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Postural Dynamic Balance in clients with Type 2 Diabetes Mellitus - A Study

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ABSTRACT

Type 2 diabetes, is characterized by insulin resistance and high blood sugar levels, can significantly impact postural dynamic balance due to complications like diabetic neuropathy Diabetic neuropathy, reduces sensation and causes muscle weakness in the lower extremities, leading to difficulties in detecting surface changes and making postural adjustments. Posture refers to the position someone holds their body while standing, sitting, or lying down. Good posture involves training the body to stand, walk, sit, and lie in positions where the least strain is placed on supporting muscles and ligaments during movement or weight-bearing activities. Good posture involves alignment, balance, proper muscle tone. Additionally, impaired proprioception in diabetes can slow reaction times and coordination, while visual impairments and vestibular issues further compromise balance. Maintaining good postural dynamic balance is crucial for preventing falls, enhancing mobility, and improving the quality of life for individuals with Type 2 diabetes. As, dynamic balance is essential for performing daily living activities safely, this study, was attempted to reveal the relevance of multi-sensory treatment activities (Occupational therapy) with postural dynamic balance in individuals with Type 2 Diabetes Mellitus.

AIM:

To asses diabetic neuropathy clients on dynamic balance with standardized assessment scale and relate its relevance to functional activities training.

OBJECTIVES:

To select type 2 diabetic patients from Medicine OPD of GCMC&H

To asses them with Tinetti balance assessment scale

To administer selected multisensory treatment activities for a period of 3 months

To find effect of selected treatment activities on dynamic balance

STUDY setting & Design

Medicine OPD of Government Cuddalore medical college and hospital at Chidambaram. It is a Quasi Experimental study

OUTCOME MEASURES:

Tinnetti performance oriented mobility assessment (POMA)-balance test scale.

SELECTION (INCLUSION) CRITERIA:

For diabetic neuropathy patients with a diagnosis and treatment ongoing for 3 year.

POMA score less than 24 is included

EXCLUSION CRITERIA:

If POMA score is more than 24 is excluded

RESULT:

Result with statistical analysis shows that there is a positive significant correlation between Tinetti-Balance-Assessment and Blood sugar level in pre-therapy & post therapy score exists.

Keywords: posture, diabetic neuropathy, dynamic balance, Occupational Therapy, multisensory treatment activities, POMA scale

INTRODUCTION

Diabetic Neuropathy happens because of a problem in body regulating sugar. High blood sugar levels can lead to disorders of the circulatory, nervous and immune systems. There are several types of diabetes, each with different causes and treatments. In Type 2 Diabetes mellitus, the body becomes resistant to insulin or the pancreas doesn't produce enough insulin. It is more common in adults, but increasing in children and adolescents due to rising obesity rates. Lifestyle changes (diet and exercise), oral medications, and sometimes insulin can manage the condition, still some end up with Nerve damage, particularly in the legs and feet. Occupational Therapy if administered from the beginning can help them to prolong the wellbeing of body and mind. Effective interventions include balance training, strengthening exercises, sensory integration activities, and functional tasks, supported by education by on- going professional guidance. Regular assessment and personalized exercise programs are essential to address these balance challenges, ultimately helping individuals with type 2 diabetes improve their stability and independence. Postural dynamic balance is crucial for individuals for several reasons, impacting daily life, overall health, and quality of life.

Symptoms of Diabetic Neuropathy

- Numbness
- Tingling or burning sensation
- Increased hunger, Fatigue
- Blurred vision
- Loss of balance and coordination
- Unexplained weight loss, loss of muscle bulk, Muscle weakness
- Cataract, Glaucoma & damage to the blood vessels of the retina, potentially leading to blindness
- Hearing problems are more common in people with diabetes
- Slow-healing sores
- Frequent infections
- High blood sugar over time can damage or destroy nerves. That may result in tingling, numbness; pain or loss of feeling that usually begins at the tips of the toes or fingers and gradually spreads upward.
- **Insulin resistance** happens when cells in muscles, fat, and liver don’t respond well to insulin. As a result, pancreas makes more insulin to help glucose enter cells. But it is not absorbed properly.

