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Original Research Article

Effects of Chest PNF v/s Thoracic Maitland Mobilization on Respiratory Parameters in Parkinson's Patients: A Randomised Control Trial

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ABSTRACT

Background: Parkinson's disease is a chronic progressive disease of nervous system characterised by cardinal features of rigidity, bradykinesia, tremor and postural instability and may also cause gait disturbances, cardiopulmonary changes, etc. Chest PNF technique leads to the possible increase in flexibility and strength. Vertebral Mobilisation is a manual technique that is commonly used by osteopaths, chiropractors and physiotherapists to treat spinal pain and dysfunction.
Aim and objectives: To study the effects of Chest PNF v/s Thoracic Maitland Mobilization on respiratory parameters in Parkinson's patients using Peak expiratory flow rate and thoracic mobility using Ott's sign.
Methodology: A total of 45 patients were selected according to the inclusion and exclusion criteria and consent was taken. 3 groups were made in which patients were divided. Group A was given chest PNF and breathing exercises, group B was given Thoracic Maitland Mobilization and breathing exercises and group C was given breathing exercises. Peak expiratory flow rate (PEFR) and thoracic mobility were assessed pre and post treatment. The treatment protocol was given 3 times a week for 4 weeks.
Result: There was significant increase in PEFR ($p < 0.0001$) and Ott's sign for flexion ($p=0.0031$) and extension ($p<0.001$) for Chest PNF.
Conclusion: The Chest PNF technique when given to a group of Parkinson's patients gave highly significant differences in pre and post values of PEFR and Ott's sign as compared to Thoracic Maitland Mobilization.

Keywords: Parkinson's patients, Respiratory parameters, Chest PNF, Thoracic Maitland Mobilization.

INTRODUCTION

Parkinson's disease (PD) is as a chronic degenerative pathology which occurs due to a generalized injury of black substance that is responsible for sending neuronal fibers that secrete dopamine directly to the caudate nucleus and the putamen, structures that are part of the basal ganglia. [1] Parkinson's disease is a chronic progressive disease of nervous system whose cardinal features are rigidity, bradykinesia, tremor and postural instability. Other symptoms like gait disturbances, sensory changes, cardiopulmonary changes, etc can also be caused. Parkinson's disease's average onset is approximately 50 to 60 years and is a very common neurodegenerative disorder. About 84 percent of patients demonstrate respiratory impairments. [2]

In Parkinson's disease pulmonary function has been studied. In Parkinson's

patients it was postulated concomitant chronic obstructive pulmonary disease or obstruction due to increased bronchial muscle tone caused by increased parasympathetic activity. [3] In Parkinson's disease airway obstructions have been found. These complications can occasionally induce severe episodes of pulmonary failure present a high incidence. After the sudden withdrawal of dopamine agonists acute respiratory failure has also been reported. Most patients do not report respiratory symptoms although there is physiological evidence of frequent and potentially severe pulmonary dysfunction. The respiratory adaptation to effort is never used as Parkinson's patients often lead a sedentary life. Ventilatory problems induced by the loss of musculoskeletal flexibility and kyphotic posture were suggested to be a factor contributing to increased functional disability in daily living activities. [4]

Airway obstruction has been linked to episodes of pulmonary failure and is most frequently reported pulmonary problem. Decreased chest expansion that occurs as a result of rigidity of trunk muscles, loss of musculoskeletal flexibility and kyphotic posture is linked to restrictive lung dysfunction and is common. Pulmonary dysfunction leads to reduction of the daily function and activity participation. Intercostal, costovertebral or intervertebral problems are more likely to be seen in patients with breathing difficulty than pleural disorder. [5]

The respiratory muscles weaken with increased life expectancy as humans age. Because of this there is frequent rise in problems of respiratory function. Thoracic mobilization, stretching of the respiratory muscles, and strengthening of the respiratory muscles have physical therapeutic approaches for the thorax. There is reduction in respiratory problems in patients with respiratory dysfunction through such respiratory rehabilitation. [6]

In Parkinson's patients, the respiratory parameters are reduced. Restrictive lung dysfunction is common in these patients and is linked to decreased chest expansion which results in difficulty in daily function and activity participation. Our study focuses on the effects of Chest PNF techniques v/s Thoracic Maitland Mobilization on the respiratory parameters in Parkinson's patients. The results of our study may bring out the finest approach for altering the respiratory parameters in Parkinson's patients. Hence, there is the need of the study.

