

## ETHNOMEDICINAL PLANTS USED IN THE TRADITIONAL TREATMENT OF RHEUMATOID ARTHRITIS IN ALGERIA

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### Abstract

Rheumatoid arthritis (RA), especially polyarthrititis, are becoming increasingly common worldwide. The use of phytotherapy to treat these conditions is frequent. The aim of the study is to identify the medicinal plants used in Algeria to treat polyarthritie. The survey resulted in recording of 16 recipes using 31 medicinal plant species. Among them Olive oil (*Olea europea* L.), ginger (*Zingiber officinale* L.), and garden cress (*Lepidium sativum* L.) seeds are the most commonly used plant part. Decoction is the most widely used method of preparation and topical massage is the most frequently recommended route of administration. The analysis of ICF conclude that the oil-based, externally applied preparations built around a small, recurring core show a higher degree of consensus. The collected recipes showed notable efficacy, particularly in relieving the symptoms associated with the disease, suggesting their possible use as a complement to biomedicines.

### Introduction

Phytotherapy is practiced in all countries of the world as folk, alternative, or complementary medicine (Bruno 2013). Traditional medicine constitutes the initial and primary healthcare needs of approximately 80% of the world's population "Saving the plants that save lives" is widely used as a slogan (World Health Organization 1993). In Algeria, as in any other developing country, phytotherapy plays an important role in the curative and preventive treatment of rheumatic diseases.

The term "rheumatism" refers to most painful joint or para-articular manifestations, affects the conjunctive and support tissues of the musculoskeletal system. More than 200 diseases, in inflammatory or non-inflammatory forms, are concerned (Magnani 2018). Rheumatoid arthritis (RA) is a chronic inflammatory rheumatism. It is an autoimmune disease according to Andia *et al.* (2016), responsible for joint destruction that contributes to functional disability. The prevalence of RA is estimated differently around the world. It ranges from 0.5 to 1.0% in Europe and in the North American population. In Africa, it is between 0.13% and 2.5% (Usenbo 2015) but is mainly observed between 40 and 60 years of age. It is more common in women than in men (Sany *et al.* 1997). Several factors are involved in triggering this disease: hormonal, genetic, and environmental factors (Ghozlan *et al.* 2012).

A great progress has been made in understanding the biological mechanisms that lead to the development of RA, cure has not yet been achieved in a large proportion of patients receiving available drug treatments. However, patients find it difficult to accept long-term drug treatment, due to its side effects. Consequently, patients are increasingly seeking complementary adjuvant therapies, particularly nutritional interventions. Therefore, RA constitute an excellent field of study in alternative medicine (Cameron 2011). In this study, our objective is to inventory the medicinal plants used in alternative medicine recipes to treat RA.

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## Material and Methods

To identify plants used by the local population to treat RA, an ethnobotanical survey was conducted using a questionnaire published on various Algerian Facebook pages (Février-mars). The web questionnaire form is divided into two parts; the first part collects information about the informant, and the second part collects information about the medicinal plants used by the population. The link of questionnaire is :

[https://docs.google.com/forms/d/e/1FAIpQLSea0sfjkV2SUM0QneyAOSdKQdw\\_LhtkDbAEB\\_RwlcWskXyrTA/viewform?usp=pp\\_url](https://docs.google.com/forms/d/e/1FAIpQLSea0sfjkV2SUM0QneyAOSdKQdw_LhtkDbAEB_RwlcWskXyrTA/viewform?usp=pp_url)

The study was also conducted in the field to identify the different traditional recipes used against RA, among herbalists and people practising alternative medicine. The given data of web questionnaire were enregistered and treated by :

1. Excel software: data were calculated using simple statistical methods.
2. SPSS software: the chi-square test is used to identify factors that influence RA.

## Results and Discussions

The study sample consisted of 73 individuals: (38% patients, 11% herbalists/healers, 51% information collectors), in both gender (52% male, 48% female) of different ages from 20 to 60 years old (34% of them belonged to the 20-30 age group), 60% of them have a university level, 17% a high school, 10% a middle school, 1% a primary, 12% no formal education. For socioeconomic status; 85% are middle income, 8% high income and 7% low income, responded the online questionnaire, and more than twenty individuals who provided us with recipes in the field. The analysis of the data from different variables (two by two) using the chi-square test, can determine whether there is a relationship between the variables at a significance level of 5% = 0.05).