POSTURE & BALANCE ARE INTERCONNECTED

Good sense of balance comes from information related to brain with inner ears, eyes, skin receptors, muscle movement, and body position. **Balance** pertains to good posture, a neutral spine, and a firm stance. Good posture involves training the body to stand, walk, sit, and lie in positions where the least strain is placed on supporting muscles and ligaments during movement or weight-bearing activities. Good posture helps in correct alignment reducing “wear and tear” on joint surfaces. Stress and strain to the spinal cord and nervous system is also lowered, allowing our body and organs to function at its best. Balance and posture are controlled by the same part of the brain, the cerebellum. A 2015 study showed that if someone’s side alignment is 50mm or more from normal, there are negative health outcomes such as arthritis, congestive heart failure, chronic lung disease and more. But, gravity, genetics, occupation, lifestyle habits, activity levels, trauma plays vital role in correct alignment. Posture involves the integration of multisensory inputs and the coordination of different body parts and senses . On the other hand, balance refers to the ability to resist or control internal and external perturbations to keep the body segments oriented in three-dimensional space without falling . It encompasses both postural equilibrium (stability) and postural orientation . While postural control focuses on the mechanisms and processes involved in maintaining stability, balance encompasses a broader scope, including the ability to initiate, inhibit, and adapt to various types of motion . Both postural control and balance are essential for daily activities and can be improved with practice.

Components of Good Posture:

1. **Alignment:**

- The head, shoulders, spine, hips, knees, and ankles should be aligned.
- The spine should maintain its natural curves (cervical, thoracic, and lumbar) without exaggeration.

2. **Balance:**
   - Weight should be evenly distributed on both feet when standing.
   - When sitting, weight should be distributed evenly on the buttocks and thighs.
3. **Muscle Tone:**
   - Muscles should be engaged but not overly tense.
   - Core muscles (abdominals and lower back) should support the spine.
4. **Symmetry:**
   - Both sides of the body should mirror each other.
   - Avoid leaning to one side, slumping, or hunching.

Importance of Good Posture:

1. **Reduces Strain:**
   - Minimizes the wear and tear on joints, muscles, and ligaments.
   - Prevents muscle fatigue and strain.
2. **Prevents Pain:**
   - Reduces the risk of back, neck, and shoulder pain.
   - Helps prevent headaches caused by muscle tension.
3. **Improves Breathing:**
   - Opens up the chest and allows for better lung expansion.
   - Enhances oxygen intake and overall respiratory function.
4. **Enhances Circulation:**
   - Proper alignment promotes better blood flow.
   - Reduces the risk of varicose veins and circulatory problems.
5. **Boosts Confidence:**
   - Good posture can improve appearance and self-esteem.
   - Projects a confident and assertive image.

Components of Balance:

1. **Sensory Input:**
   - Visual System: Provides information about the body's position relative to the environment.
   - Vestibular System: Located in the inner ear, it detects head movements and helps maintain equilibrium.
   - Proprioceptive System: Provides feedback from muscles and joints about body position and movement.
2. **Central Processing:**
   - The brain integrates sensory information to understand the body's position and movement.
   - It plans and adjusts movements to maintain or regain balance.
3. **Motor Output:**
   - Muscles execute the movements necessary to maintain or restore balance.
   - Coordination of muscle groups is essential for smooth and effective responses.

POSTURAL DYNAMIC BALANCE

Postural Dynamic balance refers to the ability to maintain stability and control while the body is in motion. This type of balance is crucial for performing daily activities that involve movement, such as walking, running, and transitioning from one position to another. Postural dynamic balance involves continuously adjusting the body's position to stay upright and avoid falls.

Here's why maintaining good postural dynamic balance is important:

