



***Please keep the mobile silent.***

***لطفًا اجعل المحمول صامتًا***



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

سَنُرِيهِمْ آيَاتِنَا فِي الْآفَاقِ وَفِي أَنْفُسِهِمْ حَتَّى يَتَبَيَّنَ لَهُمْ أَنَّهُ  
الْحَقُّ أَوَلَمْ يَكْفِ بِرَبِّكَ أَنَّهُ عَلَى كُلِّ شَيْءٍ شَهِيدٌ

# RESPONSE OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE TO PULSED ELECTROMAGNETIC FIELD

استجابة مرضى السدة الرئوية المزمنة للمجال المغناطيسي  
الكهربائي المتقطع



# ACKNOWLEDGMENT





***First*** and foremost, all thanks  
and gratitude to ***GOD***, most  
gracious and most merciful.



I am very grateful to many persons who helped me in several ways to finish this work. I am extremely grateful to **Dr. Azza A. El Aziz A. El Hady**, Professor in Department of Physical Therapy for Cardiovascular/Respiratory Disorder and Geriatrics, Faculty of Physical Therapy, Cairo University, for her continuous guidance, meticulous supervision and valuable suggestions, saving neither efforts nor time to read every word in this work.



I am very appreciative to Prof. Dr. **Khaled Mahmoud Zamzam**, Professor of chest diseases Medical military academy; Head manager of Kobry El koba chest hospital for his continuous guidance and valuable advice for enriching this work, which has given a powerful push helping this research to come to reality.



I am very appreciative to my colleague Dr. **Hany Farid Eid Morsy Elsisi** Lecturer of physical therapy for cardiovascular/respiratory disorders and geriatrics. Faculty of Physical Therapy, Cairo University for his continuous guidance and valuable advice for enriching this work, which has given a powerful push helping this research to come to reality.



I also wish to extend my deepest appreciation to all my professors and colleagues in Faculty of Physical Therapy, Cairo University who helped me a lot making this work possible.



Great thanks to all my patients who participated in this study for their efforts and time spent in this work.



**I am very appreciative to my wife and my children for their endless support and encouragement.**





# Introduction

Chronic obstructive pulmonary disease (COPD), also known as chronic obstructive lung disease (COLD), chronic obstructive airway disease (COAD), chronic airflow limitation (CAL) and chronic obstructive respiratory disease (CORD), is the occurrence of chronic bronchitis or emphysema, a pair of commonly co-existing diseases of the lungs in which the air way become narrowed (Vogelmeier et al., 2011).



COPD is caused by noxious particles or gas, most commonly from tobacco smoking, which triggers an abnormal inflammatory response in the lung (Rabe et al., 2007). The diagnosis of COPD requires lung function tests. Important management strategies are smoking cessation, vaccinations, rehabilitation, and drug therapy.



*Magnet therapy, magnetic therapy, or magnotherapy is an alternative medicine practice involving the use of static magnetic fields. Practitioners claim that subjecting certain parts of the body to magnetostatic fields produced by permanent magnets has beneficial health effects. (Falzone et al., 2011).*

# Statement of the problem



Was there any effect of magnetic field therapy on chronic obstructive pulmonary disease (COPD)?

# **Purpose of the study**

**. The purpose of this study was to find out the effect of magnetic field therapy on FVC and FEV1 and to asses the FVC and FEV1 in response to magnetic therapy in (COPD) patients.**



- **DELIMITATION:**

- This study was delimited to patients between 35 to 55 years old both sex with COPD from out patient chest clinic of air force hospital.

# LIMITATIONS :

- 1- The physical and psychological status of the patients may affect the patient performance.
- 2- Patient did not believe in the efficacy of magnetic therapy.
- 3- The study was also limited according to the patient ability to complete the whole program (12 weeks).



