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ORIGINAL ARTICLE

Assessment of correlation of thyroid function with physical parameters

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ABSTRACT:
Background: Many factors have been found to affect a person's weight, including lifestyle choices like nutritional behaviour and physical activity, as well as genetics, environmental and endocrinal factors.The present study was conducted to assess correlation of thyroid function with physical parameters. **Materials & Methods:** 124subjects of both genders were included. Body weight, Height and BMI was calculated and thyroid hormone profile (S. TSH, Total S. T3, and Total S. T4) was estimated by lumax chemiluminescence immunoassay strip reader. **Results:** The mean age was 35.4 years in normal and 36.7 years in obese subjects. The mean weight was 54.2 kgs in normal and 68.5 kgs in obese subjects. The mean height was 160.2 cm in normal and 163.1 cm in obese subjects and mean BMI was 21.3 Kg/m^2 in normal and 26.9 Kg/m^2 in obese subjects. The mean T3 (ng/dl) level in normal subjects was 108.3 and obese was 94.5, T4 (µg/dl) level was 8.9 in normal and 7.2 in obese and TSH (mIU/L) level was 2.31 in normal and 3.74 in obese subjects. The difference was significant ($P< 0.05$).TSH shows significant positive correlation with age, weight, BMI and BF percentage. T3 shows significant negative correlation with age, weight, and BMI and BF percentage and T4 shows significant negative correlation with weight and BMI. **Conclusion:** The physical parameters play an important role to determine the thyroid function, as thyroid hormone play an important role in metabolism of almost all the cell of the body.
Key words: Thyroid function, Height, Weight

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INTRODUCTION

One of the numerous functions of thyroid hormones in the human beings is the stimulation of adrenergic activity with an increased heart rate and myocardial contractility. Literature has shown that both hypo and hyperthyroid disorders may increase the risk of hypertension.[1]The clinical symptoms of thyroid hormone dysfunction are numerous and varied even in more subtle sub-clinical thyroid disease with general symptoms that may escape diagnosis. Sub-clinical hypothyroidism has been associated with diastolic hypertension and reduced pulse pressure.[2]

Many factors have been found to affect a person's weight, including lifestyle choices like nutritional behaviour and physical activity, as well as genetics, environmental and endocrinal factors. Thyroid hormone regulates energy metabolism and thermogenesis and plays a critical role in glucose metabolism and lipid metabolism, food intake, and the oxidation of fatty acids.[4]

Most studies on euthyroid individuals have shown that there is a significant association between body mass index (BMI) and thyroid function.[5]It is evident that obesity and mild thyroid failure are common diseases. More studies are required to fully understand the extent of the association and translate the findings into practical use in the clinical setting.[6]The present study was conducted to assess correlation of thyroid function with physical parameters.

MATERIALS & METHODS

The present study comprised of 124subjects of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. Body weight was measured to the nearest 1.0 kg using mechanical weighing machinewith subjects. Height was measured to the nearest 1.0 cm freestanding without shoes using measure tape. BMI was calculated as weight/ height formula (kg/m2). 5 ml of blood was taken and all samples were centrifuge at 2000 rpm for 5 min and supernatant serum was collected then thyroid hormone profile (S. TSH, Total S. T3, and Total S. T4) was estimated by lumax chemiluminescence immunoassay strip reader.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Demographic characteristics

Parameters	Normal	Obese	P value
Age (years)	35.4	36.7	0.92
Weight (Kgs)	54.2	68.5	0.02
Height (cm)	160.2	163.1	0.84
BMI (Kg/m^2)	21.3	26.9	0.01

Table I shows thatmean age was 35.4 years in normal and 36.7 years in obese subjects. The mean weight was 54.2 kgs in normal and 68.5 kgs in obese subjects. The mean height was 160.2 cm in normal and 163.1 cm in obese subjects and mean BMI was 21.3 Kg/m^{2}in normal and 26.9 Kg/m^{2}in obese subjects. The difference was significant (P< 0.05).

Table II

Thyroid profile	Normal	Obese	P value
T3 (ng/dl)	108.3	94.5	0.04
T4 (µg/dl)	8.9	7.2	0.05
TSH (mIU/L)	2.31	3.74	0.01

Table II, graph I shows that mean T3 (ng/dl) level in normal subjects was 108.3 and obese was 94.5, T4 (µg/dl) level was 8.9 in normal and 7.2 in obese and TSH (mIU/L) level was 2.31 in normal and 3.74 in obese subjects. The difference was significant (P< 0.05).