In this study, from the 73 requested persons; 76.78% are women and 23.22% are men. The test revealed a significant relationship between RA and gender ( $p=0.001$ ); it affects approximately 20 women for every 6 men. According to Sany *et al.* (1997), RA is four times more common in women than in men, but this gender difference gradually diminishes with age beyond 70.

Concerning the mode of treatment and its results, 43.83% of the population used both treatment methods simultaneously, where the highest percentage showed good results of treatment (6.85); however, the majority of this population (23.29%) showed no improvement in their condition, while 13, 69% felt well but experienced side effects. Followed by those who used bio-medication (38.36%), of whom 19.18% had good results but with side effects, only 1.37% felt well, and 17.81% showed no improvement. Finally, there was the alternative and complementary medicine (ACM) group (17.81%), with this type of treatment, 4.12% had good results, 5.47% experienced side effects, and 8.21% showed no improvement.

Sport Practitioners shows a relatively more favourable pattern: 44.44% had good results, 38.89% showed acceptable results with side effects and 16.67% showed no improvement.

Treatment effectiveness increases with duration. RA require a long-term therapy for tangible results. Lifelong treatment showed best results (13% with some side effects)

Treatment duration has not any significant relationship with side effects (the asymptotic significance value 0.059 is superior than the significance level 0.05). Analysis of the questionnaire data reveals that lifelong therapy has no side effects. 61.64% of the study population achieved satisfactory results without side effects after treatment lasting more than two years and several months. 10.96% have stomach ulcers 20.55% experienced tired, idleness- vertigo and 6.85% suffers from allergy.

**Table 1. Main recipes collected.**

| Recipe | Ingredients                                                                                                                                                                                                                                                                                        |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01     | 50g sesame, 50g ginger, 50g turmeric, 25g chamomile, 25g cinnamon, 20g cardamom, 20g garden cress, 20g thyme, Crush ingredients and mix them into 1kg of honey, and take a spoonful morning and evening before going to bed.                                                                       |
| 02     | same amount of: olive oil, eucalyptus oil, peppermint oil and harmala oil. Mix them and make Transcutaneous massage on the painful areas.                                                                                                                                                          |
| 03     | same amount of: peppermint oil, olive oil, eucalyptus oil, harmala oil, mustard oil, nigella oil and castor oil. Mix them and make Transcutaneous massage on the painful areas.                                                                                                                    |
| 04     | 5 cloves + same amount between fingers of: henna, artemisia, juniper and coloquinte. After boiling in water (decoction) and filtration take it orally                                                                                                                                              |
| 05     | same amount of: harmala, juniper, artemisia, lavender, thyme, rose water, radish fenugreek, galbanum, jujube and garden cress. After boiling the ingredients in water, add the onions and immerse the painful part of the body, then massage with olive oil. Repeat this process every three days. |
| 06     | 2 boxes of Vaseline + 10g ginger + 10g nigella seeds + 10g castor oil + 10g lavender + 2 bottles of nigella oil. Mix them and make Transcutaneous massage on the painful areas.                                                                                                                    |
| 07     | spoon of garden cress in a glass of milk. Take it orally                                                                                                                                                                                                                                           |
| 08     | teaspoon of turmeric in a cup of milk. Take it orally                                                                                                                                                                                                                                              |
| 09     | glass of olive oil + teaspoon of black pepper. Mix them and make Transcutaneous massage on the painful areas.                                                                                                                                                                                      |
| 10     | put half-teaspoon of cress seeds in pitted dates and consume daily                                                                                                                                                                                                                                 |
| 11     | cup olive oil + spoon ginger + spoon black pepper + spoon cloves + spoon nigella seeds. Mix all ingredients in a bowl and place over heat. Let it boil for five minutes, then allow it to cool completely. Strain and store it in a bottle. Use as needed by applying it to the area of pain.      |
| 12     | glass of sesame oil + glass of olive oil + spoon ginger powder + 3 cloves + teaspoon peppermint leaves (once the oils are warm, add the ginger, mint and cloves and turn off the heat and let it cool. Apply a small amount of the mixture to your body and massage for 15 minutes)                |
| 13     | chop the lamb fat (50g) and add glass of olive oil and two spoons of capper powder. Place a mixture over a fire until the fat melts. Apply this mixture to the pain area before bedtime                                                                                                            |
| 14     | camel fat (50g) and glass of olive oil are mixed with ginger, cappers and turmeric. Melted over low heat, strained and used as an ointment                                                                                                                                                         |
| 15     | mixture of spoon olive oil and powders of spoon garden cress seeds + quarter teaspoon of each of turmeric, cloves, ginger and nigella seeds. And mix them into a paste. Apply a small amount on pain area.                                                                                         |
| 16     | cook over boiled water cabbage leaves, add spoon of olive oil and apply to the area of pain                                                                                                                                                                                                        |

Based on these 16 recipes, reliable indices are calculated.

