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# CLINICAL EFFECTIVENESS OF GLUCOSAMINE AND CHONDROITIN SULPHATE IN TREATMENT OF OSTEOARTHRITIS

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**ABSTRACT:** Osteoarthritis is a form of arthritis, and is the most common form of arthritis. Persons suffering from osteoarthritis have symptoms of pain, stiffness, decreased range of motion of affected joints. Although NSAIDS are the most commonly prescribed agents for this disorder but can cause of serious adverse effects. Two compounds Glucosamine and chondroitin which are extracted from animal products have been used in various forms for OA. To assess the clinical effectiveness of glucosamine and chondroitinsulphate in treatment of osteoarthritis symptoms like joint pain, joint space narrowing, reduced walking time, swelling etc. We searched articles separately for glucosamine and chondroitin sulphate using internet. Fifteen articles met the inclusion criteria. Data from articles was extracted using a standardized data extraction tables i.e. table1 and table 2. Glucosamine and Chondroitin sulphate are effective in the treatment of Osteoarthritis because these canreducepain, prevent further joint space narrowing and solve other related problems of this disease. The two agents can be used in osteoarthritis treatment as their safety is already assured as compared to other symptomatic treatment for OA. But these agents can take more time to treat disease as compared to conventional medicine like NSAIDS.

**INTRODUCTION:** Osteoarthritis is a form of arthritis, and is the most common form of arthritis. [1, 2]. In 2010-2011, over 4.6 million Canadians (16.7% of those 15 years and older) reported suffering from arthritis [39]. Osteoarthritis is classified on the basis of its cause. Two classes of osteoarthritis are primary or idiopathic osteoarthritis and secondary osteoarthritis. Primary osteoarthritis occurs due to unknown causes but is strongly associated with age.

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Secondary OA develops as a result of joint injury, infection, hereditary, developmental, metabolic or neurologic disorders. Secondary osteoarthritis occurs less frequently [3, 4]. Friction between the bones is resulted by gradual wear and loss of cartilage in the joints, which Causes pain and swelling in affected joints. For a long time it was thought that in osteoarthritis only cartilage is affected. But, now it is known that the underlying bone synovium also undergoes changes [5-7].

In Osteoarthritis joint movement suffers additional restriction due to the reaction of prearticular bone with osteophyte formation. It predominates in weight-bearing joints, such as the knee and hip [8]. There are many risk factors known of OA which include; age [9], Over weight and obesity [10], genetic determinants [11, 12]. Persons suffering from

osteoarthritis have symptoms of pain, stiffness, decreased range of motion of affected joints [13]. It is the leading cause of pain and physical disability in older people [14]. A biomechanical abnormality to the joint or limb may be present in osteoarthriris [40]. There are still questions concerning the causal factors of OA. The nature of the initiating event is often unknown, although many processes involved in the progression of OA are known. Due to disruption of the cartilage collagen matrix, the water content of the cartilage increases [43].

Osteoarthritis-affected joints are commonly tender. Patients suffer from morning and/or prolonged fixed body position stiffness. Swelling and crepitus may also be evident. Generally, pain escalates with increasing activity throughout the day and many patients need frequent breaks to rest the involved joint [41]. The use of NSAIDs has a palliative effect and can cause adverse effects in the long-term. Therefore, effective and safe treatments for the control and management of osteoarthrosis of the Temporomandibular Joint are the use of Chondroitin sulphate and Glucosamine [44]. For treatment of osteoarthritis only few effective remedies are available. [15] Primary concern of currently available medical therapies of osteoarthritis is treatment of joint pain in patient.[16]

