

Effectiveness of Grade 1 and 2 Joint Mobilizations with Non Steroidal Anti Inflammatory Drugs (NSAIDS) in Comparison with NSAIDS alone in Pain Management of Knee Osteoarthritis

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Abstract

Background: To analyze the effectiveness of Grade 1 and 2 joint mobilizations with NSAIDS in comparison with NSAIDS alone in pain management of knee osteoarthritis.

Methods: In this randomized controlled trial patients with knee osteoarthritis (n=50) were divided into two groups, 25 patients in each group. Control group received diclofenac salt 50mg in twice daily dose along with quadriceps and knee joint exercises, while experimental group received knee joint mobilizations grade 1 and 2 in addition to the diclofenac salt 50mg twice daily dose and quadriceps and knee joint exercises. Main outcome was moderate, good or excellent control of pain with the intervention. Among secondary parameters were the effect on pain intensity, quality of life, and functionality. Grades of mobilizations used are defined as per Kaltenborn.

Results: At the end of six weeks the knee pain with activities improved in the experimental group (mean 7.44) compared to control group (mean 11.28) and pain with physical function also showed improvement in experimental (mean 25.84) as compared to control (mean 36.28). The stiffness also showed better mean values in the experimental (mean 2.08) to control (Mean 3.12). Visual analog scale readings also showed improvement in experimental group (mean 5.12) compared to control (mean 6.84).

Conclusions: Grade 1 and 2 manual knee joint mobilizations in combination with diclofenac salt are more effective than diclofenac salt alone. Emphasis of this therapy should be given to reduce knee joint pain, stiffness and improvement in physical function on various activities.

Key Words: Osteoarthritis , Non steroidal anti inflammatory drugs (NSAID's), Manual knee joint mobilizations, Pain

Introduction

Physiotherapists often utilize joint mobilization to reduce pain in knee osteoarthritis and to improve function. However, there is insufficient experimental data confirming its efficacy. This research was targeted to prove the effectiveness of joint mobilizations in management of pain in knee osteoarthritis (OA). The knee is the most complex and largest joint in our body. It's also the most susceptible joint to injuries and arthritis because it bears colossal weight and pressure loads while providing flexible movements. When we walk, our knees support 1.5 times our body weight; climbing stairs is about 3-4 times our body weight and squatting about 8 times. Osteoarthritis (OA) is the most common form of arthritis and is a leading cause of disability. About 75% of people over age seventy exhibit radiographically detectable changes consistent with osteoarthritis of knees. Osteoarthritis is characterized by cartilage destruction and narrowing in the joint space. As the cartilage breaks down, pieces may break off into the synovial fluid in the joint space. This will lead to further irritation and inflammation. Some believe that a tendency to the disorder coupled with other factors like age, obesity, previous injury or surgery on the joint, excessive physical activities and diet contribute to the onset of the disease. However, relatively little is known of the roots of the pain and disability of osteoarthritis.

Osteoarthritis is the commonest cause of pain among the middle age and elderly, which creates a damaging profile on the patient health, the people lose their ability to ambulate and also progressively lose their cardiopulmonary endurance owing to reduced

walking and decreased aerobic activity due to painful knee joint. Now a days research is focused on a manual therapy procedure by kaltenborn which uses joint mobilizations in grade 1 and 2 to reduce pain in the knee joint in combination with NSAIDs. Diclofenac sodium is a NSAID with analgesic and antipyretic properties . It is widely used in treatment of mild to moderate pain particularly when inflammation is also present as in cases of rheumatoid arthritis, osteoarthritis, musculoskeletal injuries and some postoperative conditions. Its pharmacological effects are believed to be due to jamming the conversion of arachidonic acid to prostaglandins by inhibiting cyclooxygenase enzymes. The action of one single dose is much longer (6 to 8 hours) than the very short half-life that the drug indicates. This could be partly because it remains for over 11 hours in synovial fluids. There is some evidence that diclofenac blocks the lipoxigenase pathways thus eliminating or reducing formation of the leukotrienes . There is also speculation that diclofenac may inhibit phospholipase A₂ as part of its mechanism of action. These additional actions may explain the high potency of diclofenac - it is the most potent NSAID on a broad basis.

