



Multivitamins - Minerals

Technical Document

Developed by INDI/SNIG for the Irish Sports Council

2014

Multivitamins-Minerals

Pubmed (Medline) and SPORTDiscus were searched for all human studies published in peer reviewed journals up to 2009 (original) and updated to March 2014. The terms searched were “multivitamins” “multivitamins AND exercise” and “multivitamins AND sport”. Studies included fitted the following criteria:

Inclusion criteria

- Human studies published in English
- Healthy subjects
- Original investigations assessing the use of multivitamins and/or exercise
- Incorporated the use of an indistinguishable placebo

Exclusion Criteria

- Qualitative studies assessing the prevalence of supplement use in both the general and athletic population

After title and abstract review, four original articles that assessed the use of multivitamins and/or minerals in exercise settings were retrieved for review.

Introduction

In clinical medicine, nutritional supplements are intended to supply nutrients (vitamins, minerals, fatty acids or amino acids) that are missing from or not consumed in sufficient quantities through a person's diet. Nutritional supplements have become increasingly popular within the athletic population, with the perception of them boosting or maintaining the immune system, reducing or protecting against fatigue (Knez and Peake 2010), inturtenhancing performance. This may be through compensation for less than adequate diets or lifestyle choices to meet unusual nutrient demands induced by heavy exercise or by the production of a direct ergogenic effect (Molinero and Marquez 2009, Crowley and Wall 2004, Knez and Peake 2010).

Elite athletes commonly use products that claim to be beneficial for their performance or recovery. Often these products are purchased based on anecdotal evidence, advertising and peer or coach recommendation without acquisition of professional nutritional or medical advice (Knez and Peake 2010). Some athletes endorse products such as supplements to enhance recovery or performance, possibly due to positive personal experiences with the product, or to supplement their income. Product endorsement does not necessarily indicate efficacy of the product. Many products are promoted as ergogenic despite a lack of conclusive scientific evidence to support their benefits or lack thereof (Juhn 2003).

Vitamins, such as A, B, C, D, E and K are micronutrients which act as catalysts in metabolic reactions in the human body. Vitamins do not provide energy, but facilitate energy metabolism (Lukaski 2004). Minerals, such as calcium, iron, potassium, sodium and magnesium, are also micronutrients which assist in the formation of body tissues, maintenance of fluid balance, and excitation of tissues (Fry et al. 2006). Multivitamins are pharmaceutical products that contain more than one vitamins and/or minerals and are typically purchased in capsule, tablet or liquid form.

It is well recognised that vitamins and minerals interact each other, play a significant role in metabolism and therefore are important in physical performance (Fry et al. 2006). Though recommended daily allowances (RDA) for vitamins and minerals have been established for the general population to maintain optimal health (Recommended Dietary Allowances for Ireland, 1999), the ergogenic effect of consuming multivitamins to increase vitamin and mineral intake in athletes above these RDA is not well supported in the scientific literature.

It has been reported that vitamin intake in professional and amateur athletes' are well within the range of the RDA, although Vitamin C intake is usually well above the RDA (Sureda et al. 2004). It has also been suggested that athletes, due to the increased metabolic work involved with physical exercise, may need a multivitamin to maintain this higher metabolic work rate (Lukaski 2004).

The health benefits claims of consuming multivitamin supplements

The following populations may benefit from multivitamin supplementation (Furlong and Trustwell 2004, Woolfe and Manore 2006):

- People whose diet may be restricted or unbalanced
- People with low calorie intake because of poor appetite
- Those on a weight reducing diet
- The elderly
- The emotionally disturbed
- Socially disadvantaged people

The athletic benefits of consuming multivitamin supplements

First and foremost athletes should strive for a diet that incorporates all major food groups to achieve both macronutrient (carbohydrates, proteins and fats) and micronutrient (vitamins and minerals) requirements. Supplements should not be seen as a quick fix and a substitute for a poor diet.

There is very limited evidence in regards to the consumption of a multivitamin-mineral supplement and performance enhancement. Table 1 provides a summary of the literature to date in athletic populations. Athletes who may benefit from a multivitamin-mineral supplement include athletes who fall into any of the groups listed above, for example those participating in making weight or aesthetic sports such as rowing, gymnastics and judo.

Multivitamin dosage

Some research supports the consumption of a daily multivitamin-mineral supplement (Willet 2001) as an “insurance policy” in regards to covering all multivitamin and mineral bases, however these multivitamins should contain no more than 150% of the RDA for each vitamin or mineral (Vinvi 2005).

Due to the wide variation in composition of multivitamins, and difference in dosage recommendations between products, dosage guidelines cannot be recommended. It is therefore advised that athletes seek specialist advice from a suitably qualified professional such as a dietitian, physician or pharmacist regarding the use of a particular multivitamin-mineral supplement. It is also recommended that if a multivitamin is to be consumed, products which contain all 13 established vitamins should be purchased, unless a deficiency has been diagnosed and a qualified, professional, has recommended individual vitamin and/or mineral supplementation (Furlong and Trustwell 2004).

