



## Comprehensive Nursing Management of Non-Tophaceous Gout in a 30-Year-Old Male with Vitamin D Deficiency: A Case Study

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### ABSTRACT

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**Background:** Gout, an inflammatory arthritis linked to hyperuricemia, primarily affects older people. This study highlights the overlooked impact of vitamin D deficiency on urate-lowering therapy in younger patients diagnosed with gout.

**Objective:** The objective of this study is to discuss comprehensive nursing management of a 30-year-old patient with vitamin D deficiency who was diagnosed with non-tophaceous gout in primary care.

**Methods:** The case presentation involves a 30-year-old patient who presented to the GP with symptoms of gout. An x-ray ruled out a fracture, which was the patient's primary suspicion after slipping downstairs drunk. Serum uric acid levels were highly elevated, and he was prescribed urate-lowering therapy comprising allopurinol, prednisolone, and naproxen. The patient's symptoms did not improve over time, as flare-ups were frequent, even in the absence of a restricted diet and alcohol intake. On follow-up, the nurse discovered the patient's vitamin D deficiency. The patient was prescribed vitamin D supplements alongside urate-lowering therapy.

**Results:** Following combined treatment with vitamin D supplements and urate-lowering therapy, serum uric acid levels reduced significantly, achieving <6 mg/dL. During the eight-month follow-up, the patient only experienced a minor episode of a flare once.

**Conclusion:** This case study demonstrates the importance of assessing vitamin D deficiency in gout patients, especially the younger ones. Addressing vitamin D deficiency, if present, together with the administration of standard urate-lowering therapy, can improve outcomes and the frequency of flare-ups in gout patients.

### KEYWORDS:

Gout, nurse-led management, vitamin D deficiency

### BACKGROUND

Gout is inflammatory arthritis caused by hyperuricemia and the crystallization of uric acids in and around joints, triggering an immune response leading to swelling, pain, and stiffness in that joint(s) (Fenando et al., 2024). The global prevalence of gout is estimated to be approximately 2%, and together with incidence, they are predicted to continue to increase significantly in the future due to the aging world (Dehlin et al., 2020; He et al., 2023). Gout is common in individuals born as male and older people (Choi & Stone, 2023; Singh & Gaffo, 2020). As a result, most

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studies focus on managing gout in older people with little emphasis on younger people (Abhishek, 2017; Day et al., 2019). Younger people may often present with gout uniquely, presenting management challenges. In Europe and Britain, gout management guidelines encourage the prescription of urate-lowering drugs (ULDs), corticosteroids, and NSAIDs (Russell et al., 2022). Although this approach is well supported in the literature with high-quality studies, sometimes patients may become unresponsive to treatment, leading to suboptimal achievement of desired patient outcomes (Borghi & Perez-Ruiz, 2016). Such is the case when a gout patient also has Vitamin D deficiency and insufficiency. If patients are unresponsive to ULD, they may end up unnecessarily taking it for a long time, leading to adverse effects.

Vitamin D deficiency and insufficiency have been linked to elevated levels of serum uric acid (Charoenngam et

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al., 2020; Peng et al., 2013). However, most of these correlational studies do not provide sufficient insights into the causal relationship between the two variables. Vitamin D is a steroid hormone commonly known for regulating the normal homeostasis of calcium and phosphorus (Anderson et al., 2012). The sources of Vitamin D include dietary intake and endogenous synthesis by the skin (Benedik, 2022). Globally, vitamin D deficiency (<30 nmol/L serum concentration) affects approximately 18% of the population (Cui et al., 2023; Roth et al., 2018). Therefore, Vitamin D deficiency is crucial for comprehensive nursing management of gout due to its association with gout (Han et al., 2022).

This case study demonstrates how addressing vitamin D deficiency in a 30-year-old male patient diagnosed with gout improved outcomes and responsiveness to ULD.

### **CASE PRESENTATION**

A 30-year-old African male presented to a primary healthcare center with pain in his right big toe. The toe was swollen, tender, and warm. The pain began after he had approximately 20 beers and roast/marinated beef at a nightclub, where he also slipped downstairs. He previously experienced mild, transient pain in his right foot after drinking, which he attributed to ankle twisting, and did not seek medical treatment. This time, the pain persisted for two weeks, prompting him to visit a GP. Over-the-counter pain relief provided only modest relief, and the pain worsened after discontinuation.

