CORRELATION BETWEEN TSH AND BODY MASS INDEX IN MALE AND FEMALE PATIENTS WITH SUBCLINICAL HYPOTHYROIDISM

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ABSTRACT

Hypothyroidism is a syndrome resulting from thyroid hormone deficiency or rarely inefficacy. It is a common endocrinological problem affecting especially women and the elderly. Thyroid hormones play an important role in synthesis, metabolism and mobilization of lipids. One of the most important symptoms of hypothyroidism is weight gain or inability to lose weight. The rapid increase in the prevalence of obesity in the past 20 to 30 years emphasizes the important role of lifestyle and environmental factors, because genetic changes could not have occurred so rapidly. Obesity is a complicated process that depends on signals of satiety and hunger, genetics, endocrine abnormalities, and other factors. Our study purposes to investigate the relationship between BMI and thyroid function in patients of subclinical hypothyroidism.

Objective of this study is to correlate thyroid stimulating hormones (TSH) and body mass index (BMI) in male and female patients with subclinical hypothyroidism**.**

This cross sectional study included 42 Subclinical hypothyroid patients, both males and females between 20-45 years of age and without a history of alcohol or tobacco consumption, history of any cardiovascular disorders or diabetes mellitus and any drug history like corticosteroids, beta blockers. and TSH test estimated by VITROS 5600 integrated analyzer and correlated with body mass index.

The results showed a positive Correlation analysis in subclinical Hypothyroid males between BMI and TSH, (r= 0.47), which was found to be statistically significant (p=0.02*) in case of subclinical Hypothyroid females the results indicated positive correlation between BMI and TSH (r= 0.58) which was found to be statistically significant (p=0.005*).

A strong positive correlation between Body Mass Index (BMI) and Thyroid stimulating hormones (TSH).

KEYWORDS: TSH (Thyroid Stimulating Hormone), BMI (Body Mass Index), SCH (Subclinical hypothyroid), SD (Standard Deviation), WHO (World Health Organization).

INTRODUCTION

Thyroid disorder have been reported in over 110 countries of the world with 1.6 billion people at risk and who need some form of iodine supplementation Most of these people reside developing countries, Asia, Africa and Latin America.[1] The prevalence of hypothyroidism in India is 11%, compared with only2% in the UK and 4.6% in the USA. Compared with coastal cities (Mumbai, Goa, and Chennai), cities located inland (eg, Kolkata, Delhi, Ahmadabad, Bangalore and Hyderabad) have a higher prevalence (11.7% vs. 9.5%). The highest prevalence of hypothyroidism (13.1%) is noted in people aged 46-54 years, with people aged 18-35 years being less affected (7.5%).[2] According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases.[3] Hypothyroidism is 10 times more common in women than men and it prevalence increases with age.[4] As per the survey carried out in the year 2014-2016 about 32% of the Indian population is suffering from various kinds of thyroid disorders. North India reported maximum cases of Hypothyroidism while the south and west zones reported cases of hyperthyroidism.[5]

Hypothyroidism is a syndrome resulting from thyroid hormone deficiency or rarely inefficacy. It is a common endocrinological problem affecting especially women and the elderly [6], One of the most important symptoms of hypothyroidism is weight gain or inability to lose weight. [7] Subclinical Hypothyroidism is a mild form of hypothyroidism where the only abnormal hormone level is an increased TSH.[8]

Body composition and thyroid hormones appear to be closely related. Thyroid hormones regulate basal metabolism, thermogenesis and play an important role

in lipid and glucose metabolism, food intake and fat oxidation. .Thyroid dysfunction is associated with changes in body weight and composition, body temperature and total resting energy expenditure (REE) independent of physical activity. Hypothyroidism is associated with decreased thermogenesis, decreased metabolic rate, and has also been shown to correlate with a higher body mass index (BMI) and a higher prevalence of obesity.[9]

Thus, the present study was conducted to correlate thyroid stimulating hormones (TSH) and body mass index (BMI) in male and female patients with subclinical hypothyroidism.

Research Design

- This was a cross-sectional study and carried out at Era's Lucknow Medical College and Hospital, Lucknow. Sample size was of 42 subjects which includes (21 male and 21 female). After obtaining ethical clearance from Era's Lucknow Medical College and hospital, Lucknow

Inclusion Criteria

- Male and Female patients between 20-45years.
- newly diagnosed subclinical hypothyroidism patients.

Exclusion Criteria

- Patients with incomplete thyroid function test, and hyperthyroid patients .
- Subject taking medicine for immunosuppressive disease.
- Pregnant women.
- History of chronic smoking, alcoholism and using sedatives medication.

Methodology

All the subjects fulfilling the inclusion criteria and not falling into the domain of exclusion criteria were invited to enroll in the study till the sample size requirements were fulfilled. All subjects were explained about the protocol of the study and a written informed consent was obtained.

