

# A Comparative Study of Lipid Profile in Patients of Hypothyroidism and Diabetes Mellitus

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**Abstract:** Background: A disease due to disorder of the endocrine system is often called as endocrinopathy. Hypothyroidism is a condition characterized by abnormally low thyroid hormone production and diabetes mellitus is also common endocrine disorder which is defined as group of metabolic diseases characterized by hyperglycemia. In this study, 25 patients of clinically established hypothyroidism and 25 patients of diabetes attending the Out Patient Department, Department of Medicine, MDM Hospital (Jodhpur) were evaluated for lipid profile. Results: Serum total cholesterol of hypothyroids and diabetic patients showed a highly significant relationship ( $p < 0.0001$  and  $0.0002$  respectively) as compared to controls. Serum triglycerides showed a very significant relationship ( $p = 0.003$  and  $0.001$  resp.), serum LDL-c also showed a highly significant relationship ( $p < 0.0001$  and  $0.0002$  resp.) while serum VLDL-c of hypothyroid patients showed a significant relationship ( $p = 0.024$ ) and in diabetic patients very significant relationship ( $p = 0.006$ ) as compared to controls. Conclusion: Estimation of serum lipid profile is simple, reliable, economic and sensitive that can now be considered as an adjunct in the management of hypothyroidism and diabetes mellitus.

**Keywords:** Lipid profile, Hypothyroidism, Diabetes mellitus, serum T<sub>3</sub>, serum T<sub>4</sub>, serum TSH

## 1. Introduction

Endocrinopathies are the diseases of various endocrine glands. The Endocrinopathy is commonly used as a medical term for a hormone problem. Common endocrinopathies include Diabetes Mellitus and Thyroid disorders.

Hypothyroidism associated with increased risk of coronary artery disease, peripheral vascular disease and various biochemical abnormalities including increased total cholesterol [1], increased serum triglycerides and LDL-c level [2].

Diabetes mellitus is associated with a cluster of interrelated plasma lipid and lipoprotein abnormalities that are all recognized as predictors for coronary heart disease [3], including reduced plasma levels of HDL cholesterol particles and elevated plasma levels of triglycerides. [4]

Thus the primary object of this study is to delineate the usefulness of blood glucose, serum lipid profile, serum T<sub>3</sub>, T<sub>4</sub> and TSH in patients with hypothyroidism and diabetes mellitus.

## 2. Material & Methods

The present study was conducted on 25 healthy subjects, 25 hypothyroidism patients and 25 diabetes mellitus patients of varying age group and of either sex attending the Out Patient Department, Department of Medicine, MDM Hospital, Jodhpur (Rajasthan). Following investigations were performed in all the subjects included in this study in clinical laboratory, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur:

- Blood Glucose by GOD-POD methods.

- Serum Total Cholesterol by COD-PAP methods.
- Serum Triglycerides by GPO-PAP methods.
- Serum HDL-c by Phosphotungstic acid methods.
- Serum VLDL-c and LDL-c calculated from the Friedwald<sup>s</sup> formulae.
- Serum T<sub>3</sub>, T<sub>4</sub> and serum TSH by ELFA methods.

## 3. Results

Among the 25 healthy control subjects (12 males and 13 females), hypothyroid subjects (10 males and 15 females) and diabetic subjects included (14 males and 11 females) were studied for lipid profile, thyroid function tests and blood sugar.

The mean serum total cholesterol level was  $168.12 \pm 24.10$  mg/dL in controls,  $210.92 \pm 31.97$  mg/dL in hypothyroids and  $200.6 \pm 31.63$  mg/dL in diabetic subjects. This difference was highly significant in hypothyroid subjects ( $t = 5.35$ ;  $P < 0.0001$ ) as well as in diabetic subjects ( $t = 4.08$ ;  $P = 0.0002$ ). (Table: 1, 2, 3).