1. **Daily Activities:**
   - Safety and Independence: Essential for performing everyday tasks like walking, climbing stairs, carrying objects, and transitioning between sitting and standing. Good balance ensures these activities are done safely and independently.
   - Efficiency and Comfort: Proper dynamic balance helps movements to be more efficient and less tiring, reducing unnecessary strain on muscles and joints.
2. **Fall Prevention:**
   - Reduced Risk of Injury: Falls are a leading cause of injury, especially in older adults. Good dynamic balance helps prevent falls by improving stability during movement.
   - Enhanced Reaction Time: Better balance improves the body's ability to react quickly to sudden changes in the environment, such as tripping or slipping.
3. **Athletic Performance:**
   - Sports and Exercise: Crucial for participating in sports and physical activities that require coordination, agility, and stability. Athletes rely on dynamic balance to change directions quickly, maintain form, and enhance overall performance.
   - Injury Prevention: Good balance reduces the risk of sports-related injuries by ensuring proper alignment and movement patterns.
4. **Posture and Alignment:**
   - Spinal Health: Maintains the natural curves of the spine, reducing the risk of back pain and spinal issues.
   - Joint Health: Proper alignment decreases the wear and tear on joints, preventing conditions like arthritis.
5. **Muscular Strength and Coordination:**
   - Muscle Engagement: Dynamic balance exercises engage and strengthen core muscles and lower extremities, leading to better overall muscle tone and strength.
   - Coordination and Motor Skills: Enhances the coordination between different muscle groups, improving overall motor skills.
6. **Quality of Life:**
   - Confidence and Independence: Good balance boosts confidence in one's ability to move safely and perform daily activities, leading to greater independence.
   - Mental Well-being: Reduces anxiety and fear of falling, which is particularly important for older adults and those with mobility issues.
7. **Health and Longevity**:
   - Active Lifestyle: Encourages an active lifestyle by enabling participation in physical activities and exercises, contributing to overall health and longevity.
   - Chronic Condition Management: Helps manage conditions like diabetes, arthritis, and cardiovascular diseases by promoting regular physical activity and reducing complications related to immobility.
8. **Rehabilitation and Recovery:**
   - Post-Injury Rehabilitation: Critical for rehabilitation after injuries, surgeries, or medical conditions that affect mobility and balance.
   - Neurological Health: Beneficial for individuals with neurological conditions (e.g., stroke, Parkinson's disease) by improving coordination and reducing the risk of falls.

DIABETIC NEUROPATHY

Diabetic neuropathy is a type of nerve damage that can occur in individuals with high blood sugar levels over a prolonged period. It can injure nerves throughout the body, but diabetic neuropathy most often damages nerves in the legs and feet. This condition can lead to various symptoms and complications, significantly impacting the quality of life.

Types of Diabetic Neuropathy:

1. **Peripheral Neuropathy:**

Symptoms: Numbness, tingling, pain, and burning sensations in the extremities (hands, feet, legs, and arms).

Complications: Increased risk of foot ulcers, infections, and amputations due to reduced sensation and poor wound healing.

2. **Autonomic Neuropathy:**

Symptoms: Affects autonomic nerves controlling the heart, bladder, lungs, stomach, intestines, and eyes. Symptoms include bladder and bowel problems, erectile dysfunction, heart rate and blood pressure abnormalities, and digestive issues (e.g., gastroparesis).

Complications: Can lead to severe health issues like silent heart attacks, urinary retention, and gastrointestinal distress.

3. **Proximal Neuropathy** (Diabetic Amyotrophy):

Symptoms: Severe pain in the hip, thigh, or buttock, leading to muscle weakness and difficulty getting up from a sitting position.

Complications: Muscle wasting and mobility issues, but typically affects only one side of the body.

4. **Focal Neuropathy** (Mononeuropathy):

Symptoms: Sudden weakness or pain in a specific nerve or group of nerves, often in the head, torso, or leg. Commonly affects the eyes and facial muscles.

Complications: Usually occurs suddenly and can cause severe pain, but it tends to improve over time and doesn't cause long-term damage.

Symptoms of Diabetic Neuropathy:

Sensory Symptoms: Numbness, tingling, burning or sharp pain, increased sensitivity to touch, and loss of sensation.

Motor Symptoms: Muscle weakness, loss of reflexes, and muscle cramps.

Autonomic Symptoms: Digestive issues, bladder problems, abnormal sweating, and dizziness or fainting due to blood pressure changes.

Risk Factors:

Duration of Diabetes: For longer duration diabetes stays, the greater the risk of developing neuropathy. Uncontrolled blood glucose levels significantly increase the risk. Excess weight increases the risk of diabetic neuropathy. Smoking narrows and hardens arteries, reducing blood flow to the legs and feet and exacerbating nerve damage. Kidney damage associated with diabetes can lead to toxins in the blood, contributing to nerve damage.

Diabetic neuropathy can significantly impact postural dynamic balance due to following reasons

1. **Sensory Impairment:**

Reduced Sensation: Peripheral neuropathy often leads to numbness or a loss of sensation in the feet and legs. This impairs the ability to feel the ground and detect changes in surface texture or inclination, which are crucial for maintaining balance.

Proprioception: Impaired proprioception, or the sense of the relative position of one's own body parts, makes it difficult to sense the position of the feet and legs, leading to uncoordinated movements and instability.

2. **Muscle Weakness:**

Motor Neuropathy: Damage to motor nerves can cause muscle weakness, particularly in the lower extremities. Weak muscles are less able to support the body and respond to changes in balance, increasing the risk of falls.

