RESEARCH PAPER

# DYNAMIC LUNG FUNCTION TESTS IN MIDDLE AGED COPD WOMEN IN TERTIARY CARE HOSPITAL

**Dr Jesse Gifty[1], Dr K F Kammar[2]**
[1,2]Assistant Professor, Department of Physiology, KLE JGMM Medical college, Gabbur cross, Hubballi, India.
**Corresponding author addresses: E-mail id/ Social Media Link**
Dr. Jesse Gifty, Assistant Professor, Department of Physiology, KLE JGMM Medical college, Gabbur cross, Hubballi, India
**Email:** jessgifty13@gmail.com
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**ABSTRACT**
**Background:** Chronic Obstructive Pulmonary disease (COPD) is one of the commonest lung diseases worldwide. COPD was until recently largely considered a disease of elderly men who smoke. However, as our understanding has evolved, COPD is increasingly being viewed as a disease that greatly impacts women as well, especially with the increased prevalence of smoking among women. The present study was done to assess dynamic lung function tests in women affected with COPD. For our study middle aged women are taken for the study who are non-smokers. **Objectives of the Study:** 1. To assess Dynamic lung function tests in stabilized COPD women. 2. To compare Dynamic lung function tests results between age matched COPD otherwise healthy women. **Materials And Methods:** This was comparative observational study and was conducted over a period of 1 year (Aug 2022 to July 2023) in the Department of Physiology, KIMS, Hubballi, Karnataka. COPD women were investigated for spirometry in the stable phase of COPD (2-4 weeks after acute exacerbation). The study included 35 middle aged women COPD cases and 35 controls. Spirometry test was done using computerised spirolyser. **Results:** We found that COPD patients Dynamic lung function tests, FEV1, FVC, FEV1/FVC and MVV were significantly reduced in cases as compared to controls. **Conclusion:** FEV1, FVC and FEV1/FVC and MVV were significantly reduced even in stable phase of COPD (2-4 weeks after acute exacerbation). There is a need to have nation-wide community based survey to estimate the true burden of COPD among women using robust and uniform methodology which is useful for planning and implementation of control measures and also for their monitoring and evaluation.
**Key words:** Stable COPD, Women, leptin, inflammation, dynamic lung function tests.
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## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common and debilitating condition affecting the respiratory system. It is a progressive disease involving airways, alveoli and pulmonary vasculature eventually leading to irreversible airflow limitation and loss of elastic recoil. The disease causes a gradual decline in expiratory flow resulting in increased end-expiratory volume and dynamic hyperinflation.[1]

The etiology is diverse, complex and multifactorial and gene-environment interactions have been linked to its development. Symptoms of COPD, such as shortness of breath, chronic cough and phlegm, negatively impact health and productivity. Globally COPD is among the leading cause of morbidity and mortality. COPD was estimated to be the sixth leading cause of death in 2019.[2]

COPD was until recently largely considered a disease of elderly men who smoke. However, as our understanding has evolved, COPD is increasingly being viewed as a disease that greatly impacts women as well, especially with the increased prevalence of smoking among women.[3]

Women are more susceptible to tobacco, having a more severe disease despite lower cumulative tobacco consumption, earlier onset of COPD, and faster decline in FEV1, but conversely obtain greater benefit from cessation of exposure. This susceptibility to airborne contaminants involves not only tobacco but includes biomass fuels as well. Celli et al., found that 80% of non-smoker COPD patients are women, probably on account of exposure to biomass fuels.[3]

## AIM OF THE STUDY

The aim is to know whether stabilised COPD women have changes in investigations of respiratory parameters.

## OBJECTIVES OF THE STUDY

The present study was conducted in department of Physiology, KIMS Hubballi from August 2023 to July 2024.

1. To assess Dynamic lung function tests in stabilized COPD women.
2. To compare Dynamic lung function tests results between age matched COPD otherwise healthy women.

## MATERIALS AND METHODS

Study design: Comparative Observational Study

**SOURCE OF DATA:**

- 35 COPD women diagnosed by physicians clinically as per the protocol from General

Medicine department were included in the study.

- 35 healthy women from general population of same age were included in the study as controls.

**INCLUSION CRITERIA:**

- 35 to 45 years old females suffering from chronic obstructive pulmonary disease.
- Investigation done in the stabilized status. (2-4 weeks of exacerbation)
- Patients were on treatment viz: Bronchodilators and steroid inhalers.

**EXCLUSION CRITERIA:** Females with

- History of Bronchial Asthma, Diabetes, Hypertension or any other chronic illness.
- History of tobacco smoking.
- History of drug intake for a long duration.

**METHOD OF COLLECTION OF DATA:**

**Materials:**

Computerised hand held spirolyser ' TRUEFLO by ndd'

**SAMPLE SIZE ESTIMATION:**

**Formula:**

**Sample size = Z 1-α/22p(1-p)/ d2**

Z 1-α/2 – Standard normal variate (at 5% type I error (p=0.05) it is 1.96)

p- expected proportion based on previous studies

d- absolute error of precision

Sample size calculated for hypothesis testing for 2 means.

