

Original Research Article

Study on prevalence of hypothyroidism in ST segment elevation myocardial infarction

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ABSTRACT

Background: Both subclinical and overt hypothyroidism have effects on myocardial contractility and cardiovascular haemodynamics. In addition, changes in lipids, low levels of inflammation, elevated homocysteine etc. contribute to accelerated atherosclerosis and increased cardiovascular mortality and morbidity in hypothyroidism. In this study, we tried to find out the prevalence of hypothyroidism in patients admitted with acute ST elevation myocardial infarction. We also tried to assess the BMI, diastolic BP and lipid profile of these patients.

Methods: A cross sectional study was done among patients admitted with ST elevation myocardial infarction in Coimbatore Medical College, Coimbatore, Tamil Nadu, India. We collected information on BMI, blood pressure, lipid profile and thyroid function of these patients.

Results: The prevalence of hypothyroidism was found to be 14% in patients admitted with ST elevation MI. Hypothyroidism was three times more common in women. Patients with hypothyroidism was found to have higher BMI, elevated total cholesterol, triglycerides and LDL which was statistically significant. Higher prevalence of diastolic hypertension was also seen among hypothyroid patients.

Conclusions: Thyroid hormone has various actions on heart. Hypothyroidism has increased cardiovascular morbidity and mortality. The associated risk factors like obesity, hyperlipidaemia and diastolic hypertension contribute to this. Patients with coronary artery disease should be screened for hypothyroidism.

Keywords: Hypothyroidism, ST elevation myocardial infarction

INTRODUCTION

Starting from the phase of embryological development, thyroid gland and the heart are related.^{1,2} They are closely related functionally also. Both subclinical and overt hypothyroidism have influences on the myocardial contractility and cardiovascular hemodynamics.³⁻⁵ Cardiac muscle cannot convert T₄ to T₃.⁵ Hence the actions of thyroid hormones on the heart are brought about by the blood levels of triiodothyronine. Thyroid hormones affect cardiac contractility by influencing the

calcium cycling.^{4,5} Triiodothyronine by direct action on the vascular smooth muscles and through nitric oxide causes reduction in the systemic vascular resistance.^{6,7} Systemic vascular resistance may be elevated as high as 30% and mean arterial pressure as high as 20mmHg in hypothyroidism. Low blood level of renin is also seen in hypothyroidism. All these contribute to diastolic hypertension in hypothyroidism.

Both the total cholesterol and LDL cholesterol are elevated in hypothyroidism.⁸⁻¹⁰ TSH up regulates the

hepatic HMG CoA reductase in the liver resulting in the above changes.¹¹ This causes accelerated atherosclerosis and increased incidence of coronary artery heart disease.^{9,12-15} Elevated homocysteine levels and low grade inflammation, as suggested by elevated CRP are the other risk factors for coronary artery disease in hypothyroidism.^{16,17}

This study was conducted to find out the prevalence of hypothyroidism in patients with coronary artery disease-acute myocardial infarction and to find out the relation of hypothyroidism to factors like hypercholesterolemia and diastolic hypertension in the study population.

METHODS

Study was done at Coimbatore Medical College Hospital, Coimbatore, Tamil Nadu, India. This was a cross sectional study. The study was approved by ethical committee, Coimbatore Medical College, Coimbatore. 100 patients with ST elevation myocardial infarction in the age group 30 to 60 years were included in the study. Patients with history of thyroid disease or thyroid surgery, patients on treatment with drugs affecting thyroid function tests or lipid profile, patients with nephrotic syndrome and pregnant patients were excluded from the study. The study groups identified were informed about the study and participants willing for the study were selected after obtaining informed written consent.

The clinical examination consisted of medical history, physical examination and anthropometric measurements. Laboratory data included electrocardiogram, chest x-ray, lipid profile, blood sugar, renal function tests and thyroid function tests. All laboratory investigations were collected at the time of admission to the hospital.

Reference values for thyroid function tests were TSH- 0.34 to 4.25 microIU/ml, T3- 77 to 135 ng/dl, Free T3- 2.4 to 4.2 pg/ml, T4- 5.4 to 11.7 microgram/dl and Free T4- 0.7 to 1.24 ng/dl. Diastolic BP more than or equal to 90 mmhg was taken as diastolic hypertension. Significance testing was done by chi square test. Significance considered if the 'p' value was below 0.05.