## **Basic assumption:**

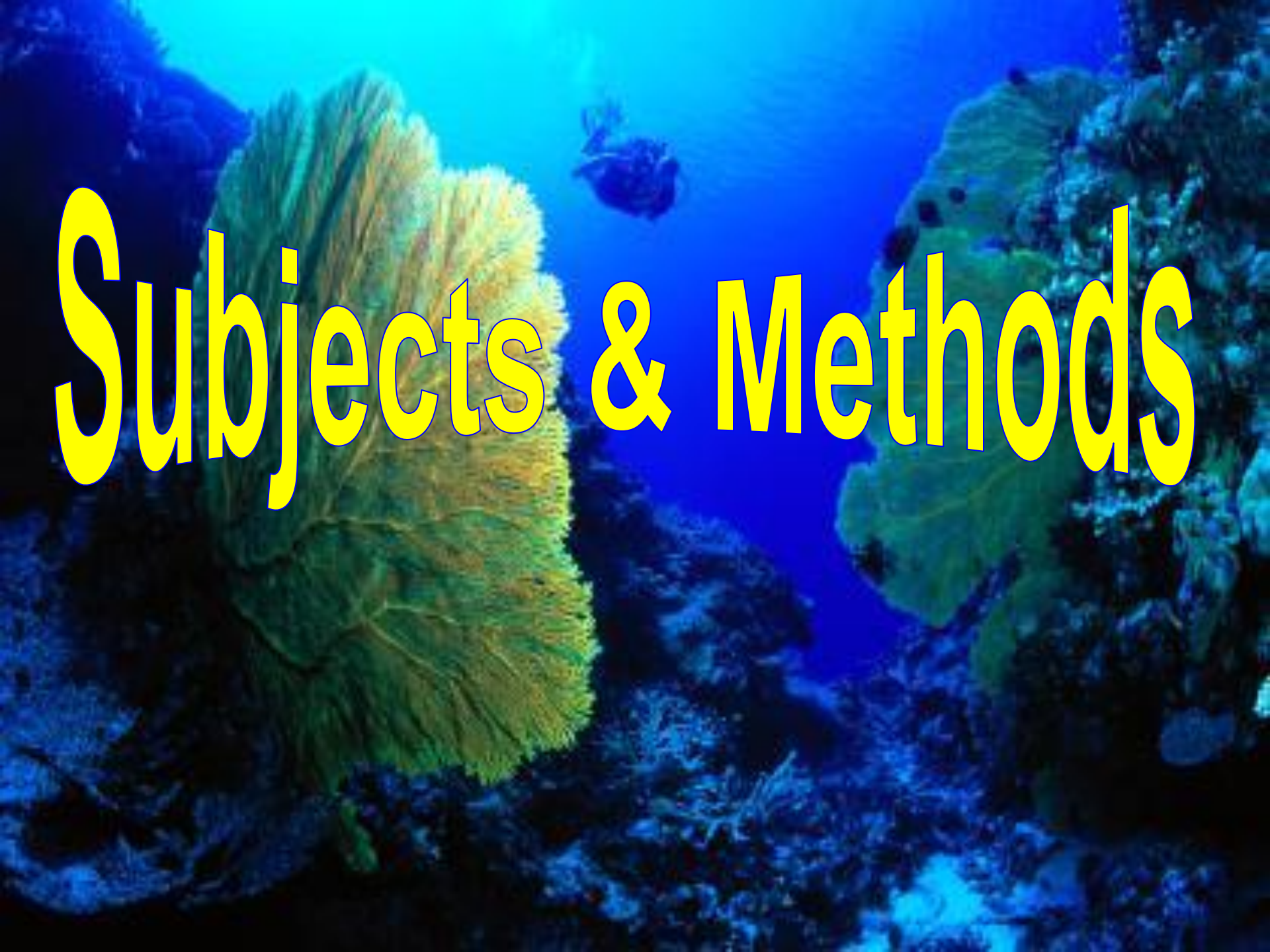
It was assumed that:

- 1- Each patient followed the instructions exactly as taught to them.
- 2- Each patient received his medication regularly as prescribed by the physician.
- 3- The calibration of the equipments used in this study was accurate.
- 4- The equipment used was the same for all patients.
- 5- All patients were the same environmental circumstances.

# **Null Hypothesis:**

There were no significant difference effects of magnetic field therapy on chronic obstructive pulmonary disease (COPD)?





# Subjects & Methods

# Subjects' Selection



**Forty COPD  
patients**

**Out-patients' chest Clinic at Air Force Hospital**

**G1**

**Study GA**

**G2**

**Control GB**





### ***a- Inclusive criteria:***

All the patients had the following criteria:

- The patients' age ranged from 35-55 years of age.
- Patients suffered from mild and moderate grade of (COPD) from five to seven years
- The patients were previously diagnosed as chronic obstructive pulmonary disease from not less than five years ago.
- All patients had adequate language and comprehension to follow instructions given.

## ***a- Exclusion criteria:***

- Alcohol drinkers.
- Cardiac Pace maker patient.
- Mentally retarded patient.
- cardiovascular pathology,
- Any other diseases of the nervous system or musculoskeletal system, which could potentially cause respiratory disorders.
- Tuberculosis.
- Uncontrolled high blood pressure or cardiovascular disorders.





