

GLUCOSAMINE AND CHONDROITIN SULFATE: IS THERE A “GROUND” FOR USING THIS “SUBSTANCE”?

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Dietary supplement use and expenditure has been increasing exponentially over the years. From 1994-1999, Americans spent \$8.6 billion to \$14.9 billion dollars on dietary supplements, and greater than 40% of American people use dietary supplements.¹ Unfortunately, the industry is not regulated by the Food and Drug Administration. As a result, studies are consistently conflicting with many supplements in part due to lack of standards for purity and testing. One of the more common supplements asked about and addressed clinically by physical therapists is glucosamine and/or chondroitin sulfate (GCS), a supplement believed to help limit pain experienced with osteoarthritis (OA). The prevalence of OA increases sharply with age, making it an increasingly important public health issue as the population grows older.² One in three adults in the U.S. reports chronic symptoms or physician-diagnosed arthritis.² Recently, the first large-scale, multicenter clinical trial in the United States tested the effects of GCS for the treatment of knee OA. The purpose of the study tested whether GCS used separately or in combination reduced pain in participants with OA. The current summary highlights the relevant research pertaining to GCS.

Glucosamine and chondroitin sulfate are natural substances found in the cells of cartilage. Glucosamine is an amino sugar that the body produces and distributes in cartilage and other connective tissues, and chondroitin sulfate is a complex carbohydrate that helps cartilage retain water.

In February of 2006, the *New England Journal of Medicine* published its findings in a multi-center, double-blind, placebo and celecoxib-controlled

Glucosamine/chondroitin Arthritis Intervention Trial (GAIT).³ 1583 patients aged 40 and over with symptomatic knee OA were randomly assigned to one of five treatment groups over a six month period: 1) glucosamine alone, 2) CS alone, 3) GCS in combination, 4) celecoxib, 5) or placebo. Celecoxib was compared to placebo to validate the study design. On average, participants were about 59 years of age and nearly 2/3rds were women. Patients were stratified into two pain subgroups – 78% with mild pain and 22% with moderate to severe pain. A positive response to treatment was defined as a 20% or greater reduction in pain compared from week 24 to the start of the study. Participants had the option of using acetaminophen as needed to control pain, but use was low across the study. On average, they used less than two 500mg tablets per day.

The results of the study were as follows:

- Participants taking celecoxib experienced statistically significant pain relief versus placebo. About 70% of those taking celecoxib had a 20% reduction or greater in pain versus about 60% for the placebo.
- For the patients with moderate to severe pain, glucosamine combined with chondroitin sulfate provided statistically significant pain relief compared with placebo – 79% had 20% or greater relief of pain compared to 54% for placebo.
- For participants with mild pain, glucosamine and chondroitin sulfate together or alone did not provide statistically significant pain relief.

Researchers concluded that GCS used together may be effective for people with moderate to severe knee pain. Essentially, the more severe the pain, the better the response and the combination of the two, not used alone, is the best method.

Band and Hungerford² reviewed several articles pertaining to GCS and found that the evidence is mixed for use of chondroitin sulfate for OA. For those with knee OA, chondroitin sulfate (CS) was found to have a statistically significant effect on pain relief at four weeks, comparable to the effects of acetaminophen. Additionally, pain relief increased from week four to week twelve in subjects taking CS.

In studies using CS for knee or hip OA, studies have found that the joint space narrowing is significantly lower in that patients treated with CS than those who were given a placebo. However, the effect size was small, thereby questioning clinical importance.

Studies using glucosamine or chondroitin sulfate for knee OA revealed that there was a beneficial effect of glucosamine (G) and CS on joint space narrowing, and that using both together was more effective than placebo. In trials using chondroitin sulfate for knee, hip, or hand OA, results showed that CS may be useful for treatment of OA.

As with most studies on supplements, the results are often ambiguous, even in meta-analyses, because of the slight differences in study criteria, treatment duration, or the variable investigated – physical changes via X-ray or pain relief. Therefore, it is important for the physical therapist to synthesize the available evidence and make an educated, thoughtful decision about the appropriateness of supplementation for a patient with the patient's physician.

The clinical significance of the GAIT study is that GCS can be effective for those having moderate to severe pain, but may not be efficacious for those with mild pain. That being said, it should not substitute for the benefits physical therapy can provide through education, activity modification, weight loss, strengthening, stretching, and pain

relief modalities. For the advancement of our profession and for the benefit of our patients, it behooves us as therapists to educate our patients about the validity of supplement use as well as empowering them to manage their diagnosis in order to lead an active, healthy lifestyle.

REFERENCES:

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