ORIGINAL ARTICLE

EXPLORING THE LINK BETWEEN OBESITY AND HYPOTHYROIDISM

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Background: Obesity and hypothyroidism are two common clinical conditions that are often connected. This connection is now more important because of an exceptional rise in the prevalence of obesity around the world. Both of these conditions have a noteworthy impact on human health and well-being. The main objective of this study was to determine the frequency of hypothyroidism in obese patients presenting at Ayub Teaching Hospital, Abbottabad. **Methods**: This cross-sectional study was carried out on 242 patients in the Department of Medicine of Ayub Teaching Hospital, Abbottabad from 1st March to 31st August 2022. SPSS version 23.0 was used for data analysis. **Result**: In this study, 242 obese patients were included. The mean age of the patients was 39.55±9.361 years. The mean BMI was 41.62±8.099kg/m^2 ranging from 31 to 61kg/m^2, the mean TSH level was 3.04±2.604mU/l, the mean T4 level was 8.53±2.215pmol/L and the mean T3 level was 1.2195±0.35795nmol/L. Out of a total of 242 patients, 34 (14.0%) were male and 208(86.0%) were female patients. Patients found with overt hypothyroidism were 11 (4.5%), subclinical hypothyroidism were 31 (12.8%) and euthyroid were 200 (82.6%) **Conclusion:** The proportion of hypothyroidism among the obese patients was quite less in our setup and not significantly associated with age and gender of the patients.

Keywords: Thyroid Gland; Hypothyroidism; BMI; T3; T4; Thyroid stimulating hormone

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INTRODUCTION

Thyroid problems are very common and the second most common type of hormone-related disease after diabetes. The amount of thyroid hormones in our blood can cause the body to have either too much or too little.[1] Too much of thyroid hormone secretion will cause hyperthyroidism and too low hormone secretion will lead to hypothyroidism while when hormones are normal in secretion will lead to a euthyroid state. Hypothyroidism is a condition in which the body produces insufficient thyroid hormones or can't use thyroid hormones properly. Signs of this condition are feeling tired, lacking energy, gaining weight, having a slow heart rate, being sensitive to cold temperatures, having difficulty with bowel movements and feeling sad or having difficulty remembering things.[2]

Obesity is a pandemic disease affecting many people, especially in developed countries, and it is getting worse around the world. In Turkey, almost 36 out of 100 people had this condition in 2010 according to a study called TURDEPII.[3]

Being very overweight may cause problems with the thyroid gland as usually overweight may be hypothyroid which happens to many people.[4] Lately, people have been paying more attention to the thyroid gland in obese people.[4] Research has found that Asian people tend to have higher BMI than European people. The people in charge of helping with obesity around the world have suggested that Asian people should be considered overweight if their BMI is between 23.0 and 24.9 kg/m^2, and obese if it's over 25.0 kg/m^2.[5] More and more adults are becoming overweight and obese, according to information from the World Health Organization.[6]

Recent data has shown a hormone called leptin [Fat cell hormone], which comes from fat cells. It is an important reason that overweight people have thyroid dysfunction. According to a study conducted in Spain almost 10% of the population has Thyroid disorders.[7]

Thyroid dysfunction has been associated with increased levels of serum cholesterol and triglycerides, which aggravates the risk of cardiovascular disorders in these patients.[8]

Healthcare professionals need to be careful about the chance of thyroid problems in patients who are very overweight. The issue is finding overweight people who have a slight problem with their thyroid hormones. Sometimes, having high TSH levels may be just because of being overweight. If someone is overweight, their thyroid might not be working properly, but healthcare professionals might not realize it. These people will gain more weight and have abnormal blood lipid and fat levels, which connects back to the link between thyroid problems and obesity.[9,10]

Being overweight and obese are important risk factors for disability-adjusted life-years (DALY) and mortality; in 2015, over 4 million people died and 120 million lost healthy years due to obesity, making up 7.1 and 4.9% of all deaths and health problems around the world.

The prevalence of obesity has significantly increased in the last 30 years. Around 12% of adults around the world are overweight and this is found more often in women than men.[11,12]

Thyroid diseases are considered as most significant public health problem around the world with a prevalence of 5%-10%. In Pakistan, the prevalence of hypothyroidism is 4.1% whereas hyperthyroidism is reported as 5.1%.[13]

Thyroid disorder is commonly identifiable and treatable, but if not diagnosed or left untreated can have serious adverse effects. In spite of the fact impressive work has been done on this subject internationally, there is incredible lack of data locally. Even though hypothyroidism in obesity is a frequently reported problem in our part of world, a few studies have been carried out. Therefore, this study is planned to identify the frequency of hypothyroidism in obese patients presenting at ATH.

