"FORMULATION AND EVALUATION OF AN AYURVEDIC POLYHERBAL OIL FOR ARTHRITIS TREATMENT USING BOSWELLIA SERRATA, VITEX NEGUNDO, AND MEDICINAL HERBS"

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Abstract: Arthritis is a prevalent condition that affects a huge number of people and causes painful swelling of the joints. The most prevalent conditions are rheumatoid arthritis and osteoarthritis. Osteoarthritis is a degenerative joint disease that primarily affects the elderly, while rheumatoid arthritis is an inflammatory condition with an unclear cause. The present study aimed to formulate and evaluate a polyherbal anti-arthritis oil using medicinal herbs such as Shallaki, Nirgundi, Ajwain, Garlic, Ginger, Clove, and Nutmeg with sesame oil as a base. These herbs possess anti-inflammatory and analgesic properties useful in the management of arthritis and joint pain. The formulated oil was evaluated for physicochemical parameters including pH, specific gravity, acid value, viscosity, irritancy, solubility, and organoleptic characteristics. The formulation showed satisfactory results with pH 7.6, specific gravity 0.88, acid value 2.412 mg/gm, and was found to be non-irritant and stable. The study suggests that the prepared polyherbal oil may be effective for topical management of arthritis and associated pain and inflammation.

Keyword: Herbal formulations, Traditional medicine, Natural products, Phytochemical preparations.

1. INTRODUCTION

➢ HERBAL FORMULATION

Herbal formulations are dosage forms used in the diagnosis, treatment, and mitigation of human illnesses that contain one or more herbs or processed herbs in precise proportions to provide particular nutritional and cosmetic benefits. An active component, a herbal ingredient, or both may be present in herbal formulations. Herbal preparation or a combination of one or more herbal preparations and herbal ingredients. Herbal materials are put through procedures including extraction, distillation, expression, fractionation, purification, concentration, or fermentation to create herbal medicines. Examples include powdered or comminuted herbal compounds, tinctures, extracts, expressed juices, essential oils, and processed exudates. An active component, a herbal ingredient, or both can be found in herbal formulations. Herbal preparation or a combination of herbal ingredients and one or more herbal preparations. Herbs are combined to make herbal medicines. Procedures such as extraction, distillation, and expression Processes include fermentation, concentration, purification, and fractionation. powdered or crushed. Algae, fungi, and lichen in their natural state—usually dried but occasionally fresh—as well as entire, broken, or sliced plants. Using these substances, herbal formulations were made. The main purposes of herbal medicines are to promote health and treat chronic conditions rather than life-threatening ones. Herbal components are subjected to procedures including extraction, distillation, expression, fractionation, purification, concentration, or fermentation in order to create herbal medicines. Herbal components that have been ground into a powder, tinctures, extracts, essential oils, expressed juices, and processed exudates. [1]

➢ **HERBAL ARTHRITIS OIL**

Natural oils have long been recommended for pain treatment by traditional medical systems. Herbal remedies have long been used to treat arthritis and joint pain due to its analgesic and anti-inflammatory properties. Mustard oil is commonly used in these compositions due to its penetrating and warming qualities[2]. The debilitating condition known as arthritis, which results in joint pain, swelling, and stiffness, affects millions of people worldwide. Osteoarthritis, gout, and rheumatoid arthritis are prevalent types that can reduce quality of life and mobility. As the world's population ages, interest in natural, less invasive arthritis therapies is rising. herbal oils. To improve blood circulation, massage the oil with long, gentle strokes without applying excessive pressure. By combining Greek and Latin, the combinatorial word "arthritis" was produced. "Arthron" means "specifies inflammation" in Latin and "joint" in Greek. Improvement of Circulation: Improved circulation in the joints can reduce pain and hasten healing. This warming oil lowers inflammation and promotes blood flow.[3]

➢ **RHEUMATOID ARTHRITIS**

One percent of people worldwide suffer from the chronic inflammatory condition known as rheumatoid arthritis (RA). In addition to having a severe functional disability and a progressive, crippling illness, patients with RA may also have a shorter life expectancy because the major organ systems are frequently affected. Molecular biology advancement shave significantly improved our understanding of the damaging and inflammatory mechanisms underlying this complicated illness. [4] The chronic inflammatory condition known as rheumatoid arthritis (RA) is marked by a varied clinical response to various therapies. Certain patients are challenging to manage and fail to meet therapeutic goals, such as minimal disease activity or clinical remission[5]. Arthritis is a prevalent condition that affects a huge number of people and causes painful swelling of the joints. The most prevalent conditions are rheumatoid arthritis and osteoarthritis. Osteoarthritis is a degenerative joint disease that primarily affects the elderly, while rheumatoid arthritis is an inflammatory condition with an unclear cause. The most popular complementary and alternative therapy for treating a variety of systemic problems is Ayurveda, which uses herbs[6]. About 5 out every 1000 persons globally suffer from rheumatoid arthritis (RA), a chronic inflammatory joint condition. The illness can strike at any age and affects women two to three times more frequently than men. [7]

2. AIM AND OBJECTIVE

❖ **AIM**

To formulate and evaluate a poly-herbal anti-arthritis oil using medicinal herbs for the effective management of arthritis, joint pain, inflammation, and stiffness.

