

# Formulation & Evaluation of Herbal Spray For The Treatment of Rheumatoid Arthritis.

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## ABSTRACT

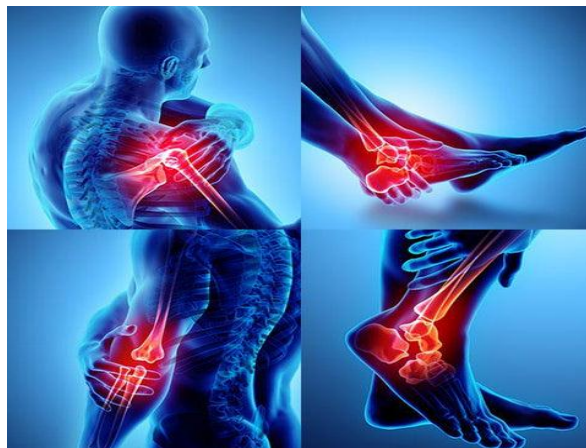
Rheumatoid Arthritis is basically autoimmune disease that causes chronic of joints and other areas of the body. Conventional treatments of rheumatoid arthritis includes Non – steroidal anti-inflammatory drugs(NSAID), Anti – Rheumatoid drugs, Corticosteroids and Biological agents. Allopathic medications have been prescribed to alleviate symptoms of this disease which results into associated side effects like gastrointestinal bleeding and bone loss (osteoporosis). Herbal formulation have emerged as effective & favorable safety profile as compare to allopathic formulation .This herbal spray are contain number of herb extract which beneficial for quick relieve of joints pain & inflammation.The herbs exhibited strong anti-inflammatory and anti-oxidant activities, contributing to a reduction in inflammation and tissue damage.Herbal spray is one of the type of dosage form. This spray are contain different type of herbs. This spray are give the quick relieve of joint pain, neck pain & other part of body. Herbal spray used it an affected area to relieve pain & inflammation.

**Keywords :** Rheumatoid Arthritis (RA), NSAID ,Herbal plants, Betal vine leaf, Papper mint, Ginger, Turmeric, Ashwagandha, Herbal Spray.

## INTRODUCTION

Rheumatoid Arthritis is the most common inflammatory disease and is major case of disability. That initially affects Small joints, Larger joints, Skin, Eyes, Heart, Kidneys and Lungs, often the Bone and Cartilage of joints are destroyed and tendons & ligments weaker. Some factors which may influence RA are a genetic factor, age, hormones, environmental factors, smoking, etc. The goals of treatment for RA are to reduce joint inflammation and pain, maximize joint function, and prevent joint destruction and deformity. Treatment regimens consist of combinations of pharmaceuticals, weight-bearing exercise, educating patients about the disease, and rest.

Treatments of Rheumatoid Arthritis includes Non – Steroidal Anti-Inflammatory Drugs(NSAIDs), Anti-Rheumatoid Drugs, Corticosteroids & Biological Agents are used. There are so many medicinal plants are shown anti-rheumatoid arthritis properties, so the plants and plant products with advantages are used for the treatment of Rheumatoid Arthritis.



**Fig 1 : Inflammation in joints.**



### **Symptoms :**

- Joint pain & Swelling.
- Stiffness in joints.
- Sleepssness.
- Flu, Fatigue.
- Loss of weight.
- Loss of energy.
- Joint Inflammation.

### **Causes :**

- Combination of genetics hormones and environmental factor.
- An infection, smoking or physical or emotional stress.
- Exposure irritant and pollutants.

### **General Treatments :**

For prevention of RA disease anti-rheumatic drugs & non- steroidal anti-inflammatory drugs (NSAIDs) have been used. Other drugs like corticosteroid, anti-inflammatory drugs must be used.

### **Types Of Ra :**

There are 2 main types of RA :

- 1) Seropositive.
- 2) Seronegative.

#### **1) Seropositive :**

It is type of RA which means your blood has antibodies that can attack your body and inflame your joints.

- Symptoms : Fatigue, Fever, Joint pain, Swollen joints.
- Treatments: 1)Using anti-rheumatic drugs, corticosteroids.  
2)Other medications like anti-inflammatory drugs.
- Complications : Eyes issues, Increase infection risk & Lung complication

#### **2)Seronegative :**

People who have RA symptoms without these anti-bodies may reduce a diagnosis of Seronegative RA.

