

AN EXPERIMENTAL STUDY ON THE EFFECT OF BOSU BALL BALANCE EXERCISE ON IMPROVING BALANCE WITH DIABETIC NEUROPATHY PATIENTS

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Abstract

BACK GROUND:

High blood sugar can injure nerve throughout the body. Diabetic neuropathy most often damages nerves in the legs and feet. It is a serious diabetes complication that may affect as 50% of people.

Bosu ball is a training device, invented in 1999 by David Weck. It consists of an inflated rubber hemisphere attached to a rigid platform the device is often used for balance training.

OBJECTIVE AND AIM OF THIS STUDY:

To find out the effectiveness of Bosu ball balance exercise in diabetic neuropathy patient.

METHODS:

30 subjects are selected and divided into two groups 15 subjects in each group

Group A: This group will receive Bosu ball balance exercise and medical treatment.

Group B: This group will receive medical treatment only.

RESULT:

This study revealed significant difference in balance after giving Bosu ball balance exercise in diabetic neuropathy patients.

CONCLUSION:

This study can be concluded by there is an improvement of balance in diabetic neuropathy patients after giving Bosu ball exercise.

Key Word: Diabetic neuropathy, Bosu ball balance exercise, Balance

INRODUCTION:

Diabetics is a systemic disorder of energy metabolism in cellular resistance. Diabetes affects both the central and peripheral nervous system. Diabetes is the well-known cause of neuropathy, and neuropathy is the most common complication in diabetes. It is estimated that neuropathy affects 25% of people with diabetes. Diabetic neuropathy is implicated in most of nontraumatic amputations. According to WHO, there are two main types of diabetes mellitus insulin dependent diabetes mellitus (type I) and noninsulin dependent diabetes mellitus (type II). Type II diabetes mellitus is a syndrome having heterogeneous and is associated with risk of number of complications like neurological, cardiovascular, renal, ocular and musculoskeletal problems. Out of these neurological and cardiovascular systems are commonly affected. Diabetes occurs throughout the world but is more common (type 2) in more developed countries. The great increase in rate has however been seen in low- and middle- income countries, where more than 80% of diabetic death occur. The fastest prevalence increases in expected to occur in Asia and Africa, where most people with probably live in 2030. DN mostly often damage nerves in the legs and foot The exact causes of diabetic neuropathy are unknown, but several factors may include to the disorder, these are

- High blood sugar (glucose).
- Metabolic factors. Patients who are overweight or obese are also at increased risk of developing neuropathy.
- Inherited factors. There are some genetic traits that may make some people more susceptible to nerve disease than others.

More likely to develop the nerve damage if you have diabetes and overweigh, along with high blood pressure, have a high cholesterol, advanced kidney disease, alcoholic drinks, and smoke
Diabetic neuropathy is highly prevalent condition that substantially affects patients by increasing falls, causing pain and reducing quality of life.

Depending on the affected nerves, diabetic neuropathy symptoms that include pain and loss of sensation in the legs, feet and hands. Burning / numbness or shooting pain along a nerve, weakness in the muscles, functional imbalance. Based on this Clinical feature that is functional imbalance, subject was evaluated with berg balance scale, containing 14 balance tasks. Balance training to be an effective means of preventing falls in patients with diabetic neuropathy

METHODOLOGY

This study belongs to experimental design. The study was conducted at out-patient department of Cherran's college of physiotherapy. 30 subjects and 15 in each group by Random sampling technique. The procedure was explained to subject. Group A received Bosu ball balance exercise with medical treatment Group B received medical treatment. The pre and post-test were analysed by using Berg Balance scale. The **Inclusion Criteria** are: Both gender (male and female), Age 45-55 years, Patient who reported at least one fall in the past 6 months, Diabetics with a duration of more than 3 years, Type 2 diabetes with diagnosed neuropathy and the **Exclusion Criteria** are: Planter ulcer, Lower extremity amputation, Visual defects, Patients with inability to walk without any assistive devices, Musculoskeletal impairment, Central nervous system dysfunction, Diabetic with any other systemic involvement

PROCEDURE

The subjects were explained about the study screened inclusive and exclusive criteria. The purpose of study was explained to them and informed consent was obtained. The subjects were randomly assigned into Group A and Group B. The subjects in GROUP A were treated with Bosu ball balance exercise with medical treatment. The subjects in GROUP B were treated with medical treatment. The subjects are treated for 5 days a week for 5 weeks each therapy session lasting for about 45 minutes.

