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## Comparing the effectiveness of intra articular hyaluronic acid injection and intra articular corticosteroid injection in symptomatic osteoarthritis knee

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### Abstract

**Background:** Osteoarthritis (OA) knee is a most common chronic degenerative condition effecting old age group individuals. Intraarticular (IA) injections is the final non-operative modality and includes corticosteroids, viscosupplements and blood-derived products. In this study we compare the therapeutic efficacy of intra-articular hyaluronic acid (HA) and corticosteroids (CS) for OA knee.

**Methods:** It is prospective randomized study done during April 2016 to January 2018. Total 100 patients with OA knee were enrolled and randomised into two groups. Patients receiving Hyaluronic acid (group A) and Corticosteroids (Group B). Patients were graded using Kellgren and Lawrence classification. Visual analogue score and Knee society score were calculated before giving injections and at 1st-month, 3rd-month and 6th-month post treatment and results were compared.

**Results:** Group A and Group B includes 50 patient in each group. The mean age of the study population is 64 years with majority being females (81 patients). At one month, group B group had better pain relief and functional outcome compared to group A. At 3 months, Group A had better functional outcome, whereas, there was no significant difference in pain relief between both the groups. At 6 months, patients in both the groups had pain relief and improved functional outcome compared to baseline, but there was no significant difference in outcome between both the groups.

**Conclusion:** Short term efficacy is better in CS compared to HA. Both group A and Group B had no significant difference in pain relief and functional outcome by the end of 6 months.

**Keywords:** Osteoarthritis knee, hyaluronic acid, corticosteroids, intra-articular injection

### Introduction

Osteoarthritis (OA) is a clinical syndrome characterized by loss of articular cartilage, osteophyte formation, subchondral bone remodelling, and inflammation of the joint [1]. Worldwide, OA is one of the common cause of joint disability and most common cause of joint pain [2]. It is a major health problem in patients with elderly age group and obesity [3]. Aetiology is multifactorial.

Management of OA knee requires both non pharmacologic and pharmacologic modalities. Non-pharmacologic interventions include weight reduction, exercises, patient education, bracing, local heating/cooling and electromagnetic therapy. Pharmacologic modalities include paracetamol, opioids, Non-steroidal anti-inflammatory drugs, and other drugs such as glucosamine. Intraarticular (IA) injections is the final non-operative modality and includes corticosteroids, viscosupplements and blood-derived products [4, 5]. Two widely accepted IA injections for OA knee are hyaluronic acid (HA) and corticosteroids (CS) [6].

HA injections results in pain relief with functional improvement due to restoration of viscous properties of synovial fluid. Various studies proved that HA decreases apoptosis of chondrocytes and has a bio-synthetic effect. It also interacts with matrix turnover and inflammatory mediators in joint cells [7, 8, 9].

According to a major Cochrane review, IA CS have fast and short-lived action with no evidence of long term efficacy [10]. The efficacious dose and regimen are still controversial [11]. There are several studies comparing efficacy of IA HA and CS. A meta-analysis concluded that, HA has greater efficacy after 8 weeks of injection compared to CS [12].

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Few other studies did not reveal significant differences in efficacy between CS and HA at 3months and 6 months follow up. [13, 14, 15]. Here, we compared the efficacy of IA HA and CS on 100 patients diagnosed with OA knee.

**Materials and Methods**

It is a prospective, randomized study conducted on 100 patients from a single centre in south India. Study was done during April 2016 to January 2018. Patients were randomized 1:1 into two groups. Group A includes patients receiving single dose of HA 60mg (4ml) and Group B includes patients receiving single dose of CS, methylprednisolone 80mg (2ml). The follow-up visits were scheduled at 1 month, 3 months and 6 months.

Demographic details, detailed history, laboratory investigations were recorded. X-ray knee anteroposterior view on standing was done in all patients. Patients were graded for OA knee using Kellgren and Lawrence classification.

Patients with age more than 40 years suffering from primary osteoarthritis knee were included in the study. Exclusion criteria includes patients with age less than 40 years, infection of the affected limb, history of previous intra articular injections, allergies to study medications, inflammatory arthritis, crystalline arthropathy, type 2 diabetes mellitus and metabolic syndrome.

Administration of IA injection was done under strict aseptic precautions. With knee in mild flexion, needle was inserted into the patellofemoral joint space. After confirming the joint space, study medication (HA or CS) was injected.

Primary endpoints were reduction in pain graded by 0-10 visual analog score (VAS) and functional improvement grading using knee society score (KSS). Statistical analysis was done using Student’s t-test.

**Results**

A total of 100 patients were included in the study during April 2016 to January 2018. The mean age of study population was 64 years. Fifty patients received HA (group A) and 50 patients received CS (group B). There were more women (81%) compared to males (29%) subjects. Fifty one patients had right knee involvement and forty nine patients had left

knee involvement. The baseline characteristics were shown in table 1. Table 2 shows distribution of patients based on Kellgren - Lawrence classification.

The mean VAS scores at 1 month in Group A and Group B is 5.18+/-0.962 and 3.08+/-1.192 respectively, which shows early symptomatic pain relief in patients receiving CS injections. The mean KSS at 1 month in Group A is 150.30+/-8.830 and in Group B is 155.34+/-10.464, which shows better improvement in the functional outcome in the CS injection group.

At 3 months, the mean VAS scores in Group A is 3.74+/-1.046 and Group B is 3.04+/-1.195, which shows that there no diffence in pain relief between both the groups. The mean KSS at 3 months, in Group A is 160.80+/-4.882 and in Group B is 155.84 +/- 8.525, which infers that there is a significant improvement in functional outcome following HA injection compared to CS injection.

