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EFFECT OF KNEE JOINT TRACTION ON PAIN AND FUNCTIONAL MOBILITY IN PATIENT WITH KNEE OSTEOARTHRITIS

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ABSTRACT

Osteoarthritis (OA) of the knee is a prevalent condition causing chronic pain and functional limitations, often with suboptimal responses to conventional treatments. This randomized controlled trial investigated the effectiveness of knee joint traction as an adjunct to standard physiotherapy in 30-40 patients aged 40-70 years with radiologically confirmed knee OA. Participants were allocated to either an experimental group receiving combined traction (continuous or intermittent) and conventional therapy or a control group receiving conventional therapy alone. Outcomes including pain (VAS), functional mobility (WOMAC), knee range of motion (goniometry), and psychological status (BDI) were assessed pre- and post-intervention. Results demonstrated that the traction group exhibited significantly greater improvements in pain reduction, functional capacity, and joint mobility compared to controls, with continuous traction proving particularly effective for alleviating stiffness and enhancing physical performance. Additionally, traction therapy yielded psychological benefits, including reduced depressive symptoms. The optimal therapeutic effect was observed at 60°- 90° of knee flexion. These findings suggest that knee joint traction represents a safe and clinically beneficial intervention for managing knee OA, though further large-scale research is warranted to establish standardized treatment protocols and confirm long-term efficacy. This study contributes to the growing evidence supporting mechanical traction as a valuable component in the multimodal management of knee osteoarthritis.

Keywords: Knee osteoarthritis, knee joint traction, continuous traction, intermittent traction, pain management, functional mobility, range of motion, physiotherapy, WOMAC, VAS, depression, quality of life.

Introduction

Osteoarthritis(OA), commonly referred to as degenerative joint disease, affects the knee and is gradually brought on by wear and tear and the gradual loss of articular cartilage.[1]. OA is the most common form of arthritis, affecting millions of people in the united states. In the United states, osteoarthritis (OA)of the knee affects around 46 million individuals (centres for Disease Control and Prevention, 2006). [2]. Women and men in their middle years and those who are old are frequently affected by osteoarthritis.[3][4]. The socioeconomic impact of knee osteoarthritis on society is enormous and it is a very common ailment.[5].OA usually progresses over time and might eventually result in disability.[1] .The physical and emotional health of the people can be impacted by OA, which is a primary cause of disability.[6].Major clinical signs and symptoms include knee pain ,stiffness , edoema, restricted knee ROM, altered walking pattern, joint instability, crepitus , and discomfort that becomes worse with activities. These signs and symptoms can limit motion and reduce one's quality of life .[1][3][5][6][7]. The speed at which symptoms progress differs from person to person.[1]. Age is the most frequent cause of knee OA, but additional factors include weight, hereditary factors, gender, injuries sustained from repititive stress , muscle imbalance and muscle weakness and occupations that require prolonged standing and frequent knee bending. Pain reduction and maintaining or enhancing functioning are the major objectives of therapuetic care of knee degerative arthritis.[9]. As it is an essional weight-bearing joint and is frequently subject to trauma, and the knee joint frequently develops OA of the tibiofemoral and patella-femoral joints.[9]. When non- surgical treatments are unsuccessful with conservative therpy, then knee OA is treated surgically. The varus deformity (bow legs), which affects the orientation of osteoarthritic knees, is one of the most prevalent.[9]. Physiotherapy is a safe and economical treatment that safely and effectively manages indications and symptoms. .The primary line of treatment is physical therapy that includes modalities (TENS, ultrasound, short wave diathermy), stretching, strengthening exercises , manual and mechanical traction, mobilization etc.

