Glucosamine

Pubmed (Medline), SPORTDiscus and Cochrane library were searched for all human studies published in peer reviewed journals. The terms searched were “glucosamine AND exercise” and “glucosamine AND sport” and “glucosamine AND athletes”. Studies included in this review adhered to the following criteria:

Inclusion criteria
- Human studies published in English
- Original investigations assessing the use of glucosamine and 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
- Glucosamine use in the elderly population

A further review of the literature to update the original document revealed no additional original articles, to add to the two identified in the original document, assessing the use of glucosamine in exercise settings that met the above criteria were retrieved for review.

Introduction

Glucosamine is a naturally occurring amino monosaccharide synthesized from glucose. Glucosamine is a component of glycosaminoglycan, proteoglycans and other molecules in connective tissue (Arendt-Nielsen et al. 2007, Lebrun 2004, Fallon, 2001). The mechanisms of action of glucosamine sulphate are still debatable, but evidence suggests that glucosamine can stimulate proteoglycan synthesis, depress cartilage catabolism, inhibit superoxide radical generation and inhibit lysosomal enzymes (Fallon 2001). Glucosamine has been purported to be an anti-inflammatory, an analgesic and to serve as an alternative or adjuvant treatment to non-steroid anti-inflammatory drugs (Braham et al. 2003).

A majority of the scientific literature studied the efficacy of glucosamine for reducing pain and increasing range of movement in degenerative joint diseases such as osteoarthritis. Several studies have demonstrated that glucosamine is effective for reducing pain and increasing range of motion in patients with osteoarthritis without the side effects exhibited with non-steroidal anti-inflammatory drug ingestion (Ostojic et al. 2008). For a detailed Cochrane review on glucosamine therapy for treating osteoarthritis refer to (Towheed et al.

Glucosamine is commercially available as glucosamine sulphate, glucosamine hydrochloride, and n-acetyl-glucosamine (Lebrun, 2004). For a review of the clinical pharmacology, pharmacokinetics and pharmacodynamics please refer to Lebrun (2004). Currently in many European countries, glucosamine is available only as a prescription medicine.

The athletic benefits of consuming glucosamine

Glucosamine is sold as a ‘joint health’ product (Hespel et al. 2006) and in athletic populations marketed to ‘support’ or ‘repair’ articular cartilage (AIS Sports Nutrition, 2007). Though glucosamine appears promising for the treatment of osteoarthritis, there are limited studies assessing glucosamine supplementation in athletes and healthy populations (see Table 1). The recent series of reviews on nutritional supplements in the British Journal of Sports Medicine (2010) concludes that there may be potential benefits of glucosamine use, in conjunction with chondroitin, for athletes with knee degenerative joint disease. However, there is no evidence to suggest glucosamine could prevent osteoarthritis and/or joint pain in healthy adults (Hespel et al. 2006, Braham et al. 2003).

Proposed dosage of glucosamine

Due to the lack of evidence for use in the athletic population, there is no recommended dosage for glucosamine supplementation. Among individuals with osteoarthritis, a recent safety review of glucosamine concluded that supplementation at a dosage of 20-25mg per kg body mass is safe for consumption (Anderson et al. 2005).

Concerns with glucosamine supplementation

The following side effects have been reported in the literature:
- Bloating, nausea and abdominal pain
- Diarrhoea
- Headache and back pain
- Increased blood glucose levels in patients with diabetes, though this finding is not conclusively

Other adverse effects have been reported in individuals with shellfish allergies, and people who are allergic to sulphur-containing drugs or sulphite-containing food additives (Anderson et al. 2005, Lebrun, 2004, Fallon, 2001).
Summary

Since the original document was produced a further review of the literature revealed no advances in research indicating any benefit of athletes using glucosamine as an ergogenic aid. Therefore, due to the limited evidence for efficacy in athletic populations, glucosamine can not be recommended for use by athletes.
Table 1  Summary of glucosamine literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>Subjects</th>
<th>Dose</th>
<th>Sport / Exercise Protocol</th>
<th>Outcome</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arendt-Nielsen et al. 2007</td>
<td>60 healthy men</td>
<td>Glucosamine sulphate (1500mg/day), ibuprofen (1200mg/day) or placebo orally for 22 days</td>
<td>Eccentric exercise of first dorsal interosseous muscle in left hand.</td>
<td>Muscle tenderness was assessed and was significantly higher in group consuming glucosamine</td>
<td>Glucosamine sulphate facilitates muscle tenderness</td>
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<tr>
<td>Ostojic et al. 2008</td>
<td>106 male and female professional athletes who had sustained an acute sports injury of the knee.</td>
<td>1500mg of glucosamine or placebo per day for 28 days</td>
<td>Pain and functional ability were assessed before supplementation and on days 7, 14, 21 and 28 after supplementation.</td>
<td>Knee pain, swelling, and range of movement at the knee</td>
<td>Glucosamine supplementation demonstrated significant improvement in knee flexion and extension but not pain and swelling.</td>
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</tbody>
</table>
References


