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Original Article

Outcome of Hyaluronic Acid for Knee Osteoarthritis

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Abstract:

Osteoarthritis(OA) is the most common chronic condition of the knee joints that takes place when the cartilage or a low friction surface between joints breaks down which leads to pain, stiffness and swelling. Total 56 patients with osteoarthritis of knee, randomized to receive intra articular hyaluronic acid injection and were followed up for 3 months. Patients were evaluated with the Western Ontario and Mc Master University Osteoarthritis Index(WOMAC), Knee injury and Osteoarthritis Outcome Score (KOOS) and the visual analog scale. This study was done for the evaluation of the therapeutic effect of intra articular injection of hyaluronic acid (HA) in knee osteoarthritis. Patients mean age were57 ±9 years. WOMAC score shows that stiffness did not improved after intervention, (P> 0.05). KOOS score shows that after intervention, symptoms were improved (P< 0.05).

Keywords: Osteoarthritis, Intra-articular injection, Hyaluronic acid.

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Introduction

OA a degenerative form of arthritis, is the most common type of arthritis in the knee, affecting 14 million. Individuals in the United States[1] .OA is associated with degradation of the cartilage in the knee joint space. Which leads to symptoms such as pain, stiffness, and crepitus[2] ·treatment of OA is rapid acting pain medication like acetaminophen or non-steroidal anti-inflammatory drugs (NSAID)[3,4,5].

Treatment with NSAIDS is related to a increased risk of serious gastrointestinal and CVS side effects, indicating limited use of NSAID[6].

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The safety profile of NSAIDS contradicts it the chronic character of knee OA in which prolonged treatment is required. Additionally, non –pharmacological measures such as strength training exercise and weight reduction programme were also added.

Intra articular injection with hyaluronic acid (HA) is an alternative treatment for the knee OA patients. Intra articular HA result in similar effect on reduction of pain and functional improvement compared to NSAID use. Peak effectiveness of intra-articular HA is reached between 1 and 2 month sin a series of patient and residual effects exits up to 6 months[7,8]

Traditionalyintra-articular injections of steroids, anti-inflammatory drugs or hyaluronic acid as alternative modalities is used to maximize the local effect and minimize the systemic side effects. Each modalities has shown to reduce some form of pain, though the safest and long lasting treatment has been shown with intra articular hyaluronic acid injection. Thus, the present study was aimed to determine the treatment outcome of intra articular HA injection.

Composition of hyaluronic acid:

Hyaluronate is a high molecular weight, ubiquitous molecule that naturally occurs within the cartilage and synovial fluid. It is composed of alternating N-acetyl-D-glucosamine and

glucuronic acid residues attached by B (1-4) and B(!-3) bonds with molecular mass ranging from 6500 to 10900kDa.

Materials and Methods

This prospective interventional study was conducted in a private clinic of Sylhet. A total of 56 patients selected during the study period from January 2020 to December2021 according to inclusion and exclusion criteria. Patient of both sexes included from 45 to 75 years who were suffering from knee OA for at least 3 months, along with radiographic OA grade II-III(According to Kellgren and Lawrence(KL) grading scale. Patient with history or presence of trauma or surgery, cancer, malignancy, infections or ulcer on the target knee, history of vasovagal shock, pregnancy and laction are excluded.

Informed written consent was taken from each patient as well as from his/her guardian. All patients were assessed by physical examination and necessary investigations. Under aseptic conditions the needle was inserted into the suprapatellarpouch and IA injections HA is administered weekly for 5 week and another injection given after 4week.Thus before each injection after the 1st injection and 3 months after the last injection follow-up (total 6 follow-up) and evaluation was done by Western Ontario Mc Master University Osteoarthritis (WOMAC), Knee injury and Osteoarthritis Outcome Score (KOOS) and Visual analog scale (VAS).

Western Ontario McMaster University Osteoarthritis (WOMAC) in this study Farsi version of the WOMAC index was used[9]. WOMAC questions were asked again in the last section of follow- up.

Knee injury and osteoarthritis Outcome Score (KOOS) is a tool used for knee and designed to evaluate the patients attitude on the knees and related problems. This score contains 42 items in 5 scored subscales including pain and other Symptoms, Function in daily living (ADL), Function in Sport and Recreation (Sport/Rec), and Knee related Quality of Life (QOL) [10].

Visual analog scale the visual analog scale (VAS) is an instrument regularly used to measure pain intensity based on a 0-10cm (Flandryet al.1991). In the present study, Patient was asked:"Based on VAS, how much pain are you in experiencing?" In the follow-up sections, based on VAS, was asked about their pain again and measurement was recorded.

