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Effectiveness of Nordic Walking on People with Parkinson's Disease

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ABSTRACT
BACKGROUND: *Parkinson's disease is one of the most common neuro degenerative diseases with a prevalence of 100-200/100000 people worldwide. Nordic walking is walking with two poles using a reciprocal arm leg action to improve aerobic fitness body strength, mobility and coordination. The aim of Nordic walking is to develop the correct postural muscles, balance and co ordination required to produce a normal walking pattern.*
OBJECTIVE: *To find the efficacy of Nordic walking in subjects with parkinsonism, and to compare the effects of Nordic walking treatment pattern with ordinary walking treatment pattern in patients with Parkinson's disease.*
MATERIALS AND METHODS: *30 subjects with Parkinson's disease were selected in the study according to the inclusion and exclusion criteria and divided into two groups. Patients in interventional group were given Nordic walking treatment pattern. Patients in control group were given Ordinary walking treatment pattern. TUG test and PDQ39 will be used as clinical outcome measures to evaluate the effectiveness of training method in improving physical function and mobility respectively.*
RESULTS: *Comparison between the two groups was analyzed using the unpaired t-test. It revealed a statistically significant difference of 'p' value ($p<0.001$) between the TUG test scorings of group A and Group B. And also showed a statistically significant difference of 'p' value ($p<0.001$) between the PDQ39 test scorings of group A and Group B.*
CONCLUSION: *The results have shown that there is significant difference* ***($p<0.001$)*** *when comparing the effectiveness of Nordic walking and ordinary walking treatment pattern in patients with Parkinson's disease. Therefore Alternative hypothesis has been accepted.*
KEYWORDS: *Nordic walking in Parkinson's disease, Gait training in Parkinsonism, Physical function training in Parkinson's disease.*

INTRODUCTION

Parkinson's disease is one of the most common neuro degenerative diseases with a prevalence of 100-200/100000 people worldwide[1]. The risk of developing Parkinson's disease increases with age. Clinical manifestation in characterized by motor deficits like bradykinesia, tremor, rigidity, postural instability. It includes loss of dopamergic cells in substancia nigra with lack of neurotrans-mitter dopamine[2] and presence of Lewy bodies[3]. the pigmented cells in substancia nigra synapse with other cells located in striatum, which are

responsible for movement balance and walking. Messages are transmitted between substancia nigra and striatum by dopamine.

Chemical imbalance due to lack of dopamine aggravates the symptoms of Parkinson's disease, leaving it incapable to perform simple activities of daily living[4]. Parkinsonism patients will have lowest level of strength[6] and decreased functional ability, caused by combination of physical impair-ments such as walking and balance[5] problems, depression, fatigue, cognitive dysfunction and pain.

Nordic walking concept was developed on the basis of off season ski training activity while using one piece ski poles. Nordic walking[7] is walking with two poles using a reciprocal arm leg action to improve aerobic fitness body strength, mobility and coordination. The poles are designed for the purpose of activating the upper body during walking. Poles are equipped with rubber or spike tips. Nordic walking improves the step length, arm swing and walking speed in patients with Parkinson's disease.

Patients are asked to walk in upright position, not leaning forward or backward. The head should be up and looking forward or backward when the leading foot moves forward to waist height. The opposite pole strikes the ground level with the heel of the leading foot. The patients were remainded not to place the pole infront of their feet. Pole remains pointing diagonally backward and pushed on far back as possible arm strengthens and hand is opening off the grip by the end of arm swing.

There is stronger involvement of upper body in Nordic walking which might burn more calories[8]. By using the poles, the muscles in the upper body can be activated and length of each step taken is supposedly increased, resulting in a faster gait[9]. This technique was established by the International Nordic walking association, focuses on a co ordinate gait pattern with the attention to arm swing, trunk rotation, and stride length and heel strike, while maintaining an upright posture (INWA 2008).

NEED FOR STUDY

There is a need to develop effective treatment pattern to improve the physical function in people who have mild to moderate Parkinson's disease.

AIMS

- To examine the effects of Nordic walking on people with Parkinson's disease.
- To compare the results of Nordic and ordinary walking on physical function and wellbeing in people with Parkinson's disease.

OBJECTIVES

- To improve physical function in Parkinson's disease.
- To improve mobility, coordination and walking capacity in Parkinson's disease.

MATERIALS AND METHODS

Method of collection of data

Sampling Technique: Simple random sampling.

Sample Size: The study included a sample of 30 subjects.

Source of Data: Subjects are chosen from Narayana general and superspeciality hospital, inpatient and outpatient department, Nellore.

Research Design: Comparative study design.

Population: Study included adults who were diagnosed with Parkinson's disease

INCLUSION CRITERIA

- Ability to follow simple instructions.
- Male and female subjects >50 years of age at the time of enrollment.
- Subjects with a minimum modified Hoehn and Yahr scale stage classification of 2 but not more than 4.
- Subjects who have given written informed consent.
- Ability to walk independently without any aid for atleast 10 meters.

