

Intra-articular injection of hyaluronic acid inpatients with knee osteoarthritis in Aden, Yemen

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Abstract

Background: Knee osteoarthritis is a chronic degenerative joint disease, characterized clinically by gradual development of fluctuating joint pain, swelling, stiffness, and loss of motion.

The aim of the study was to determine the characteristics of the patients, some aspects of the clinical findings and the outcome of treatment procedure.

Materials and method: It was a retrospective descriptive study of patients suffering from knee osteoarthritis and who had been treated by the use of intra-articular injection of hyaluronic acid. The study was conducted from January 2016 to December 2016 in a private hospital in Aden. The patients' charts were retrieved and the study data obtained.

Results: The study patients were 112 (males 54.5% and females 45.5%). The ratio male to female was 1.2:1.

The age of patients ranged between 60 to 88 years.

Most of the patients 50 (44.6%) were of age group 60 – 70 years followed by the age group 71 – 80 years with 42 (37.5%). The mean age of all patients was 72.8 ± 7.2 years. The body mass index (BMI) ranged between 27 – 41 kg/m². Obesity of the patients (BMI between 30 – 39.9 kg/m²) were predominant 100 (89.3%).

Most of the patients were from rural areas (75.0%). The sites of knee osteoarthritis were bilateral (50.0%), right knee (25.9%) and left knee (24.1%).

The total number of affected knee joints was 168. Moderate pain was predominant 89 (53.0%) followed by severe pain 66 (39.2%). Morning stiffness was found in 76.8% patients. The follow up period ranged between 6 to 12 weeks.

Sixty nine percent of treated OA knee joints improved, 13.8% deteriorated and 17.2% did not improve.

Conclusion: As a result of the follow-up we found 69% of treated OA knee joints were improved due to the use of intra-articular hyaluronic injections.

Key words: Knee osteoarthritis, Intra-articular injection, hyaluronic acid, Aden, Yemen

Introduction

Knee osteoarthritis (OA), is a chronic degenerative joint disease, characterized clinically by gradual development of fluctuating joint pain, swelling, stiffness, and loss of motion [1].

A recent study revealed that OA is a leading cause of disability, with 10% of men and 13% of women over 60 years of age suffering from symptomatic OA of the knee [2].

The incidence of OA is higher in women compared with men, and aging, obesity, genetics and biomechanical predisposing factors are risk factors for the initiation and progression of OA [3].

Patients with OA are vulnerable to morbidity, disability and functional deficits [4].

The number of patients with OA is estimated at 151 million worldwide. Symptomatic knee OA has emerged as the most common form of OA in the elderly aged 65 years or older [5].

Viscosupplementation with intra-articular hyaluronans (HA) is the latest pharmacological treatment for OA.

Intra-articular hyaluronic acid injections, also known as viscosupplementation, are widely used by orthopedic surgeons to treat knee OA [6]. There has been some debate about the effectiveness of viscosupplementation in earlier studies, most of which were manufacturer-sponsored studies. However, a Cochrane review of 76 clinical trials concluded that viscosupplementation was effective for treating knee osteoarthritis [7]. The treatment effect often lasted for up to four months and led to improvements in pain and function [7,8].

The aim of our study was to determine the characteristics of the patients, some aspects of the clinical findings and the outcome of treatment procedures.

Materials and method

This is a retrospective descriptive study of patients suffering from knee osteoarthritis and treated by the use of intra-articular injection of hyaloronic acid (HA).

The study was conducted from January 2016 to December 2016 in a private hospital in Aden.

During the study period, a total of 112 patients were seen at the outpatient clinic of the private hospital with chronic osteoarthritis and they were examined and treated with intra-articular knee injections of low molecular density HA.

The patients' charts were retrieved and information about sex, age, residency, osteoarthritis knee side, body mass index (BMI), type of pain (of each effected knee joints),

morning stiffness (of each effected knee joints), duration of follow-up, and the outcome of the treatment procedures was obtained. Body Mass Index (BMI) was defined as weight in kilograms divided by the square of patient's height in meters. Patients were stratified by obesity status into 4 groups according to their BMI values: <25 kg/m² (underweight), 25-29.9 kg/m² (overweight), 30-39.9 kg/m² (obese), and = 40 kg/m² (morbidly obese) [9].

