IJABR

International Journal of Advanced Biotechnology and Research (IJABR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-9, Issue-4, 2018, pp357-360
http://www.bipublication.com

Research Article

Frequency of subclinical hypothyroidism in children and adolescents

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Received: 10/11/2018 Accepted:01/12/2018 Published: 06/12/2018

ABSTRACT

Objective: To find out the frequency of subclinical hypothyroidism in children and adolescents

Material and methods: This cross sectional study was conducted at Department of Medicine, Services Hospital, Lahore from February 2017 to August 2017 over the period of 6 months. Total 600 children and adolescent having age between 6-19 years either male or female were selected and subclinical hypothyroidism and lipid profile was assessed in selected patients.

Results: Out of 600 patients, 272 children and 328 adolescents. Total 9.9% children and 10.4% adolescent were found with thyroid dysfunction. In 7.7% children and 4.9% adolescents, subclinical hypothyroidism was observed. A higher rate of subclinical hypothyroidism was seen in females as compared to males.

Conclusion: Results of present study showed a higher rate of thyroid dysfunction. Female population was more affected as compared to male population.

Keywords: Euthyroid, Hyperlipidaemia, HDL, Overt hypothyroidism, Total cholesterol, Subclinical hypothyroidism

INTRODUCTION

Thyroid disorders are the most common endocrine disorders. Thyroid disorder may occur at any stage of life.[1]They are more commonly encountered in the mid age and adulthood.[2] Thyroid hormones influence nearly all major metabolic pathways.[3] Their most obvious and well known action is the increase in basal energy expenditure obtained by acting on protein, carbohydrate and lipid metabolism. The lipid metabolism is more influenced by the thyroid hormone.[4] Hypothyroidism is defined as a deficiency of both T3 and T4 resulting in decreased thyroid activity. Biochemically decrease in T3 and T4 concentration leads to hyper secretion of pituitary TSH and an amplified increase in serum TSH levels.[5] Hypothyroidism is a progressive disorder presenting with different degrees of thyroid failure and metabolic consequence.[6] Hypothyroidism is a well known cause of hyperlipidemia.[7] In hypothyroid patients the most frequent lipid abnormality is hypercholesterolemia, mainly due to an increased concentration of low density lipoproteins (LDL).[8] Elevation of very low density lipoproteins (VLDL) and high density lipoproteins (HDL Cholesterol) have also been reported. Plasma triglycerides are increased because of an enhanced esterification of fatty acids at hepatic level.[6]Asymptomatic patients with raised TSH and

normal FT4 concentration are known as subclinical hypothyroid. Subclinical hypothyroidism is mild thyroid disorder if left untreated leads to overt hypothyroidism in many cases. Subclinical hypothyroidism has adverse effect on lipid profile, but available reports are controversial.[8] Some SCH patients have vague complaints like malaise, dizziness, bradycardia, psychiatric disorders.

This study was planned to evaluate the subclinical hypothyroidism in children and adolescents. By early screening of this age group for subclinical hypothyroidism may decrease morbidity of this age group.

MATERIAL AND METHODS

This cross sectional study was conducted at Department of Medicine, Services Hospital, Lahore from February 2017 to August 2017 over the period of 6 months. Total 600 patients having age between 6-19 years either male or female come at Medical or peads OPD were selected this study. Patients under the age of 6 years and above 19 years, patients with history of thyroid disorder, patients with any other systemic disease were excluded from the study. Study was approved by the ethical committee and written informed consent was taken from every patient. Selected patients were divided into two groups. The patients aged between 6-12 years (children) were named as group I and 12-19 years (adolescents) were as group II.

5 ml venous blood sample was collected from each patient and send to laboratory for thyroid profile and lipid profile. Findings were entered in pre-designed performa along with demographic profile of the patients.

Thyroid dysfunction (hypothyroidism, subclinical hypothyroidism, hyperthyroidism and subclinical hyperthyroidism) was defined as per the standard cut offs of T3, T4 and TSH in different age groups of manufacturer's manuals. The following cuts off values were considered to diagnose the thyroid dysfunction as mentioned in manufacturer's manual.

Table 1: Values to diagnose thyroid function.

For	Total T3 (ng/mL)	Total T4 (µg/dL)	TSH (µIU/mL)
6-10 years	0.8-2.4	6.3-13.2	0.25-5
11-15 years	0.8-2.15	5.5-11.8	0.25-5
16-20 years	0.8-2.15	4.2-11.8	0.25-5

All the collected data was entered in SPSS version 18. Mean and SD was calculated for numerical data and frequencies were calculated for categorical data.

