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Harnessing Indigenous Medicinal Plants and Phytochemicals for Rheumatoid Arthritis Therapy in Africa

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ABSTRACT

Rheumatoid arthritis (RA) is a chronic autoimmune disorder that causes persistent joint inflammation, pain, and disability. Despite advances in modern medicine, there is no known cure, and existing treatments are often limited by high costs, adverse side effects, and restricted accessibility in resource-constrained regions such as Africa. Indigenous African medicinal plants, long utilized in traditional healing systems, represent a promising source of novel therapeutic agents. Many of these plants contain bioactive phytochemicals including flavonoids, alkaloids, and terpenoids with demonstrated anti-inflammatory, analgesic, and immunomodulatory effects relevant to RA management. This review highlights selected indigenous plants traditionally used for arthritis treatment, such as *Piptadeniastrum africanum*, *Aspilia africana*, and *Piper nigrum*, emphasizing their phytochemical profiles, mechanisms of action, and experimental evidence. It also examines the challenges of clinical validation, conservation threats, and the need for robust policy frameworks to protect indigenous knowledge and promote sustainable use. Harnessing Africa's phytomedical resources for RA therapy requires an integrated approach that bridges traditional medicine and modern science through pharmacological studies, clinical trials, and ethical conservation. Advancing this research could not only provide safer, more affordable treatment options for RA patients but also strengthen local healthcare systems, preserve biodiversity, and promote equitable benefit sharing with indigenous communities.

Keywords: Rheumatoid Arthritis, Indigenous Medicinal Plants, Phytochemicals and Anti-inflammatory Therapy.

INTRODUCTION

Despite advances in orthodox medical science, there is no known cure for rheumatoid arthritis (RA). Current treatments attempt to control the inflammatory response and reduce pain, ultimately improving the patient's quality of life. Many indigenous plants in Africa, utilized in traditional medicine, have been shown to contain phytochemical compounds with anti-inflammatory and analgesic activities that alleviate RA symptoms. The main objective of the present investigation was to determine if any indigenous African plants or phytochemicals, as evidenced by the literature, have been shown to reduce inflammation or pain in an RA context or in preclinical models relevant to RA [1]. Rheumatoid arthritis (RA) is a multifactorial, polygenic, chronic, progressive inflammatory autoimmune disease characterized by articular and extra-articular manifestations. It frequently occurs on the lining tissue of the joints and organs, with symptoms such as joint swelling, pain, redness, and tenderness. Although the exact pathophysiology is unknown, early diagnosis is essential to mitigate disease progression and prevent joint damage. Currently, no cure exists, but management aims to control inflammation, reduce pain, and enhance the quality of life [2]. Various indigenous plants, traditionally used in Africa, have demonstrated anti-inflammatory and analgesic properties that alleviate RA symptoms. Evidence from scientific literature indicates that several indigenous African plants and phytochemicals can diminish inflammation or pain within an RA framework or in related preclinical models, supporting their potential use in RA therapy.

Understanding Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a chronic autoimmune disease that afflicts approximately 1% of the global population and markedly reduces the quality of life of those affected; it alters biological functions that contribute to increased incidence of cardiovascular and pulmonary diseases, osteoporosis, and lymphoma [1]. Worldwide, the overall raw disability-adjusted life years rate for RA was 40.9 (95% uncertainty interval 35.5 to 46.5) in 2017. The major clinical signs of RA include symmetrical multiple arthritis, loss of joint function, and tender joints that are inflamed and painful. This damage often leads to the complete loss of joint or skeletal function. RA patients typically suffer from severe pain and inflammation in the synovial joints, further exacerbated by the erosion of bone and deformity of the joints that ultimately results in the complete loss of skeletal function. In some cases, escalating deformation and lesions in the joints of the hand, knee, and feet can cause significant disability; the disease can affect many other organs such as the heart, lungs, eyes, and brain. RA expression is characterized by the production of antibodies by the immune system, for example, anti-citrullinated protein antibodies for seropositive RA or Rheumatoid factors. Diagnosing RA requires a combination of factors that include a history of clinical examination, laboratory tests, and X-ray imaging. Biomarkers evaluated include erythrocyte sedimentation rate, C-reactive protein, and anti-cyclic citrullinated peptide antibodies. Treatment of RA can be achieved through the use of a large repertoire of diverse synthetic anti-rheumatic agents that range from cardiovascular, metal-based agents, immunosuppressants, biologics, and anti-inflammatory drugs. Various biological anti-rheumatic agents such as TNF- α blocking agent, IL-1 receptor antagonists, monoclonal antibodies against B-cells, IL-6 blockers, and others are used as monotherapy or in combination with DMARDs. TNF-blockers, however, have been reported to induce antibodies and lupus-like syndromes [2]. Given the limitations and risks of conventional therapy, patients seek alternative treatments that are effective, less toxic, and reduce pill burden. Herbal therapies based on traditional medicine have gained significance as alternative options.