The mean serum triglycerides level was  $113.80 \pm 37.56$  mg/dL in controls,  $148.0 \pm 40.21$  mg/dL in hypothyroids and  $151.60 \pm 43.77$  mg/dL in diabetic subjects. This difference was very significant in hypothyroid subjects ( $t = 3.11$ ;  $P = 0.0031$ ) as well as in diabetic subjects ( $t = 3.28$ ;  $P = 0.0019$ ). (Table: 1, 2, 3)

The mean serum HDL-c level was  $36.56 \pm 2.45$  mg/dL in controls,  $33.44 \pm 2.10$  mg/dL in hypothyroids and  $35.56 \pm 2.06$  mg/dL in diabetic subjects. This difference was highly significant in hypothyroid subjects ( $t = 4.83$ ;  $P < 0.0001$ ) and non significant in diabetic subjects ( $t = 1.56$ ;  $P = 0.1252$ ). (Table: 1, 2, 3)

The mean serum VLDL-c level was  $23.6 \pm 7.77$  mg/dL in controls,  $28.8 \pm 8.06$  mg/dL in hypothyroids and  $30.32 \pm 8.76$  mg/dL in diabetic subjects. This difference was significant in hypothyroid subjects ( $t=2.32$ ;  $P=0.0245$ ) and very significant in diabetic subjects ( $t=2.87$ ;  $P=0.0061$ ). (Table: 1, 2, 3)

The mean serum LDL-c level was  $107.96 \pm 23.69$  mg/dL in controls,  $144.36 \pm 25.10$  mg/dL in hypothyroids and  $138.52 \pm 30.10$  mg/dL in diabetic subjects. This difference was highly significant in hypothyroid subjects ( $t=5.18$ ;  $P<0.0001$ ) as well as in diabetic subjects ( $t=3.99$ ;  $P=0.0002$ ). (Table: 1, 2, 3)

**Table 1:** Mean Serum Lipid Profile (mg/dL) of the groups studied

S. N.	Mean $\pm$ SD	Groups studied		
		Hypothyroids	Diabetics	Controls
1.	Cholesterol	$168.12 \pm 24.10$	$210.92 \pm 31.97$	$200.6 \pm 31.63$
2.	TG	$113.80 \pm 37.56$	$148.0 \pm 40.21$	$151.60 \pm 43.77$
3.	HDL-c	$36.56 \pm 2.45$	$33.44 \pm 2.10$	$35.56 \pm 2.06$
4.	VLDL-c	$23.6 \pm 7.77$	$28.8 \pm 8.06$	$30.32 \pm 8.76$
5.	LDL-c	$107.96 \pm 23.69$	$144.36 \pm 25.10$	$138.52 \pm 30.10$

**Table 2:** Statistical analysis of Serum Lipid Profile in Hypothyroids v/s Healthy controls

S. No.	parameters	t-value	p-value
1.	Cholesterol	5.35	$P<0.0001$ [HS]
2.	Triglycerides	3.11	0.0031 [VS]
3.	HDL-c	4.83	$P<0.0001$ [HS]
4.	VLDL-c	2.32	0.0245 [S]
5.	LDL-c	5.18	$P<0.0001$ [HS]

- S = Significant
- VS = Very Significant
- HS = Highly Significant

**Table 3:** Statistical analysis of Serum Lipid Profile in Diabetics v/s Healthy controls

S. No.	parameters	t-value	p-value
1.	Cholesterol	4.08	0.0002 [HS]
2.	Triglycerides	3.28	0.0019 [VS]
3.	HDL-c	1.56	0.1252 [NS]
4.	VLDL-c	2.87	0.0067 [VS]
5.	LDL-c	3.99	0.0002 [HS]

- NS = Non-Significant

#### 4. Discussion & Conclusion

In this study, a highly-significant relation was observed in serum total cholesterol level in hypothyroid subjects as well as in diabetic subjects when compared with healthy subjects. The results of this study were concordant with Reza AA et al (1999), [5] and Joe AF et al (1999), [6].

Prakash A et al (2006), [7] observed highly-significant relation in serum triglycerides of hypothyroid subjects Amin-ul-Haq et al (2006), [8] reported a significant relation in diabetic subjects when compared with healthy subjects. In relation to our study Singh K et al (2011), [9] observed

significant relation in serum VLDL-c level of hypothyroids and diabetic subjects when compared with healthy subjects.

Nakhjavani M et al (2005), [10] observed highly significant relation in serum LDL-c level of hypothyroids and diabetic subjects when compared with healthy subject.

Park JR et al (2005), [11] examine lipid profile in hypothyroidism and diabetes mellitus and also observed that hypothyroidism is associated with an increase in plasma triglycerides & LDL-c while HDL-c remains unchanged and diabetes mellitus is associated with an increase in plasma VLDL-c.

Estimation of serum lipid profile is simple, reliable, economic and sensitive that can now be considered as an adjunct in the management of hypothyroidism and diabetes mellitus.

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