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## ORIGINAL ARTICLE

# Assessment of thyroid functions in patients with chronic obstructive pulmonary disease

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### KEYWORDS

COPD;  
Thyroid hormones;  
Pulmonary function tests;  
Arterial blood gases

**Abstract** *Background:* Chronic obstructive pulmonary disease (COPD) is no longer considered to affect only the lungs and airways but also the rest of the body. The systemic manifestations of COPD include a number of endocrine disorders, such as those involving the pituitary, the thyroid, the gonads, the adrenals and the pancreas. The severity of airway obstruction in chronic obstructive pulmonary diseases (COPD) is associated with the impairment of thyroid gland function.

*Aim of work:* This study was carried out to evaluate thyroid abnormalities in patients with COPD and relationship between pulmonary function tests, arterial blood gases and thyroid functions.

*Patients and methods:* Serum free triiodothyronine (ft3), free thyroxin (ft4), and thyroid stimulating hormone(TSH) were measured in 50 patients with COPD and 50 healthy volunteers (control group) and its relation to some ventilatory function tests (FEV1/FVC, FEV1, FVC%, and FEF25-75) and ABG parameters (PH, Paco2, Pao2, Hco3 and O2 saturation) were studied.

*Results:* There was no significant difference in mean levels of TSH, FT3 and FT4 between COPD and control group. The mean values of free T3, free T4, and TSH were within normal limits in both groups however, free T3 values in the case group were toward upper normal limits and the mean values of free T3 were increased in the case group compared to their values in the control group. The mean values of free T3 of the cases were significantly increasing with increased severity

*Abbreviations:* T3, triiodothyronine; T4, thyroxin; TSH, thyroid-stimulating hormone; ft3, free triiodothyronine; ft4, free thyroxin; TT3, total triiodothyronine; TT4, total thyroxin

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of COPD. Significant negative correlations were present between free T3 levels and pulmonary function tests of the cases. Significant negative correlations were present between free T3 levels and both PaO<sub>2</sub> and SO<sub>2</sub> of the cases and also show a significant positive correlation between free T3 levels and PaCO<sub>2</sub> of the cases.

**Conclusion:** Thyroid function tests among COPD patients showed a significant increase of the mean free T3 values and a non significant decrease of the mean free T4 and TSH values compared to the control group. With increasing severity of COPD, the mean free T3 values showed a significant increase. Significant negative correlations were noticed between free T3 levels and both PaO<sub>2</sub> and SO<sub>2</sub> of the cases. A significant positive correlation was observed between free T3 levels and PaCO<sub>2</sub> of the cases. Significant negative correlations were observed between free T3 levels and pulmonary function tests of the cases.

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## Introduction

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease with significant extra-pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung due to exposure to noxious particles or gases. COPD affects the lungs and produces systemic consequence [1]. Abnormalities in thyroid hormone regulation are encountered frequently in nonthyroidal diseases; these include normal or decreased total and free thyroxine (TT4 and FT4 respectively), decreased total (TT3) and free (FT3) triiodothyronine along with usually normal thyroid-stimulating hormone (TSH) levels [1]. These changes have been observed primarily in critical illness, such as starvation, sepsis, surgery, or myocardial infarction, but also in diverse chronic, systemic conditions, i.e., in chronic heart failure, chronic liver or hematological diseases, cancer, diabetes, and in connective tissue disorders [2]. Chronic obstructive pulmonary disease (COPD) is a major cause of chronic morbidity and mortality throughout the world, leading to years of suffering and premature death from it or its complications [3]. The severity of airway obstruction in COPD is associated with the impairment of thyroid gland function [4]. There is an apparent clinical resemblance between a hyperthyroid state and advanced COPD. Early detection of thyroid disturbances may therefore be clinically important in COPD [5]. In the present study, we evaluated thyroid abnormalities in patients with COPD and relationship between pulmonary function tests, arterial blood gases and thyroid functions.

**Aim of the Work:** This study was carried out to evaluate thyroid abnormalities in patients with COPD and relationship between pulmonary function tests, arterial blood gases and thyroid functions.

## Subjects and methods

This study was conducted on 50 patients with COPD and 50 healthy volunteers (control group). They were selected from the Department of Chest diseases, Al-Hussein University Hospital, Al-Azhar University over a period of one year from June 2011 to June 2012.

## Study design

### Case control study

- **Subjects**  
Fifty patients diagnosed as COPD according to (GOLD); 47 males and 3 females with an age range of 48 to 75 years (mean  $61.8 \pm 7.5$  years).  
A control group of 50 healthy smokers' subjects with age and sex match was included; 45 males and 5 females with age ranging from 47 to 72 years (mean  $59.4 \pm 6.8$  years).
- **Inclusion criteria**  
Patients diagnosed as COPD according to Global Initiative for chronic obstructive lung disease criteria (GOLD).
- **Exclusion criteria**  
Patients with known chronic chest diseases other than COPD.  
Patients with known hypothyroidism, hyperthyroidism, or previous thyroid surgery.  
Patients with other diseases or illnesses that might affect thyroid functions e.g., endocrinal, metabolic, autoimmune disorders, etc.  
Patients on any regular medication, other than the COPD drugs, that might affect thyroid functions, such as iodine-containing drugs, amiodarone and immunosuppressive drugs.

All patients were subjected to the followings:

- Full history taking and clinical examination.
- Plain chest X-ray postero-anterior view.
- Complete blood picture, liver and kidney functions.
- Pulmonary function (Spirometry): In pulmonary function unit in the Chest Department, Al-Hussein University Hospital. Reversibility test was done to differentiate between COPD and bronchial asthma, pre and 15 min post bronchodilator (400 micrograms salbutamol by meter dose inhaler) FEV<sub>1</sub> done. All COPD patients had post bronchodilator response less than 12% of absolute FEV<sub>1</sub>.
- The severity of COPD was rated according to *GOLD, 2010 and depends on post bronchodilator FEV<sub>1</sub>* [1].
- Arterial blood gas analysis (ABG): it was done in all cases.

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