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Original Article

Investigating the Prevalence of Hypothyroidism in Obese & Overweight Individuals in Sir Ganga Ram Hospital, Lahore

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Abstract

Objective: Aim of this study was to workup for the prevalence of thyroid disorders in hypothyroid patients in overweight & obese individuals.

Methods: This cross-sectional study was performed in the medicine department of Sir Ganga Ram Hospital, in the city of Lahore during 7th December 2019 to 6th June 2021. After getting approval from the ethical committee of Sir Ganga Ram Hospital and after fulfilling inclusion and exclusion criteria, 235 patients were enrolled. Anthropometric measurements were performed. Then blood sample was taken after all aseptic measures by using disposable syringe of 3 cc and was forwarded to the laboratory for assessment of serum thyroid stimulating hormone (TSH), free thyroxine (free T4) and Thyroid peroxidase antibody levels (TPO Antibodies). Reports were assessed and levels were noted. If levels were deranged, the hypothyroidism was managed as per standard protocol. Written informed consent was taken by each & every individual involved in study.

Results: Mean age of the patients was 49.79+14.29 years, out of total 235, 139(59. 15%) patients were male. Mean TSH level of the patients was 4 .57+2 04IU/ml. Hypothyroidism among obese was noted in 47(20.42%) patients. TPO Antibodies was positive in 8 (3.4%) patients. However, no association was noticed between overweight group and odds of hypothyroidism and TPO Antibodies positivity in adjusted results.

Conclusion: Obesity was linked with a high risk of overt hypothyroidism and TPO Antibodies positivity.

Keywords: Hypothyroidism, Obesity, Over weight

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Introduction

Subclinical hypothyroidism, manifested as high serum TSH with serum free T4 concentrations at the lower level of normal euthyroid range, affects almost approximately 4-10% of general population. It has been observed to be associated with more severe coronary & carotid artery disease. Diseases of thyroid are among the most prevalent endocrine illnesses all over the world. Obesity has a very close association with thyroid dysfunction which may be due to the impact of thyroid hormones on metabolism of lipids, glucose, blood pressure, & cardiovascular dysfunctions.

Metabolic Syndrome is defined as if three out of all five cardiometabolic risk factors are found among hyperglycemia, low serum HDL cholesterol level. high serum triglycerides level[1], systolic increase in blood pressure & in obese individuals. It enhances the chance of cardiovascular illnesses & type 2 diabetes mellitus. Evidence favors that metabolic syndrome is having strong association with disorders of endocrine including disorders of thyroid gland. It may further adds to cardiovascular illness risk hence increase morbidity & mortality.[1, 2] Thyroid disorders are the most prevalent endocrine disorders all over the world. It has been seen that almost forty two million people in India have thyroid illnesses. Both hyperthyroidism & overt hypothyroidism are linked with high prevalence of metabolic syndrome & its components, while currently data on subclinical hypothyroidism is very limited especially in general population.[3] Al Jabri et al, 4 found that hypothyroidism was present in 18.8% individuals with metabolic syndrome. Reason of our study is to find the frequency of hypothyroidism in individuals with metabolic syndrome. Literature suggested that there is variation in the frequency

of hypothyroidism in individuals with metabolic syndrome, showing that disturbed thyroid hormone level may also be part of metabolic syndrome and may coexist with it, but in routine patients who develop metabolic syndrome do not bother for endocrinal changes in the body, as in our society, knowledge about metabolic syndrome is very low & people usually do not bother to check for endocrinal changes after diagnosis of metabolic syndrome and mostly patients present after the complications develop. So there is a need to conduct a study to get the evidence and implement the regular screening 3 of patients of metabolic syndrome for thyroid functions as well. So we want to conduct this study to get information and data regarding coexistence of hypothyroidism in adults with metabolic syndrome belonging to local community and in future we can plan the strategies to lessen the chance of metabolic syndrome to prevent its associated complications.[5]

