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), in turn enhancing 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

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


