

Serum 25-Hydroxyvitamin D Status and Anaerobic Performance in Female Collegiate Basketball Players

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INTRODUCTION

- Professional athletes with adequate vitamin D status jumped higher and sprinted faster than those with insufficient status [$<50\text{nmol/L}$]¹
- The incidence of deficiency varies throughout the year, with rates increasing from 12% in the fall to 63% in the winter²
- This seasonal dip may adversely affect skeletal muscle function and performance

PURPOSE: To evaluate serum vitamin D [25(OH)D₃] status and anaerobic performance in collegiate female basketball players and verify whether 2000 IU/daily vitamin D₃ is sufficient to maintain optimal 25(OH)D₃ levels during the winter months

METHODS

- CSB/SJU IRB approval was obtained prior to testing
- 15 varsity female collegiate basketball players volunteered to participate in the double blind, placebo-controlled investigation. One subject was excluded from data analysis due to problems with supplementation compliance (age = 19.7 ± 1.4 y)
- Subjects were randomly divided into two groups: 1) 2000 I.U. vitamin D₃/daily or 2) 100 I.U. vitamin E/daily (i.e. placebo)
- Supplements were consumed for 60 days
- Health questionnaires, T drill sprint tests, and vertical jumps were completed pre- and post-supplementation
- Serum vitamin D concentrations were measured pre- and post-supplementation using an using a 25(OH)D₃ ELISA assay
- SPSS t-tests were used for statistical analysis of data; Vitamin D deficiency was defined in accordance with the Endocrine Society guideline for inadequacy ($<75\text{ nmol/L}$)

Table 1. Endocrine Society vitamin D concentration classifications

Serum 25(OH)D (nmol/L)	Status
< 50	Deficient
50-75	Insufficient
75-125	Optimal

RESULTS

Table 2. Serum vitamin D₃ status and anaerobic performance changes over 60 day supplementation period (mean \pm SD)

	Placebo group (n=7)	2000 IU vitamin D ₃ /day (n=7)
25(OH)D₃ (nmol/L)		
Baseline	66.9 \pm 26.5	67.9 \pm 24.2
Final	56.7 \pm 26.5	79.0 \pm 18.2*
Vitamin D Sufficient (%)		
Baseline	42.9	14.3
Final	42.9	57.1*
T Drill Agility Test (s)		
Baseline	11.3 \pm 0.7	11.6 \pm 1.1
Final	11.4 \pm 0.3	11.1 \pm 0.6
Vertical Jump (cm)		
Baseline	47.3 \pm 6.7	47.8 \pm 6.6
Final	48.2 \pm 6.2	48.8 \pm 6.2
Power (W)		
Baseline	4086.5 \pm 438.4	4033.3 \pm 531.6
Final	4112.8 \pm 476.3	4094.9 \pm 497.9

* $p < 0.05$

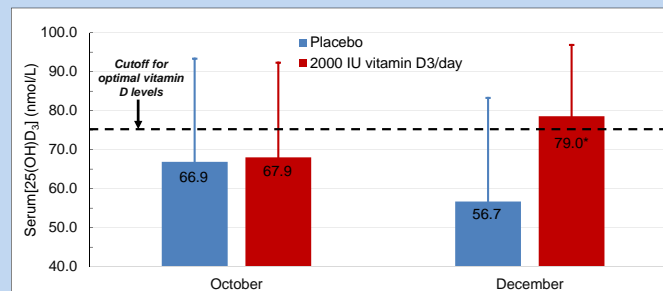


Figure 1. Changes in serum 25(OH)D₃ (nmol/L) following 60-day supplementation



Figure 2. Just Jump mat vertical jump

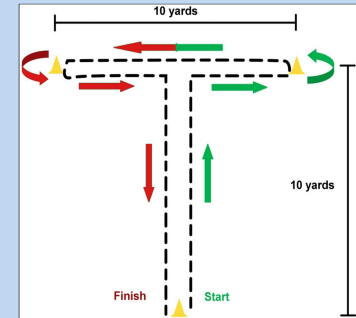


Figure 3. T drill agility test diagram

CONCLUSIONS

CONCLUSION: Daily supplementation of 2000 IU vitamin D₃ over a 60-day period increased serum 25(OH)D₃, but the elevated vitamin D status did not improve our chosen measures of anaerobic performance in collegiate female basketball players.

- 72% of participants were either vitamin D deficient or insufficient in October (28.5% and 43%, respectively).
- Compliance:** 64% of subjects reported taking their supplements 5-7 days/week; 29% complied 3-5 days/week; and 7% reported 1-3 days/week
- Vitamin D supplementation did not appear to make a difference on anaerobic performance, which may indicate that a chronic deficiency of vitamin D or a more severe deficiency is needed to adversely affect muscle function.

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¹Close, G.L., Russell, J., Cobley, J.N., Owens, D.J., Wilson, G., Gregson, W., Fraser, W.D. & Morton, J.P. (2013). Assessment of vitamin D concentration in non-supplemented professional athletes and healthy adults during the winter months in the UK: implications for skeletal muscle function. *Journal of Sports Sciences*. 31(4): 344-353. doi: 10.1080/02640414.2012.733822

²Halliday, T.M., Peterson, N.J., Thomas, J.J., Kleppinger, B.W., Larson-Meyer, D.E. (2011). Vitamin D status relative to diet, lifestyle, injury, and illness in college athletes. *Medicine and Science in Sports and Exercise*. 43(2): 335-43. doi: 10.1249/MSS.0b013e3181eb9d4d.