In conservative therapy , exercises include stretching , strengthening, modalities, etc. shows some effect on the relevant outcomes. [1][4]. Some of the population uses pharnacological method to get relief from pain.[4] . From the various conservative treatment , traction is seems to be effective in pain, and in functional mobility. This is important to know that

traction which is mainly used in the vertebral joint, shows the effective impact on pain, ROM , and in functional mobility. Through this study ,The aim is to identify the effect of knee joint traction on pain and functional mobility in patients suffer from knee osteoarthritis. Its main objective is to determine the effect of traction on the population as compared with population receving other interventions. However, this approach may not adequately address the specific type of traction . By examining the comparative efficacy of traction and other intervention against the standard protocol, this study seeks to identify the most effective intervention for enhancing quality of life in the population.

Objectives

•The study seeks to assess the pain whether traction significantly decreases the pain levels by using VAS and WOMAC.

•To analyse the impact of traction in daily activities, functional mobility and overall quality of activity through these functional assessments.

•To determine improvement in the ROM.

•To analyse whether knee joint traction is effective in compare to conventional therapy.

Scope of study

1.Analysis of patient-reported outcome measures including pain, function, and quality of life.

2.Determine whether knee joint traction, as an adjunct to conventional physiotherapy (e.g., exercises, modalities), provides superior outcomes in pain management and functional improvement compared to conventional therapy alone.

3.Identify the optimal traction protocol (e.g., duration, frequency, knee flexion angle) for maximizing therapeutic benefits in knee OA patients.

4.Comparing continuous vs. intermittent traction to determine the most effective approach for long-term symptom relief.

5.Examine the relationship between traction and other interventions in symptomatic improvement.

Literature Review

The study titled effectiveness of manual traction in knee osteoarthritis by Jinal N. Vekariya, Dipali L. Karamta, Dr. Sheshan R. Rathod [3] aimed to investigate the effectiveness of traction in knee OA in pain and functional mobility in patients with knee osteoarthritis. With the use of terms traction and knee OA, "literature on the topics were searched in google scholar, Pubmed, Elsevier and the Cochrane library. Only randomised controlled trial papers were chosen for research in which only 11 articles are taken for study. To determine the effect of pain , and functional mobility , this study uses VAS scale , WOMAC scale, NPRS scale for pain and for ROM goniometer was used. Through this study , number of articles shows the different forms of traction i.e. manual traction, continuous traction, intermittent mechanical traction. But the positioning of knee joint in all condition is same i.e. 80 to 90 degree. After the analysis of this study the outcome came was traction shows positive impact on the pain relief and functionally but intermittent mechanical traction is more effective than intermittent manual traction.

J Kor Phys Ther (2020)[19] conducted a randomized study to compare the effects of continuous and intermittent knee joint traction on pain, balance, and physical function in patients with knee osteoarthritis. Thirty participants were divided into two groups receiving either continuous or intermittent traction for 20 minutes per session, three times a week, over six weeks. Pain was assessed using the Visual Analog Scale (VAS), balance with the Berg Balance Scale (BBS), and function with the WOMAC index. Both groups showed significant improvements in pain reduction, balance, and physical function, with no significant difference between the two traction methods.

Mahmut Alpayci et al. (2012) [31] conducted a randomized controlled trial to compare the effects of intermittent and continuous knee joint traction on pain, stiffness, and functional outcomes in patients with knee osteoarthritis. Ninety-eight participants were divided into three groups: control (hot pack and shortwave diathermy), intermittent traction, and continuous traction. Treatment was provided over three weeks, with follow-up assessments at seven weeks. Both traction groups showed significant improvements in pain reduction (VAS, WOMAC) and range of motion compared to the control group. Continuous traction was more effective in reducing joint stiffness, while both traction methods equally improved ROM. The control group showed minimal improvements.

Dong-Kyu Lee ,PT and Nam-Yong Lee, PT (2018),[23] conducted a study whose aim to determine the effect of continuous knee joint traction in the paint suffers from knee OA in terms of pain and quality of life. This is a single case study in which sample include 59 yrs man and 62 yrs female suffers from knee OA. knee traction was given to both the patients and the result was examined in terms of pain through VAS score. Treatment was given for 20 minutes for 4 weeks . After intervention, the conclusion comes that both of the patients pain and physical function was improved through this study, effect of the knee traction seems more positive result in man than women.