The data was entered into a computer and analyzed using SPSS version 17, statistical package. For variables difference, chi-square tests, and P values were calculated. A p-value of < 0.05 was considered statistically significant.

Results

In the study period, a total of 112 patients who suffered from chronic knee osteoarthritis were seen and treated by the author at the private hospital in Aden.

Table 1 summarizes the characteristic variables of patients with knee joint osteoarthritis. The study patients were 61 (54.5%) males and 51 (45.5%) females with the ratio of male to female 1.2:1. The age of patients ranged between 60 to 88 years.

Most of the patients 50 (44.6%) were of age group 60 – 70 years followed by the age group 71 – 80 years with 42 (37.5%) and > 80 years 20 (17.9%). The mean age of all patients was 72.8 ± 7.2 years, and the mean age of males was 72.1 ± 7.0 years and for women it was 73.6 ± 7.4 years. By comparing between means using Anova table in SPSS no positive relationship was found between values (p > 0.05).

The Table revealed that the BMI ranged between 27 – 41 kg/m². The obesity of the patients (BMI between 30 – 39.9 kg/m²) were predominant 100 (89.3%) followed by overweight (BMI between 25 – 29.9 kg/m²) with 9 (8.0%) and morbidly obese (BMI = 40 kg/m²) were 3 (2.7%).

Patients from rural areas were predominant 84 (75.0%).

Figure 1 displays the sites of knee osteoarthritis which were bilateral (50.0%), right knee (25.9%) and left knee (24.1%).

Table 2 shows the total number of affected knee joints which was 168. It revealed that 85 (50.6%) were in the right side and 83 (49.4%) in the left side. Moderate pain was predominant 89 (53.0%) followed by severe pain 66 (39.2%) and mild pain 13 (7.8%). It showed also that 129 (76.8%) patients were complaining of morning stiffness.

Table 3 shows the right and left knees OA related to type of pain, morning stiffness and outcome.

In general, pain was slightly more 85 (50.6%) in the right knee OA and in left knee OA was 83 (49.4%).

Table 1: Characteristic variables of patients with knee joint osteoarthritis (n = 112)

Variables	Range	Mean \pm SD	No	%
Sex:				
Males			61	54.5
Females			51	45.5
Age range (years):	60 – 88			
Age groups (years):				
60 – 70			50	44.6
71 – 80			42	37.5
> 80			20	17.9
Mean Age (years):				
Age of all patients		72.8 \pm 7.2		
Age of males		72.1 \pm 7.0		
Age of females		73.6 \pm 7.4		
P-value		P > 0.05		
Range BMI (kg/m²)	27 – 41			
BMI groups (kg/m²):				
25 – 29.9			9	8
30 – 39.9			100	89.3
\geq 40			3	2.7
Body mass index (BMI):				
All patients		33.7 \pm 2.5		
Men		33.8 \pm 2.5		
Women		33.5 \pm 2.5		
P-value		P > 0.05		
Residency:				
Urban areas			28	25.0
Rural areas			84	75.0