Pathophysiology of Rheumatoid Arthritis

Rheumatoid arthritis (RA) is an autoimmune disease marked by chronic inflammation of the synovial membrane, cartilage degradation, and bone erosion [1]. Both genetic predisposition and environmental factors contribute to its pathogenesis, with approximately 3 million affected individuals in the United States and a higher prevalence in women. The primary clinical manifestations include swelling, redness, and pain in the hands and feet. Standard treatment regimens rely on anti-inflammatory and disease-modifying drugs, which may produce severe side effects and exhibit variable efficacy across patient populations, underscoring the demand for novel therapeutic agents with improved safety and effectiveness. Given the substantial side effects and limitations of conventional therapies, researchers have turned to indigenous African medicinal plants as potential sources of anti-rheumatoid agents. Advances in natural product research, coupled with emerging targeted delivery systems like nanoparticles and an understanding of the interplay between dietary products and the host microbiome, support the exploration of phytochemicals derived from herbs for RA treatment. *Piptadeniastrum africanum*, for example, possesses bioactive compounds exhibiting anti-inflammatory, antihyperalgesic, and anti-arthritic properties; its modulatory effects on the immune system and inhibition of pro-inflammatory mediators validate its traditional use and identify it as a candidate for the development of novel therapeutic agents [3].

Symptoms and Diagnosis

Patients with RA typically experience multiple signs and symptoms [2]. These include joint stiffness (predominantly morning stiffness), bony erosions and progressive joint destruction, joint tenderness on palpation and passive movement, bony swelling, systemic features such as fatigue and weight loss, subcutaneous nodules, and joint subluxation. In the absence of a pathognomonic sign or symptom complex, classification criteria vary between specialist groups. Early diagnosis of the disease at a stage where irreversible damage can be minimised is challenging and requires considerable clinical expertise; prompt institution of therapy is important to limit damage. The 2010 American College of Rheumatology criteria are widely used in the U.K, essential criteria include joint involvement, serology, duration of symptoms, and evidence of acute phase response [4]. Diagnosis is supported by a combination of clinical, laboratory, and radiological features. Extensive discussion of the articular and extra-articular features of RA is beyond the scope of this review and is readily available elsewhere: historical points include the availability of DMARDs and recognizing that anti-cyclic citrullinated peptide (anti-CCP) antibodies may be positive many years before clinical signs become apparent. Autoantibodies form part of disease classification criteria and are involved in the pathogenesis.

Current Treatment Options

Rheumatoid arthritis (RA) symptoms can be managed with non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and diclofenac, and steroids like prednisone [2]. These options carry side effects when administered long-term. Other frequently used medications include disease-modifying anti-rheumatic drugs (DMARDs) such as

methotrexate, leflunomide, and hydroxychloroquine that slow disease progression. Biological agents⁸⁶including IL-1 blockers, rituximab, abatacept, and tocilizumab [86] exhibit greater efficacy in symptom reduction than some DMARDs, yet none achieve permanent drug-free remission, prevent joint damage, or eliminate functional disability. Pulse therapy with cyclophosphamide, administered orally or intravenously, has been successful as an adjunct in certain refractory cases. Amidst the limited availability and high cost of these drugs in many African countries, indigenous medicinal plants and associated phytochemicals can complement traditional DMARDs and biological agents in the management of RA symptoms.

The Role of Medicinal Plants in Traditional Medicine

Ethno-medicinal plants are widely employed worldwide, prominently in sub-Saharan Africa, Europe, India and Asia, in the treatment of inflammatory conditions such as rheumatoid arthritis (RA). These plants contain bioactive phytochemical components that reduce the inflammation caused by endothelial cell activation. The therapeutic use of these plants presents an alternative approach to the RA symptoms. Particular species and families of plants are recognised for their anti-inflammatory properties, and the phytochemicals present exert their therapeutic effects in different ways. These include the reduction of proinflammatory cytokines, including TNF- α , PGE₂, IL-6 and anti-IL-4; the inhibition of transcription factors, such as NF- κ B; and the activity of proteolytic enzymes and free radicals. In addition, the inhibition of cyclooxygenase-2 (COX-2) and 5-lipoxygenase (5-LOX) reduces the inflammation caused by the metabolism of arachidonic acid. The treatment of RA differs between conventional medicine and traditional medicine, highlighting the diverse target groups of these systems. Indigenous medical treatments are preferred in general because they are accessible and can reduce symptoms without adverse effects. The wide variety of plants available on the African continent has promoted a variety of uses for the treatment of RA, and other chronic conditions. Despite documentation of indigenous knowledge, as well as of medicinal plants and their properties, the knowledge is at risk and the plants are facing extinction.

