

A Prospective Assessment Study of Thyroid Dysfunction in Moderate to Severe COPD

Dr Vijayaragavan ¹, Dr.A.Prabhu Md ²

¹Junior Resident, General Medicine, Government Rajaji Hospital and Madurai Medical College, Madurai
²Assistant Professor, (corresponding author) Department of General Medicine, Government Rajaji Hospital and Madurai Medical College, Madurai.

Corresponding author: Dr.A.Prabhu Md

Date of Submission: 01-05-2019

Date of acceptance: 15-05-2019

I. Background

Chronic Obstructive Pulmonary Airway Disease is a Preventable & Treatable Disease which is characterised by irreversible airflow limitation of progressive in nature occurring due to chronic inflammatory response affecting the lung parenchyma & airways to noxious stimulants & various toxic pollutants in the atmosphere. The Global Burden of Disease Society States that COPD will become the leading cause of death by 2020. COPD is a chronic systemic disease affecting the vital organ systems in the body, since it is not confined to affect only the respiratory system. COPD often leads to Anaemia, Osteoporosis, Ischemic Heart Disease, Muscle Wasting, Depression & various other systemic ailments.

COPD being a systemic illness affects many vital organ systems in the body. Endocrinological disorders in the form of hypothyroidism is quite common among COPD individuals than compared to the general population.

Hypothyroid in COPD leads to decreased respiratory drive, Acute on chronic alveolar hypoventilation, Decreased lung volumes, Depression of respiratory centres to its stimulants, Upper airway obstruction, Respiratory Failure & frequent exacerbations. Hypothyroidism causes inspiratory & expiratory muscle weakness due to impaired expression of myosin heavy chains IIB & decreased neuromuscular transmission. Diaphragmatic dysfunction & myopathy can occur. Severity of hypothyroidism linearly correlates with muscle weakness & myopathy. All these factors results in frequent exacerbations of COPD which has significant role in affecting the quality of life in COPD individuals. Hence, determining the functional state of Thyroid gland is of remarkable importance in treatment of COPD

Although research studies has been conducted in India, the literatures pertaining to the thyroid function abnormality in COPD individuals is not quite abundant in Indian literatures. Hence this study was conducted to assess the relationship between COPD severity with thyroid function abnormality in COPD patients admitted or attending in medical OPD of Government Rajaji Hospital, Madurai.

II. Aims & Objectives

The present study was conducted to assess the prevalence of thyroid dysfunction in moderate and severe COPD. To measure the relationship between COPD severity with the thyroid function abnormality.

III. Methods

100 COPD patients were made to undergo pulmonary function test by Using spirometer. Patients belonging to moderate & severe COPD was included as subjects in the study population. Then their blood samples were analysed for thyroid function tests to determine the thyroid dysfunction in moderate & severe COPD.

STUDY DESIGN:

A Prospective Assessment Study of Thyroid Dysfunction in Moderate to Severe COPD

STUDY POPULATION:

One hundred patients diagnosed previously as COPD, belonging to either sex attending / admitted in Thoracic Medicine & General Medicine OPD / Wards at Govt Rajaji Hospital, Madurai was included as study population.

DURATION OF STUDY:

3 Months September 2016 - November 2016

INCLUSION CRITERIA:

One Hundred patients diagnosed as COPD as per GOLD (GLOBAL INITIATIVE FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE) were included in the study population

EXCLUSION CRITERIA:

Known Hypothyroid & Hyperthyroid Patients
 Patients Underwent Thyroid Surgery
 Patients On Medications That Interfere With TFT - Amiodarone, Iodine Preparations, Immunosuppressive Drugs
 Patients Has Chronic Obstructive Disease Other Than COPD Bronchiectasis, Cystic Fibrosis.

IV. Method of Collecting Data

COPD patients of varying age and sex were selected carefully using GOLD criteria. Their written consent was taken. The history was elicited. Age, height, weight were recorded. Thorough clinical examination were carried out. The subjects were made to undergo pulmonary function tests using Medspiror, for 3 times at every 15 minutes interval and best of 3 readings was taken. The Forced Vital Capacity (FVC), Forced Expiratory Volume at the end of one second (FEV1), FEV1/ FVC ratio were recorded. Patient belonging to Moderate & Severe COPD stages as per GOLD guidelines were included for the study. Then they were subjected for thyroid function test.