The primary aim of this study was to estimate the proportion of subjects who achieve adequate pain control (moderate, good, or excellent) with combination therapy of knee joint oscillations grade 1 and 2 alongwith 42 days of a drug therapy (diclofenac salt 50mg twice daily dose) and quadriceps exercises and compared with individuals on only drug therapy with quadriceps exercises.

Patients and Methods

This study was conducted in outpatient department of Medicine and Physiotherapy in Fauji Foundation Hospital Rawalpindi in six weeks time. A total of 50 patients are included in the study after careful monitoring of exclusion and inclusion criteria and taking the informed consent. Patients were kept in two groups, the experimental group of 25 patients which are given diclofenac salt 50mg twice daily dose along with joint grade 1, 2 oscillations and general exercise plan for home. The second control group comprising 25 patients was only given 50 mg twice daily diclofenac salt with postural correction tips and general exercise plan for home. Male and female patients between ages 35 to 65 years diagnosed with symptomatic OA of the target knee joint as evidenced by knee pain for at least 3 months (for at least 20 days of each month) and osteophytes confirmed by an x-ray taken within the last two years. It was also ensured

with the help of physician that patients must meet the criteria of diagnosis of osteoarthritis of knee according to American College of Rheumatology and must be on pain medication (diclofenac sodium 50mg BD dose).Pregnant females, breast feeding mothers and subjects who have received treatment with a strong opioid (e.g. morphine, methadone, long-acting oxycodone etc.) in last 4 weeks preceding study entry were excluded from study. Subjects for whom a treatment was planned within the study period that could alter the degree or nature of pain (e.g. arthroscopic techniques, osteotomy, joint replacement surgery, etc),subjects with a significant psychiatric disorder (including major depression), subjects receiving anti-psychotic medication and subjects who have taken sedatives, hypnotics, phenothiazines, anticonvulsants, tranquilizers or muscle relaxants within two weeks preceding study entry were excluded from the study. A section of "Womac Questionarre"was used to assess pain status and functional outcome. The patients were instructed to take treatment in the experimental group twice per week and follow up recording of variables was taken on 7, 14, 28, 42 days. The weight was recorded on 1st, 3rd and 4th visit. Likewise the patients in the control group were handled with the same protocol except they were not offered the manual therapy treatment and only general exercises and pain medication was used as treatment.The primary objective of this study was to determine the proportion of subjects, who experienced "moderate", good, or "excellent" pain control and joint stiffness during 45 days of treatment with diclofenac salt and joint oscillations by using a section of WOMAC Osteoarthritis Index questionnaire. Subjects will rate their pain, stiffness and physical function at baseline and each visit by means of the WOMAC Questionnaire (Western Ontario and McMaster University Osteoarthritis Index). A one-week recall period was applied to all questions. Visual Analog Scale(VAS) was used as a measure of pain to have an idea of pain intensity. Patients were asked to assume 0 as no pain and 10 means extreme pain you cannot tolerate or may even die of that pain and to rate their pain accordingly.VAS taken at the beginning and then at each follow up visit.