Historical Perspectives

A historical focus on natural therapies can offer new perspectives on current healthcare challenges, including rheumatoid arthritis (RA), an autoimmune disorder with multifaceted causes. In many regions, indigenous medicinal plants and the phytochemicals they contain have long served as effective treatments for RA. Africa, with a distinct phyto-geo-diversity compared to other continents, hosts an extensive pharmacopoeia of such plants [4]. The World Health Organization estimate that approximately 80% of the African population depends on traditional medicine; consequently, preserving indigenous knowledge is imperative. Rheumatoid arthritis is characterized by pain, swelling, stiffness, and gradual destruction of synovial joints [1, 2]. Historically, few effective remedies were available until the advent of non-steroidal anti-inflammatory drugs (NSAIDs). Later, immunotherapeutic agents such as biologics and Janus kinase inhibitors improved disease management by targeting underlying inflammatory and immunological processes. Nevertheless, controlling and potentially curing this complex disease remain ongoing challenges [2].

Cultural Significance

Medicinal plants play an essential role in the healthcare practices of millions around the globe and have been used in human and animal healthcare for thousands of years. Note that when members of the public look at a plant-based medicine, they often do not appreciate that approximately 80–90% of their medicine contains constituents derived from natural products. Moreover, indigenous peoples still rely on plants for various ailments, often due to cultural links to the natural world and the biological and chemical diversity that it harbours. Traditional knowledge of indigenous peoples continues to make essential contributions to the discovery and development of new medicines, as well as maintaining health and well-being [6]. Considering the cultural significance of the natural environment and indigenous peoples' use of plants, it would appear self-evident that their knowledge and intellectual property rights should be recognized and protected. What is not so clear is the extent to which these rights are recognized and protected. Indigenous knowledge has often been overlooked or even deliberately overlooked for the benefit of other parties. In Africa, collaboration between indigenous traditional healers and modern medicine practitioners may be an essential step in providing healthcare to all. Furthermore, educating patients about the risk of drug interactions is also necessary, given that many patients use traditional medicines derived from plants in conjunction with conventional treatment [5].

Indigenous Medicinal Plants of Africa

Africa, with its diverse habitats and vegetation zones, harbours a rich biodiversity comprising over 45,000 plant species and naturalized crops, accounting for about 20% of the world's flora. Approximately half of these are endemic to the region. Ethnobotanical studies reveal that between 5,000 and 7,000 species are used for medicinal purposes. The World Health Organization (WHO) estimates that over 80% of the world's population relies on traditional medicine, primarily botanical sources, for their healthcare needs, with a growing interest in alternative therapies in developed countries due to their affordability, efficacy, and lower incidence of side effects [5].

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Systematic investigation of indigenous plants provides valuable insights into the development of novel anti-inflammatory drugs with improved specificity and potency. African medicinal plants used for rheumatoid arthritis (RA) are particularly promising sources of bioactive compounds, given the limited efficacy and safety concerns associated with conventional synthetic drugs such as anticytokine agents and kinase inhibitors [4].

Overview of Indigenous Flora

Africa boasts one of the world's richest biodiversity hotspots, harboring some of the most inventive and ingenious ethnomedical systems [4]. About 80% of the continent's population depends on traditional medicine to meet their primary healthcare needs, principally because of its affordability, cultural acceptability, and perceived efficacy. So far, some 54% of all modern drugs are derived directly or indirectly from natural products, yet a myriad of indigenous African medicinal plants with immense potential remain unexplored. These plants are all potentially useful because they are known to be used by traditional healers in Africa, in various remedial measures, including treatment against rheumatoid arthritis (RA). A significant number of these indigenous medicinal plants and their phytochemicals reportedly have immunomodulatory, anti-inflammatory, and antioxidant effects in in-vitro and in-vivo models of RA.

Ethnobotanical Studies

Within the African continent, ethnobotanical surveys aimed at documenting indigenous medicinal flora have referred to upwards of 80 species utilized in traditional therapies for rheumatoid arthritis (RA). Such investigations, undertaken within both rural and urban settings, suggest that culturally embedded plant-use traditions underpin these practices. As of 2013, a minimum of 20 indigenous plants had been posited as potential sources of antirheumatic agents. Application of these botanical resources predominantly involved exudate materials (extracted latex, resin, sap, and gum), leaf extracts, root preparations, and bark derivatives [4]. Early efforts in the collection and field identification of medicinal plants began during the colonial period, yet comprehensive cataloguing of African ethnobotanical data remains incomplete. Post-independence of many African states has stimulated renewed ethnobotanical research, culminating in the development of aggregate databases on medicinal plants by both governmental and non-governmental organizations. Such growth has increased the potential for locating and analyzing plants rich in antirheumatic phytochemicals [4, 5].