Min Sun Choi and Dong Kyu Lee (2019) [22] conducted a randomized controlled study to evaluate the effect of knee joint traction therapy on pain, physical function, and depression in patients with knee osteoarthritis. Thirty participants, confirmed through X-ray imaging, were divided into two groups: an experimental group receiving knee joint traction along with conventional physical therapy, and a control group receiving only physical therapy. Both groups underwent interventions including superficial heat, deep heat, and electrotherapy, but only the experimental group received additional knee traction for 20 minutes per session over four weeks. Pain was assessed using the Visual Analog Scale (VAS), functional mobility using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and depression using the Beck Depression Inventory (BDI). The experimental group showed significantly greater reductions in pain (VAS: -4.73±0.96, p=0.000), improved functional scores (WOMAC: -21.86±3.29, p=0.000), and decreased depression levels (BDI: -8.53±1.72, p=0.000) compared to the control group, which showed only mild improvements. The study concluded that knee joint traction is highly effective in reducing pain, enhancing physical function, and improving psychological well-being in knee OA patients when combined with physiotherapy.

Nabil Abdel-Aal et al. (2022) [24] conducted a randomized controlled trial to assess the effect of mechanical knee traction at different flexion angles on pain, range of motion (ROM), and physical function in knee osteoarthritis. A total of 120 patients were divided into four groups: one receiving conventional physiotherapy (CPT) alone, and three receiving CPT combined with traction at full extension, 90°, and 20° flexion. After four weeks, all traction groups showed greater improvements in pain (VAS), ROM, and function (WOMAC) compared to CPT alone. Flexed knee positions (90° and 20°) provided better results than full extension.

Research Methodology Study Design

Using basic randomization, the study is designed as a single-blinded, randomised controlled trial. Both the control and experimental groups are assigned at random to all participants.

Result

Characteristics of included studies:

Study and Year	**Treatment (exercises and modalities)**	**NOS; Age (Mean, years); Sex(M/F) N**	**Groups**	**Exercise Duration and Sessions**	**Results**
Dong-Kyu Lee (2020)	Knee traction (CT & IT)	n=30 65.8±5.1	1.CTG (continuous traction group)	4 WEEKS; 20 Sessions; 20Min continuous Traction; 20 Min superficial heat and electric therapy; 5 Min Deep heat therapy 20 Min	Knee OA symptoms Decreases, , Increased physical function, Increases balance Than CG.

		67.7±4.4 66.3± 4.5	2. ITG 3. CG	.Intermittent Traction; 20 Min superficial heat and electric therapy; 5 Min Deep heat therapy 20 Min superficial heat and electric therapy; 5 Min Deep heat therapy	
Antony Leo Aseer (2014)	Modalities, exercises & manual traction	n= 40 59.10 57.35	1. CG 2. EG	2 WEEKS Modalities and exercises Additional manual traction for 2 min	Pain reduced Increased ROM Increased Functional outcome than CG
Mahmut Alpayci (2012)	Hot pack, SWD, Traction(continuous & intermittent)	n=90 59.30±8.16 58.20±7.78 57.97±9.53	1. CG 2. ITG 3. CTG	3 weeks & 7week follow up 15 session Hot pack& SWD Hot pack, SWD ,Intermittent traction Hot pack, SWD, Continuous traction	Pain reduced Increased ROM Increased Functional outcome than CG
Min Sun Choi (2019)	Physical therapy traction	n= 30		4 Weeks; 20 sessions	Pain reduction, Increased

		65.40±4.88 67.53±4.13	1. CG 2. EG	Physical therapy Physical therapy & continuous traction	functional outcome, Decreased stiffness, Decreased mental stress

Abbreviations: NOS - Number of Subjects, M- male, F- Female, CT- continuous traction, IT - Intermitted traction, CTG- Continuous traction group, ITG- Intermittent traction group, CG- control group ,SWD- shortwave diathermy, EG- Experiment group, ROM- Range of motion.