EXCLUSION CRITERIA

- Severe hypertension, COPD, uncontrolled diabetes mellitus, hypercholesteremia, osteoarthritis.
- Subjects with a history of cognitive impairment.
- Subjects who have undergone neurosurgical procedure for Parkinson's disease. (pallidotomy, thalamotomy, deep brain stimulation etc.,)
- Subjects who have untreated major depressive disorder, seizure etc.,

Measurement Tool: Mobility, Physical function, Activities of daily living

Outcome Measures

- Timed up and go tes t(TUG test) to assess physical function
- Parkinson disease questionnaire-39: only 2 subscales i.e., mobility and activities of daily living are included for this study.

Duration of Study: 6months

METHODOLOGY

A total number of 30 subjects diagnosed with Parkinson's disease are selected based on inclusion and exclusion criteria. After informed consents obtained, they were randomly assigned into two groups of 15 each.

Prior to the treatment initial assessment has been performed to come across subjects condition and then pre test has been conducted for both the group subjects to know their level of physical function and mobility using the TUG test and PDQ -39 (2 subscales). A brief explanation of procedure and about the treatment, a written informed consent is taken from the subjects.

After a brief demonstration about the procedure, the interventional group i.e., group A subjects are subjected to Nordic walking treatment pattern for a period of 8 weeks with 3 sessions per week and each session lasted for an hour.

After a brief demonstration about the procedure, the control group i.e., group B subjects are subjected to Ordinary walking treatment pattern for a period of 8 weeks with 3 sessions per week and each session lasted for an hour.

Outcome was assessed in all subjects before and after completion of the training period. The post test was conducted for group A and group B on TUG test and PDQ-39 (2 subscales), and the results are recorded and analysed to compare the pre test and post test results.

Nordic walking treatment pattern:

Nordic walking is intensification of normal walking with the use of specialized poles. The poles are held behind the body at 45 degree angle to the ground. The poles are designed for the purpose of activating the upper body during walking. Subjects are asked to walk in upright position, not leaning forward or backward and the head should be up looking forward and the poles are kept close to the body. The session also includes some flexibility exercises and strength exercises. The treatment is focused on endurance training. Subjects are encouraged to increase the intensity of training by walking faster, walking uphill, walking more distance. Each training session finished with a cool down program.

NORDIC WALKING TRAINING

UPHILL WALKING TRAINING

DATA ANALYSIS: The data were analyzed by repeated measures Paired `t' test and unpaired `t' test

TIMED UP AND GO TEST:

ALL GROUPS

T-Test

Group Statistics

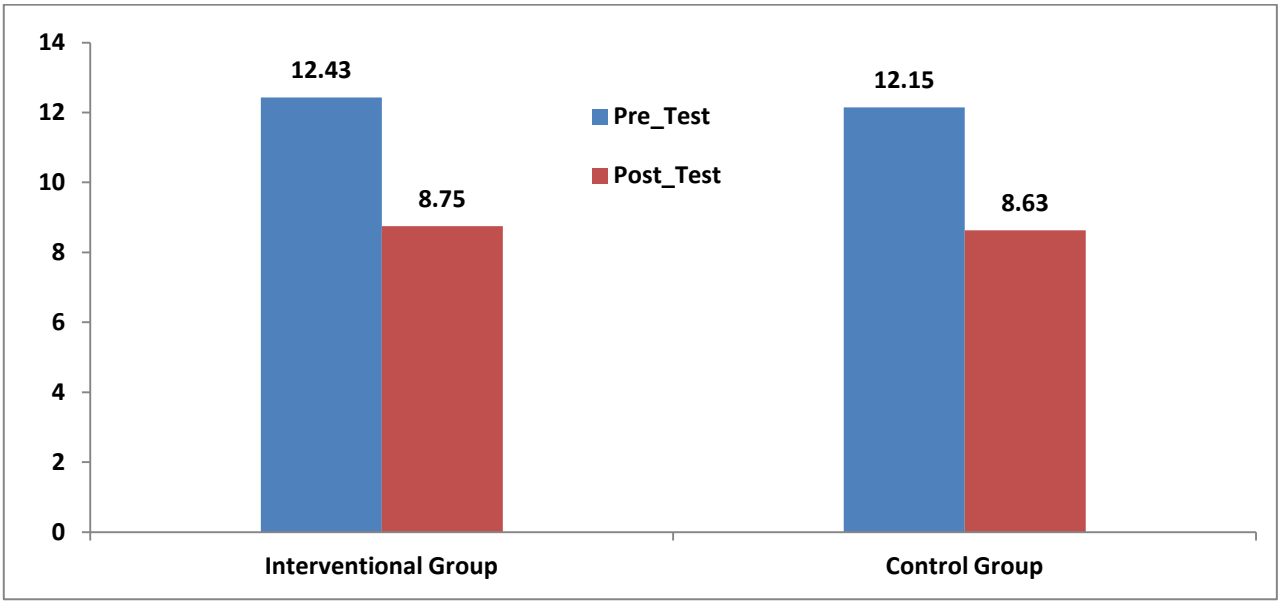
	GROUP	N	Mean	Std. Deviation	Std. Error Mean
PRE_TEST	Interventional Group	15	12.4267	1.15355	.29784
	Control Group	15	12.1467	1.13381	.29275
POST_TEST	Interventional Group	15	8.7467	.76145	.19661
	Control Group	15	8.6333	.63434	.16378

