WHITEPAPER

Vitamin D: is it part of the toolbox for Covid-19?

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Introduction

Vitamin D, which is well known for its classic role in the maintenance of bone mineral density and prevention of rickets and osteomalacia, is now increasingly studied for its extra-skeletal roles. In the context of COVID-19, the influence of vitamin D on immune function, including its impact on the inflammatory cascade, has been the subject of intensive research interest. Studies indicate that low vitamin D blood levels are linked with increased risk of respiratory tract infections, including COVID-19; small uncontrolled studies evaluating the potential role of vitamin D supplementation in reducing the risk of COVID-19 show promise, although large, well-controlled clinical trials are needed. Many governments recommend vitamin D supplementation to prevent the low blood levels, which are common in the context of current lifestyles and the COVID-19 pandemic where a majority of time is spent indoors. In the UK, the recommendation in all four countries is that everyone should consider taking a supplement providing 10 micrograms daily of vitamin D.

About the author

Dr Pamela Mason qualified as a pharmacist before completing an MSc and PhD in nutrition, and later a second MSc in food policy. Pam is Editor of the Pharmaceutical Press publication, Dietary Supplements – on top of this, Pam has authored three additional books, designed teaching programmes, and written over 300 articles in this topic area.

What is the role of Vitamin D in immune function?

Vitamin D receptors are present in immune cells such as T and B cells, and evidence suggests that immune cells also possess the enzymes that can convert vitamin D to its biologically active form – calcitriol or 1,25-dihydroxyvitamin D3 (Martens et al, 2020; Sassi et al, 2018). As such, vitamin D has a potential role in regulating both types of immune function (i.e., innate and acquired immunity).

The mechanisms of action for the effect of vitamin D on immune function are complex. Vitamin D improves epithelial integrity, promotes the microbial killing activity of innate immune cells through inducing release of antimicrobial proteins, such as cathelicidins and defensins, and is also reported to help contribute to a healthy gut microbiota. It reduces production of pro-inflammatory cytokines and increases activity of anti-inflammatory cytokines, and appears to have a role in macrophage production (Calder, 2020; Calder et al, 2020). Based on findings from nonclinical studies, vitamin D is thought to make it harder for an antigen to trigger an inflammatory response whilst making it easier to turn off the inflammatory cascade once initiated (Lang, Aspinall 2015).

How do we obtain Vitamin D?

Vitamin D can be classified as a steroid hormone. Subcutaneous production in human skin from 7-dehydrocholesterol due to exposure to ultraviolet B rays (UVB; 280–315 nm range) from sunlight is the main source of vitamin D for humans. Exposure of the hands, face and arms (or 10% of the skin) for 20 minutes (from April to September in northern countries) contributes to increasing vitamin D (25-hydroxy vitamin D) concentrations in the blood. A longer duration of exposure increases the risk of skin burning.

Vitamin D can be obtained from the diet and dietary supplements. However, dietary sources are few and include oily fish (e.g. sardines, salmon, tuna), eggs, full fat dairy produce, liver, and some fortified foods (e.g. fortified breakfast cereals, spreads, and plant-based milk-type drinks). Average intake of vitamin D from food in the UK is 2.7 micrograms daily (27% of the amount recommended by UK governments (10 micrograms)). Vitamin D is also found in vitamin D supplements, multi-vitamin/mineral supplements and fish liver oils.

VITAMIN D SOURCES

Sunshine
Exposure of the hands, face and arms (or 10% of the skin) for 20 minutes (April - September in northern countries)

Diet
Includes: oily fish, eggs, full fat dairy produce, liver and fortified foods

Supplements
Includes: vitamin D supplements, multi-vitamin/mineral supplements and fish liver oils