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Original Article

Frequency of Obesity and Dyslipidemia in ThePatients with Hypothyroidism

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Abstract

Background: Hypothyroidism is a common endocrine disorder resulting from deficiency of thyroid hormone. Thyroid hormones have regulatory function on different metabolism in human. Hypothyroidism can lead to changes in lipid profile and BMI of people. The objective of the study was to evaluate the frequency of obesity and dyslipidemia in hypothyroid patients.

Objective: To evaluate the frequency of obesity and dyslipidemia in hypothyroid patients.

Materials and Methods: This was an observational cross-sectional study amongpurposively selected 96 patients diagnosed as hypothyroidism at Medicine and Endocrinology department at Dhaka National Medical College & Hospital from August 2017 to September 2018. Analysis was done using the analytic software SPSS version 21.0.

Results: Age of the patients ranged from 21 to 60 years with a mean of 39.2±9.5years. Majority of the patients were female (86.5%) and housewives (71.9%), belongs to middle class society (89.6%), age of the highest number of thepatients were in 31-40 years of age group (37.5%). In the study, TSH (59.4%), FT3(87.5%) and FT4(86.5%) level was within normal range, categorized as subclinical hypothyroidism 86.5% of patient. BMI found as obese in majority of the patient, among them category I obesity, category II obesity and category III obesity were 46.9%, 32.3% and 5.2% respectively. Laboratory test results for lipid profile showed majority of the patient had desirable level of total cholesterol (62.5%), triglyceride level higher than normal level includes High level of triglyceride (33.3%) and Hypertriglyseridemic (39.6%). LDL cholesterol level was higher in more than half of the better outcome of patients comprising Near/above optimal, Borderline high, High and Very high. Majority (71.9%) of them had normal level of HDL cholesterol.

Conclusion: Subclinical hypothyroidism is more prevalent in the patients. Higherproportion of them have elevated level of triglyceride and LDL cholesterol. Obesity is more common in hypothyroidism patients. Proper management dyslipidemia and obesity is recommended for the patients with hypothyroidism.

Keywords: Hypothyroidism, Obesity, Dyslipidemia.

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Introduction

Hypothyroidism is a common endocrine disorder resulting from deficiency of thyroid hormone. It usually is a primary process in which the thyroid gland is unable to produce sufficient amounts of thyroid hormone. [1,2] Hypothyroidism may be either subclinical or overt. Subclinical hypothyroidism is defined as an elevated serum TSH level, usually above 10 mIU/L, associated with normal total or T4 and T3 values. An elevated TSH, usually above 10 mIU/L,

in combination with asubnormal free T4 characterizes overt hypothyroidism.[3] The frequency of hypothyroidism increases with age. Hypothyroidism is most prevalent in elderly populations, with 2-20% of older age groups having some form of hypothyroidism. [4] The Framingham study found hypothyroidism in 5.9% of women and 2.4% of men older than 60 years'.[5] Overt

hypothyroidism increases the TC and LDL-C.[6] It is characterized by hypercholesterolemia and a marked increase in LDLbecauseof a decreased fractional clearance of LDL by a reduced number of LDL receptors in the liver. However, the controversypersists regarding the lipids level in subclinical hypothyroidism and its clinical significance. Thyroid dysfunction is associated with changes in body weight and composition, body temperature, and total and resting energy expenditureindependently of physical activity. Thyroid function tests in people who are morbidly obese may differ from thosein a comparable group of lean people, with a serum TSH that is higher in the obese, but with no tendency of FT3 and FT4 in serum to be low in the obese. On the contrary, FT3 and also in some studies FT4 in serum tends to be higher in obese people. The pattern has been most clearly observed in overweight children and adolescents, where the frequency of underlying thyroid disease in the population is much lower than in adults.[7]

Materials and Methods

This was an observational cross-sectional study. The patient was selected by purposive sampling method. Duration of the study was from November 2017 to September 2018. The study population was the patients with diagnosed Hypothyroidism by medicine consultant at Medicine department and registered endocrinologist at Endocrinology department of Dhaka National Medical College & Hospital (DNMC&H), Dhaka, Bangladesh. A total Number of 96 patients were included in this study.

Results

Table I showed the socio-demographic characteristics of the respondents. The patients age ranged from was 21 years to 60 years with a mean of 36.2±9.5 years. Largest number of the patients were from 31-40 years of age group (37.5%) followed by 21-30 years (35.4%). The male female ratio was 1:6.38.

Table I: Socio-demographic characteristics of the respondents. (N=96)

Characteristics	n	%
Age in years		
21-30 yrs.	34	35.4
31-40 yrs.	36	37.5
>40 yrs.	26	27.1
Mean ±SD	36.20±9.496	
Sex		
Male	13	13.5
Female	83	86.5

Table II showed that about two-third of the patients were already suffering from hypothyroidism (74.0%) and remaining one-third were newly diagnosed (26,0). The highest proportion of patients was suffering from hypothyroidism for 1-3 years (41.7%) followed by more than 3 years (32.3

Table II: Personal history of hypothyroidism. (N=96)

Personal history	n	%
Previous history of hypothyroidism		
Yes	71	74.0
No	25	26.0
Duration of hypothyroidism in years		
New diagnosed	25	26.0
1-3	40	41.7
>3	31	32.3
History of taking drug for thyroid dysfunction management		
Yes	71	74.0
No	25	26.0

Table III showed that only 8.3% patients had family history of thyroid dysfunction and others did not have any family history (91.7%) of thyroid dysfunction. No known case of family history of dyslipidemia among the respondents. Majority (69.8%) of the patients did not know about their family history of dyslipidemia.