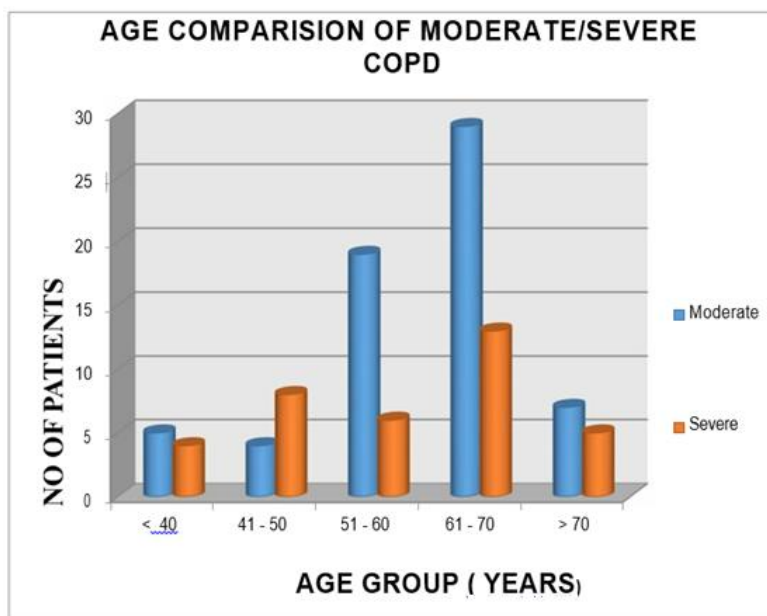
CONSENT:

Patients were informed about the details of the test performed and blood samples were collected with the consent.

V. Results

In Our Study, Majority Of Patients (42/100) Were Within 60-70 Yrs Of Age. Majority Of Study Population Were Males (82/100)

In Study Population, 64 Patients Comes Under Moderate COPD Severity
 34 Patients Comes Under Severe COPD Severity

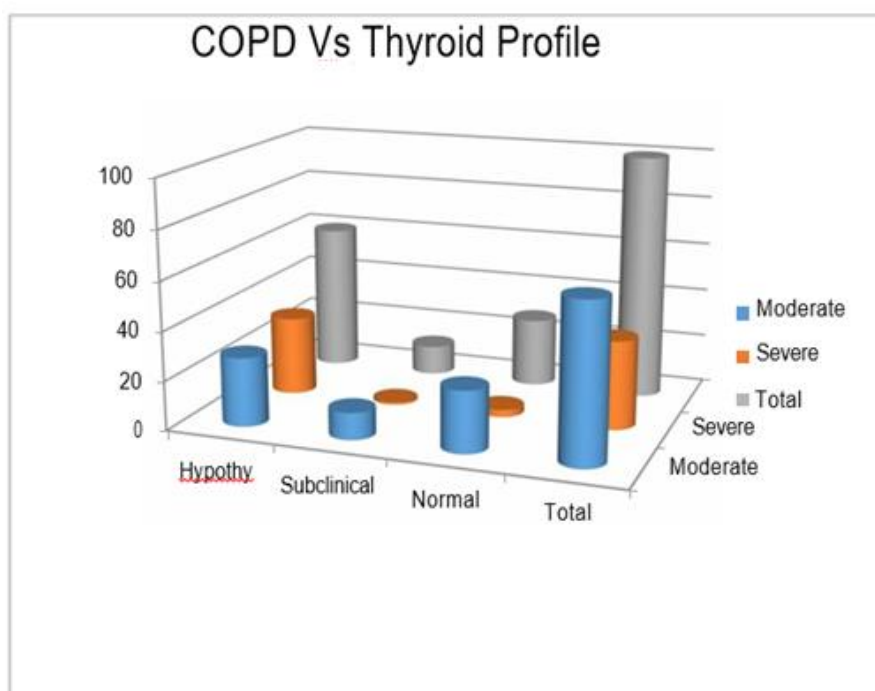


Mean Values Of FEV1/FVC Ratio In Moderate & Severe COPD are shown

COPD	Mean	SD
Moderate	61.59	5.98
Severe	51.28	7.15

Table showing Biochemical Profile Of Thyroid Disorder In Moderate & Severe COPD

COPD	Overt Hypo	Subclinical	Normal	Total
Moderate	28	11	25	64
Severe	32	1	3	36
Total	60	12	28	100



Our study results showed the prevalence of thyroid dysfunction in the form of hypothyroidism was observed in 67 out of 100 COPD study subjects. Mean value of TSH is of significantly elevated in our study subjects (moderate & severe COPD) with its p value being significant (<0.001). There was a significant negative correlation between COPD severity predicting parameter FEV1 with TSH values. Mean values of Free T4 & Free T3 was of significantly reduced as the FEV1 drops down in study subjects of moderate & severe COPD. P values of Free T3 & Free T4 in our study is also of significant (<0.001).

In Study Population,

- Mean Value Of TSH In Moderate COPD 9.27 ± 2.35 μ Iu/ml
 - Mean Value Of TSH In Severe COPD 14.29 ± 1.31 μ Iu/ml
 - Mean Value Of Free T4 In Moderate COPD -0.64 ± 0.36 ng/dl
 - Mean Value Of Free T4 In Severe COPD -0.36 ± 0.13 ng/dl
 - Mean Value Of Free T3 Among Moderate COPD 2.912 ± 0.667 pg/ml
 - Mean Value Of Free T3 Among Severe COPD 2.161 ± 0.768 pg/ml
- Several other parameters showed significant relation with COPD severity predicting parameter FEV1.
- Correlation Coefficient between FEV1 & TSH : Good Negative Correlation with statistical value : -0.72 (Good Negative Correlation)
 - Correlation Coefficient between FEV1 & Free T4 : Good Correlation with statistical value : 0.649 (Good Positive Correlation)
 - Correlation Coefficient between FEV1 & Free T3 :Moderate Correlation with statistical value: 0.474 (Moderate Positive Correlation)

Mechanics such as Hypoxia, Hypercarbia, Systemic Inflammatory Mediators & Iatrogenic steroids results in hypofunctioning state of thyroid gland in COPD.

