

Evidence in Action

Chondroitin Sulfate Supplements for Osteoarthritis: Current Evidence

By Robert Vining, DC

OSTEOARTHRITIS (OA) RESEARCH

has been the focus of many disciplines, including those studying pharmacotherapies, surgical procedures, physical exercise/therapy and nutritional treatments. Some nutritional therapies, like chondroitin sulfate, have been available as over-the-counter supplements for many years. Whether or not nutritional recommendations are part of your everyday practice, you probably have been or are likely to be asked about oral chondroitin sulfate supplements for OA.

Some prior research focused on chondroitin sulfate has included studies with lower-quality methods that could possibly confound results or included inadvertent bias, making conclusions difficult to judge. Because more clarity is needed, a question remains. That question could be worded as: Is there research evidence for a benefit, lack of benefit or potential harm from taking chondroitin sulfate supplements for OA?

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Chondroitin Sulfate in Brief

Chondroitin sulfate is a glycosaminoglycan found in cartilage, bone and other human tissues. Most nutritional supplements use animals (e.g., cattle, pigs, chicken, sharks and fish) as their sources of chondroitin sulfate. It has been suggested that supplementation with chondroitin provides sulfur-containing amino acids and small oligosaccharides thought to help prevent cartilage degeneration by helping restore extracellular cartilage matrices and promoting proteoglycan synthesis.^{1,2}

An Evidence-Based Consideration

Using the online PubMed database and the search terms “chondroitin,” “osteoarthritis” and “systematic review” generated several hundred citations. Combing through several hundred citations and

judging the strength of each study so you can better judge the results can be challenging. Fortunately, there was an alternative database that provided an appropriate article to help answer this particular question.

Cochrane Collaboration

The Cochrane Collaboration describes itself as “a global independent network of researchers, professionals, patients, careers and people interested in health.”³ In a nutshell, the network gathers and summarizes research evidence to help providers and patients make informed decisions. One way of summarizing research evidence is by conducting and publishing thorough systematic reviews.

Systematic reviews conducted by the Cochrane Collaboration are generally recognized and respected by researchers for their thoroughness, rigorous method and high quality. The Cochrane Collaboration also maintains an extensive and searchable online library of systematic reviews and other research on a wide variety of clinical topics.⁴

Entering the term “chondroitin sulfate” into the Cochrane Library search field revealed a handful of articles including a very recent systematic review authored by Singh et al., entitled “Chondroitin for osteoarthritis.”⁵

The Systematic Review

Systematic reviews are important tools researchers use to gather, summarize and analyze similar studies focused on a given topic. Generally, results from high-quality systematic reviews represent stronger evidence than what is available from individual clinical trials because combining results of several studies can often provide a more comprehensive understanding of the effects of an intervention. In the Singh et al. review, authors included only randomized controlled trials. That is to say each included study had an active intervention (i.e., chondroitin sulfate supplements, with or without glucosamine) and a comparison arm consisting of a placebo, medication or other medicinal/herbal intervention. Trials included in

Robert Vining, DC, is associate professor and senior research clinician at the Palmer Center for Chiropractic Research, Palmer College of Chiropractic, Davenport, Iowa.

this review lasted at least two weeks and reported clinical outcomes. Singh et al., concluded their literature search in November 2013, finding 43 studies that could be included in the review.

High-quality systematic reviews report robust search strategies for each database searched. Often included are measures to judge individual studies for important considerations like risk of bias, treatment effects and heterogeneity. Without these assessments, it is difficult to judge the quality of evidence supporting conclusions.

Some systematic reviews also perform a meta-analysis, a collection of statistical analyses that pool results from studies within a systematic review. In the case of the review authored by Singh et al., a meta-analysis was also performed.

Synthesizing the Evidence

Conclusions can only be as strong as the available evidence. In other words, knowing some of the characteristics of the studies included in this review is necessary to properly assess author conclusions. Generally speaking, the higher the overall quality of studies included in a review, the stronger the potential conclusions. But what do we mean by quality? The term “quality” is a measure of the study methods used in a clinical experiment. The more rigorously performed, the higher the quality. For example, if two studies were found to be identical in every way, except that one study did not blind participants while the other did, the study with blinding would be considered higher quality because there is a lower likelihood participants can bias the results either purposefully or inadvertently.

Many of the 43 studies included in the review by Singh et al. were of relatively low quality. Some studies reported unclear methods for dealing with missing data (10 studies), 14 studies unclearly reported blinding methods, and nine did not report blinding at all. Furthermore, most studies in the review were funded by a chondroitin supplement manufacturer. Other challenges the authors encountered included outcome measures that were not reported consistently across studies.

So what can be said of conclusions rendered by a rigorous systematic review and meta-analysis based on studies with a relatively high risk of bias and low-to-moderate methodological quality? Well, the answer is mixed.

► Studies funded by a chondroitin sulfate manufacturer showed more positive results than studies funded independently.

► Supplementation with chondroitin sulfate appears to be well tolerated and quite safe, though little long-term safety evidence is available.

► Small-to-medium favorable treatment effects were noted for pain and physical function, though the evidence to date is based mostly on small, lower-quality trials funded mostly by chondroitin sulfate manufacturers.

► Clearly high-quality clinical trials within large and diverse patient populations are needed to provide more definitive answers with respect to treatment effectiveness and long-term safety.

► Joint space size reduced less in those taking chondroitin sulfate compared with those who didn't in a few moderate-to-high quality studies.

► Considering few treatment options are available for OA and commonly used treatments such as NSAIDs are associated with several potentially problematic side effects, especially in the elderly, it is reasonable for providers to have an informed conversation with patients about chondroitin sulfate, even though effectiveness has not been thoroughly established experimentally.

Unfortunately, research concerning the effectiveness of chondroitin sulfate still hasn't progressed far enough to provide definitive answers. Nevertheless, the review by Singh et al. provided a synthesis of a large amount of research information suggesting chondroitin sulfate is safe, although some questions remain. Realistic expectations of effectiveness could range from none to moderate with respect to symptom reduction and physical function. Even without definitive answers from this review, the information provided, when combined with your experience, helps equip you with additional capacity to have an informed discussion with patients about chondroitin sulfate supplementation. ■

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