



EFFECTIVENESS OF PROPRIOCEPTIVE EXERCISE TRAINING ON PAIN & QUALITY OF LIFE IN PATIENTS WITH OSTEOARTHRITIS OF KNEE-RCT

Physiotherapy

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ABSTRACT

Impaired proprioception has been reported for subjects suffering from knee osteoarthritis. Functional consequences of impaired proprioception may include – Lower Gait Velocity, Shorter Stride Length, Slower Stair Walking Time, Impaired Balance and Risk of Falls ultimately affects the quality of life. This Study was planned to see additive effects of proprioceptive exercise along with conventional exercise. 30 participants were randomly 1:1 divided in 2 groups where both groups were received quadriceps strengthening exercises & Hot Pack prior to exercises for 10 minutes. While group-A additionally received Proprioceptive exercise training. Each group was treated for a period of 2 weeks, 6 days a week, once a daily. Findings of this study reflects importance of using Proprioceptive exercise training along with conventional therapy is beneficial for reducing pain, improvement in physical function and health related quality of life in subjects with knee osteoarthritis.

KEYWORDS

OA Knee, Pain, Stiffness, Loss of proprioception, Altered quality of life, Proprioceptive training

INTRODUCTION

Knee osteoarthritis nowadays became a major public health problem. High prevalence of knee osteoarthritis is a burden on health care system.^{1,2} Implications of this burden are poor Quality of life, reduction in daily activities and disability.³ About 20 million people in United States, are affected by Osteoarthritis which is one of the five leading causes of disability among elderly population.⁴

Quadriceps sensorimotor dysfunction has been reported in subjects with osteoarthritis knee.⁵ Walker JM, Helewa A et al: reported that articular damage evokes abnormal afferent information which in turn decreases the excitability of Alpha-motor neurons as well as Gamma-motor neurons.

This, decreased excitability of Alpha-motor neurons would decrease voluntary activation of Quadriceps muscle and that of Gamma-motor neurons would decrease muscle spindle sensitivity, which consequently decreases proprioceptive acuity.⁶

Major challenges for subjects with knee osteoarthritis are walking, stair climbing and moving from sitting to standing. These activities not only require knee muscle strength but also require good standing balance.⁷ Balance deficits have been identified in subjects with osteoarthritis knee.^{8,9} Instability of knee has been seen in 63% of subjects with knee osteoarthritis. 44% of these reported that knee instability affects their mobility and increases the risk of fall in elderly.¹⁰

Physical therapy is a very popular regimen, which aims to increase range of motion, decrease pain, improve strength of weak muscles, improve daily functional activities by using mobilization, manipulation, taping, prescription of orthotics, gait aids, electro-modalities (SWD, Heat, Cold therapy), and exercises.¹¹

The intent of proprioceptive exercise is to expose the people for activities that challenge stability of the knee and balance in a controlled manner during rehabilitation, a strategy that may allow them to develop motor skills adequate to protect the knee from potentially harmful loads during functional activities.¹²

Another goal of training is to shorten the amount of time that it takes to mentally react and physically move to accomplish the task. The ability to move more quickly and powerfully stimulates more accurate transmission of instruction from nervous system to the working muscle.¹³ Correct restoration of these proprioception and muscle contraction with rehabilitation may retard progression of knee osteoarthritis and disability.

Studies regarding proprioception and changes in quality of life in subjects with OA are also not sufficiently available. Hence the need of the study is to see the additive effect of proprioceptive exercises to strengthening exercises in subjects with OA.

MATERIALS AND METHODS

Intervention was conducted at Physiotherapy OPD, S.B.B. College of Physiotherapy, V.S. Hospital, Ahmedabad. Each subject was treated for a two weeks, 6 days in a week, once a day. Subjects aged 40-60 years, both males & female, with clinical diagnosis of osteoarthritis of knee with symptoms of knee pain, joint stiffness, crepetus, tenderness for more than 3 months with involved joint is primary cause limiting physical and functional activity were included.

Subjects with history of traumatic knee pain, ligaments instability or Menisci injury at knee, history of knee surgery and metal implants acute exacerbation of symptoms of arthritis Febrile and Mentally deficit participants were excluded. 30 patients according to inclusion Criteria were taken. The study was explained and written informed consent was taken. Subjects were randomly allocated into Group-A and Group-B. Both groups received Hydro Collateral Packs for 15 minutes prior to exercises. Group-A had performed a set of Proprioceptive exercises along with Quadriceps strengthening exercises. 10 repetitions of each exercise and performed for 6 days in a week for 2 weeks, once a day. In both the groups 60 seconds rest was given after completed one set (10 RM) of each exercise. Group-A had performed a set of Proprioceptive exercises along with Quadriceps strengthening exercises.

In which Partial squatting: (45° KNEE FLEXION) Hold for 10 counts, One Leg Standing with Eyes Open: hold for 10 counts, Weight shifting on Wobble board: antero-posterior & side-side, Reach Out activities in all directions, Forward and Sideward Lunges, Step up & down on small stool. While for Quadriceps strengthening exercises: Static Quadriceps, Straight Leg Rising, Last degree knee extension, Knee extension in high sitting. Group-B had performed 10 repetitions of the each quadriceps strengthening exercises for 6 days in a week for 2 weeks, once a day. Outcome measures used were Visual Analogue Scale (VAS), Index of Severity for Osteoarthritis knee by Lequesne and SF-36 (Quality Of Life). Patient's outcomes were assessed on Day-1 and at the end of 2 weeks. Appropriate statistical test was used to compare the data within the groups and between the groups to determine the difference between two protocols.

RESULTS

Table-1: Age Distribution Of Subjects.

