Frequency of Subclinical Hypothyroidism in Adult Overweight and Obese Individuals in District Peshawar.

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ABSTRACT

Background: Overt hypothyroidism and its associated complications particularly weight gain and hypercholesterolemia are well established but association of the subclinical hypothyroidism to overweight, obesity and related comorbidities is controversial till date. Since routine screening for thyroid function is not in practice, in majority of symptomless patients subclinical hypothyroidism remain undiagnosed. Generally in obese patients with elevated serum cholesterol level subclinical hypothyroidism gets ignored as a component of etiological factors and remain undiagnosed. Presence of subclinical hypothyroidism in overweight and obese individuals has not been established as a cause or the result till date. Treatment of subclinical hypothyroidism with few exceptions is not indicated in routine practice. This study was aimed to look into an association of subclinical hypothyroidism with overweight and obesity and to provide a baseline observation for further longitudinal studies on the subject.

Objective: To assess the correlation of thyroid hormones level (Thyroid stimulating hormone and free thyroxine) with overweight and obesity among overweight and obese adults (BMI > 24.9 kg /m^2 and age 18 50 years).

Material & Methods: This cross-sectional study was conducted from April, 2015 to September, 2015 at the Chemical Pathology department of Khyber Medical College Peshawar.

Participants who were willing to participate were screened for inclusion and exclusion criteria using a health check questionnaire and 200 eligible individuals were included in the study. Written informed consent was obtained from the selected participants.

Results: Out of 200 analyzed participants 40 (20%) were females and 160 (80%) were males. Binary logistic regression analysis showed that median TSH levels were significantly associated with BMI.

Conclusion: Our study suggests that obesity and overweight is associated with subclinical hypothyroidism however this is affected by other variables like age, gender and glycemic state of the person. This finding supports the idea that SCH may be the result rather than an etiological factor for obesity and overweight.

Key Words: *Cardiovascular disease (CVD), Body mass index (BMI), Thyroid stimulating hormone (TSH), free thyroxin (f T4).*

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INTRODUCTION:

Obesity (BMI > 30kg / m^2 has doubled in the past three decades growing in pandemic proportions and globally 1.5 billion people more than 20 years are reported to be obese or overweight by WHO[1]. Obesity is the leading cause of many preventable causes of death such as type 2 diabetes, coronary heart disease, hypertension, osteoarthritis and cancer which affects approximately 50% of Pakistani population[2-4]. The risk of cardiovascular disease in Asian specific population has been shown to occur at a relatively lower BMI cut off (23kg/m^2 instead of 25 kg/m^2) for overweight. According to this cut-off, 25% of the general Pakistani population is either overweight or obese[5] and in KP, this proportion has been shown to be 15% in male and 16% in female medical students indicating a considerable future risk of obesity related co-morbidities and increased mortality in this age group[6]. Thyroid hormones are important for the regulation of whole body metabolism and are therefore associated with changes in weight of an individual. Generally the diagnosis of SCH is made biochemically in asymptomatic patients with persistently elevated serum TSH level and a normal free thyroid hormone (FT4) level[7].Increase in body weight associated with SCH has been observed in a few studies[8-10]. It has been reported that a unit increase in TSH level causes 3% increase in weight[11-12]. The prevalence of SCH in Pakistani population is 5.4% while that of overt hypothyroidism is 4.1% [13]. The association of overt hypothyroidism with weight gain is well established, but such an association with SCH is controversial and there are no consensuses on thyroid hormone replacement for subclinically hypothyroid patients except for patients at high risk of overt hypothyroidism.

MATERIALAND METHODS:

This descriptive study of cross-sectional type was carried out from April 2015 to September 2015 in District Peshawar and collected specimens analyzed in the chemical pathology laboratory of Khyber Medical College Peshawar. Participants who were willing to participate were screened for inclusion and exclusion criteria using a health check questionnaire. Written informed consent was obtained from the eligible participants. Convenient sampling technique was used for

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collecting samples from 200 participants (aged 18 50 and BMI > 24.9 kg /m^2. Height (in inches) and weight (in pounds) was measured, converted to millimeter and kilograms calculating BMI by the formula BMI=kg/m^2. Serum TSH and ft4 were measured on automated immunoassay analyzer "ECL method, elecsys e411 (Automatic) made by "ROCH" using electro-chemiluminiscence technology according to manufacturer instructions. All data was collected using specially designed Performa and analyzed using Minitab® version 17.