From the above results, we conclude that there is a clear influence of RA and gender on the treatment method. This, in turn, affects treatment results, as biomedicine may be more effective than ACM, which have a positive impact when used together with biomedicine. Currently, clinical treatment strategies for RA rely mainly on chemical drugs such as anti-inflammatory drugs and biological agents. Sometimes the use of strong opioid painkillers to treat pain in rheumatic patients who do not respond to standard treatments is necessary, this type of treatment must be administered with particular caution in elderly people and independent patients, due to frequent side effects such as constipation, nausea and dizziness (Valko *et al.* 2006). As example: at present, traditional Chinese medicine using ACM is becoming increasingly accepted in the clinical field worldwide (Xiaoyu *et al.* 2024). Recent findings emphasize the anti-inflammatory and antioxidant properties of bioactive natural compounds, such as polyphenols extracted from plants, and their possible synergistic effect when used in combination with current therapies to improve the

prognosis and symptoms of inflammatory rheumatic diseases (Tamburini *et al.* 2025). Sport plays an important role in improving treatment results. Adopting a healthy lifestyle enhances the effectiveness of treatment and reduces its side effects. physical activity is widely promoted among the general population by the WHO due to its many beneficial effects on cardiovascular health, anti-tumour and anti-inflammatory properties, as well as its role in preserving bone mass and cognitive function (Sokka *et al.* 2008). Duration of treatment also has a significant impact on its results, as the treatment of rheumatic diseases generally requires a long period of time to achieve tangible results. However, prolonging the duration of treatment may increase the risk of side effects. Taking these complex relationships into account, herbal treatment requires careful periodic monitoring. Some traditional recipes used to treat RA have been collected (Table 1).

The main medicinal plants used in these recipes and its relative frequency of citation are presented in the Table 2. The RFC confirms olive oil, ginger and garden cress as the pillars of the local recipe repertoire against RA. These species are documented as have anti-inflammatory and anti-arthritic activity in the pharmacological literature.

**Table 2. Relative frequency of citation of the medicinal plants used in treatment of RA.**

| Species                                                                                          | FC | RFC   | Share of all citations |
|--------------------------------------------------------------------------------------------------|----|-------|------------------------|
| Olive oil ( <i>Olea europea</i> L.)                                                              | 10 | 0.625 | 14.49%                 |
| Ginger ( <i>Zingiber officinale</i> L.)                                                          | 6  | 0.375 | 8.69%                  |
| Garden cress ( <i>Lepidium sativum</i> L.)                                                       | 5  | 0.312 | 7.24%                  |
| Turmeric ( <i>Curcuma longa</i> L.)                                                              | 4  | 0.250 | 5.80%                  |
| Nigella ( <i>Nigella damascena</i> L.)                                                           | 4  | 0.250 | 5.80%                  |
| Clove <i>Syzygium aromaticum</i> L.                                                              | 4  | 0.250 | 5.80%                  |
| Peppermint ( <i>Mentha spicata</i> L.)/ Harmala ( <i>Peganum harmala</i> L.)                     | 3  | 0.188 | 4.35% each             |
| 8 species (thyme, sesame, eucalyptus, castor, artemisia, juniper, lavender, black pepper, caper) | 2  | 0.125 | 2.9% each              |
| 14 species                                                                                       | 1  | 0.062 | 1.45% each             |

The ICF indicates moderate-to-good agreement across informants despite the breadth of the recipe corpus (31 species across 16 recipes) a value closer to 1 consistent with what quantitative ethnobotanical surveys typically interpret as meaningful convergence on a therapeutically relevant core, following the original Trotter and Logan (1986) framework for using informant consensus to flag "potentially effective" medicinal plants worth further pharmacological investigation.