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	P VALUE	Mean Difference	Std. Error Difference	Lower	Upper
PRE_TEST	Equal variances assumed	.065	.801	.670	28	.508 NOT SIG	.28000	.41763	-.57547	1.13547
	Equal variances not assumed			.670	27.992	.508	.28000	.41763	-.57548	1.13548
POST_TEST	Equal variances assumed	.725	.402	.443	28	.661 NOT SIG	.11333	.25589	-.41083	.63750
	Equal variances not assumed			.443	27.115	.661	.11333	.25589	-.41160	.63827

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
PRE_TEST	Interventional Group	15	12.4267	1.15355	.29784
	Control Group	15	12.1467	1.13381	.29275
POST_TEST	Interventional Group	15	8.7467	.76145	.19661
	Control Group	15	8.6333	.63434	.16378



PARKINSON'S DISEASE QUESTIONNAIRE -39:

ALL GROUPS

T-Test

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
PRE_TEST	Interventional Group	15	67.1380	6.83815	1.76560
	Control Group	15	68.7727	6.65799	1.71908
POST_TEST	Interventional Group	15	42.8787	5.05410	1.30496
	Control Group	15	46.4007	5.73557	1.48092

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	P VALUE	Mean Difference	Std. Error Difference	Lower	Upper
PRE_TEST	Equal variances assumed	.063	.804	-.663	28	.513 NOT SIG	-1.63467	2.46427	-6.68249	3.41315
	Equal variances not assumed			-.663	27.980	.513	-1.63467	2.46427	-6.68265	3.41332
POST_TEST	Equal variances assumed	.138	.713	-1.784	28	.085 NOT SIG	-3.52200	1.97384	-7.56523	.52123
	Equal variances not assumed			-1.784	27.564	.085	-3.52200	1.97384	-7.56811	.52411

RESULTS

The data was entered in Excel spreadsheet, the descriptive statistics was performed as mean, standard deviation and analysis was performed using paired t-test and between group analysis, using unpaired tests, a two tailed P value of less than 0.05 was considered statistically significant.

Comparison of pre test and post test scorings of TUG TEST and PDQ39 test of the two groups was done using paired t-test. It revealed a significant difference of p value ($p<0.001$) between pre test and post test scorings of both the scales.

Comparison between the two groups was analyzed using the unpaired t-test. It revealed a statistically significant difference of 'p' value ($p<0.001$) between the TUG Test scorings of group A and Group B. And also showed a statistically significant difference of 'p' value ($p<0.001$) between the PDQ39 test scorings of group A and Group B.

DISCUSSION

Overall goal of the present study is to find the effectiveness of Nordic walking pattern and also to compare the effectiveness of Nordic walking pattern to Ordinary walking pattern in improving the level of physical activity in patients with Parkinson's disease. In the present study, along with the specific walking pattern subjects are trained with flexibility exercises, strength training, and endurance training also. Both groups showed improvement in TUG test and PDQ39 scale scorings using Nordic walking and Ordinary walking treatment patterns. The result of the study is Nordic walking provide good benefit for patients with Parkinson's disease. Nordic walking has positive effects on some symptoms such as alternating movements, postural stability, mobility, risk of falling etc.,

Results of present study has shown that physical function, mobility, coordination and walking capacity in Parkinson's disease have been improved significantly in Group A than in Group B of ($P<0.0001$). Present study revealed that Nordic walking pattern is effective in improving physical function when consistently performed thrice a week for 8 weeks. A study revealed that there is a positive effect10 of Nordic walking in Parkinson's disease when performed 2 times a week for 6 weeks. Other study suggested that by walking behind the supervisor patient match his/her stride at the end of training patient realize that they need not to think about the poles as it has become a automatic behavior with practice.

The ability of the patients walking and Nordic walking group realize a higher Walking speed with lower body pressure levels and lower heart rate showed the successful adaptation to exercise. Nordic walking training program can likely be attributed to better efficiency of cardio vascular system. Earlier studies reported an enhancement of cardio vascular metabolism and increase in walking speed by Nordic walking. Posture and Postural instability11 were most improved by Nordic walking supported by poles, patients walked during the training and it has shown that a training which challenges the balance control can improve the postural stability and gait control.

In a study made on effectiveness of Nordic walking, Parkinson's patient achieved a good improvement in PDQ, TUG and 10 minute walking test. Nordic walking might also be suitable in advanced stages of Parkinson's disease, since the support of the poles reduces the risk of falls. The findings suggest that training should be supervised and training frequency and intensity to be increased in the treatment sessions. Nordic walking was beneficial physically, in improving dynamic stability, stride length, therefore to improve good walking capacity.

CONCLUSION

Nordic walking is effective treatment pattern to improve the physical function in people who have mild to moderate Parkinson's disease.

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