Phytochemicals and Their Therapeutic Potential

Scientific research has demonstrated that indigenous medicinal plants contain phytochemicals, such as polyphenols, terpenoids, alkaloids, flavonoids, carotenoids, and glycosides, which are responsible for various therapeutic effects [5]. Among these compounds, polyphenols, alkaloids, and carotenoids have attracted considerable interest due to their potential to alleviate or prevent rheumatoid arthritis (RA). By identifying indigenous African medicinal plants rich in polyphenols and other compounds with anti-inflammatory and immunomodulatory properties, researchers might discover candidate treatments for RA. For example, *Aspilia africana* contains phytochemicals that merit further investigation for the development of novel anti-inflammatory therapeutics. A more detailed examination of phytochemical constituents and their mechanisms of action is therefore critical to validate the suitability of these compounds as alternative remedies for RA. The beneficial properties of indigenous medicinal plants are largely due to their phytochemical content, which can be classified as primary or secondary metabolites. Primary metabolites, including proteins, sugars, and amino acids, are directly involved in growth and development, whereas secondary metabolites, such as tannins, alkaloids, flavonoids, and glycosides, serve protective functions. These secondary metabolites have diverse biological activities, ranging from protection against oxidative stress to effects on mammalian hearts and blood circulation. Essentially, secondary metabolites are organic compounds synthesized through various biochemical pathways and fulfill specific functions within the plant. The ability of these natural products to modulate human immune responses underpins their utilization in pharmaceutical formulations. Investigating the chemical constituents of indigenous medicinal plants is thus important for identifying the active antibacterial, antifungal, or other bioactive compounds responsible for their therapeutic use [4, 5].

Types of Phytochemicals

Phytochemicals constitute a broad spectrum of chemical compounds produced by plants that contribute to their distinct flavors and colors [5]. They are classified based on their chemical structures and include phenolics, tannins, flavonoids, and alkaloids as the primary groups of biologically active compounds. Extensive evidence indicates that natural compounds derived from plants have the ability to intercept Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS) linked to rheumatoid arthritis [6]. Phytochemicals such as phenolic antioxidants, including flavonoids, possess significant antioxidant and anti-inflammatory properties, as well as other health-promoting effects. Phytochemicals encompass substances such as flavonoids, tannins, terpenoids, alkaloids, glycosides, essential oils, and steroids. Their therapeutic potential is often associated with antioxidant activity that modulates the metabolism and bioactivity of ROS. Indeed, phytochemicals are active agents that

confer protection against age-related oxidative stress. They may regulate pro- and anti-inflammatory pathways, thereby reducing chronic inflammation, which is a driving force in many diseases [5, 6].

Mechanisms of Action

Current therapies for rheumatoid arthritis include corticosteroids, nonsteroidal anti-inflammatory drugs (NSAIDs), disease-modifying antirheumatic drugs (DMARDs), and nonpharmacological options. Many indigenous African medicinal plants that possess anti-inflammatory and analgesic properties can be classified as NSAIDs based on their mode of action and classification of phytochemicals. Although the primary target of aesculin (a coumarin derivative) and colchicine (an alkaloid) is known, both compounds belong to the group of NSAIDs. Common phytochemical classes such as alkaloids, essential oils, flavonoids, glycosides, phenols, saponins, and tannins exert anti-inflammatory activity due to the presence of one or more NSAIDs functional groups [5]. Various biological anti-rheumatic agents including TNF- α blocking agents, IL-1 receptor antagonists, monoclonal antibodies against B-cells, and IL-6 blockers are used as monotherapy or combined with DMARDs. TNF-blockers have been reported to induce antibodies and lupus-like syndromes [2]. Consequently, patients seek alternative treatments that are effective, less toxic, and reduce pill burden, including herbal therapies based on traditional medicine [2, 5].

Research Methodologies

Field and laboratory work methodologies applied to the collection of plants and screening for phytochemical groups are central to harnessing indigenous knowledge. The rising interest in plant phytochemistry, driven by its diverse applications, has intensified the search for medicinal plants globally. However, despite Africa's rich biodiversity, the continent contributes relatively little to new plant-derived drugs, highlighting an opportunity for deeper exploration. Phytochemicals are chemicals that occur naturally in plants and display several biological activities in humans [2]. RA results from the abnormal regulation of the immune system, making phytochemicals characterized by their antioxidative and anti-inflammatory properties therapeutic against RA symptoms. Orthodoxy has continually insisted on pseudoscientific evidence on the safety and efficacy of plant-based treatment as a pre-condition for accepting them as alternatives for treatment. The first phase would be to determine phytochemical contents in these plants. Categorizing phytochemicals as anti-RA agents should then serve as preliminary evidence in the search for an anti-RA drug, as natural therapies are often used as complementary and supplementary treatment for patients of RA [5].