Analgesics as well as traditional and cyclooxygenase-2–selective non-steroidalanti-inflammatory drugs (NSAIDs) are effective and are widely used [17, 18]. Although NSAIDS are the most commonly prescribed agents for this disorder but can cause of serious adverseeffects[19, 20]. Two compounds Glucosamine and chondroitin which are extracted from animal products have been used in various forms for OA [21]. These compounds are found modestly effective but because of their safety, these would have high utility in the treatment of OA [22, 23]. Chondroitin sulphate reduces both cartilage volume loss and bone marrow lesions in knee osteoarthritis patients starting as early as 6 months after initiation of therapy. [42]

## MATERIALS AND METHODS:

### Data Sources

To search the original articles of both glucosamine and chondroitin sulphate we searched the electronic data bases from 1980 to 2011 including: Science direct.com, American college of rheumatology (arthritis and rheumatism), Pub Med and American medical association. From there we selected the articles which met our inclusion criteria.

### Inclusion criteria

All the published trials on arthritis of various parts of body and in which preparations were given orally (in form of tablets or powder) were included. Comparisons in trials of glucosamine and chondroitin were mostly with placebo but trials for comparison of glucosamine and chondroitin with NSAIDS were also included. Duration of study should be at least one month because these agents may take time to produce effect.

### Data extraction

Thirteen articles met the inclusion criteria. Data from that articles were extracted using a standardized data extraction table. In **Table 1** and **Table 2**, we notified the author/year of article, duration of study, dose of agent tested, outcome measured and conclusion of the article. And from the **Table 1** and **Table 2**, having all material for review, we drew conclusion of our review.

## RESULTS:

Table 1 and table 2 summarizes prospective data based on the use of glucosamine and chondroitin sulfate in the treatment of osteoarthritis in which names of authors along with years have been given. Table 1 and table 2 also contains number of patients, their dosage, duration of intervention, type of intervention and conclusion based on these interventions.

**DISCUSSIONS:** Objective of this review is to assess the clinical effectiveness of glucosamine and chondroitin sulphate in reducing pain and preventing joint space narrowing and other problems that OA patients face, hence the overall effectiveness of these agents for osteoarthritis treatment and their role in progression of osteoarthritis disease. To collect articles we set inclusion criteria, according to which published articles of glucosamine and chondroitin sulphate were collected and reviewed by forming standard tables i.e. **Table 1** and **Table 2**.

In three articles of glucosamine sulphate [24, 25, 29] outcome measure is joint pain and from the conclusions of two articles in which study was

conducted by comparing glucosamine to placebo we can see that glucosamine is superior to placebo to reduce pain. In one article study was conducted by comparing glucosamine to ibuprofen both agents showed almost equal success (glucosamine: 48%, ibuprofen: 52%) but ibuprofen showed effect sooner than glucosamine sulphate.

**TABLE 1: SHOWS THE USE OF GLUCOSAMINE IN OSTEOARTHRITIS TREATMENT**

| | | Glucosamine | | | |
|---|---|---|---|---|---|
| **Author, year** | **No. of patients** | **Dosage** | **Duration** | **Type of intervention** | **Conclusion** |
| Drovanti A et al. 1980 [24] | 80 | 500mg t.i.d | 30 days | Articular Joint pain, Joint tenderness Swelling, and Range of motion | Interventions were found to be significantly improved in the GS group than in the placebo group. |
| Pujalte JM et al. 1980 [25] | 20 | 500mg t.i.d | 6 to 8 weeks | Joint pain, Joint tenderness, and Swelling. | GS is superior to placebo in improving outcome measures. |
| Noack W et al.1994 [26] | 252 | 500mg t.i.d | 4 weeks | Lequesne's index | Decreased by 3.2 points in the GS group and only 2.2 points in the placebo group. |
| Reginster JY et al.2001 [27] | 212 | 1500mg o.d | 3 years | Joint space width | Joint space narrowing<br>In GS group: 0<br>In placebo: -.31mm |
| Pavelka K et al.2002 [28] | 202 | 1500mg t.i.d | 3 years | Worsening osteophytes | 20% in placebo group and 6% in GS group |
| Fassbender HM et al.1994 [29] | 200 | GS: 1500mg o.d<br>Ibuprofen: 1200mg o.d | 3 months | Joint pain | 52% pain reduction observed in ibuprofen group while 48% in GS group but effect occurred sooner in ibuprofen group |
| Bruyere et al. 2004 [30] | 319 postmenopausal Women | 1500 mg o.d | 3 years | Radiographs of the knee: joint space narrowing. | GlcN·S: no significant joint space loss<br>Plac.: Progressive joint space narrowing. |
| Kawasaki 2008 [31] | 142 | 1500 mg o.d | 18 months | Joint space width | 0.0 mm in GS group and -0.31 mm in control group |