Figure 1: Site percentage of osteoarthritis among the study patients

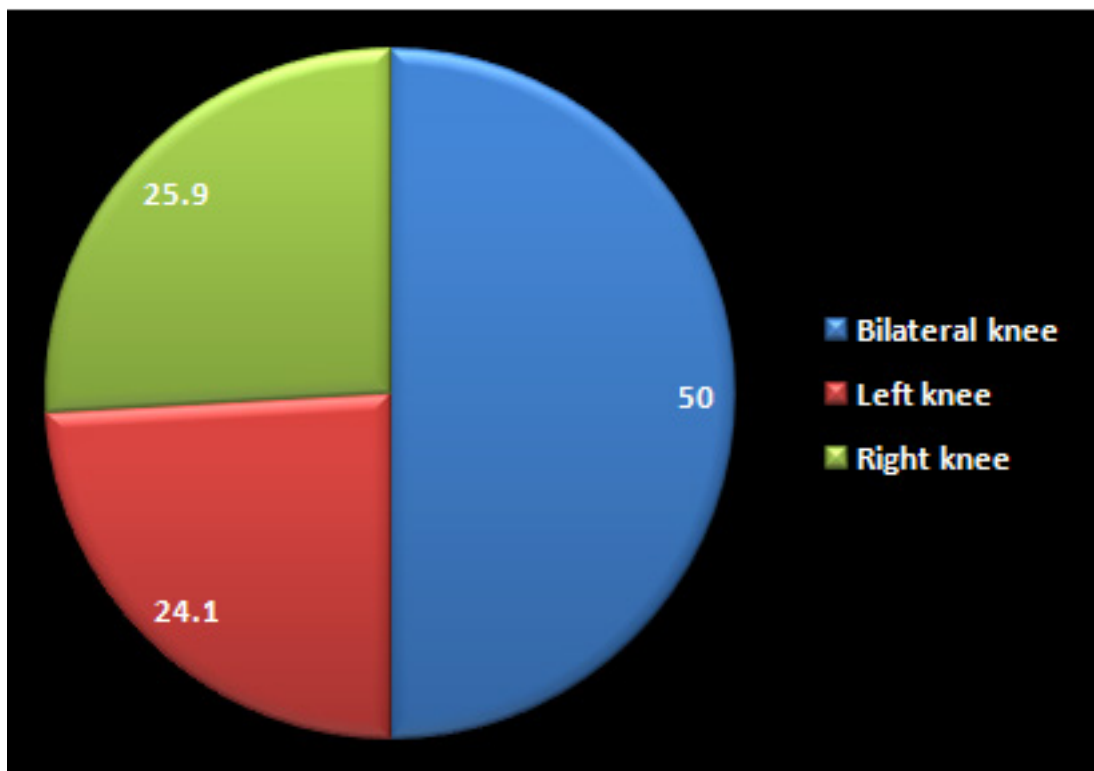


Table 2: Distribution of knee joint osteoarthritis among the study patients (n = 168)

Variables	Frequency	%
Site of all knee joints:		
Right	85	50.6
Left	83	49.4
Type of pain:		
Moderate	89	53.0
Severe	66	39.2
Mild	13	7.8
Morning stiffness:		
Yes	129	76.8
No	39	23.2

Table 3: Site of knee OA related to type of pain and morning stiffness (n=168)

Variables	Right knees n = 85 (50.6%)		Left knees n = 83 (49.4%)		Total n = 168 (100%)		p-value
Type of pain:							
Moderate	43	(25.6)	46	(27.4)	89	(53.0)	P > 0.05
Severe	33	(19.6)	33	(19.6)	66	(39.2)	
Mild	9	(5.4)	4	(2.4)	13	(7.8)	
Morning stiffness							
Yes	71	(42.3)	58	(34.5)	129	(76.8)	P < 0.05
No	14	(8.3)	25	(14.9)	39	(23.2)	