Field Studies and Plant Collection

The tropical belt of Africa represents a unique geographic area that harbours extensive biodiversity. Its indigenous plants harbor various essential phytochemicals. Local inhabitants have used these plants and related knowledge in traditional medicine for several years. Studies on plants for pharmaceutical development typically begin with the identification and study of plant species known to have beneficial health effects according to folklore. Information describing the therapeutic uses of plants by specific ethnic groups in particular locations over a long period has frequently been explored to provide valuable datasets for the screening and selection of species with potential biological activity. During the last decade, a growing number of ethnobotanical surveys have been published describing medicinal plants used by African indigenous people for treatment of rheumatoid arthritis and related diseases [5,6]. Ethnobotanical studies provide detailed descriptions concerning preparation methods for plant remedies, parts of plants used, and routes of administration for different disease conditions. The local common names of the species, which differ from place to place, are normally reported." Lowland rainforest regions of the eastern Democratic Republic of Congo support a high diversity of plant species. Indigenous communities are living in close proximity with relatively poor living conditions. Knowledge about natural remedies and the collection of non-timber forest products are still very important for subsistence of the local communities. Collections of medicinal plants are, therefore, of great significance to the indigenous community. A number of plants used as treatments for various diseases in four different territories in the Kivu region of the DRC have been identified for further investigation of phytochemical contents [3, 5].

Laboratory Analysis of Phytochemicals

Collected samples of indigenous plants underwent various laboratory-analytical techniques aimed at identifying the bioactive components. Analytical tests comprised qualitative screening and extraction methods for the elucidation of volatile compounds and diverse chemical agents through solvent extraction. The consistently identified phytochemical constituents included alkaloids, flavonoids, glycosides, saponins, steroids, and terpenoids [7].

Case Studies: Indigenous Plants used for Rheumatoid Arthritis

Specific RA-critical phytochemicals present in indigenous African medicinal plants are linked to the plants used and their applications in RA relevant symptoms. This constitutes necessary preliminary information toward identifying medicinal plants in the development of drugs for managing RA in Africa. Phytochemical analyses of

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indigenous plants are also reported. In the literature, a plethora of indigenous medicinal plants and isolated phytochemicals have been reported on for their possible roles in RA therapy [7]. These indigenous African medicinal plants and phytochemicals used for alleviating the symptoms of RA are listed in the table provided further below, together with their traditional application and known RA critical phytochemical(s). The phytochemical constituents of several of the indigenous plants are indicated in the relevant 'known RA critical phytochemical(s)' entry [8]. Ethnobotanical surveys of numerous regions in Africa serve Georgia state south-eastern European, the European Union, the UK, the USA, are a few of the important commercial consumer countries. However, the indigenous knowledge of medicinal plants and its application in healthcare for people in Africa is associated with important aspects [8].

Efficacy and Applications

Piptadeniastrum africanum is rich in compounds possessing anti-inflammatory, antihyperalgesic and anti-arthritic potential [3]. The activities of the plant were evaluated by in vivo study using a model of complete Freund's adjuvant-induced arthritis in rats. The activity of *P. africanum* extracts is strongly justified by their effect on the immune system and their inhibitory properties on the release of pro-inflammatory mediators as observed in the in vitro study. These results support the use of *P. africanum* in traditional treatment against inflammatory diseases including arthritis and classify the plant among potential candidates for the isolation of novel anti-inflammatory and anti-arthritic compounds. Many plants traditionally used to treat malaria and infections contain compounds such as quinones, xanthenes, flavonoids, phytosteroids, saponins, glycosides, terpenes, tannins and other polyphenols that have known therapeutic actions [8]. Plant materials are often readily available, sustainable, and socially acceptable, especially among rural communities. The biological activity of such plants may extend beyond medicine to agricultural uses, for example in the treatment of animals or the protection of crops from bacterial, fungal or parasitic infections. Processed plant products can be used in environmentally friendly agriculture as affordable alternatives to imported pesticides, and providing a complementary route of income for local farmers. Ongoing research is exploring the botanical diversity and chemistry of these natural resources with a view to medical and commercial exploitation. The flavonoid quercetin has been reported to be effective in the treatment of RA because it helps to reduce inflammatory cytokine activity. Other flavonoids reported to alleviate RA symptoms include kaempferol, kaempferol-3-O-glucoside, kaempferitrin, haskap (*Lonicera caerulea* L.), galangin, and epigallocatechin-gallate. The alkaloid piperine, extracted from long pepper (*Piper nigrum*), has demonstrated efficacy in treating RA symptoms in animal models [2]. Inhibition of the nuclear factor kappa-B signaling pathway and a decrease in some pro-inflammatory markers has also been reported for piperine. Anti-RA effects for the alkaloids ellipticine and tetrandrine have also been demonstrated. Studies on terpenoids such as abietic acid, triptolide, and andrographolide show that these phytochemicals display inhibitory activity on the production of synovial inflammatory cytokine proteins. The alkaloids sinomenine and berberine also display anti-RA properties, and a recent study reported that berberine alkaloids suppress experimental arthritis in a rat model. The diterpene triptolide, extracted from *Tripterygium wilfordii*, has immunosuppressive properties that can improve the symptoms of RA [3].

