

## A Study to find out Pulmonary Function Capacity in Parkinson's Disorder Patients: A Pilot Study

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### Abstract

**Background:** Parkinson's disease is a chronic progressive disease of the nervous system characterized by the cardinal features of rigidity, bradykinesia, tremor and postural instability. In Parkinson's disease every year there are less than 10 new cases per 100000 under age of 50. while there are at least 300 new cases per 100000 ages 80 to 99 years annually.

Pulmonary complications associated with Parkinson's diseases a common reason for hospital admission 35.8% reported shortness of breath on exertion, 17.9% reported cough, 13% reported sputum production. Pulmonary function test is mainly used to check the lung function capacity in Parkinson's patients. In Parkinson's patients due to forward head stoop posture there is decrease in lung function capacity.

In Parkinson's disease morbidity and mortality are commonly caused by respiratory disorders from pulmonary function impairments.

**Aims:** The study aim is to find out pulmonary function capacity in Parkinson's disorder patients.

**Objective:** (1) To check FVC in Parkinson's disorder patients. (2) To check FEV1 in Parkinson's disorder patients. (3) To check FEV1/FVC ratio in Parkinson's disorder patients.

**Method:** Pulmonary function test was conducted using PFT software and PFT probe (HELIOS-401) and results of FVC, FEV1, FEV1/FVC ratio were obtained from Parkinson's disease patients.

**Result:** The data was assessed using PFT; the study showed that there has been a significant reduction in lung function capacity of the Parkinson's disorder patients.

**Conclusion:** In the present study we concluded that the lung function capacity of Parkinson's disorder patients was very low compared to that of normal individuals.

**Keywords:** Parkinson's disease; Pulmonary function capacity; Pulmonary function test (PFT); Forced vital capacity (FVC); Forced expiratory volume (FEV1); FEV1/FVC ratio.

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## INTRODUCTION

The term Parkinson is used to refer to a group of disorder that produce abnormalities of basal ganglia function. Parkinson's disorder or idiopathic parkinsonism is the most common form affecting approximately 78% of patients. Secondary parkinsonism result from a number of different identifiable causes including virus, toxins, drugs, tumors, etc. True Parkinson's disorder or paralysis against was first described as the shaking palsy by

James Parkinson in 1817. Etiology is idiopathic. Two distinct sub groups have been identified. One group includes individual whose dominant symptoms includes postural instability and gait disturbances, another group includes individual with tremors as the main feature. Patient who are tremor predominant typically demonstrate few problems with bradykinesia or postural instability.<sup>1</sup>

### **Epidemiology**

PD is a very common neurodegenerative disease that affects more than 2 percent of the population older than 65 years of age. Average age of PD onset is approximately 50 to 60 years. The incidence increase dramatically with increasing age. There are less than 10 new cases per 100,000 under age 50 while there are at least 300 new cases per 100,000 ages 80 to 99 years annually. A small percentage (4-10%) develop young onset PD, which is defined by the appearance of initial symptoms before the age of 40.<sup>2</sup>

### **Diagnosis**

Pulmonary function test is a group of that measures how well your lungs works, how well the lungs taken in and exhale air, and how efficiently they transfer oxygen into blood. Pulmonary complications associated with Parkinson's diseases a common reason for hospital admission 35.8% reported shortness of breath on exertion, 17.9% reported cough, 13% reported sputum production. A higher proportion of patients with Parkinson's diseases die from pneumonia than in general population. Abnormal PFT is interpreted if FVC and FEV1 is less than 80% (total volume of air expelling is approx: 80% within 1sec i.e. FEV1). FEV1 is the volume of air that can forcibly be blown out in 1sec after full inspiration. Values between 80% and 120% are considered to be as normal. FEV1/FVC (FEV1%) is the ratio of FEV1 to FVC in health adults this should be approximately 75-80%. For Obstructive lung complication FEV1/FVC ratio is <70%, FVC is <80%, FEV1=[80-120 (mild), 50-80 (moderate), 30-50 (severe), <30 (very severe)]. For Restrictive lung complication FEV1/FVC ratio is >70%, FEV1 is 80-120%, FVC=[>70 (mild), 60-69 (moderate), 50-59 (moderately severe), 35-49 (severe), <35 (very severe)].<sup>3,4</sup>

## **AIMS AND OBJECTIVES**

### **Aims**

The study aim is to find out pulmonary function

capacity in Parkinson's disorder patients.