Figure 2: Percentage of follow up periods for all study patients

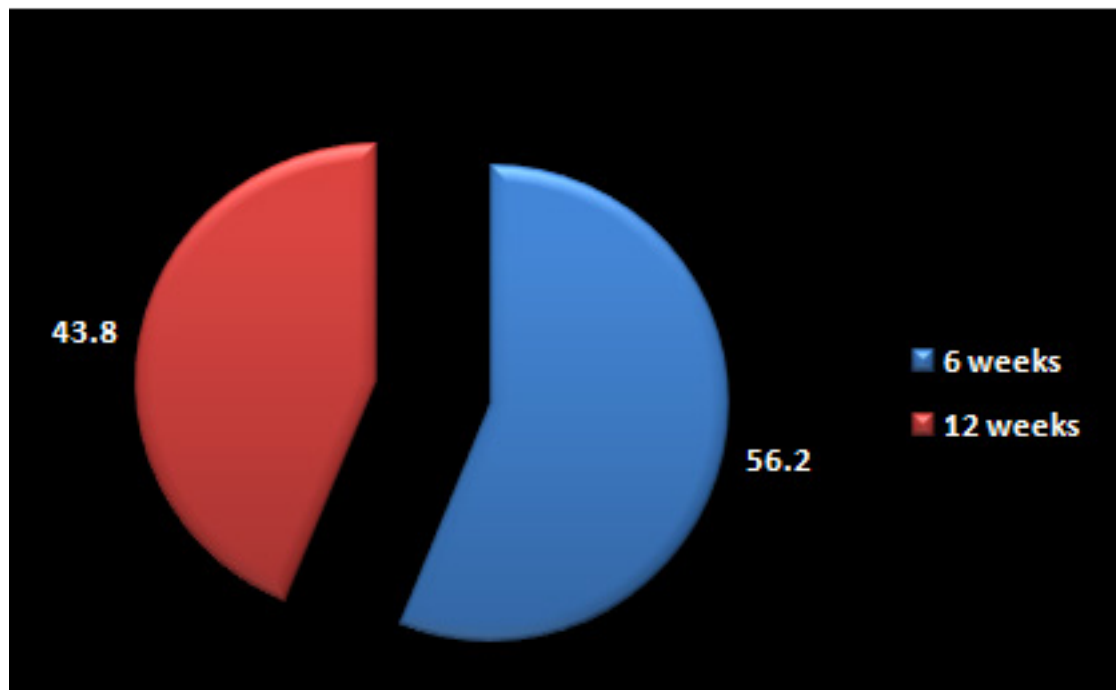
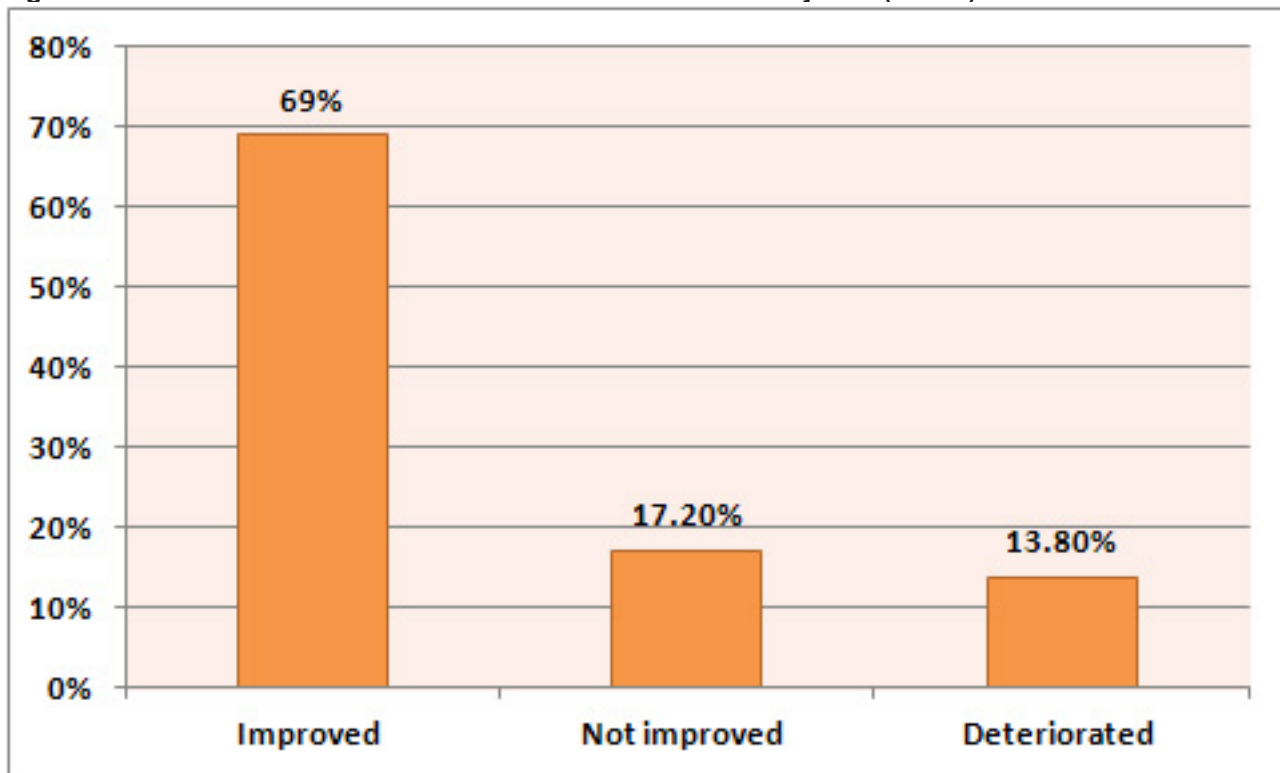


Figure 3: Illustration of treatment outcome of the total OA knee joints (n=168)

Moderate pain in the right and left knee joint were to some extent similar 43 (25.6%) and 46 (27.4%) respectively. Also, severe pain in both knee joints was similar and the difference appeared in mild pain 9 (5.4%) in the right knee joints and 4 (2.4%) in the left knee joints. The difference between values is not statistically significant ($p > 0.05$). Morning stiffness was more in the right knee joints 71 (42.3%), while in the left knee joints was 58 (34.5%). The difference between values is statistically significant ($p < 0.05$).

