



## Effectiveness of Proprioceptive Training Programme on Joint Position Sense and Balance in Patients with Knee Osteo Arthritis - A Randomized Control Trial

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### ABSTRACT

**Background:** Most of the patients with OA knee complaining knee pain, impaired muscle strength. Although many interventions are accepted with OA knee substitutional evidence regarding the combined effect of proprioceptive training and conventional physiotherapy is lacking.

**Purpose of the study:** To determine the effects of proprioceptive training on joint position sense, muscle strength and functional ability in knee OA patients

**Objective of the study:** To find the effects of proprioceptive training with conventional physiotherapy and to find the effects of conventional physiotherapy in improving joint position sense and balance.

**Methodology:** 16 subjects with Knee Osteoarthritis were included and divided into two groups A and B. After pre-test measurements of joint position sense and balance group A was given Proprioceptive Training and Conventional physiotherapy and group B was given Conventional physiotherapy only for three days a week for three weeks. Post-test measurements were done after 3week. Isokinetic dynamometer for joint position sense and Clinical testing for sensory interaction of balance (CTSIB) was used as pre and post outcome measures.

**Result:** After 3 weeks of proprioceptive training group A shows significant results as compared to group B.

**Conclusion:** Proprioceptive training in patients with knee osteo arthritis proved to be effective in improving joint position sense and standing balance.

**Keywords:** Osteoarthritis knee, joint position sense, ctsib, isokinetic dynamometer, proprioceptive trainin

### INTRODUCTION

Osteoarthritis (OA) is a prevalent, ubiquitous, disabling condition that most often affect the knee joint. Osteoarthritis (OA) is a progressive multifactorial disease that leads to articular cartilage loss and joint space narrowing, but also to pain, loss of function and physical disability, thus greatly impairing quality of life.<sup>1</sup> The cardinal feature of knee OA includes the pain but the patients also report muscle

weakness, instability, fatigue and early morning stiffness.<sup>2</sup> The pathophysiological changes in OA involves dehydration & degeneration of both intraarticular and periarticular structures which in turn leads to distraction of mechanoreceptors that manifest as impaired static and dynamic proprioception and kinesthetic sense.<sup>3</sup> In physiotherapy treatment for OA included the use of individual or combined treatments comprising of electrotherapy, exercise therapy and manual therapy. These interventions were shown to improve proprioception and balance so the use of specific strategies like proprioceptive training may be necessary to individualize the therapeutic program in knee OA patients.<sup>4</sup> According to recent studies proprioceptive training improves balance, muscle strength & static & dynamic posture and function of daily life.<sup>5</sup> Proprioception involves awareness of the spatial and mechanical status of the musculoskeletal framework. They include the senses of position, movement and balance.<sup>6</sup>

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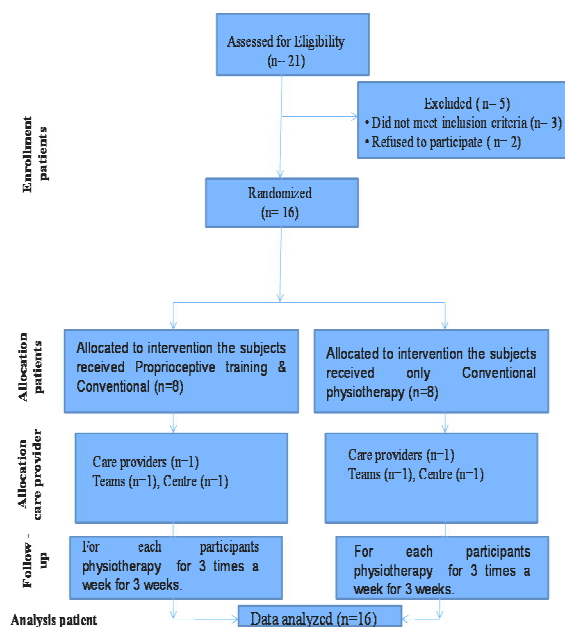


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## METHODOLOGY

**Study Design:** A Randomized clinical trial. **Study Setting-** The study setting was Tertiary Multidisciplinary Hospital MMIMSR, Mullana, Ambala, Haryana, India. **Sampling-Criteria** based purposive sampling. **Sample size-** Total of 16, in which 8 were in experimental group and 8 were in control group. **Inclusion Criteria:** Subjects with bilateral & unilateral osteoarthritis of knee, 45 to 78 yrs age group, Subjects both male and female. **Exclusion Criteria:** Patients with complaints in one or more joint, Polyarthritis, the presence of rheumatoid arthritis or other systemic inflammatory arthropathies, knee arthroplastic surgery case, Intraarticular corticosteroid injection into either knee within the previous 3 months, Other conditions which prevents in taking part in the study. **Independent variable:** Proprioceptive training, Strengthening exercise, Moist heat pack. **Dependent variable:** Joint Position Sense, Balance. **Outcome Measures:** Isokinetic dynamometer for joint position sense, Clinical testing for sensory interaction of balance (CTSIB)

## PROCEDURE



**Step 1.** Study protocol approved by the Departmental Ethical Committee.

**Step 2.** All the details were recorded like name, age, occupation, dominance, height and weight. Medical history was asked for scrutinizing the subjects, which come under exclusion criteria.