Reduced Reflexes: Neuropathy can diminish reflexes, slowing the body's automatic responses to balance disruptions, making it harder to recover from a loss of balance.

3. **Pain and Discomfort:**

Chronic Pain: Neuropathic pain, often described as burning, tingling, or stabbing, can lead to an altered gait or postural changes as individuals try to minimize discomfort. These compensatory movements can compromise balance.

Avoidance of Movement: Persistent pain may lead individuals to avoid certain activities or movements, resulting in decreased physical activity and further weakening of muscles needed for balance.

4. **Joint Instability:**

Charcot Joint (Charcot Foot): This condition, a complication of diabetic neuropathy, leads to weakening of bones in the foot, causing fractures and joint dislocations. The resulting deformity can severely affect balance and gait.

Reduced Joint Mobility: Neuropathy can cause stiffness in joints due to decreased movement, which can limit the range of motion and affect balance.

5. **Autonomic Dysfunction:**

Postural Hypotension: Autonomic neuropathy can cause a drop in blood pressure upon standing (orthostatic hypotension), leading to dizziness or fainting, which directly impacts balance.

Sweating Abnormalities: Impaired sweating can affect skin integrity on the feet, leading to sores or infections that make standing and walking painful and unstable.

6. **Cognitive and Psychological Impact:**

Fear of Falling: The experience of balance issues or falls can lead to a fear of falling, which may result in reduced activity levels. This inactivity can weaken muscles further and worsen balance.

Cognitive Load: Managing chronic pain and the stress associated with it can occupy cognitive resources that would otherwise be used to maintain balance.

7. **Visual Impairment:**

Diabetic Retinopathy: Complications from diabetes, like retinopathy, can impair vision, making it difficult to see obstacles and navigate environments safely, further challenging balance.

Impact on Dynamic Balance:

Walking and Gait: Neuropathy can lead to an abnormal gait, with shuffling or unsteady steps, increasing the risk of tripping or falling.

Stair Navigation: Climbing stairs or navigating uneven surfaces becomes hazardous due to reduced sensation and muscle weakness.

Activity Avoidance: Individuals may avoid activities that challenge balance, leading to decreased overall physical fitness and further deterioration of balance capabilities.

STRENGTH AND BALANCE EXERCISES

Carolyn Baum occupational therapist emphasizes the importance of strength and balance exercises in managing conditions like diabetic neuropathy. Here are some key exercises and strategies related to strength and balance

Strength Exercises

1. **Lower Body Strengthening:**

- Squats: Perform bodyweight squats to strengthen the thighs and gluteal region. Start with a few repetitions and gradually increase as strength improves.
- Lunges: Forward and side lunges help build strength in the legs and improve functional mobility.
- Step-Ups: Step up onto a platform or step to enhance lower body strength and coordination.

2. **Core Strengthening:**

- Planks: Hold a plank position to strengthen the core muscles, which are essential for maintaining balance.
- Bridges: Perform gluteal bridges to strengthen the lower back, contributing to overall stability.

3. **Functional Strengthening:**

- Sit-to-Stand: Practice standing up from a seated position without using hands. This exercise mimics daily activities and strengthens the legs and core.

Balance Exercises

1. **Static Balance:**

Single-Leg Stance: Stand on one leg for a few seconds, gradually increasing the duration as balance improves. This exercise helps enhance static balance and proprioception.

Tandem Stance: Stand with one foot directly in front of the other, heel to toe, to challenge and improve balance.

2. **Dynamic Balance:**

Heel-to-Toe Walk: Walk in a straight line, placing one foot directly in front of the other, heel to toe. This exercise improves dynamic balance and coordination.

Side Steps: Perform side steps to improve lateral stability and balance.

Occupational Therapy Program

1. **Balance and Coordination Exercises:**
   - Balance Board Activities: Standing or performing movements on a balance board challenges the vestibular and proprioceptive systems.
   - Foam Pad Stance: Standing on a foam pad enhances proprioceptive feedback and improves balance control.
2. **Sensory Stimulation Exercises**:

- Textured Surfaces: Walking on different textured surfaces (e.g., sand, grass) can stimulate the tactile system and improve sensory discrimination.
- Therapeutic Massage: Provides proprioceptive input through deep pressure, helping to enhance sensory integration.

