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Application of therapeutic nutrition for controlling gout: An overview

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Abstract

Adding such ingredients in food items increases their nutritional value, texture, and other sensory properties. Although fruits and vegetables waste have a great potential, there are still some concerns such as variability of raw materials, processing intensification and acceptability by the consumers. For their successful implementation into the market, it is crucial to set proper regulatory frameworks and to secure food safety. This review also shows evidence that interdisciplinary approaches are crucial to improve the valorization of agricultural waste specifically fruits and vegetables. Converting these wastes into high performance functional materials aids in the environmental cause of strengthening the development of healthy and green food systems.

Keywords: Gout, hyperuricemia, therapeutic interventions, inflammatory arthritis, non-pharmacological

Introduction

Gout is defined as the result of various factors including genes, culture, diet and way of living among others. Out of these, a history of poor nutrition tends to be always highlighted as the underlying cause of High Uric Acid (HUA) levels and consequent linkage to gout (Qi *et al*, 2024) ^[12]. Similarly, the results of the study add weight to other reports that ingestion of certain types of food and drinks lead to increase levels of uric acid which causes the deposition of urate crystals. Gout is highly prevalent in advanced nations of the world owing to poor diets and lifestyle choices, which have been the primary reasons for the high slopes of prevalence curves (Dalbeth *et al*, 2021 and Sur *et al*, 2024) ^[5, 4]. In most of the cases the disorder will start with sudden flares of inflammation in the joints which in case is left unchecked may go to the stage of chronic tophaceous gout. To be able to effectively manage this disease the aim should always be to reduce serum urate levels so as to avoid the chances of flaring up and future distress. In this paper, clinical techniques for treatment and some advances in the field of diagnosis and management of gout are discussed.

Pathophysiology of gout

Gout is a metabolic disorder characterized by hyperuricemia, leading to the deposition of Monosodium Urate (MSU) crystals in joints and surrounding tissues, triggering inflammation and acute arthritis (Ragab *et al.*, 2017) ^[13]. The pathogenesis begins with an overproduction or underexcretion of uric acid, often influenced by genetic predisposition, lifestyle factors, and comorbidities such as obesity, hypertension, and renal impairment. MSU crystals activate the NLRP3 inflammasome in macrophages, promoting the release of pro-inflammatory cytokines like interleukin-1 β (IL-1 β), which orchestrates the acute inflammatory response. Persistent hyperuricemia contributes to chronic tophaceous gout, joint damage, and reduced mobility if untreated (Dalbeth *et al.*, 2016) ^[6].

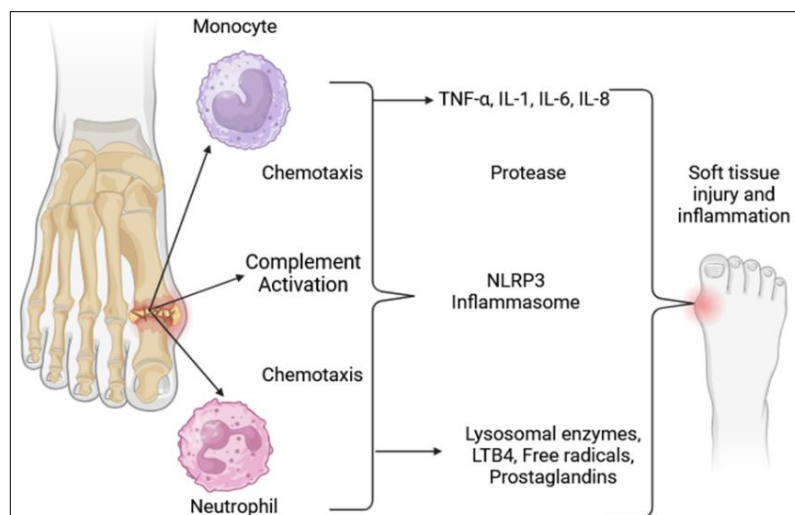


Fig 1: Pathophysiology of Gouty Arthritis inflammation. (IL-1: Interleukin 1, IL-6: Interleukin 6, IL-8: Interleukin 8, LTB4: Leukotriene B4, NLRP3: Nod-like receptor protein 3, TNF-α: tumor necrosis factor-α) (Patil *et al.*, 2021) ^[10].