Methods

This was a cross-sectional type of study performed in medicine department of Sir Ganga Ram Hospital, in city of Lahore for a period of six months after synopsis approval i.e. 18-11-2021 to 18-5-2022 Total of 235 cases were calculated with 95% level of confidence, 5% error margin & taken percentage of hypothyroidism i.e. 18.8% in patients with metabolic syndrome. Non-probability, consecutive sampling technique was used. Patients age range between 25-75 years, of both genders, with metabolic syndrome were included while those with recurrent hypothyroidism or goiter (on medical record), pregnant females, liver disorders (AST>25IU, ALT>30IU, hepatitis B or C), renal disorders (creatinine >2 mg/dl or on hemodialysis), biventricular failure, took oral contraceptive pills, lipid lowering agents and other drugs that alter thyroid function & lipid levels were excluded. After taking approval from hospital ethical committee, 235 patients fulfilled inclusion criteria were registered in the study from out patient department of Medicine of Sir Ganga Ram Hospital in Lahore. Written consent was taken from each & every patient enrolled in study. Demographic variables like name, age, gender, body mass index, smoking (>5 pack years), were noted. Then 3 cc blood was taken by using 3cc disposable syringe and was transferred to the laboratory for assessment of TSH level. Reports were assessed and level was noted. If levels were deranged, the hypothyroidism was managed as per standard protocol. All this information was recorded on proforma. The registered data was entered and analyzed in computer system software SPSS version 22. Quantitative variables like age and BMI were presented as mean and standard deviations. Quantitative variables like, gender, smoking and hypothyroidism was posted as frequency and percentage. Data was stratified for age, gender and smoking, post stratification, chi-square test was applied to compare hypothyroidism in stratified group. P-value ≤0.05 was considered as significant.

Results

Mean age in patients was 49.79±14.29 years with minimum & maximum age of 25 & 75 years. In this study 139(59.15%) patients were male & 96(40.85%) were females. According to this study 69(29.36%) of them were smokers. Mean SBP value of patients was 174.17 ± 27.53 mmHg and the mean DBP value was 105.62± 13.43 mmHg. The mean FBS value of the patients was 162.00±28.04 g/dl with minimum and maximum FBS values of 115 & 210 g/dl respectively. The mean body mass index (BMI) of the patients was 35.21±2.93 kg/m^2 with minimum & maximum BMI of 30.5 & 40.5 kg/m^2. Mean serum triglycerides level of patients was 228.28± 39.99 & mean serum HDL level of the patients was 22.42±9.98.

Table 1: *Descriptive statistics of triglycerides and HDL of the patients*

	n	Mean	Standard Deviation	Min.	Max.
Triglycerides	235	228.28	39.99	156.00	300.00
HDL	235	22.42	9.98	5.00	39.00

The mean serum TSH level of patients was 4.57±2.04 IU/ml with minimum & maximum serum TSH values of 2.10 & 9.70 IU/ml respectively. The study results showed that the hypothyroidism was noted in 77(32.77%) of them.

Table 2: *Descriptive statistics of TSH (IU/ml) of the patients*

	n	235
TSH (IU/ml)	Mean	4.57
	Standard Deviation	2.04
	Minimum	2.10
	Maximum	9.70

In those having age ≤ 50 years, hypothyroidism was noted in 35(30.2%) patients and in those having age >50 years, hypothyroidism was noted in 42(35.3%) patients. This difference was seen statistically insignificant. i.e. p-value=0.403. In males, hypothyroidism was noted in 38(27.3%) patients and in females it was noted in 39(40.6%). This difference was seen statistically significant. i.e. p-value=0.033. In smokers, hypothyroidism was noted in 11(15.9%) patients and in nonsmoker hypothyroidism was noted in 66(39.8%) patients. This difference was statistically significant. i.e. p-value= 50 42 77 35.3% 64.7% 100% Total 77 158 235 32.8% 67.2% 100.0% 67 Comparison of hypothyroidism between gender Hypothyroidism Total p-value Yes No

Gender Male 38 101 139 0.033 27.3% 72.7% 100% Female 39 57 96 40.6% 59.4% 100.0% Total 77 158 235 32.8% 67.2% 100% 68 Comparison of hypothyroidism between smoking Hypothyroidism Total p-value Yes No Smoking Yes 11 58 69

