

## Correspondence

# Increase in urolithiasis prevalence due to vitamins C and D supplementation during the COVID-19 pandemic

Dear Editor,

The Coronavirus disease (COVID-19) pandemic has made significant impact on the population's health and well-being. This was highlighted by Bell *et al.* who have shown that most people engaged in healthier behaviors during the pandemic.<sup>1</sup> We recently noted a significant increase both in the incidence of stone disease and in the stone sizes in the emergency departments and in our clinics, although there was usually a slight decrease in urolithiasis incidence during this season. This increase in urolithiasis cases is similar to the 'wave' of kidney stones we witness usually in summer days. We think that the massive supplementation of the vitamins C and D during the COVID-19 era, as a part of this so-called 'healthier behavior', could have played a significant role in that 'epidemic' of stone disease. Vitamins C and D are known to be potential lithogenic molecules.

First, vitamin C is used for its antioxidative properties and functioning of immune system. Oxalate is an end product of the metabolism of vitamin C. Circulating ascorbic acid is converted into an antioxidant in the tissues, resulting in the formation of ascorbyl radicals. Those radicals will then be converted to dehydroascorbate, which can be converted to diketogulonic acid, an unstable molecule that can easily break down to oxalate.<sup>2</sup> The increase in the ingestion of ascorbic acid leads to excessive formation of oxalate. Small rise in urinary oxalate can increase the risk of calcium oxalate crystal formation, and higher levels of urinary oxalate are a major risk factor for the formation of calcium oxalate kidney stones.<sup>3</sup>

Vitamin D regulates the calcium–phosphorus homeostasis and is also required for the immune system function. The active form of vitamin D, calcitriol, is the main factor responsible for the intestinal absorption of calcium. Vitamin D supplements are activated as 25-hydroxyvitamin D in the liver and then as calcitriol in the kidney. Calcitriol decreases parathyroid hormone (PTH) synthesis, subsequently increasing the excretion of calcium into urine (PTH increases the calcium

absorption in the distal tubular kidney cells).<sup>4</sup> Hypercalciuria is known also to increase the risk of urolithiasis.<sup>4</sup>

Therefore, supplementation with vitamins C and D, although maybe beneficial for the management of COVID-19, is not without risk. These molecules should be used with caution, particularly in prior stone formers. Physicians should be responsible for understanding the impact that potential treatments of COVID-19 could have on common pathologies within their scope of practice.

### Authors' Contributions

A.K., G.M. and F.A. were in charge of conceptualization. A.K., G.M. and H.Y. were responsible for writing—first draft. A.K., G.M., H.Y. and F.A. took care of writing—review and editing.

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### Conflict of Interest

All the authors have no conflicts of interest to disclose.

### Data Availability Statement

No new data were generated or analyzed in support of this research.

### References

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4 Letavernier E, Daudon M. Vitamin D, hypercalciuria and kidney stones. *Nutrients* 2018 Mar;**10**(3):366.

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