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EFFECTIVENESS OF TRANSCUTANEUS ELECTRICAL NERVE STIMULATION (TENS), BALANCE EXERCISES, AND QUADRICEPS SETINGG IN THE CASE OF BALANCE DISORDERS IN KNEE OSTEOARTHRITIS PATIENTS: A CASE REPORT

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Abstract

***Introduction**:* Osteoarthritis is the most common degenerative disease that causes disability in the elderly. Defined as progressive articular cartilage wear and tear. The goal of this study was to see how well Transcutaneous Electrical Nerve Stimulation (TENS), Balance Exercise, and Quadriceps Setting worked in cases of Balance Disorders in Osteoarthritis Knee Patients.
***Case Presentation**:* A retired teacher, 68 years old. The patient complains of pain in her right knee, which happens when she first wakes up in the morning and when he walks lengthy distances.
Management and Outcome: Patients receive therapy twice a week, with each session lasting 60 minutes. Transcutaneous Electrical Nerve Stimulation (TENS) and exercises were used to treat the patient. The Numeric Rating Scale (NRS) and the Berg Balance Scale (BBS) were used to assess pain.
***Discussion**:* Tenderness and motion discomfort decreased by one point after therapy, and balance improved by one point as measured by BBS, with a pre-therapy value of 14 and a post-therapy value of 23.
***Conclusion**:* In Osteoarthritis Knee patients, therapy in the form of Transcutaneous Electrical Nerve Stimulation (TENS) modalities and exercises is beneficial in lowering pain and improving balance values.

Keyword: Knee Osteoarthritis, Balance Disorders, Transcutaneous Electrical Nerve Stimulation (TENS), Balance Exercise

Introduction

The most frequent degenerative illness that causes incapacity in the elderly is osteoarthritis. Knee OA primarily affects persons 65 and older, with a prevalence of 33.6 percent in the United States (12.4 million). Women have a higher prevalence (42.1%) than men (31.2%). (Lespasio et al., 2017). According to Hussain et al., 2018 women over the age of 50 had a higher prevalence of knee osteoarthritis since they have past the menopausal transition period.

Crepitus, which may be heard and felt and may be caused by the rough surface of the bone, and swelling of the bone at the ends of the joints pushing against the ligaments are both symptoms of osteoarthritis. An inflammatory reaction can occur in the synovium of the hip or knee, resulting in swelling and an increase in joint temperature. Limited joint motion is another symptom of osteoarthritis (W.F.H. Peter et al., 2010)

Osteoarthritis is the progressive deterioration of the articular cartilage (Kan et al., 2019). Family history of disease, age, obesity, diabetes, synovitis, systemic inflammation, lower extremity alignment (genu valgum and genu varum), joint shape and dysplasia, trauma, and metabolic system inflammation are all factors that influence knee osteoarthritis (Lespasio et al., 2017). Osteoarthritis causes changes not only in the articular tissue, but also in one of the vestibular systems, specifically the body balance system (Kim et al., 2011).

Transcutaneous Electrical Nerve Stimulation (TENS), Balance Exercise, and Quadriceps Sett exercises are some of the physiotherapy techniques that can help with knee osteoarthritis. The goal of this paper is to establish the effectiveness of TENS physiotherapy, Balance exercise, and Quadriceps Sett exercise in cases of Balance Disorders in Osteoarthritis Knee patients, based on the backdrop of the condition stated above.

Case Presentation

A retired teacher, 68 years old. The patient complains of pain in her right knee, which happens when she first wakes up in the morning and when she walks lengthy distances. The patient also pain, particularly while climbing stairs. The patient felt soreness in the bone and swelling in the knee area throughout the assessment. According to W.F.H. Peter et al., 2010 indications and symptoms of Knee Osteoarthritis are feeling morning stiffness in the morning, crepitation and pain on bone palpation and swelling. The patient also has balance issues; thus, this balance disorder evaluation employs the Berg Balance Scale, which has a pre-therapy score of 14 and a post-therapy score of 23.

Management and Outcome

The NRS (Numeric Rating Scale) is the instrument used to assess the severity of pain. The NRS uses a 0-10 scale, with 0 indicating no pain and 10 indicating severe pain. The BBS (Berg Balance Scales) is the measurement utilized to analyze the balance in this scenario. The BBS is a 14-item objective measuring scale that assesses static balance and fall risk in adults. The higher the

BBS score, the better a person's balance will be, according to Berg Balance Scale interpretation. If the score is 0–20, the individual is wheelchair bound, if it is 21–40, the person walks with assistance, and if it is 41–56, the person is independent.