MATERIAL AND METHODS

This Cross-sectional study was conducted in the Department of Medicine, Ayub Teaching Hospital, Abbottabad from 1st March to 31st August 2022. After ethical approval and informed consent, patients were interviewed and data was recorded on a predesigned pro forma. Variable of the study were patient name, age, gender, BMI and TSH, T3and T4 levels. SSP-23.0 was used for its analysis. For significance testing, Chi square test was applied at 5% level of significance.

RESULTS

Out of a total of 242 patients, 34 (14.0%) were male and 208 (86.0%) were female patients. (Forty-nine) 20.2%) of patients were below 30 years of age and 193 (79.8%) were 30 years and above. Table 1 shows data about quantitative variables. Patients found with overt hypothyroid were 11(4.5%) with subclinical hypothyroidism were 31 (12.8%) and with euthyroid were 200 (82.6%) as shown in Table 2.

Table 3. Shows the Frequency distribution of age and gender with respect to thyroid status: patients below 30 years with overt hypothyroidism were 2 (0.8%) with subclinical hypothyroidism were 2 (0.8%) and euthyroid were 49(20.2%). Patients of 30 years and above with overt hypothyroidism were 9(3.7%) with subclinical hypothyroidism were 29 (12.0%) and euthyroid were 155 (64.0%). With respect to gender, 2 (0.8%) male patients had overt hypothyroidism 2(0.8%) had subclinical hypothyroidism and 30 (12.4%) were euthyroid. Female patients with overt hypothyroidism were 9(3.7%), with subclinical hypothyroidism were 29 (12.0%) and euthyroid were 170 (70.2%).

Table 1: Means of continuous variables

	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	242	20	60	39.55	9.361
Height (meters)	242	1.10	1.83	1.56	0.160
Weight (kg)	242	60	150	99.95	14.274
BMI	242	31	61	41.62	8.099
TSH Level	242	0	11	3.04	2.604
T4 Level	242	2	13	8.53	2.215
T3 Level	242	0.02	2.90	1.2195	0.35795

Table-2: Demographic characteristics of hypothyroidism

Variable		N (%)
Age Group	Below 30 years	49 (20.2)
	30 years and above	193 (79.8)
Gender	Male	34 (14.0)
	Female	208 (86.0)
Thyroid status	Overt hypothyroid	11 (4.5)
	Subclinical hypothyroid	31 (12.8)
	Euthyroid	200 (82.6)

Table-3: Frequency distribution of age group and gender with respect to thyroid status:

Age group and Gender	Thyroid			Total	*p*-value
	Overt hypothyroid	Subclinical hypothyroid	Euthyroid		
Below 30 years	2	2	45	49	
	0.8%	0.8%	18.6%	20.2%	0.116
30 years and above	9	29	155	193	
	3.7%	12.0%	64.0%	79.8%	
Male	2	2	30	34	
	0.8%	0.8%	12.4%	14.0%	
Female	9	29	170	208	0.409
	3.7%	12.0%	70.2%	86.0%	
Total	11	31	200	242	
	4.5%	12.8%	82.6%	100.0%	

The chi-square test was used to evaluate the statistical significance

DISCUSSION

In this study, 82.6% of obese patients were reported as euthyroidism, 4.5% as overt hypothyroidism and 12.8% as subclinical hypothyroidism, whereas a study carried out in India by De Moura *et al* revealed that overt hypothyroidism was found in 3.5–7.4% and subclinical hypothyroidism in 14.6–53% of obese patients.[14]

An increase in BMI has a huge impact on thyroid hormone levels. Due to the increasing prevalence of obesity worldwide, it is essential to determine obesity-related thyroid dysfunctions. The goal of this research is to find out the frequency of hypothyroidism in patients with obesity. Around 4.6% of people in the USA have been diagnosed with hypothyroidism, while 3.05% of the population was hypothyroid in Europe.[15]

One study carried out by Kota *et al*, in Hyderabad India showed obvious hypothyroidism was present in 33% of the obese population which is a significant number.[16] This is in contrast to our study where only 4.5% of the obese population was overtly hypothyroid. Another study conducted by Montoya-Morales et al in Mexico revealed that overt hypothyroidism was found in 8% and subclinical hypothyroidism in 6% of obese patients.[17].

Other studies which were conducted by armed forces showed that hypothyroidism is more prevalent in obese females than the male population[18] which is similar to our study results.

Not many studies have looked specifically into the affiliation between hypothyroidism and obesity.[19] On the other hand, hyperthyroidism has traditionally been associated with weight loss. However, it is not yet clear whether this is true for hypothyroidism.[20]

Thyroid gland disorder is a common medical problem that affects many individuals, though Health care professionals can typically diagnose and treat the condition effectively. However, if it's not diagnosed and left untreated, it can cause serious problems. Healthcare professionals who take care of people first can teach them how to make healthier choices and live better lives. It's very important for people with obesity and thyroid problems to be careful.

This research is an observational study and is limited by patient selection bias. This study was conducted in one hospital with a small sample size; therefore, the results are not generalizable to larger populations. In future studies these shortcomings should be overcome, this will ultimately improve the generalizability and comparison of our current findings.

