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EUTHYROID SICK SYNDROME AS A PROGNOSTIC MARKER IN ACUTE CORONARY SYNDROME.

Medicine

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ABSTRACT

Aim: To study the prevalence of euthyroid sick syndrome in acute coronary syndrome and its effect on complications and mortality of ACS.
Methods: Total 122 patients of ACS were included as per inclusion and exclusion criteria. Thyroid functions were done at day 1, day 3 and in between day 7 to day 30 of the admission. Patients were assessed for in hospital complications of ACS and death.
Results: Total 6 patients (5%) were found to have euthyroid sick syndrome. These patients had statistically significant association with the ACS related complications like arrhythmias, cardiogenic shock and heart failure (p=0.000) and poor left ventricular dysfunction (p = 0.00036). The association of ESS and in hospital mortality was also found to be statistically significant (p=0.0000)
Conclusion: The cases of Euthyroid sick syndrome has significant statistical association with in-hospital complications and mortality.

KEYWORDS

Euthyroid sick syndrome, acute coronary syndrome.

Introduction

Acute Coronary Syndrome is a condition in which there is an inadequate supply of blood and oxygen to a portion of the myocardium, it typically occurs when there is an imbalance between myocardial oxygen supply and demand". It includes ST elevation MI, Non-ST elevation MI and Unstable angina.

The thyroid gland plays a pivotal role in tissue metabolism and development, and in doing so affects various organ systems. These hormones play an important role in cell differentiation during development and keep maintaining the metabolic and thermogenic homeostasis in the adult.

Changes in levels of thyroid hormones have been described in many systemic non-thyroidal illnesses, including the acute cardiac diseases. These changes referred as "euthyroid sick syndrome", consist of low serum levels of total T3 or free T3, increased reverse T3, and normal T4, free T4 and TSH levels in acute coronary syndromes, affecting the prognosis.

Aims and objectives:

1. To study the thyroid hormone profile in acute coronary syndrome patients in a tertiary care center
2. To find out the proportion of Euthyroid sick syndrome among the acute coronary syndrome patients and its relation to the mortality and morbidity of the disease.

Materials and methods:

This Cross sectional observational study was conducted at Dr DY Patil Medical College, Hospital and research center, Pimpri. This study was conducted among the patients attending Medicine OPD, and patients who were admitted to the Emergency Department, Medicine wards and ICU. Study was initiated after taking approval from Institute's Ethics Committee. Total 122 cases of ACS fulfilling inclusion criteria were included in the study.

Inclusion criteria: Patients with acute coronary syndrome above 18 years.

Exclusion criteria: Patients of established or known thyroid disease or goiter, patients on Amiodarone, Lithium, para aminosalicylic acids, steroids, previous history of iodine, thyroxine, anti-thyroid and thyroid replacement therapy that alters the thyroid hormone level. In all the 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-Echocardiogrphy. 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	Value
T3	0.58-1.59 ng/mL
T4	4.87-11.72 µg/dL
TSH	0.40 – 4.00 µIU/mL

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 122 patients of ACS. Out of all the patients, 6 patients (5%) were found to have Euthyroid sick syndrome whereas rest patients had normal thyroid function. Subjects with ESS were compared with those having normal thyroid function with respect to in hospital complications and mortality.

Out of 122 ACS patients 66 (54%) were male and 56(46%) were female. 55 (45%) patients had unstable angina, 46 (38%) patients had NSTEMI and 21 (17%) patients had STEMI. Out of all the cases, total 6 (5%) patients were found to have Euthyroid sick syndrome.

There was statistically significant correlation between presence of Euthyroid sick syndrome and in hospital complications like heart failure, arrhythmias, cardiogenic shock, LV dysfunction and mortality in the study group. Table 2,3.

Table no 2. Left Ventricular dysfunction among patients with ESS and with normal thyroid hormone profile.

LV dysfunction	ESS	Normal thyroid profile	Grand Total	%
mild	1	17	18	14.75
moderate	0	15	15	12.29
Severe	5	12	17	13.93
Normal	0	78	78	63.93
Grand Total	6	116	122	100

Table no 3. Association of complications in patients with ESS and with normal thyroid hormone profile

Complication	ESS	Normal Thyroid profile	Total	%
Arrhythmia	1	1	2	1.6
Cardiogenic Shock	2	3	5	4
Heart Failure	3	3	6	2.4
None	0	109	109	89
Grand Total	6	7	13	100

Discussion:

Prevalence of ESS in ACS:

