



Comparative Study of Short Wave Diathermy and Therapeutic Exercise on Pain and Physical Functioning of Patients with Osteoarthritis Knee

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Abstract

Introduction: Osteoarthritis (OA) is a chronic joint disorder in which there is a progressive softening and disintegration of articular cartilage accompanied by new growth of cartilage and bone at the joint margin (osteophytes) and capsular fibrosis. Heat especially deep heat (diathermy) is an appropriate adjunct in the treatment of those patients with chronic osteoarthritis. The physiological response to the thermal effect includes increase in the extensibility of collagen tissue, the pain threshold, the promotion of blood flow, and enhancement of the efficiency of the muscular activity. To maximize the functional capacity of patients with OA, comprehensive exercise programs that emphasize stretching, strengthening, flexibility exercise and reconditioning are recommended. The purpose of this study is to assess the value of short- wave diathermy and therapeutic exercise on pain and physical functioning of the patients with OA of knee.

Materials and Methods / Study Design: This randomized clinical trial was conducted in the department of physical medicine and rehabilitation, Chittagong medical college hospital from June to August, 2011. A total of 50 (fifty) patients were selected randomly for this study according to ACR selection criteria. The selected patients were divided into two groups - in group A. Patients were treated with ADLS instructions, NSAIDS and SWD and in group B, patients were treated with ADLS instruction, NSAIDS and TE. Each treatment session consists of 30 minutes for 6 weeks.

Results: In study group, age and sex did not show any significant variation. Assessment of pre-treatment & post- treatment pain and tenderness score of the study showed that group B had significant improvement than group a at the end of six weeks following treatment. Assessment of WOMAC pain, stiffness physical function subscale score showed that Group B had significant improvement than group A.

Conclusion: The results indicate that therapeutic exercise is better than shortwave diathermy in OA knee.

Keyword: Therapeutic exercise, short wave diathermy, arthritis.

Introduction

Osteoarthritis (Osteoarthritis) is as old as mankind. Osteoarthritis, a degenerative joint disease is common in our ageing population. It is the most common joint disease affecting more than 80% of those who reach the age of 70. Although its suffix indicates otherwise, osteoarthritis is not characterized by excessive joint inflammation¹.

As it progresses, however pain, stiffness, and limitation of movement may develop. Common sites of discomfort are the vertebrae, knees, and hip joints that bear much of the weight of the body. The condition can range from mild to severe. It generally affects the hands and in particular joints under considerable strain. As the cartilage breaks down, the body attempts to repair the damage by making new bone and this in turn may cause the joint to lose its normal shape. The bone ends may thicken and grow outward, forming obvious bony spurs or nodules. It is these bony spurs that can be responsible for restricting movement in the joints and are therefore the direct cause of many of the problems experienced by osteoarthritis sufferers, such as inability to use the joints and perform daily activities. These bony nodules also add to the pain and experienced. The exact cause of the cartilage breakdown seen in osteoarthritis is not known. However, scientists currently believe that the production of mechanical stress is a key component. Osteoarthritis is often regarded as a progressive process associated with getting ageing. Moreover the incidence of osteoarthritis is increasing due to changing lifestyle and industrialization. Sedentary jobs and lack of proper exercise or diet lead to obesity, which is an important factor in predisposing to or aggravating osteoarthritis.

The major weight bearing joints are frequently affected by osteoarthritis. Knee pain is remarkably common. The quality of knee pain experienced in the earlier decades of adult life, and echoed again by some in the later decades, is distinctive. The description is of the insidious onset of pain localizing anteriorly or anteromedially. It is manifested bilaterally also.

The knee joint is one of the most common sites of involvement because of its weight bearing requirement, high mobility and lack of intrinsic stability, and typically worsens while the joint is bearing weight and improves with rest.)

The discomfort is exacerbated by activity, especially going up and down stairs, as opposed to most other forms of knee pain where descending is more difficult. Prolonged sitting (the “movie sign”) aggravates the discomfort. With significant improvement in our understanding of the etiopathogenesis of osteoarthritis, there have been changes in the conceptual approach to its management providing preventive measures and a more comprehensive approach to treatment.)

The American college of Rheumatology has developed guidelines for non- pharmacological therapy for hip and knee OA that includes patient education, weight loss if overweight physical therapy, orthotics, occupational therapy and aerobic exercise programs.

Methods and Materials

Study Design: Randomized clinical trial.

Place of study: Department of physical medicine and rehabilitation, Chittagong medical college Hospital, Ctg.