3. **Movement-Based Activities:**

- Swinging and Spinning: Engaging in activities that involve swinging or spinning can stimulate the vestibular system and improve dynamic balance.
- Reaching and Grasping: Activities that involve reaching for objects at different heights and distances can enhance proprioceptive feedback and coordination.

4. **Functional Task Training:**

- Daily Living Activities: Practice tasks such as dressing, cooking, or cleaning with added sensory challenges (e.g., closing eyes while reaching) to improve functional balance.
- Obstacle Courses: Navigating through an obstacle course that incorporates various sensory inputs helps integrate sensory information and improve overall coordination.

5. **Cognitive and Sensory Integration:**

- Dual-Task Training: Perform balance exercises while engaging in cognitive tasks (e.g., counting or recalling information) to improve attention and coordination.
- Sensory-Motor Integration: Activities that combine sensory input with motor output, such as ball tossing or catching, enhance coordination and balance.

TINETTI PERFORMANCE ORIENTED MOBILITY ASSESSMENT SCALE (POMA)

The Tinetti Performance-Oriented Mobility Assessment (POMA) was developed by **Mary Tinetti**, a prominent researcher in geriatrics and occupational therapy. The primary purpose of the Tinetti POMA is to evaluate an individual's balance and gait to assess their risk of falling. This assessment is crucial in identifying balance impairments and gait disturbances, enabling clinicians to create personalized interventions aimed at reducing fall risk and improving functional mobility. By providing a detailed analysis of both static balance and dynamic gait, the Tinetti POMA helps in monitoring progress over time and evaluating the effectiveness of therapeutic strategies, ultimately enhancing overall functional independence.

REVIEW OF LITERATURE

1. **Morrison et al. (2023)** evaluated the effectiveness of a 12-week balance training program for patients with diabetic peripheral neuropathy (DPN). The study included a randomized controlled trial with participants divided into an intervention group and a control group. The intervention group underwent a structured balance training program that included exercises aimed at improving strength, flexibility, and proprioception. The results of the study were significant, showing that participants in the intervention group experienced marked improvements in dynamic balance, as measured by various clinical tests such as the Berg Balance Scale and Timed Up and Go Test. Furthermore, the study reported a substantial reduction in fall risk among these participants, suggesting that targeted balance exercises are effective in enhancing postural stability in individuals with DPN.
2. **Sartor et al. (2022)** conducted that explored the reflex responses in individuals with diabetic neuropathy. The study specifically examined the speed and effectiveness of postural reflexes when these patients were exposed to sudden perturbations, such as unexpected shifts in balance. The findings revealed that patients exhibited significantly delayed reflex responses, taking longer to react to balance disturbances

compared to individuals without neuropathy. The delay in reflexes was directly linked to impaired nerve conduction. This slowed response time compromised the patients' ability to regain balance quickly, thereby increasing their susceptibility to falls, particularly in dynamic situations where rapid adjustments are necessary.

3. **Van Deursen and Simoneau (2021)** explored the postural strategies employed by individuals with diabetic neuropathy**.** They discovered that patients tend to rely more heavily on hip strategies, rather than ankle strategies, to maintain balance. This shift occurs because the distal muscles in the lower limbs, are weakened and less responsive due to neuropathy. The study found that this reliance on hip strategies , especially during dynamic balance tasks, leading to greater instability and an increased risk of falls. The authors noted that while hip strategies can be effective for large postural corrections, they are not as efficient for the fine adjustments required to maintain stability during normal activities.

4. **Ghanavati et al. (2020)** investigated gait abnormalities and found that individuals with DPN exhibit several characteristic changes in gait, including slower walking speeds, reduced stride length, and a wider base of support. These gait alterations are often compensatory mechanisms that arise in response to sensory deficits and muscle weakness in the lower limbs. The study emphasized that while these changes might help patients feel more stable, they lead to inefficient movement patterns. For example, the reduced stride length and slower walking speed may increase the duration of double support (when both feet are on the ground), which can lead to decreased overall stability and an increased risk of falls, especially in environments that require quick adjustments or changes in direction.

4. Richardson et al. (2020) emphasized the role of occupational therapy in enhancing postural dynamic balance through tailored interventions. The study discussed how occupational therapists assess dynamic balance using functional tasks that mimic daily activities, such as walking while carrying objects or turning quickly. Based on these assessments, OT programs are developed to target specific deficits. The study highlighted the use of balance training exercises, including dynamic stability tasks like standing on unstable surfaces, shifting weight, and practicing sudden changes in direction. These exercises are designed to improve the patient's ability to maintain balance during complex movements. The study suggested that OT interventions, such as task-specific training and the use of adaptive equipment, are crucial for helping patients maintain their independence in daily activities despite balance impairments. The study found that OT could effectively improve patients' ability to perform ADLs, such as dressing, bathing, and meal preparation, by teaching compensatory strategies and incorporating exercises that enhance fine motor skills and hand strength.