Challenges in Harnessing Indigenous Knowledge

The development of inclusive knowledge-based economies that transcend the exploitation of mineral resources is a key agenda of many African governments. The vast reservoir of indigenous knowledge in Africa presents an opportunity to address this objective by harnessing and commercialising products derived from tropical biodiversity. The cultural history of indigenous knowledge provides a foundation from which to seek indigenous products for the treatment of rheumatoid arthritis (RA) [6]. The protection of local or indigenous knowledge against worldwide broadcasting via modern communication technologies warrants additional concerns. Furthermore, some of the local fauna and flora are endangered and require protection of their genetic makeup through conservation and preservation. RA is a chronic disabling disease affecting people globally. Standard treatment protocols with disease-modifying anti-rheumatic drugs and biological agents compromise the immune system and have an array of side effects. Patients with RA often turn to complementary and alternative therapy. Indigenous Africans have a long history of using medicinal plants to treat various illnesses. Africa possesses a wide range of indigenous medicinal plants that are rich in phytochemical compounds demonstrating therapeutic potential for RA as well as symptoms such as inflammation, pain, and joint swelling. An overview of African indigenous medicinal plants and their phytochemicals with reported potential to treat RA is therefore presented [5].

Intellectual Property Issues

The awareness of the importance of protecting traditional knowledge (TK), which is often transmitted orally and embedded within the traditional social and cultural fabric of its holders, is relatively recent within international circles where intellectual property rights (IPRs) predominate [9]. The interest in protection arises from concerns

that patented inventions on biological resources or traits linked to their use could negatively impact on the livelihoods of indigenous communities. Bioprospecting initiatives within the international community have sought ways of protecting TK as a strategy to minimise exploitation and misappropriation [10]. Although TK is being recognised, protection remains a challenge because TK often lacks attributes relevant for standard IPRs; such protection should be well defined in existing legal frameworks. TK, as is the case with biodiversity, cannot be protected as an isolated phenomenon but through a holistic approach incorporating confidentiality, cultural morals and relationship agreements between repositories or communities and defendants. The particularities of TK, including its oral transmission and the ambiguity as to whether it consists of scientific or objectified knowledge, argue for that this important area must be given special consideration by international legal frameworks if it is to survive and continue to contribute to the global economy.

Conservation Concerns

Many indigenous peoples around the world, including a large majority of Africans, use plants for their healthcare system and still practice traditional medicine despite environmental stress. Several indigenous knowledge systems and languages are no longer applied daily and are thus at risk of extinction. For these to be preserved, they must remain relevant and ideal for a large section of the population. Cultural practices are evolving without the necessary conservation of indigenous knowledge. The role of intellectual property rights frameworks in supporting preservation efforts and protecting indigenous knowledge also needs to be highlighted. The increasing threat of biodiversity loss due to human activities has attracted global attention for preservation [5]. The large-scale disappearance or depletion of plant species is often linked to overexploitation and environmental degradation. Many medicinal plants used in Africa are endangered as a result of overharvesting. The depletion of natural biodiversity has consequently reduced the number of medicinal plants available for the treatment of diseases such as RA. Therefore, there is an urgent need to take proper care of the earth's biodiversity for preservation and sustainable use [10].

Integrating Traditional and Modern Medicine

Studies of Africa's indigenous medicinal plants for rheumatoid arthritis (RA) treatment strongly justify the integration of African indigenous and modern medicine. Collaboration between modern and indigenous-traditional healthcare practitioners and patient educational follow-up on the use of phytochemical-containing plants is a prerequisite. These steps ensure that RA victims derive genuine benefits rather than fall prey to unregulated, profit-making charlatans. Although Africa possesses the richest indigenous medicinal plant biodiversity, scientific validation remains largely unexplored. The presence of phytochemicals such as alkaloids, flavonoids, saponins, tannins, and phenolics in plants with anti-inflammatory properties suggests their potential to alleviate RA symptoms. However, many medicinal herbs with these beneficial phytochemicals have yet to be investigated. Recognizing RA as a long-term progressive inflammatory disease affecting mainly synovial joints, and understanding that no known cure currently exists, emphasizes the value of phytochemical therapy as a potent alternative [1, 10]. This therapeutic development provides much-needed relief for the millions of sufferers in Africa. Protecting intellectual property rights and ensuring the sustainable utilization of medicinal plants would support indigenous plant-driven joint therapy in Africa. These processes necessitate future clinical investigations, validation, and relevant policy development.

