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EFFECT OF PROPRIOCEPTION TRAINING AND BACKWARD WALKING TRAINING AMONG DIABETIC NEUROPATHY PATIENTS

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Aim: The aim of this study is to find the effect of proprioception exercise and backward walking training among diabetic neuropathy patients.

Background of the Study: The physical activity is the key element in prevention and management of diabetes mellitus. Physiotherapy intervention, such as aerobic exercise, resisted exercise, and endurance exercise lower bloodglucose level, among diabetes mellitus patients. The background of the study is to find the effectiveness of proprioception training and backward walking training among diabetic neuropathy patients for the improvement of proprioception sensationof lower limbs and improve the quality of life in diabetic neuropathy patients.

Materials and Methods: Once the study is approved by the Institutional Review Board, 30 patients both male and female were selected from clinically diagnosed diabetic neuropathy. The study setting was in Chennai. The source population includes patient with a clear history of diabetes mellitus, the patient has symptoms of neuropathy such as numbness and tingling sensation of extremities, loss of sensations,and abnormal sensation (dysesthesia), for example, burning and electric pain and both male and female. The age groupwas within 40–55 years. The Patient who score <20 s in time up and go test. Patient who score 21–40 in berg balance scale (BBS) grading test. Clinically diagnosed diabetes mellitus. The study population excludes severe traumatic illness in lower limbs, poor vision that affects walking, severe cardiopulmonary insufficiency, presence of other forms of neuropathies such as mononeuropathy, severe pain, and muscle weakness, and psychiatric illness. The samples were fully explained about the benefits of participating in the study. They were asked to fill the consent form duly signed by the samples and therapist. Data regarding the balance were collected using the BBS and time up and go test.

Result: The result of this study shows that bothproprioception exercise training and backward walking training are effective in increasing proprioception sensation of lower limbs. However, proprioception exercise training was better than backward walking training in improving the proprioception sensation of lower limbs among diabetic neuropathy patients.

KEY WORDS: Backward walking, Berg balance scale, Diabetic neuropathy,

Proprioception, Time up and go test.

INTRODUCTION

Diabetes mellitus is a group of metabolic disorder characterized by increased blood sugar (glucose) level(hyperglycemia) with absolute relative deficiency in carbohydrates, protein, and fat metabolism caused bydefect in insulin secretion action of insulin or both.[1,2]There are two types of diabetes mellitus-type 1 and type 2; however, the most common one is type 2 diabetes mellitus which the world health organizationestimates that the number of people with type 2 diabeteswill be more than double by 2030. Diabetes mellitus approximately affecting 366 million people.[3] Chronic hyperglycemia is associated with macrovascularand microvascular problems that can cause visual

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impairments, blindness, nephropathy, neuropathy, amputations, cardiomyopathy, strokes, and features ofautosomal disorders such as sexual dysfunctions.[4]

Type I Diabetes

Type I diabetes is the most severe form of diabetes.It is also known as insulin-dependent diabetes mellitus (IDDM), juvenile diabetes, and childhood- onset diabetes. People with type I diabetes generally depend on injections of insulin to regulate their sugar metabolism. Type I diabetes due to the deficiency or failure of the pancreas to secrete insulin. It occurs when the pancreas fails to produce adequate insulin, the hormone used by the body to make blood sugar (glucose) available tocells.

Spasticity: Pandyan 2005 proposed that spasticity could be defined as "disordered sensory-motor control, resulting from an upper motor neuron lesion, presenting as intermittent or sustained involuntary activation of muscles" .McCrea 2008 recently suggested that 'spasticity' may be interpreted as an umbrella term for all the positive, active symptoms of the upper motor neuron syndrome that one might encounter in routine clinical practice. In this review the term 'spasticity' will be used according to this umbrella term. Resistance of muscle to passive stretch/movement, which is velocity dependent (increases with the rate of stretch), has traditionally been attributed to hyperexcitable tonic stretch reflex responses (spasticity) (Lance 1980). Some evidence exists that velocity dependent resistance also arises from passive muscle components (Lee 2002; Singer 2003). According to Satkunam 2003, spasticity results from interruption of the neural circuitry regulating the muscles and is a common complication of stroke