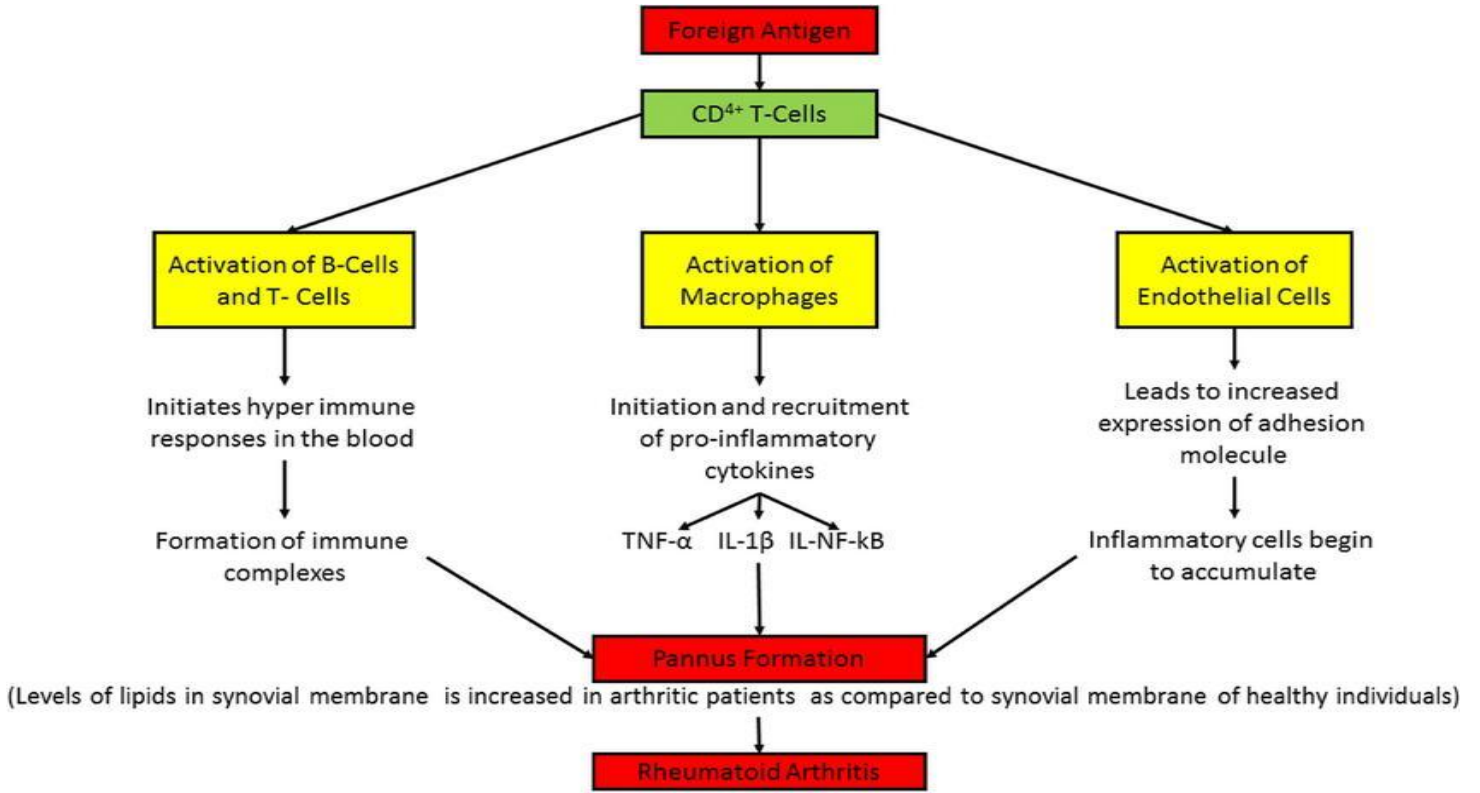
- Symptoms : Swelling, redness in joints, fatigue, stiffness.
- Treatments : NSAIDs, Steroids, Anti-rheumatic drugs also used.
- Complications : damage cartilage leads to inflammation & joint pain.