Period of study: The study was carried out from June to August, 2011.

Sample size: Sample size was determined purposively. It is calculated using formula of simple random sampling.

Selection of Patient

Inclusion Criteria: Patient those who satisfied ACR clinical classification criteria for OA knee will be selected for the study.

American College of Rheumatology (ACR) criteria for OA of the knee

Clinical Finding

1. Knee pain for most days of prior month.
2. Crepitus on active joint motion.
3. Morning stiffness <30 minutes in duration.
4. Age > 38 years.
5. Bony enlargement of the knee on examination.

Exclusion Criteria

- ◆Clinical inflammatory arthropathy
- ◆Patients who had fixed flexion deformity
- ◆No pain on WOMAC pain score
- ◆Serious injury within six months
- ◆Previous knee replacement

Study Population

A total of 50(Fifty) patients were selected randomly for this study according to ACR selection criteria.⁹⁴

Age, sex distribution, Occupational aspects, socio economic status was observed during the study period.

The selected patients were divided into two Groups.

Group A:

In this group patients will be treated with ADLs instructions, NSAIDs and Short Wave Diathermy (SWD).

Group B:

In this group patients will be treated with ADLs instructions, NSAIDs and Therapeutic Exercise (TE).

Details of the Treatment

Short Wave Diathermy (SWD): The therapeutic elevation of temperature in the tissues by means of an oscillating electric current of extremely high frequency.

Duration of treatment

Each session consists of 30 minutes.

Total time: 6 weeks.

Position of the patients:

Supine in the coach.

Frequency:

Single occasion per day every alternate day.

Method: Contra planner.

Machine: FYSIOMED NV

FYSIOPULS Automatic (Model 11165).

Therapeutic Exercise (TE):

Types:

Isometric Quadriceps strengthening exercise, aerobic exercise, stretching exercise and non weight bearing exercise such as cycling.

Duration: Each session consists of 30 minutes.

Total Time: 6 weeks.

Frequency:

Single occasion per day every alternate day.

Treatment for Both groups: ADLs + NSAIDs

Analysis of Data

The result obtained was subjected to standard statistical procedure. Statistical analysis of the result was obtained by using window based computer software devised with statistical package for social science [(SPSS) (SPSS tnc, Chicago IL, USA)]. Statistical test for significance of difference were done using t test, chi-square test. A P value <0.05 was considered as significant.

Observations & Results

Table: I Age distribution of the study subjects

Age (Years)	Group- A (N=25)	Group- B (n=25)	Total (n=50)	P Value
Mean ± SD	56.9 ± 9.50	54. ± 9.71	55.9 ± 9.60	>0.50 ^{ns}
40-49	6 (24)	7 (28)	13 (26)	>0.10 ^{ns}
50-59	10 (40)	12 (48)	22 (44)	
60-69	6(24)	4 (16)	10 (20)	
≥ 70	3(12)	2 (8)	5 (10)	

^aUnpaired Student's t test, ^bChi- square test, NS= Not significant

Table: II Sex distribution of the study subjects

Age (Years)	Group- A (N=25)	Group- B (n=25)	Total (n=50)	P Value
Male	11(44)	12(48)	23 (46)	>0.50
Female	14 (56)	13 (52)	27 (54)	

Sex Distribution showed that in Group A (n=25), 11 (44%) patients were male and 14 (56%) were female, however, in Group B (n=24), 12 (48%) were male and 13 (52%) were female. Statistically no significant variation was observed (Table- II). Overall (n=50), 23 (46%) were male and 27 (54%) were female.

Table- III. Occupation of the study subject: (n-50)

Occupation	Frequency	Percentage
Housewife	20	50
Service holder	7	14
Businessman	6	12
Farmer	2	4
Retired	10	20

Shows distribution of occupation of the study patients. Maximum number of patients were housewives 25(50%), followed by service holder7 (14%), Businessman6 (12%), farmer 2 (4%), the rest retired 10 (20%).

Table-IV. Socioeconomic status of the study subjects (n=50)

Socioeconomic status	Frequency	Percentage
Low	15	30
Middle	33	66
High	2	4

Table- IV shows that maximum number of patients belonged to middle income group 33 (66%), followed by low 15. (30%), and high (4%).

Table V shows comparison between pretreatment and post treatment pain score of Group A and Group B patients. At 6th week follow up pain score of Group B showed significant improvement (mean 61.89%, P<0.001), but in Group A improvement was not significant (mean 2.86%, P>0.05).

