

A Study to Find out Effect of Mechanical Knee Traction versus IFT on Pain and Functional Disability in Patients with Knee Osteoarthritis - An Interventional Study

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Abstract: OA is degenerative joint disorder of articular cartilage leading to a decreased joint space width and range of motion. OA represent a major cause of impairment and disability among the elderly community. Objective of this study to find of comparative effect of mechanical knee traction versus IFT on pain and functional disability in patients with knee arthritis. 30 patients with knee arthritis were allocated into 2 groups. Group A was given mechanical knee traction and conventional therapy. Group B was given IFT and conventional therapy. Visual analogue scale (VAS) was used to assess knee pain and western Ontario and McMaster universities osteoarthritis index used to measure physical function (WOMAC). Treatment was given for 7 days. Data was analysed by using SPSS software version 20. Within group there was significant improvement seen by Wilcoxon signed rank test and Between groups no significant difference using mannwhitney U test and VAS ($Z=-0.832$, $p=-.403$) and WOMAC ($Z=-.727$, $p=-.467$).result of this study says that mechanical knee traction and IFT both are equally effective in reducing pain and improving physical function in patients with knee osteoarthritis.

Keywords: osteoarthritis, mechanical knee traction IFT, VAS, WOMAC

1. Introduction

Osteoarthritis (OA) is a chronic degenerative disorder primarily affecting the articular cartilage of synovial joints, with eventual bony remodelling and overgrowth at the margins of the joints. There is also progression of synovial and capsular thickening and joint effusion ^[1]. There are multiple factors like age, sex, obesity, genetic, bone density, cigarette smoking, local factors and joint location having a major effect on osteoarthritis. It is the most frequent joint disease with prevalence of 22% to 39% in India. ^[2]

Traction is the longitudinal force application to the joint in resting position for mechanical separation of the specific joint surface. Mechanical separation temporary improves joint space and helping to reduce pain by stimulating mechanoreceptor. It also improves flexibility by stimulating proprioceptive stimuli. ^[3] continuous loading on bone is responsible for faster degeneration process of the articular cartilage. As per evidence intermittent traction knee joint get relaxed and reduces the friction between structures that reduces pain and increases the walking distance as well as range of movement of knee joint ^[5]

Interferential current (IFT) is made of two alternatives current by forming a single interference current. Interferential Current is a medium frequency current which is widely used for rehabilitation because it has less associated adverse effects. Its primary objective is analgesia. IFT is work on gate theory and increased nervous fibers depolarization threshold. ⁴Interferential Therapy (IFT) may inhibit the nociceptive. ^[6]

Pain severity can be measured for on visual analogue scale. This is basic scale for pain measurement tool. The western Ontario and mcmaster universities osteoarthritis index is the disease specific self-report multidimensional questionnaire assign pain, stiffness and functional disability. This both scales are reliable and widely using for assessment of the pain and disability.

Electrotherapeutical modalities of rehabilitation are important resources in the treatment of musculoskeletal pain. IFT is a popular treatment for pain and dysfunction associated with musculoskeletal conditions. The effectiveness of traction is well studied in vertebral column. There are very few evidences showing the use of mechanical traction applied to knee joint as a treatment option in patients with knee osteoarthritis. Thus, the purpose of this study is to evaluate the comparative efficiency of mechanical knee traction versus IFT on pain and functional disability for knee osteoarthritis.

2. Methods

This prospective, experimental study was conducted in accordance with the principles of good clinical practice. The protocol was approved by Ethics committee and written consent was obtained from all patients. The study consisted of 30 subjects, 15 in each group. Both male and female subjects participated in the study. The subjects were selected for study based on the inclusion and exclusion criteria.

Inclusion Criteria

- Age group between 40 to 70 years.
- Both male and female.
- Patients with unicompartamental tibiofemoral knee osteoarthritis.
- Patients with grade-2 and 3 (according to the Kellgren and Lawrence system) knee osteoarthritis.
- Patients who are having any or all type of symptoms of osteoarthritis knee (According to American college of rheumatology criteria patients with osteoarthritis knee have disabilities like knee pain and at least 3 of 6, age>50, stiffness <30min, crepitus, bony tenderness, bony enlargement, no palpable warmth.).

Exclusion Criteria:

- Patients with history of hip and/or back injury and lower-limb joint replacement.
- Participants who had history of meniscal or other knee injury in past 6 months.
- Any other neurological or musculoskeletal disorder.
- Osteoporosis
- Patients with Rheumatoid arthritis or gout.
- Uncooperative patients
- Non-consent patients

Eligible patients were assigned into 2 groups according to convenient sampling method.