### **Objective**

- To check FVC in Parkinson's disorder patients.
- To check FEV1 in Parkinson's disorder patients.
- To check FEV1/FVC ratio in Parkinson's disorder patients.

### **Need of Study**

The severity of the Parkinson's diseases can be determined by stages of Parkinson's diseases and with the progression of every stage the severity of the disorder also gets increased and with that various lung complications occurs.

The dysfunction of the respiratory system leads to increased morbidity and mortality and deterioration in quality of life so measurement of respiratory function can be used to establish if any abnormality is present and identify particular disorders there for the present study needed to a study to find out pulmonary function capacity in various stages of Parkinson's disorder patients.

## **HYPOTHESIS**

### **Null Hypothesis**

There is no significant change in pulmonary function capacity Parkinson's disorder patients.

### **Alternate Hypothesis**

There is significant change in pulmonary function capacity Parkinson's disorder patients.

## **MATERIAL AND METHODOLOGY**

### **Methodology**

- Study Design: Pilot study
- Sample size: 4
- Sample Method: Convenient method
- Study Duration: 1 month
- Study Population: Parkinson's patients
- Study Setting: Rajkot

## **CRITERIA FOR SELECTION**

### **Inclusion Criteria**

- Male and Female Subjects

- Age: 40-60 years

**Exclusion Criteria**

- Patients with history of any lung disease
- Structural abnormalities of upper airways
- Subjects not able to give desired cooperation for the test procedure

**MATERIALS**

- PFT Probe and Nose Clip
- Laptop
- Pen and Paper
- Spirit and Cotton
- Consent and Assessment Form

**METHOD<sup>5</sup>**

**In this pilot study PFT was conducted on 4 consecutive patients with Parkinson's disorder**

**After that written inform consent was taken**

**Each patient went underwent for the assessment**

**Detailed instruction and procedure and purpose of performing PFT to patients was given**

**Data is in form of age, height, weight, gender and smoking status was entered**

**Patients instructed to perform PFT**

**Always at least 2-3 attempts were made**

**And from that best result was used**

**Which is determined on basis of Flow Volume Loop and Time Volume Loop**

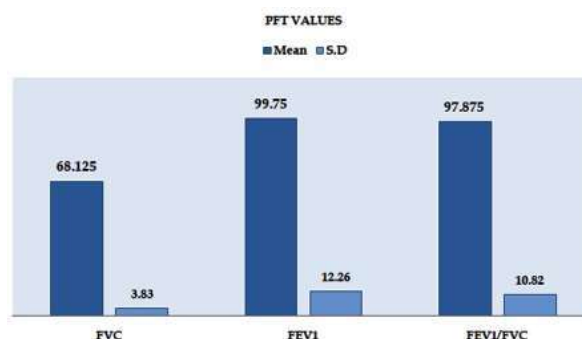
**PFT values i.e. FEV1, FVC and FEV1/FVC ratio were obtained and encoded in data sheet**

**RESULT**

Data was collected on data sheet & was encoded for statistical analysis. Microsoft excel and Microsoft word used to generate graph, tables and master chart. Through descriptive statistics, the mean and standard deviation was obtained. The following result was generated.