Results

In the control group the maximum score for pain with physical function on the questionnaire (n=25, mean=43.56, SD =6.752) was 52 maximum and minimum 28 out of 64 after the therapy on the initial visit while it was observed to be minimum 13 and maximum 50 on the final visit with (mean 36.28, SD

8.629). On the other arm in experimental group in which the initial visit showed a reading of minimum 12 and maximum 52(mean 43.64 SD 10.681) which declined to become minimum 06 and maximum 40 showing improvement in symptoms(mean25.84 SD 8.479) (Table 1). The second variable of joint stiffness was scored as minimum 01 and maximum 06 out of a total of 08 in the control(n=25, mean 4.68, SD 1.626) on the initial visit while on the final visit was minimum 01 and maximum 05 (mean 3.12, SD .971). As compared with this in the experimental group this variable on the first visit was recorded as 01 and 06 (mean 3.28, SD 1.792) while on the final visit was recorded as 00 and 04(mean 2.08, SD 1.115) (Table 2). The third variable was visual analog scale (VAS) and the recordings on the first visit in the control were 06 and 08 out of a total of 10 (mean 7.48, SD0.586) while on the final visit it showed a reading of 05 and 08 (mean 6.84, SD0.987). While on the other arm of experimental group the VAS recorded on initial visit was 04 and 08(mean6.76, SD 1.091) which improved to be a minimum of 03 and a maximum of 07 (mean5.12, SD1.201) on the final visit showing a lot of improvement (Table 3).

Table 1: Improvement in pain control in control and experimental group

Visit	pain with physical function in control	pain with physical function in experimental
Initial Visit	43.56/64	43.64/64
Final Visit	36.28/64	25.84/64

Table 2: Improvement in joint stiffness in control and experimental group.

Visit	pain with physical function in control	pain with physical function in experimental
Initial Visit	4.68/8	3.28/8
Final Visit	3.12/8	2.08/8

Table 3: Improvement in Visual analog scale (VAS) in control and experimental group.

Visit	pain with physical function in control	pain with physical function in experimental
Initial Visit	7.48/10	6.76/10
Final Visit	6.84/10	5.12/10

Tabulated values of mean and their standard deviation of each dependent variable , along with standard mean error, the values are each of the initial and final visits, t test is used to estimate level of significance $\alpha = 0.05$, before the estimation of level of significance levene’s test for equality of variances to determine the significance of mean calculated values (Table 4)

Table 4: Group Statistics

	Groups	N	Mean	Std. Deviation	Std. Error Mean	P- Value
Stiffness	control	25	3.12	.971	.194	<0.001
	Experimental	25	2.08	1.115	.223	<0.001
Pain with physical functions	control	25	36.28	8.629	1.726	<0.001
	experimental	25	25.84	8.479	1.696	<0.001
Visual analog scale	control	25	6.84	.987	.197	<0.001
	Experimental	25	5.12	1.201	.240	<0.001

Discussion

Knee joint mobilizations are an acceptable mean of improving pain in patients with osteoarthritis. Many researches all over the world support its effectiveness on shoulder and hip joint but data on knee joint is still lacking in literature. Christine Clar described these methods and the same principal was used in this research and a research hypothesis was formulated that the technique brings some relief of pain, the data from patients was rigorously examined and it supported the research hypothesis.¹⁰ The patients selected for the study were of low socioeconomic group of the society, who lack the facilities for prevention and maintenance of disease. An important feature in this population in contrast to America and Europe where commodes are mainly used. Use of ground toilet seat(Indian seat) leads to further damage to the knee joint, which seemed a very important factor of less pain management in study population; if alternative ways are available pain scale could have been much lower.

Given the design of our study in which random selection of study participants was done and the testers were blinded to group to be assessed and given the lack of improvement, it is unlikely that the

desirable outcomes were caused by the passage of time or by some tester bias and it is also unlikely that other causes unrelated to the intervention were responsible for the observed improvements. The dropout rate was higher in the treatment group (21%) than in the placebo group (12%). If the treatment itself had led to negative outcomes, causing the patients to withdraw, this differential dropout rate might significantly affect the interpretation of our results. However, the reasons given for withdrawal were unrelated to treatment. Previously reported dropout rates in similar trials of exercise for osteoarthritis of the knee are 9.8%, 15%, 17%, 20%, 25%, 26% and 52% in various studies. Patients with higher initial WOMAC scores may be less likely to complete a regimen of physical therapy. As initial WOMAC scores were substantially higher in patients from both the treatment and the placebo groups who did not complete the study than in those who completed the study, we do not believe that aspects of the therapeutic regimen were responsible for the failure to complete all visits during the treatment phase.