### **Scenario of Ra :**

- Rheumatoid Arthritis is widely prevalent through out the world the overall worldwide prevalence is 0.8 to 1% and steadily increases to 5% in women over the age of 70 year.
- RA is 2 to 3 times more common in women compared to men.
- In India the prevalence has been estimated to the 0.5 % to 0.75 %.

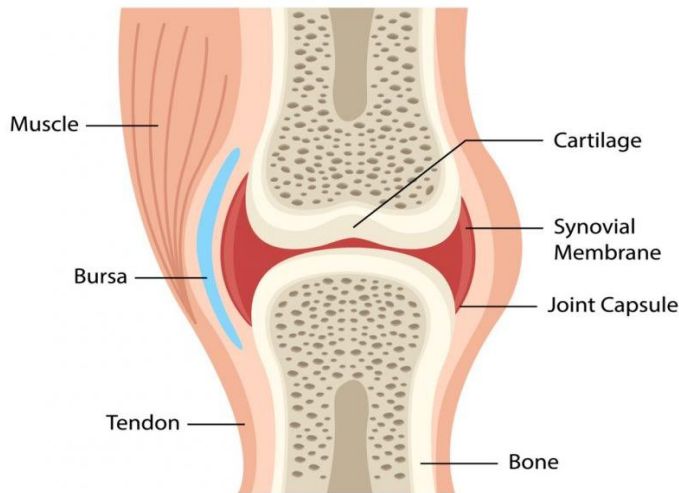
### **Pathophysiology of Ra :**

**Fig 2 : Pathphysiology Of**

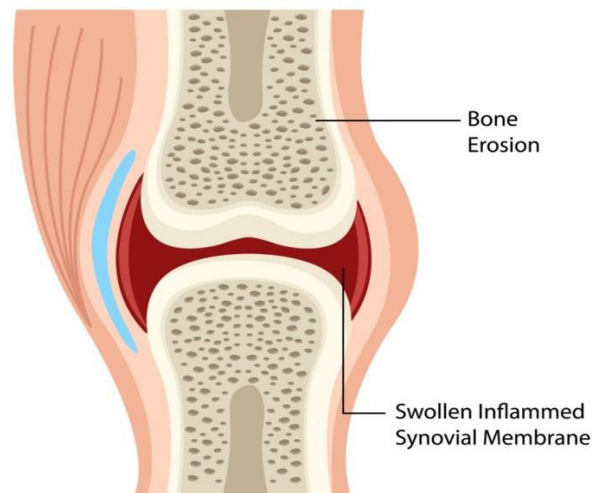


**Formulation :**  
**Herbal Spray –**

**HEALTHY JOINT**



**RHEUMATOID ARTHRITIS**



Spray is a dynamic collection of drops dispersed in a gas. The process forming a spray is known as atomization. A spray nozzle is the device used to generate a spray. There are different type of spray are used different purpose such as, Pain relief spray, Aromatherapy Spray, Antibacterial spray, Insect repellent spray, Skin care spray. A herbal spray are used in rheumatoid arthritis for reducing Inflammation, joint pain & providing relief from stiffness. This spray Are composed of

different variety of herbal plants. A solution is made from natural plant extract or essential oil that sprayed onto surface of body for relieving the pain.



**Advantages :**

- Faster onset of action
- Easy to apply.
- Easily withdrawn of drug.
- Avoid first pass metabolism.
- Direct contact with medicament.

**Disadvantages :**

- May be very costly.
- Sometimes propellant may causes toxic reactions.
- Avoid contact with fire because aerosol are explosive.

**Plant Profile :**

1) **Betal Vine Leaf :**



**Fig 4 : Betal Vine Leaf**

**Synonym :** Betal Papper, Nagveli, Paan.

**Biological Source :** It is obtained from leaf of Piper Betal Linn.

**Family :** Piperaceae.

**Geographical Source :** It cultivated India, Lucknow , Andhra Pradesh, Tamil nadu, Karnataka, kerala, Odisha etc.

**Chemical Constituents :** Piper betle L. contains eugenol, allylpyrocatechol, Hydroxy Chavicol. The middle part of vine contain Tannin. Some of nearly 100 phyto-constituents of the plant are Chavibetol, Allylpyrocatechol, Chavibetol acetate, Eugenol, Piperitol, Quercetin, Luteolin etc are successfully extracted and indentified.

