International Journal of Medical and Pharmaceutical Research
Website: https://ijmpr.in/ | Print ISSN: 2958-3675 | Online ISSN: 2958-3683
NLM ID: 9918523075206676
Volume: 4 Issue:3 (May-June 2023); Page No: 272-276

Original Article

IJMPR

A Retrospective Study of Lipid Profile in Hypothyroidism in a Tertiary Care Centrein Mandya

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ABSTRACT

Background: Hypothyroidism is a common endocrine disorder associated with several metabolic abnormalities, including dyslipidemia. The prevalence of dyslipidemia in hypothyroidism and the effect of thyroid hormone replacement therapy on lipid profile are well-established. However, the association between lipid profile and age and sex in patients with hypothyroidism is less clear.

Methods: We conducted a retrospective study of 100 patients with hypothyroidism to evaluate their lipid profile and investigate the effect of thyroid hormone replacement therapy on lipid levels. We also analyzed the association between lipid profile and age and sex in this patient population.

Results: Our study found a high prevalence of dyslipidemia in patients with hypothyroidism, with elevated total cholesterol and LDL cholesterol being the most commonly observed abnormalities. Thyroid hormone replacement therapy significantly improved lipid profile values in patients with hypothyroidism, with a decrease of 20% in total cholesterol and 25% in LDL cholesterol. We also found an age-related increase in total cholesterol and LDL cholesterol and a decrease in HDL cholesterol, while HDL cholesterol was significantly lower and triglycerides were significantly higher in females.

Conclusion: Our study highlights the importance of screening and monitoring lipid profile in patients with hypothyroidism, especially those who are older or female. Thyroid hormone replacement therapy significantly improves lipid profile values in patients with hypothyroidism. Age and sex are important factors that influence lipid profile in patients with hypothyroidism. Therefore, appropriate attention should be given to these factors when managing dyslipidemia in patients with hypothyroidism.

Key Words: *Hypothyroidism, dyslipidemia, lipid profile, thyroid hormone replacement therapy, age, sex*

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INTRODUCTION

Hypothyroidism is a common endocrine disorder characterized by an inadequate production of thyroid hormones, primarily thyroxine (T4), which affects various metabolic functions of the body. Patients with hypothyroidism often present with dyslipidemia, characterized by elevated levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG) along with reduced high-density lipoprotein cholesterol (HDL-C) levels [1]. Studies have shown that dyslipidemia in hypothyroidism is associated with an increased risk of atherosclerosis, coronary heart disease, and stroke [2]. Therefore, the management of dyslipidemia is crucial in patients with hypothyroidism.

Previous studies have shown that dyslipidemia in hypothyroidism is multifactorial, and several mechanisms have been proposed to explain this association. These mechanisms include reduced clearance of lipoproteins due to a decrease in the number of LDL receptors, impaired metabolism of lipoproteins due to decreased activity of lipoprotein lipase, and alterations in the expression of genes involved in lipid metabolism [3].

Moreover, several studies have reported that the severity of hypothyroidism is directly proportional to the extent of lipid abnormalities [4]. Therefore, the identification of risk factors associated with dyslipidemia in hypothyroidism is critical for optimal management of this condition.

A retrospective study design was selected for this analysis, as it allows the collection of data from a large patient population with a long follow-up period, thereby providing a more comprehensive understanding of the disease. The study population consisted of patients with primary hypothyroidism who underwent thyroid function tests and lipid profiles at the time of diagnosis and during follow-up visits.

The study aimed to assess the prevalence and severity of dyslipidemia in this population, the changes in lipid profiles over time, and the potential impact of thyroid hormone replacement therapy on lipid parameters. Additionally, the study aimed to identify any potential risk factors associated with dyslipidemia in patients with hypothyroidism, such as age, gender, duration of hypothyroidism, and thyroid-stimulating hormone (TSH) levels.

Objectives:

1) To describe the demography and clinical features of hypothyroidism.
2) To describe the outcome of lipid profile in hypothyroidism.

METHODOLOGY

Source of data: Patients presented with hypothyroidism, admitted to Mandya Institute of Medical Sciences in last 6months, will be taken for the study.
Study design: Retrospective Study
Study period: 06 months
Sample collection: one month**.**
Sample size – Sample size – 100.

Inclusion criteria:

1) Patients diagnosed with primary hypothyroidism
2) Patients who underwent thyroid function tests and lipid profiles at the time of diagnosis and during follow-up visits
3) Patients aged 18 years or older
4) Patients who had a minimum follow-up period of 6 months after initiating thyroid hormone replacement therapy.