**Step 3.** The subjects are thoroughly explained about the procedure and informed consent form the subject was obtained.

**Step 4.** The study subjects were selected through inclusion criteria, they were randomly allocated in to two groups. Experimental group (A) & Control group (B)

**Step 5.** In group (A) the subjects received Proprioceptive training & Conventional physiotherapy and in group (B), the

subjects received only conventional physiotherapy for 3 times a week for 3 weeks.

**Step 6.** Protocol of Proprioceptive training programme consist of: Exercise 1: Slide step forward/backward, Exercise 2: step forward/backward, Exercise 3: single leg stance, Exercise 4: squats and conventional treatment include wax bath therapy, moist heat packs and knee isometrics

**Step 7.** There were pre and post test measurement of balance and proprioception by using Clinical testing for sensory interaction and balance and Isokinetic dynamometer as an outcome measure. It was given for 3 times per week for 3 weeks (total 9 sessions).

**Step 8.** Prior to commencement of the data collection subjects were asked to read and acknowledge the consent form. Subjects were told about the whole experimental programs and its effect, and told the subjects that how to perform the test i.e.; CTSIB.

### Procedure for measuring balance by CTSIB scale

**Level 1:** Stand on the floor with arms across your chest & your hands touching your shoulders, feet together with ankle bones touching & hold for 30 sec.

Stand on the floor with arms across your chest & your hands touching your shoulders, feet together with ankle bones touching with your eyes closed & hold for 30s.

**Level 2:** Stand on a 3 inch high density foam cushion with your arms crossed & touching your shoulders, feet together with your ankle bone touching & your eyes closed, holding for 30sec.

Stand on a 3 inch high density foam cushion with your arms crossed & touching your shoulders, feet together with your ankle bone touching & your eyes open, looking into the dome, holding for 30 sec.

**Level 3:** Stand on a 3 inch high density foam cushion with your arms crossed & touching your shoulders, feet together with your ankle bone touching & your eyes closed, holding for 30sec.

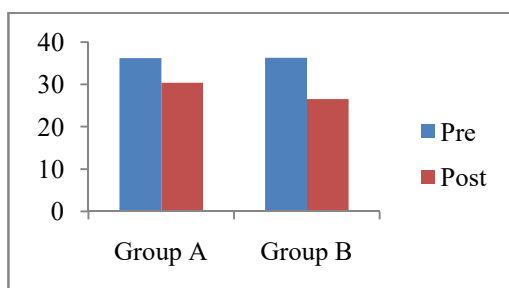
Stand on a 3 inch high density foam cushion with your arms crossed & touching your shoulders, feet together with your ankle bone touching & your eyes open, looking into the dome, holding for 30 sec.

## Result and Discussion

The data was collected by the research person and it was collected at two levels- baseline measurement. The data was analyzed using SPSS 16 software package. The statistical analysis carried out with repeated ANOVA was used within the groups. Independent Sample Test was used between groups.

After 3 weeks of proprioceptive training the group A shows significant results as compared to group B. We observed an improvement in walking on level, maintaining balance and stairs up and down. There was a statistically significant improvement in standing balance after proprioceptive training as compared to group B.

Comparisons of Mean Difference between Group A and Group B



The result considered significant at  $p < 0.05$ .

Lephart et al. state that a lack of reflex stabilization of the knee is associated with a decrease in the sensory feedback mechanisms, which in turn causes latent motor responses of the hamstring muscles. This leads to abnormal body positioning and an increased probability of re-injury.<sup>7</sup>

Lephart et al. find out that patients who are fatigued may have changed proprioceptive abilities, which make them more prone to injuries. This might not be due to a deficit in proprioception, but rather to the decreased ability of the muscles to respond to the mechanoreceptor signals. Proprioceptive deficits are the cause of the injury or the result of the injury remains controversial.<sup>8</sup>

Barrett et al. states that there is a clinical proprioceptive deficit in most patients with functional instability after an anterior cruciate ligament (ACL) rupture. This deficit seems to persist to some degree after an ACL reconstruction). The most appropriate rehabilitation protocol for ACL rehabilitation would be a programmed that includes isometric strengthening of the hamstrings, gastronomies and quadriceps as well as dynamic reflex training and functional hamstring co-contraction.<sup>9</sup>

### CLINICAL IMPLICATIONS

The results of the present study enlighten the use proprioceptive training as a more effective approach than the standard of care in the clinical settings for the management of knee osteoarthritis patients.

### FUTURE SUGGESTIONS

Future studies should be more on experimental trial to explore the effect of proprioceptive training in knee osteoarthritis to make it more evidence supported as there is less evidence. Future clinical trials with long term follow ups will be conducted to determine the effect.

This study concluded that proprioceptive training along with conventional physiotherapy show statistically significant improvement in balance and proprioception in knee osteoarthritis patients. Hence, comparison of balance and proprioception in both groups with and without Proprioceptive training programme provide new insights in osteoarthritis patients.

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