

Study of Thyroid Hormone Profile in Cases of Acute Coronary Syndrome

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ABSTRACT

Aim and objectives : To study the prevalence of thyroid dysfunction in acute coronary syndrome and its effect on complications and mortality of ACS.

Methods : Total 200 patients of ACS were included as per inclusion and exclusion criteria. Thyroid functions were done at admission. Patients were assessed for in hospital complications and death.

Results : Total 36 patients (18%) were found to have thyroid dysfunction. Out of this 19 (9.5%) had subclinical hypothyroidism, 14 (7%) had sick euthyroid syndrome (low T3 syndrome), hypothyroidism in 2 (1%). Amongst this cases of sick euthyroid syndrome (low T3 syndrome) had statistically significant association with complications like Heart failure (p=0.0016), cardiogenic shock (p=0.0001), Arrhythmias (p=0.0001) and in hospital mortality, (p<0.0001), LV dysfunction on echo (p= 0.0052). However cases of subclinical hypothyroidism had no significant association with complications and mortality.

Conclusion : In cases of ACS low T3 syndrome has strong statistical association with in hospital complications and mortality whereas subclinical hypothyroidism had no statistically significant association with complications or mortality.

Key words : Low T3 syndrome, Acute coronary syndrome.

Introduction :

The thyroid gland plays a pivotal role in tissue metabolism and development, and in doing so affects various organ systems. These hormones play a critical role in cell differentiation during development and help maintain thermogenic and metabolic homeostasis in the adult. Some studies have shown the effect of thyroid hormones on complications and mortality from heart failure, systemic arterial hypertension, atherosclerosis, dyslipidemia and cardiopulmonary surgeries.

Clinical hypothyroidism is found to be highly prevalent in patients with acute coronary syndrome (ACS). Other thyroid dysfunctions like low T3 syndrome (euthyroid sick syndrome), subclinical hypothyroidism are also found to be highly prevalent in acute coronary syndrome and affect the prognosis and outcome in acute coronary syndrome.

Aims and Objectives :

- To study the prevalence of thyroid dysfunction in cases of ACS admitted in ICU
- To study the association between thyroid dysfunction and in hospital complications in ACS (Heart Failure, Arrhythmias, LV dysfunction)
- To study the association between thyroid dysfunction and in hospital mortality in ACS

Material and methods :

This Cross sectional observational study was conducted at Govt. Medical College, Nagpur. Study was initiated after taking approval from Institute's Ethics Committee. Total 200 cases of ACS fulfilling inclusion criteria were included in the study.

Inclusion criteria : Patients diagnosed to have ACS as per WHO criteria which included cases of ST elevation Myocardial infarction, non ST elevation Myocardial infarction and unstable angina were included in study irrespective of gender, race, ethnic group, age, and clinical severity.

Exclusion criteria : Patients with pre-existing thyroid disease, those taking drugs like levothyroxine, carbamazepine, amiodarone, cases with associated critical illness were excluded. In all the

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patients blood was sent for Thyroid Function Test (Total and Free T3, T4, TSH) and CPK-MB and they were subjected for ECG and 2D-Echocardiography. Thyroid function tests (TFT) were carried out by Chemi-Immunolumiscent assay (C.L.I.A.), normal values of which are mentioned below **Table 1**.

Table 1 : Normal values of thyroid hormones

Investigation	Normal range
Thyroid Stimulating Hormone (TSH)	0.30 - 5.5 μ IU/ml
Total triiodothyronine (T3)	60 - 200 ng/dl
Total tetraiodothyronine Thyroxine (T4)	4.5 - 12.0 μ g/dl
Free triiodothyronine (fT3)	1.7 - 4.2 pg/dl
Free tetraiodothyronine (fT4)	0.7 - 1.8 pg/dl

Statistical analysis :

Cases were followed up for in hospital complications and mortality and statistical correlation was done by calculating odds ratio, 95% CI, and p-value by unpaired t-test to find out association between thyroid dysfunction with complications & mortality.

Results :

The study included 200 patients of ACS. Total 200 patients were screened for the presence of Thyroid dysfunction. 36 (18%) patients were found to have thyroid dysfunction whereas 164 (82%) patients had normal thyroid function. Subjects with thyroid dysfunction were compared with those having normal thyroid function with respect to in hospital complications and mortality.

Out of 200 patients 87(43.5%) patients had STEMI which included 48 males and 39 females whereas 113 (56.5%) patients had NSTMI and UA which included 62 males and 51 females. Out of 200 patients 36 (18%) patients were found to have thyroid dysfunction. Subclinical hypothyroidism was found in 19 (9.5%) patients while euthyroid sick syndrome (low T3 syndrome) was found in 14 (7%) of patients. Hypothyroidism and hyperthyroidism were found in 2 (1%) and 1 (0.5%) patients respectively.

Table 2 : Distribution of thyroid dysfunction in study population

TYPE OF THYROID DYSFUNCTION	NUMBER OF PATIENTS	PERCENTAGE
SUBCLINICAL HYPOTHYROIDISM	19	9.5
EUTHYROID SICK SYNDROME	14	7
HYPOTHYROIDISM	02	1
HYPERTHYROIDISM	01	0.5
SUBCLINICAL HYPERTHYROIDISM	00	0
TOTAL	36	18

Corelation between thyroid dysfunction and cardiac complications and mortality :

There was statistically significant correlation between presence of thyroid dysfunction and in hospital complications like heart failure, arrhythmias, cardiogenic shock, LV dysfunction and mortality in the study group. This association was seen only with cases of low T3 syndrome and was not observed in cases of subclinical hypothyroidism.