# Instrumentation

## ***FOR ASSESSMENT:***

*All patients were subjected to complete clinical examination*

*To assess COPD patients :*

*(1) Weight and height scale.*



*(2) Computerized spirometer:*



# Instrumentation

*for Treatment:  
to treat COPD patients:*

*(1) ASA Magnetic Field  
Health - Waves Magneto  
therapy device*

*(2) Respiratory exercise.*





# Procedures:

## A) Evaluative Procedures:

### 1- Weight and height measuring procedures:

Subjects were medically, physically and mentally examined. Data were collected from each subject regarding name, age, weight, height, blood pressure, heart rate and chest complaint. Then, data were recorded.

- ***2-Ventilatory functions measurement:***
- ***Position:*** Measurements obtained preferably in the sitting position to give accurate results in assessment. Ventilatory functions measurement: computerized spirometer was used for each subject to record the initial FVC, FEV1.





**Fig. (7) The patient during preparation for measurement.  
Out-patients' Clinic at Air Force Hospital**

## **B- Procedures for Treatment:**

- the patients were assigned randomly into two groups equally in number.
- (1) The Study group: treated by traditional medical treatment prescribed by treating physician and traditional physical therapy in the form of respiratory exercise three times per week in addition to magnetic therapy.
- (2) The Control group: treated by traditional medical treatment and traditional physical therapy in form of respiratory exercise.



# Magnetic therapy



**Fig. (12) Position of patient during application of Health - Waves Magnetotherapy device.**

# Respiratory exercise:



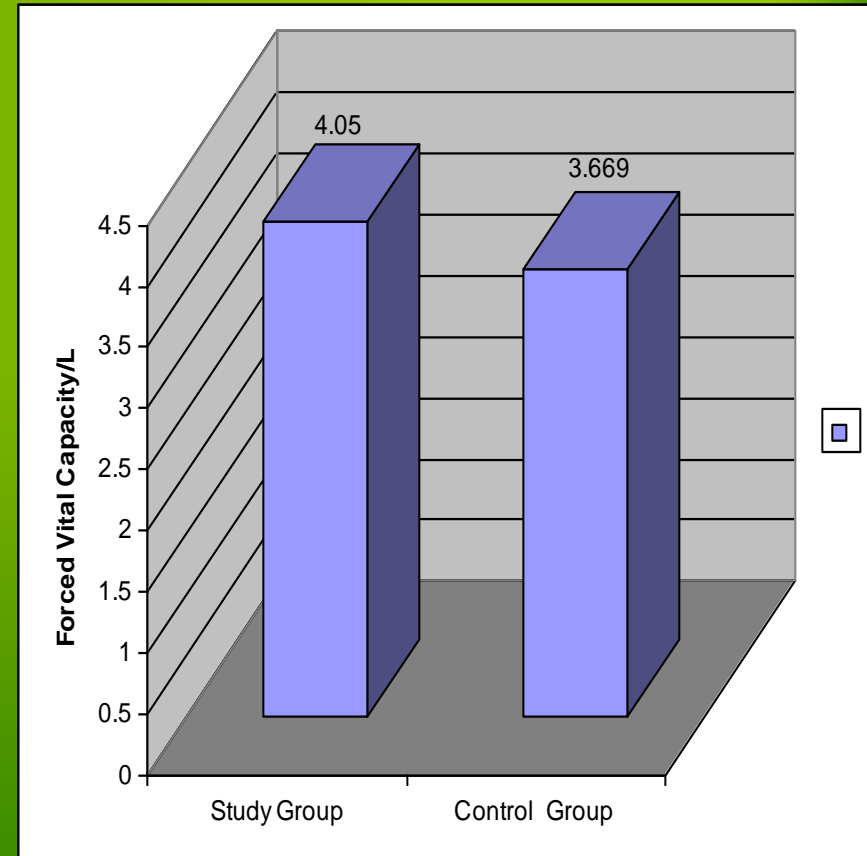
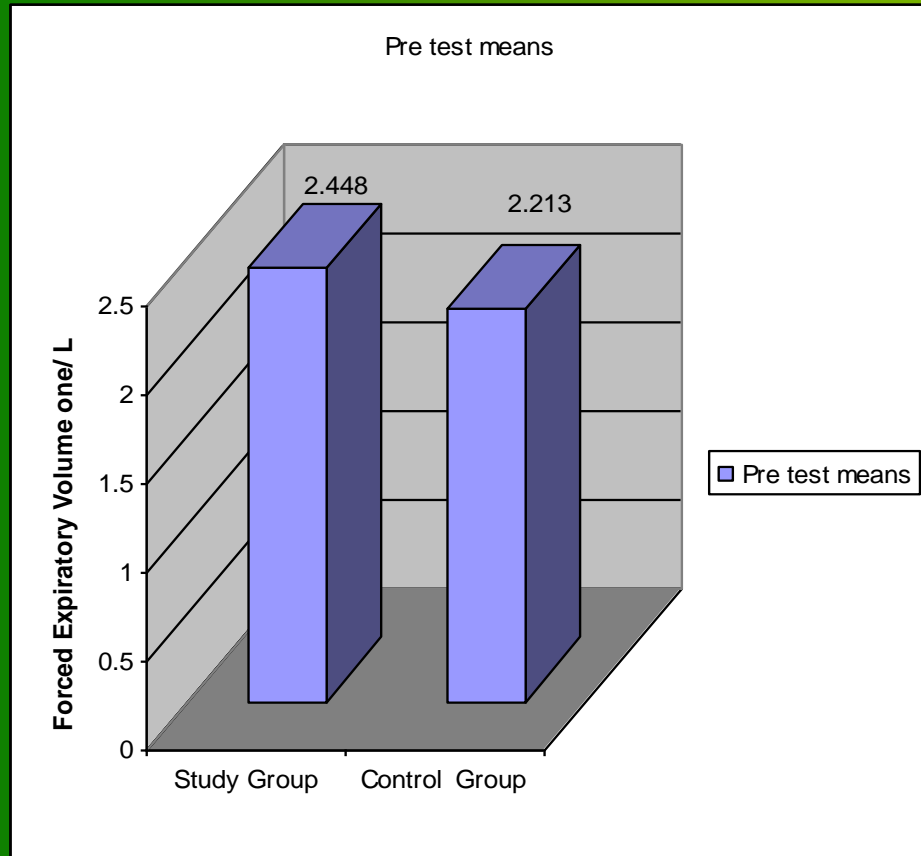
**Fig. (10-11) Shows intercostals and apical breathing exercise**