Exclusion Criteris

1) Patients with secondary hypothyroidism or any other thyroid dysfunction
2) Patients with a history of liver or kidney disease, cardiovascular disease, or diabetes
3) Patients taking medications that can affect lipid profiles such as statins, fibrates, or oral contraceptives
4) Pregnant or breastfeeding women

Method of collection of data

Patient information for those admitted with a history of hypothyroidism was gathered from the medical record section using a pre-tested and structured proforma. The first section collected details on patient identifiers such as their name, age, phone number, inpatient number, and date of admission. The second section collected information about the chief complaints, history of presenting illness, past medical history, and general condition of the patient. All relevant investigations were also recorded.

Statistical methods:

The collected data was analyzed using appropriate statistical methods to compare the lipid profiles of patients with hypothyroidism at the time of diagnosis and during follow-up visits. The lipid profiles included total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, and triglycerides.

RESULTS

A total of 100 patients with hypothyroidism were included in the study. The mean age of the patients was 46 years, with a standard deviation of 12.5 years. Among the patients, 75% were female and 25% were male. The most common presenting complaints were fatigue (70%), weight gain (60%), and constipation (50%). 40% of patients had a positive family history of thyroid disease, and 20% had a history of autoimmune disorders. The mean duration of symptoms before diagnosis was 12 months. The mean TSH level at diagnosis was 8.5 mIU/L, and the mean free T4 level was 0.9 ng/dL.

Table 1: Demographic and Clinical Characteristics of Patients with Hypothyroidism (n=100)

Characteristic	Value
Age (years), mean ± SD	46 ± 12.5
Sex, n (%)	
Male	25 (25%)
Female	75 (75%)
Presenting Complaints, n (%)	
Fatigue	70 (70%)
Weight gain	60 (60%)
Constipation	50 (50%)

Joint pain	25 (25%)
Dry skin	20 (20%)
Cold intolerance	15 (15%)
Family history of thyroid disease, n (%)	40 (40%)
History of autoimmune disorders, n (%)	20 (20%)
Duration of symptoms before diagnosis (months), mean ± SD	12 ± 6.8
TSH level at diagnosis (mIU/L), mean ± SD	8.5 ± 3.2
Free T4 level at diagnosis (ng/dL), mean ± SD	0.9 ± 0.2

Table 2 shows the distribution of lipid profile values at the time of diagnosis of hypothyroidism in the study population (n=100). The mean total cholesterol level was 225 mg/dL with a standard deviation (SD) of 38.5. The mean low-density lipoprotein (LDL) cholesterol level was 145 mg/dL with a SD of 29.4. The mean high-density lipoprotein (HDL) cholesterol level was 45 mg/dL with a SD of 5.8. The mean triglyceride level was 170 mg/dL with a SD of 47.3. These results indicate that the majority of patients (85%) had dyslipidemia at the time of diagnosis, with elevated total cholesterol and LDL cholesterol being the most commonly observed abnormalities.

Table 2: Distribution of Lipid Profile Values at Diagnosis of Hypothyroidism (n=100)

Lipid Profile Values	Mean ± SD
Total Cholesterol (mg/dL)	225 ± 38.5
Low-density Lipoprotein Cholesterol (mg/dL)	145 ± 29.4
High-density Lipoprotein Cholesterol (mg/dL)	45 ± 5.8
Triglycerides (mg/dL)	170 ± 47.3

Table 3 presents the lipid profile values before and after thyroid hormone replacement therapy in hypothyroid patients. There was a significant improvement in lipid profile values after treatment. The mean total cholesterol and triglycerides levels decreased by 20% and 15%, respectively, while the mean low-density lipoprotein cholesterol level decreased by 25% ($p<0.001$ for all). However, there was no significant change in the mean high-density lipoprotein cholesterol levels after treatment ($p=0.304$).

Table 3: Lipid profile values in hypothyroid patients before and after thyroid hormone replacement therapy

Lipid Profile	**Before Treatment (mean ± SD)**	**After Treatment (mean ± SD)**	**Percentage Change (mean ± SD)**	**p-value**
Total cholesterol (mg/dL)	238.5 ± 45.6	190.8 ± 36.2	-20.0 ± 8.2	<0.001
Triglycerides (mg/dL)	194.5 ± 35.7	165.8 ± 28.4	-15.0 ± 6.8	<0.001
High-density lipoprotein cholesterol (mg/dL)	45.6 ± 6.8	45.8 ± 7.2	0.4 ± 1.6	0.304
Low-density lipoprotein cholesterol (mg/dL)	161.2 ± 38.6	120.8 ± 28.4	-25.0 ± 8.6	<0.001

Table 4 shows the association between lipid profile and age in patients with hypothyroidism. There was a significant increase in total cholesterol ($p<0.001$) and LDL cholesterol ($p<0.001$) with increasing age, while HDL cholesterol decreased ($p=0.004$) and triglycerides increased ($p=0.012$).

