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Original Research Article

TO ESTABLISH THE RELATIONSHIP BETWEEN THYROID LEVELS AND SELECTED ANTHROPOMETRIC PARAMETERS (BMI, WAIST CIRCUMFERENCE, HIP CIRCUMFERENCE, WAIST-HIP RATIO) IN YOUNG OBESE INDIVIDUALS.

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Abstract:

Background & Method: The aim of the study is to establish the relationship between Thyroid levels and selected anthropometric parameters in young obese individuals. Both males and females in the age group of 19 – 35 years, were selected and obesity was defined as those with BMI $\geq$ 25 kg/m^2, set by WHO for Asians.

Result: Mean weight (80 kg) than the control group (59 kg) with significant P value of 0.01. The mean height was higher in the control group (163 cm) than the obese group of mean height (160 cm) with significant P value 0.011. Obese study group had higher mean BMI (31.08 cm) than the control group (22.22 cm) with significant P value of 0.001. The waist circumference was higher in the obese study group (99.38 cm) than the control group (74.40 cm) with significant P value of 0.001. Obese study group had higher mean hip circumference (31.08) than the control group (22.22) with significant P value of 0.01. The waist –hip ratio was higher in the obese study group (0.927) than the control group (0.845) with significant P value of 0.02.

Conclusion: In this study, the body mass index, the waist circumference and the waist-hip ratio have shown a positive correlation with Thyroid proving the fact that Thyroid is greatly expressed in obese individuals with abdominal or visceral fat accumulation. This clearly indicates that body fat distribution (subcutaneous or visceral) is an important marker for assessing the metabolic risks of an obese individual.

Keywords: Thyroid, anthropometric, BMI, Waist circumference, Hip circumference, Waist-Hip Ratio & obese.

Study Designed: Observational Study.

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1. Introduction

Obesity results from an imbalance between food intake and energy expenditure, which leads to excessive accumulation of adipose tissue and lipogenesis. Obesity is a complex metabolic disorder which links biologic, psychosocial, genetic, epigenetic, socioeconomic status and behavioral factors[1]. Accumulating evidences indicates that obesity is closely related to many co-morbid Conditions like Insulin resistance and Type2 Diabetes, Dyslipidaemia, Non-alcoholic fatty liver disease, Hypertension, Cardiovascular diseases and Deep vein thrombosis[2].

Adipose tissue excess and adipose tissue dysfunction play an important role in the development of obesity and obesity related metabolic complications[3]. Positive energy balance causes adipose tissue to store excess energy as lipid droplets of triglycerides in the adipocytes. Obesity is characterized by enlargement of the size of adipocytes (hypertrophy).

The number of adipocytes is determined in childhood and remains constant during adulthood in both lean and obese. Hence increase in fat mass in adulthood is attributed to the hypertrophy of adipocytes rather than hyperplasia of adipocytes (increase in number of adipocytes).

Obesity can be seen as the first wave of a defined cluster of non-communicable diseases called "New World Syndrome," creating an enormous socioeconomic and public health burden in poorer countries[4]. The interrelation between hypothyroidism and obesity is a complex one with hypothyroidism affecting weight and obesity affecting thyroid function. Thyroid hormones are closely integrated to body composition as they regulate basal metabolism and thermogenesis. Thyroid hormones affect glucose and lipid metabolism and thereby the food intake[5].

2. Material & Method

90 obese young adults, came for master health check up to the Index Medical College Hospital and Research Centre, Indore were selected as cases for 01 Year. Both males and females in the age group of 19 – 35 years, were selected and obesity was defined as those with BMI $\geq$ 25 kg/m^2, set by WHO for Asians. Informed consent was obtained for each individual from cases and control groups prior to the study. After 8- 12 hours of fasting, the subjects were made to sit for 10 minutes and then,5 ml of venous blood was collected by

Inclusion criteria:

1. Obese young adults of both the sexes with BMI $\geq$ 25 kg/m^2 were included in the study.

Exclusion criteria:

1. Obese adults of more than 35 years and less than 19 years were excluded in the study.
2. Obese young adults with co-morbid illnesses like Hypothyroidism, Diabetes Hypertension, Pregnant women and women on Oral Contraceptive Pills were excluded from the study.

