

Effect of vitamin D supplementation on upper and lower limb muscle strength and muscle power in athletes: A meta-analysis.

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[Abstract](#)

BACKGROUND:

Vitamin D may play a role in skeletal muscle because of the discovery of VDR in skeletal muscle. However, vitamin D deficiency is a global problem, including athletes. Studies examining the effect of vitamin D supplementation on muscle function in athletes have inconsistent results. Therefore, we aimed to quantitatively summarize the evidence for the effect of vitamin D supplementation on skeletal muscle strength and explosive power of athletes using a meta-analysis.

METHODS:

PubMed, EMBASE, Cochrane Library, and Web of Science were searched for studies to identify randomized controlled trials or controlled trials meeting the inclusion criteria. By a meta-analysis, effect sizes (standardized mean differences, SMD) with 95% confidence intervals (CI) was calculated to compare reported outcomes across studies, I² index was used to assessing heterogeneity, and heterogeneity factors were identified by regression analysis. The potential publication and sensitivity analyses were also assessed.

RESULTS:

Eight RCTs involving 284 athletes were included. The protocols used to evaluate the muscle strength of athletes were inconsistent across the included studies, and muscle explosive power was assessed via vertical jump tests. The results indicated that vitamin D supplementation had no impact on overall muscle strength outcomes (SMD 0.05, 95% CI: -0.39 to 0.48, $p = 0.84$). In subgroup analysis, vitamin D supplementation had an effect on lower-limb muscle strength (SMD 0.55, 95% CI: 0.12 to 0.98, $p = 0.01$) but not upper-limb muscle strength (SMD -0.19, 95% CI: -0.73 to 0.36, $p = 0.50$) or muscle explosive power (SMD 0.05, 95% CI: -0.24 to 0.34, $p = 0.73$). Vitamin D supplementation was more effective for athletes trained indoors (SMD 0.48, 95% CI: 0.06 to 0.90, $p = 0.02$).

CONCLUSIONS:

Vitamin D supplementation positively affected lower limb muscle strength in athletes, but not upper limb muscle strength or muscle power. Different muscle groups and functions may respond differently to vitamin D supplementation. Additional studies should focus on determining the appropriate vitamin D supplementation methods and optimal serum 25(OH)D levels for athletes.

REGISTRATION:

The protocol for our study is registered in the international prospective register of systematic reviews (PROSPERO registration number CRD42016045872).

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