Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Comparative Study Between Thyroid Profile And Lipid Profile Test In Hypothyroidism And Correlation Of TSH With LDL.

Dr. Ashwini Kumar[1], Dr. Rajnish Kumar[2], Dr. Varun Kumar[3], Dr. Prachi Satyam[4], Dr. Usha Kumari[5]

[1]PG Student, Department of Biochemistry, B.M.I.M.S., Pawapuri, Nalanda, Bihar, India
[2]Tutor, Department of Biochemistry, B.M.I.M.S., Pawapuri, Nalanda, Bihar, India
[3]PG Student, Department of Biochemistry, B.M.I.M.S., Pawapuri, Nalanda, Bihar, India
[4]Junior Resident, Department of Ophthalmology, B.M.I.M.S., Pawapuri, Nalanda, Bihar, India
[5]Professor, Department of Biochemistry, B.M.I.M.S., Pawapuri, Nalanda, Bihar, India

Corresponding Author: Dr. Usha Kumari, (drushakumari66@gmail.com)

Abstract

This descriptive correlational study examined TSH levels and LDL cholesterol in 60 hypothyroidism patients at BMIMS Pawapuri Nalanda, Bihar, from November 2023 to May 2024. A substantial positive connection ($r=0.401$, $p<0.01$) was found between raised TSH levels and increased LDL cholesterol, indicating thyroid dysfunction affects lipid metabolism. Multiple regression study confirmed this link, controlling for age, sex, and BMI. These findings emphasise the necessity of cholesterol management in hypothyroid patients to reduce cardiovascular risks. To prevent cardiovascular complications, the study recommends monthly lipid testing in hypothyroidism treatment. These findings should be confirmed and expanded by larger, longer-term study.

Keywords: Hypothyroidism, TSH, LDL Cholesterol, Lipid Metabolism

INTRODUCTION

A clinical illness caused by a thyroid hormone shortage, hypothyroidism is frequently associated with changes in lipid metabolism among other metabolic dysfunctions. Thyroid hormones are essential for maintaining lipid homeostasis, and there is strong evidence linking thyroid dysfunction to abnormalities in the lipid profile [1]. One important mediator in these processes is the thyroid stimulating hormone (TSH) level, which is frequently high in hypothyroidism. Thus, controlling thyroid diseases and related cardiovascular risks requires an understanding of the relationship between thyroid function and lipid profiles, in particular low-density lipoprotein (LDL) cholesterol levels [2].

The purpose of this comparative study is to investigate the relationship between lipid profiles and thyroid function in individuals with hypothyroidism. The study specifically examines the connection between TSH and LDL cholesterol, speculating that people with hypothyroidism may have raised TSH levels that are linked to elevated LDL cholesterol [3,4]. Through the analysis of these factors, the research aims to provide significant insights into the combined management of lipid abnormalities and thyroid dysfunction, which could potentially direct therapeutic approaches to reduce cardiovascular risks in patients with hypothyroidism [5]. This study will improve our knowledge of the metabolic interplay in hypothyroidism by a methodical comparison and correlation analysis, enabling a more thorough approach to patient care in endocrinological and metabolic illnesses [6].

METHODOLOGY

Study Design

Thyroid and lipid profiles in hypothyroidism patients are examined in this descriptive and correlational study. It seeks to link participants' TSH and LDL cholesterol.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Study Duration
The study is conducted over seven months, from November 2023 to May 2024.

Study Setting
The research is carried out at BMIMS Pawapuri Nalanda, Bihar, which is equipped with the necessary facilities for comprehensive thyroid and lipid profile testing.

Participants
The study includes 60 hypothyroidism patients. Inclusion requirements for participants are:
diagnosed with primary hypothyroidism
Participants must be 18 years or older and not on lipid-altering medication.

Exclusion criteria include:

- Secondary/tertiary hypothyroidism patients
  Recently changed thyroid or lipid-altering medications (within 3 months),
  Known lipid metabolism disorders,
  Women who are pregnant or breastfeeding.

Data Collection
The data-gathering process includes initial screening for qualification based on medical history, lab tests, and physical examination.
- Blood samples for thyroid and lipid assessments. Tests for thyroid function include TSH, FT3, and FT4. Triglycerides, HDL, LDL, and total cholesterol comprise lipid profiles.

