

Original Article

Modulating perception of pain using multijoint coupling dynamic technique versus conventional therapy in early knee osteoarthritis

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Abstract

Background: The pain in early knee osteoarthritis reflexively inhibits the muscle activation and is detrimental to either the motor or the sensory components of muscle function promoting adaptive compensatory strategies. This study aimed at determining the effectiveness of Multi-Joint Coupling Dynamic (MJCD) technique for modulating pain status in early knee osteoarthritis.

Methods: The study included 80 subjects with a diagnosis of early knee osteoarthritis and their baseline evaluation was done for pain (using VAS & WOMAC). The subjects were assigned to two intervention groups (i.e. group A and group B) using random allocation method (by treatment allocation concealment). In Group A, MJCD technique and in Group B, conventional treatment technique was used for a period of 8 weeks followed by re-evaluation. Between-group analysis was done using student t test.

Results: Mean pain score on VAS for left & right knee and WOMAC were 2.1 ± 1.4 , 2.1 ± 1.3 & 2.4 ± 1.3 for MJCD group and 4.2 ± 1.8 , 4.6 ± 1.7 & 5.6 ± 2.2 for conventional treatment group respectively after 8 weeks of intervention and the p value was found to be highly significant in MJCD group ($p < 0.001$) for pain.

Conclusion: MJCD technique is more effective than conventional technique for modulating pain in early knee osteoarthritis.

Key words: Knee; osteoarthritis; pain.

Introduction

Knee osteoarthritis involves a combination of mechanical, cellular and biochemical processes affecting the articular cartilage, synovial membrane and synovial fluid, underlying subchondral bone and the overlying joint capsule. These articular damages may result in loss of motor control, motor neuron excitability, and proprioceptive acuity. It is characterised by a range of disorders of clinical and pathological outcome such as pain, muscle

weakness, muscle dysfunction, proprioceptive impairment [1,2]; neuromuscular incoordination, abnormal joint loading, altered plantar weight distribution and limited functional abilities [3-5].

The pain mechanism in early knee osteoarthritis has been attributed to neuro-physiological and biomechanical factors. It may originate in several articular or para-articular tissues supplied by sensory nerves. The mechanism for pain production may be greater mechanical strain, abnormal stress

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loading, pain, inflammation, effusion and muscle dysfunction in and around knee [6]. Pain reflexively inhibits the muscle activation and is detrimental to either the motor (movement, strength, activation) or sensory (proprioception, balance) components of muscle function, thereby promoting adaptive compensatory strategies. In osteoarthritic knee, there is abnormal nociceptive and mechanoreceptive activity in structures surrounding knee, resulting in pain & biomechanical shift of centre of gravity. This shift of centre of gravity leads to abnormal loading and unloading at knee resulting in vicious cycle of pain, and functional disability further aggravating the degenerative processes at knee [4,7,8].

Researchers have different opinions about managing pain in knee osteoarthritis. They have emphasised on the need for individually tailored treatment programme, and subset-specific approaches beyond strengthening exercises. Presently, available intervention strategies demonstrate tunnel view and focuses on relief of pain, spasm, improving joint range of motion, muscle strength by stretching, knee strengthening (isometric & isotonic) exercises in extreme ranges, therapeutic massage, passive modalities etc. Existing guidelines for the management of knee osteoarthritis lack specificity and do not provide significant estimates of treatment effect. Recently a Multi-Joint Coupling Dynamic (MJCD) technique for managing pain in knee osteoarthritis has also evolved into practice [9,10].

Therefore, the study was taken up with an objective to compare the efficacy of MJCD technique over conventional technique for modulating perception of pain in early knee osteoarthritis.

Methods

In the study, 80 subjects aged 40 to 60 years with a diagnosis of early knee osteoarthritis participated. All the participants with a history of knee pain and positive radiological finding of Grade I and II (Lawrence & Kellgren Classification System), were included in the study. Those with traumatic knee, inflammatory arthritis, metabolic disorder, cardiovascular and psychiatric illnesses were excluded from the study to prevent assessment and treatment bias. The ethical approval was taken from institutional human ethical committee

of C.S.M.M.U. Lucknow, India. A written informed consent was obtained from each patient at the time of enrolment.

The instruments used in the study were-

- (i) Multidisciplinary Weight Distribution analysis system / Foot Plate [3],
- (ii) Visual Analogue scale,
- (iii) Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC) [9,10]

Visual Analogue Scale (VAS): VAS is a self-administered pain assessment tool for measuring the severity of pain and its improvement. The VAS is usually designed as a 10 cm line with description at each end.

Western Ontario McMaster Universities Osteoarthritis Index (WOMAC): WOMAC is a tri-dimensional self-administered questionnaire for assessing pain and functional status in osteoarthritis knee. The questionnaire contains 24 questions targeting areas of pain, stiffness and physical function status. The scoring is based on 5 point ordinal scale ranging from 0 (none) to 5 (extreme). Lesser the score better is the prognosis.

After enrolment of subjects, the baseline evaluation was done for pain using VAS and WOMAC. The subjects were assigned to either of the two intervention groups (i.e. group A and group B) using random allocation method. The allocation schedule was implemented using treatment allocation concealment. The treatment allocation concealment was done by using computer generated allocation sequence. With group A, multijoint coupling dynamic (MJCD) technique [9] and with group B, conventional treatment technique was used.

The intervention was given for a period of 8 weeks followed by re-evaluation. The duration and frequency of treatment session was kept constant for each group i.e. 3 sessions per week of 40 minutes duration each. Out of 80 subjects, there were 2 dropouts in the conventional therapy group. The reason for dropout was noncompliance with the therapy programme.

Multi-Joint Coupling Dynamic Technique: The

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