

# Efficacy of Intra Articular Injections in Different Grades of Osteoarthritis of Knee

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## ABSTRACT

**Objectives:** To assess the efficacy of intra articular injections in different grades of osteoarthritis of knee.

**Study Design:** Descriptive study

**Place and Duration of Study:** This study was conducted at the Department of Orthopedics Railway Hospital Rawalpindi and Ibn-e-Seina Hospital & Research Institute Multan started from June 2008 to June 2012.

**Materials and Methods:** This study included 90 patients of either sex having mild, moderate and severe grades of osteoarthritis of knee based on radiographic findings. A study proforma was designed in which bio-statics and results of the study were recorded. Five intra-articular injections of hyaluronic acid were given on weekly basis and patients were assessed for pain and functional activity at intervals of 0, 6 and 12 weeks by KSKS, WOMAC and VAS scoring system. These patients were selected consecutively.

**Results:** In this study patients with mild and moderate grades of osteoarthritis of knee showed improvement but patients with severe grades of osteoarthritis either showed no response or less improvement.

**Conclusion:** Intra-articular injection of hyaluronic acid is an effective modality in early stages of osteoarthritis of knee.

**Key Words:** Osteoarthritis, Hyaluronic acid, Knee

## INTRODUCTION

Osteoarthritis is the most common joint disorder in the elderly.<sup>1</sup> The prevalence of osteoarthritis ranges from 1% below the age of 30 years to over 50% in people above the age of 60.<sup>2</sup> In osteoarthritis of knee there is progressive cartilage destruction which results in sub-articular cysts and osteophyte formation. There is also sclerosis of the surrounding bone and capsular fibrosis. Patient with osteoarthritis of knee usually presents with pain in one or both joints, stiffness, intermittent swelling and loss of function.

Although knee arthroplasties are performed in sufficient number in Pakistan but still this group represents only a small number of patients with knee osteoarthritis. Most patients avoid surgeries due to their high cost by using a variety of non-operative treatments like oral analgesics, nonsteroidal anti-inflammatory drugs, exercise and physiotherapy, weight relieving braces or different types of intra articular injections.<sup>3</sup>

Hyaluronic acid is a critical component of normal synovial fluid and an important contributor to joint homeostasis.<sup>4</sup> In osteoarthritis, both the concentration and the molecular weight of intra-articular endogenous hyaluronic acid is decreased, which reduces the viscoelasticity of the synovial fluid.<sup>5,6</sup> Therefore, the original rationale for intra articular injection of hyaluronic acid was to restore the viscoelasticity of synovial fluid.<sup>7,8</sup> In addition, it has been found that injected hyaluronic acid augments the flow of synovial fluid, normalize the synthesis and inhibit the

degradation of endogenous hyaluronic acid, and relieve joint pain.<sup>9,10</sup>

Clinical trials have demonstrated the safety and efficacy of hyaluronic acid injections for the treatment of knee osteoarthritis.<sup>11</sup> But studies in our setup are inconclusive regarding the best responders with respect to age, grade of osteoarthritis, level of symptoms and level of physical activity. This study was undertaken to access the efficacy of intra articular hyaluronic acid in different grades of osteoarthritis of knee defined radiologically.

## MATERIALS AND METHODS

This multicentered, prospective and observational study included those patients who satisfied the inclusion criteria. Patients were offered enrolment until planned number of patients were reached. Patients were enrolled between June 2008 to June 2012.

Inclusion criteria was age above 30 years, radiological evidence of symptomatic osteoarthritis of knee and failure of other non operative modalities like NSAIDS, physical therapy and knee braces.

Exclusion criteria was pregnant and lactating mothers, radiographic evidence of chondrocalcinosis or if physical examination demonstrated insufficiency of ligaments of the knee and neuropathic joints. The study was approved by the ethical committee and patients were explained about the study. Follow up of the patients was ensured.

Data including sex, age, height, weight and site of involvement was recorded. Weight bearing

anteroposterior and lateral radiographs of the involved knee were obtained. Findings on the initial radiographs were graded by the radiologist as mild, moderate and severe arthritis. Mild arthritis was defined as minimal loss of joint space and osteophyte formation. Moderate arthritis was defined as up to 75% loss of joint space, subchondral changes and more noticeable osteophyte formation. Severe arthritis was defined as total loss of joint space and more severe changes. During grading all the three compartments including medial and lateral tibiofemoral and patellofemoral were graded and worse grade was recorded.

