

Effect of Obesity on Thyroid Stimulating Hormone Levels at Atbara Town, Sudan

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Abstract: Background: Obesity is a condition of excess adipose tissue associated with hormonal imbalances associated with the degree of obesity. **Objective:** To assess the effects of obesity on thyroid-stimulating hormone in Sudanese subjects in Atbara, Nile State. **Materials and Methods:** Collect 40 samples from randomly selected obese and overweight (male and female) subjects in Atbara City, Nile State. Between July and September 2021. Efficacy was evaluated in 20 healthy subjects with normal BMI of TSH levels of obesity as a control group. Serum TSH levels were determined using an enzyme immunoassay analyzer (TOSOH) and results were analyzed using the Social Science Statistical Package (SPSS) computer program. **Results:** The results of this study showed the mean concentration of TSH levels in obese subjects (mean \pm SD) (1.248 ± 0.48915) and controls (1.480 ± 0.3), *P. value* = 0.07 and was also non-significant. Also showed that the mean concentration of BMI, waist circumference and waist hip ratio and TSH level was (33.58,106.187,1.07,1.24) with *P. value* (0.063,0.404,0.064,0.860) respectively, which is insignificantly. **Conclusions:** Obesity has no effect on TSH levels, and it is concluded that there is no correlation between BMI, waist circumference, waist-to-hip ratio, and TSH levels.

Keywords: Thyroid-stimulating hormone, waist-to-hip ratio, Obesity, BMI, Atbara, Sudan.

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INTRODUCTION

Obesity is a condition of excessive adipose tissue mass. It is effectively defined by assessing its association with morbidity or mortality [1]. This is defined by the World Health Organization as a BMI $>30\text{kg/m}^2$. The disease is associated with increased mortality from cancer as well as cardiovascular disease and diabetes. Obesity also significantly increases the morbidity of many complications such as arthritis and sleep apnea [2]. Obesity is becoming a global epidemic. A quarter of adults in the UK are obese and more than half are overweight (or obese). In the US, that number climbs to 39% obese and 69% overweight (or obese). This puts a huge strain on medical resources [2]. The thyroid gland is located in the lower front part of the neck and is shaped like a fly. It is divided into two lobes, one

on each side of the trachea. A band of thyroid tissue called the thymus spans the lobes. Beneath the thyroid are the parathyroid gland (which controls calcium balance) and the recurrent laryngeal nerve (which innervates the vocal cords) [3]. The thyroid secretes her three hormones, thyroxine (T₄) and triiodothyronine (T₃). Both are iodine derivatives of tyrosine and the polypeptide hormone calcitonin. Calcitonin is produced by her C cells, while T₃ and T₄ are produced by follicular cells. C-cells are of developmental origin, functionally independent of other thyroid hormones, and play a minor role in calcium homeostasis. Disorders of this secretion are rare. However, overproduction or under secretion of T₃ and T₄ is common in thyroid disorders [4]. Hypothyroidism is the most common thyroid disease in the adult population, especially older women. It is usually autoimmune and manifests as either primary

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atrophic hypothyroidism or Hashimoto's thyroiditis [5]. Thyroid disease is common in the general population and prevalence increases with age [6]. Thyroid-stimulating hormone is a glycoprotein hormone produced by the hypothalamus and released into the portal system that directs the thyroid-stimulating hormone cells in the anterior pituitary to secrete TSH (dimeric glycoprotein) or low physiological hormone (3 amino acids) [7].

MATERIALS AND METHODS

Study design:

This is a cross-sectional, case-control study aimed to assess the effects of obesity on thyroid-stimulating hormone in Sudanese subjects in Atbara, Nile State.

Study area:

This study was conducted in the River Nile kingdom at Atbara town (Atbara is a metropolis of 111,399 positioned in River Nile State within side the north of Sudan, additionally referred to as the {Railway metropolis}, and 347.8km some distance far from Khartoum kingdom, has many clinical facilities and hospitals which include Atbara hospital, Atbara clinical complex, Life are hospital, Al Ribat hospital...etc.) from June to September 2021.

Study population:

A populace includes 60 people to look at, 40 of them had been obese with extraordinary training as case, 20 whole some to function manage institution had been enrolled on this look at with each sex and extraordinary ages.

Inclusion Criteria:

Obese humans have been covered in this look at each gender and extraordinary age.

Exclusion Criteria:

Any elements can affect the TSH levels which include Thyroid disease, Thyroiditis, Thyroid treatments, pituitary disease, or tumors.

Data Collection:

Data were collected by a closed-ended a closed-ended questionnaire written with inside the Arabic language throughout the length of look at which comprise many questions which include (age, occupation, height, weight, BMI, sort of diet, if diet involved sea food and iodized salt, exercise).