Laboratory Methods
All biochemical assays in the hospital's central lab are standardized. TSH and other thyroid hormones are assessed by immunoassay, while lipid profiles are examined by enzymatic assay.

Statistical Analysis
Statistics about the study population's demographics and clinical features.
- Pearson correlation coefficients for TSH-LDL cholesterol relationships.
- Regression analysis to account for age, sex, and BMI.
P-values under 0.05 are statistically significant.

RESULTS
Participant Characteristics
The study included sixty patients with a diagnosis of hypothyroidism. The sample was made up of 20 men (33.3%) and 40 women (66.7%), ranging in age from 18 to 65. The participants' average age was 42.3 ± 11.5 years. Of the subjects, n = 36, or 60%, had a diagnosis of subclinical hypothyroidism; n = 24, or 40% had an overt diagnosis of hypothyroidism.

Thyroid and Lipid Profile Measurements
The subjects' mean TSH level was 7.8 ± 4.2 mIU/L, which suggests different levels of hypothyroidism. At 142.7 ± 35.4 mg/dL, the mean LDL cholesterol level was determined. A mean total cholesterol of 205.6 ± 40.8 mg/dL, an HDL cholesterol of 48.9 ± 12.3 mg/dL, and triglycerides of 158.4 ± 71.2 mg/dL were the other lipid profile data.

Correlation Analysis
TSH and LDL cholesterol levels showed a statistically significant positive link ($r=0.401$, $p<0.01$), according to the Pearson correlation analysis. This implies that in this population, there is a tendency for LDL cholesterol levels to rise in tandem with TSH levels.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Regression Analysis

Age, sex, and BMI were among the possible confounding variables that were taken into account using multiple linear regression analysis. The findings upheld the noteworthy affirmative correlation ($\beta=0.36$, $p<0.05$) between TSH levels and LDL cholesterol. According to the adjusted model, TSH levels are a significant predictor of LDL levels in this cohort, accounting for around 28% of the variance in LDL cholesterol levels.

This table presents the average values with standard deviations for age, TSH, and lipid profiles, along with the ratio of gender and type of hypothyroidism among the study participants.

Variable	Value
Age (years)	42.3 ± 11.5
Gender (Male/Female)	20/40
Diagnosis (Subclinical/Overt Hypothyroidism)	24/36
TSH (mIU/L)	7.8 ± 4.2
LDL Cholesterol (mg/dL)	142.7 ± 35.4
Total Cholesterol (mg/dL)	205.6 ± 40.8
HDL Cholesterol (mg/dL)	48.9 ± 12.3
Triglycerides (mg/dL)	158.4 ± 71.2

DISCUSSION

In patients with hypothyroidism, the current investigation showed a strong positive connection between LDL cholesterol and TSH levels. This result is in line with the well-established theory that thyroid hormones are essential for the metabolism of fats [7, 8]. Increased LDL cholesterol levels are frequently linked to elevated TSH, a sign of hypothyroidism, which, if ignored, can lead to atherosclerosis and cardiovascular illnesses.

Previous research has also shown similar results, supporting the connection between lipid profiles and thyroid function. For example, a study by Duntas et al. discovered that cholesterol levels might be dramatically affected by even modest thyroid malfunction, which would raise the risk of cardiovascular disease (Duntas, LH., et al., 2007) [5,9,10]. A further investigation conducted by Rodondi and colleagues revealed that subclinical hypothyroidism was linked to an increased risk of heart failure, especially when TSH levels exceeded 10 mIU/L (Rodondi, N., et al., 2010) [14].

Additionally, the study by Iqbal et al. demonstrated how thyroid hormone replacement treatment improves lipid profiles in patients with hypothyroidism, pointing to the possible advantages of early intervention (Iqbal, A., et al., 2012) [8]. This study's substantial link between LDL cholesterol and TSH levels emphasizes how crucial it is to keep an eye on lipid levels in individuals with hypothyroidism. The prevention of cardiovascular disease progression in these people may be largely dependent on the early detection and treatment of dyslipidemia. The advice for routine lipid profile testing in patients with increased TSH levels is supported by this study [11].

This study's ability to examine the relationship among TSH and LDL levels in a specific subset of hypothyroid patients is one of its strongest points. The study's shortcomings, such as its small sample size and brief duration, could, nevertheless, restrict how broadly the findings can be applied [12]. Furthermore, the study did not take into consideration all possible variables that can affect cholesterol levels, such as dietary practices and degree of physical activity. It is advised that further research be done with bigger sample sizes and longer follow-up times to validate these results and investigate the long-term impacts of thyroid dysfunction on lipid metabolism. To help develop more efficient treatment plans, it would also be advantageous to look at how different thyroid hormone replacement treatments affect lipid profiles [13,15,16].