To test null hypothesis of no difference between 2 groups with 90% power and alpha error of 5%, We required a minimum of 29 subjects in each group.

Total rounded off to 35 subjects in each group.

**STATISTICAL ANALYSIS:**

All data are presented as mean and SD for continuous variables.

Unpaired student t test was used to compare mean and standard deviation of various parameter between COPD and control group.

Statistical analyses were performed using SPSS, version 17.0 software (SPSS Inc., Chicago, Illinois, USA). All parameters were expressed as mean values ± SD. P-value of less than 0.05 was considered to be statistically significant.

**RESULTS**

Thirty-five female COPD patients (Cases) were included in the study and matched with 35 healthy females (Controls).

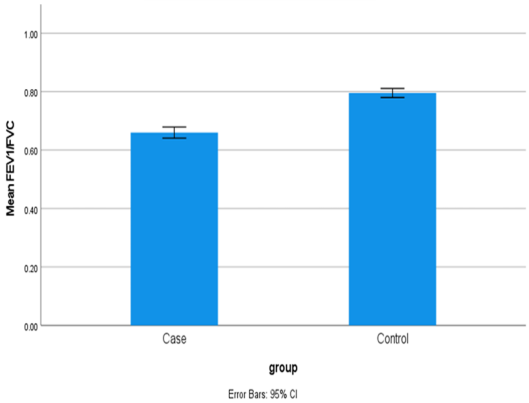
**Table 1: AGE (years)**

| | GROUP | | | |
|---|---|---|---|---|
| | Case | | Control | |
| | Mean | SD | Mean | SD |
| AGE | 40 | 4 | 41 | 4 |

P=0.17, Not Significant

**Table 2: Dynamic lung function tests**

| Characteristic | Case | Control | P value |
|---|---|---|---|
| FVC (L) | 2.92±0.19 | 3.16±0.26 | <0.0001 |
| FEV1(L) | 2.08±0.23 | 2.52±0.28 | <0.0001 |
| FEV1/FVC | 0.66±0.06 | 0.80±0.05 | <0.0001 |
| MVV (L/Min) | 50.97±8.52 | 67.34±10.01 | <0.0001 |




**Graph 1: Mean of FEV1/FVC**

**DISCUSSION**

Mean FVC is 2.9L in cases and 3.16 in controls. Mean FEV1 is 2.08L in cases and 2.52L in controls. Mean FEV1/FVC is 0.66 in cases and 0.80 in controls. Women clinically diagnosed with COPD FVC, FEV1 and the ratio of FEV1/FVC was low as compared to FVC, FEV1 and FEV1/FVC in controls.

The study by David P. Johns et al., states that the standard measure for defining airway obstruction has been specified as a reduction in the ratio of forced expiratory volume in one second (FEV1) to forced vital capacity (FVC), the forced expiratory ratio (FER). They state that spirometry is accepted as the diagnostic test to assess airflow obstruction and classify severity of disease, based on specific cut points for FER (FEV1/FVC <0.7 after bronchodilator).[4]

The association of reduced FEV1 with increased overall mortality has been recognized in studies in non-smokers and smokers with the effect of reduced FEV1 independent of smoking history.[5]

In our study as our subjects are non-smokers, biomass smoke may be an important risk factor for the development of respiratory dysfunctions of COPD. Significant association was found between COPD and biomass smoke exposure for women living as well in rural as in urban areas.[6,7]

Mean MVV in cases is 50L/min and in controls is 67L/min. MVV is a respiratory parameter commonly done during spirometry tests. It evaluates the maximum amount of air a person can inhale and then exhale during a 12 to 15s interval with maximal voluntary effect.

In our study, Mean MVV was lower in cases as compared to controls and was statistically

significant. Our findings are in line with the study by Ana Carolina Andrello et al. It states that MVV correlates equally or better than FEV1 with outcomes of dyspnea, exercise capacity, unctional status, and health status in subjects with COPD. MVV depends on inspiratory and expiratory capacity of the subject. It is reduced in COPD patients owing to the reduced respiratory effort in them.[8]

**CONCLUSION**

1. Since the natural history of COPD in community is largely unknown particularly in women, there is a need to have nation-wide community-based survey to estimate the true burden of COPD among women using robust and uniform methodology which is useful for planning and implementation of control measures and also for their monitoring and evaluation.
1. The sex difference in COPD may result from behavioural and/or environmental factors or biologic and/or genetic factors.
2. Since women take the responsibility of cooking for the family, it is more difficult to reduce their exposure to bio-mass smoke in the kitchen. Using cleaner domestic fuel such as LPG and providing better stove designs that allow smoke to be directed away through vents and chimneys.

**Limitations of the study:**

1. Stable period was not regular in our patients admitted to our hospital.
2. We did not the know actual status of the patient during acute exacerbation.

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