RESULTS

In the study sample 76% of patients were males and 24% were females. 47% patients had anterior wall MI, 37% had inferior wall MI, 10% had extensive anterior wall MI and 6% had lateral wall MI. In the study population 14% patients were hypothyroid and rest were euthyroid (Table 1). Of the 14 patients with hypothyroidism, 4 patients were having overt hypothyroidism (low T3, T4 and elevated TSH), the rest 10 patients were having subclinical hypothyroidism (elevated TSH only). 9.2% of males and 29.2% of females were found to have hypothyroidism. Body mass index was elevated in 78.6% of hypothyroid patients and 37.2% of euthyroid patients

(Table 2). This higher BMI was found to be statistically significant. 71.4% of hypothyroid patients had hypercholesterolemia whereas only 39.6% of euthyroid patients had hypercholesterolemia. This was statistically significant. Hypothyroid patients were found to have elevated triglycerides and high LDL also (Table 3). 64.3% of hypothyroid patients were found to have diastolic hypertension when compared to euthyroid (34.9%) (Table 4).

Table 1: Prevalence of hypothyroidism.

Thyroid status	Number of patients
Hypothyroid	14
Euthyroid	86
Total	100

Table 2: Relation between hypothyroidism and BMI.

Thyroid status	Elevated BMI	Normal BMI	Total
Hypothyroid	11 (78.6%)	3 (21.4%)	14
Euthyroid	32 (37.2%)	54 (62.8%)	86
Total	43	57	100

Table 3: Relationship between thyroid status and lipids.

	Hypothyroid	Euthyroid
Total cholesterol		
Elevated	10(71.4%)	34(39.6%)
Normal	4(28.6%)	52(60.4%)
Triglyceride		
Elevated	10(71.4%)	36(41.9%)
Normal	4(28.6%)	50(58.1%)
LDL		
Elevated	10(71.4%)	37(43.1%)
Normal	4(28.6%)	49(56.9%)
Total	14	86

Table 4: Relationship between hypothyroidism and diastolic blood pressure.

Thyroid status	Normal diastolic BP	Elevated diastolic BP	Total
Hypothyroid	5(35.7%)	9(64.3%)	14
Euthyroid	56(65.1%)	30(34.9%)	86
Total	61	39	100

DISCUSSION

The prevalence of hypothyroidism in our study was 14% which was comparable to other similar studies.¹² 29.2% female patients and 9.2% of male patients were hypothyroid. Hypothyroidism was 3 times more prevalent in females. Other similar studies also reported same findings.^{9,12} In present study 78.8% of hypothyroid patients had elevated BMI which was also comparable to

study by Knudsen et al.^{18,19} In the study sample 71.4% hypothyroid patients had elevated total cholesterol and 39.6% euthyroid patients had elevated total cholesterol. 71.4% hypothyroid patients had elevated triglycerides and 41.9% euthyroid patients had elevated triglycerides. 71.4% hypothyroid patients had elevated LDL cholesterol and 43.1% euthyroid patients had elevated LDL cholesterol. 64.3% of hypothyroid patients had low HDL cholesterol and 39.5% euthyroid patients had low HDL cholesterol. All these observations except the prevalence of low HDL cholesterol were statistically significant. Other studies have also reported similar findings.^{8-10,17,19} We also observed a higher prevalence of diastolic hypertension in hypothyroid patients (64.3%) compared to euthyroid patients (34.9%). Similar results were obtained in other studies also.⁶

CONCLUSION

Thyroid hormone has various actions on the heart and hypothyroidism has increased cardiovascular mortality and morbidity.²⁰⁻²³ The associated cardiovascular risk factors in hypothyroid patients are obesity, hypercholesterolemia and diastolic hypertension. Patients with coronary artery disease especially those with the above risk factors should be screened for hypothyroidism and hypothyroidism should be managed.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of Coimbatore Medical College, Coimbatore, Tamil Nadu, India

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