Table 3: *Comparison of hypothyroidism between smoking*

		Hypothyroidism		Total	p-value
		Yes	No		
Smoking	Yes	11	58	69	<0.001
		15.9%	84.1%	100.0%	
	No	66	100	166	
		39.8%	60.2%	100.0%	
Total		77	158	235	
		32.8%	67.2%	100.0%	

Discussion

Metabolic syndrome can have associations with non-endocrine & endocrine illnesses & has multiple after effects. Changes in thyroid function, although well recognized by everyone, may not be identifiable on clinical grounds and there is inconsistent checking of thyroid functions in metabolic syndrome.[6] Thyroid hormones play a key role in regulation of energy balance and in metabolism of glucose and serum lipids. Individual parts of metabolic syndrome have been examined with reference to function of thyroid gland.[5] In this study in metabolic syndrome individuals, hypothyroidism was noted in 77(32.77%). A study by Saroj Khatiwada et al[2] presented that thyroid disorders were observed in 31.9 % (n = 54) of individuals with metabolic syndrome according to which major thyroid dysfunction was subclinical hypothyroidism (26.61 %) followed by overt hypothyroidism (3.48 %) & subclinical hyperthyroidism (1.71%). It was more common in female patients (39.7%, n = 29) than their counterpart males (26 %, n = 25) but it was not significant statistically (P value = 0.068). Al Jabri et al6 found that hypothyroidism was present in 18.8% patients with metabolic syndrome. Chang et al[3], reported that after controlling risk factors, patients with metabolic syndrome were at a 21% excess risk of 7 developing subclinical hypothyroidism. While Naureen et al., conducted another study, in Rawalpindi, 25% patients of metabolic syndrome had hypothyroidism. While in another study, hypothyroidism was seen 13.9% patients of metabolic syndrome.[2,4] Another study in district Kavre of the Republic of Nepal by Gyawali et al showed thyroid disorders in 31.85 % with individuals of metabolic syndrome, more familiar disorder was subclinical hypothyroidism (29.33 %) then followed by overt hypothyroidism (1.69 %) & subclinical hyperthyroidism (0.83 %)[8]. In hospital based studies by Baral et al. & Khatiwada et al. it has shown much high frequency of thyroid diseases.[9,10] A study by Meher et al. experienced a high percentage of subclinical hypothyroidism (22.01%) & overt hypothyroidism (4.01%) with metabolic syndrome individuals.[11] A study in eastern Nepal by Baral et al showed hyperthyroid & hypothyroid in 13.69 % & 17.18 % among general public respectively. Likewise, Khatiwada et al. found thyroid disorders in 36.01 % of patients with diabetes mellitus in a well-known tertiary care hospital of eastern Nepal. Prevalence of high rates of thyroid disorders in this part of the world may perhaps be 7 secondary to high rate of autoimmune nature of thyroid gland, like iodine excess or deficiency.[10] In this study , mean serum TSH level of patients was 4.57±2.04 IU/ml with minimum and maximum TSH values of 2.10 & 9.70 IU/ml respectively A serum TSH level more than 4.2 mU /L is considered as a case of primary hypothyroidism.[12,13] Hence, such serum TSH levels were used as criterion for inclusion in the present study. The wide range of serum TSH values in patients with low level of serum FT4 is not unusual as observed in our patients.[14] Another study showed that increased levels of serum TSH in subclinical hypothyroidism with a serum TSH>10mIU/l is linked with high chances of prevalence in individuals of metabolic syndrome.[15,16] However, even high normal serum TSH levels and low normal serum free T4 levels were significantly linked with much more high prevalence of metabolic syndrome, which can be of critical value when evaluating such subjects.[16,17] Hypothyroid is very much common in those with metabolic syndrome and it is suggested that it should be thought of & screened in newly labelled metabolic syndrome individuals.[18]

Conclusion

From the results of this study we concluded that frequency of hypothyroidism is 32.77% in patients with metabolic syndrome so every patient of metabolic syndrome must be screened for subclinical hypothyroidism.