Parameters	Moderate Mean	Moderate S.D	Severe Mean	Severe SD	P Value
pH(7.35- 7.45)	7.369	0.04	7.319	0.057	<0.001 sig
SaO2(95- 98%)	93.37	2.49	88.86	3.86	<0.001 sig
PCo2(35-45mmhg)	44.7	4.49	51.5	6.19	<0.001 sig
PO2(85-105mmhg)	89.35	5.4	80.09	9.53	<0.001 sig
HCO3(22-30 mEq/l)	24.52	2.12	21.30	2.98	<0.001 sig

In our study as the severity of COPD progress thyroidal biochemical of Overt & Subclinical hypothyroidism was observed. Thus from the study, we came to know that as the COPD individuals progress in the airflow limitation from mild to moderate & then to severe COPD stages , they encounter Hypothyroidism biochemical features of elevated TSH with Lower Values of FT3 & FT4 which remarkably affects the quality of life of COPD individuals

LIMITATIONS OF THE STUDY

- It is a single center study so results are needed to be evaluated further.
- We could not equalize the COPD severity as moderate COPD subjects were higher than the Severe COPD subjects
- Radionucleotide Scan Of Thyroid Gland often reveals the thyroid functionality quite accurate which was not included in the study

VI. Conclusion

COPD patients in their due course of the illness develop multiple systemic complications. Hypothyroidism is one among such systemic complications of COPD. As there is progressive airflow limitation, the severity of COPD progress which results in varied thyroid function abnormality particularly Hypothyroidism. Hypothyroidism has remarkable effects on the respiratory dynamics & mechanics of ventilation which culminating in frequent exacerbations & respiratory failure. Thyroid dysfunction in COPD has important effects in affecting the quality of life & hospitalization in COPD individuals. Hence COPD patients should be regularly monitored for abnormal thyroid function & managed accordingly to improve their quality of life.

Bibliography

- [1]. Lalit Singh, Abhishek Jain, Anurag Agrawal, Rajeev Tandon, Hemant Kumar. A study of prevalence of thyroid disorders in chronic obstructive pulmonary disease patients at a tertiary care center in U.P. International Journal of Contemporary Medical Research 2016;3(5):1239-1242
- [2]. Sevinc Sarinc Ulasli, Serife Sava Bozbas, Zeynep Erayman Ozen, Berna Akinci Ozyurek et al. Effect of thyroid function on COPD exacerbation frequency: a pre- liminary study. Multidisciplinary Respiratory Medicine 2013;8:64.
- [3]. Gupta Madhuri, Vardey SK, Joshi Nalin, Dixit R. Evaluation of thyroid dysfunction in chronic obstructive pulmonary disease. Biomedical Research 2013;24:110- 113.
- [4]. GOLD report 2015 Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. [Internet]. 2015 [cited 2015 Jun 13]. Available from: <http://www.GOLDCopd.org>.
- [5]. Roberto R, Antonio A, Jean B et al. Pocket Guide to COPD diagnosis, management and prevention: Global Initiative for Chronic Obstructive Lung Disease (GOLD) updated 2010.
- [6]. Antonio Mancini, Sebastiano Raimondo, Chantal Di Segni, Mariasara Persano and Alfredo Pontecorvi Dept of Internal Medicine, Division of Endocrinology, Catholic University School of Medicine, Rome, Italy
- [7]. Gulfidan Aras, Dilek Kanmaz, Sevim Purisa, Figen Kadakal et al. Are thyroid functions changing in patients with exacerbated COPD? Thyroid functions in exacerbated COPD. JAREM 2014;1:18-24.
- [8]. UK Guidelines for the Use of Thyroid Function Tests. British Thyroid Foundation; [Internet]. 2006 [cited 2014 Jun 13]. Available from: www.british-thyroid-as- sociation.org
- [9]. Pechatnikov LM: Significance of hypothyroid disorders in chronic obstructive bronchitis. Klin Med(Mosk) 1989;67: 40-43.
- [10]. Uzuml K , Atalay H , Inal A .Thyroid hormone levels inpatients with acute exacerbation of chronic obstructivepulmonary disease.Eur J Gen Med 2007; 4(2): 80- 82.

Dr.A.Prabhu Md," A Prospective Assessment Study of Thyroid Dysfunction in Moderate to Severe COPD." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 5, 2019, pp 33-36.