Collaboration between practitioners

It is imperative that users of herbal medicine and conventional practitioners work together. Collaboration between herbal and conventional medicine practitioners can help patients make the safest possible choices about their treatment options, especially when choosing either herbal or allopathic medicine as a treatment method. Phytochemical extracts of indigenous African medicinal plants used in the treatment of RA could serve as potential alternative options for RA management, thus reducing the number of RA patients in Africa and the world. As collaboration among members of the culture of a group fulfils a host of needs, the interaction of their worlds of experience makes their subcultures fascinating, and the analysis of their subculture relationships educates people about the various components of culture in the world in which they live [3]. For example, a diverse group of users of the environment in a missionary district depleting a resource causes each species, including that of man himself, to change because of the collision of cultural subclusters in the flux." Communication among indigenous, traditional, and orthodox practitioners is a vital step towards exploiting beneficial indigenous remedies for some of the debilitating chronic illnesses faced by Rwanda and generally by Africans [4]. The indigenous plants reported for the treatment of RA represent a starting point for the search for anti-inflammatory and anti-arthritis drugs. Most of these plants are easily accessible and affordable, making them handy drugs for the increasing number of RA patients who suffer pain and joint deformities due to lack of management. However, the use of these indigenous medicinal plants and phytochemicals is faced with intellectual

property challenges and conservation issues. Proper documentation, clinical trials, and validation of their use as anti-RA agents may alleviate some of the consequent challenges [10].

Patient Education and Awareness

It is crucial for patients to be well-informed about the serious nature of rheumatoid arthritis (RA) and its potential complications. Unawareness of early symptoms, such as morning stiffness and joint swelling, can lead to delays in seeking medical attention [2]. The adoption of indigenous remedies often occurs without a full understanding of the disease's progression, highlighting the need for public education on etiology, diagnosis, and treatment options. Collaboration between biomedical practitioners and traditional healers has established clinics where diagnoses using X-rays, blood tests, and clinical examinations are complemented by treatments based on indigenous knowledge, integrating the two systems [11]. Governments and institutions should provide training for healers and assist patients in recognizing and managing RA. Educating the patient population will facilitate earlier diagnosis, prevent complications, and improve overall health outcomes. Documenting phytochemical efficacy and undertaking clinical trials will support safe application in treatment strategies.

Future Directions in Research

A large number of research initiatives on the anti-RA activities of herbal plants have been reported worldwide. In Africa, phytochemical analyses of some traditional plants have been carried out, revealing a rich presence of phytochemicals that may prevent and manage RA. Nevertheless, documented reports on research concerning the phytochemical contents of indigenous medicinal plants in some African countries remain unpublished. The scarcity of clinical trials and insufficient information on the side effects of these identified phytochemicals against RA pose challenges that cannot be overlooked or downplayed. Clinical trials evaluating the efficacy of indigenous plants reported to alleviate RA symptoms should be considered [10,11]. African governments need to study and implement necessary policies to protect indigenous knowledge systems against exploitation by third parties. Raising public awareness about RA and its risk factors will contribute to reducing its incidence. Collecting indigenous knowledge through interviews with traditional healers is also essential. Indigenous medicinal plants can be sourced and collected in different regions of Africa, with anti-RA phytochemicals identified through phytochemical screening and other analyses, thereby establishing the link between bioactive compounds and their potential to prevent or manage RA more effectively [12].

Clinical Trials and Validation

The therapeutic potential of indigenous medicinal plants and phytochemicals in the treatment of rheumatoid arthritis (RA) remains underexplored, warranting further clinical trials to establish efficacy and safety protocols. Clinical trials for phytochemical-based medicines require validation within the targeted local population to assess effectiveness accurately. There is also a pressing need to move beyond rudimentary bioassays, undertaking thorough characterisation and safety evaluations of plant extracts prior to widespread application. Regulatory bodies play a pivotal role in promoting phytomedicines that possess high efficiency and minimal side effects. Consequently, comprehensive clinical research, safety validation, and supportive policies are imperative to advance RA therapy derived from indigenous African medicinal plants [12].