**TABLE 2: SHOWS THE USE OF CHONDROITIN SULPHATE IN OSTEOARTHRITIS TREATMENT**

| **Author, year** | **No. of patients** | **Dosage** | **duration** | **Type of intervention** | **Conclusion** |
|---|---|---|---|---|---|
| Bourgeois P et al.1998 [32] | 127 | 1200mg o.d | 3 months | Joint pain | Improved mean spontaneous joint pain was observed |
| Uebelhart D et al. 1998 [33] | 46 | 800 mg o.d | 1 year | Joint space width | 0 mm in Cs group but increased by 0.4 mm in placebo group |
| Author, year | No. of patients | Dosage | Duration | Outcome measures | Conclusion |
| Bucsi L et al. 1998 [34] | 80 | 800 mg o.d | | Pain VAS,<br>Lequense's index<br>Walking time | Pain and lequense's index decreased in CS group.<br>Walking time improved in CS group. |
| Verbruggen G et al. 1998 [35] | 119 | 400 mg t.i.d | 3 years | New erosive OA of finger joints | CS protect from the development of erosive changes in patients with finger joint OA. |
| Cem Gabay et al. 2011 [36] | 162 | 800 mg o.d | 6 months | Hand pain | Decrease in the hand pain in the CS group than in the placebo group is observed. |
| Kahan et al. 2009 [37] | 622 | 800mg o.d | 2 yrs | joint space narrowing | 28% CS pts. Versus 41% Plac. pts.<br>showed joint space Narrowing. |
| Michel et al. 2005 [38] | 300 | 800 mg o.d | 2 years | Joint space narrowing | In CS group no significant joint space loss and significant joint space narrowing in placebo group. |

In three included studies [27, 30, 31] improvement in joint space narrowing is observed and conclusion of those articles show that GS is very effective in preventing joint space narrowing.

Two studies [24, 25] show improvement in joint tenderness and swelling. One study [26] concluded decrease in lequence's index by 3.2 points. One article [28] has outcome measure of worsening

osteophytes which is very less in placebo group than in GS group. Among included articles of Chondroitin sulphate outcome measure is joint space width in three articles [33, 37, 38] which showed that chondroitin sulphate is prominently superior to placebo in preventing further joint space narrowing.

Three studies [32, 34, 36] included were conducted to know the effect of chondroitin sulphate in pain reduction and conclusion of that studies showed that chondroitin sulphate effectively decrease the joint pain and was found to be better than placebo. One study [34] show decrease in lequence's index and improved walking time in the CS group. Another study [35] concluded that CS may protect against the development of erosive changes in patients with finger joint OA.

**CONCLUSIONS:** According to conducted review it is concluded that Glucosamine and Chondroitin sulphate are effective in the treatment of Osteoarthritis because these are found to be better than placebo in reducing pain and more prominently effective in preventing further joint space narrowing already present in patients of OA. Other problems which the patients of this disease have to face like swelling and walking time are also improved by these chondroprotective agents. The two agents are also found to be effective in reducing lequence's index. So the two agents can be used in osteoarthritis treatment as their safety is already assured as compared to other symptomatic treatment for OA (NSAIDS cause severe damage to gastro protective layer). But these agents can take more time to treat disease than the conventional medicine like NSAIDS.

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