BOSU BALL BALANCE EXERCISES

1. Single leg hold

- These single leg holds force you to find and maintain your centre of gravity on an unstable surface.
- Place the Bosu ball flat side on the floor.
- Place one foot in middle of the Bosu and step up onto it, balancing on your leg.
- Maintain your balance for 10 seconds, rest and repeat the exercise for 5 times.
- Rest and repeat the exercise for 5 times.
- Repeat on the other side

2. Static awareness balance

- Position upright on the Bosu with the feet hip-distance apart, place the hands by the sides with palms facing forward and focus on a focal point on the floor or wall directly ahead.
- To progress the exercise, ask patient to close one or both eyes.
- Hold the position and maintain your balance for 10 seconds.
- Rest and repeat the exercise for 5 times

3. Standing abduction toe taps

- Position upright on the Bosu with the feet hip-distance apart, place the arms into front of the body with a 90-degree bend at the elbows.
- The right foot off the Bosu and tap the foot on the side of the Bosu. Return to centre and repeat with the left leg.
- To progress the exercise, place the foot on the floor next to the Bosu ball and lower part of the body into a slight squat position.
- Rest and repeat the exercise for 5 times

4. Stand with hand tracking

- Position upright on the Bosu with the feet hip-distance apart, near position the body into a squat
- Place the hands in front of the face with bent elbows and palms facing forward. Begin to move the hands to the right and left, while allowing the torso and head to rotate with the movement.
- Track the hands with the eyes.
- To progress the exercise, keep the torso and head still while only moving the eyes.
- Rest and repeat the exercise for 5 times.

5. Lateral walk over

- Position stands next to the Bosu ball.
- To walk the right foot on top, followed the left, and to exit the dome on the other side.
- Continue walking up and over the Bosu ball. This exercise trains for lateral shuffles, which is the progression
- Repeat on the other side.
- Rest and repeat the exercise for 5 times

6. Walk ups

- In a repetitious manner, ask patient to walk up and down on the Bosu ball. Patient can lead with one foot for a certain length of time or alternate the feet.
- patient can use a body bar or wall to assist with balance.
- To progress the exercise, cue the patient to perform step-ups where only one foot is on the Bosu ball instead of two.
- Rest and repeat exercise for 5 times

7. Shin balance

- Position shins on top of the Bosu ball with a neutral spine.
- Place the toes on the ground and keep hands in front of the shoulders; hold this position.
- To progress the exercise, lift the toes off the ground, close the eyes or catch a ball thrown by the trainer.
- Rest and repeat exercise for 5 times.

MEDICAL TREATMENT

Blood glucose treatment – This is the primary treatment of diabetic neuropathy that may change the course of the condition as the other treatment focus on reducing pain and other symptoms.

5. RESULTS

Experimental group A

(Effectiveness of Bosu ball balance exercise with medical treatment.)

While comparing the pre-test and post values of experimental group using 't' test, the calculated value is 26.87.

When comparing the mean value of both, the post-test mean value 47.46 which is greater than the pre-test mean value 34.53.

It confirms that there is a statistically significant ($p < .05$) improvement in post-test experimental group than pre-test experimental group.

Control group B

(Effectiveness of medical treatment.)

While comparing the pre-test and post values of control group using 't' test, the calculated value is 8.187.

When comparing the mean value of both, the post-test mean value 39.6 which is greater than the pre-test mean value 36.86.

It confirms that there is a statistically significant ($p < .05$) improvement in post-test control group than pre-test control group.

DISCUSSION

Diabetic neuropathy is a complication of diabetes that results in damage to the nervous system. It is a progressive disease, and symptoms get worse over time. Diabetic neuropathy can affect all the tissues and the organs of the body. Approximately about 60-70% of the people with diabetes suffer from neuropathy and the onset can be at any time in life.

A common staging scale of diabetic neuropathy

- No – No neuropathy
- N1a – Signs but no symptoms of neuropathy
- N2a – Sensory, motor, or autonomic symptoms; patient able to heel walk.
- N2b – Severe symptomatic diabetic polyneuropathy, and patient unable to heel walk.
- N3 – Disabling diabetic polyneuropathy.

The control group was given medical treatment and, the patient given Bosu ball balance exercise in experimental group.

This study was an experimental approach, which studied the effectiveness of Bosu ball balance exercise in diabetic neuropathy patients. The outcome was measured by using Berg Balance Scale. It has been shown to be a valid and reliable tool for the measurement of balance by assessing the performance of functional task.

A study done by Tabassom Ghanavati et al, diabetic neuropathy is remarkable functional imbalance which may expose these patients to danger of falling during activities of daily living and become more severe as the severity of neuropathy aggravates. Balance exercise improves clinical measures of balance in patients with diabetic neuropathy.

Based on above study, the present study concluded the Bosu ball balance exercise to be an effective mean of reducing frequency of fall in diabetic neuropathy patients.

LIMITATIONS AND RECOMMENDATIONS

- Study was conducted for short of time.
- The study assessed only short-term progress of the patients.
- Convincing the patient to participate this project was more difficult.
- The same study can be done by increasing the exercise by its repetition.
- The same study can be carried out in male and females separately.
- To establish the efficacy of the treatment a large sample size study is required.
- The same study can be done by modifying the exercise by increasing the complexity.

CONCLUSION

The study concludes that Bosu ball balance exercise seemed to be beneficial in improving balance and reducing frequency of falling in diabetic neuropathy patients.

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