# Results



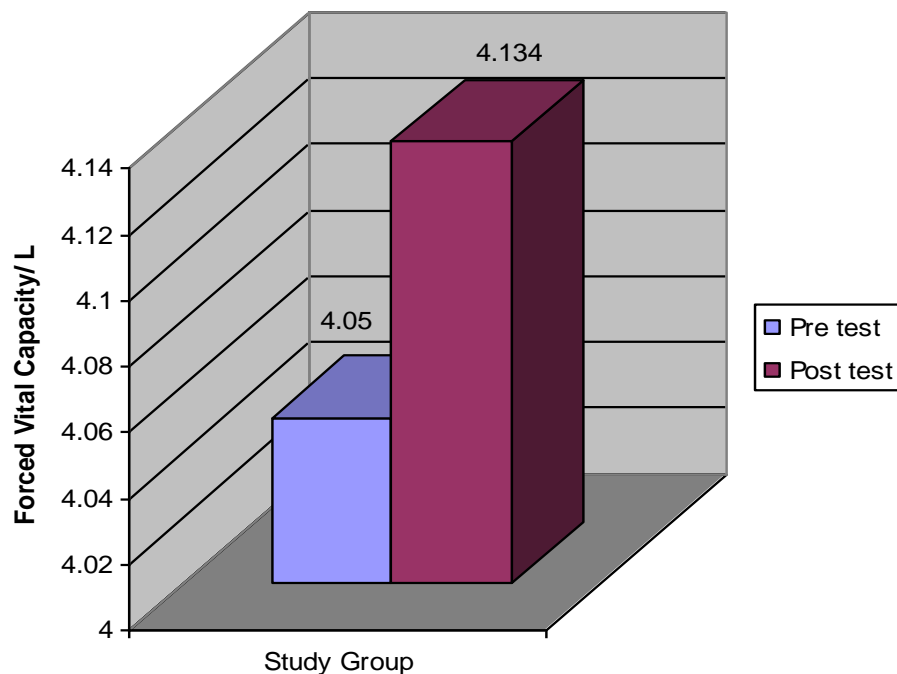
# Results computerized spirometry items



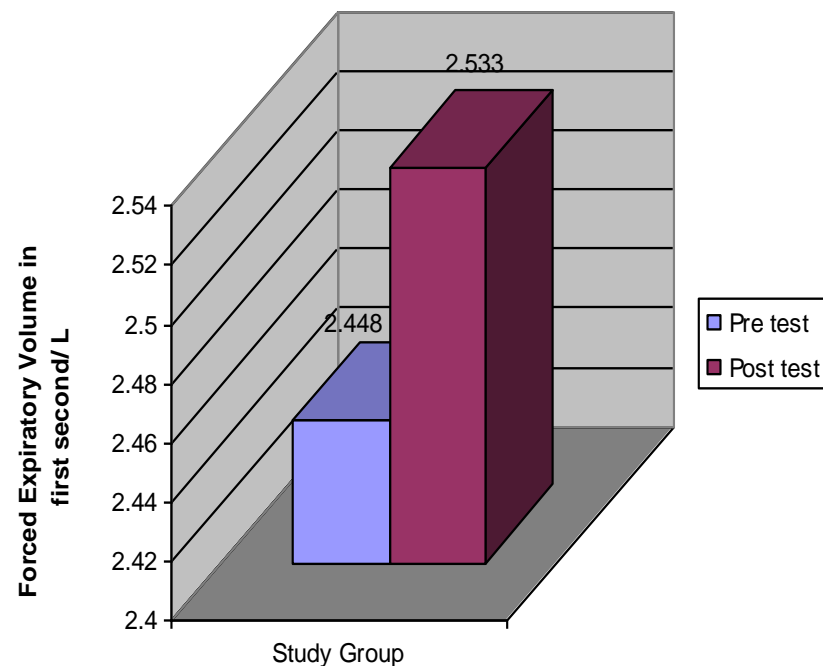
1-The mean values of computerized spirometry items pretest in both groups.