Table III: Family history thyroid dysfunction and dyslipidemia. (N=96)

Family history	n	%
Family history of thyroid dysfunction		
Yes	8	8.3
No	88	91.7
Don't know	0	0.0
Family history of dyslipidemia		
Yes	0	0.0
No	29	30.2
Don't know	67	69.8

Table IV showed that highest (59.4%) of the patients had normal TSH level, FT3 level of the majority (87.5%) of the patients was normal and majority (81.3%) of them had normal level of FT4

Table IV: Thyroid function test. (N=96)

Thyroid function test	n	Percentage (%)
TSH		
Normal (0.2 -4.5 mIU/L)	57	59.4
Elevated (> 4.5 mIU/L)	39	40.6
Mean ±SD	4.68±3.44	
Free T3		
Normal (0.16 – 0.4 ng/dl)	84	87.5
Low (< 0.16 ng/dl)	12	12.5
Mean ±SD	0.24±0.067	
Free T4		
Normal (0.7 – 1.63 ng/dl)	83	86.5
Low (<0.7 ng/dl)	13	13.5
Mean ±SD	1.04±0.37	

Table V showed that majority (62.5%) of the patients had total cholesterol level within desirable level. Hypertriglyseridemic was found in highest (39.6%) of the patients. Optimum LDL cholesterol was found in highest (44.8%) of the patients followed by near/above optimal level (30.2%). Majority (71.9%) of them had normal level of HDL cholesterol.

Table V: Serum lipid profile of the respondents. (N=96)

Serum lipid profile	n	Percentage (%)
Total cholesterol		
Desirable: <200 mg/dL	60	62.5
Borderline high: 200-239 mg/dL	25	26.0
High: >239 mg/dL	11	11.5
Mean ±SD	197.44±38.39	
Triglyceride		
Normal: <150 mg/dL	26	27.1
High: 150-199 mg/dL	32	33.3
Hypertriglyseridemic:200-499 mg/dL	38	39.6
Very high: >499 mg/dL	0	0.0
Mean ±SD	184.96±53.93	
LDL cholesterol		
Optimal: <100 mg/dL	43	44.8
Near/above optimal: 100-129 mg/dL	29	30.2
Borderline high: 130-159 mg/dL	16	16.7
High: 160-189 mg/dL	6	6.3
Very high: >189 mg/dL	2	2.1
Mean ±SD	184.96±53.93	
HDL cholesterol		
Normal: ≥40 mg/dL	69	71.9
Low: <40 mg/dL	27	28.1
Mean ±SD	43.87±8.48	

Table VI showed that there was no association between category ofhypothyroidism and BMI.

Table VI: Association between category of hypothyroidism and BMI. (N=96)

Category of hypothyroidism	BMI				Chi-square value	Degree of freedom (df)	P-value
	Frequency	Category I Obesity	Category II Obesity	Category III obesity			
	n(%)	n(%)	n(%)	n(%)			
Overt hypothyroidism	1 (7.7)	6 (46.2)	4(30.8)	2(15.4)	3.608	3	0.307
Subclinical hypothyroidism	14(16.9)	39(47.0)	27(32.5)	3(3.6)			

Table VII showed that there was no association between category of hypothyroidism and total cholesterol.

Table VII: Association between category of hypothyroidism and total cholesterol. (N=96)

Hypothyroidism Category	Total cholesterol			Chi-square value	Degree of freedom (df)	P-value
	Desirable	Boarder line high	High			
	n (%)	n (%)	n (%)			
Overt hypothyroidism	11(84.6)	0(0.0)	2 (15.4)	5.295	2	0.071
Subclinical hypothyroidism	49(59.0)	25(30.1)	9 (10.8)			

Table VIII showed that there was no association between category ofhypothyroidism and triglyceride.