**Drug action in Rheumatoid Arthritis :** It show the anti-inflammatory or anti-analgesic properties. It relieve the pain and inflammation. This plant leaf influence various signaling pathways, enzyme activities & molecular target, contributing anti-inflammatory effects.

**Uses :** Betel leaves are used for the treatment of cancer, inflammation, neurodegenerative disorders, and also as antimutagenic, antifertility, antilipidaemic, antiglycaemic, cardioprotective, etc.

2) **Papper Mint :**



**Fig 5 : Papper Mint**

**Synonym :** Brandy mint, Lamb mint.

**Biological Source :** Obtain from fresh leaves of *Mentha piperita*.

**Family :** Lamiaceae.

**Geographical source :** It was inborn to Europe, grows naturally in the northern USA, Canada, and produced worldwide. In India, Mint Is generally produced in southern parts of the Himalayan zone covering Himachal Pradesh, Haryana, Punjab, Uttar Pradesh, and Bihar.

**Chemical Constituents :** Comprises around 0.5% to 4% essential oils, that are having the composition of about 25% to 78% menthol, 14% to 36% menthone, 1.5% to 10% isomenthone, 2.8% to 10% Menthyl acetate, and 3.5% to 14% cineol (Grigoleit and Grigoleit)

**Drug action in Rheumatoid Arthritis :** It contain active compound methanol, which is interact with TRP channel particularly TRPM8, the receptor respond to temp. when methanol binds to TRPM8,it activate receptor, leadings to a cooling sensation produce helps in pain.

**Uses :** A popular flavoring for gum, toothpaste, and tea, is also used to soothe an upset stomach or to aid digestion. Also used to treat headaches, skin irritation, nausea, diarrhea, menstrual cramps and anxiety associated with depression.

3) **Ginger :**



**Fig 6 : Ginger**

**Synonym :** Gingerin , *Rhizoma zingiberis* , Zingibere.

**Biological Source :** It consist of dried & scraped rhizomes of *zingiber officinale*.

**Family :** Zingiberaceae.

**Geographical Source :** The ginger are mostly cultivates in India, Japan, Nigeria, Jamaica, West Indies and Africa.

**Chemical Constituents :** The main constituents of ginger are Sesquiterpenoids with zingiberene as the main Component. Other components include  $\beta$ -Sesquiphellandrene, bisabolene and farnesene, which are sesquiterpenoids, and trace monoterpenoid.

**Drug action in Rheumatoid Arthritis :** Ginger have inhibit the inflammatory pathways. Ginger may modulate the production of inflammatory substances, like prostaglandin and cytokines & inhibit the enzyme like Cyclooxygenase & Lipoxxygenase which play role in inflammatory process.

**Uses :** Used to help prevent or treat nausea and vomiting from motion sickness, pregnancy, and cancer chemotherapy. It is also used to treat mild stomach upset, to reduce pain of osteoarthritis, and may even be used in heart disease.

**4)Turmeric :**



**Fig 7 : Turmeric**

**Synonym :** Curcuma Longa.

**Biological Source :** Turmeric obtained from dried rhizomes of *Curcuma longa* linn.

**Family :** Zingiberaceae.

**Geographical Source :** India is a leading producer and exporter of turmeric in the world.

Andhra Pradesh, Tamil Nadu, Orissa, Karnataka, West Bengal, Gujarat, Meghalaya, Maharashtra, Assam.

**Chemical Constituents :** Curcuminoids which is a mixture of curcumin (diferuloylmethane), monodemethoxycurcumin and Bisdesmethoxycurcumin Curcumin makes up approximately 90% of the curcuminoid content in turmeric. Other Constituents include sugars, proteins, and resins.

**Drug action in Rheumatoid Arthritis :** Curcumin may inhibit the activity of inflammatory enzyme including Cyclooxygenase -2 (Cox-2) & Lipoxygenase (Lox), it can help to modulate inflammatory response in RA. It also inhibit activation of NF-KB.

**Uses :** Turmeric is used as an herbal medicine for rheumatoid arthritis, chronic anterior Uveitis, conjunctivitis, skin cancer, small pox, chicken pox, wound healing, urinary tract infections, and liver ailments.