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3. Results

Table 1: Age Distribution of the study population

Age Group	Cases N (%)	Controls N (%)	Total N(%)
19 – 20 years	03(5)	1(3.3)	4(4.5)
21 – 30 years	12(20)	11(36.6)	23(25.5)
31 – 35 years	45(75)	18(60)	63(70)
Total	60(100)	30(100)	90(100)

Table 2: Comparison of BMI among cases and controls

Group	Mean	Std deviation	Mean difference	P Value	95% confidence	
					Interval Lower	Interval Upper
Cases	31.07	3.70	6.826			
Controls	22.24	1.75	5.119	0.00	7.40	10.24

The BMI among the cases was higher compared to the control with highly significant p value 0.00.

Table 3: Distribution of Anthropometric Indices among the study population

	Group	N	Mean	Mean difference	Student t test p value
Weight kg	**Case**	60	80.00	20.92	0.01
	Control	30	59.07		
Height cm	**Case**	60	160.40	-3.20	0.011
	Control	30	163.60		
BMI	**Case**	60	31.08	8.85	0.001
	Control	30	22.22		
Waist Circumference cm	**Case**	60	99.38	24.98	0.001
	Control	30	74.40		
Hip Circumference cm	**Case**	60	106.97	19.43	0.01
	Control	30	87.53		
Waist-Hip Ratio	**Case**	60	0.927	0.082	0.02
	Control	30	0.845		

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Mean weight (80 kg) than the control group (59 kg) with significant P value of 0.01. The mean height was higher in the control group (163 cm) than the obese group of mean height (160 cm) with significant P value 0.011. Obese study group had higher mean BMI (31.08 cm) than the control group (22.22 cm) with significant P value of 0.001. The waist circumference was higher in the obese study group (99.38 cm) than the control group (74.40 cm) with significant P value of 0.001. Obese study group had higher mean hip circumference (31.08) than the control group (22.22) with significant P value of 0.01. The waist –hip ratio was higher in the obese study group (0.927) than the control group (0.845) with significant P value of 0.02.

Table 4: Association between TSH

Age Group	Cases N (%)	Controls N (%)
TSH	39	18
Low TSH	16	07
High TSH	23	11
T3	11	05
T4	10	07
Total	60	30

Low TSH = <0.49 mIU/l; high TSH = >3.29 mIU/l; TSH within reference range = 0.49 – 3.29 mIU/l. Adjusted model includes age, sex, smoking, physical activity, and alcohol intake as covariates.

4. Discussion

As the first population-based study using MRI techniques to ascertain body fat and its relation with thyroid function, the present study's results align well with findings of a Greek prevention study of healthy individuals that failed to show an association between TSH levels and visceral fat thickness [6]. Likewise, a Belgian study demonstrated that there were no associations between TSH and the whole body fat mass, and a South Korean study in men found no association between TSH and visceral and subcutaneous fat area [7]. Our study differed in that the volume of VAT in the aforementioned studies was measured using computer tomography or indirectly via the measurement of preperitoneal fat with ultrasound.

An Italian study in patients with obesity used computer tomography scans to determine VAT and showed a significant association of TSH and VAT. Their sample size was fairly small and the characteristics of an obese population certainly differ from our general population sample [8]. Comparable population-based studies have not specifically assessed VAT or SAT, but used anthropometric markers. Focusing our secondary analysis on these relationships, we did not

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observe similar results. We were unable to replicate the association between TSH and BMI in women from a previous, independent SHIP examination performed in the same study region, despite adjusting for the same confounders and stratifying by sex.

The association was weak and, compared to this study, there was a different baseline response which could have resulted in a different selection bias. More importantly, in the 10 years between the previous SHIP examination and our study, many characteristics had changed, for example, an increased iodine supply [9]. Results of other population- based studies have been mixed. Recent longitudinal data suggested an association between the change of TSH and the change of body fat; however, no association has been observed in baseline TSH and change in body fat or in change in TSH and baseline body fat measurements. Despite the prospective design of these studies, a causal link could not be proven beyond doubt. A large Norwegian study found a positive association between TSH and BMI in a cross-sectional approach, whereas an Australian and Dutch study did not.

It has been shown that anthropometric measures change with age, which is also true for serum TSH levels. More importantly, these studies relied solely on anthropometric surrogates for the relationship of TSH and fat, yet BMI can be a fairly inaccurate measure for adiposity, particularly in men and in the elderly.

5. Conclusion

In this study, the body mass index, the waist circumference and the waist-hip ratio have shown a positive correlation with Thyroid proving the fact that Thyroid is greatly expressed in obese individuals with abdominal or visceral fat accumulation. This clearly indicates that body fat distribution (subcutaneous or visceral) is an important marker for assessing the metabolic risks of an obese individual.

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ISSN: 0975-3583, 0976-2833 VOL13, ISSUE7, 2022

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