# Results

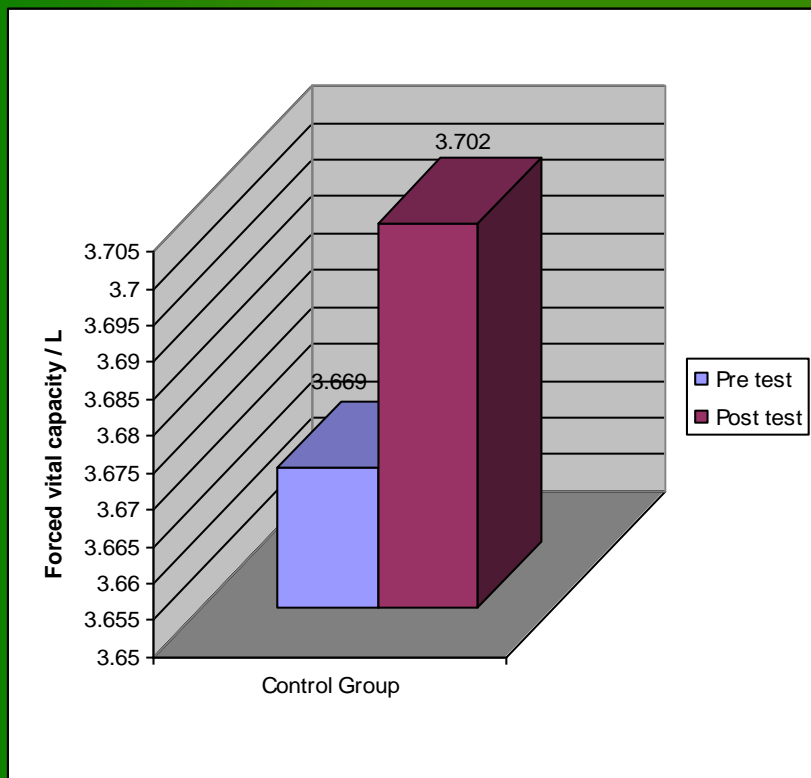


***Fig (20): The mean values of Forced vital capacity pre and post test in the study group.***

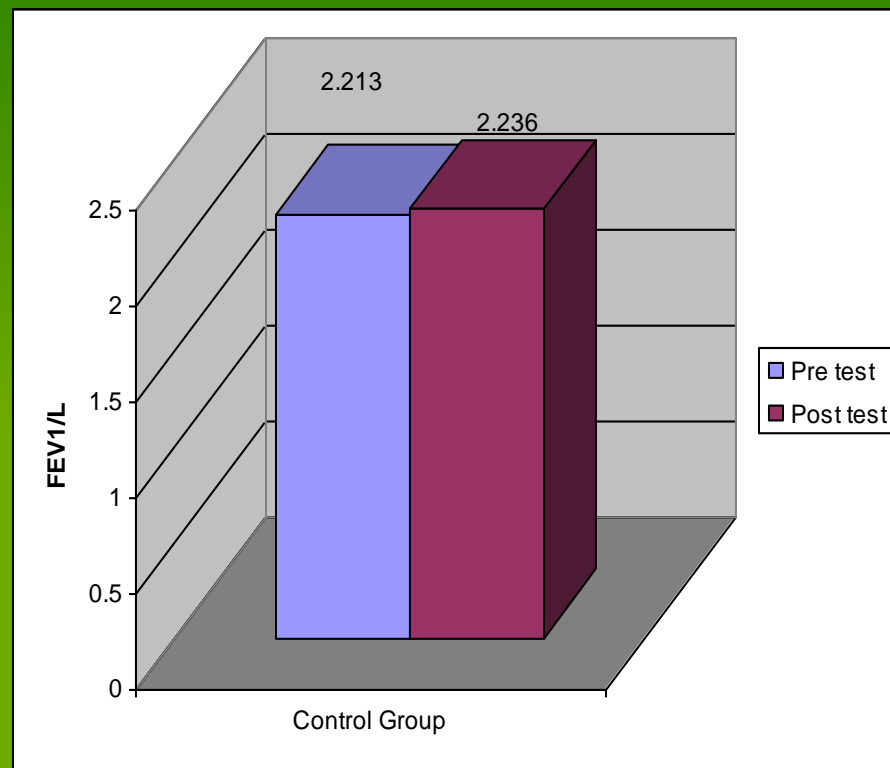


***Fig (21): The mean values of Forced expiratory volume in first second pre and post test in the study group.***

# Results



***Fig (22): The mean values of Forced vital capacity pre and post test in the control group.***



***Fig (23): The mean values of Forced expiratory volume in first second pre and post test in the control group.***





# Discussion

- In the current study Chronic obstructive pulmonary disease was objectively assessed by using computerized spirometry testing and recording the values of forced vital capacity and forced expiratory volume in first one second for each patient was used for initial and final evaluations.
- The main findings of the current study confirmed that magnetic field therapy had a positive effect on COPD.



The study group, which was treated by • magnetic field therapy in addition to the designed physical therapy respiratory exercise program showed greater improvement of forced vital capacity and forced expiratory volume in first one second. In control group the designed physical therapy respiratory exercise program for three months showed great improvement in forced vital capacity only.

- The improvement of ventilatory functions in COPD patients was well illustrated in the present study by operating computerized spirometry. Such new tool was capable to measure precisely the improvement of the patient's forced vital capacity and forced expiratory volume in first one second.



- A statistically significant difference between post/pre-treatment existed in both groups. However, the scope of improvement of ventilatory lung functions in all tested items; designating the domination of the newly elected way to treat lung tissue dysfunction in COPD patients by magnetic field therapy.