Recipes for topical use show a much higher internal consensus (ICF = 0.547, n = 11 recipes) than recipes for oral use (ICF = 0.188, n = 5 recipes). The external use of aromatic plants containing essential oils for RA is a recurring pattern in ethnomedicine, likely reflecting both a perceived faster symptomatic relief and the prevention of gastrointestinal side effects. Topical application allows for direct, localized administration to painful joints, with a lower systemic risk, which may encourage a shift toward a more limited set of oils that regularly appear in massage-based recipes.

Rhizomes show the strongest ICF for ginger and turmeric. Fruits and seeds follow, both anchored by one dominant species (olive; garden cress/nigella respectively) pulling the category toward agreement despite several minor alternatives. Leaves/aerial parts show the weakest consensus (Table 3).

Cold oil maceration shows the highest level of consensus among recipe preparation methods with olive oil, eucalyptus, mint, and haramala. Hot oil infusion and ointment preparation, on the other hand, representing moderate consensus. Decoction it shows much lower agreement (Table 4).

**Table 3. Informant consensus factor (ICF) by plant part used.**

| Plant part                                                                          | Species (Nt) | Use-reports (Nur) | ICF   |
|-------------------------------------------------------------------------------------|--------------|-------------------|-------|
| Rhizome (ginger, turmeric)                                                          | 2            | 10                | 0.889 |
| Fruit (olive, black pepper, colocynth, jujube, dates)                               | 5            | 15                | 0.714 |
| Seed (garden cress, nigella, harmala, castor, sesame, fenugreek, mustard, cardamom) | 8            | 19                | 0.611 |
| Flower/bud (clove, lavender, caper, chamomile, rose)                                | 5            | 10                | 0.556 |
| Leaf/aerial part (peppermint, thyme, artemisia, eucalyptus, henna, cabbage)         | 6            | 11                | 0.500 |

**Table 4. Informant consensus factor (ICF) by mode of preparation.**

| Preparation mode                      | Species (Nt) | Use-reports (Nur) | ICF   |
|---------------------------------------|--------------|-------------------|-------|
| Cold oil maceration/blend             | 8            | 13                | 0.417 |
| Heated oil infusion                   | 7            | 10                | 0.333 |
| Ointment/salve (fat or Vaseline base) | 7            | 10                | 0.333 |
| Decoction (boiled in water)           | 17           | 20                | 0.158 |

Nt = number of taxa (plant species) reported for that preparation mode.

Nur = number of use-reports citing that preparation mode

Active components of natural products can play therapeutic and palliative roles in RA through multiple biological mechanisms. These mechanisms primarily involve immunosuppressive, anti-inflammatory, autophagic, and apoptotic pathways (Han *et al.* 2025). These natural medicines mainly include flavonoids, polyphenols, alkaloids, glycosides, and terpenes. Among them, resveratrol, icariin, epigallocatechin-3-gallate, ginsenoside, sinomenine, paeoniflorin, and triptolide are considered star natural medicines for the treatment of RA (Liu *et al.* 2022).

**Table 5. Main medicinal plants used in alternative medicine for treatment of RA and its RFC.**

| Family        | Scientific name                    | English name |
|---------------|------------------------------------|--------------|
| Oleaceae      | <i>Olea europea</i> L.             | Olive oil    |
| Zingiberaceae | <i>Zingiber officinale</i> L.      | Ginger       |
|               | <i>Curcuma longa</i> L.            | Turmeric     |
| Brassicaceae  | <i>Lepidium sativum</i> L.         | Garden cress |
| Verbenaceae   | <i>Nigella damascena</i> L.        | Nigella      |
| Myrtaceae     | <i>Syzygium aromaticum</i> L.      | Cloves       |
| Lamiaceae     | <i>Mentha spicata</i> L.           | Peppermint   |
|               | <i>Thymus vulgare</i> L.           | Thyme        |
|               | <i>Rosmarinus officinalis</i> L.   | Rosemary     |
|               | <i>Lavandula angustifolia</i> L.   | Lavender     |
| Nitrariaceae  | <i>Peganum harmala</i> L.          | Harmala      |
| Apiaceae      | <i>Pimpinella anisum</i> L.        | Sweet anise  |
|               | <i>Cuminum cyminum</i> L.          | Cumin        |
| Fabaceae      | <i>Trigonella foenumgraecum</i> L. | Fenugreek    |
|               | <i>Artemisia herba alba</i> L.     | Artemisia    |
| Anacardiaceae | <i>Pistacia lentiscus</i> L.       | Castor       |
| Cupressaceae  | <i>Juniperus communis</i> L.       | Juniperus    |
| Capparidaceae | <i>Capparis spinosa</i> L.         | Capper       |

Mono-unsaturated and polyunsaturated fatty acids, vitamin E and phenolic compounds, share antioxidant properties and are mainly found in extra virgin olive oil (*Olea europea L*) (Tamburini *et al.* 2025). This oil shows a potential reduction in pro-inflammatory cytokines either in the blood or in the joints. Furthermore, its compounds appear to inhibit the expression of pro-inflammatory enzymes (as cyclooxygenase 2 and metalloproteases) and the infiltration of leukocytes into the synovial membrane (Santangelo *et al.* 2018).