GROUP A: - Subject (n=15) in this group were receive conventional therapy and Mechanical knee traction.

GROUP B: - Subject (n=15) in this group were receive conventional therapy and IFT.

Group A: Mechanical Knee Traction

Mechanical knee Traction was applied intermittently while patients were sitting position and their knee was placed in 30° flexion by the use of a weight cuff under the lower thigh to induce a counter pressure. The correct knee angle was checked for each patient by a goniometer.

Weight of patient was assessed and traction force of 1/7th kg of body weight was be applied to the patient. The intervention was applied continuously for 40 second hold followed by a 10 second rest period, for total of 10 minutes traction for 7 treatment sessions.^[4]

Group B: Interferential Therapy

- a) Patient Position: Supine Lying
- b) Technique:
- c) Four interferential pad electrodes were placed around the affected knee joint.
- d) Interferential dose:
 - Frequency = 4000 Hz
 - Beat Frequency = 100 Hz
 - Quadripolar / Two channel
 - Duration = 10 minutes
 - IFT was turned on (parameters as above)

Conventional Physiotherapy

As part of the convention physiotherapy quadriceps strengthening exercise has been perform in both groups.

Static quadriceps:

Position of patient: long sitting with knee extended position. Patient was instructed to isometrically contact quadriceps without producing pain and instructed to hold 3-5second.

Last degree knee extension:

Position of patient: supine A sand bag was placed under the knee to support and fix angle at in flexion. The patient was asked to extend the knee only against the resistance of gravity.

High sitting knee extension:

Patient was instructed to do knee extension in high sitting position.

Straight Leg Raising

Patient position: supine with knee extension. Patient instructed to do hip flexion of affect leg about 45 degree and for stabilization of pelvic instructed to bend unaffected leg on exercise table.

3set of 10repiations of 5 second hold for each exercise.

3. Statistical Analysis

All statistical analysis was done by statistical package for the social science (SPSS) statistics version 20.0 for windows software. Microsoft excel was used to calculate mean and Standard Deviation (SD), and to generate graphs and tables. Means and standard deviation (SD) were calculated as a measure of central tendency and measure of dispersion respectively. Pretreatment and post treatment comparison of vas and Womac value was analyzed by Wilcoxon signed rank test and between groups comparison of Vas and Womac value was analyzed by Mann whitney u test or Wilcoxon sum rank test. Level of significance (p value) was set to 0.05.

4. Results

Wilcoxon sign rank test was used for within group pre and post treatment comparison of VAS

		N	Mean	SD	Z	P	Result
Group -A	Pre	15	6.05	±0.72	-3.411	0.01	Significant
	Post	15	2.58	±1.31			
Group -B	Pre	15	6.5	±1.03	-3.413	0.01	Significant
	Post	15	3.47	±1.26			

Interpretation: Result shows significant difference for pre & post VAS GROUP A& GROUP B

Mean and SD of VAS for both the groups A and group B

	Group A	Group B
Mean	3.46	3.03
SD	±1.29	±0.84

Mann Whitney U test was used for between group comparison of VAS of Group A and Group B

	Z	P	Result
VAS	-0.832	0.403	Not significant

Interpretation: Result shows no significant difference for VAS ($Z=-0.832, p>0.403$).

Mean and SD of WOMAC for both the group A and group B

	Group A	Group B
Mean	27.20	25.00
SD	± 9.23	± 7.08

		N	Mean	SD	Z	P	Result
Group - A	Pre	15	43.06	± 9.50	-3.411	0.01	Significant
	Post	15	15.86	± 8.12			
Group - B	Pre	15	49.80	± 5.04	-3.409	0.01	Significant
	Post	15	24.80	± 9.25			

Wilcoxon sign rank test was used for within group pretreatment and post treatment comparison of WOMAC

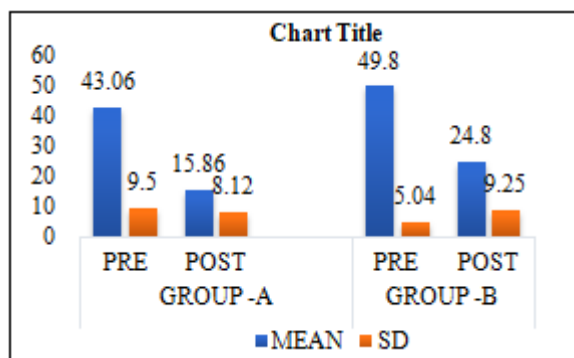
Interpretation: Result shows significant difference for pre and post WOMAC group A and group B

Mann Whitney U test was used for between group comparison of WOMAC of Group A and Group B.