Conflict of Interest: *None*

Funding Source: *None*

References

1. Ijaz A. Association of Hypothyroidism with Metabolic Syndrome. J Islamic Int Med Col. 2018;13(4):172-3.
2. Khatiwada S, Sah SK, Kc R, Baral N, Lamsal M. Thyroid dysfunction in metabolic syndrome patients and its relationship with components of metabolic syndrome. Clin Diab Endocrinol. 2016;2(1):1-5.
3. Cheserek MJ, Wu G, Shen L, Shi Y, Le G. Evaluation of the relationship between subclinical hypothyroidism and metabolic syndrome components among workers. Int J Occupational Med Environment Health. 2014; 27 (2):175-87.

4. Aljabri KS, Alnasser IM, Facharatz B, Alshareef MA, Khan PM, Mallosho AM, et al. The frequency of hypothyroidism in saudi community-based hospital: a retrospective single centre study. Trends Diab Metab. 2019; 2(1):1-4.
5. Kannan L, Pomerantz S, Chernoff A. Hypothyroidism and the metabolic syndrome. Endocrinol Metabol Int. 2017;5(2).188-91.
6. Dumitrescu AM, Refetoff S. The syndromes of reduced sensitivity to thyroid hormone. Biochim Biophys Acta. 2013;1830(7):3987-4003.
7. Huang SA, Tu HM, Harney JW, Venihaki M, Butte AJ, Kozakewich HP, et al. Severe hypothyroidism caused by type 3 iodothyronine deiodinase in infantile hemangiomas. N Engl J Med. 2000;343(3):185-9.
8. Gyawali P, Takanche JS, Shrestha RK, Bhattarai P, Khanal K, Risal P, et al. Pattern of thyroid dysfunction in patients with metabolic syndrome and its relationship with components of metabolic syndrome. Diab Metabol J. 2015;39(1):66-73. 85
9. Baral N, Lamsal M, Koner B, Koirala S. Thyroid dysfunction in eastern Nepal. Southeast Asian J Trop Med Public Health. 2002;33(3):638-41.
10. Khatiwada S, Kc R, Sah SK, Khan SA, Chaudhari RK, Baral N, et al. Thyroid dysfunction and associated risk factors among Nepalese diabetes mellitus patients. Int J Endocrinol. 2015; DOI: 10.1155/2015/570198.
11. Meher LK, Raveendranathan SK, Kota SK, Sarangi J, Jali SN. Prevalence of hypothyroidism in patients with metabolic syndrome. Thyroid Res Pract. 2013;10(2): 60.
12. Sawin CT, Castelli WP, Hershman JM, McNamara P, Bacharach P. The aging thyroid: thyroid deficiency in the Framingham study. Arch Intern Med. 1985; 145(8): 1386-8.
13. Ross D. Subclinical Hypothyroidism: İn Werner and İngbar's The Thyroid A Fundemental and Clinical Text. Editors, Braverman LE, Utiger RD 6th Edition, JB Lippincot Co. 1991;92:1258-61.
14. Mandel SJ, Brent GA, Larsen PR. Levothyroxine therapy in patients with thyroid disease. Ann Int Med. 1993; 119(6):492-502.
15. Waring AC, Rodondi N, Harrison S, Kanaya AM, Simonsick EM, Miljkovic I, et al. Thyroid function and prevalent and incident metabolic syndrome in older adults: the Health, Ageing and Body Composition Study. Clin Endocrinol. 2012;76(6):911-8.
16. Lee YK, Kim JE, Oh HJ, Park KS, Kim SK, Park SW, et al. Serum TSH level in healthy Koreans and the association of TSH with serum lipid concentration and metabolic syndrome. Korean J Int Med. 2011;26(4):432.
17. Iwen KA, Schröder E, Brabant G. Thyroid hormones and the metabolic syndrome. Eu Thyroid J. 2013; 2(2): 83-92. 86
18. Erdogan M, Canataroglu A, Ganidagli S, Kulaksizoglu M. Metabolic syndrome prevalence in subclinic and overt hypothyroid patients and the relation among metabolic syndrome parameters. J Endocrinol Invest. 2011;34(7):488-92