

The Role of Vitamin D on Sport Performance in Athletes

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Summary:

Vitamin D deficiency is pandemic across the world. It has well known impacts on calcium metabolism and bone health, but increasingly recognized associations with chronic health problems such as bowel and colonic cancer, arthritis, diabetes and cardiovascular disease. The last decade has seen a dramatic increase in general interest in and research into vitamin D, with many athletes now taking vitamin D supplements as part of their everyday dietary regimen. Athletes have the same predisposition to low levels of vitamin D, the majority of its concentrations being below 20 ng/mL in a wide range of sports, especially in the winter months. In recent years in the Sports Medicine literature, there has been an increased focus on the potential impact that inadequate Vitamin D levels may have on athletic performance. The most recognized role of vitamin D is its regulation of calcium homeostasis; there is a strong relationship between vitamin D and bone health in non-athletic individuals. In contrast, data have consistently failed to demonstrate any relationship between serum 25[OH]D and bone health, which may in part be due to the osteogenic stimulus of exercise. Muscle structure and function is recognised to play a key role in athletic performance, and both cross-sectional and longitudinal studies allude to a functional role for Vitamin D in muscle. The identification of the Vitamin D receptor in muscle tissue provides a direct pathway for Vitamin D to impact upon Skeletal Muscle structure and function. Vitamin D may interact with extra-skeletal tissues such as muscle and the immune system to modulate recovery from damaging exercise and infection risk. Vitamin D is important in bone health, but recent research also points out its essential role in extraskelatal functions, including skeletal muscle growth, immune and cardiopulmonary functions and inflammatory modulation, which influence athletic performance. Vitamin D can also interact with extraskelatal tissues to modulate injury recovery and also influence the risk of infection. Given that many athletes now engage in supplementation, often consuming extreme doses of vitamin D, it is important to assess whether excessive vitamin D can be detrimental to health. It has been argued that toxic effects only occur when serum 25[OH]D concentrations are greater than 180 nmol/L. There is a paradoxical relationship between serum 25[OH]D concentration, ethnicity, and markers of bone health: Black athletes often present with low serum 25[OH]D without physiological consequences. One explanation for this could be genetic differences in vitamin D binding protein due to ethnicity, resulting in greater concentrations of bioavailable (or free) vitamin D in some ethnic groups. The purpose of this review is to describe the latest research conducted on the epidemiology of vitamin D deficiency and its effects on sports performance and musculoskeletal health.

Keywords: vitamin D, sport performance, 25(OH)D, supplementation, athletes