The GP noted a maternal uncle with tophus gout, who frequently drank large amounts of alcohol and experienced flare-ups managed with medication. The patient had no other close family members with autoimmune diseases or gout. He was overweight, with a BMI of 29.6 (99 kg, 183 cm), and engaged in binge drinking and frequent red meat consumption. An x-ray ruled out fractures, and a lab test revealed elevated serum uric acid at 11.5 mg/dL. The GP suspected gout, prescribed allopurinol, prednisolone, and naproxen, and scheduled a follow-up.

After one week, the patient reported no swelling, tenderness, or warmth, and his uric acid level decreased to 8.1 mg/dL. The GP referred him to a nurse for education and follow-up, aiming for uric acid levels below 6 mg/dL. Four days later, symptoms recurred. The nurse advised reducing alcohol and meat consumption, but the patient consumed a small amount of meat and four beers, leading to another flare-up. The GP recommended stopping these items for several months and resuming only in minimal amounts after stabilization.

During follow-up, the nurse found that symptoms returned despite avoiding alcohol and meat. Further assessment revealed limited sunlight exposure, prompting a Vitamin D test, which showed deficiency (18.4 ng/mL). The nurse recommended daily sunlight exposure for 30 minutes, and the GP prescribed Vitamin D supplements. The patient

adhered to the therapy and experienced a single flare-up after consuming a large fish. Over eight months of follow-up, he remained flare-up-free, with consistently low uric acid levels, meeting therapeutic goals.

### **DISCUSSION AND CONCLUSION**

This is the first case study to discuss the comprehensive nursing management of a young male adult diagnosed with gout. The main takeaway from the case study is that as a nurse, it is always important to take patient history while considering the possibility of vitamin D deficiency. Young adults diagnosed with gout with vitamin D deficiency can be supplemented with vitamin D to resolve symptoms by lowering uric acid levels. These observations are consistent with various high-quality studies linking vitamin D deficiency and hyperuricemia (Charoenngam et al., 2020; Nimitphong et al., 2021; Zhang et al., 2020). In their research, Nimitphong et al. (2021) randomized seventy-one prediabetic and gout patients to three groups: vitamin D2, vitamin D3, and control. After 12 weeks, they noted that patients in vitamin D supplementation groups recorded significantly lower uric acid levels in blood compared to baseline, but no significant change was observed in the control group. Such findings are congruent with the case study findings that the patient's serum uric acid levels reduced significantly after interventions to address vitamin D deficiency. Upon taking the patient's comprehensive history, the nurse realized that the patient works from home (remotely) and rarely gets exposure to sunlight for a prolonged period, which might be the cause of his vitamin D deficiency. The practical implications are discussed below.

### **PRACTICAL IMPLICATIONS**

High-quality studies have consistently pointed out that nurse-led management of gout can result in better outcomes than GP-led treatment (Doherty et al., 2018; Fuller et al., 2019). Indeed, the nurse's involvement in patient management revealed important information that enhanced outcomes. Therefore, in the comprehensive nursing management of gout patients, especially young adults, gathering any information that might necessitate the need for testing for vitamin D deficiency is always recommended. Most studies on nurse-led gout management often focus on patient education and administration of urate-lowering therapy as the GP prescribes. However, sometimes, when there are unique cases, such as those of the patient in this case study, clinical reasoning by the nurse is used to improve outcomes. Patient education should also include dietary interventions that include increasing vitamin D intake and regular exposure to sunlight.

### **RECOMMENDATIONS FOR FUTURE RESEARCH**

Although studies have linked vitamin D deficiency to hyperuricemia, there is little evidence regarding the nature

of the association. The molecular and physiological mechanisms involved can significantly improve our knowledge of gout management. Future research should also investigate the long-term effects of vitamin D supplementation in gout management, particularly in patients resistant to typical urate-lowering therapy. Finally, there is a need to assess the cost-effectiveness and clinical utility of vitamin D deficiency screening in patients who present to primary care with gout symptoms, especially in populations at higher risk for both conditions. Findings from such studies can inform the development of guidelines for integrated care.

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