Groups	Male	Female	Mean age (years)	SD
Group-A	7	8	54.26	4.5
Group-B	8	7	52.2	4.4

Here the mean age of patient in Group A was 54.26 years and standard deviation was 4.5 and in Group B mean age of patients was 52.2 years and standard deviation was 4.4

Table 2-mean Difference In Visual Analog Scale Score Within & Between Group-A & Group-B

Groups	Group-A		Group-B		Test	p value
	Mean	SD	Mean	SD		
Pre T	6	0.7	5.9	0.9	W 153	0.003

Post T	3.95	0.5	3.7	0.9	t 9.53	<0.0001
Between Group A & B	2.05	0.5	2.2	0.8	U 130	0.64

Here, for Group-A Wilcoxon paired test with $p=0.003$ & for Group-B Paired t test with $p<0.0001$ was found significant While comparison between Groups A & B Mann-Whitney U test was performed & was found to be statistically not significant.

Table-3: Mean Difference Of Lequesne Score Within & Between Group-A & Group-B

Within groups	Group-A		Group-B		Test	P value
	Mean	SD	Mean	SD		
Pre T	10.6	1.3	11	1.6	t 10.8	<0.0001
Post T	6.9	0.6	9.1	1.3	t 8.5	<0.0001
Between groups A & B	3.67	1.2	1.9	0.8	U 43	0.0005

Here, Paired t test was performed for both Group-A & B which was found statistically extremely significant. While comparison between Group-A & B Mann - Whitney U test was performed & found statistically extremely significant

Table-4: Mean Difference In PCS Score Of Sf-36 Within & Between Group-A & Group-B

Within groups	Group-A		Group-B		Test	P Value
	Mean	SD	Mean	SD		
Pre T	37.8	2.8	36.8	6	t 5.85	<0.0001
Post T	40.7	3.4	37.5	6.3	0.10	0.91
Between groups A & B	2.9	2.0	0.7	1.1	57	0.0027

Here in group-A paired t Test with $p= <0.0001$ which found statistically extremely significant, while in Group- B paired t test with $p=0.91$ was found not statistically significant. Comparison between Group-A & Group-B Mann - Whitney U test was performed, $p=0.0027$ & found statistically extremely significant.

Table-5: Mean Difference In MCS Score Of Sf-36 Within & Between Group-A & Group-B

Within groups	Group-A		Group-B		Test	P Value
	Mean	SD	Mean	SD		
Pre T	66.9	7.2	57.7	8.4	W 46	0.11
Post T	67.2	7.9	57.8	8.4	t 0.4	0.72
Between groups a & b	0.3	2.1	0.1	1.4	U 137	0.80

Here in group-A Wilcoxon paired Test with $p= <0.11$ in Group- B paired t test with $p=0.72$ was found not statistically significant. Comparison between Group-A & Group-B Mann - Whitney U test was performed, $p=0.80$ & found statistically not significant.

DISCUSSION

Novel finding of this study was VAS, Lequesne Index and PCS component of SF-36 is improved much better in Group-A compared to Group - B. While there was no statistically significant improvement seen in MCS component Of SF-36 in both groups.

Improvement in VAS score in Group-A is supported by Gail et al in 2000 suggested that the periarthral connective tissue and muscular tissue may be implicated as sources of pain and hence, repeated challenge to the end range of movements as occurs with close chain strengthening exercises providing a strong stimulus to connective tissue may result in pain relief.¹⁴

Palmoski et al who showed that in OA knee, Proper education and physical therapy in form of exercises play an important role in restoring & improving the synthesis of cartilage which had undergone atrophy & increase in proteoglycan contents. This led to a reduction in pain & improves functional performances. The same phenomenon may be implied to present study, showing improvement in Pain & physical function in Group B.¹⁵

In accordance with Kent E et al in 1999 proprioceptive exercise training shortened the amount of time that it takes to mentally react and physically move to accomplish the task. The ability to move more quickly and powerfully stimulates more accurate transmission of instruction from nervous system to the working muscle.¹⁶

Mohammad A. Alkhazim Alghmdid et al 2004 suggested that proprioceptive exercise exposed the people for activities that challenge stability of the knee and balance in a controlled manner during rehabilitation that may allow them to develop motor skills

adequate to protect the knee from potentially harmful loads during activities of daily living & recreational activities as well.¹⁷ Hence the improvement seen in physical function following proprioceptive exercise is better in Group-A.

Improvement seen in PCS Score of SF- 36 could be because of following factors. Proprioceptive exercises emphasize of muscular co-contraction with least amount of effort. The exercises are more functional type, quite less boring & mostly used in Activities of Daily living. According to Lephart SM et al suggested that there is stress feedback mechanism within a joint, closed kinetic exercises is supposed to play a dual role in strengthening muscle power and facilitating proprioceptive function¹⁸ leading to improvement seen in physical function in above study.

Hornig YS in 2005, who had found that the Health Related Quality of Life (HRQOL) of patients with low back pain depended on functional status and psychological factors more than simple physical impairments.¹⁹ Bryan Blissmer et al in 2006 added that improvement in MCS score mainly depended on aided behavioural programs.²⁰ Thus, in this respect it seems that proprioceptive programme is not a relevant regimen to improve both patient's physical & psychological status. This might explain the lack of improvement which was obtained in the MCS component of SF-36 scores in the above study.

Future study can be done with large sample size and duration of intervention would be long enough to see the effect of proprioceptive exercises on MCS component of SF-36. Even comparing various proprioceptive exercises and their effects in subjects with chronic knee osteoarthritis.

CONCLUSION

Clinically proprioceptive exercises can be implicated along with conventional therapy is more beneficial for reducing pain, improving physical function and physical component of health related quality of life in subjects with knee osteoarthritis.

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