5. **Ahmmed et al. (2019)** explored the effects of diabetes mellitus on postural control, with a focus on the vestibular system, as published in The Journal of Laryngology & Otology. Their study highlighted that individuals with diabetes often experience significant postural changes, which can be attributed to the combined impact of peripheral neuropathy and potential vestibular dysfunction. These postural alterations increase the risk of falls and contribute to difficulties in maintaining balance during everyday activities. The research underscores the importance of addressing both somatosensory and vestibular impairments in diabetic patients to improve overall balance and reduce fall risks. The authors suggest that comprehensive management strategies that include vestibular rehabilitation, alongside more conventional diabetes care, could enhance postural stability and prevent further complications related to impaired balance in this population.

6. **Hoeymans et al. (2018)** investigated the reproducibility of both performance-based and self-reported measures of functional status, as published in The Journals of Gerontology: Series A, Biological Sciences and Medical Sciences. Their study demonstrated that while both types of measures provide valuable insights into functional status, performance-based measures tended to have higher reproducibility compared to self-reported measures, which are subject to personal bias and perception. This research is particularly relevant for studies focusing on elderly populations, as it underscores the importance of using objective performance-based assessments when evaluating functional status to ensure accuracy and consistency. The authors emphasized that combining both types of measures could offer a more comprehensive view of an individual's functional abilities, particularly in research related to aging and chronic conditions such as diabetes. Their findings support the use of reliable performance-based tools in clinical and epidemiological research, particularly for assessing the impact of interventions on functional outcomes.

NEED FOR THE STUDY

Studying postural dynamic balance in individuals with diabetic neuropathy is essential due to the significant impact of these conditions on balance and mobility. A common complication of Diabetic neuropathy, disrupts proprioceptive feedback, which is crucial for maintaining stability and coordination. This disruption increases the risk of falls, leading to serious injuries and reduced quality of life. Understanding the specific balance deficits associated with diabetic neuropathy is critical for developing targeted interventions and therapeutic strategies aimed at improving balance and preventing falls. Additionally, this research supports evidence-based practices, helps clinicians design effective rehabilitation programs, and ultimately enhances the functional independence and overall well-being of individuals affected by these conditions.

METHODOLOGY

AIM:

To asses diabetic neuropathy clients on dynamic balance with standardized assessment scale and relate its relevance to functional activities training.

OBJECTIVES:

- To select type 2 diabetic patients from Medicine OPD of GCMC&H
- To asses those with Tinetti balance assessment scale
- To administer selected multisensory treatment activities for a period of 3 months
- To find effect of selected treatment activities on dynamic balance

Exercises to Improve Strength and Balance

Exercise 1: Single Limb Stance

Exercise 2: Walking Heel to Toe

Exercise 3: Rock the Boat

Exercise 4: Clock Reach

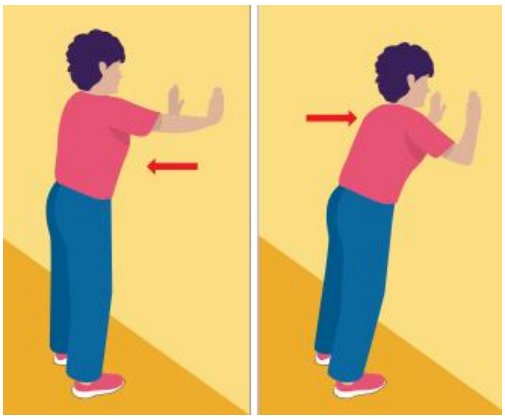
Exercise 5: Back Leg Raises

Exercise 6: Single Limb Stance with Arm

Exercise 7: Side Leg Raise

Exercise 8: Balancing Wand

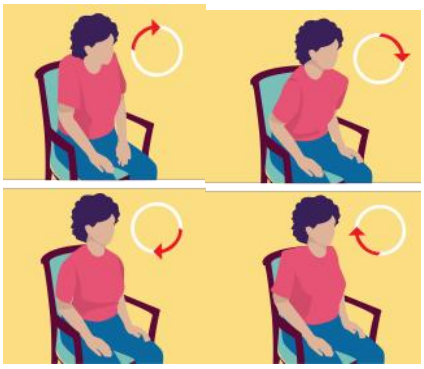
Exercise 9: Wall Pushups



Exercise 10: Marching in Place

Exercise 11: Toe Lifts

Exercise 12: Shoulder Rolls



Exercise 13: Hand and Finger Exercises

Exercise 14: Calf Stretches

DATA ANALYISIS

Table 1

Distribution of participants in terms of gender

Gender	Diabetic neuropathy patients	Percentage
Male	23	57.5
Female	17	42.5
Total	40	100.0