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	2.80+0.52	2.72+0.57	2.86+9.62	> 0.05 ^{ns}
Range	2.00-4.00	2.00-4.00	0.00-33.33	

Table VI Assessment of tenderness index of study group patients.

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	2.62+0.52	0.98+0.41	61.89+21.15	> 0.001 ^{***}
Range	2.00-4.00	0.00-4.00	0.00-100.00	

Table VI Assessment of tenderness index of study group patients.

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	2.60+0.45	2.42+0.69	6.90+27.10	> 0.05 ^{ns}
Range	2.00-3.00	1.00-4.00	-50-00.00	

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	2.67+0.45	0.87+0.56	67.42+24.44	< 0.001 ^{***}
Range	2.00-4.00	0.00-2.00	0.00-100.00	

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	5.38+1.04	5.20+1.15	3.33+10.78	> 0.05 ^{ns}
Range	2.90-6.90	2.30-7.40	-27.08-20.69	

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	5.67+1.37	4.59+1.61	19.18+17.14	< 0.001 ^{***}
Range	2.30-7.80	1.00-6.60	6.56-84.13	

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	5.41+0.95	5.30+1.59	2.03+6.07	>0.05 ^{ns}
Range	2.10-7.60	1.00-6.80	6.90-75.60	

Pain Score	Pre Treatment	Post Treatment 6th week	Improvement (%)	P Value
Mean+SD	2.44+1.31	4.36+1.50	20.04+14.29	< 0.001 ^{***}
Range	2.80-7.50	2.80-8.10	-10.87-15.09	

In pretreatment stage Group B patient showed 2.62 + 0.52 and Group A 2.80+ 0.52 respectively. Comparison of tenderness index between Mean + SD pretreatment (2.67+0.45) and 6th week post treatment (0.87+0.56) showed significant improvement in Group B, Whereas in Group A pretreatment (2.60+0.45) and (2.42+0.69) in post treatment, improvement was not significant (mean 6.94%, P>0,05).

Discussion

Among the degenerative disease of synovial joints, OA of knee is the 'commonest. The incidence of OA knee is 46 %⁵⁷ In the United states OA knee affects 10-20 percent of the elderly person.⁹⁴ Present study would not reflect the incidence due to small number of study population⁴ Out of 50 patients studied 27 (56%) were female and 23 (46%) were male. The female to male ratio was 1.17:1.

In this sample population, age distribution varied from 40 to 85 years, with a mean age of 55.9±9.61 years. According to Jan and Lai ages ranged from 40 to 74 years (mean±SD = 62.4 ± 1.3 years). Felson DT et al proposed the range between 63-94 years (mean 73)⁹⁵ which is comparatively higher than that of present study. This may be due to small study and may be due to high life expectancy or rich. Among 50 patients the youngest one was 40 years old and the oldest 85 years of age. Maximum number (44%) of patients in both age group were 50 years or above. This increasing prevalence with advancing age is compatible with usual presentation of patients with OA knee as shown in a series by Dives MA et al.⁴ However this study is in agreement with the available current study)

Therapeutic exercise program is of primary importance to maintain muscle 'strength and joint stability. Patients assigned to the exercise groups had greater pain reduction and more improved function than non-exercise group. Fisher et al added convincing data to the existing evidence that

quadriceps exercise can reduce pain and disability in patients with knee function in patient with knee. The present study, patient responded very well in group B. In this study Group A received Counseling, shortwave diathermy and NSAIDs and Group B: Counseling, Therapeutic exercise and NSAIDs. In this study, in terms of overall assessment that is pain score, tenderness index, WOMAC pain subscale score, WOMAC stiffness subscale score and WOMAC physical function subscale score, patients belonging to Counseling,

shortwave diathermy and NSAIDs, Group B showed significant improvement (P<0.001) which is not improved significantly in Group A (P>0.05). By two tailed test method, test of significance was done.

Limitations

Present study has its obvious limitation. It is confined to a highly selected group of patients in a specialized hospital (Chittagong Medical College Hospital). Follow up period was also short. However, it is necessary to investigate a large sample and multicenter trial of physical therapy for longer period follow up. In the present study, it was found that those participants attended in the therapeutic exercise program improved better than shortwave diathermy patient group.

Conclusion

As the number of patients were too small, no firm conclusion could be drawn from this study. The information collected need verification by large study on this subject. Considering the information gathered from this small study, it could be concluded that Therapeutic exercise is better than shortwave diathermy in OA knee. Based on the current study it is strongly suggested that Therapeutic Exercise achieved the best result for OA knee patients.

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