Data was presented as mean ± standard deviation. Demographic variables were done with Chi squretest.VAS pain, WOMAC and KOOS sub scores as evaluated during study time with repeated measurement of ANOVA. All statical analysis were done in IBM SPSS19. P valur <0.05 consider as significant level.

Result:

In this 56 patients taken Injection Hyaluronic acid. age of the patient ranging from 50 to 75 years with mean age57±9 years most of patients were above 60years. There were 21 (37.5%) male and 35 (62.5%) female with ratio of 3:5 (P= 0.431).Table 1 presented characteristics of occupational status (p= 0.705) and cigarette smoking (p=0.302) .All 56 patients complete 6 dose injection and three months follow up.

Table 1: Baseline demographic information

	Number	P value
Sex		0.431
Male	21	
Female	35	
Occupation		0.705
Housewife	31	
Retird	20	
Others	5	
Smoking		0.302
Yes	11	
No	45	

Table 2: Age Distribution

Age	Number	Percentage (%)
50-59	11	19.6 %
60-69	41	73.2%
70-80	04	7.2%

Table 3: Outcome of WOMAC and KOOS criteria

	Mean	SD	P value ANOVA
WOMAC score			
Pain before (0-20)	14	4.37	0.331
Pain after (0-20)	08	4.14	0.452
Stiffness before (0-8)	4.80	3.90	0.476
Stiffness after (0-8)	4.39	2.78	0.776
Physical function Before (0-68)	48	11.37	0.807
Physical function after(0-68)	33	12.56	0.906
KOOS score			
Pain before(0-100)	30	20.83	0.348
Pain after(0-100)	50	21.20	0.347
Symptoms before(0-100)	40	20.09	0.684
Symptoms after(0-100)	55	19.15	0.473
Daily activities before(0-100)	40	18.23	0.972
Daily activities after (0-100)	60	17.67	0.866

Discussion:

Osteoarthritis is chronic disabling disease with morbidity and pain. The weight bearing knee joint frequently affected by degenerative processes with much disabilities. Some disease modifying agents improved the joint mobility and function. Preventing the progression of diseases was an important secondary goal .Recent meta-analysis have shown that treatment of knee OA withintra-articular injections is superior to pharmacological interventions with oral NSAIDS[3].[To]achieve both the primary and secondary therapeutic goals, conservative intervention withintra-articular injection of hyaluronic acid (HA) is frequently administered[11]. The effectiveness of pain reduction was more durable in HA in time point of first, second and third month, shown by the using of VAS score. Previous studies also provide the same result[12]. Pain score remained significantly low after 3 months, which means the durability of efficacy of HA is significantly longer. The result of this study consistent with the finding of Leighton et al, who reported the more durable effectiveness of HA compared to methylprednisolone[13].

WOMAC score has shown that pain and joint stiffness did not improved at any time points after intervention (Table 3).However, physical function significantly improved. This index has not been widely used yet in studies related to intra- articular injections[14]. Besides, KOOS score also suggested that symptoms improved occurs after 3 months of injection HA. Moreover, daily activity improved. This scoreing system is an important tool to compare the clinical efficacy of each intervention[15]. HA is suggested to be superior in the duration of pain relief. We can propose that HA can be administered every weekly for 5 weeks then another injection after 4 week intra- articularly.

Intra-articular injection of Hyaluronic acid leads to clinically relevant improvement in pain and function. Since the costs from loss of productivity at work due to knee OA are high in patients in the working age, the treatment with HA could also result in certain economic benefits.[16] Many recent trials and meta-analyses have evaluated and proved the substantial superiority of injectable HA over the placebo group for pain relief and functional efficacy[17].The clinical trial performed by Brandt et al.[18] and Day et al[19] indicated that HA is safe and well- tolerated to induce a clinically significant improvement for patients with mild to moderate knee OA. Furthermore, Neustadtet al.[20] reported that HA also improve clinical outcome in advanced stage of OA (KL grade 4).

Conclusions:

Osteoarthritis affects a large portion of the population. As the general age of the population continues towards an older age, the prevalence of the disease is only going to go up. Therefore, more research is needed to conclude the effective modalities of treatment to fully control the disease and its side effects. Hyaluronic acid is a technique for helping lower the side effects. Its effectiveness is deployed by the multiple mode of actions, including lubrication, anti - inflammatory and chondroprotective action. New products are continuously being developed to maximize the effectiveness of treatment. Therefore treatment with Hyaluronic acid in knee OA shows a lot of potential that will hopefully be established through further research.

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