

The effect of oral Glucosamine Chondroitin sulfate in the management of knee osteoarthritis

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Abstract

The study was carried out in Tikrit teaching hospital during the period from February 2005 till April 2008. Eighty seven patients presented to the out patient department suffering from knee osteoarthritis. The study aimed to find out the effectiveness of glucosamine chondroitine sulfate tablets in the management of osteoarthritis. A comparison have been made between 2 groups of patients those treated with glucosamine chondroitine sulfate and those treated with other modalities. The study showed a vast majority of cases are females aged between 40 – 60 years old and most of them had moderate severity osteoarthritis. The patients' acceptance to the treatment with glucosamine chondroitine sulfate was poor, so that 36.8% were in compliant, mostly because of the expensive course of treatment. The pain relief and functional improvement was good in a significant bulk of patients using the glucosamine chondroitine sulfate therapy especially in those with mild to moderate osteoarthritis. Only 8 patients 9.2% of the whole sample developed side effects to glucosamine chondroitine sulfate, all in form of gastric upset, 6 of them required stopping the medication. The study concludes that glucosamine chondroitine sulfate is effective in both symptomatic and functional improvement of osteoarthritis whatever the severity.

Introduction

Osteoarthritis is the most common group of arthritides, affecting at least 20 million Americans, a number that is expected to double over the next two decades.(1,2) Currently available medical therapies primarily address the treatment of joint pain in patients with osteoarthritis.(3)

Analgesics as well as traditional and cyclooxygenase-2-selective non - steroidal anti - inflammatory drugs (NSAIDs) have suboptimal effectiveness,(4,5) and there is some question about their safety, especially in the light of recent reports of increased cardiovascular risks.(6,7,8)

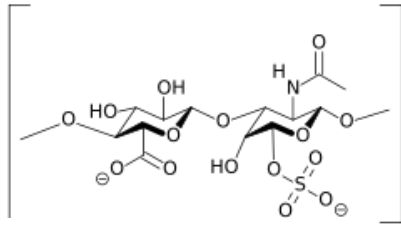
The dietary supplements glucosamine and chondroitin sulfate have been advocated, especially in the lay media, as safe and effective options for the management of symptoms of osteoarthritis. A meta-analysis studies evaluating the efficacy of these supplements for osteoarthritis (9) suggested potential benefit from these agents but raised questions about the scientific quality of the studies. Glucosamine and chondroitin sulfate occur naturally in the body, mainly in joint cartilage. They can also be made and given

in pill form or by injection. The theory is that these supplements can help protect, or possibly even repair, damaged cartilage. (9)

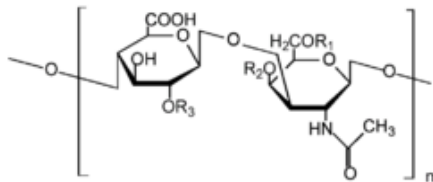
Chondroitin sulfate is a sulfated glycosaminoglycan (GAG) composed of a chain of alternating sugars (N-acetylgalactosamine and glucuronic acid). It is usually found attached to proteins as part of a proteoglycan. A chondroitin chain can have over 100 individual sugars, each of which can be sulfated in variable positions and quantities.

Chondroitin sulfate is a major component of extracellular matrix, and is important in maintaining the structural integrity of the tissue. Chondroitin sulfate readily interacts with proteins in the extracellular matrix due to its negative charges.

These interactions are important for regulating a diverse array of cellular activities. In the nervous system, chondroitin sulfate proteoglycans regulate the growth and development of the nervous system as well as the nervous system response to injury (10,11).



