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THE EFFECT OF PHYSICAL EFFORT ON TOTAL- AND FREE FRACTION OF HYDROXYVITAMIN D IN THE NATIONAL TEAM MALE TRIATHLETES.

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INTRODUCTION:

The standard indicator of vitamin D status is a total 25(OH)D concentration in the blood. Approximately 0.03% of this metabolite is the free form and remaining amount is bounded, mainly to vitamin D binding protein (VDBP). The major biologic function of VDBP is the regulation of both fractions of 25(OH)D in blood and the relationship between them [1,2]. Because only free fraction is able to exert their biological effects, it was hypothesized that this unbound form may be a better marker of vitamin D status than the classic measurement of a total 25(OH)D [1]. Recently, determination of free 25(OH)D has also been proposed in physically active subjects [3]; however its usefulness in different physiological and pathological conditions has yet to be unequivocally confirmed in scientific studies [1,2].

The study aimed to investigate the direct effects of single, acute, and non-accustomed physical effort on serum of total- and free 25(OH)D concentration in male athletes.

METHODS:

The study included 12 triathletes (members of the national team), aged 18.6 ± 2.1 years. They underwent maximal oxygen consumption (VO₂max) test on a treadmill, and (1-3 days later) a 30-minute run (at 50% VO₂max) on a 1.5-degree downhill treadmill (with an eccentric component), followed immediately by 3 x 3-min sprints at 100% VO₂max intensity, with a 1-min rests between them. Capillary blood was collected before, and 15 min, 3 and 24 hours after the exercise. The concentration of total- and free 25(OH)D (ELISA, DiaSource), VDBP (polyclonal antibodies ELISA, Immuniq), high sensitivity c-reactive protein (hsCRP - immunoturbidimetry, Roche), TNF-alfa (ELISA, R&D Systems) as well as phosphocreatine kinase activity (CK - enzymatic method, Roche), were determined. All post-exercise results were corrected for changes in plasma volume. Friedman's ANOVA with Dunn Bonferroni post-hoc test was used in the statistical analysis of the data.

RESULTS:

Despite the lack of changes in hsCRP, significant post-exercise increase in CK activity in 3 and 24 h ($p < 0.001$) and TNF-alfa ($p = 0.005$) and VDBP ($p = 0.002$) concentrations in 15 min were observed. Furthermore, the subjective severe muscle soreness the next morning was reported. At the same time, there were no significant post-exercise changes in the total- and free 25(OH)D concentrations, as well as in the total to free fraction ratio.

CONCLUSION:

The presented results indicate that in healthy high-level athletes, acute non-accustomed physical efforts, had no effect on either of both vitamin D metabolites and the ratio of total to a free fraction. This suggests that a total 25(OH)D concentration in physically active subjects is an equally good indicator of vitamin D status as the free fraction.

References

1. Bikle DD, et al. (2019), 2. Makris K, et al (2021), 3. Owens DJ, et al (2018)

Topic: Nutrition

Presentation E-poster