❖ **OBJECTIVES**

- To prepare a poly herbal anti-arthritis oil using Shallaki, Nirgundi, Ajwain, Garlic, Ginger, Clove, and Nutmeg.
- To study the medicinal and therapeutic properties of selected herbal ingredients.
- To evaluate the formulated oil for physicochemical parameters such as pH, specific gravity, acid value, and viscosity.
- To perform organoleptic and qualitative evaluation tests including irritancy, solubility, saponin, ascorbic acid, and lipid tests.
- To determine the stability and suitability of the formulation for topical application in arthritis management.

fig.no.01: ingredients used in the formulation of anti artheritis oil.

3. MATERIALS AND METHODS

3.1 Plant profile

3.1.1. Shallaki

Description : Mainly contains resin (55-65%), gum (20-25%), and volatile oil (5-10%), Boswellic acids (most active), ß-Boswellic acid, Acetyl-ß-boswellic acid, B-Boswellic acid, Acetyl-ß-boswellic acid, 11-keto-ß-boswellic acid (AKBA) (major anti-inflammatory), Terpenoids, Polysaccharides, Essential oil (pinene, limonene).

Uses :

- Powerful anti-inflammatory.
- Used in arthritis & joint pain
- Analgesic
- Anti-asthmatic
- Wound healing used in Ayurvedic formulations like pain relief oils, tablets, and guggul preparations.

fig no.02: shallaki

3.1.2 Nirgundi:

Description: Main constituents include: Flavonoids- vitexin, negundosideIridoid glycosides, Volatile oil (sabinene, cineole), Alkaloids, Triterpenes.

Uses:

- Powerful anti-inflammatory
- Used in arthritis & joint pain oils
- Analgesic (pain relief)
- Anti-asthmatic
- Antimicrobial
- Used in swelling, sprain, sciatica
- Leaf paste used for wound healing

fig no.03: nirgundi

3.1.3 Ajwain :

Description : It contain Ajowain fruits contains 2-4% of volatile oil, about 21% fat, 17% proteins and 25% carbohydrates, volatile oil mainly contains thymol (35-60%), pcymene.

Uses:

- Ajowain contains thymol, a strong anti-inflammatory and analgesic compound.
- It helps to: Reduce joint inflammation.
- Relieve pain and stiffiness.
- Improve blood circulation and reduce swelling and coldness in joints.
- Remove Ama (toxins) from the body.

fig.no.04: ajwain

3.1.4 Garlic:

Description: Garlic bulbs contains 29% of carbohydrates, about 56% of proteins, 0.1% of fat, mucilage, and 0.06 to 0.1% of volatile oil. It also contains phosphorus, iron and copper. Volatile oil of the drug' is the chief active constituent, and contains allyl propyl disulphide, diallydisulphide, allin and allcin.

Uses-

- Garlic oil is a natural remedy known for its anti-inflammatory and pain-relieving properties.
- It can help reduce joint pain, stiffness, and swelling, especially in conditions like arthritis.

fig.no.05: garlic

3.1.5 Nutmeg:

Description: It contains 5 to 16% of volatile oil, and about 30% of fat. The volatile oil contains 4 to 8% myristicin, elimicin and saffrole. The other constituents of this drug are proteins and starch.

Uses:

- It is used as an aromatic, a stimulant, and carminative.
- It is used as flavouring agent.
- The fat (nutmeg butter) also known as banda soap, it is used in a soap industries.
- The fat and volatile oil of nutmeg are used in the treatment of rheumatism**.**

fig.no.05: nutmeg

3.1.6 Ginger:

Description: Ginger (Zingiberofficinale) contains over 300 active compounds, primarily volatile oils, phenolics, and terpenoids, with-gingerol being the main pungent bioactive in fresh ginger. Key constituents include gingerols, shogaols (formed by heating/drying), zingerone, and essential oils like zingiberene, which contribute to its anti-inflammatory, antioxidant, and therapeutic properties.