Pharmacological interventions

1. Xanthine oxidase inhibitors allopurinol and febuxostat are pointed out as the mainstay of therapy for patients with gout. The main challenge posed by allopurinol, the first line is the gradual titration of dose to reduce urate levels while eliminating our risk of hypersensitivity (Stamp *et al.*, 2016) ^[16]. Febuxostat has been utilized in the patients who are intolerant to allopurinol, however, the patients having cardiovascular risk factors need careful evaluation for admitting such a drug (White *et al.*, 2018) ^[18].
2. Uricosuric agents uricosuric agents like probenecid promotes the urate excretion through kidney. These especially help those patients who are underexcretors of uric acid but should not be prescribed to those with renal impairment (Perez-Ruiz *et al.*, 2020) ^[11]. Recent researches have shown the emerging role of lesinurad a selective urate reabsorption drug as an adjunctive agent in the management of resistant cases (Saag *et al.*, 2017) ^[14].
3. Anti-inflammatory medications nonsteroidal anti-inflammatory drugs, corticosteroids, or colchicine are used to treat acute attacks, while NSAIDs are prescribed to bolster therapy. Colchicine, a conventional remedy, can work by preventing the polymerisation of microtubules. One important factor that should be remembered is the fact that it has a small therapeutic window and that precision dosing should be undertaken (Terkeltaub *et al.*, 2019) ^[17].
4. Biologic therapies sinon the two IL-1 inhibitors anakinra and canakinumab biopharmaceuticals emerge as favorable targeted therapy alternatives for patients

with refractory or intolerant gout. These therapies have shown efficacy in reducing inflammation during acute episodes but are limited by cost and accessibility (So *et al.*, 2018) ^[15].

Non-pharmacological approaches

1. Dietary interventions the management of gout throughout history has mainly relied on the advice of the individual not to adopt a diet rich in purines along with a reduction in fructose and alcohol intake. The evidence shows some effectiveness of adopting a Mediterranean diet and the consumption of low fat dairy products in urate lowering (Choi *et al.*, 2020) ^[3].
2. Weight management and physical activity given the impact of obesity as a risk factor for most of the disease prevalence's gout included increased body weight through consumption reduction and habituation of workouts is correlated with decreased serum urate levels and less frequent flare up of gout (Dessein *et al.*, 2017) ^[8].
3. Emerging therapies pegloticase is uric acid specific enzyme therapeutic that in nutshell converts uric acid into uricase that has come up in current therapeutic option for gout treatment. They remain effective in cases that are chronic and severe but barriers to adoption are immunogenicity and price Becker *et al.*, (2019) ^[2]. This research will provide blueprints for the next generation of agents that target multiple urate transporters and pathways that contribute to crystal formation and ultimately help in regaining complete control over gout.

Table 1: Summary of Therapeutic Nutrition Approaches for Controlling Gout

Nutritional Approach	Mechanism	Outcomes	Citation
Low-purine diet	Reduces purine intake, lowering uric acid production	Significant reduction in serum uric acid levels	(Dalbeth <i>et al.</i> , 2020) ^[7]
Dairy intake	Increases renal uric acid excretion	Decreased gout flares	(Choi <i>et al.</i> , 2016) ^[20]
Vitamin C supplementation	Promotes uric acid excretion by the kidneys	Lowered serum uric acid concentration	(Juraschek <i>et al.</i> , 2021) ^[21]
Mediterranean diet	Anti-inflammatory and antioxidant effects	Improved overall gout management	(Barrea <i>et al.</i> , 2020) ^[21]
Alcohol restriction	Limits alcohol-related uric acid overproduction	Reduced frequency of gout attacks	(Zhang <i>et al.</i> , 2019) ^[19]

Conclusion

The therapeutic management of gout has changed profoundly paving way to a good management of both acute attacks and chronic disease. While available drugs will always be the focus, adding correct life-style changes and novel therapeutic agents will improve the outcome. There should be an emphasis on improving availability of more advanced therapies and reiterating the gout mechanisms of pathology to devise gout-oriented therapies.

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