The efficacy assessment included Knee Society Knee Score (KSKS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score and Visual Analogue Scale (VAS) score for pain at rest and following walking and stepping activities.<sup>12,13</sup>

With KSKS clinical rating scale a score of < 55 point indicate a poor result, 55-64 fair result, 65-79 good result and 80-100 excellent result. WOMAC was used as self-administered questionnaire. With WOMAC a lower number represent a better result ranging from zero (Best) to 96 (Poor). Visual Analogue Scale was also administered to the patient ranging from 0-100mm with lower number representing less pain and higher number representing more pain.

All the three instruments were used to assess the patients during the time of enrollment, at 6 weeks and then at 12 weeks. One of the medical officer who was skilled to use the study instruments was appointed to assess the patients.

Hyaluronic acid injections (Hyalgan) were administered as a course of five weekly injections. All injections were given in the similar manner with the patient lying supine and the knee joint approached through superolateral pouch under the superolateral edge of patella. Ethylchloride spray was used immediately prior to the injection for the patient comfort. A 22 gauge needle was used to inject the prefilled 2ml syringe. In case of the knee effusion 18 gauge needle was used for the aspiration and then the needle was left in place for the injection. Patients was encouraged to avoid strenuous activity for a day following the intra articular injection.

The results obtained from KSKS, WOMAC, VAS were tested separately. Two-way Anova (Analysis of Variance) technique and F-Test were used.

## RESULTS

This study included 100 patients having symptomatic osteoarthritis of the knee. 10 patients left the follow up. Mean age of the patients was 50.45±0.90 years with range of 35-75 years. Majority of the patients were above 40 years of age. There were 68 (75.5%) patients who were 41-60 years of age. There were 16 (17.7%) patients who were less than or equal to 40 years of age

and 6 (6.6%) patients were above 60 years of age. Mean weight of the patients was 80.30±0.75 kg. (Table No.1) There were 52 (57.8%) male and 38 (42.2%) female patients. 20 (22.2%) patients had low socioeconomic status, 55 (61.1%) had middle and 15 (16.6%) had high socioeconomic status. In 38 (42.2%) patients left side was involved while in 44 (48.9%) patients right side was involved and in 8 (8.9%) patients both sides were involved. 30 (33.3%) patients had mild, 30 (33.3%) patients had moderate and 30 (33.3%) patients had severe grade of osteoarthritis.

**Table No.1: Characteristics of patients with OA Knee (n=90)**

	No. of Patients (%)	No. of Patients (%)	No. of Patients (%)
Age (yrs)	≤ 40 = 16 (17.7%)	41-60 = 68 (75.5%)	≥ 60 = 6 (6.6%)
Socioeconomic Status	Low = 20 (22.2%)	Middle = 55 (61.1%)	High = 15 (16.6%)
Side Involvement	Left = 38 (42.2%)	Right = 44 (48.9%)	Both = 8 (8.9%)
Arthritis Grade	Mild = 30 (33.3%)	Moderate = 30 (33.3%)	Severe = 30 (33.3%)

**Table No.2: Knee Society Knee Score (KSKS) in Patients with OA Knee (n=90)**

	Mild	Moderate	Severe	All
<b>KSKS</b>	N=30 Mean=62.400 S.D=4.739	N=30 Mean=54.933 S.D=2.434	N=30 Mean=37.600 S.D=4.280	N=90 Mean=51.644 S.D=11.151
<b>KSKS-b</b>	N=30 Mean=87.900 S.D=4.831	N=30 Mean=70.600 S.D=6.806	N=30 Mean=42.500 S.D=3.655	N=90 Mean=67.000 S.D=19.519
<b>KSKS-c</b>	N=30 Mean=90.900 S.D=3.872	N=30 Mean=65.567 S.D=10.516	N=30 Mean=40.267 S.D=3.483	N=90 Mean=67.444 S.D=22.006
<b>All</b>	N=90 Mean=80.400 S.D=13.607	N=90 Mean=65.567 S.D=10.516	N=90 Mean=40.122 S.D=4.282	N=270 Mean=62.030 S.D=19.534