Various phytochemical constituents of *Zingiber officinale* have anti-inflammatory properties, improving pain symptoms in people suffering from rheumatism (Razavi *et al.* 2021)

*Curcuma longa* has anti-inflammatory properties and helps reduce pain in people suffering from arthritis (Mohanad *et al.* 2016). Studies indicate that curcumin, the active ingredient in turmeric, has anti-inflammatory properties through various mechanisms involving the reduction of inflammatory transcription factors, redox status, and protein kinases in the nucleus. Curcumin has also been reported to help reduce knee and joint pain in patients with osteoarthritis, leading to the use of curcumin to reduce the circulation of cytokines in the body such as interleukin-6, which plays a role in inflammatory pain (Razavi *et al.* 2021, Zhao *et al.* 2021)

*Lepidium sativum* exhibits antioxidant and anti-inflammatory effects due to the presence of various phytochemicals such as omega-3 and omega-6 fatty acids, tocopherol, sulforaphane, glucosinolate and flavonol compounds (Diwakar *et al.* 2010, Jabeen *et al.* 2017).

Ethanol extract of *Peganum harmala* is useful in managing RA complications by strengthening the intracellular antioxidant defence mechanism in rat model (Singhai A, Patil 2021). The principal active compound, thymoquinone of *Nigella sativa* attenuates rheumatoid arthritis in animal models by downregulating TLR2, TLR4, TNF- $\alpha$ , IL-1 and NF- $\kappa$ B expression and reducing C-reactive protein and histopathological joint damage (Umar *et al.* 2019), and a clinical trial found that *Nigella sativa* oil improved inflammatory cytokine profiles and oxidative stress status in RA patients (Hadi *et al.* 2016)

*Syzigium romaticum L.* is well-documented that has anti-inflammatory and antinociceptive action, shown to reduce carrageenan-induced paw oedema and improve limb function in animal models of osteoarthritis (Montefusco *et al.* 2021), even though direct human RA trial data remain limited.

The European Commission, the World Health Organisation (WHO) and the European Scientific Cooperative on Phytotherapy (ESCOP) approve the external use of peppermint (*Mentha spicata*) to relieve not only headaches and colds, but also certain skin irritations and muscular, neuralgic or rheumatic pain (Lobstein and Couic-Marini r 2016)

Administration of *Thymus vulgaris* extract led to a marked reduction in paw and knee oedema, decreased levels of pro-inflammatory cytokines (IL-1, IL-6, TNF- $\alpha$ ), and lowered inflammatory markers (CRP, Anti-CCP, MMP-1) in treated rats. Additionally, an increase in the anti-inflammatory cytokine IL-10 was observed, indicating an immunomodulatory effect (Sabir *et al.* 2025).

The methanolic extract of *Capparis spinosa* counteracted IL-1 $\beta$ -induced cartilage damage in human chondrocyte cultures more effectively than indomethacin (Panico *et al.* 2005), and anti-arthritic activity in an adjuvant-induced rat model, acting through control of chondrocytes, osteoclasts and inflammatory mediators was confirmed (Yosri *et al.* 2022).

*Rosmarinus officinalis* demonstrated a potential in protection against RA due to its anti-arthritic and anti-inflammatory activities of various chemical constituents in plants. The main constituents are 1, 8-cineole, alpha-pinene, camphor, borneol, camphene, limonene, linalool, terpineol, verbenol, apigenin, oleanolic acid, and ursolic acid (Wei *et al.* 2021).

Finally, for the analysis, a same basic pattern: oil-based, externally applied preparations built around a small, recurring core (olive, ginger, black seed, cloves, watercress) show a higher degree of consensus. An important part of this study involves deepening the understanding of the physiology and pathophysiology of rheumatism, in order to better understand how these plants can help alleviate symptoms and improve the quality of life of affected individuals.

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