandey & Bhavaprakasha, 2006). The plant *Vitex negundo* L is first described in Charaka Samhita which is an oldest and most authentic text of Ayurveda and successful analgesic activity is reported in several studies and databases (Sharma *et al.*, 2005; Telang *et al.*, 1999)

#### Patient's feedback about the herbal medicine

Considering the patients response through questionnaire it was noticed that 66% of individuals were suffering initially of joint pain, followed by swelling of the joints (15%). The patients slowly rise with stiffness symptoms in the morning and swelling symptoms in the evening. The taste of pellet was described as astringent with little bitterness. Upon consumption some patients were experiencing with nausea and after some time they were quite normal. Oral administration of decoctions of medicine did not induce ill symptoms among the patients, it is little sweetish as it is mixed with jaggery. The external oil application on painful joints sometimes caused tingling effects to skin.

The oil massage is very potent in relieving joint pains. Many patients have experienced continuous usage of oil massage as helpful in decreasing swelling symptom especially in the evening time. It was noticed that severe joint pain was often the starting symptom of arthritis and swelling along with stiffness did increase slowly depending upon the condition of the patients. In the last part, the questionnaire included a ranking of three major categories of relief, namely excellent, good and no impact status of which patient experienced from the herbal treatment. Of the interviewed patients 80% indicated that the treatment had had excellent impact, 16% of patients had experienced good impact and 4% of them had no impact.

## Conclusions

The key objective of the present study was to document the ethnomedicinal knowledge related to the use of medicinal plants for treating and controlling arthritis. Herbal preparations are a crucial and sensitive topic and should only be prepared by an experienced practitioner. The traditional medicinal knowledge is helping a large population and is proved to be effective in numerous cases in treating diseases and disorders. The people in and

around the study area depended upon traditional medicine for arthritis given by local practitioner and were comfortable with the application of herbal medicine. The conservation of the traditional knowledge behind the treatment can be accomplish only through systematic documentation and scientific research. Finally, this study recorded the three most important herbal formulations with fifteen medicinal plants used by practitioner for the treatment of arthritis in the region of CWG.

## Declarations

#### List of Abbreviations:

CWG: Central Western Ghats

A-M: Aneguli-Maradavalli

SRB: Sharavathi River Basin

**Ethics approval and consent to participate:** The present study followed the Code of Ethics of the International Society of Ethnobiology (ISE, 2006)

**Consent for publication:** The traditional medicine practitioner consented to publish his knowledge of treating herbal medicine for curing Arthritis.

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**Conflict of interest:** The authors declare that they have no conflict of interest.

**Authors contribution:** MSS conducted field survey and interviews of traditional practitioner and patients. SSN assisted during the field survey and sampling. JN supervised the program and helped in the data analysis and revision of an article. VK helped in writing a research article and in the identification of taxa.

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