**Table No.3: WOMAC in Patients with OA Knee (n=90)**

	Mild	Moderate	Severe	All
<b>WAM AC-a</b>	N=30 Mean=45.467 S.D=2.825	N=30 Mean=51.967 S.D=2.173	N=30 Mean=61.000 S.D=3.806	N=90 Mean=52.811 S.D=7.063
<b>WAM AC-b</b>	N=30 Mean=22.167 S.D=5.032	N=30 Mean=37.033 S.D=6.636	N=30 Mean=55.067 S.D=3.868	N=90 Mean=38.089 S.D=14.507
<b>WAM AC-c</b>	N=30 Mean=17.133 S.D=6.213	N=30 Mean=36.467 S.D=10.095	N=30 Mean=58.167 S.D=5.167	N=90 Mean=37.256 S.D=18.400
<b>All</b>	N=90 Mean=28.256 S.D=13.322	N=90 Mean=41.822 S.D=10.059	N=90 Mean=58.078 S.D=4.922	N=270 Mean=42.719 S.D=15.792

Using KSKS, mild grades showed mean score of 62.40 at the start and after 12 weeks mean score was 90.90. Moderate grades showed mean score of 54.93 at the start and after 12 week mean score was 65.56. Severe grades showed mean score of 37.60 at the start and after 12 week mean score was 40.26.

Using WOMAC, mild grades showed mean score of 45.46 at the start and after 12 weeks mean score was

17.13. Moderate grades showed mean score of 51.96 at the start and after 12 weeks mean score was 36.46. Sever grades showed mean score of 61.00 at the start and after 12 week mean score was 58.16.

**Table No.4: Visual Analogue Scale (VAS) in Patients with OA Knee (n=90)**

	Mild	Moderate	Severe	All
VAS-a	N=30 Mean=56.000 S.D=4.433	N=30 Mean=68.167 S.D=2.780	N=30 Mean=78.333 S.D=3.304	N=90, Mean=67.500 0 S.D=9.837
VAS-b	N=30 Mean=26.500 S.D=8.610	N=30 Mean=48.000 S.D=8.367	N=30 Mean=70.687 S.D=5.231	N=90 Mean=48.456 S.D=19.493
VAS-c	N=30 Mean=20.000 S.D=8.610	N=30 Mean=45.467 S.D=15.204	N=30 Mean=74.500 S.D=6.867	N=90 Mean=46.656 S.D=24.823
All	N=30 Mean=34.167 S.D=17.178	N=90 Mean=53.878 S.D=14.317	N=90 Mean=74.567 S.D=6.102	N=270 Mean=54.204 S.D=21.233

Similarly using Visual Analogue Scale, mild grades showed mean score of 56.00 at the start and after 12 weeks mean score was 20.00. Moderate grades showed mean score of 68.16 at the start and after 12 weeks mean score was 45.46. Severe grades showed mean score of 78.33 at the start and after 12 weeks mean score was 74.50.

These results showed the improvement more in mild and moderate grades of osteoarthritis of knee than in severe grades of osteoarthritis of knee.

## DISCUSSION

The present study showed the treatment effect of hyaluronic acid injection in different grades of osteoarthritis of knee. Although intra-articular injections have shown improvement in all grades but effects are more in mild and moderate grades as compared to severe grades in our population as well. No radiological grading system has undergone interobserver and intraobserver reliability testing, this should be considered a limitation for any study that draws interference between radiological grades and outcome.

The meta-analysis by Wang CT, et al showed significant improvement in pain and functional outcome except those who had severe osteoarthritis.<sup>14</sup> Similarly a prospective randomized study by Petrela RJ and Petrela M showed patient satisfaction in terms of pain relief and functional improvement by hyaluronic acid.<sup>15</sup>

In this study 10 patients were slipped during the course of treatment as it require five weeks to complete so it is concluded that the course should be of shorter duration. As new variants of hyaluronic acid are discovered, single intra-articular injection with 6ml Hylan G-F 20 can replace routine method of once a week for five weeks.<sup>16</sup> The effect of hyaluronic acid at molecular level has also been established.<sup>17,18</sup>

## CONCLUSION

Intra-articular injection of hyaluronic acid is an effective modality in early stages of osteoarthritis of knee.

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