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Research Article

Evaluation of Pulmonary Functions in Patients with Hypothyroidism Who Are on Conservative Management

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Abstract: Hypothyroidism is a state in which the thyroid gland does not produce enoughamountsof the thyroid hormonessuch as thyroxine (T4) and triiodothyronine (T3).Iodine deficiency is often cited as the most common cause of hypothyroidism worldwide but it can be caused by many other factors. It can result the lack of activity of thyroid gland or from iodine-131 treatment, and can also be associated with increased stress. Aim of the Study was to Determine the Pulmonary Function Test parameters and Efficiency of lung Performances among the hypothyroidism Subjects. A total number of 40 patients with clinical hypothyroidism (n=20) group I and (n=20) group II healthy subjects without pre and past history of hypothyroidism served as a control group. Pulmonary functions test were evaluated byusing simplespirometer. Pulmonary Function Test parameters such as FVC, FVC%, FEV1, FEV1%, FEV1/FVC, FEF25-75, FEF25-75%, were assessed. Biochemical parameters such as free triiodothyronine (FT3), free thyroxin (FT4) and thyroid stimulating hormone (TSH) levels were measured in all subjects to know the hypothyroidism state among the subjects of both the groups. From our study we concluded that the pulmonary function test parameters showed a lesser value in hypothyroidism group I when compared to normal subjects group II. Spirometer evaluation of the respiratory function revealed significantly lower values for FVC (L) $P<0.05$, FVC (%); $P<0.05$, FEV1 (L) $P<0.05$ and FEV1 (%) $P<0.05$. Hypothyroidism affects the respiratory system, which in turn reduces the efficiency of respiratory system. Regular monitoring of pulmonary function test among the subjects may rule out the possible outcomes among the hypothyroidism subjects who are on regular therapy.
Keywords: Hypothyroidism, Spirometer, Muscle Strength, lung performances..

INTRODUCTION

Hypothyroidism is a state in which the thyroid gland does not produces enough of thyroid hormones such as triiodothyronine (T3) and thyroxine (T4). The prevalence of hypothyroidism was found to be more common in both the genders. Iodine deficiency is the most common cause of hypothyroidism, other than that hashimotos thyroiditis deficiency in stimulating hormones from the hypothalamus or pituitary [1]. Some drugs such as amilodranaone, interferon alpha, interleukin, rifampicin causes the hypothyroidism in prolonged usage. Temporary cause of hypothyroidism can be due to wolff-chikoff effect high intake of iodine sometimes inhibits the thyroid hormone release from the gland. The characteristic features of hypothyroidism according to WHO, The patients will have normal or decreased (T4).Normal (T3) and decreased thyroid stimulating hormone level (TSH). From the past studies it was found to be clear that thyroid hormone affects the performances of respiratory system function by obstructing the airway resistance [2].

MATERIALS AND METHODS

The study was conducted in 2010 from the month of September to January in medicine OPD of Sri Ramachandra University Chennai. Patients with known case of hypothyroidism were taken as subjects for the study. Subjects with no present or past history of hypothyroidism severed as controls. The laboratory values are analysed among hypothyroidism patients who are on regular check-up and medications with age matched controls.

Inclusion Criteria

No present or past history of smoking, Non-diabetic, Non-hypertensive, Non- alcoholic, Non obese, goitre, pregnancy, was included in the study. The criteria were applied for both subjects and control group. Institutional ethical committee approval was obtained. Informed, written consent were obtained from the participants.

The mode and purpose of the study were explained. The biochemical parameters such as TSH, FT3 and FT4 were collected in fasting state from the anticubetial vein using sterile technique.FT3 and FT4 were determined by competitive enzyme immunoassay method. TSH level was analysed using chemiluminescent immunometric assay method. The pulmonary function test parameters were measured by Med Spiro Pulmo lab III. The respiratory parameters including FVC, FVC % FVE1% FEV1/FVC, FEF 25-75 were completely assessed. The procedure was explained and demonstrated before the recording of parameters by proper instructor. Common human errors are corrected.

RESULTS

Table 1: Shows the Biochemical Variations in thyroid profile among the Hypothyroidism Patients with Controls

Parameters	In hypothyroidism(n=20)	In Controls (n=20)
TSH	74.13±37.83ng/ml.	1.82 ±3.06 ng/ml.
FT3	1.74±0.8ng/ml.	4.23 ±0.18. ng/ml
FT4	0.65±0.13ng/ml.	1.46 ±0.82 ng/ml.