The follow up period ranged between 6 to 12 weeks. 56.2% of the study patients were followed for 6 weeks and 43.8% of the patients were followed for up for 12 weeks, as shown in Figure 2.

Figure 3 reveals the proportions of the outcome of our treatment procedures (injection with HA) for all OA knee joints. Sixty nine percent of treated OA knee joints were improved, 13.8% deteriorated and 17.2% were not improved.

Discussion

The first studies on the use of HA in human knee OA were carried out in the 1970s by Rydell and Balasz (1971) [10] and Peyron and Balasz (1974) [11]. In 1974, Peyron injected 1, 2, or 3 ml of HA (Healon) in 23 knees and obtained positive responses in pain and function in 74% of patients. The treatment with two injections of 2 ml HA each appeared to have the best outcome [12].

To our knowledge, this is the first retrospective and observational study on the use of intra-articular injection of hyaluronic acid (HA) in patients with osteoarthritis of knee joint in Aden.

In the present study male patients were predominant 61 (54.5%) while females were 51(45.5%). The ratio male to female was 1.2:1.

Women are at greater risk for developing knee osteoarthritis [13,14] compared with men, particularly those over 50 years of age [14].

Women with OA have also been found to have greater levels of knee pain and lower function [15]. However, a greater prevalence of radiographic knee OA in women [16] could account for sex differences in knee pain and function [15].

In the world, it is estimated that 10%–15% of all adults aged over 60 have some degree of OA, with prevalence higher among women than men [17].

According to data produced by the Dutch Institute for Public Health, the prevalence of knee OA in those aged 55 and above was 15.6% in men and 30.5% in women, respectively [18].

Our findings differ from those of other studies that revealed that knee osteoarthritis affects more women than men.

Our explanation for this difference is that our study was limited to patients in one private clinic. Also, it may be due to the women's choice of female orthopedic doctors as a result of traditions and religious reasons in our society.

In our study we found that the BMI ranged between 27 – 41 kg/m². The obesity of the patients (BMI between 30 – 39.9 kg/m²) was predominant 100 (89.3%) followed by overweight (BMI between 25 – 29.9kg/m) with 9 (8.0%) and

the morbidly obese (BMI = 40 kg/m²) were 3 (2.7%).

Hasan et al [19] mentioned that every step taken in a normal gait places about three times an individual's body weight on lower limb joints. Thus it should not be surprising that obesity and high body mass index have long been recognized as potent risk factors for OA, especially medial compartment OA of the knee in females.

The Framingham Study found that women who lost about 5 kg had a 50% reduction in the risk of developing new symptomatic knee OA [20]. Weight-loss interventions have been shown to decrease pain and disability in established knee OA.

The Arthritis, Diet, and Activity Promotion Trial showed that weight loss combined with exercise, but not either weight loss or exercise alone, was effective in decreasing pain and improving function in obese elders who already had symptomatic knee OA [21].

In the present study the patients from rural areas were predominant (75.0%).

A study done in Asian countries of India, Pakistan, and Bangladesh showed a higher prevalence of OA knee in rural areas which was 13.7% as compared to 6.9% in urban areas [22].

Community survey data in rural and urban areas of India show the prevalence of OA to be in the range of 17%–60.6% [23].

A study conducted in India among adults had shown a significant difference in the prevalence of OA between rural (56.6%) and urban areas (32.6%) [23]. Due to the lifestyle habits, Asians have a higher risk for knee joint arthritis compared to Americans and Europeans [22].

