



# The Preparation And Evaluation Of Commiphora Mukul Gel Contain Antiarthritis Drug For Rheumatoid Arthritis

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## Abstract :

*Commiphora Mukul* is widely known as guggulu. The present research study supports preformulation , formulation, evaluation and in-vitro activity of that gel accomodating *Commiphora Mukul* as an inflammation reducing agent. The preformulation study is fulfilled by evaluation of active pharmaceutical ingredient using suitable parameters like state, colour, odour, appearance and solubility. The *commiphora Mukul* is drug come under family Burseraceae. *Commiphora Mukul* gel is cheap anti-inflammatory drug with least side effects. The in-vitro inflammatory activity is fulfilled by Protein denaturation method. The percentage inhibition of sample containing 10 mg was found to 32.50% The absorbance was found to be 0.81 at wavelength 660 nm. The gel is suitable, acceptable and moderate.

## Keywords :

Anti-inflammatory, *Commiphora mukul*, Preformulations

## Introduction :

Rheumatoid arthritis is more than 180million people in India - pervasiveness more than many well-known diseases such as diabetes, AIDS and cancer. About 14percent of the Indian population look for treatment for joints every year. Arthritis, in that knee arthritis, is expected to appear as the fourth most common cause of physical disorder in India.

Up to 14 million population around the world have rheumatoid arthritis (World Health Organization, 2021). Rheumatoid arthritis affects more than 1.36 million peoples in the United State. (Rheumatology International, 2017).

Indonesia, Timor-Leste, and Sri Lanka had the short rates (91.1, 91.4, and 97.2, respectively). Age-structure incidence rates ranged between 5.6 to 27.5 cases/100,000 population, with the highest incidence rates in the sovereign state Ireland, and Sweden. Nationally, the age-standardized pervasiveness rate of RA in the United Kingdom, Trinidad and Tobago and Barbados ranges from 91 to 471 cases / 100,000 population, with the highest age-standard-prevalence rate.<sup>1,2</sup>

## Rheumatoid Arthritis

Rheumatoid arthritis is autoimmune disorder of joint inflammation, synovial proliferation and destruction of articular cartilage. Immune complexes composed of IgM activate complement and release cytokines mainly TNF-alpha and IL -1 which are chemotactic for neutrophils. Macrophage stimulate TNFalpha, IL1 and IL6. It causes stimulation of fibroblast. And due to that stimulation causes osteoclast and bone erosion takes place.

RA is an immune response in which that body's immune system attacks its own healthy cells. The specific condition of the Rheumatoid Arthritis are not known, but some elements can improve the danger of developing the disease.<sup>3</sup>

## Causes of Rhumatoid Arthritis :

- **Age :**

Age is one of the reason of Rheumatoid arthritis and it can take place at any age, but commonly start in intermediate age.

- **Family history :**

If your any family member has been rheumatoid arthritis, you may have an increase danger of the disease.

- **Smoking :**

Smoking increases the danger of developing rheumatoid arthritis, particularly if you have a genetic predisposition for developing the disease. Smoking also appears to be associated with greater disease severity.

- **Excess weight :**

People who are overweight arise to be at a somewhat higher danger of denoting rheumatoid arthritis.<sup>4</sup>

## Synthetic drug used in Rheumatoid Arthritis

- Methotrexate
- Azathioprine
- Cyclosporine
- Sulfasalazine
- Etanercept<sup>3</sup>

## Disadvantages Of Synthetic Drugs :

- High cost
- Adverse effect
- Drug resistance due to overuse
- Hallucination
- Stomach problem

## Avdantages of herbal medicine :

- Safe
- Low cost
- Less adverse effects
- Easily available
- Found in large variety
- More effective
- Easily incorporated with skin

## Herbal Plants used in Rheumatoid Arthritis :

- Myrobalan
- Black pepper
- Ginger
- Deodar cedar
- Ram Tulsi<sup>5</sup>

### ***Commiphora Mukul* :**

*Guggul* is the oleo- gum- resin obtained by making deep incisions at the basal part of stem bark of *Commiphora Mukul* belonging to family Burseraceae and should contain not less than 0.1% and not more than 1.5% Guggulsterone.

