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Study of Pulmonary Function Test in Subclinical Hypothyroidism in West Bengal

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Abstract
Subclinical Hypothyroidism refers to biochemical evidence of Thyroid hormone deficiency in patients who have few or no apparent clinical features of Hypothyroidism. In practical field, if the patients serum fT_4 is within normal limit but serum TSH is elevated then it is considered as Subclinical Hypothyroidism. So Subclinical Hypothyroidism resides in the same spectrum of clinical hypothyroidism In Hypothyroidism there is decreased muscle strength and this may affect Pulmonary functions accordingly.
Objective: *To assess Pulmonary Functions in Subclinical Hypothyroidism cases to find out whether there is any significant impairment of lung functions.*
Materials and Methods: *The study was done in one of the Peripheral Medical Colleges of West Bengal. 100 subjects (50cases and 50 controls) were selected according to age BMI, Inclusion and exclusion criteria. Serum TSH and serum fT_4 were measured and spirometric measurement of lung functions were done.*
Statistical analysis was done by SPSS-17 and P value < 0.001 was considered as statistically significant.
Result: *All the spirometric parameters were significantly decreased in subclinical hypothyroidism as compared with the normal control group.*
Keywords: *subclinical hypothyroidism, serum TSH, serum fT_4, spirometric measurement of lung function.*

Introduction

Subclinical Hypothyroidism refers to biochemical evidence of Thyroid hormone deficiency in patients who have few or no apparent clinical features of Hypothyroidism[(1)]. It is a common phenomenon seen more often in female with increasing age and the prevalence is 6 -8 % in female and 3% in male[(2)]. The prevalence of subclinical hypothyroidism in US is 4.8 -5 %[(3)] while different prevalent rates from Indian Studies have been reported as 11.3 % with 1: 3.7 male : female[(4)], 8.02 %[(5)], 4.3 -9 % with male- female ratio 2.8 and 7.5 respectively[(2)]. The annual risk of progression from Subclinical Hypothyroidism to overt disease is 2 -5%[(6)].

In Subclinical Hypothyroidism, patients may suffer from somnolence, weakness and fatigue[(2)]. In practical field, the clinical and Subclinical Hypothyroidism are defined on laboratory values. If the patient's serum fT_4 is within the normal limit but serum TSH level is elevated, then it is regarded as Subclinical Hypothyroidism [(7)]. So

Subclinical Hypothyroidism resides in the same spectrum of clinical hypothyroidism.

It has been reported in many studies that patients with Subclinical Hypothyroidism have increased frequency of hyperlipidemia, diabetes, hypertension and increased cardiovascular risk compared with the euthythoid population[8,9]. Pulmonary functions may get affected like other systems of the body but respiratory manifestations are generally not major complaint[10]. Muscle strength may also be affected in Subclinical Hypothyroidism. Decreased muscle strength affects pulmonary functions accordingly[11,12]. There are not many studies related to pulmonary functions in subclinical hypothyroidism. Hence the study to assess the pulmonary functions in subclinical hypothyroidism to find out whether there is any impairment of lung functions.

Materials and Methods

The study was cross sectional. The study was done in one of the Peripheral tertiary health care system in West Bengal. 100 subjects were selected in our study group. Among them 50 cases with Subclinical Hypothyroidism and 50 normal subjects were selected from the Medicine OPD between the age group of 20 to 50 yrs. 50 cases were selected from OPD with serum TSH value more than 6.16 µIU/ml and serum fT_4value between 0.8 -2ng/dl with the same age group. 50 controls were selected with normal serum TSH and fT_4 value (TSH <6.16µlU/ml and fT_4<0.2ng/ml). BMI of both the groups were below 30 kg / M^2. History of smoking and any other respiratory illness or any other medical complications were excluded from the study group. Both groups, cases and controls were free from any complaints of Hypothyroidism.

After taking history, all the participants were clinically evaluated and their BMI was measured. Subjects with BMI between 24 -30 kg/ M^2 were included in our study group.

Thyroid function test was done in the Department of Biochemistry by Enzyme Immuno Assay (EIA) using standard kit in Auto analyzer TECAN ELISA Reader and Washer.

Pulmonary Function test was done in Physiology Department using RMS Helios 401 Spirometer.

Parameters chosen for pulmonary functions include FVC (L), FVC%, FEV_1, FEV_1%, FEV_1/FVC%, FEF (L), FEF%, PEFR (L), PEFR%.