MATERIALS AND METHOD

Once the study is approved by the Institutional Review Board, 30 patients both male and female were selected from clinically diagnosed diabetic neuropathy. The study setting was in Chennai. The source population includes patient with a clear historyof diabetes mellitus, the patient has symptoms of neuropathy such as numbness and tingling sensation of extremities, loss of sensations, and abnormal sensation (dysesthesia), for example, burning and electric pain, both male and female. The age group waswithin 40–55 years. The study population includes theage group within 40-55years and clinically diagnosedwith diabetes mellitus.The patient who scored < 20 inpretest of time up and go test,and patient who scored 21-40 in berg balance scale(BBS) grading test. The study population excludes severe traumatic illness in lower limbs**,** poor vision that affects walking, severe cardiopulmonary insufficiency**,** presence of other forms of neuropathies such as mononeuropathy, severe pain, and muscle weakness, and psychiatric illness. The samples were fully explained about the benefits of participating in the study. They were askedto fill the consent form duly signed by the samples andtherapist. Data regarding the balance were collected using the BBS and time up and go test. Participants would be selected based on the selection criteria and divided into two groups.

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using the statistical package for social science (SPSS) version 24. The paired t-test was adopted to find the statistical difference within the groups, and independent t-test (Student t-test) was adopted to find the statistical difference between the groups.

Table 1 reveals the mean, standard deviation (SD), t-test, degree of freedom (df), and P-value of the BBS between (Group A) and (Group B) in pretest and posttest weeks.

Table 1 shows that there is no statistically significant difference in pretest values of the BBS between Group A and Group B (*P > 0.05).

Table 1 shows that statistically highly significant difference in posttest values of the BBS between Group A and Group B (***P ≤ 0.001) [Graph 1].

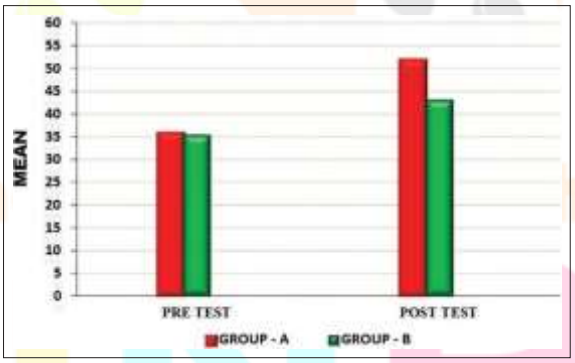
Both the groups show a significant decrease in the posttest means but Group A which has the higher mean value is more effective than Group B.

Table 2 reveals the mean, SD, t-test, df, and P value of the time up and go test between Group A and Group B in pretest and posttest weeks.

Table 1: Comparison of BBS score between Group – Aand Group - B in pre and posttest

#BBS	Mean±SD		*t*-test	df	Significance
	#Group - A	#Group - B			
Pretest	36.00±2.17	35.40±2.55	0.693	28	0.494*
Posttest	52.00±2.56	43.20±1.69	11.08	28	0.000***

#Group A – Proprioception exercises, #Group B - Backward walking training. **P*>0.05, ****P*≤0.001. BBS: Berg balance scale, df: Degree offreedom, SD: Standard deviation



Graph 1: Comparison of berg balance scale (bbs) scorebetween Group – a and Group - b in pre and post test

Table 2: Comparison of time up and go test betweenGroup - A and Group - B in pre and posttest

#TUG	Mean±SD		*t*-test	df	Significance
	#Group - A	#Group - B			
Pretest	11.26±1.43	10.80±1.74	0.801	28	0.430*
Post test	4.53±1.06	7.53±1.06	−7.75	28	0.000***

#Group A - proprioception exercises, #Group B - backward walking training.