Guggul is one of the drug from Ayurveda and Unani system. Guggul plant is native to Africa especially in its arid zones like Ethiopia, Somalia, Kenya, Zaire, and Zimbabwe. It grows widely in Rajasthan and Gujarat states. Ajmer and Jaisalmer district of Rajasthan are the prominent living places.

Guggul tree develop to maturity satisfactorily in sandy loam soil with more gypsum content, with a pH 7.5 – 9 . Seeds are a natural way of propagation. The seeds are collected from July – September. For vegetative propagation, 25-30 cm long stem cutting are planned in June or October – November. Oleo- gum- resin is collected from at least 5 year old plants. It is drained from main bark with the 7.5 cm of diameter on which deep circular incision are prepared. Guggul expel a thick sticky liquid having whitish yellow aromatic source of rubber like matter. Thick branches of tree give best grade of guggul. Each plant gives from 0.5 –1 kg of guggul per year. Guggul contain steroids, diterpenoids, hydrate of carbon, and straight or branched chain esters. The gum gives pentosan, pentose, furfural. Steam distillation of the guggul give pale yellow volatile oil, containing the terpenes like myrcene, caryophyllene.

Deterioration, admixture, sophistication, substitution, inferiority are the group of adulteration. International impairment in drug having intended benefit is spoilage. Addition and mixing one substance to another accidentally or carelessly or due to ignorance is admixture. Adulteration is mostly because of commercial advantage , when there is a huge demand but less availability of drug. *Boswellia*, *Serrata*, *Hymenodictyon excelsura*, *C.roxburghii*, *C.molmol*

### **Causes of substitution**

- Cost of drug
- Adverse effect of drug
- Seasonal availability of drug
- Geographical distribution of drug

### **Anti-rheumatoid activity of guggul**

*Commiphora mukul* is drug established to treat anti-inflammatory activity in rheumatoid arthritis. So now the guggul is drug which relief the pain caused during rheumatoid arthritis. The active pharmaceutical constituent of guggulipid is guggulsterone which prevent the activation of nuclear factor-kappa B (NF-kappaB), a critical controller of inflammatory responses. *Commiphora mukul* (Guggul extract) was discovered to be beneficial and low cost inflammation reducing drug with minimum side effects

### **Method of preparation**

There are three methods of preparation such as fusion method, cold method, dispersion method. Gelling agent is added in beaker containing water with stirring. At 1200 RPM for 30 min. and drug is added

### Herbal Gel

Herbal gel is pharmaceutical preparation containing herbal extract as a active pharmaceutical ingredient. Types of gel are organogel, hydrogel, xerogel. The gel contain water as dispersion medium is called as hydrogel. Organogel contain non aqueous solvent as dispersion medium. *Commiphora mukul* gel is hydrogel. Gelling agents such as accasia, guar gum, pectin, gelatin, ethyl cellulose, calcium sillicatechitosan, bentonite. Preparation of Commiphora mukul gel contain agar-agar as a agent which give gel like consistency.