# Conclusions

- Pulsed Electromagnetic Field (PEMF) and traditional physical therapy in form of respiratory exercise have significant effect on treatment of FVC and FEV1 in chronic obstructive pulmonary disease patients. Comparison of each variable pre and post treatment in each group revealed a significant improvement in all different parameters in study group (GA)  $P \leq 0.05$  with a percentage of improvement of (0.02 L) for FVC and (0.035 L) for FEV1;

# Conclusions

- however the control group showed a significant improvement only in FVC with a percentage of improvement of (0.008 L). Comparison of post treatment results of both groups showed that pulsed electromagnetic field used in study group GA showed significant increase in FEV1 than group B.

## ***Recommendations***

The following Suggested Recommendations are for further researchers:

- A study may include a larger number of patients to provide wide representation of the data and longer duration with measurement of the changes in ventilatory and lung functions.
- A study may include comparison between plasma levels of oxygen in both groups (study group and control group) to see the effect of PEMF and respiratory exercises on plasma levels of oxygen in COPD patients.



## *Recommendations*

- A similar study should be conducted with different parameters of PEMF as there is a lack in the literature regarding the appropriate or the best parameters.
- A study of new modalities of physical therapy to solve ventilatory dysfunction in COPD patients.
  - Studies are needed to confirm the efficacy and the reliability of the computerized spirometry system in the evaluation of lung volumes dysfunction in COPD patients



A close-up photograph of a red rose, showing the intricate layers of its petals. The petals are a deep, rich red and are covered with numerous small, clear water droplets that catch the light, giving the flower a fresh and dewy appearance. The background is dark, making the red of the rose stand out prominently.

Thank you