Uses-

- relieving nausea (morning sickness, motion sickness, chemotherapy)
- improving digestion
- reducing inflammation and muscle pain
- managing blood sugar, and lowering cholesterol
- It is used fresh, powdered, as oil, or in tea.

fig no.07: ginger

3.1.7 Clove: Main active component = Volatile oil (15–20%) Important constituents: Eugenol (70–90%) → main active compound eugenyl acetate β-caryophyllene, tannins, flavonoids, resin.

Uses:

➢ **Medicinal Uses**

- Strong analgesic (toothache relief)
- Antiseptic & antimicrobial
- Carminative (relieves gas)
- Expectorant (cough relief)
- Anti-inflammatory

➢ **Pharmaceutical Uses**

- Used in clove oil
- Dental preparations
- Mouthwashes & toothpastes
- Flavouring agent in syrups

fig no.08: clove

table no.01: method of preparation

SR. NO	INGREDIENTS	QUANTITY REQUIRE
1.	Shallaki	15 ml

2.	Nirgundi	20 ml
3.	Ajowain	10 ml
4.	Garlic	20 ml
5.	Ginger	10 ml
6.	Clove	3 ml
7.	Jayphal	2 ml
8.	Sesame oil [base oil]	70 ml

3.2 Evaluation Of Poly Artheritis Oil.

1. Specific gravity
2. pH
3. Acid value
4. Irritancy test
5. Organoleptic evaluation
6. Viscosity test
7. Ascorbic acid test
8. Saponin test
9. Solubility test
10. Test for lipid

3.2.1 Specific gravity:

Weighing was done on an initially empty bottle with a specific gravity (W1). The identical specific gravity bottle was then filled with water and weighed again (W2). Later, the specific gravity container was replaced with arthritis oil, and the weight was again measured (W3). Weights are noted, showing that the specific gravity of the artheritis oil was determined. The weight of an empty bottle of specific gravity is W1 gms. A bottle containing water and specific gravity weighs W2 gms. The weight of a hair oil bottle with a given gravity is W3 grams. The specific gravity of the water 0.9961 g/cm.

fig no.09: determine the specific gravity using density bottle.

3.2.2 pH:

10 ml of herbal artheritis oil were put in a beaker and bulb of pH.meter dipped in this oil. The measured pH values are documented. The ph of artheritis oil is – 7.7 [skin friendly]

fig.no.10: determination of ph meter.

3.2.3 Acid value:

1ml oil was weighed in a conical flask and added to the 2.5 ml of ether and 5 ml of ethanol in ratio (2:1). Phenolphthalein indicator was added to the solution. This solution was titrated with 0.1M potassium hydroxide (KOH) solution until it changes from pink to pestle pink.

Acid value: V*N*56.1/W

Where,

V= Volume of KOH used

N= Normality of KOH

W = Weight of the oil sample

56.1 = Molecular wt. of the KOH.

fig no.11: determination of acid value as a result pink colour convert in to pastle pink colour when titrate with 0.1n koh

3.2.4 Irritancy test:

Oil was applied on hand and expose to the sunlight for 5 minutes to see any irritant effect shown by the poly herbal hair oil or not.

3.2.5 Organoleptic property:

Colour, odour and texture were determined by senses.

3.2.6 Viscosity:

Use a viscometer to measure the viscosity. It is the process of calculating a liquid flowresistance, the higher the viscosity, the larger the flow resistance. The viscosity was measured Using an Ostwald viscometer.

fig.no.12: determination of viscosity by using an ostwald viscometer.

3.2.7. Ascorbic Acid Test:

Added 1 drop of freshly prepared 5 per cent w/v sodium nitroprusside solution and 2 ml of dilute sodium hydroxide solution to 1 ml of 2 per cent w/v solution and 5 ml of water. Drop in 0.6ml of hydrochloric acid, mix, and records found.

3.2.8 Saponin Test: The formation of stable froth was observed by shaking oil and water in a test tube.

fig no.13: determination of saponin test.

