



EXPLORING IMPACT OF DIFFERENT STRATEGIES IN NEUROPATHY

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KEYWORDS :

INTRODUCTION:

Diabetes Mellitus (DM) is one of the largest global public health emergencies of the 21st century.⁽¹⁾ Approximately 415 million adults have DM and by 2040 this number will rise to 642 million.⁽²⁾ According to WHO as per the 2015 data in India there are 69.2 million diabetic patients and Neuropathies are one of the most commonest complication of DM with a prevalence of 60% approximately. Poor Glycemic control for few years in patients with Type 2 DM may present with the complication of Diabetic Neuropathy. Diabetic Neuropathy refers to symptoms and signs of neuropathy in a patient with diabetes. Distal symmetrical neuropathy is the commonest accounting for 75% Diabetic Neuropathy. It may comprise balance during daily activities. Patients with Diabetic Neuropathy have increased risk of falling and because of which it leads to deterioration of immobility, activity avoidance. The studies focusing on epidemiological status showed a higher incidence of falls in the elderly with Diabetic Neuropathy. Balance is said to be affected by numerous factors such as vestibular, visual, proprioceptive, lower extremity range of motion and so on. Among this, the deterioration of proprioceptive, vestibular and lower extremity muscle strength were the main reasons for impaired balance in patients with Diabetic Neuropathy. Neuropathic patients were 23 times more likely to fall and are 15 times more likely to report an injury compared with matched non neuropathic subjects. Taking active training to reduce the risk of falls in Diabetic Neuropathy with balance impairment to prevent falls and improve their balance and quality of life is very important. Dual task training under various sets of instruction that is fixed priority and variable priority instruction sets effects the balance in patients with Diabetic Neuropathy. This study predicts that people would have great difficulty doing two tasks at once. A second view is that cognition is limited by the speed with which cognitive system can operate and normal ageing result in slowing of processing. In fixed priority instruction set same amount of attention has been given on both tasks that is on balance tasks and cognitive tasks all the time. In variable priority instructional set, attention has been switched between the tasks that is on the balance tasks and on the cognitive tasks. The efficacies of these two different tasks training strategies are studied for the acquisition, retention and transfer of tasks coordination skills in Diabetic Neuropathy patients.

MATERIAL & METHODS:**Sample**

Total of 30 diagnosed patients of Diabetic Neuropathy with Balance impairment were chosen for the study. They were assigned randomly into 2 groups based on the inclusion criteria.

Group A : Dual Task Training with fixed priority Instruction

Group B : Dual Task Training with variable priority Instruction

Inclusion criteria

1. Age above 60 years with or without history of falls.
2. No difference of Age and Gender.
3. Patients with Diabetic Neuropathy.
4. Absent Ankle jerks.
5. Able to understand & follow verbal instruction.
6. Ambulate independently with or without walking aids for at least 6 meters.

7. Patients not using external appliances.
8. Score of TPOMA 19-24.
9. No cognitive impairment (MMSE 25).
10. Tolerate standing & walking for at least 5 minutes.

Exclusion criteria

1. Acute musculoskeletal pain.
2. Neurological signs & symptoms not under the control of medication.
3. Unstable medical condition.
4. Complaint of dizziness or blurred vision leading to difficulty in walking.
5. Any medical condition contra-indicatory to physical activity.
6. Lower extremity joint deformity.
7. Patients with Spinal infection.
8. Spinal surgery.
9. Chronic Anaemia.

Study design

Pre test- Post test Experimental Study Design.

Procedure & Protocol

The study consisted of 30 patients of Diabetic Neuropathy with balance impairment who were randomly divided into 2 groups based on the inclusion criteria. Prior to the participation, all subjects were informed about the study and an informed consent was taken. Group A was given Dual Task Training where the Instruction was fixed priority & Group B was given Dual Task Training where the variable priority Instruction was used. Patients after the completion of the task were assessed on the basis of scale TPOMA.

- Group A received the set of balance tasks while simultaneously performing the secondary tasks. During each session, they were directed to maintain attention on both the tasks that is Postural & secondary tasks. Postural task included Stance and Gait activities. Stance activities included Semi tandem, eyes open, arm alteration, Semi tandem, eyes closed, arm alteration, Draw letter with right foot, Draw letter with left foot, Perturbed standing, holding a ball and the Secondary task included Counting backwards, spelling of words & remembering of words.
- Group B received the same set of exercises as group A but different instruction set. During each session, half of the training was done with focus on Postural tasks & half were done with focus on secondary tasks.
- During these sessions in both groups, Data on performance accuracy in the secondary task were recorded in terms of number of missteps (in novel task) which was not directly trained that is to confirm the patient really allocate attention to one task or not & to see the improvement of the performance on this task. Balance measurement was taken before training, last day of second week of training & after training of 4 weeks.
- Novel task performance was taken before pre and post training of 4 weeks.

DATA ANALYSIS AND RESULTS:

The data for the study was analyzed using the SPSS 13. The balance performances were assessed using paired sample t test within the group and independent sample t test between the groups. The p

value was set at a significance level of $p < 0.05$.