### Types Of Gel :

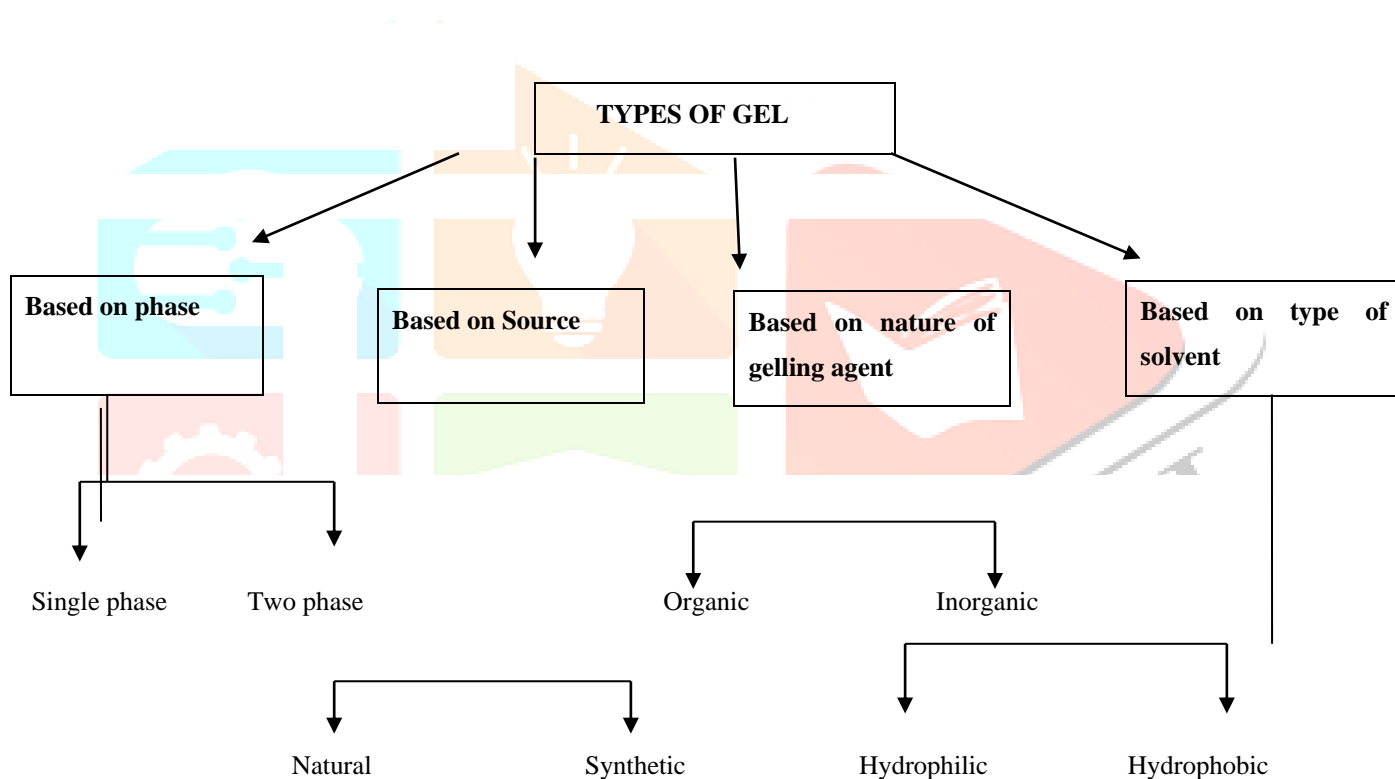
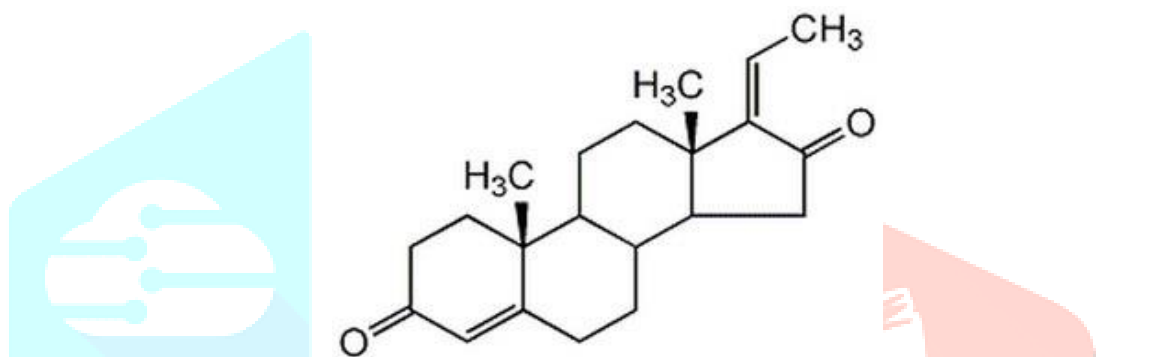


Fig. No. 1 Classification of gel <sup>7</sup>

## Drug Profile



Fig. No. 2 *Commiphora Mukul* plant



**Synonym :** *Commiphora* , *Scented Bdellium*, *Gum guggul*

Fig. No. 3 Structure Of *Commiphora Mukul*

**Molecular weight:** C<sub>21</sub>H<sub>27</sub>O<sub>2</sub>

**Molecular mass :** 370 gm/mol

**Route of administration:** Topical

**Use:**

1. It is applied as anti-inflammatory, anti-rheumatoid, hypolipidemic, and hypocholesteremic drug.
2. It Lowers low density lipoprotein and supports weight contact.
3. 'Guggulipid' developed from *Commiphora mukul* is an antihyperlipidemic product.