Chondroitine sulfate



Glucosamine

The dosage of oral chondroitin used in human clinical trials is 800–1,200 mg per day. Most chondroitin appears to be made from extracts of cartilaginous cow and pig tissues (cow trachea and pig ear and nose), but other sources such as shark, fish and bird cartilage are also used. (12)

The benefit of chondroitin sulfate in patients with osteoarthritis is likely the result of a number of effects including its anti-inflammatory activity, the stimulation of the synthesis of proteoglycans and hyaluronic acid, and the decrease in catabolic activity of chondrocytes inhibiting the synthesis of proteolytic enzymes, nitric oxide and other substances that contribute to damage cartilage matrix and cause death of articular chondrocytes.(13)

Recently, new mechanisms of action have been described for chondroitin sulfate. In an in vitro study, chondroitin sulfate reduced the IL-1 β -induced nuclear factor-kB (Nf-kB) translocation in chondrocytes (14). In addition, chondroitin sulfate has recently shown a positive effect on osteoarthritic structural changes occurred in the subchondral bone (15).

Chondroitin sulfate has shown in several prospective controlled studies clinical benefits to decrease pain improve functional disability, reduce NSAID or acetaminophen consumption, and good tolerability with an additional carry-over effect (16-22).Recently, a review by Bruyere et al. about glucosamine and chondroitin sulfate for the treatment of knee and hip osteoarthritis concludes that

both products act as valuable symptomatic therapies for osteoarthritic disease with some potential structure-modifying effects.(21)

Currently OARSI (Osteo-Arthritis Research Society International) is recommending chondroitin sulfate as the second most effective treatment for moderate cases of osteoarthritis (22). Likewise, the European League Against Rheumatism (EULAR) supports the usefulness of chondroitin sulfate in the management of knee osteoarthritis (23).

The aim of the study was to demonstrate the effectiveness of oral glucosamine chondroitine sulfate in the treatment of variable degrees of knee osteoarthritis.

Patients and Methods

During the period from February 2005 till April 2008, eighty seven patients with variable grades of knee osteoarthritis presenting to the out patient department in Tikrit Teaching Hospital, were included in the study.

The age ranged from 25 – 80 years (mean =51.3 years). There were 74 females and 13 males. The patients were classified into 3 groups according to the severity of osteoarthritis.

All the patients were instructed to take about 3000 mg daily in divided dose of glucosamine chondroitine sulfate for 6 months, in addition to other modalities of treatment. But 32 of the 87 patients refused glucosamine chondroitine sulfate mostly due to expensive price, thus they were treated by other modalities like NSAID, steroid, supplementary drugs, physiotherapy...etc. and they were considered as a control group to be compared to the rest of our patients. After the completion of 6 months the patients were reassessed for functional and symptomatic improvement. This was assessed by the patients themselves into (good, fair, poor), as whether to be satisfied about their improvement or not. The results were analyzed statistically to find out its significance.

Results

The present study finds that most of the patients were female in the age group ranging from 40 – 60 as shown in fig. 1.

The study revealed poor patients compliance to glucosamine chondroitin sulfate, 36.8% of the patients were unable to use the drug (fig. 2). 75% of them find that this drug was expensive and they can not order it. While about 18.8% could not finish the course because of side effects (all were gastric problems) see fig. 3.

This study shows that the majority of our patients 51.7% were having moderate osteoarthritis of the knee (see fig 4). While 28.7% and 19.6% had mild and severe osteoarthritis respectively.

The study reveals remarkable difference in patient's satisfaction about the outcome of treatment with glucosamine chondroitine sulfate, compared to those patients who refused this medication.

Table 1 show clearly that patients taking glucosamine chondroitine sulfate had good pain relieving effect, and this effect was obvious in mild to moderate osteoarthritis 84.2% and 75.9% respectively. Nevertheless, 85.7% of patients with severe osteoarthritis had fair pain relieving effect.

In the contrary the control group had less pain relief compared to the above readings. Another point to be considered is that the readings are almost the same in this group for all the grades of osteoarthritis, these were; around 30% good pain relief; around 50% fair; and around 20% poor.