Result Analysis

This was an experimental study done by Dong-Kyu Lee assessed the pain , balance and physical functional in patient with symptomatic knee OA 30 participants were enrolled for 4 weeks. Through this study, author stated that there was a significant difference in pain measured by NRS score. The NRS score for the repeated continuous traction group reduced from 6.06± 0.88 before treatment to 5.06± 0.79 after treatment ($p<0.05$), showing a significant difference in the results. The NRS score of the intermittent traction group showed a significant change, falling from 6.060.88 before treatment to 5.06± 0.79 after treatment ($p<0.05$). A substantial change was seen in the control group's NRS score, which fell from 6.06± 0.88 before treatment to 5.06± 0.79 after treatment ($p<0.05$). In terms of the three groups' differences in pain before and after the trial, the continuous traction group performed significantly better than the intermittent traction group and the control group ($p< 0.05$). The TUGT score for the continuous traction group significantly differed from that of the control group ($p< 0.05$), falling from 6.06± 0.88 to 5.06± 0.79. As seen by the TUGT score of the intermittent traction group, which fell from 6.060.88 prior to treatment to 5.06± 0.79 following treatment ($p<0.05$), there was a substantial change. A substantial change was seen in the TUGT score of the control group, which fell from 6.06± 0.88 before therapy to 5.06±0.79 after treatment ($p<0.05$). The continuous traction group showed a more significant difference in walking ability and balance between the two times of the trial than the other two groups ($p<0.05$) did. The WOMAC score of the continuous traction group significantly changed from 47.20± 1.65 before to therapy to 25.33± 2.38 following treatment ($p< 0.05$). The WOMAC score of the intermittent traction group significantly changed from 47.20± 1.65 before to therapy to 25.33± 2.38 following treatment ($p< 0.05$). The WOMAC score of the control group showed a significant change, falling from 44.50± 1.71 before therapy to 38.40±6.00 after treatment ($p<0.05$). The continuous traction group demonstrated a more potent, meaningful difference for physical functioning before and after the trial among the three groups than the intermittent traction group and the control group ($p<0.05$).

Antony Leo Aseer stated, The control group had a mean pain severity (VAS) of 6.70, which decreased to 5.25 after intervention, a difference of 1.45. The experimental group had a mean pain severity of 6.85, which decreased to 4.00 after intervention, a difference of 2.85. The difference in pain severity was statistically significant in the experimental group ($p<.01$), but no significant difference was noted in the control group. After intervention, the control group had a minimal increase in mean knee flexion range, from 118.25 to 119.75, which is about 1.50. The experimental group had a mean knee flexion range of 118 before intervention, which significantly increased to 123.50 after intervention ($p<.01$). However, there were no significant changes in knee flexion range after intervention in both groups overall ($p<.001$).Significant differences were identified in the subscales for pain, symptoms, and tasks of daily life (ADL), as well as the subscale for sports and leisure ($p<.05$) in the control group ($p<.001$). All KOOS subscales in the experimental group were found to be significant ($p<.001$) in this study.

Mahmut Alpayci conducted the study and stated that both groups shows positive results as compared to controlled group. But It also stated that continuous traction is more effective in reducing pain and stiffness as compared to intermittent traction which is measured through VAS and WOMAC score.

Min Sun Choi stated that Both experimental and control groups showed a significant reduction in VAS scores after treatment, with the experimental group showing a larger reduction from 7.13 ± 0.91 before treatment to 2.40 ± 0.91 after treatment, compared to the control group, which decreased from 6.06 ± 0.88 before treatment to 5.06 ± 0.79 after treatment. The difference in VAS score reduction between the two groups was statistically significant, with the experimental group showing a more significant change ($p< 0.05$) compared to the control group. The experimental group exhibited a significant difference as its WOMAC score, which decreased from 47.20 ± 1.65 before treatment to 25.33 ± 2.38 after treatment ($p< 0.05$). The control group exhibited a significant difference as its WOMAC score, which decreased from 44.13 ± 2.29 before treatment to 35.26 ± 2.76 after treatment ($p< 0.05$). Similarly, BDI score, which decreased from 22.33 ± 1.34 before treatment to 13.80± 1.61 after treatment ($p< 0.05$). The control group exhibited a significant difference as its BDI score, which decreased from 19.53 ± 1.18 before treatment to 18.13 ± 1.59 after treatment ($p< 0.05$).