### Mechanism of action

Inflammation is process related to pain and involve increase in permeability , protein denaturation and membrane alteration. Active constituent of guggulipid is guggulsterone which is established to inhibit activation factor kappa B critical controller of anti-inflammatory response.

**Side effect:**

- Stomach upset
- Loose stool
- Diarrhea
- Belching
- Hiccups<sup>6</sup>

**Objective**

1. To procure API and excipients.
2. To carry pre-formulation study.
3. To make and develop formulation by suitable technique.
4. To characterize gel by using applicable parameters.
5. To carry out In vitro study of gel.
6. To interpret the obtained statistical analytical data

**Need of investigation**

*Commiphora Mukul* is known as Guggul contain oleo gum resin as guggulsterone which has been habituated traditionally to relieve pains in joints. It has been applied as anti-rheumatoid agent. Guggulsterone is responsible for anti-rheumatoid activity. Although, some medicinal plants have been presented as anti-rheumatoid but guggulsterone is well s popular herbal drug which is available in crude form and in some herbal formulation.

It was our intention to prepare different herbal gel formulation using guggul extract as a medicament and agar agar as gelling agent. After successful evaluation of gel formulation the priority formula will be developed as the best anti-rheumatoid preparation.

**Experimental Methodology****Formulation and development of gel**

Material:

Materials used in formulation of gel are mainly *Commiphora mukul*, agar-agar. *Commiphora Mukul* is herbal drug applied in synthesis of herbal gel. Methyl paraben was used as preservative. Preservatives are required in any formulation to avoid the maturation of microorganisms. While agar- agar was used as gelling agent. Gelling agents were required to keep gel like consistency. Water is applied as solvent. Formulation table given below

Sr . No.	Ingredient	Quantity taken
1	<i>Commiphora Mukul</i>	16 gm
2	Agar Agar	2 gm
3	Methyl Paraben	q.s.
4	Water	100 ml

Fig. No. 4 Formulation Table

## Method of preparation

### Extraction of drug

Extraction was investigated by macersion method. API such as 25 gm. *Commiphora mukul* was added in 50ml DMSO and 25 ml of water . After that sample was kept for 2-3 days for extraction. After that sample was filtered. Liquid filtrate was taken. And kept in oven for drying and solvent was evaporated. Then extract was ready.

### Method of preparation of gel

1. Active pharmaceutical ingredient and excipients, solvent was weighed.
2. Weighed 16gm of *Commiphora mukul* and 2gm of agar agar.
3. 100ml of water was taken and added 16gm of drug in it. Then stir well.
4. 2 gm of gelling agent such as agar - agar was mixed in it.
5. Methyl paraben as preservative was mixed in it.
6. Then stirred well till semisolid consistency appear.
7. Herbal gel was prepared.

## Research Design

### 1. Preformulation study

Identification of Drug :

Appearance

Colour

Solubility



Fig. No.5 Physical Appearance Of *Commiphora Mukul*

## 2. Formulation study

Evaluation Of Gel :

pH

Consistency

Viscosity

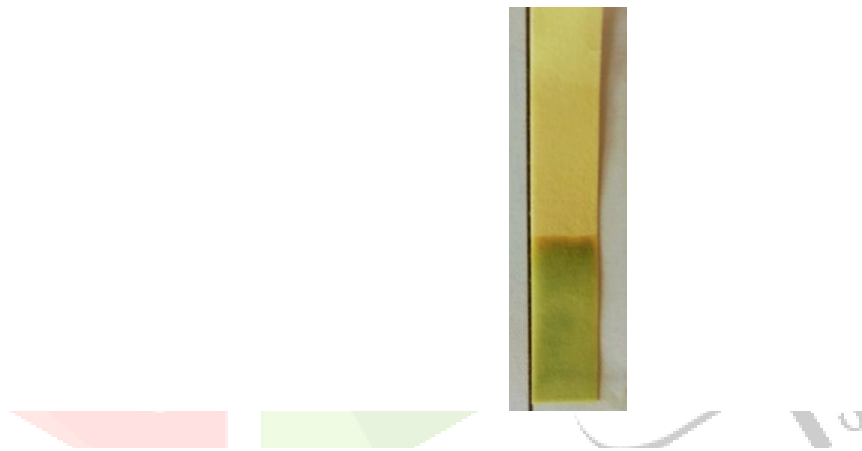


Fig. No. 6 Sample pH

1. pH was tested by pH paper. pH was established to be acidic.
2. Viscosity was calculated by Brookfield Viscometer. Spindle no.64 was used at 20 RPM.
3. 2gm of gel was taken on spreadability apparatus. Then 500gm weigh was added over that. And it was kept for 10min. After that that how much gel was spread was calculated.