MATERIAL AND METHODS

Material

Demographic data sheet**,** consent form**,** plinth**,** measuring tape, skin marker**,** peak expiratory flow meter.

Method

A randomised control trial type of study design was selected in which 54 samples were taken according to random sampling method. The study duration was of 6 months and study setting was hospitals in and around Pune. The target population was Parkinson's patients.

Inclusion Criteria

1. Both males and females
2. Patients within 50 to 60 yrs of age
3. Medically diagnosed with Parkinson's
4. Hoehn and Yahr disability classification grades 1, 2 and 3.[1]

Exclusion Criteria

1. Those patients who were not willing to participate
2. Hoehn and Yahr disability classification grades 4 and 5
3. Cognitive impairment.

Outcome Measures

1. Peak expiratory flow rate using peak flow meter. [7]
2. Ott's sign. [8]

Statistical Methods

- Microsoft office excel 2010 and Instat was used for statistical analysis.
- Average values for various parameters are calculated.

- Effect is tested using unpaired 't' - test.
- Level of significance was set at 5% (i.e. < 0.05)

RESULT

Table 1: Comparison of outcome measures among various groups.

Outcome Measure	Group A (Mean ± SD)	Group B (Mean ± SD)	Group C (Mean ± SD)	P Value
Age	58.73±5.70	57.73±4.89	54.73**±4.09**	0.0814
Gender	Male=10 Female=5	Male=9 Female=6	Male=10 Female=5	
PEFR: Pre	80±24.785	82.66±22.82	86.00±24.72	0.7710
Post	100±30.23	88.66±25.03	92.66±22.50	0.3859
P value	<0.0001	0.0004	0.4465	
Ott's sign Flexion: Pre	2.20±0.92	2.22±0.75	2.14±0.95	0.9702
Post	2.53±0.83	2.40±0.73	2.13±0.90	0.3962
P value	0.0031	<0.0001	0.9690	
Ott's sign Extension: Pre	0.40±0.38	0.45±0.29	0.46±0.37	0.8760
Post	0.76±0.25	0.52±0.29	0.52±0.33	0.0599
P value	<0.001	0.0069	0.6495	

Figure 1:- Represents the pre and post treatment values of PEFR (l/min) for PNF and Thoracic Maitland Mobilization.

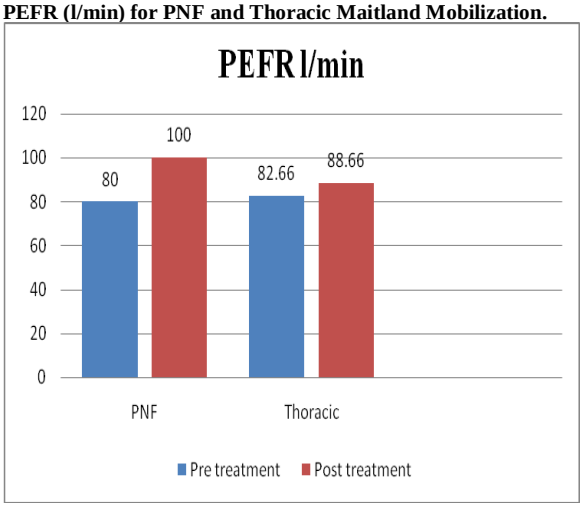


Figure 2:- Represents the pre and post treatment values of Ott's sign for flexion (cm) for PNF and Thoracic Maitland Mobilization.