Statistical analysis was done by SPSS-17 and P value < 0.001 was considered statistically significant.

Result

Table- 1 Demographic Features of Participants

		Control group (n= 50)	Subclinical hypothyroidism (n= 50)
Age (years)		36.78 ± 4.62	37.22 ± 4.43
Gender	Female	31	36
	Male	19	14
Presence of Symptoms	Yes	0	24
	No	50	17

Table- 2 Thyroid Function Values of The Participants

	Control group **(**n=50**)**			Subclinical hypothyroidism **(n**=50**)**		
	Mean	Standard Deviation	Standard Error	Mean	Standard Deviation	Standard Error
fT_4 (ng/dL)	1.4	0.26	0.04	1.26	0.24	0.04
TSH (µlU/ml)	2.12	0.62	0.09	12.08	4.11	0.64

Table- 3 Comparison of Spirometric Means between Subclinical Hypothyroidism and Control Group of Subjects

	Control group (n=50)			Subclinical hypothyroidism (n=50)			p-value	significance level
	Mean	Standard Deviation	Standard Error	Mean	Standard Deviation	Standard Error		
FVC(L)	3.57	0.35	0.05	3.17	0.24	0.04	<0.001	HS**
FVC %	106.20	2.80	0.40	97.76	2.46	0.38	<0.001	HS**
FEV, (L)	3.41	0.35	0.05	2.96	0.21	0.03	<0.001	HS**
FEV1 %	98.64	2.53	0.36	89.37	2.62	0.41	<0.001	HS**
FEV1 / FVC (%)	95.53	2.00	0.28	93.63	1.60	0.25	<0.001	HS**
FEF 25-75(L)	5.98	0.35	0.05	5.36	0.35	0.05	<0.001	HS**
FEF25-75 %	78.78	3.72	0.53	78.29	4.54	0.71	0.583	NS
PEFR(L)	5.94	0.39	0.06	5.28	0.34	0.05	<0.001	HS**
PEFR %	79.50	3.56	0.50	77.78	4.35	0.68	0.045	S*

Note: HS**= Highly Significant, S*=Significant, NS=Not Significant

Discussion

Table -1 show the demographic features of participants. Mean age of the participants were 37.22±4.43 yrs and 36.78±4.62 yrs in Subclinical Hypothyroidism and controls respectively. So there was no significant difference between the groups regarding age. Among 50 subclinical hypothyroidism cases 36 participants (72%) were female and rest 14 patients were male. In the control group there were 31 subjects (62%) were female and 19 subjects were male.

Table – 2 shows the comparative values of fT4 and TSH between cases and controls. Mean serum fT_4 values between cases and controls were 1.26±0.24 ng/dl and 1.4 ± 0.26 ng/dl respectively. Mean serum TSH levels were 12.08 ± 4.11µIU/ml and 2.12 ± 0.62 µIu /ml in cases and controls respectively which was statistically significant (P<0.001). There was significant difference of TSH level between cases and controls.

Table 3 shows the spirometric measurement of lung functions between cases and controls.

The mean value of FVC (L), FVC%, FEV_1 (L), FEV_1%, FEV_1/FVC%, FEF_{25-75} (L), FEF%, PEFR (L), PEFR% in Subclinical Hypothyroidism cases were 3.17± 0.24, 97.76± 2.46, 2.96 ±0.21, 89.37± 2.62, 93.63± 1.60, 5.36± 0.35, 78.29± 4.54, 5.28± 0.34 and 77.78 ± 4.35 respectively whereas in the control group the values are 3.57 ±0.35, 106± 2.80, 3.41± 0.35, 98.64 ±2.53, 95.53 ±2.00, 5.98 ± 0.35, 78.78 ± 3.72, 5.94 ± 0.39, 79.50 ± 3.56 respectively. Here the spirometric parameters are higher in the control group than the cases of subclinical hypothyroidism. The differences of FVC, FVC%, FEV_1, FEV_1%, FEV_1/ FVC, FEF_{25-75}, PEFR are statistically significant (P< 0.001).

Conclusion

All the spirometric parameters are significantly decreased in subclinical hypothyroidism cases as compared with the normal control group. Respiratory system is highly affected in Subclinical Hypothyroidism probably due to weakness of the respiratory muscles. As subclinical hypothyroidism resides in general population, they should be properly evaluated and clinical approach for the respiratory system should be done at the earliest.

Limitations

The study would be better if our study population was larger and other measurement of lung function like DLCO would be done.

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