From the above table, it is seen that the present study includes 23 (57.5%) male diabetic neuropathies and 17 (42.5%) female diabetic neuropathies, which has been represented diagrammatically as shown below.

Table 2

't' test for postural dynamic balance on pre and post therapy score among the diabetic neuropathies

Groups	Number	Mean	Standard Deviation	t-value	P Value
Pre therapy	40	13.02	3.48	19.540	0.001
Post therapy	40	23.75	1.44		

Comparing pre and post therapy, post therapy (23.75) scored higher mean value than pre therapy (13.02). The calculated 't' value (19.540) is greater than the table 't' value & there is a significant difference between the pre and post therapy groups. **Post therapy scores have high level postural dynamic balance than pre therapy among the diabetic neuropathies.**

Table 3

't' test for Blood sugar level on pre and post therapy score among the Diabetic neuropathies

Groups	Number	Mean	Standard Deviation	t-value	P Value
Pre therapy	40	260.50	24.32	30.485	0.001
Post therapy	40	225.67	24.20		

Comparison of pre and post therapy, score shows, pre therapy (260.50) is having higher mean value than post therapy (225.67). The calculated't' value (30.485) is greater than the table 't' value, & significant difference noted. So, Post therapy low score mean value indicate, high effect of therapy among the diabetic neuropathies.

Table 4

't' test for blood sugar level on pre therapy score among the gender

Gender	Number	Mean	Standard Deviation	t-value	P Value
Male	23	269.21	18.36	2.715	0.001
Female	17	248.71	26.85		

Comparing male and female diabetic patients, male (269.21) scored higher mean value than female participants (248.71). The calculated 't' value (2.715) is greater than table 't' value, & there is significant difference between the male and female groups noted.

Table 5

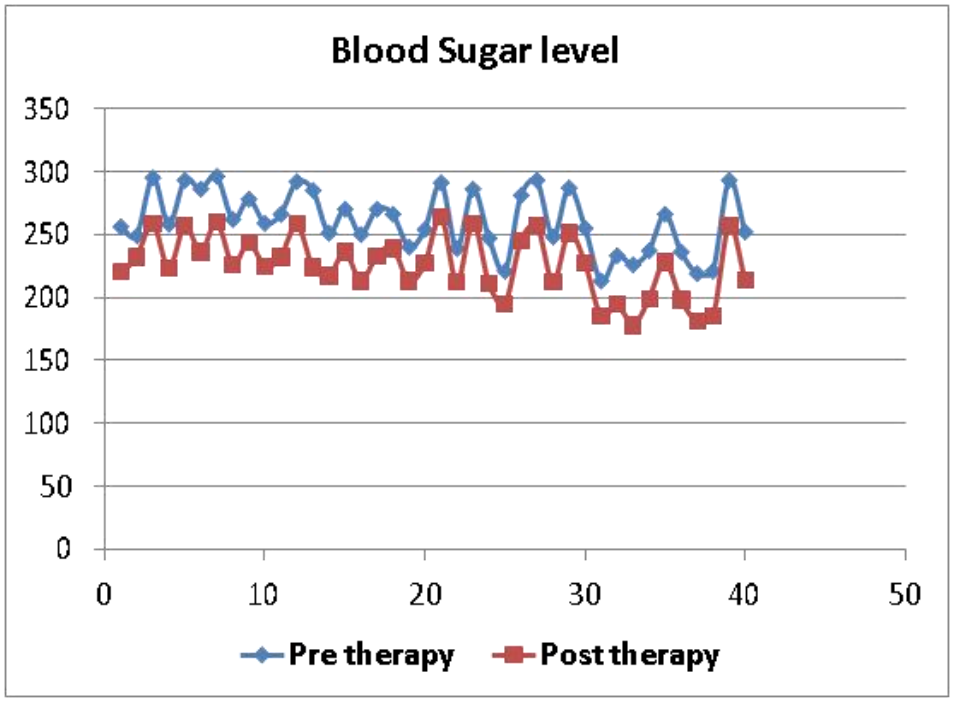
't' test for post therapy score among the participants