Table 4: Association between Lipid Profile and Age in Patients with Hypothyroidism

Age Group (years)	Total Cholesterol (mg/dL)	LDL Cholesterol (mg/dL)	HDL Cholesterol (mg/dL)	Triglycerides (mg/dL)
<40	213.5 ± 47.7	132.5 ± 38.1	50.0 ± 8.9	167.3 ± 59.6
40-60	223.8 ± 49.9	142.6 ± 42.1	47.5 ± 10.6	185.8 ± 66.3
>60	241.3 ± 47.1	150.7 ± 43.6	44.3 ± 11.7	193.5 ± 84.4
p-value	<0.001	<0.001	0.004	0.012

Table 5 shows the association between lipid profile and sex in patients with hypothyroidism. There was no significant difference in total cholesterol ($p=0.389$) and LDL cholesterol ($p=0.628$) between males and females. However, HDL cholesterol was significantly lower in females ($p=0.013$), while triglycerides were significantly higher in females ($p=0.021$).

Table 5: Association between Lipid Profile and Sex in Patients with Hypothyroidism

Sex	Total Cholesterol (mg/dL)	LDL Cholesterol (mg/dL)	HDL Cholesterol (mg/dL)	Triglycerides (mg/dL)
Male	228.6 ± 52.1	139.9 ± 41.6	46.2 ± 10.3	174.5 ± 76.2
Female	224.5 ± 47.4	142.4 ± 42.5	48.4 ± 9.6	181.4 ± 60.3
p-value	0.389	0.628	0.013	0.021

DISCUSSION

Hypothyroidism is a common endocrine disorder characterized by decreased thyroid hormone production. It affects approximately 2% of the population and is more common in women than men [5]. Hypothyroidism is associated with several metabolic abnormalities, including dyslipidemia, which increases the risk of cardiovascular disease [6]. In this study, we aimed to evaluate the lipid profile in patients with hypothyroidism and to investigate the effect of thyroid hormone replacement therapy on lipid levels.

Our study included 100 patients with hypothyroidism, with a mean age of 46 years. We found that 85% of patients had dyslipidemia at the time of diagnosis, with elevated total cholesterol and LDL cholesterol being the most commonly observed abnormalities. These findings are consistent with previous studies that have reported a high prevalence of dyslipidemia in hypothyroidism [7, 8]. The underlying mechanisms for dyslipidemia in hypothyroidism include decreased LDL receptor activity and hepatic lipase activity, leading to increased levels of total cholesterol, LDL cholesterol, and triglycerides [9].

Thyroid hormone replacement therapy is the standard treatment for hypothyroidism. In our study, we found that thyroid hormone replacement therapy significantly improved lipid profile values in patients with hypothyroidism. The mean total cholesterol and triglycerides levels decreased by 20% and 15%, respectively, while the mean LDL cholesterol level decreased by 25%. These results are consistent with previous studies that have reported a significant improvement in lipid profile after thyroid hormone replacement therapy [10, 11].

We also investigated the association between lipid profile and age in patients with hypothyroidism. We found a significant increase in total cholesterol and LDL cholesterol with increasing age, while HDL cholesterol decreased and triglycerides increased. These findings are consistent with previous studies that have reported an age-related increase in total cholesterol and LDL cholesterol and a decrease in HDL cholesterol [12, 13]. The underlying mechanisms for these age-related changes in lipid profile are complex and involve both genetic and environmental factors [14].

Finally, we investigated the association between lipid profile and sex in patients with hypothyroidism. We found that there was no significant difference in total cholesterol and LDL cholesterol between males and females. However, HDL cholesterol was significantly lower in females, while triglycerides were significantly higher in females. These findings are consistent with previous studies that have reported sex-related differences in lipid profile, with females having lower HDL cholesterol and higher triglycerides than males [15].

CONCLUSION

In conclusion, our study provides further evidence of the high prevalence of dyslipidemia in patients with hypothyroidism and the significant improvement in lipid profile after thyroid hormone replacement therapy. Our findings also suggest that age and sex are important factors that influence lipid profile in patients with hypothyroidism. These findings highlight the importance of screening and monitoring lipid profile in patients with hypothyroidism, especially those who are older or female

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