**Table 1:** Descriptive analysis of the obtained data

-	Mean	Standard Deviation
FVC	68.125	3.83
FEV1	99.75	12.26
FEV1/FVC	97.875	10.82



**Graph 1:** Mean and Standard Deviation of PFT VALUES

**Interpretation:** The above data shows the mean and standard deviation of the subjects.

## DISCUSSION

All the Parkinson patients at the time of pulmonary status assessment clearly demonstrated a significant reduction in lung function capacity. In this study, we found out that all 4 patients were having restrictive pattern of pulmonary dysfunction.

M Polatli, akyol, O cildag, K Bayulkem, *European journal of neurology*, in 2001: Pulmonary function tests in Parkinson's disease and estimated that decrease in PEF and MEF values and MVV decrease in PD.<sup>6</sup>

M Sabate, I Gonzalez, F Ruperez, *Journal of neurological sciences*, in 1996: Research on Obstructive and restrictive pulmonary dysfunction in Parkinson's disease. The present data support the hypothesis that Parkinson patients present a high risk for neurologic disturbances. These pulmonary dysfunctions are induced by the simultaneous action of a group of factors including the degree of bradykinesia or rigidity and the musculoskeletal limitations of vertebral column probably induced by chronic anomalous posture.<sup>7</sup>

HM zakaria, SH Mohammed, *Bulletin of Faculty of Physical therapy*, in 2009: Physical disability and subclinical pulmonary dysfunction in different stages of Parkinson's disease and they concluded that the severity of PD had a great impact on ventilator functions specially MVV which may serve as a useful.<sup>8</sup>

W Zhang, L Zhang, N Zhou, E Huang, *Frontiers in neurology*, in 2019: Dysregulation of respiratory center drive (P0.1) and muscle strength in patients with early stage idiopathic Parkinson's disease and findings suggest that abnormal pulmonary function is present in early stage IPD patients as evidenced by significant changes in PImax, PEmax, and P0.1. Most importantly, P0.1 may have the potential to assist with the identification of IPD in the early stage.<sup>9</sup>

## CONCLUSION

In the present study we concluded that the lung volume and the lung function capacity of Parkinson's disorder patients was very low compared to that of normal individuals.

## REFERENCES

1. Adams RD, Victor M, Ropper AH (1997). Abnormalities of movements and posture due to disease of the basal ganglia. In: *Principles of Neurology*, 6th edn. McGraw-Hill, New York, pp. 64±83.
2. Bogaard JM, Hovestadt A, Meerwaldt J, MecheÂ FGA, Stigt J (1989). Maximal expiratory and inspiratory flow±volume curves in Parkinson's disease. *Am Rev Respir Dis* 139:610±614.
3. Fontana GA, Pantaleo T, Lavorini F, Benvenuti F, Gangemi S (1998). Defective motor control of coughing in Parkinson's disease. *Am J Respir Crit Care Med* 158:458±464.
4. Gold WM (2000). Pulmonary function testing. In: Murray JF, Nadel JA, eds. *Textbook of Respiratory Medicine*. W.B. Saunders Co., Philadelphia, pp. 781±881.
5. Gorell JM, Johnson CC, Rybicki BA (1994). Parkinson's disease and its comorbid disorders: an analysis of Michigan mortality data, 1970 ±1990. *Neurology* 44:1865±1868.
6. Hoehn MM, Yahr MD (1967). Parkinsonism: onset, progression and mortality. *Neurology* 17:427±442.
7. Irwin RS, Boulet LP, Cloutier MM et al. (1998). Managing cough as a defence mechanism and as a symptom. A consensus panel report of the American College of Chest Physicians. *Chest* 114:133s±142s.
8. Kakinuma S, Nogaki H, Pramanik B, Morimatsu M (1998). Muscle weakness in Parkinson's disease: isokinetic study of the lower limbs. *Eur Neurol* 39:218±222.
9. Koseoglu F, Inan L, Ozel S et al. (1997). The effects of a pulmonary rehabilitation program on pulmonary function tests and exercise tolerance in patients with Parkinson's disease. *ct Neurol* 12:319±325.