RESULTS:

Binary logistic regression analysis showed that median TSH levels were significantly associated with BMI (odds ratio 1.9, 95% confidence interval 1.008, 1.18, p=0.028), BMI of female participants was significantly higher than males (p=0.02) and had significantly higher TSH levels (p=0.0004).

Whether plasma TSH levels were correlated with adiposity, we calculated Spearman Rank correlation of plasma TSH and BMI. There was a tendency towards a relationship between the levels of TSH and BMI (r= 0.125, p= 0.078). However there was a significant positive correltaion between TSH and plasma random blood sugar (r= 0.14, p= 0.046). Levels of TSH were not significanlty correlated with age (p=0.236), systolic blood presure (p=0.144), and diastolic blood pressure (p=0.981).

DISCUSSION:

In our study 16% of participants with BMI > 24.9 had significantly raised levels of TSH with fT4 level within normal limits compared to the 5.4% prevalence of SCH in general population. This observation suggests that SCH was more common in obese and overweight participants when compared to overall general population. In our study female participants had significantly higher TSH levels compared to males and percentage of SCH was more common in females (30%) as compared to males (13%). This finding is parallel with the prevalence of SCH being more in females than males[14]. In a study conducted in Italy it was recorded that SCH was present in 13.7% of obese patients with slightly raised serum TSH level in the face of normal fT4 levels[15]. In another study conducted in India high percentage of obesity (46% versus 34%) was observed in overt hypothyroidism than in SCH[16]. However it will be possible only after case control longitudinal studies to evaluate that in between SCH and obesity which one is the start and which one is the result.

In our study 33 (17%) of all participants were diabetic (Diabetes mellitus type 2) including 26 males and 7 females. Diabetes is a metabolic disorder of chronic nature that is the result of inability of the body to produce insulin (type I DM) or resistance of the body to respond to circulating insulin (type II DM). Although both types of DM differ etiologically and have different pathogenesis

Table1: Descriptive statistics of study participants

Variable	Female (n=40)		Male (n=160)		p- value*
	Median	IQR	Median	IQR	
Age (years)	34.00	12.50	34.000	9.750	0.628
SBP (mmHg)	150.00	48.75	130.00	45.00	0.004
DBP(mmHg)	97.50	27.50	85.00	20.00	0.008
RBS (mg/dl)	125.50	30.00	121.00	25.75	0.344
Ht. (inches)	64.000	2.000	64.000	1.000	0.058
Wt. (Pounds)	188.00	16.00	180.00	30.00	0.0002
BMI (kg/m^2)	32.800	2.150	31.200	5.600	0.002
TSH (mIU/L)	2.880	4.017	1.695	1.488	0.0004
fT4 (pmol/L)	119.30	34.52	115.05	31.99	0.455

but both have one thing in common i.e. inflammation. In our study diabetes type II was more common in those participants who were subclinically hypothyroid. It is possible that DM and SCH may share the immune mediated processes at some stage in the course of the two diseases. This observation also favors the idea that SCH may be the result rather than a cause of obesity and obesity related complications. In our study 15 patients with raised BMI had used lipid lowering drugs for elevated serum cholesterol. The occurrence of lipid abnormalities, particularly hypercholesterolemia and Hypertriglyceridemia in overt hypothyroidism is established; however in SCH this correlation needs further exploration. In a study conducted in Brazil it was found SCH is 3 to 4 times more common in persons with raised total plasma cholesterol concentration[17]. Dyslipidemia increases the chance of developing atherosclerosis which increases the risk for cardiac arrest. Treatment of SCH can reduce the cholesterol by 8% and also the risk of coronary vascular disease[18]. In a study conducted in Southern Denmark it was shown that patients with SCH had elevated level of triglycerides and raised C-reactive protein level that could be a cause of increased chances of coronary artery disease in young males[19].

CONCLUSION:

According to the calcualtion of Spearman Rank correlation of serum TSH and BMI there was a tendency towards a relationship between the levels of TSH and BMI (r= 0.125, p= 0.078).However there was a significant positive correltaion between TSH and plasma random blood sugar (r= 0.14, p= 0.046).

It is recommended to do thyroid profile (TSH and FT4) in overweight and obese individuals paricularly those having obesity related morbidities like diabetes type-2.

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