Age distribution

GROUP	MEAN	N	STD DEVIATION	
A	74.13	15	6.209	0.644
B	73.14	15	5.502	
Total	73.63	30	5.786	

Gender distribution

	GROUP A		GROUP B	TOTAL	ASSYMMETRICALLY SIGNIFICANT
M	COUNT	10	6	16	0.143
	% WITHIN GROUP	66.7	40.03	53.3	
F	COUNT	5	9	14	
	% WITHIN GROUP	33.3	60	46.7	

MMSE

Group No	N	MEAN	STD DEVIATION
Group A	15	27.13	1.302
Group B	15	27.40	1.352

TPOMA (TINNETI PERFORMANCE ORIENTED MOBILITY ASSESSMENT)

GROUP	BALANCE BEFORE EXERCISE	BALANCE AFTER 2 WEEKS	BALANCE AFTER 4 WEEKS
A	MEAN	21.20	21.67
	N	15	15
	STD DEVIATION	1.740	1.952
B	MEAN	21.53	23.20
	N	15	15
	STD DEVIATION	1.727	1.373

TPOMA CHANGES BEFORE EXERCISE TO AFTER EXERCISE

		T TEST EQUALITY OF MEANS		
		T test	df	Sig.(2 tailed)
BALANCE BEFORE EXERCISE	EQUALITY VARIANCE ASSUMED	-0.527	28	0.603
BALANCE AFTER 2 WEEKS	EQUALITY VARIANCE ASSUMED	-2.488	28	0.019
BALANCE AFTER 4 WEEKS	EQUALITY VARIANCE ASSUMED	-3.928	28	0.001

COMPARISON OF BALANCE PERFORMANCE BETWEEN TWO GROUPS AFTER 4 WKS TRAINING PROGRAM

GROUP	MEAN	STD DEVIATION	p VALUE
A	22.27	1.907	.001
B	24.80	1.612	

CAMPARISON OF PERFORMANCE OF NOVEL TASK BEFORE EXERCISE TO AFTER EXERCISE

GROUP	PERFORMNANCE ON NOVEL TASK BEFORE EXERCISE	PERFORMNANCE ON NOVEL TASK AFTER EXERCISE
A	MEAN	8.67
	N	15
	STD DEVIATION	1.718
B	MEAN	8.53
	N	15
	STD DEVIATION	1.598

PERFORMANCE ON NOVEL TASK CHANGES BETWEEN TWO GROUPS

		T TEST EQUALITY OF MEANS		
		T test	df	P value
Performance on novel task before exercise	EQUALITY VARIANCE ASSUMED	0.220	28	0.827
Performance on novel task after exercise	EQUALITY VARIANCE ASSUMED	3.272	28	0.003

DISCUSSION:

The study was carried out to compare the Effectiveness of two groups , Dual task training with fixed priority instruction set and variable priority instruction set in patients with Diabetic Neuropathy with Balance Impairment. There is improvement in TPOMA scores after 4 weeks training program in both groups as dual task training improved the motor processing which is essential for the motor control that requires attentional resources. Anne shumway cook et al , 2006 studied that task coordination (strategies that people used to coordinate dual task performance) was necessary in the balance training under dual task condition. According to task coordination theory, coordinating & managing multiple task is crucial for the dual task performances and this ability might be reduced in the diabetic neuropathic patients with balance impairment. This dual task training is necessary to optimize stability during performance of the concurrent tasks .There is more significant improvement in group B who received variable priority instruction set. They showed increased accuracy of the task , decreased reaction time, faster acquisition of the task ,transfer to the novel task . Our mean data after 4 weeks training program are on the upper end of the range in TPOMA in Group B as compared to the Group A. Subjects who received dual task training under variable priority instruction set also showed improvement on novel task performance (untrained task). Gopher et al suggested that improvement in the novel task is the result of development of improved dual task processing skills (ability to allocate attention) and this skill can be generalized to other task which was not directly trained. This lead to the understanding that explicit instruction regarding attentional focus is necessary to be included in dual task training .Kramer et al ,supported the benefits of dual task training albeit the balance related task and the relative importance of instruction set on learning. Dual task training benefits with the regard to functional improvement, reduction of depressive symptoms thus contributes to better quality of life. Balance confidence affects the balance performances which has important implication for the development of rehabilitation. This research may serve as the basis for the implementation of balance training program for stroke patients and other neurological impaired population which is necessary for the functional independence involving ADL in dual task environment and thereby prevent fall in patients which is major issue. This study specifically impacts the diabetic neuropathy patient's .Progressively nerves degenerate and blood vessels shrink in this disease, eventually which leads to balance and walking disabilities. This disease typically occurs in elderly. Our study clearly indicates positive effect on balance in such cases.

CONCLUSION:

Dual task training with variable pr instructions can be carried out safely in elderly population with balance impairment.

Dual task training with variable priority instruction set can be used safely in diabetic neuropathy with balance impairment.

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