Table VIII: Association between category of hypothyroidism and triglyceride. (N=96)

Category of hypothyroidism	Triglyceride			Chi-square value	Degree of freedom (df)	P-value
	Normal	High	Hypertrigly-ceridemic			
	n (%)	n (%)	n (%)			
Overt hypothyroidism	4 (30.8)	3 (23.1)	6 (46.2)	0.714	2	0.700
Subclinical hypothyroidism	22 (59.0)	29 (30.1)	32 (10.8)			

Discussion

Thyroid disorders are among the most common endocrine disorders and usually alter lipid metabolism. In our study subclinical hypothyroidism is more

common than overt hypothyroidism. It is being diagnosed more frequently with great awareness than overt hypothyroidism these days. In our study, mean age of the hypothyroid patients was of 36 years that has similarity with the study of Sharma et al.[8] and less than what was found by Sadariya et al.[9] suggesting that more patients of hypothyroidism seeking healthcare is around 40 years of age group. As at this age group of people are more prone to cardiovascular complications and other problems. In the study, hypothyroidism patients comprise 86.5% women and 13.5% men, male to female ratio was 1:6.[10] which had similar male to female ratio 1:7 as a previous study [11] which shows that hypothyroidism is more common in women than in men. One of the most common causes of hypothyroidism in women is the autoimmune disease called Hashimoto's disease, in which antibodies gradually target the thyroid and destroy its ability to produce thyroid hormone, pregnancy and menopause are other factors those increases the prevalence of hypothyroidism in female.[12] Majority of the respondents in the study were suffering from subclinical hypothyroidism. Pirich et al.[13] reported an incidence of 1.1% for newly diagnosed subclinical hypothyroidism and no case of overt hypothyroidism. Hypothyroidism and obesity frequently co-existed in varying degree of severity. Hypothyroidism leads to increased body weight by increasing mucin deposits in skin and other organs and by salt and water retention. Subtle elevation of TSH is associated with measurable deficiency in resting energy expenditure and increased body weight.[14] In the present study the mean total cholesterol value was 197 mg/dL, which had similarity with some other studies found higher level of total cholesterol. [15] The mean serum triglyceride value was 185 mg/dL, majority of the patient in present study had higher level of triglyceride.

Conclusion

The study demonstrates that subclinical hypothyroidism is more prevalent in relation to overt hypothyroidism. A higher proportion of patients have elevated level of lipid especially triglyceride and LDL cholesterol. Obesity is also very common among the hypothyroidism patients. Therefore, it may be a good practice to screen patients with hypothyroidism for evidence of dyslipidemia and obesity. More studies are required to find out the actual scenario of obesity and lipid profile among the hypothyroid patient and find out the correlation and association.

References

1. Orlander PR, Varghese JM, Freeman LM. Hypothyroidism 2017
2. Walker BR, Colledge NR. Davidson's Principles and Practice of Medicine E-Book: Elsevier Health Sciences; 2013.
3. Garber JR, Cobin RH, Gharib H, Hennessey JV, Klein I, Mechanick JI, et al. Clinical practice guidelines for hypothyroidism in adults:cosponsored by the American Association of Clinical Endocrinologists and the American Thyroid Association. Thyroid. 2012;22(12):1200-35.
4. Duntas LH. Thyroid disease and lipids. Thyroid. 2002;12(4):287-93.
5. Sawin CT, Castelli WP, Hershman JM, McNamara P, Bacharach P.The aging thyroid: thyroid deficiency in the Framingham study. Archives of Internal Medicine. 1985;145(8):1386-8.
6. Jung CH, Sung KC, Shin HS, Rhee EJ, Lee WY, Kim BS, et al. Thyroiddysfunction and their relation to cardiovascular risk factors such as lipidprofile, hsCRP, and waist hip ratio in Korea. The Korean journal of internal medicine. 2003;18(3):146.
7. Biondi B. Thyroid and obesity: an intriguing relationship. Oxford University Press; 2010. Laurberg P, Knudsen N, Andersen S, Carlé A, Pedersen IB, Karmisholt J. Thyroid function and obesity. European thyroid journal. 2012;1(3):159-67.
8. Sharma P, Patgiri D, Goyal S, Sharma G, Pathak M. Hypothyroidism causing dyslipidemia in both subclinical & overt hypothyroidisms. Indian J Basic Appl Med Res. 2013;7(2):779-88.
9. Sadariya B, Jain S, Sogani S. Altered lipid parameters and their relationship with t hyroid stimulating hormone in subclinical hypothyroidism. International Journal of Current Research and Review.2015;7(18):01-5.

10 Milionis HJ, Tambaki AP, Kanioglou CN, Elisaf MS, Tselepis AD, Tsatsoulis A. Thyroid substitution therapy induces high-density lipoprotein–associated platelet-activating factor–acetylhydrolase in patients with subclinical hypothyroidism: a potential antiatherogenic effect. Thyroid. 2005;15(5):455-60.

11 Verma A, Jayaraman M, Kumar HK, Modi KD. Hypothyroidism and obesity. Cause or effect? Saudi medical journal. 2008;29(8):1135-8.

12 Poppe K, Velkeniers B, Glinoer D. Thyroid disease and female reproduction. Clinical endocrinology. 2007;66(3):309-21.

13 Pirich C, Müllner M, Sinzinger H. Prevalence and relevance of thyroid dysfunction in 1922 cholesterol screening participants. Journal of clinical epidemiology. 2000;53(6):623-9.

14 Unnikrishnan AG, Menon UV. Thyroid disorders in India: An epidemiological perspective. Indian journal of endocrinology and metabolism. 2011;15(Suppl2): S78.

15 Murgod R, Soans G. Changes in electrolyte and lipid profile in hypothyroidism. Life Science Bio Chemistry. 2012;2(3):185-94.