By 6 months the mean VAS score in Group A and Group B is 4.52+/-1.129 and 4.02+/-1.301 respectively, and the mean KSS score in Group A and Group B is 151.20+/-8.525 and 152.54+/-10.270 respectively, which infers that there is no significant difference in the pain relief and functional outcome in both the groups. Table 3 shows the mean VAS and KSS scores of both groups at baseline, 1 month, 3 months and 6 months.

**Table 1**

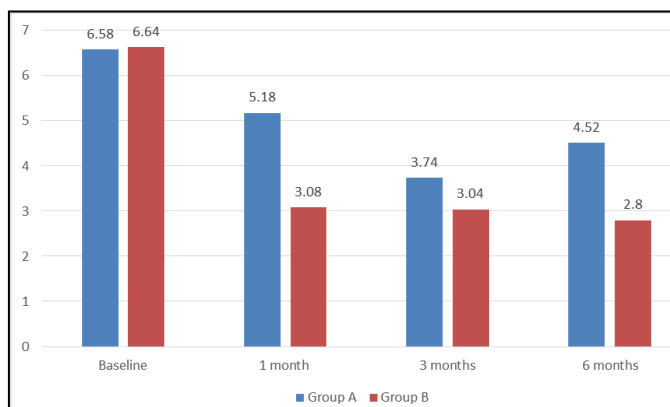
Demographic characteristics	Group A (n=50)	Group B (n=50)
Female, n (%)	39 (78%)	42 (84%)
Mean age in years	63 years	65 years
Knee side Involved		
Right knee, n (%)	23 (45%)	28 (54.9%)
Left knee, n (%)	28 (57.2%)	21 (42.8%)

**Table 2**

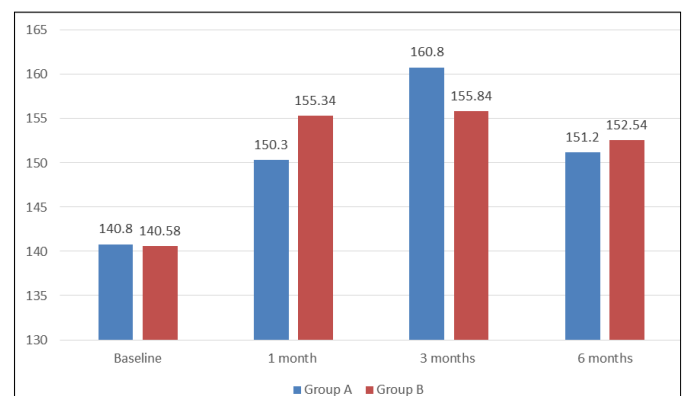
Kellegren – Lawrence grading	Number of patients, n
Grade 1	Nil
Grade 2	58
Grade 3	42
Grade 4	Nil

**Table 3**

	Baseline		1-month		3-months		6-months	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
VAS	6.58+/-0.928	6.64+/-1.005	5.18+/-0.962	3.08+/-1.192	3.74+/-1.046	3.04+/-1.195	4.52+/-1.129	4.02+/-1.301
KSS	140.80+/-9.223	140.58+/-12.380	150.30+/-8.830	155.34+/-10.464	160.80+/-4.882	155.84+/-8.525	151.20+/-5.584	152.54+/-10.270



**Fig 1: Mean Visual Analogue Score**



**Fig 2: Mean Knee Society Score**

## Discussion

OA is a chronic degenerative disease leading to functional and structural defects in one or more joints. Treatment modalities include non-pharmacological, pharmacological and operative procedures. In this study we explored efficacy of HA and CS injections in OA knee.

A study by Jones *et al.* reported that patients who received HA injections for the treatment of OA knee had better pain relief at six months of follow up than patients who received CS [16]. In our study at the end of six months follow up group B had better pain relief from baseline compared to group A. Leardini *et al.* concluded that HA was superior to the CS in terms of duration of pain relief. The authors stated HA to be a potential therapeutic breakthrough. However, the limitation of their study was less number of subjects included and limited follow up period, 40 patients and 2 months respectively [17]. In our study, we included a total of 100 patients with a follow up period of 6 months.

Skwara A *et al.* study on gait patterns following intra articular HA and CS stated that single injection of high viscosity HA shows superior range of motion and pain relief as well as improvement in clinical results but there was no significant difference compared to CS [18]. In our study, most of the patients had full range of motion with terminal pain. Significant gait changes were not noted before the injection in most of the patients. Patients with mild gait changes showed improvement both with HA and CS.

Seth S Leopold *et al.* in his study on 100 patients has used VAS, knee society score and WOMAC score to evaluate the efficacy of HA and CS intra articular injections in OA knee. Aspiration was done to all patients in both the groups prior to the injection. In their study, CS patients could have a second injection of CS in their 6 months follow period. Patients of both the groups could take NSAIDs. He has concluded that no difference was detected between patients treated with intra articular injection of HA and those treated with the corticosteroid with respect to pain relief or function at six months of follow up [19]. In our study, we have used VAS and knee society score for evaluation of HA and CS intra articular injections in OA knee. We have done aspiration to all patients in both the groups prior to the intra articular injection. Patients in both the groups could take NSAIDs and encouraged to do quadriceps and hamstring strengthening exercise. The present study demonstrated only modest treatment effects from baseline for both HA and the corticosteroid and no significant difference in outcome has been noted between the two treatment groups.

Based on the results in our study, we conclude that, both modalities (HA and CS) are effective in reducing pain and functional restriction. The two treatment modalities showed no significant difference in efficacy at 6 month follow-up period whereas, CS showed superior efficacy at one month compared to HA.

## Declarations

**Ethical approval:** Ethical clearance taken from Institutional Ethical Committee, Sri Ramachandra Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

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