## Result and discussion

### Physical appearances

Appearance	Gum guggul	
	Experimental	Theoretical
Colour	Slight Yellow	Slight Yellow
Odour	Acrid	Acrid
Test	Bitter	Bitter

Fig. No. 7 Physical Appearance

Organoleptic properties obtained by practically which matches the properties given in article. Thus it conform the identity of drug.

### Solubility

Solvent	Solubility
Water	Insoluble
Ethanol	Sparingly Soluble
Chloroform	Sparingly Soluble
Acetone	Sparingly Soluble
DMSO	Soluble

Fig. No. 8 Solubility

*Commiphora mukul* gel is soluble in DMSO.

## Evaluation of gel

Parameter	Result
pH	5.5-6.5
Consistency	Smooth
Viscosity	Good
Spreadability	Good

Fig. No. 9 Evaluation Table

- pH is acidic.
- Spreadability was established to be 16.7gmcm/sec.
- Viscosity was established to be 8608 cp

## Summery

In that therapy gel was formulated, developed and evaluated by using *Commiphora Mukul* as API. The gel was moderately penetrate skin and increase the drug delivery of drug molecules. *Commiphora Mukulis* was the drug used as anti-rheumatoid drug for the cure of rheumatoid arthritis. Gel may enhance drug delivery into and across the skin primarily by modulating concentration gradient across skin and skin barrier function.


Preformulation was did by observing the aspect of drug *Commiphora Mukul* which was solid state and colour of drug was established to be slight yellow. The solubility of drug was established to be dissolved in DMSO and slightly soluble in ethanol, chloroform, acetone and Insoluble in water.

Formulation was made by using drug, gelling agent and water as vehicle. The formulation was made by hydrogel method. Percentage Inhibition was established to be 0.32 at wavelength 660 nm contain 10 mg of gel. The final product was suitable acceptable, elegant, good and palatable.

## Conclusion

The different batches of formulation of gel were prepared by protein denaturation method from which F2 batch was optimized for moderate anti-inflammatory activity.

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**Certificate of Analysis**

Date :- 24/10/2021

**Name / Organization:** Manali Patil

**Sample Description :** Mukul Gel (F1 formulation)


**Activity:** Anti-inflammatory activity  
**In vitro anti-inflammatory activity by Protein denaturation method**

The reaction mixture (10 mL) consisted of 0.4 mL of egg albumin (from fresh hen's egg), 5.6 mL of phosphate buffered saline (PBS, pH 6.4) and 4 mL of formulation F1 (5mg/ml and 10mg/ml). Similar volume of double-distilled water served as control. Then the mixtures were incubated at (37°C ± 2) in a incubator for 15 min and then heated at 70°C for 5 min. After cooling, their absorbance was measured at 660 nm by using vehicle as blank. Diclofenac sodium at concentration 1mg/ml ) was used as reference drug and treated similarly for determination of absorbance. The percentage inhibition of protein denaturation was calculated by using the following formula,

$$\% \text{ inhibition} = \frac{\text{absorbance of control} - \text{absorbance of test}}{\text{absorbance of control}} \times 100$$

Sample code	Anti-inflammatory activity	
	Absorbance at 660nm	% inhibition
Control	1.20	
Standard Diclofenac sodium (1 mg/ml)	0.38	68.33
F1 (5mg)	0.95	20.83
F1 (10mg)	0.81	32.50

**Conclusion:** At the concentration of 10mg/ml, the Sample F1 showed moderate anti-inflammatory activity as compared with standard.



**Managing Director**

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Note : The results included in this report are obtained from the activities performed at our laboratory. This report can't be used for court purpose. We are not responsible for any legal matter.

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