After enrolment, a general and systemic examination was done and a proper case history was recorded to confirm that the subjects selected were apparently healthy. These subjects then underwent recording of anthropometric parameters like height(in meters) and weight (in kilograms) and Body Mass Index(BMI) was calculated.

BMI =Weight in kg/Height m^2

The WHO Criteria for various subgroups of Body Mass Index was taken into consideration. [10]

Body Mass Index	Range
Underweight	<18.5
Normal	18.5-24.9
Overweight	25-29.9
Obese	>=30

In this study the TSH test was recorded estimated by VITROS 5600 integrated analyzer, Normal range of TSH= 0.46-4.68 (µIU/ml),[11]

Thyroid Profile Parameters	Normal Range
TSH	0.46-4.68 (µIU/ml)

TSH	Interpretation
Elevated	Subclinical hypothyroidism

Statistical Analysis

- The data so collected was subjected to statistical analysis using Statistical Package For Social Sciences (SPSS) version 20.0
- To analyze any statistically significant differences between the means of different categories of BMI i.e. underweight, normal, overweight and obese, in both males and females separately and also combined, One- Way ANOVA was used.
- To correlate BMI with TSH Pearson's Correlation was applied.
- The confidence limit of the study was 90% hence a 'p' value less than 0.05 was considered to be statistically significant.

OBSERVATION AND RESULTS

The study was carried out to observe correlation between Thyroid Stimulating Hormone (TSH) and Body Mass Index (BMI) in male and female patients with subclinical hypothyroidism. A total number of 42 apparently newly diagnosed subclinical hypothyroid patients, both males and females in the age group of 20-45 years were enrolled in the study.

BMI (kg/m2)	MALE			FEMALE		
	(N=30)	%	Mean ±SD	(N=30)	%	Mean ±SD
Normal Weight	4	19.7%	24.50±0.41	4	19.3%	24.39±0.27
Over Weight	12	57.1%	26.73±1.19	10	47.6%	27.51±1.20
Obese	5	23.8%	31.10±1.23	7	33.3%	32.57±2.39
Total	21	100%	27.35±2.24	21	100%	28.60±3.46

Table 1: Gender Wise Distribution Of Subject According To Body Mass Index (bmi)

N=number of subjects, SD=standard deviation, **%=** percentage.

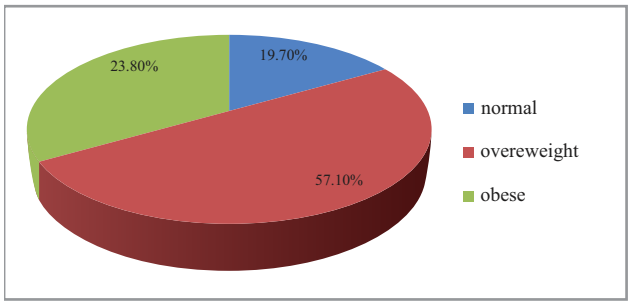


Fig 1(a): Percentage Distribution Of Males (N=21) According To Bmi

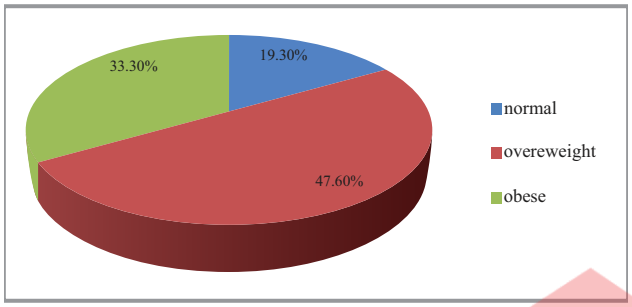


Fig 1(b) : Percentage Distribution Of Females (N=21) According To BMI

INDEX	SCH Males (N=21) Mean±SD	SCH Females (N=21) Mean±SD	t- value	P Value
BMI(kg/m2)	27.35±2.24	28.60±3.46	-1.33	0.19
TSH(µIU/ml)	8.63±4.57	9.44±4.10	-0.57	0.57

Table 2: Gender Wise Comparison Of Various Parameters In Subclinical Hypothyroid Subjects

N=number of subjects, SD=standard deviation, SCH= Subclinical Hypothyroid, P=correlation is significant, BMI= Body Mass Index.

