



# IPSYCHOMETRIC EVALUATION OF KNEEPAIN: ABAB DESIGN

## A Single Subject Randomized Control Trial

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### ABSTRACT

**Aim:** The purpose of this study was to evaluate the efficacy of psychometric tools and physiotherapeutic interventions on pain perception in knee osteoarthritis patient.

**Case Study:** A 58-year-old male patient with bilateral grade-2 primary knee was referred to a physiotherapist with a complaint of bilateral knee pain. He experienced pain severity of nine on visual analog scale, difficulty climbing stairs and while walking. Pain was also assessed using self-rated psychometric tool such as Knee pain and osteoarthritis outcome score (KOOS). The pain subscale was 12% means severe pain prior to the intervention using KOOS questionnaire. The patient was given bilateral multiple angled resisted exercises twice daily for 3 weeks.

At the end of 6th week pain was nearly normal two on visual analog scale and Knee pain and osteoarthritis outcome score pain subscale was 90% means substantial pain relief and good improvement in gait.

**Discussion:** Psychometric tools are the most reliable and validated tools in the evaluation of pain perception in bilateral knee osteoarthritis as the pain perception differs during various activities of daily life.

**Conclusion:** This case concludes that resisted exercises were effective and these scales are diagnostic as well prognostic in use for longitudinal prospective interventional studies due to their validity and reliability.

**Key Words:** Resisted exercises, Knee pain, Visual analog scale, Pain subscale of KOOS

### INTRODUCTION

Pain is the most excruciating and occurring symptom in people with knee osteoarthritis leading to worsening of the activities of daily living. Many patients with bilateral or unilateral knee pain may appreciate various degrees of pain perception during their physical activities of daily living. Among available interventions, resisted exercises were also beneficial in the management of Osteoarthritis knee. Visual analog scale which is the most reliable subjective method used to provide pain perception at rest in knee osteoarthritis patients<sup>1</sup> and patients may not be able to differentiate pain threshold at various physical activities but the recent development of psychometric tools are the most useful tools which assess the pain levels during activities of daily living<sup>2</sup>. Hence, this single subject control trial<sup>3</sup> was done to evaluate the effects of resisted exercises and efficacy of psychometric tool as subjective and specific assessment tools.

### A SINGLE SUBJECT RANDOMIZED CONTROL TRIAL

#### Patient history

The patient, a 58-year-old male complained of bilateral knee pain for 5 months that had started gradually. There was no history of trauma, congenital or acquired knee deformities, ankylosing spondylitis. The cardinal symptoms were knee pain, with restricted knee painful movements. He had no history of a similar problem in the past. The symptoms worsened as the day progressed and relieved with rest.

#### Physical examination

On examination, it was found that the patient had decreased knee movements, inability to flex full range of flexion. Restriction of active extension and flexion were measured using a universal goniometer, where flexion was more restricted than extension, measuring 110° flexion, left and right knee

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flexion was  $110^\circ$  each side, He rated his pain threshold level as 9 on a 0-10 linear visual analog scale (VAS). There are 9 psychometric questions of pain domain of KOOS scale<sup>2</sup>.

### Treatment methods:

The patient was informed about the study and his consent was taken. The patient's pain severity was measured before the intervention as base line value using visual analog scale. Many authors have emphasized the importance of self-rated/subjective scales to evaluate the pain threshold by visual analog scale in musculoskeletal injuries<sup>1</sup>. Terwee also reported that physical functioning was very much influenced by knee pain<sup>4</sup>.

In the present study, active movements were measured by universal goniometer method in knee pain. The patient was then educated about his condition and the possible treatment to be given.

## EXERCISE THERAPEUTICS

### Strengthening

Strengthening exercises for extensors and flexors of the knee were administered to maintain the muscle strength. The patient was given resisted exercise in sitting position twice a day for three alternative weeks along with initial isometrics to overcome muscle soreness and to facilitate resisted exercises. Resisted exercise was carried out using a minimal weights after determining the repetition maximum [1RM]. In the second week, there was no exercise given. In the third and fifth weeks, the weight was progressed as the patient was more comfortable to the resisted exercise twice a day, like wise on the second, fourth and sixth weeks, he was discontinued from the resisted exercise to see the efficacy of the resisted exercise on pain variable as under ABAB [A-intervention, B-no intervention, A-intervention- no intervention design<sup>3</sup>. The first, third and fifth were treatment given weeks, likewise the second, fourth and sixth weeks were control weeks.

### Clinical outcomes:

At the end of the first week of intervention with consolidated weight, the patient was reassessed; his pain had decreased from 9/10 to 7/10, pain subscale of KOOS was 30% from 12% and ROMs of flexion had improved from  $110^\circ$  to  $115^\circ$ . At the end of the second week, without intervention the patient was reassessed; his pain status was the same like at the end of first week, 7/10 on VAS, KOOS was 30% respectively. At the end of the third week of intervention with progressed weight, the patient was reassessed; his pain had decreased from 7/10 to 4/10, KOOS was 60% from 30% and ROMs of flexion had improved from  $115^\circ$  to  $120^\circ$  and respectively. At the end of the fifth week of intervention with

progressed weight, the patient was reassessed; his pain had decreased from 4/10 to 2/10, KOOS was 90% from 60% and ROMs of flexion had improved from  $120^\circ$  to  $135^\circ$  and respectively. At the end of the sixth week without intervention, the patient was reassessed, his pain status was same like at the end of the fifth week. This case study with single subject randomized control trial design clearly shows the efficacy of resisted exercise and psychometric tools in assessing pain and improving the ROM of flexion and extension.

## DISCUSSION:

There are many linear psychometric scales available but VAS is more reliable in terms of quantification of pain as a subjective measure of specification of pain intensity and it is unidirectional measure of pain intensity. The sensitivity and reproducibility are very much acceptable<sup>5</sup>. But more reliable in literate people than illiterate people<sup>5</sup> and also VAS scale has limitation in measuring pain among older adults due to decline in cognitive ability<sup>6</sup> and older adults with knee OA may not be able to differentiate the quantity of pain as this OA pain is mostly perceptual during physical activities. The pain subscale of KOOS scale has nine items which is constructed based on the symptoms of rheumatic diseases<sup>2</sup>. This scale is highly comprehensive and multidimensional in terms of physical functioning<sup>6,7</sup>. Due to its comprehensiveness it evaluates the pain threshold during different physical activities<sup>6-8</sup> as it helps the clinician to understand and plan the rehabilitation program<sup>8,9,10</sup>.

## CONCLUSION

In this single subject randomized control trial, resisted exercises shown to be effective and pain subscale of KOOS scale has better multidimensional pain evaluation capability than unidirectional VAS scale compared to control weeks.

### Clinical implications:

Clinicians must select proper questionnaire that is most appropriate for their specific purpose and betterment of the patient prognosis.

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**Abbreviations:** KOOS - Knee pain and osteoarthritis outcome score, VAS:visual analog scale, ABAB :A-intervention, B-no intervention ,OA: Osteoarthritis, ROM : Range of motion, 1RM : repetition maximum

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