The age of the patients in our study ranged between 60 to 88 years and most of the patients (44.6%) were of age group 60 – 70 years followed by the age group 71 – 80 years with (37.5%) and over 80 years (17.9%). Also, the mean age of the study patients was 72.8 ± 7.2 years. The mean age of all patients was 72.8 ± 7.2 years, and the mean age of males was 72.1 ± 7.0 years and for women it was 73.6 ± 7.4 years. There was no statistical significance between means ($p > 0.05$).

Christensen et al [24] reported that age is the greatest risk factor in the development of OA and the prevalence of the disease increases with age, reaching 20% in the 45 years of age group, 40% in the 55 years of age group, 70% in the 65 years of age group, and 80% in geriatric patients over age 75 with osteoarthritis of the knee. Also, Haq et al [25] mentioned that review of many studies in the literature reveals that the mean age of the OA patients in these studies was 65 years and over.

Bakirhan et al [9] reported that in their study the mean age of the 320 patients was 66.92 years. This finding supports the finding in our study that the highest frequency of

osteoarthritis is observed in people aged 60–70 years.

In the current study we found the sites of knee osteoarthritis were bilateral 56(50.0%), right knee 29(25.9%) and left knee 27(24.1%). So, we observed that bilateral knee osteoarthritis site was predominant.

Cross sectional studies have shown that bilateral knee pain is a frequent problem in the community and each additional joint affected by osteoarthritis results in a decrease in physical function and an increase in overall pain [26,27].

A recent study demonstrated that bilateral knee pain was an independent risk factor for poor physical function [28].

Whereas joint injury (bony or soft tissue) usually affects one joint alone; there are many reasons why knee osteoarthritis would tend to progress to bilateral disease. Genetic influences and inherent mal-alignment would be expected to lead to bilateral disease [29]. A recent gait analysis study found abnormal loading in the unaffected knee of patients with unilateral knee osteoarthritis, implying that patients with a painful joint may accelerate disease in other joints due to changes in gait [30]. Gunther et al [31] reported that bilateral knee osteoarthritis is particularly common in people with advanced disease.

In a previous study with 2-year follow-up, 34% of patients with unilateral disease subsequently developed disease in the contra-lateral knee, however follow up was relatively short and the study was restricted to females only [32].

In the present study moderate pain was predominant 89 (53.0%) followed by severe pain 66 (39.3%) and mild pain 13 (7.7%).

Hawamdeh et al [33] found in their study 44.8% had severe pain, 38.3% had moderate pain, and 16.8% had mild pain. The types of pain vary between our finding and finding of Hawamdeh et al from Jordan [33].

The most common symptom of knee OA is pain around the knee joint. Pain can be dull, sharp, constant, or intermittent (off and on). Pain can vary from mild to agonizing. Range of motion can be decreased. These disabilities, mainly related to pain, are usually manifested by difficulty in walking, climbing stairs, performing household chores, and sitting upright and have a negative psychological impact, all of which can lead to a decreased quality of life. Knee pain can develop slowly and worsen over time (most common), or pain can have a sudden onset [34].

In the present study we found that 129 (76.8%) patients complained of morning stiffness. Morning stiffness was more in the right knee joints 42.3%, while in the left knee joints was 34.5%.

The difference between morning stiffness and values of right and left knee osteoarthritis was statistically significant ($p < 0.05$).

Knee pain and stiffness in the morning, after sitting, or after prolonged rest are most common. Over time, painful symptoms may occur more frequently, including during rest or at night. Typically, pain flares up with vigorous activity. Joint pain and stiffness after sitting or prolonged rest typically loosens up in less than 30 minutes, known as gelling [34].

In our study the follow up period ranged between 6 to 12 weeks. 56.2% of the study patients were followed for 6 weeks and 43.8% of the patients were followed for up to 12 weeks. As a result of this follow-up we found 69% of treated OA knee joints were improved, 13.8% deteriorated and 17.2% were not improved.

Multiple studies have been conducted to evaluate the efficacy of intra-articular hyaluronic injections. Initial studies [11,35] in the 1970s and 1980s demonstrated benefits for hyaluronic injected knees.

Conclusion

The patients in this study were characterized by the majority of obese patients and most patients complained of moderate pain followed by severe pain. Most of the patients complained of morning stiffness. As a result of the follow-up we found 69% of treated OA knee joints were improved due to the use of intra-articular hyaluronic injections.

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