Perspective

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Pharmacological Functions and Mechanisms of Quercetin Treatment in GA

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Introduction

The deposition of monosodium urate crystals in joints and the tissues surrounding them is the underlying cause of gout, a prevalent and potentially crippling condition characterized by a painful inflammatory arthritis gout flare. Because gout frequently coexists with other chronic conditions like diabetes mellitus and chronic kidney disease, traditional mainstays like allopurinol, colchicine and corticosteroids may not be preferred or may cause side effects in these patients. For drug development and research, it is essential to comprehend the pathophysiology of crystalline-driven inflammation, hyperuricemia and gout. As a result, safe and effective treatments for patients with a wide range of comorbid conditions are being proposed using both new drugs and protocols that combine existing drugs. These tactics, which could be used to treat gout in the future, will be discussed in this review. Quercetin can be found in a wide variety of natural plants, particularly Chinese herbal plants. In China, it has been used for thousands of years to treat arthritis. However, the mechanisms by which quercetin treats gout arthritis remain a mystery. The treatment of GA with quercetin was confirmed and the underlying mechanism was investigated.

Description

Metabolism disorders

Purine metabolism disorders and elevated blood uric acid cause gout, a metabolic disease. Gout flares are characterized by more severe joint pain, stiffness, and swelling than common arthritis. Colchicine, non-steroidal anti-inflammatory drugs, glucocorticoids and adrenocorticotropic hormones are the current clinical treatments for gout flares. Sadly, a number of issues have arisen as a result of these treatments, such as irritability, mood disorders, elevated blood glucose levels, immunosuppression and fluid retention. However, because of the drug's poor therapeutic efficacy, long term treatment is complicated by the requirement for large doses and frequent administration. Gout flare treatment medications that are both safer and more effective are desperately needed. Although GSZD has a positive effect on gout in the clinic at this time, there are few studies that focus on its effectiveness and safety for gout. Typically, rheumatoid arthritis treatment is the focus of GSZD reports. Only one systematic review of the effectiveness of GSZD in the treatment of gout has been published, in which GSZD and chemical drugs were compared on the curative effect and the sample size was small. The Preferred Reporting Items for Systematic reviews and Meta Analyses (PRISMA) reporting checklist was followed during the meta analysis (Supplemental material).

Due to their larger active areas, nano medicines have reduced side effects and dosages for many diseases in recent years. For arthritis, a number of drug delivery systems were utilized, each with improved biosafety and efficacy. Additional anti-phlogistic medications are still involved, despite significant progress. Several nano agents were used directly to reduce uric acid without requiring the use of additional anti-phlogistic medications, but the inflammatory issues were hardly resolved. This nano-medicines limited efficacy may be due to the therapeutic strategies that only focused on lowering uric acid. Utilizing medications that lower uric acid is not recommended during the acute phase of gout flares. It not only has negligible analgesic and anti-inflammatory effects, but it also drops blood uric acid too quickly, encouraging the dissolution of tophi in the joints, which results in the formation of insoluble crystals and worsens inflammation. Treatment to lower uric acid levels cannot be initiated until the acute symptoms have subsided less than two weeks. As a result, we develop a novel treatment for acute gout attacks that, despite the presence of high uric acid symptoms, can still reduce pain and inflammation. Understanding patients' beliefs about their disease, increasing the efficacy of interventions, selecting relevant findings for future research, and setting research priorities in this area all depend on this information. According to the Synopsis of the Golden Chamber, the traditional herbal formula Guizhi Shaoyao Zhimu Decoction (GSZD) has been used for a long time to treat arthralgia.

Clinical manifestations

The mechanism by which quercetin is used to treat GA was discovered through a combination of experiments and network pharmacology. Gout and quercetin have been identified as potential targets. The core targets were then identified and the protein–protein interaction network for the common targets between quercetin and gout was constructed. To better understand the pharmacological functions and mechanisms of

quercetin treatment in GA, gene ontology and Kyoto Encyclopedia of genes and genomes analyses of the common targets were carried out. Finally, a GA-induced monosodium urate-induced rat model was used to verify the network pharmacology predictions. There were 72 common targets found. According to KEGG analysis, the interleukin-17, Tumor Necrosis Factor (TNF), mitogen-activated protein kinase and phosphoinositide 3-kinase-Akt signaling pathways were primarily involved in quercetin treatment of GA. In an experimental validation, quercetin reduced the bone loss and histological lesions caused by inflammation in the ankle joint. It also controlled the release of RAR-related orphan receptor gamma t, IL-17E, IL-1, IL-6, TNF-, Foxp3, and transforming growth factor-beta. It also reduced the expression of IL-6, IL-17A, and IL-17F in the IL-17 pathway. Among the published research papers, there are few studies on GSZD in the treatment of gout. More studies on how to treat gout with modified GSZD and other treatments like chemical drugs, TCM external treatment, and TCM nursing were included in this meta-analysis.

Conclusion

The findings as a whole point to quercetin as an effective alternative treatment for GA. Due to a persistent excess of uric acid in the blood, the disease known as gout is characterized by the accumulation of monosodium urate crystals. The inflammatory response to these crystals is the primary cause of its clinical manifestations. Due to changes in diet and other habits and an increase in life expectancy, its prevalence and incidence are rising. Gout and its comorbidities have a significant impact on individuals, families and the psychosocial world. It leads to significant disability, pain, an increase in healthcare utilization and a decline in quality of life. Even though there is a treatment that works, the way it is handled is bad. While some professionals report under diagnosis and inadequate antihypertensive dosages, others describe it as a minor health issue with good treatment adherence and response. Some patients say they don't know much about the disease, it's hard to change their lifestyle and long term treatment isn't working or they don't stick with it. Outcome measures in rheumatology clinical trial an international initiative of health professionals, was established to promote the incorporation of patients' perceptions and experiences and their active participation in rheumatology research decisions in order to improve the treatment of musculoskeletal issues. Its OMERACT 2.0 program aims to ensure that patient relevant aspects are identified by outcome measures from clinical trials and observational studies. Gout sufferers' experiences can be better understood through qualitative research. However, despite the fact that numerous studies have been carried out in various contexts we have not discovered any in our setting.