**4) Ashwagandha :**



**Fig 8 : Ashwagandha**

**Synonym :** Indian Gingseng, winter cherry.

**Biological Source :** It is obtained from dried root & stem of *withania somnifera*.

**Family :** Solanaceae.

**Geographical Sources :** That grows in India, the Middle East, and parts of Africa.

**Chemical Constituents :** The biologically active chemical constituents Are alkaloids (ashwagandhine, cuscohygrine, anahygrine, Tropine etc), steroidal compounds, including ergostane type Steroidallactones, withaferin A, withanolides A-y, Withasomniferin-A, withasomidienone, withasomniferols A-C, Withanone etc.

**Drug action in Rheumatoid Arthritis :** Ashwagandha contain compounds including withanolides have suggested to posses anti-inflammatory effects.these compound inhibit the certain inflammatory pathways & enzymes, contributing to a certain in inflammtion.

**Uses :** It is used as anti-stress, neuroprotective, antitumor, anti-arthritis, analgesic and anti-inflammatory etc. It is useful for different types of diseases like Parkinson, dementia, memory loss, stress induced diseases, malignoma

### MATERIAL & METHOD

#### Formulation Table -

Sr. no	Materials	Quantity	
		F1	F2
01.	Betal vine leaf ( Oil )	8ml	12ml
02.	Papper Mint ( Oil )	6ml	9ml
03.	Ginger ( Oil )	4ml	6ml
04.	Turmeric ( Extract )	4ml	5ml
05.	Ashwagandha ( Extract )	3ml	3ml
	<b>Total</b>	25ml	35ml

#### Methods:

Method of preparation :

- a) Soxhlet Extraction.
- b) Maceration.

#### 1) Soxhlet Extraction :

##### -Procedure :

- 1) In this method, 10gm coarsely ground crude drug is placed in porous bag or thimble made up by strong filter paper which is placed in chamber of the Soxhlet appratus.
- 2) Put the round bottom flask in heating mental & add some glass beds to the flask to avoid bumping.
- 3) Add suitable solvent like ethanol, methanol, ethyl acetate, chloroform etc by using funnel to the top of tube of condenser then it passed to the soxhlet chamber.
- 4) The solvent is pass through the drug material in soxhlet chamber to siphon tube & when sufficient amount of solvent is pass to the level of siphon tube then the solvent drips into the round bottom flask.
- 5) The extracting solvent in flask is heated at the temperature of boiling point if the solvent ( 70-80°C ) & vapour is pass through the vapour tube to the condenser & vapour is condensed in condenser.
- 6) When vapour is condensed then it coverts into liquid & liquid is drips into the thimble containing crude drug drop by drop.
- 7) This solvent with dissolved chemical constituents fills the chamber & also fill siphon tube.
- 8) When level of this solvent rises to the return point of siphon tube then it falls to the round bottom flask completes one cycle & it repeats for 3 times. It is continues process.



**Fig 9 : Soxhlet Appratus**

**2) Maceration : -**

**Procedure**

- About 15 g of finely ground powder was dissolved in 100 ml of 70% alcohol.
- The preparation was left undisturbed for 48 hours.
- Filter with the help of filter paper.

**Fig 10 : Maceration Of Turmeric**







**Fig 11 : Filtration Of Extract**



**Fig 12 : Salkowski Test**

### Identification Tests For Herbal Drugs :

#### 1)Terpenoids Test ( Papper Mint ) –

##### a)Salkowski Test :

3 ml extract + 1 ml chloroform + 2ml Conc. Sulphuric acid.

**Observation** – reddish brown colour at the junction Of two layer.

#### 2)Alkaloid Test ( Ashwagandha ) –

##### a)Dragendoffs Test :

2ml extract + 2-3 drops dragendoffs reagent.

**Observation** – Orange red colour.

##### b)Mayers Test :

2ml extract + 2-3 drops mayers reagent.

**Observation** – Creamy white ppt.

**c) Hagers Test :**

Extract + few drops hagers reagent.

**Observation** – Yellow colour.

**d) Wagners Test :**

Extract + few drops if wagner reagent.