In this study with the 122 patients, an occurrence of Euthyroid sick syndrome was about 5% with 3 (14%) in the STEMI group, 3 (6.5%) in the NSTEMI and no patient of UA was observed to have an incidence of ESS. A study, Adawiyah J, Norasyikin AW et al[1] published in Heart Asia observed that the prevalence of ESS in ACS was 53% with 48% of the subjects with UA had ESS, while 54% and 56%of the subjects with NSTEMI and STEMI respectively were affected, the study was done on a total of 82 patients. In other studies by Pimentel RC, Perez CG et al[2] and Qari FA et al136 showed the prevalence of 18% and 10% respectively. Ashutosh Somalwar, Rahul Jadhav et al[3] conducted in Nagpur showed the prevalence of 7% Euthyroid sick syndrome in ACS. The findings of the last study were found to be consistent with this study. The low occurrence of the euthyroid sick syndrome in this study and the study by Ashutosh Somalwar, Rahul Jadhav et al compared to other studies could be due to the population of patients of different geographical area and absence of measurements of reverse T3 in the study.

Association Euthyroid sick syndrome and in hospital complications:

Total 5 patients with ESS had severe dysfunction whereas 1 patient had mild LV dysfunction. When compared to the patients with normal thyroid hormone profile, ESS was associated with a high incidence of severe LV dysfunction. (p-value = 0.00036) A study by Shilpa Deoke and Ujwala Walvi et al[4] found a statistically significant correlation between low T3 and left ventricular dysfunction, reduced T3 was associated with poor LVEF. Adawiyah et al[1] concluded that thyroid hormones are important for the systolic as well as diastolic functions of the heart. When the thyroid hormone system is down-regulated in acute myocardial infarction, handling of the intracellular calcium gets affected in such a way that it leads calcium overload which causes myocardial stunning and reperfusion injury. It also causes increased systemic vascular resistance leading to increased cardiac workload due to this down-regulation. If the heart is unable to cope with this, cardiac output and consequently LVEF is reduced. Medha Rajappa and S.K. Sen[5] concluded that the levels of serum T3 is inversely proportional to the severity of cardiac damage and it might have a prognostic value.

Out of study group of 122, a total of 13 patients had complications of ACS including Heart failure, Arrhythmias and Cardiogenic shock. Out of those 13 patients, 6 patients belonged to the ESS group. Hence the association of ESS between ACS induced complications was statistically significant. (p-value = 0.0000) In studies conducted elsewhere including Adawiyah et al, Ashutosh Somalwar, Rahul Jadhav et al, Osama A et al[6] and Saurabh et al[7] observed that presence of ESS in acute coronary syndrome leads to more incidence of complications than those with normal thyroid hormone profile.

Association of Euthyroid sick syndrome and mortality:

In our study, a total of 7 patients succumbed to death out of which 5 patients were of STEMI and 2 were NSTEMI. In the patients with ESS, 4 patients succumbed to death and 2 were discharged. The association of ESS with death was statically significant. (p-value = 0.000) Saurabh et al found that the association of Euthyroid sick syndrome was found to be significant for mortality in patients of STEMI with 3 out of 4 expired patients of STEMI having Euthyroid sick syndrome at the of admission with a significant p-value ($p < 0.05$) Osama A et al found a statistically significant increase in mortality among the patients with ESS ($p < 0.0003$) STEMI group as compared to NSTEMI and unstable angina group and thyroid dysfunction in STEMI group increase relative risk of mortality by 9.1 fold than euthyroid patients. Faiza Abdulaziz Qari[8] found that 38 (9.8%) patients with the acute coronary syndrome in their study succumbed to death. The Euthyroid sick syndrome was present in all of the dead patients and free T3 levels were statistically significant low in death patients ($P < 0.001$). Hence it was concluded that the low serum T3 level is an important marker of the disease severity and predicted mortality ICU patients. Thus, Euthyroid sick syndrome (low T3 syndrome) is significantly associated with mortality in patients of ACS in our study. And these findings were similar to other studies.

Conclusion

We can conclude that the thyroid dysfunction in our cohort of ACS is significantly prevalent as our patients experienced Euthyroid sick syndrome and this dysfunction was reported in both STEMI and NSTEMI subjects. Euthyroid sick syndrome (low T3 syndrome) was significantly associated with all cause morbidity and mortality but more significant in acute myocardial infarction than unstable angina patients.

Implications of the study:

Test for thyroid disorders in acute coronary syndrome can give predictor for risk of morbidity and mortality.

The possible impact of thyroid dysfunction on ACS and its complications deserves particular attention for carrying out routine thyroid function studies in these patients. More number of studies and number of patients are required for recommending routine thyroid function tests studies in ACS patients.

There is a need for further studies designed to answer the question of whether the restoration of euthyroidism might improve morbidity and mortality or not.

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