Concerns with multivitamin supplementation

Products marketed as multivitamins do not necessarily mean that the product contains all essential vitamins and minerals, or that they are present in proportion to nutritional requirements (Furlong et al. 2004). There is also the potential risk of inadvertent doping, with many multivitamins and minerals not regulated to the standards of prescription medicines, and many not assessed for banned substances through accredited processes such as Informed Sport (Molinero and Marquez 2009).

It can therefore be summarized that unless there is a clinical deficiency in a particular vitamin or mineral, multivitamins may give no more than a placebo effect for performance. Attention therefore should be made to ensure that first and foremost any serious athlete has a balanced diet containing the appropriate combination of key macro and micronutrients and which caters for their specific needs.

Table 1 Summary of multivitamin literature

Reference	Subjects	Dose	Intervention	Outcome	Summary
Carroll et al. 2000	80 healthy males	1 x Berocca® or placebo consumed daily for 28 days	This study assessed psychological well being through questionnaires and plasma zinc levels	Positive	Berocca significantly reduced anxiety and perceived stress
Ferrer et al. 2009	19 male pre-professional soccer players	A multivitamin capsule daily for 3 months	Lymphocyte oxidant and antioxidant status of athletes who already exceeded the RDA for vitamins C and E was assessed	Negative	Supplementation did not modify the endogenous antioxidant response to training
Fry et al. 2006	14 resistance trained males	One ounce of the "1-Step Liquid Multi-Vitamin & Mineral®" or a placebo daily for 8 weeks	30 sec sprint and 1 set of squat exercise on 2 days were used to assess anaerobic exercise performance	Negative	Supplementing micronutrients may not be effective ergogenic aids for well trained individuals consuming an adequate diet
Machefer et al. 2007	16 male and 1 female athletes	3 capsules daily of Isoxan- Endurance® (a multivitamin and mineral) for 3 weeks prior and the week of competition.	6 long duration running races in the Moroccan desert	Not assessed	The combination of multivitamin and minerals prevented lipid peroxidation induced by repetition of exercises and may improve mobilization and/or utilization of antioxidant vitamins

References

Aljaloud, S.O. and Ibrahim, S.A. 2013. Use of dietary supplements among professional athletes in Saudi Arabia. *Journal of Nutrition and Metabolism*, 2013pp.245349-7.

Carroll D, Ring C, Suter M, Willemsen G. The effects of an oral multivitamin combination with calcium, magnesium, and zinc on psychological well-being in healthy young male volunteers: a double-blind placebo controlled trial. *Psychopharmacology* (2000) 150:220–225

Crowley JJ, Wall C. The use of dietary supplements in a group of potentially elite secondary school athletes. *Asia Pac J Clin Nutr*. 2004; 13: S39.

Ferrer MD, Tauler P, Sureda A, Pujol P, Drobnic F, Tur JA, Pons A. A soccer match's ability to enhance lymphocyte capacity to produce ROS and induce oxidative damage. *Int J Sports Nut Ex Metab*. 2009; 19: 243-258.

Fry AC, Bloomer RJ, Falvo MJ, Schilling G BK, Weiss LW. Effect of a liquid multivitamin/mineral supplement on anaerobic exercise performance. *Research in Sports Med*. 2006; 14: 53-64.

Furlong VE, Truswell AS. Search for the most complete multivitamin. *Asia Pac J Clin Nutr* 2004; 13(3): 222-225.

Juhn, MS. Popular Sports Supplements and Ergogenic Aids. *Sports Medicine*. 2003; 33(12): 921-939.

Knez, W.L. and Peake, J.M. 2010. The prevalence of vitamin supplementation in ultraendurance triathletes. *International Journal of Sport Nutrition and Exercise Metabolism*, 20(6), pp.507-514.

Lukaski HC. Vitamin and mineral status: Effects on physical performance. *Nutrition*. 2004; 20: 632–644.

Machefer G, Groussard C, Vincent S, Zouhal H, Faure H, Cillard J, Radak Z, Gratas-Delamarche A. Multivitamin-mineral supplementation prevents lipid peroxidation during "The marathon des Sables". *J American College of Nutr*. 2007; 26(2): 111-120.

Molinero O, Marquez S. Use of nutritional supplements in sport: risks, knowledge, and behavioural-related factors. *Nutr Hosp*. 2009; 24(2): 128-134.

Recommended Dietary Allowances for Ireland, 1999. Food Safety Authority of Ireland. <http://www.fsai.ie/assets/0/86/204/fb3f2891-2896-4bf9-903f-938f3c2ad01f.pdf> Accessed 23rd October 2009.

Sureda A, Batle JM, Tauler P, Aguiló A, Cases N, Tur JA. Hypoxia/reoxygenation and vitamin C intake influence NO synthesis and antioxidant defences of neutrophils. *Free Radical Biology & Medicine*. 2004; 37: 1744-1755.

Vinci D. Nutrition Myth Busters. *Athletic Therapy Today*. 2005; 10(2): 48-49.

Willett W. *Eat, Drink, and Be Healthy: The Harvard Medical School Guide to Healthy Eating*. New York, NY: Fireside; 2001.

Wolf K, Manor MM. B-Vitamins and Exercise: Does exercise alter requirements? *Int J Sports Nut Ex Metab*. 2006; 16: 453-484.