Biochemical analysis of thyroid profile among both the groups (patients with hypothyroidism and controls).Normal TSH was 0.34-5.6 UIU/ML, FT3 was 2.5-3.9 UIU/ML and for FT4 was 0.58-1.64 UIU/ML. From our study the values of thyroid profile among both the groups were FT3 was around 1.74±0.8ng/ml in hypothyroidism patients, when compared with control group the FT3 was around 4.23 ±0.18. ng/ml.FT4 was around 0.65±0.13ng/ml in hypothyroidism patients, when compared with control the FT4 was around 1.46 ±0.82 ng/ml.TSH was around 74.13±37.83ng/ml in hypothyroidism patients, when compared with control the TSH was around 1.82 ±3.06 ng/ml.

Table 2: Shows the pulmonary function test Variations among the Hypothyroidism Patients with Controls

Pulmonary function tests parameters	In Hypothyroidism	In controls	P Value
FVC (L)	3.2±0.12	4.22±0.23	0.032*
FVC %	74.8±16.72	87.3±9.81	0.034**
FEV1 (L)	3.2±0.14	4.22±0.333	0.028
FEV1 (%)	89.0±14.37	97.88±13.4	0.034**
FEV1 / FVC(L)	110.42±8.36	118.14±12.34	0.062***
FEF 25-75%	84±32.42	103.5±13.0	0.081**

P value <0.05 *considered as statically significant

Pulmonary function parameters variations among (patients with hypothyroidism and controls).FVC (L) in hypothyroidism patients was 3.2±0.12 L when compared with control group the FVC was around 4.22±0.23 L the FVC was found to be increased when compared with the controls of P value 0.032.FVC % in hypothyroidism patients was 74.8±16.72 L when compared with control group the FVC% was around 87.3±9.81 L the FVC% was found to be increased when compared with the controls. P value 0.034.FEV1 (L) in hypothyroidism patients was 3.2±0.14 L when compared with control group theFEV1 (L) was around 4.22±0.333 L the FEV1 (L) was found to be increased when compared with the controls. P value 0.028.FEV1 (%) in hypothyroidism patients was 89.0±14.37 L when compared with control the FEV1 (%) was around 97.88±13.4 L the FEV1 (%) was found to be increased when compared with the controls. P value 0.034.FEV1 / FVC in hypothyroidism patients was 110.42±8.36 L when compared with control the FEV1 / FVC was around 118.14±12.34 L the FEV1 / FVC was found to be increased when compared with the controls P value 0.062.FEF 25-75% in hypothyroidism patients was 84±32.42 when compared with control the FEF 25-75%was around 103.5±13.0 the FEF 25-75% was found to be increased when compared with the controls P value 0.081.

DISCUSSION

Hypothyroidism is strongly associated with major respiratory problems such as sleep apnoea, hypercapina, reduced inspiratory muscle strength, and minimal atrophy of diaphragm .Frequent depression in hypoxic

ventilatory responses has been observed in hypothyroidism patients.

Ciftci F *et al.* in 2001 conducted a study on Measurement of ventilatory responsiveness in hypothyroidism there study showed that proportion of type 1 fibres of the diaphragm and intercostal muscles decreased four weeks after total thyroidectomy. The degree of muscle weakness is usually mild to moderate level depending upon the period of treatment among Hypothyroidism patients [3].

Col NF *et al.* from their study they revealed that obese hypothyroid patients have severe reduction in vital capacity and lung volumes when compared to normal BMI subjects. After the conservative management therapy with thyroxine therapy among obese subjects. It was clear that hypothyroidism along with obesity reduces the lung performances [4].

Beyer IW *et al.* in1998 conducted a study on muscle dysfunction in subclinical hypothyroidism showed that the central nervous system responses, respiratory and cardiovascular performances .Their study proved that there was decrease in both expiratory and inspiratory muscle strength among hypothyroidism subjects. Limitations in thorax movements, reduction in muscle tone, reduces the respiratory force affects the lung volumes without disturbing FEV1/FVC ratio there by showing the restrictive pattern in pulmonary function test **[5].**

Rajagopal KR *et al.* in 1984 conducted a study on obstructive sleep apnoea in Hypothyroidism they proved that hypothyroidism patients have easy state of fatigue, shortness of breath with minimal exercise, swelling of tongue, hoarse of voice, and sleep apnoea were observed commonly in subclinical hypothyroidism and in chronic hypothyroidism [6]. Siafakas NM, et al conducted a study in 1992 on respiratory muscle strength in hypothyroidism there results proved that there was an decreased level of FVC, FVC%, FEV1, FEV1%, FEV1/FVC,were observed. This result of the study supports our study by showing the decreased pulmonary function parameters among hypothyroidism subjects [7].

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CONCLUSION

From our study we concluded that hypothyroidism reduces the pulmonary functions by decreasing the respiratory muscle performances by increasing the airway obstruction.

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