**Observation** – reddish brown colour.



**Fig 13 : Alkaloid Test**

**3) Polyphenol Test ( Turmeric ) –**

**a) Extract + Sulphuric acid**

**Observation** – Brown colour.

**b) Extract + Boric acid**

**Observation** – Reddish brown colour.



**Fig 14 : Polyphenol Test**

**4) Phenolic Test ( Ginger ) -**

**a) Extract + Acetic acid.**

**Observation** – Red colour formed.



**Fig 15 : Phenolic Test**

**5) Polypropanoid Test ( Betal Vine Leaf ) –**

**a) Alkaline Reagent Test :**

Extract + NaoH

**Observation** – Yellow Colour.

**b) Zinc Hcl Test :**

Extract + Zinc dust + Conc. Hcl

**Observation** – Red colour formed after few min.



**Fig 16 : Polypropanoid Test**

### **Formulation -**

#### **-Procedure :**

- 1) Take a beaker and add all oils in it with continuous Stirring.
- 2) After mixing boil the mixture in water bath For 10-15 minutes.
- 3) Cool the mixture at room temperature and filter it.Through the filter paper.
- 4) Filled the mixture in a Suitable container.



**Fig : 17 Herbal Spray Formulation ( F1 & F2 )**

### **Evaluation of herbal spray -**

#### **1)Physical Evaluation:-**

- Formulated herbal spray was further Evaluated by using the following physical parameter :
- Colour



- Odour
- State

**a)Colour:-**

The colour of the spray was observed by visual examination.

**b)Odour:-**

The odour of spray was found to be characteristics.

**c)State :-**

The state was spray was examined visually. The spray was liquid in state result.

**2)pH :**

The pH of all formulations were found to be in the range of 5.20 to 6.0 which signifies that formulations will not cause any irritation to skin.

**3)Irritancy Test :**

Mark an area (1sq.cm) on the left-hand dorsal surface. The spray was applied to the specified area and time was noted. Irritancy are checked.

**Expected Outcomes –**

- It has no side effects.
- It is safe for use.
- It helps to reduce pain and inflammation.
- Improve joint mobility and functionality.
- Improve quality of life by reducing severity of RA Symptoms.

### RESULT

In this research, we found that by giving herbal plant i.e Betal vine leaf, Papper mint, Turmeric, Ginger & Ashwagandha the form of medicines we are able to diagnose the Rheumatoid arthritis. Treatment with medicinal plant with rheumatoid activity in humans is potentially beneficial option.The following evaluation parameters are conducted after the formulation of herbal spray :

Sr. No	Evaluation Parameters	Result	
		F1	F2
01.	Colour	Brown	Brown
02.	Odour	Stimulating	Stimulating
03.	State	Liquid	Liquid
04.	Spreadability	Good	Low
05.	pH	5.40	5.49
06.	Irritation Test	No irritation	No irritation

### CONCLUSION

In conclusion, the formulation and evaluation of the herbal spray for rheumatoid arthritis have shown promising results. The herbal blend, comprising betel vine leaf oil, ginger oil, turmeric oil, Pappermint oil & Ashwagandha oil demonstrated significant anti-inflammatory and analgesic properties in our experimental models. There are 2 formulation of spray is



prepared i.e. F-1 & F-2. F1 is 25ml & F2 is 35ml. By using material in different quantity in both F1 & F2 formulation for checking the formulation activity & Stability. The F1 Formulation is better result in evaluation test as compare to F2 formulation. Overall, this research contributes to the growing body of evidence supporting the use of herbal remedies in rheumatoid arthritis management.”

### Summary

This research paper contain general information regarding rheumatoid arthritis & formulation process. All the literature survey include s regarding the RA. A herbal spray for treating the rheumatoid arthritis is formulated by using the Betal vine leaf, Papper mint, Ginger, Turmeric & Ashwagandha. Firstly collected all herbs which showing the anti- rheumatoid activity. After extracted the oils from herbs by using the Soxhlet extraction process. Then phytochemical screening is performed for identifying the compound present or not. Formulation is prepared by using proper procedure for preparing the herbal spray. There are 2 formulation is prepared F-1 which is 25ml & F-2 which is 35 ml for checking the stability & activity. After evaluation test is performed. In the formulation F-1 is better result compare to F-2 formulations.

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