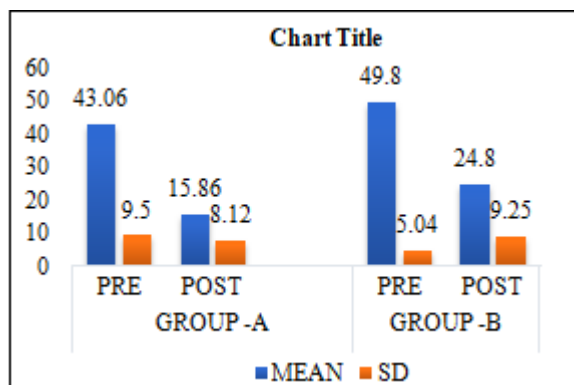
	Z	P	Result
WOMAC	-0.727	0.467	Not Significant

Interpretation: Result shows no significant difference for WOMAC ($Z=-0.707, p=0.467$).

Graphs



Graph 1: Mean and SD of pre and post of VAS of both the groups



Graph 2: Mean and SD for Pre and Post of WOMAC for both the groups

5. Discussion

The result showed that group A (mechanical knee traction) and group B (IFT) improve significantly after 7 day of treatment in patients with knee osteoarthritis on the pain and functional disability. After comparing group, A and group B there is not found significant difference.

Thus, the result of the present study rejects the experimental hypothesis and supports the null hypothesis. Both techniques mechanical knee traction and IFT were equally effective in reducing pain and improving functional mobility.

Intermittent mechanical knee traction helps to produce distraction force. Longitudinal distraction force helps to improve vascular blood flow around joint surface thus traction reduce pain and muscle guarding. Mechanical stretching is producing by traction that improve mobility of the tight structure surrounding joint^[7].

Based on principles of Skeletal Traction the mechanical traction force was designed that was 1/7th of the body weight and based on Manual Traction the treatment period was designed. But if the traction force was applied to the straight leg, then effective force was not applied at the Knee Joint alone thus traction is given in the resting position of knee joint^[4].

Vaishali Jagtap assessed the effectiveness of mechanical traction on the functional outcome in knee joint osteoarthritis and concluded that mechanical traction is more effective than conventional physiotherapy treatment on improving function in osteoarthritis knee^[4]

The interferential electric current is characterized by a medium frequency wave with low frequency modulated amplitude. The rationale for pain was provided by the gate control theory of pain proposed by Melzack and Wall. The prevalent belief that there is a selective effect of IFT such that high frequency/low intensity applications work via the pain gate mechanism. The input of the mechanoreceptors reduces the excitability of the nociceptor responsive cells to pain generated stimuli; thus, producing a presynaptic or segmental inhibition whereas low frequency/high intensity works via the opiate mechanisms received^[11].

Atmaz examined comparative efficiency of trans cutaneous electrical nerve stimulation, interferential currents and soft wave diathermy in knee osteoarthritis and concluded that all group shows significant improvement.^[11]

Devid j magee analysis effect into active interferential current and placebo on pain pressure sensitivity, pain pressure threshold and placebo response taken as outcome and concluded that active interferential current is more useful in pain pressure sensitivity. Placebo is not significantly decrease to control.^[12]

6. Clinical Implication

Results suggest that both the modalities. Mechanical knee traction & IFT are proved to be effective in reducing pain

and in improving functional mobility in primary OA knee so, either can be used as an alternative form of treatment.

7. Limitations

Blinding was not done in the study.

Medications related to their clinical symptoms of the joint were not ceased.

Duration of condition was not taken into consideration

8. Further Recommendations

- Study can be done with large sample size.
- Treatment can be given for longer duration with follow up.
- Other stages of osteoarthritis can be taken for correlation.

Conflict of Interest

There was no conflict of interest at personal to institutional level.

Source of Funding: self

9. Conclusion

The result of the present study showed that patients belonging to both the groups that is mechanical knee traction and IFT group had relief from pain and other symptoms, increase activity of daily living and knee related quality of life. Hence, concluded that both the techniques were effective for osteoarthritis of knee joint. It can be further recommended that both the techniques can be included together in OA treatment regime for better results to patients.

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