3.2.9 Solubility test: Take 1 ml oil and add in test tube containing water and another one is organic solvent

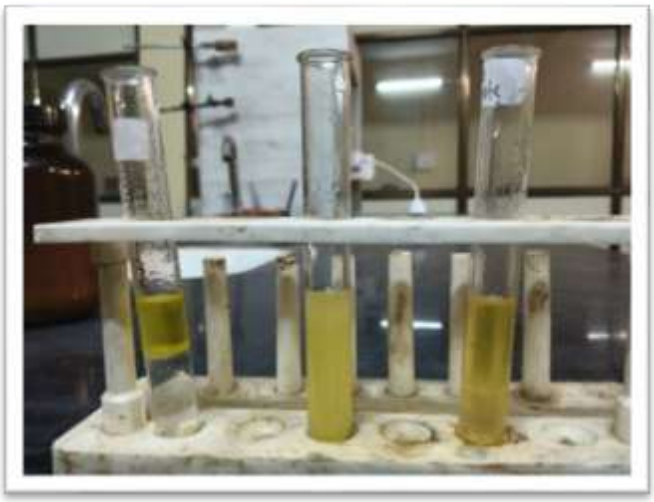

fig.no.14: solubility test

3.2.10 Stability Test: It is observed that the prepared formulations are stable throughout the shelf life for 12 months.

3.2.11 Test for lipid: In this test we were toper form Ninhydrin test and Xanthoproteic test for determination of protein and amino acid. Ninhydrin test: Take 5-10 drops of ninhydrin and add 1 ml herbal oil. Put it in water bath for 5 min. Appearance of blue colour indicate presence of protein .Xanthoproteic test: Add 1 ml conc HNO3 add 1 ml oil there was appearance of white colour heat for 1 min yellow colour appear cool the mixture add NaOH orange colour appear which indicate the presence of aromatic amino acid is present.

4. RESULT

table no.01: evaluation parameter

Parameters	**Standard value**	**Observation**
Specific gravity	0.85 - 0.95	0.88
Ph	5 - 7	7.6
Acid value	Less than 4	2.412 mg/gm
Irritancy	No irritant	No irritant
Viscocity	0.94	0.90
Solubility test	Soluble	Soluble in organic sample insoluble in water
Saponin	Froth present	Froth present
Ascorbic acid	--	Yellow to blue

solubility	Soluble in organic solvent insoluble in water	Soluble in organic solvent insoluble in water
Test for lipid	Presence of protein	Presence of protein
ORGANOLEPTIC CHARACTERS	-	-
a. Colour	Dark yellowish brown	Dark yellowish brown
a. Odour	Strong, pungent	Strong, pungent
b. Test	Spicy, pungent	Spicy, pungent
c.Texture	Smoot	Smoot
d. Appearance	Clear to slightly hazy	Clear to slightly hazy
e.consistancy	viscous	viscouss

5. CONCLUSION

The purpose of this study is to formulate and evaluate poly herbal arthritis oil using the combination of medicinal plants that are known for their medicinal properties, such as pain reliever and anti-inflammatory, analgesic, and anti arthritic properties. The main goal was to develop a natural, simple, affordable oil that could help to reduce common arthritis symptoms such as swelling, joint pain, and stiffness. We combine different types of herbs such as shallaki, nirgundi, ajwain, ginger, garlic, clove, jayphal, sesame oil, and nutmeg that contain medicinal properties. The oil was prepared carefully to make sure that the beneficial compound from the plant was properly extracted and preserved. After the preparation of oil was evaluated by using different tests that included observing its color, smell, viscosity, pH, and stability. and shows the color and pleasant herbal smell, which indicates the presence of active plant components. Its viscosity was good; that means it spread easily on skin without being too thick and runny. The pH was found to be safe for skin application, suggesting it is unlikely to cause irritation. A stability study shows that oil maintains its properties over time without any change in appearance and texture. This indicates that the oil formulation is stable and stored for regular use. The presence of natural plant compounds like flavonoids, tannins, and essential oils supports the potential effectiveness of poly herbal oil formulations. This compound is known to have pain reliever and anti-inflammatory properties. which may help in managing the arthritis symptoms when the oil is applied regularly. Since the formulation is plant-based and natural, it may be a good option for the people looking for an alternative to synthetic and chemical-based treatment.

Overall, this study shows that our poly herbal arthritis oil is a promising natural remedy. It's
natural, cost-effective, and suitable for external use.

6. SUMMARY

The research work focuses on the formulation and evaluation of a polyherbal anti-arthritis oil prepared using medicinal herbs such as Shallaki, Nirgundi, Ajwain, Garlic, Ginger, Clove, and Nutmeg with sesame oil as the base. These herbs were selected because of their well-known anti-inflammatory, analgesic, antimicrobial, and therapeutic properties, which are beneficial in relieving arthritis-related pain, swelling, stiffness, and inflammation. The prepared herbal oil was subjected to various physicochemical and qualitative evaluation tests including specific gravity, pH, acid value, viscosity, irritancy test, solubility test, saponin test, ascorbic acid test, lipid test, and organoleptic evaluation. The results showed that the formulation possessed acceptable properties such as suitable pH, good viscosity, stability, non-irritant nature, and characteristic odor and appearance. The study concluded that the formulated poly herbal anti-arthritis oil is stable, safe for topical application, and may be useful in the management of arthritis and joint pain. The formulation may serve as a natural and effective alternative to synthetic treatments with fewer side effects.

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