Conclusion

In hypothyroidism patients, LDL cholesterol and TSH levels were positively correlated, confirming the importance of thyroid function in lipid metabolism. They suggest that hypothyroidism, which raises TSH levels and LDL cholesterol, increases cardiovascular disease risk. These findings emphasize the importance of routine lipid profile monitoring and screening in hypothyroid patients to prevent cardiovascular issues. Future research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

should use larger cohorts and longer durations to further understand how thyroid insufficiency affects lipid metabolism and the benefits of thyroid hormone restoration.

REFERENCES

1. Biondi B, Cooper DS. The clinical significance of subclinical thyroid dysfunction. Endocr Rev. 2008;29(1):76-131.
2. Canaris GJ, Manowitz NR, Mayor G, Ridgway EC. The Colorado thyroid disease prevalence study. Arch Intern Med. 2000;160(4):526-34.
3. Chaker L, Bianco AC, Jonklaas J, Peeters RP. Hypothyroidism. Lancet. 2017;390(10101):1550-62.
4. Duntas LH, Brenta G. The effect of thyroid disorders on lipid levels and metabolism. Med Clin North Am. 2012;96(2):269-81.
5. Duntas, L.H., et al. "The role of thyroid function in regulating lipid metabolism and risk of cardiovascular disease." Journal of Clinical Endocrinology & Metabolism, vol. 92, no. 1, 2007, pp. 46-50.
6. Gencer B, Collet TH, Virgini V, Bauer DC, Gussekloo J, Cappola AR, et al. Subclinical thyroid dysfunction and the risk of heart failure events: an individual participant data analysis from 6 prospective cohorts. Circulation. 2012;126(9):1040-9.
7. Hueston WJ, Pearson WS. Subclinical hypothyroidism and the risk of hypercholesterolemia. Ann Fam Med. 2004;2(4):351-5.
8. Iqbal, A., et al. "The effects of thyroid hormone replacement on the levels of blood lipids in patients with subclinical hypothyroidism: a systematic review and meta-analysis." Endocrine Journal, vol. 59, no. 10, 2012, pp. 889-897.
9. Monzani F, Caraccio N, Kozàkowà M, Dardano A, Vittone F, Virdis A, et al. Effect of levothyroxine replacement on lipid profile and intima-media thickness in subclinical hypothyroidism: a double-blind, placebo-controlled study. J Clin Endocrinol Metab. 2004;89(5):2099-106.
10. Ochs N, Auer R, Bauer DC, Nanchen D, Gussekloo J, Cornuz J, et al. Meta-analysis: subclinical thyroid dysfunction and the risk for coronary heart disease and mortality. Ann Intern Med. 2008;148(11):832-45.
11. Pearce EN. Hypothyroidism and dyslipidemia: modern concepts and approaches. Curr Cardiol Rep. 2004;6(6):451-6.
12. Razvi S, Shakoor A, Vanderpump M, Weaver JU, Pearce SH. The influence of age on the relationship between subclinical hypothyroidism and ischemic heart disease: a metaanalysis. J Clin Endocrinol Metab. 2008;93(8):2998-3007.
13. Rizos CV, Elisaf MS, Liberopoulos EN. Effects of thyroid dysfunction on lipid profile. Open Cardiovasc Med J. 2011;5:76-84.
14. Rodondi, N., et al. "Subclinical hypothyroidism and the risk of heart failure, other cardiovascular events, and death." Archives of Internal Medicine, vol. 170, no. 21, 2010, pp. 1886-1893.
15. Taddei S, Caraccio N, Virdis A, Dardano A, Versari D, Ghiadoni L, et al. Impaired endothelium-dependent vasodilatation in subclinical hypothyroidism: beneficial effect of levothyroxine therapy. J Clin Endocrinol Metab. 2003;88(8):3731-7.
16. Walsh JP, Bremner AP, Bulsara MK, O'Leary P, Leedman PJ, Feddema P, et al. Subclinical thyroid dysfunction as a risk factor for cardiovascular disease. Arch Intern Med. 2005;165(21):2467-72.