Table 3 : Corelation between thyroid dysfunction and cardiac complications and mortality.

COMPLICATIONS	THYROID DYSFUNCTION (N=36)	NORMAL THYROID FUNCTION (N=164)	P-value
HEART FAILURE (N=76)	22	54	0.0016
CARDIOGENIC SHOCK (N=61)	21	40	0.0001
ARRYTHMIAS N=65	19	46	0.0001
LV DYSFUNCTION ON ECHO N=83	24	59	0.0052
MORTALITY (N=41)	13	28	0.0104

Discussion :**PREVALENCE OF THYROID DYSFUNCTION IN PATIENTS OF ACS :**

In our study 18% patients were found to have thyroid dysfunction. Study done by Osama A and Khalil MD et al had 23 % of patients with thyroid dysfunction¹ and Faiza Abdulaziz Qari had thyroid dysfunction in 23.3% patients.²

In our study 9.5% patients were found to have subclinical hypothyroidism.

Study done by Okuyan Ertugrul et al had Subclinical hypothyroidism in 10.76% of patients³. Study done by Osama A and Khalil MD et al had 5.6% of patients of subclinical hypothyroidism and Faiza Abdulaziz Qari had subclinical hypothyroidism in 2.7% patients². Lower percentage in later study as compared to our study is due to cutpoint of sTSH which was > 5mIU/L in our study and it was > 10 mIU/L in study by Faiza Abdulaziz Qari.

Euthyroid sick syndrome (low T3 syndrome) was found in 7% of patients in our study. In other studies Rodrigo et al reported 18% cases⁴, Osama A et al reported 15% cases¹ and F. A. Qari reported 10% cases² of subclinical hypothyroidism in their studies.

Association Thyroid dysfunction and in hospital complications.

Thyroid dysfunction is associated with significant in hospital complications and mortality in patients of acute coronary syndrome.

In our study thyroid dysfunction was significantly associated with cardiogenic shock (p-0.0001), arrhythmias (p-0.0001), heart failure (p-0.0016) and left ventricular dysfunction (p-0.0052). This association was seen only in cases of low T3 syndrome but was not seen in cases of subclinical hypothyroidism.

Osama A et al detected that thyroid dysfunction increases relative risk of occurrence of shock, arrhythmia and reinfarction by 6.04, 2.05 and 1.67 fold respectively than euthyroid cases, in acute coronary syndrome¹. These findings are nearly similar to our findings.

Shilpa Deoke and Ujwala Walvi⁵ found statistically significant correlation between low T3 and left ventricular dysfunction, reduced T3 was associated with poor LVEF. Patients with cardiogenic shock had significantly reduced T3 levels. Thus it can be concluded that low T3 in AMI is associated with poor LV function during short term follow-up. This is similar to our finding.

Association of Thyroid dysfunction and mortality :

In our study we found mortality of 36.11% in patients with thyroid dysfunction. Out of 36 patients of thyroid dysfunction 13 patients died. Statistical analysis showed significant association (p<0.0001) between thyroid dysfunction and mortality. Again this association was noted only in cases of low T3 syndrome and was not seen in cases of subclinical hypothyroidism.

Medha Rajappa and S. K. Sen⁶ concluded that the degree of T3 decrease is proportional to the severity of cardiac damage and may have a possible prognostic value.

Adwiyah J, Norasylium A.W.⁷ showed significant association between non thyroidal illness syndrome and mortality in cases of acute coronary syndrome. Study by Surav Potddar et al⁸, Wartofski et al⁹ and Becker C et al¹⁰ showed similar findings in their studies.

Osama A et al found mortality of 22.22% in patients with thyroid dysfunction¹. Faiza Abdulaziz Qari found mortality of 9.8% in patients with Acute coronary syndrome². All of those patients had low T3 syndrome and FT3 was significantly low in dead patients (P < 0.001). The findings correlate with our study.

Conclusions :

We can conclude that the thyroid dysfunction in our cohort of ACS is highly prevalent as 18% of our patients had thyroid dysfunction. The most frequent thyroid dysfunction was subclinical hypothyroidism.

Euthyroid sick syndrome (low T3 syndrome) was next common thyroid dysfunction found in our

study population. Euthyroid sick syndrome (low T3 syndrome) was significantly associated with in hospital complications and mortality in patients of ACS in hospital but more significant in STEMI group than NSTEMI and UA group.

Subclinical Hypothyroidism was not associated with in hospital complications and mortality in patients with ACS in our study group.

Implications of the Study

Test for thyroid disorders in acute coronary syndrome can predict in hospital complications and mortality. The possible impact of thyroid dysfunction on ACS and its complications deserves particular attention in view of its implication for screening strategies in growing number of ACS patients.

There is a need for further studies designed to answer the question whether restoration of euthyroidism by thyroid hormone replacement might influence complications and mortality or not. Larger studies are needed to answer this question.

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