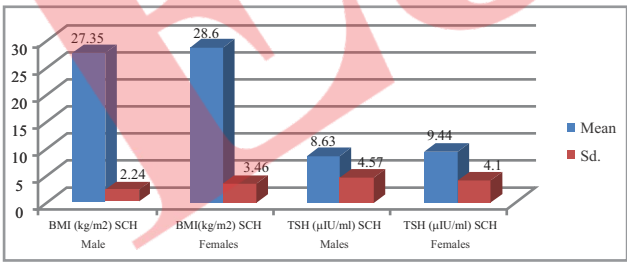
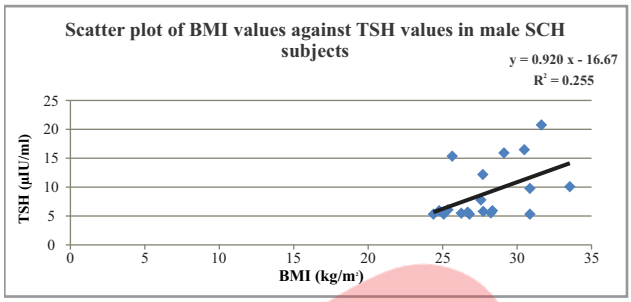


Fig 2: Gender Wise Comparison Of Various Parameters In Subclinical Hypothyroid Subjects

Parameters	Gender	N	r Value	p Value
BMI (kg/m^2)	Male	21	0.47	0.02*
TSH (mIU/ml)				
BMI (kg/m^2)	Female	21	0.58	0.005*
TSH (µIU/ml)				

Fig 3(a): Scatter Plot Of BMI Values Against TSH Values In Male Sch Subjects

N=number of subjects, Correlation coefficient (r), * correlation is significant (p) ≤ 0.05 level (2- tailed)



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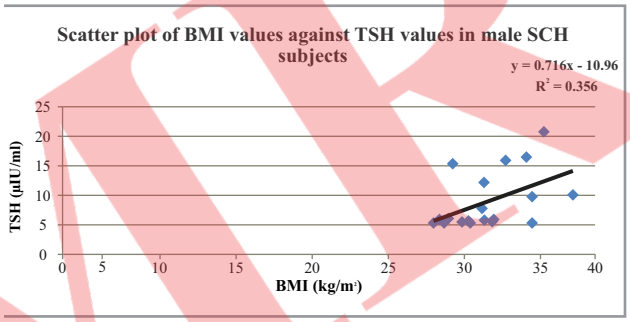

Fig 3(a): Scatter Plot Of BMI Values Against TSH Values In Male Sch Subjects.

DISCUSSION

This cross-sectional study was conducted in the department of Physiology in collaboration with biochemistry and OPD of Medicine department, Era Lucknow Medical College, Era university Lucknow, The study included 42 cases with 21 males and 21 females patients between 20-45years of age newly diagnosed with subclinical hypothyroidism.

The mean BMI in the present study was 27.97±3.07, out of 42 Subclinical hypothyroid subjects there were 21 males and 21 females. This is accordance with the study done by Singla Gesu et al in the year 2016 where they also found 27.07±4.04 out of 20 hypothyroid subjects.[12]

In our study Correlation analysis in subclinical Hypothyroid males indicated positive correlation between BMI and TSH, ®= 0.47), which was found to be statistically significant (p=0.02*) in case of subclinical Hypothyroid females the results indicated positive correlation between BMI and TSH (r= 0.58) which was found to be statistically significant (p=0.005*). Zhang et al. described that the risk of obesity is quite higher in patients with SCH in Chinese adolescents [13]. Gaurav Gupta et al reported that positive correlation was found between TSH and BMI in SCH women[14]. Velivela et al supported this study that the prevalence of subclinical hypothyroidism is

higher in females and increased with BMI [15]. Solanki et al reported that the level of TSH is quite higher in obese patients and it increases as BMI increases 16. On the other hand Karthick et al. found that patients with SCH represent lower BMI when compared to euthyroid control group [17]. Milionis A and Milionis C in the year 2013 where they also found the correlation between BMI and various thyroid hormones different in both sex, in males BMI was negatively with TSH. Males result was contradict to my study .[18]

This study emphasizes that Subclinical Hypothyroid peoples are also characterized by increased BMI. More study with large sample size on adolescence as well as children should be conducted to analyze this fact.

CONCLUSION

This study suggested that an increase in BMI level which causes increase TSH value in SCH patients**.** We have shown that variations of TSH are accompanied by differences in BMI perhaps due to the changes in the basal metabolic rate. The high incidence of the pathological disorders in thyroid function with associated various environmental factors (diet, exercise, etc.) cause weight gain with an unknown biological mechanism and lead to obesity. It is a small study, but on the basis of the conclusions drawn, further research work can be undertaken with a larger sample size to ascertain any significant relation between subgroups of Body Mass Index with the TSH.

Study Limitations

It is a small study, but on the basis of the conclusion drawn, further research can be undertaken with a larger sample size to ascertain any significant relation TSH with BMI i.e. underweight normal weight, overweight and obese.

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