RESULTS

In the present study, 272 children (male: female=122:150) and 328 adolescents (male: female=128:200) with a mean age (in years) of 8.64±1.75 and 14.3±2.53 respectively were evaluated. The base line characteristics such as age, gender, thyroid profile and lipid profile are depicted in Table 2.

The mean ±SD of serum total cholesterol (mg/dL), triglycerides (TGL) (mg/dL), high density lipoproteins (HDL) (mg/dL) and low-density lipoproteins (LDL) cholesterol of group I and group II were 146±14.5, 145±13.9, 60.4±11.2, 56±11.2, 38.1±3.15, 37.3±1.7 and 115±26.6, 119±27.9 respectively. Similarly, mean ±SD of serum total triiodothyronine (tT3) (ng/mL), total tetraiodothyronine (tT4) (µg/dL) and TSH (µIU/mL) of group I and group II were 1.36±0.30, 1.34±0.23; 7.81±1.12, 7.81±0.99 and 2.82±1.72, 2.51±1.55 respectively (Table 3). The distribution of thyroid dysfunction in both children and adolescent groups has been given in Table 3 and Figure 1. Out of 272 children studied in group I, 245 (90.1%) were found to be euthyroid, 27 (9.9%) were found to be having thyroid dysfunction.

Similarly, in adolescents, the thyroid dysfunction was found to be in 34 cases (10.4%). In both the groups, SCH was found to be having more number of subjects as compared to other types of dysfunction. Among 272 subjects of group I, 21

(7.7%) subjects were affected with SCH whereas 16 (4.9%) were affected in adolescents (Table 3).

Table 2: Mean and SD of different variables.

Parameter	Group I (children age 6-≤12 years) (n=272)	Group II (adolescents 12-≤19 years) (n=328)
Age (in years)	8.64±1.75	14.3±2.53
Gender Males (n=250) Females (n=350)	 122 (44.9%) 150 (55.1%)	 128 (39%) 200 (61%)
Total cholesterol (mg/dl)	146±14.5	145±13.9
Triglycerides(TGL) (mg/dl)	60.4±11.2	56±11.2
HDL cholesterol (mg/dl)	38.1±3.15	37.3±1.7
LDL cholesterol (mg/dl)	115±26.6	119±27.9
Total T3 (ng/ml)	1.36±0.30	1.34±0.23
Total T4 (µg/dl)	7.81±1.12	7.81±0.99
Thyroid stimulating hormone (TSH) (µiu/ml)	2.82±1.72	2.51±1.55

Table 3: Distribution of thyroid dysfunction

Thyroid function	Group I (children, n=272) (%)	Group II (adolescents, n=328) (%)
Euthyroid	245 (90.1)	294 (89.6)
Overt hypothyroidism (OH)	5 (1.8%	15 (4.6)
Subclinical hypothyroidism (SCH)	21 (7.7)	16 (4.9)
Overt hyperthyroidism	1 (0.4)	3 (0.9)

DISCUSSION

Thyroid disorders are known to alter the lipid metabolism. Hypothyroidism results in a rise in circulating total cholesterol and LDL cholesterol levels.[9]The elevated LDL cholesterol level in hypothyroidism may occur as a result of increased cholesterol synthesis and absorption, decreased hepatic lipase and lipoprotein lipase activities and defect in the receptor mediated catabolism of LDL cholesterol. The elevation in LDL cholesterol levels may be accompanied by increased formation of oxidized LDL cholesterol contributing to enhanced risk of atherosclerosis.[10]

Present study was aimed to determine the frequency of thyroid dysfunction. Out of 600 subjects studied (children and adolescents), the prevalence of hyperthyroidism was found to be in 5 subjects (0.7%). Among children group, only 1 subject (0.4%) was affected with overt hyperthyroidism where as in adolescents 3 (0.9%) were affected. The prevalence of hyperthyroidism is known to increase during childhood and reaches its peak during adolescent age and also is more common in females than males.[11]