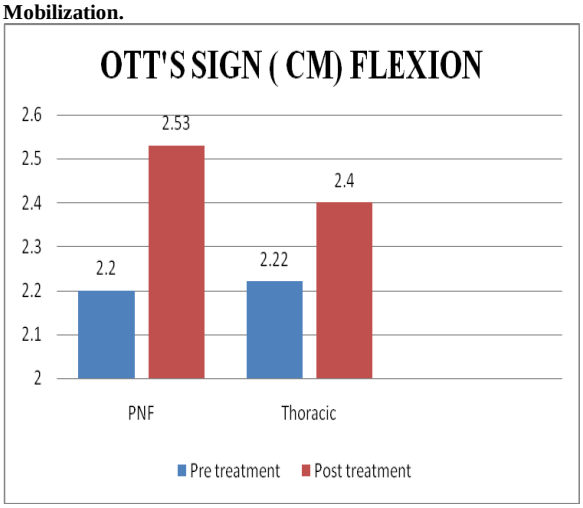
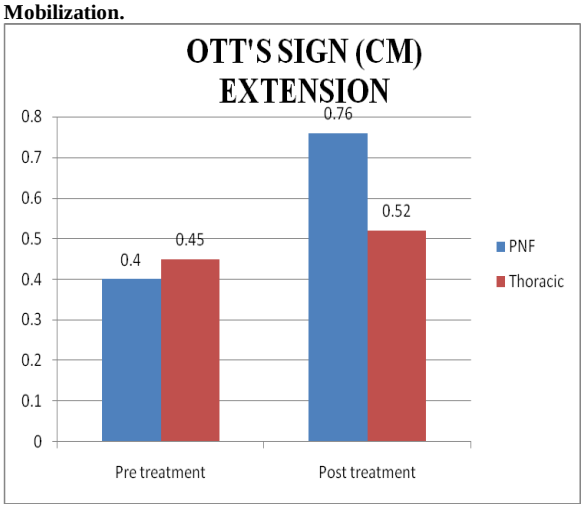


Figure 3:- Represents the pre and post treatment values of Ott's sign for extension (cm) for PNF and Thoracic Maitland Mobilization.



DISCUSSION

This project is about the effects of PNF v/s Thoracic Maitland Mobilization on respiratory parameters in Parkinson's patients. In this study 54 medically diagnosed patients were approached out of which 5 participants were excluded according to the inclusion and exclusion criteria and 4 patients dropped out of the study.

In 1984 Vincken et al published their findings on pulmonary function in a variety of extrapyramidal disorders, including Parkinson's disease. They used the technique of maximal expiratory and maximal inspiratory flow-volume (MEFV and MIFV) and concluded that upper airway

obstruction (UAO) was the most prominent pulmonary abnormality. According to Emilton Lima de Carvalho et. al the PNF promotes improved fitness in mobility, muscle stretching, provides a training motor functions, and improve possible postural changes resulting from the PD.

This positive influence of Chest PNF technique is related to the possible increase in flexibility and strength, given that a major feature of PD is the muscle stiffness. Some research results have shown that tidal volume is more affected by movement of the rib cage than abdominal motion. Therefore, the chest expansions degree is considered to be closely related to respiratory function and an important element in representing it.

The important factors in air flow during inspiration and expiration are mechanical properties and muscle tension of the rib cage caused by movement of the rib cage. In addition, the thorax has an elastic structure that expands and contracts during breathing. A crucial parameter representing the gas exchange ability of the lung is the interaction between the lung and the chest cavity.

Further the capacity of the thorax affects the expansion and contraction of the lungs which is determined by the mobility of the skeletal muscles, the elasticity of surrounding soft tissues, and the intensity of the respiratory muscles.

Chest PNF possibly stimulates the main respiratory muscles (diaphragm and intercostals), as well as other accessory muscles (neck muscles, chest wall, and upper limbs). Chest PNF produces changes in muscle fibre type specifically changing fiber type IIA to IIB, while reducing the cross-sectional area of type IIB fibers. Chest PNF increases the mobility of the chest wall increased, which leads to improvements in pulmonary function.

CONCLUSION

The Chest PNF technique when given for 4 weeks to a group of Parkinson's patients gave highly significant differences in pre and post values of PEFR and Ott's sign as compared to Thoracic Maitland Mobilization.

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