In this study the functional improvement were shown to be affected by the administration of glucosamine chondroitine sulfate (table 2). The patients on glucosamine chondroitine sulfate having mild and moderate osteoarthritis had good functional improvement in a percentage reaching 68.4% and 48.3% respectively. While in the same group, 85.7% of the patients having severe osteoarthritis described their functional improvement by fair.

On the other hand, the control group had mostly fair to poor improvement in function. This was most obvious in patients with severe osteoarthritis, thus 80% of them had a poor functional improvement.

Only 8 patients 9.2% of the whole sample developed side effects to glucosamine chondroitine sulfate, all in form of gastric upset, 6 of them required stopping the medication.

Discussion

The present finding of increased incidence of osteoarthritis in female patient was statistically significant. This is agreed by Lawrence (1), although the difference was less pronounced than in our study, most probably due to differences in the population under study i.e between us and USA. Our finding may be referred to more duties in the home to the housewives in addition to bad habits of sitting manner especially in our locality.

The study revealed poor compliance to take glucosamine chondroitine sulfate. This was statistically significant (P value <0.05). But most of the previous studies disagree with our result (9,12,15,16-22). The disagreement with most of the previous series mostly due to low socio-economic status in our community compared to that of other studies, add to this a very low health education and the defective knowledge of the patient about the principle basics of osteoarthritis. The cause of patient's in compliance to glucosamine chondroitine sulfate was in majority due to economic factors. Signifying the above poor acceptance to this drug, because most patients prefer at first the cheap faster pain relief like that of NSAID. But this finding was also disagreed with the above authors. (9,12,15,16-22)

Table 1 the majority of our patients had moderate OA rather than mild or severe, this result is statistically significant.

Glucosamine chondroitine sulfate is a very large molecule as shown above, thus it will be difficult to cross the capillary wall in order to reach the articular cartilage. Thus a large dose for long duration is needed to be effective in repairing the degenerating cartilage and relieving the symptoms.(3,9) the present study clarified that pain relief was good in most of mild to moderate osteoarthritis, and was fair in most of severe osteoarthritis, this was in regard to patients taking glucosamine chondroitine sulfate, with P value <0.05 (significant). Timothy et al agrees with our finding (26), as well, Daniel agree with this finding but he claims that pain relief was better in moderate to severe condition.(27) While the control group showed a less patient satisfaction and

the pain relieving effect was unaffected by the severity of their condition (P value > 0.05).

This study presents a good functional improvement in a valuable percentage of patients on glucosamine chondroitine sulfate, nevertheless still less than the pain relieving effect. The statistical analysis suggests significance of this finding. This finding was agreed with previous series (16-22, 26, 27). Suppose that the patients should continue the course fully, in order to achieve repair of the damaged or degenerated cartilage.

We conclude the effectiveness of glucosamine chondroitine sulfate in treatment of osteoarthritis both symptomatically and functionally. And all the patients get remarkable benefits even with severe osteoarthritis. We recommend the use of high dose glucosamine chondroitine sulfate for long course in order to achieve therapeutic effect.

We recommend increasing the health educational programs about osteoarthritis and its management, and the role of glucosamine chondroitine sulfate in its treatment.

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Table (1): The pain relieving effect of glucosamine chondroitine sulfate in osteoarthritis.

Degree of pain relief	With glucosamine chondroitine sulfate						Without glucosamine chondroitine sulfate					
	Mild OA		Moderate OA		Severe OA		Mild OA		Moderate OA		Severe OA	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Good	16	84.2	22	75.9	1	14.3	2	33.3	5	31.3	3	30
Fair	2	10.5	7	24.1	6	85.7	3	50	8	50	5	50
Poor	1	5.3	0	0	0	0	1	16.7	3	18.7	2	20
Total	19	100	29	100	7	100	6	100	16	100	10	100

Table (2): functional improvement with and without glucosamine chondroitine sulfate