In the present study, significantly higher levels of cholesterol, TGL and lower levels of HDL cholesterol were found in SCH subjects when compared to euthyroid subjects. However, no significant variation of LDL levels was found between SCH and euthyroid groups. At a younger age, it was noticed that SCH has more severe pathophysiological effects resulting in vascular disease, endothelial dysfunction or a direct effect on myocardium.[12] Our results were in association with Lai et al., where the higher levels of TGL and Lower HDL levels were observed.[13] Similarly, Iqbal et al., also claimed similar results in SCH patients after performing a follow-up study in males, whereas increased cholesterol, LDL cholesterol and apo B levels in females.[14] On the contrary, total cholesterol levels were not found to be elevated in Rottedam study.[12]

Earlier and recent studies also show that T4 replacement therapy may improve lipid profile and LDL to HDL cholesterol ratio in the cases of

subclinical hypothyroidism with Hashimoto thyroiditis.[14] In another study, a significant reduction in the concentrations oftotal cholesterol, non-HDL and apo-B was found, but without significant changes in the serum concentrations of LDL, HDL cholesterol, TGL, apolipoprotein A-I, and Lp(a) after levo-thyroxine replacement.[15] The reduction in total cholesterol levels were inversely correlated with an increase in free T4 levels, but not correlated with changes in TSH levels.[16]

CONCLUSION

Results of present study showed a higher rate of thyroid dysfunction. Female population was more affected as compared to male population.

REFERENCES

1. Chandna S, Bathla M. Oral manifestations of thyroid disorders and its management. Indian journal of endocrinology and metabolism. 2011 Jul;15(Suppl2):S113.
2. Benseñor I. Screening for thyroid disorders in asymptomatic adults from Brazilian populations. São Paulo medical journal. 2002 Jul;120(5):146-51.
3. Mullur R, Liu YY, Brent GA. Thyroid hormone regulation of metabolism. Physiological reviews. 2014 Apr;94(2):355-82.
4. Vir SC. Current Status of Iodine Deficiency Diseases and Strategy for Its control in India. Indian J Pediatr. 2002;69:589-96.
5. Marwaha RK, Tandon N, Garg MK, Desai A, Kanwar R, Sastry A, et al. Thyroid status two decades after salt iodization: country-wide data in school children from India. ClinEndocrinol (Oxf). 2012;76:905-10.
6. Salerno M, Capalbo D, Cerbone M, de Luka F. Subclinical hypothyroidism in childhood-current knowledge and open issues. Nature Reviews Endocrinol.2016;12:734-46.
7. Rizos CV, Elisaf MS, Liberopoulos EN. Effects of thyroid dysfunction on lipid profile. The open cardiovascular medicine journal. 2011;5:76.
8. Khan MA, Majumder I, Hoque M, Fariduddin M, Mollah FH, Arslan MI. Lipid profile in hypothyroid patients: a cross sectional Study. Medicine today. 2013;25(1):21-4.
9. Ineck BA, Ng TM. Effects of subclinical hypothyroidism and its treatment on serum lipids. Annals of Pharmacotherapy. 2003 May;37(5):725-30.
10. Feingold K, Brinton EA, Grunfeld C. The effect of endocrine disorders on lipids and lipoproteins.
11. Markus B. Thyroid disorders in children from birth to adolescence. Eur J Nucl Med. 2002;29(S2):S339-S446.
12. Shekhar R, Chowdary NVS, Das MC, Vidya D, Prabodh S. Prevalence of subclinical hypothyroidism in coastal Andhra Pradesh. Biomed Res. 2011;22(4):471-4.
13. Lai Y, Wang J, Jiang F, Wang B, Chen Y, Li M, et al. The relationship between serum thyrotropin and components of metabolic syndrome. Endocr J. 2011;58(1):23-30.
14. Iqbal A, Jorde R, Figenschau Y. Serum lipid levels in relation to serum thyroidstimulating hormone and the effect of thyroxine treatment on serum lipid levels in subjects with subclinical hypothyroidism: the Tromso Study. J Intern Med. 2006;260(1):53-61.
15. Ito M, Arishima T, Kudo T, Nishihara E, Ohye H, Kubota S, et al. Effect of Levo-Thyroxine Replacement on Non-High-Density Lipoprotein Cholesterol in Hypothyroid Patients. J ClinEndocrinolMetab. 2007;92(2):608-11.
16. Tagami T, Tamanaha T, Shimazu S, Honda K, Nanba K, Nomura H, et al. Lipid profiles in the untreated patients with Hashimoto thyroiditis and the effects of thyroxine treatment on subclinical hypothyroidism with Hashimoto thyroiditis. Endocr J. 2010;57(3):253-8.