Policy Implications

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease characterized by inflammation of the synovium; the membrane lining the joints of the skeletal system. It is a progressive deforming condition defined clinically by persistent poly-arthritis. RA manifests as symmetric painful swelling and tenderness of the joints, accompanied by morning stiffness affecting the small joints of the hands and feet. Diagnosis is based on clinical criteria, clinical examination, and the presence of RA factors. Specific laboratory tests assist rapid diagnosis. RA is currently incurable [10, 11]. However, symptoms can be managed and reduced by various conventional therapies, including non-steroidal anti-inflammatory drugs (NSAIDs), steroids, and disease-modifying anti-rheumatic drugs (DMARDs). Research has explored numerous indigenous plants and their phytochemicals for suppression or eradication of symptoms. Collections of such plants have also been conducted in specific areas of the African continent. The widespread use of indigenous plants in modern therapies has implications for scientific research and policy-making. Collaboration among scientists, clinicians, drug makers, and indigenous healers is essential to increase knowledge about these phytochemicals. Patients should be sensitized about the appropriate use of these therapies to avoid side effects. Rigorous clinical trials must be conducted to verify the safety and efficacy of these compounds [12]. Protective frameworks for indigenous knowledge are necessary to prevent appropriation by pharmaceutical companies. Additionally, over-collection of useful plant species poses a threat, underscoring the need for development of cultivation or domestication policies.

CONCLUSION

Rheumatoid arthritis remains a major global health challenge, with existing therapies offering only partial relief and often being inaccessible to patients in low-resource settings such as Africa. Indigenous medicinal plants,

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enriched with bioactive phytochemicals, present a valuable opportunity to complement or provide alternatives to conventional RA treatments. Evidence from traditional practices and emerging pharmacological studies underscores their potential anti-inflammatory, analgesic, and immunomodulatory effects. However, to fully harness these benefits, there is a pressing need for rigorous scientific validation, clinical trials, and the development of standardized formulations. Equally important are conservation measures and policies that protect biodiversity and ensure fair recognition of indigenous knowledge systems. By integrating traditional medicine with modern research, Africa can pioneer sustainable, affordable, and culturally relevant therapies for RA, while also contributing significantly to global innovations in drug discovery.

REFERENCES

1. Dudics S, Langan D, R. Meka R, H. Venkatesha S et al. Natural Products for the Treatment of Autoimmune Arthritis: Their Mechanisms of Action, Targeted Delivery, and Interplay with the Host Microbiome. 2018. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/30111111/)
2. Albeena (Scholar) N, A. (Supervisor) Zargar M, Hamid (Co-Supervisor) A. Exploring the immunomodulatory effects of *Ajuga bracteosa* and *Atropa accuminata* towards understanding of the their Anti-Arthritic potential. 2013. [\[PDF\]](#)
3. Mbiantcha M, Almas J, U. Shabana S, Nida D et al. Anti-arthritic property of crude extracts of *Piptadeniastrum africanum* (Mimosaceae) in complete Freund's adjuvant-induced arthritis in rats. 2017. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/28111111/)
4. D. Stark T, J. Mtui D, B. Balemba O. Ethnopharmacological Survey of Plants Used in the Traditional Treatment of Gastrointestinal Pain, Inflammation and Diarrhea in Africa: Future Perspectives for Integration into Modern Medicine. 2013. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/24111111/)
5. Okello D, Lee J, Kang Y. Ethnopharmacological Potential of *Aspilia africana* for the Treatment of Inflammatory Diseases. 2020. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/32111111/)
6. A. Adebayo S, P. Dzoyem J, J. Shai L, N. Eloff J. The anti-inflammatory and antioxidant activity of 25 plant species used traditionally to treat pain in southern African. 2015. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/26111111/)
7. Leo Elisha I, Dzoyem JP, Joy McGaw L, S. Botha F et al. The anti-arthritic, anti-inflammatory, antioxidant activity and relationships with total phenolics and total flavonoids of nine South African plants used traditionally to treat arthritis. 2016. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/27111111/)
8. Koko Tittikpina N, ECC Ejike C, Castelluci Estevam E, Jawad Nasim M et al. TOGO TO GO: Products And Compounds Derived From Local Plants For The Treatment Of Diseases Endemic In Sub-Saharan Africa. 2015. [\[PDF\]](#)
9. Polycarp Amechi E. Leveraging Traditional Knowledge on the Medicinal Uses of Plants within the Patent System: The Digitisation and Disclosure of Knowledge in South Africa. 2015. [\[PDF\]](#)
10. Agan W. Commercialisation of traditional knowledge in South Africa : whether the existing intellectual property framework encourages commercialisation. 2013. [\[PDF\]](#)
11. N. Lindler B, E. Long K, A. Taylor N, Lei W. Use of Herbal Medications for Treatment of Osteoarthritis and Rheumatoid Arthritis. 2020. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/33111111/)
12. Chopra A, Saluja M, Tillu G, Venugopalan A et al. A Randomized Controlled Exploratory Evaluation of Standardized Ayurvedic Formulations in Symptomatic Osteoarthritis Knees: A Government of India NMITLI Project. 2010. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/20111111/)

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