CONCLUSION

The proportion of hypothyroidism among the obese patients was quiet less in our setup and not significantly associated with the age and gender of the patients. Based on these research findings, we recommend regular screening of obese patients for underlying hypothyroidism, especially for obese female patients, to ensure early detection of hypothyroidism.

AUTHORS' CONTRIBUTION

SM: Literature search, data collection. SR: Write-up, data collection. FN, ZS: Statistical analysis. NR: Data interpretation.

REFERENCES

1. Dangol R, Lanjekar P, Pulipati C. Thyroid Function Abnormalities among Hospital Patients of Hilly Nepal. J Lumbini Med Coll 2018;5(1):29–33.
2. Sorensen JR, Winther KH, Bonnema SJ, Godballe C, Hegedus L. Respiratory Manifestations of Hypothyroidism: A Systematic Review. Thyroid 2016;26(11):1519–27.
3. Satman I, Omer B, Tutuncu Y, Kalaca S, Gedik S, Dinccag N, *et al*. Twelve-year trends in the prevalence and risk factors of diabetes and prediabetes in Turkish adults. Eur J Epidemiol 2013;28(2):169–80.
4. Longhi S, Radetti G. Thyroid function and obesity. J Clin Res Pediatr Endocrinol 2013;5(Suppl 1):40–4.
5. Sharma P, Magar NT, Mahesh BK. Prevalence of thyroid disorder in residents of Western region of Nepal. Int J Appl Sci Biotechnol 2021;9(3):169–75.
6. Bahadur S, Yousaf M, Ayaz HM, Sohail Z, Rehman AU, Baloch S, *et al*. Self-reporting of obesity, overweight and health risks among 1st year MBBS students of Rehman medical college, Peshawar. Khyber Med Univ J 2013;5(2):24–7.
7. Valdes S, Maldonado-Araque C, Lago-Sampedro A, Lillo A, Garcia-Fuentes E, Perez-Valero, *et al*. Population-based national prevalencthyroid dysfunction in Spain and associated factors: diabetes study. Thyroid 2017;27(2):156–66.
8. Elgazar E, Esheba N, Shalaby S, Mohamed W. Thyroid dysfunction prevalence and relation to glycemic control in patients with Type 2 diabetes mellitus. Diabetes Metab Syndr 2019;13(4):2513–7.
9. Verma A, Jayaraman M, Kumar HK, Modi KD. Hypothyroidism and obesity? Cause or effect? Saudi Med J 2008;29:1135–8.
10. Yadav A, Yadav GA, Narsingrao KK, Kumar LN, Yadav GS. Prevalence of thyroid disorders among patients with diabetes in rural South India. Diabetes Metab Syndr 2021;15(3):885–9.
11. Afshin A, Forouzanfar MH, Reitsma MB, Sur P, Estep K, Lee A, *et al*. Health effects of overweight and obesity in 195 countries over 25 years. N Engl J Med 2017;377(1):13–27.
12. Bukhari SI, Ali G, Memom MY, Sandeelo N, Alvi H, Talib A, *et al*. Prevalence and predictors of thyroid dysfunction amongst patients with Type 2 diabetes mellitus in Pakistan. J Family Med Prim Care 2022;11(6):2739–43.
13. Blüher M. Obesity: global epidemiology and pathogenesis. Nat Rev Endocrinol 2019;15(5):288–98.
14. De Moura Souza A, Sichieri R. Association between serum TSH concentration within the normal range and adiposity. Eur J Endocrinol 2011;165:11–5.
15. Garmendia Madariaga A, Santos Palacios S, Guillén-Grima F, Galofré JC. The incidence and prevalence of thyroid

dysfunction in Europe: A meta-analysis. J Clin Endocrinol Metab 2014;99(3):923–31.
16. Kota SK, Sarangi J, Jali SN, Meher LK, Raveendranathan SK. Prevalence of hypothyroidism in patients with metabolic syndrome. Thyroid Res Pract 2013;10(2):60–4.
17. Montoya-Morales DS, Tapia-González MA, Alamilla-Lugo L, Sosa-Caballero A, Muñoz-Solís A, Jiménez-Sánchez M. Alteraciones de la función tiroidea en pacientes con obesidad mórbida. Rev Med Inst Mex Seguro Soc 2015;53(Suppl 1):S18–22.
18. Rauf A, Mirza SA, Utra KA. Prevalence of hypothyroidism in obese females. Pak Armed Forces Med J 2015;65(1):885–6.
19. Amouzegar A, Kazemian E, Abdi H. Association between thyroid function and development of different obesity phenotypes in euthyroid adults: a nine-year follow-up. Thyroid 2018;28(4):458–64.
20. Ross DS, Burch HB, Cooper DS. 2016 American Thyroid Association Guidelines for diagnosis and management of hyperthyroidism and other causes of thyrotoxicosis. Thyroid 2016;26(10):1343–421.

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