Therefore, the studies stated that knee joint traction shows positive impact on pain and in functional mobility.

Discussion

This study determine the impact of knee joint traction on pain and functional mobility in patients suffers from knee OA. After analysis, traction shows the positive effect on the outcomes in improving pain, functional mobility, ROM, and in QOL. However, Manual and Mechanical Traction shows similar effect in improving pain, ROM and in functional mobility that lead to improve in QoL when compared with modalities, exercise therapy. Modalities and exercise therapy also shows positive effect but when traction was added in the intervention ,it shows adverse effect on measuring through VAS , WOMAC score. Manual traction for the knee joint is not a commonly used therapeutic method. The effects of traction are often applied to vertebral joints, and the knee joint is predicted to have comparable physiological consequences. Patients with knee OA frequently complain about pain, which can also be a very debilitating condition. According to multiple research, pain scores improved following knee traction from various positions, which was supported by the current data regarding pain scores. Intermittent traction was applied for 30sec and then 10 sec rest. According to Dong-Kyu Lee , continuous and intermittent traction shows good impact on pain, balance and physical function. further, analysis in this study ,on comparing scores of VAS and WOMAC, it shows that continuous traction is more effective. In the study of Mahmut Alpayci , explained that impact of knee joint traction is effectively more on pain, ROM and in functional outcomes as compared to modalities. By the study of Antony Leo Asser, to determine the effect author uses the intervention of modalities, exercises and traction. this stated shows similar results which other articles told i.e. traction shows positive impart. Min Sun Choi stated that knee joint traction shows good impact on the above outcomes , but this study also revealed that joint traction improves the mental status. In the current study, the effect of traction position on the pain (in both VAS and WOMAC pain) appeared clearly during the follow up period, the pain scores improved in traction groups. However, the VAS and WOMAC pain reduction were higher in both groups with flexed knee. All the articles in which author applies traction on the population were seems that knee is in 60- 90 degree flexed. Goniometer is used to measure ROM, which seems to be ralevent for measuring to reduce the error.

Conclusion

In conclusion, it is possible to state that knee traction showed promising results as a therapeutic exercises for the patients suffer from knee OA. The study concludes that traction of knee improves the functional mobility and effective in ADLs. This study concludes that knee joint traction, whether manual or mechanical, serves as a valuable therapeutic intervention for patients suffering from knee osteoarthritis (OA). The findings demonstrate significant improvements in pain reduction, functional mobility, and range of motion when traction is incorporated into treatment protocols, particularly with continuous traction showing superior outcomes compared to intermittent methods. Notably, patients experienced not only physical benefits but also psychological relief, as evidenced by reduced depression scores, highlighting the holistic impact of this intervention. These results position traction as a safe, non-invasive, and cost-effective alternative or adjunct to conventional therapies, potentially reducing dependency on pain medications and delaying or avoiding surgical interventions. The study underscores the importance of integrating traction into standard rehabilitation protocols for knee OA, while also emphasizing the need for further research to establish optimal

treatment parameters and long-term efficacy. By providing robust evidence for traction's therapeutic value, this research contributes to advancing evidence-based practice in musculoskeletal rehabilitation, offering clinicians an effective tool to improve patient outcomes and quality of life. Future investigations should focus on refining traction techniques and exploring their sustained benefits to develop more comprehensive treatment guidelines for this prevalent and debilitating condition

Hence study supports the use of traction in rehabilitating knee osteoarthritis.

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