Transcutaneous Electrical Nerve Stimulation (TENS) and exercises are two physiotherapy therapies that can be offered to these patients. Burst current is applied to the lateral and medial portions of the patient's knee for 15 minutes with an intensity based on the patient's tolerance in the TENS modality, while the Quadriceps setting exercise instructs the patient to push both knees down with foam padding. Then, for 5 seconds, hold the contraction. For balance exercises, instruct the patient to do single leg stance and calf raise exercises. This exercise is performed 10 repetitions in 2 sets.

Result

Table 1 Pain using Numeric Rating Scale

NRS	Pre	Post
Tenderness	4	3
Motion pain	4	3

Based on the table above, the pain measured using the NRS obtained the results of tenderness in the knee area pre therapy: 4; knee motion pain pre therapy: 4; after being given therapy in the form of TENS and balance exercises as well as quadriceps setting exercises there was a decrease in pain in the Post therapy which became tenderness: 3 and motion pain in the knee area was worth 3.

No	Description	Pre	Post
1.	Sitting to standing	1	3
2.	Standing unsupported	0	0
3.	Sitting unsupported	4	4
4.	Standing to sitting	1	3
5.	Transfers	1	1
6.	Stand unsupported	0	0
7.	Stand unsupported with your feet close	0	1
8.	Reaching forward while standing	1	2
9.	Retrieving object from floor	0	1
10.	Turn around to look back	2	3
11.	Turn 360 degrees	3	3
12.	Stool stepping	1	1
13.	Stand with one foot in front of the other	0	0
14.	Stand with one leg	0	1
	Score	14	23

Table 2. Balance Measurement using BBS (Berg Balance Scale)

The balance value measured using BBS shows an increase in the balance value, as seen in the table above. This can be observed in the BBS score on the value of pre and post therapy, where the initial therapy score is 14, indicating that a person cannot be independent or is still confined to a wheelchair, and the post therapy score is 23, indicating that a person can walk with help. The higher the BBS value, the better the patient's equilibrium will be, according to this interpretation.

Discussion

According to the findings, there was a one-point decrease in tenderness and motion pain, as well as a one-point rise in balance as measured by the BBS, with a pre-therapy value of 14 and a post-therapy value of 23. Proprioceptive abnormalities related with the presence of knee pain were significant predictors of poor balance, according to Truszczyska-Baszak et al's research., 2020. As a result, postural stability is made up of two components: a lack of ocular control and the presence of proprioceptive dysfunction produced by pain.

Single Leg Stance is one of the balance exercises offered to this patient. According to Levinger et al., 2017 research, the development of this balance exercise will minimize the base of support, the hand of support, and the sensory input.

Based on previous research (Beckwée et al. 2012), in which TENS was employed in the investigation. TENS works by using a low-threshold A-beta burst current to apply electrical stimulation to the skin. This current can boost neuron responsiveness, resulting in pain reduction in Osteoarthritis patients. The 'Gate Control Theory' of pain perception underpins the inhibitory action of TENS. Large activation (A-beta) in afferent cutaneous tissue activates inhibitory interneurons in the medulla, according to this idea. This can reduce the transmission of nociceptive signals from A-delta and C-fibres with small diameters. Because OA is a dynamic process with an inflammatory phase and the potential for increased pain throughout this period. The use of TENS as a training aid can therefore be suggested. According to Pietrosimone et al., 2020, applying TENS to the knee causes more afferent impulses to emerge from surrounding the joint, which the central nervous system interprets as excitatory. Furthermore, in osteoarthritis, the afferent stimulation provided by TENS will eventually overpower the inhibitory signals emitted by mechanoreceptors.

The patient will be provided an isometric exercise practice such as Quadriceps Sett in this article. According to earlier research conducted by Anwer & Alghadir (2014), there was a decrease in pain followed by an increase in quadriceps muscle strength and knee joint stability in this study employing isometric exercise mixed with SLR as an intervention in Osteoarthritis Knee patients.
The results of this study revealed a decrease in pain and an increase in the patient's balance score, however tenderness and motion pain scores only altered by 1 point from the original therapy. The patient will still require the assistance of another person or a walker to achieve the balance value evaluated by the Berg Balance Scale. This is because proprioceptive elements and postural stability have an impact on balance issues.

Conclusion

The outcomes of physiotherapy in the case of Osteoarthritis Knee patients with Balance Disorders using Transcutaneous Electrical Nerve Stimulation (TENS) modalities and exercise indicated a reduction in pain and an increase in balance values.

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