The benefits of treatment were achieved in four clinic visits. Most previous studies have demonstrated the benefits of exercise in 36 to 48 clinical visits. Our study required 24 telephone contacts in addition to 4 clinical visits. Previous reports of average improvement with exercise have ranged from 8% to 27% decreases in pain and 10% to 39% improvements in function. The total improvement in WOMAC score in our study averaged 56%; average subscale improvements were 60% for pain, 54% for stiffness, and 54% for functional ability. Most important, these changes can be compared with those in control patients who experienced no meaningful change. Changes of 20% to 25% are generally considered to be clinically important. The greater overall improvement compared with results of previous studies may be due to the manually applied treatment, which allowed the therapist to focus treatment on the specific structures that produced pain and limited function for each patient. The comprehensive exercise program may also have addressed more of the impairments found in patients with osteoarthritis of the knee. The design of our study precludes determination of which aspect of the treatment program produced the changes in performance. The effects of the manual therapy procedures cannot be separated from either the clinical or home exercise programs. A recent randomized clinical trial found that a combination of manual therapy and clinical exercise provided greater improvements in strength, pain, and function than did

clinical exercise alone for impingement syndrome of the shoulder, another chronic inflammatory joint condition. The exercise program was simple, but it adequately addressed the lower limb physical findings that are common in patients with osteoarthritis of the knee. To prevent increasing inflammation, pain, and boredom with the program, patients did not perform multiple exercises with the same therapeutic effect or exercise more than once each day.

Ettinger stressed the importance of targeting the clinical treatment and appropriately dosing the exercise to improve joint motion, muscular strength, and cardiovascular fitness for patients with osteoarthritis of the knee.²¹ Patients frequently reported 20% to 40% relief of symptoms after only two to three clinical treatments of manual therapy and exercise. This rapid reduction of symptoms implies that the structures responsible for at least part of the pain are not the most fixed or unchangeable aspects of the pathology of osteoarthritis. Periarticular connective and muscular tissue could be implicated as symptom sources. Perhaps the repeated challenge to the end range of movement, as occurs with closed-chain strengthening exercises, manually applied passive movement, and active range-of-movement exercises, provides a strong stimulus to connective tissue, resulting in pain relief. The effects of the physical therapy intervention beyond 1 year are unknown. Continued relief over a longer period may depend in part on patient compliance with the home exercise program.

Longer-term follow-up may answer some of these questions. Many patients with osteoarthritis typically receive very little physical therapy before undergoing total joint replacement. Because short-term physical therapy can decrease pain and stiffness and increase functional capacity in patients with osteoarthritis of the knee, it represents a cost-effective way to improve patient function.

Physical therapy may also delay or defer the need for total joint replacement. We observed fewer knee replacement surgeries in the treatment group. As military health system beneficiaries, all patients had equal access to orthopedic surgery. The surgeons were aware that a study was under way to examine the effectiveness of a physical therapy intervention, but they were unaware of patients' group assignments. The surgeons were also unaware that the number of patients receiving surgery in the two groups would be compared. Patients were asked at 1 year if they were seeking knee surgery; no patient who had not undergone surgery was seeking it.

Conclusion

1. Combination of manual physical therapy and supervised exercise is more effective than no treatment in improving walking distance and decreasing pain, dysfunction, and stiffness in patients with osteoarthritis of the knee. Such treatment may defer or decrease the need for surgical intervention.
2. Benefit of manual therapy augment the patient recovery ,but still awareness about the manual therapy in Pakistan is not at the desired level.
3. Training facilities and workshops on the use of such interventions can play a pivotal role in the improvement of public awareness.

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