Graph I Thyroid profile in subjects

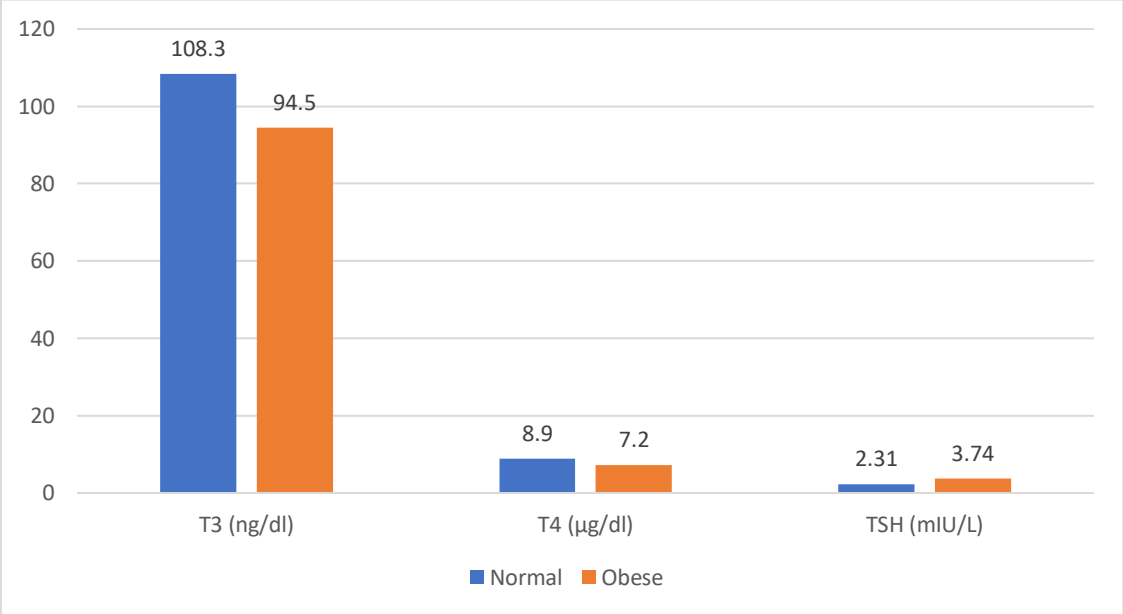

Table III Correlation of thyroid hormone profile with physical parameters

Thyroid profile	Correlation	Age	Height	Weight	BMI
T3 (ng/dl)	R	-0.23	-0.26	-0.45	-0.31
	P	0.01	0.07	0.02	0.01
T4 (µg/dl)	R	-0.081	-0.17	-0.32	-0.28
	P	0.82	0.32	0.01	0.02
TSH (mIU/L)	R	0.24	0.065	0.34	0.37
	p	0.01	0.92	0.03	0.04

Table III shows that TSH shows significant positive correlation with age, weight, BMI and BF percentage. T3 shows significant negative correlation with age, weight, and BMI and BF percentage and T4 shows significant negative correlation with weight and BMI.

DISCUSSION

The basal unstimulated production rate of the thyroid gland is insufficient by itself to maintain healthy concentrations of thyroid hormones. Only through appropriate glandular stimulation by the pituitary hormone thyrotropin (TSH) will the levels rise adequately to satisfy the needs of the body.[7] To prevent overstimulation, the system is regulated

tightly via multiple negative feedback loops that monitor hormone concentrations and adjust the required stimulatory response.[8]The present study was conducted to assess correlation of thyroid function with physical parameters.

We found that the mean age was 35.4 years in normal and 36.7 years in obese subjects. The mean weight was 54.2 kgs in normal and 68.5 kgs in obese subjects. The mean height was 160.2 cm in normal and 163.1 cm in obese subjects and mean BMI was 21.3 Kg/m^2 in normal and 26.9 Kg/m^2 in obese subjects. Patel et al[9]correlated the thyroid hormone profile with the age, height, weight, body mass index (BMI), with body fat percentage (BF%) in apparently healthy person.84 normal subjects were included in the present study. In thyroid hormone profile S. TSH, Total S. T3, and Total S. T4 were estimated by lumax chemiluminescence immunoassay strip reader in the laboratory. Height, weight and BMI were recorded by standard method and BF% was calculated by the formula. Analysis was done by SPSS software.Of 84 subjects, 39 were males and 45 were females. The correlation coefficient of thyroid hormone profile: For S. TSH (r=+0.261, p=0.02), (r=+0.064, p=0.57), (r=+0.330, p=0.00), (r=+0.368, p=0.00), (r=+0.387, p=0.00); For S. T3 (r=-0.299, p=0.01), (r=-0.208, p=0.06), (r=-0.447, p=0.00), (r=-0.377, p=0.00), (r=-0.257, p=0.02); For S. T4 (r=-0.086, p=0.44), (r=-0.174, p=0.11), (r=-0.365, p=0.00), (r=-0.297, p=0.00), (r=-0.072, p=0.52) with age, height, weight, BMI and BF% respectively.

We found that the mean T3 (ng/dl) level in normal subjects was 108.3 and obese was 94.5, T4 (µg/dl) level was 8.9 in normal and 7.2 in obese and TSH (mIU/L) level was 2.31 in normal and 3.74 in obese subjects. Hoermann et al[10]analyzed the relational equilibria between thyroid parameters defining thyroid production and thyroid conversion in a group of 271 thyroid-healthy subjects and 86 untreated patients with thyroid autoimmune disease. Results: In the euthyroid controls, the FT 3 -FT 4 (free triiodothyronine-free thyroxine) ratio was strongly associated with the FT 4 -TSH ratio (tau = –0.22, $p < 0.001$, even after correcting for spurious correlation), linking T 4 to T 3 conversion with TSH-standardized T 4 production. Using a homeostatic model, we estimated both global deiodinase activity and maximum thyroid capacity. Both parameters were nonlinearlyand inversely associated, trending in opposite directionsacross the euthyroid reference range. Within the panel ofcontrols, the subgroup with a relatively lower thyroid capacity (<2.5 pmol/s) displayed lower FT 4 levels, but maintainedFT 3 at the same concentrations as patients with higher functional and anatomical capacity. The relationships were preserved when extended to the subclinical range in the diseased sample.

We observed that TSH shows significant positive correlation with age, weight, BMI and BF percentage. T3 shows significant negative correlation with age, weight, and BMI and BF percentage and T4 shows significant negative correlation with weight and BMI.Knudsen et al[11], a significant positive association between TSH levels and BMI was seen. Other investigators have also found positive associations between TSH levels and obesity in their studies.[12]

CONCLUSION

Authors found that the physical parameters play an important role to determine the thyroid function, as thyroid hormone play an important role in metabolism of almost all the cell of the body.

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