*P>0.05, ***P≤0.001. SD: Standard deviation

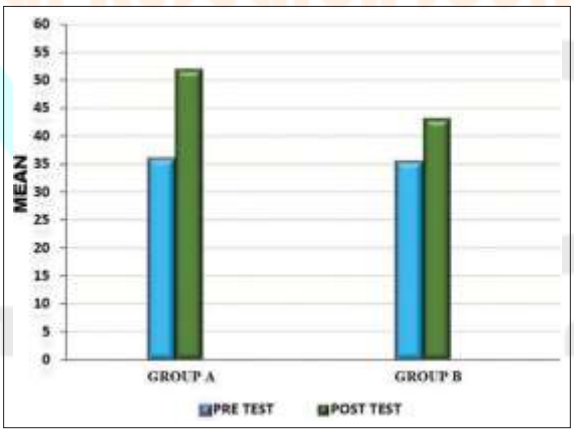
RESULTS

On comparing the mean values of GroupA and Group B on BBS score, it shows a significant increase in the posttest mean values but (Group A - Proprioception Exercises) shows (52.00) which has the
higher mean value is more effective than (Group B - Backward Walking Training) (43.20) at P ≤ 0.001. Hence, the null hypothesis is rejected. On comparing the mean values of Group A and Group B on Time Up and Go Test Score, it shows a significant decrease in the posttest mean values but (Group A - Proprioception Exercises) shows (4.53) which have the lower mean value is more effective than (Group B - Backward Walking Training) (7.53) at P ≤ 0.001. Hence, the null hypothesis is rejected. On comparing the pretest and posttest within Group A and Group B on BBS and time up and go test shows highly significant difference in mean values at P ≤ 0.001.

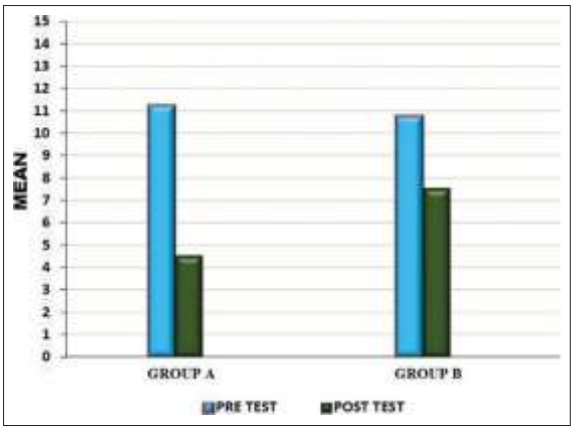
DISCUSSION

The principal finding of the present study was that proprioception exercise training was significantly more effective than backward walking training in improving proprioception sense among diabetic neuropathy patients as measured by BBS and time up and go test.
There are several possible mechanisms that could explain why proprioception exercise increases proprioception sensation of lower limbs. In 2012, Abeer-el-Wishy et al. concluded that
proprioception training along with conventional physiotherapy was more effective in improving proprioception sensation and balance.

Postural control is resultant from the interaction of thevestibular, visual, and sensory systems. Anyalterations



Graph 3: Omparisonof berg balance scale (bbs) withinGroup – a and Group – b between pre & post test values



Graph 4: comparison of time up and go test within Group – aand Group – b between pre & post test value

in one or more of these systems, such as sensory deficits on the feet, can result in postural instability. The better improvement in the proprioceptive traininggroup compared to the control group might be due to the fact that practicing balance training in progressivechallenging level as described in the
study can enhance somatosensory integration.[15-17] The findingsof the current study are in the linewith other studies that analyzed the effects of proprioception exercise programs for patients with diabetes[18-20] they reportedthat balance and postural stability could be improved.

Conclusion

This study shows that both proprioception exercise training and backward walking training are effective in increasing proprioception sensation of lower limbs.However, proprioception exercise training was better than backward walking training in improving the proprioception sensation oflower limbs.

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