Gender	Number	Mean	Standard Deviation	t-value	P Value
Male	23	235.17	16.93	3.005	0.001
Female	17	212.82	26.99		

Among male and female diabetic neuropathy patients, male (235.17) scored higher mean value than females (212.82). The calculated 't' value (3.005) is greater than the table 't' value, there is a significance between the male and female groups. So, low score indicate high effect among the diabetic neuropathies.

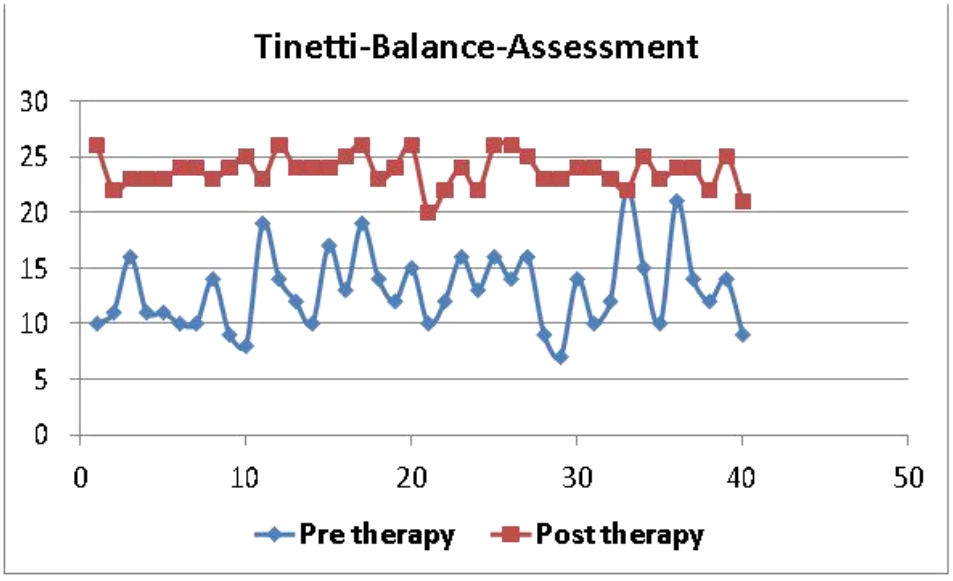
PLOT DIAGRAM 1

Plot diagram describing BLOOD SUGAR level Pre therapy & Post therapy



PLOT DIAGRAM 2

Plot diagram describing TINETTI BALANCE & GAIT SCORE Pre therapy & Post therapy



RESULT

Statistical analysis shows that there is a positive significant correlation between Tinetti- Balance-Assessment and Blood sugar level in pre therapy & post therapy. So there exist a direct relationship between exercises and blood sugar level

DISCUSSION

The purpose of this study was to identify Postural dynamic balance problem in diabetic neuropathy, with POMA scale. For this study, consent from Department of general medicine HOD from medicine OPD, Government Cuddalore Medical College and Hospital Chidambaram, was obtained for conducting study in the Hospital premises. After screening the patients available at GCMC&H, 40 patients were identified as suitable for the study. The

patients were assessed using standardized Tinetti Performance Oriented Mobility Assessment Form. The Postural Dynamic Balance problems in individuals were noted. It was informed to Patients apply the method of Strength and balance exercises , irrespective of whether they are at Hospital premises or at home. After such intervention application for 3 months, reassessing them using the same scale revealed a change in score of POMA scale.

CONCLUSION

For this study postural dynamic balance for diabetic neuropathy, 40 patients were randomly selected. They were assessed with Tinetti POMA scale. Those patients scoring less than 24 were given Strength and balance exercises. Reassessing them after 3 months revealed that exercise is effective for postural dynamic balance. It could be taught to the individuals who are suffering postural balance in an early stage to minimize the inappropriate postural pattern.

LIMITATION AND RECOMMENDATIONS

- The study was done by screening available patients at medicine OPD but only 40 clients were appropriate.
- The study was carried out for 3 months duration due to patients occupational restrictions.

RECOMMENDATIONS:

- It is recommended to carry out the study on larger samples.
- Study can be done in other diabetics without diabetic neuropathy.

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