Degree of functional improvement	With glucosamine chondroitine sulfate						Without glucosamine chondroitine sulfate					
	Mild OA		Moderate OA		Severe OA		Mild OA		Moderate OA		Severe OA	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Good	13	68.4	14	48.3	1	14.3	0	0	0	0	0	0
Fair	5	26.3	14	48.3	6	85.7	3	50	10	62.5	2	20
Poor	1	5.3	1	3.4	0	0	3	50	6	37.5	8	80
Total	19	100	29	100	7	100	6	100	16	100	10	100

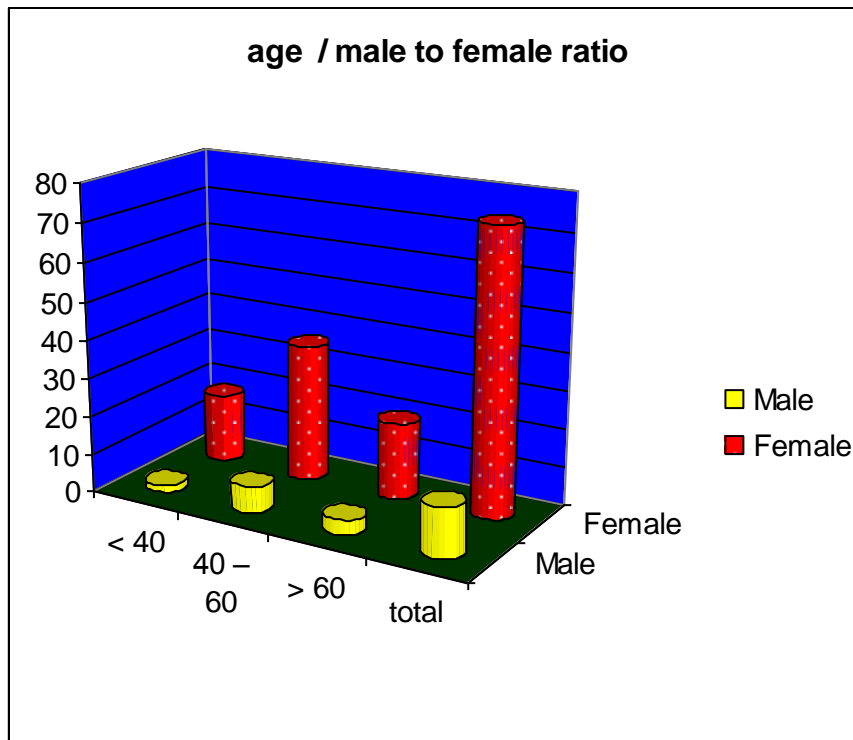


Fig (1): age \ sex distribution of the patients

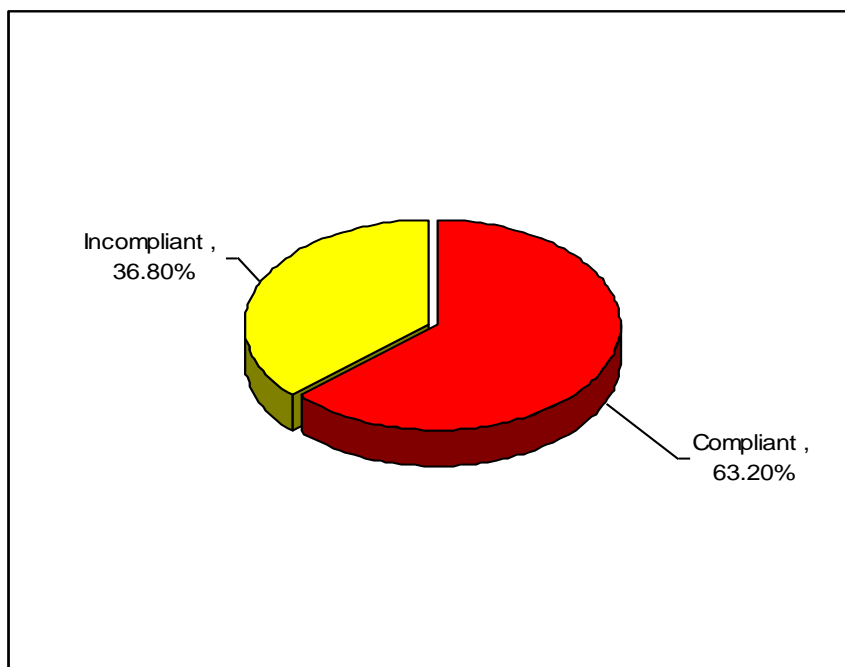


Fig (2): The percentage of patients rejection to be treated with glucoseamine chondroitin sulfate

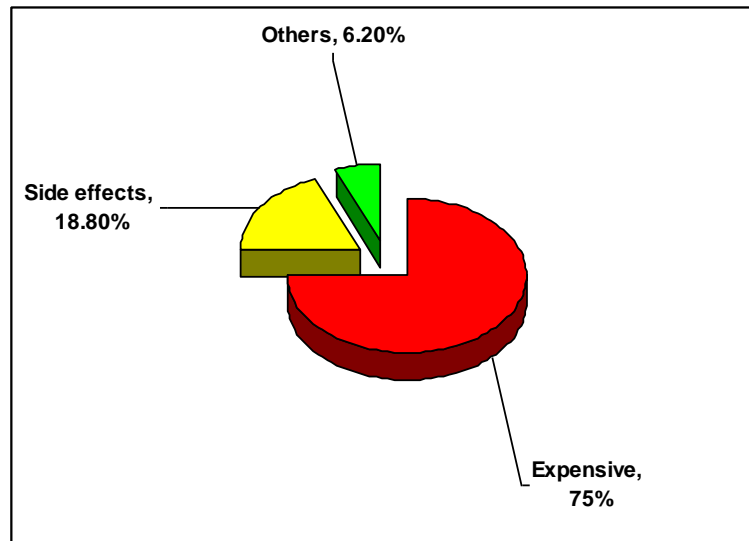


Fig (3): the causes of patient's incompletion

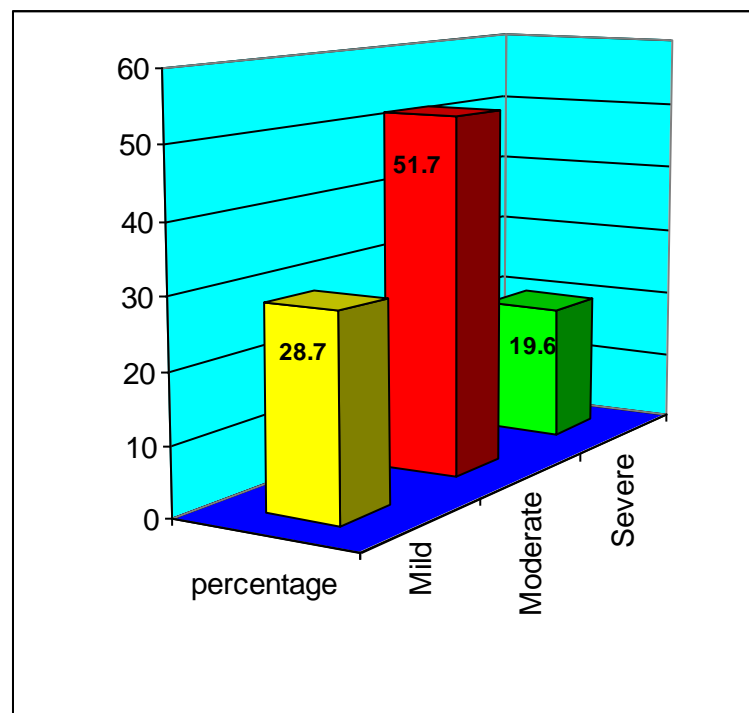


Fig (4): the severity of osteoarthritis.