Data Analysis:

Data was analyzed by using the SPSS computer program. Version 19, Independent T-test and Correlation were used for analysis Quality management the precision and accuracy of the technique used on this look-at had been checked and analyzed by commercially prepared control sera.

Ethical Approval and Consent:

Ethical approval for the study was obtained from the Board of the Faculty of Graduates Studies at Shendi University. The written informed consent form was obtained from each guardian of the participant as well as from the subject himself before recruitment into the study. All protocols in this study were done according to the Declaration of Helsinki (1964).

RESULTS

The results of this study showed the mean concentration of TSH levels in obese subjects (mean ± SD) (1.248 ± 0.48915) and controls (1.480 ± 0.3) was *P. value* = 0.079, and was non-significant variation between case and control in the TSH level (Table 1). Also showed insignificant Correlation between BMI, age, waist circumference, and waist hip ratio with TSH result, the mean concentration of BMI, waist circumference and waist hip ratio and TSH level was (33.58,106.187,1.07,1.24) with *P. value* (0.063,0.404,0.064,0.860) respectively (Table 2).

Table-1: Comparison between mean of TSH in case and control (mIU/L)

Variable	No	Mean(mIU/L)	SD	P. value
Case	40	1.248	0.4891	0.079
Control	20	1.4800	0.4443	

Table-2: Correlation the finding TSH result with age groups, obesity classes and different diagnostic approach

Variable		Test result	Mean ± SD
BMI	Pearson Correlation	0.296	33.58±3.56
	Sig(2-tailed)	0.063	
Age	Pearson Correlation	0.136	35.97±12.704
	Sig(2-tailed)	0.404	
Waist Circumference	Pearson Correlation	0.295	106.187±10.76
	Sig(2-tailed)	0.064	
WHR	Pearson Correlation	-0.029	1.24±0.489
	Sig(2-tailed)	0.860	

DISCUSSION

Body fat distribution plays an important role in the development of obesity-related diseases. Fat around your belly has a higher risk of disease than fat around your buttocks, hips, and thighs. Disorders affecting the hypothalamic-pituitary-thyroid axis are associated with obesity in both men and women. Obesity has long been associated with hormonal imbalances in both men and women. Obesity affects many hormones in the body. This study was conducted to investigate the effect of obesity on serum TSH levels. This cross-sectional case-control descriptive study was conducted from June to September 2021 on the Nile State River in Atbara town. The population included 60 study subjects, 40 of whom had various types of obesity, and 20 healthy controls. Mixed-gender and mixed-age groups were included in this study. In the surveys conducted, gender (50% male, 50% female), place of residence (97.5% in Atbara, 2.5% in Aldamar), occupation (62.5% employee, 15% freelancer, 15% inexperienced, 7.5% students), type of food (100% mixed), seafood (85% irregular, 10% never, 5% always), iodized salt (92.5% never, 7.5% irregular), sports (17.5% irregular, 82.5% normal) and a family history of obesity (50% with family history, 50% without family history). Revealed data found that obesity had no effect on TSH levels with *P. value* (0.079), the findings showed that the increasing prevalence of obesity worldwide could further disrupt and contradict the population's normal TSH range, Kaptein said. Who showed that the increased prevalence of obesity worldwide may further confound the normal TSH range in population and disagree with the upper limit of the reference range is involved in the development of obesity [8]. Also, accept as true with the have a look at performed with the aid of using Hari Kumar K V Son 2009 who confirmed no courting among the severity of weight problems and TSH level [9]. And a look performed with the aid of using Denisa in 2014 confirmed that during overweight children, regular fT4, and fT3 degrees advise an undistributed peripheral hormones metabolism. These degrees display correlation with elevated TSH level [10]. But disagree with a have a look at performed with the Rose in 2019, which confirmed in lots of overweight patients, the elevation in TSH exists with regular peripheral thyroid hormones, consisting of loose T4 [11]. The concluded records located there has been a non-significant correlation between BMI, age, waist circumference, and waist-hip ratio with TSH result with *P. value* (0.063, 0.404, 0.064, and 0.860) respectively. My submit opinion after carrying out results, maximum of the have a look at populace is nicely knowledgeable and attempted to deal with their disorder thru a workout and weight loss program lifestyle however they did now no longer locate sufficient time to do sports and feature a touching way of life approximately slimming sports activities and a way to manipulate their time, weight loss program type and life activities in general.

CONCLUSION

There is no effect of obesity on TSH level. No correlation between BMI, waist circumference and waist and hip ratio with TSH level.

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