

Evaluation Of Thyroid Dysfunction In Acute Coronary Syndrome

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Abstract: Background & Objectives: 1} To describe thyroid hormone profile in patients with acute coronary syndromes (ACS) 2} To find, If any, short term prognostic significance of Thyroid diseases. Materials & Methods The study has been carried out at Shree Sayajirao General Hospital and Medical College Baroda during period of March 2011 to May 2012. The study comprised of patients with acute coronary syndrome admitted in ICCU of SSG, Hospital. Inclusion criteria were patients with acute coronary syndrome, irrespective of gender, race, ethnic group, age, and clinical severity, giving consent for being included as a part of the study. Exclusion criteria included patients using corticosteroids, amiodarone, or thyroid disease drugs, who had received any iodinated contrast agent within the previous two weeks, Patients with established diseases, such as neoplasias, chronic renal failure, chronic obstructive pulmonary disease requiring antibiotic therapy, liver cirrhosis, active infection, and decompensated diabetes mellitus, conditions that are known to affect thyroid function tests. Results: Of total 30 pts of STEMI, 30 % had increased level of Free T4 on day 0 and 23.07% had increased values on day 4. Of total 30 pts of NSTEMI/UA, 20 % had increased level of Free T4 on day 0 and 14.28% had increased values on day 4. The levels of TSH, free and Total T3 as well as Total T4 were not significantly different in either STEMI/NSTEMI group either Day 0 or Day 4. 21.67% of pts had evidence of Sick Euthyroid Syndrome on day of admission. Of the total 6 pts expired before day 4, 3 patients had evidence of Sick Euthyroid Syndrome at the time of admission. The association of Sick Euthyroid syndrome was found to be significant for mortality in patients of STEMI with 3 out of 4 expired patients of STEMI having SES at the of admission with significant p value {p <0.05}. There was no significant difference in mortality in patients of NSTEMI/UA having SES. Conclusion: Our results show the importance of recognizing the "Euthyroid Sick Syndrome" in coronary heart disease patients, suggesting an association with poorer prognosis in patients with ST elevated Myocardial Infarction in form of increased mortality and no association was found with mortality in patients having Non ST elevated Myocardial Infarction or Unstable Angina. [Potdar S et al NJIRM 2013; 4(5) : 65-71]

Key Words: SES, sick euthyroid syndrome, STEMI, ST elevation myocardial infarction, UA, unstable angina

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Introduction: Acute Coronary Syndrome (ACS) 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.

The most common cause of myocardial ischemia is atherosclerotic disease of an epicardial coronary artery (or arteries) sufficient to cause a regional reduction in myocardial blood flow and inadequate perfusion of the myocardium supplied by the involved coronary artery^{1,2}.

With urbanization in countries with emerging economies and a growing middle class, elements of the energy-rich Western diet are being adopted. As a result, the prevalence of risk factors for and of ACS itself are both increasing rapidly in those regions such that a majority of the global burden of

ACS occurs there. Population subgroups that appear to be particularly affected are men in South Asian countries, especially India and the Middle East. In light of the projection of large increases in ACS throughout the world, ACS is likely to become the most common cause of death worldwide by 2020.^{1,2}

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.³

Autoimmune disorders of the thyroid gland can stimulate overproduction of thyroid hormones (*thyrotoxicosis*) or cause glandular destruction and hormone deficiency (*hypothyroidism*). In addition,

benign nodules and various forms of thyroid cancer are relatively common and amenable to detection by physical examination.³

Some studies have shown the effect of thyroid hormones on morbidity and mortality from heart failure⁴, systemic arterial hypertension⁵, atherosclerosis⁵, dyslipidemia⁵ and cardiopulmonary surgeries⁶.

Thyroid hormone directly affects the heart and peripheral vascular system. The hormone can increase myocardial inotropy and heart rate and dilate peripheral arteries to increase cardiac output. atrial arrhythmias, limitations in exercise tolerance, and congestive heart failure.^{7,8,9}

Serum thyroid hormone levels have been described in several systemic non thyroidal illnesses, among them acute heart diseases. The changes observed in these situations have been classified as “euthyroid sick syndrome”, consisting of low total T3 and/or free T3, increased/ normal total T4 and free T4 levels. These findings are seen in acute myocardial infarction, affecting the prognosis^{7,8}

Material & Methods: Acute Coronary Syndrome (ACS) 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. The most common cause of myocardial ischemia is atherosclerotic disease of an epicardial coronary artery (or arteries) sufficient to cause a regional reduction in myocardial blood flow and inadequate perfusion of the myocardium supplied by the involved coronary artery^{1,2}.

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Results: A cross sectional study of Assessment of Thyroid Dysfunction in patients of Acute Coronary Syndrome was conducted in the ICCU of SSG hospital, Vadodara ICCU from March 2011 to May 2012.

Table 1: Demographic Distribution Of The Study Population

AGE OF PATIENTS	FEMALE	MALE	TOTAL	PERCENT
31-40	0	2	2	3.33
41-50	4	8	12	20
51-60	13	12	25	41.67
61-70	11	7	18	30
71-80	1	2	3	5

The study included patients with the youngest patient of 33 years of age and the oldest one being 76 years of age. The mean age of study population is 59 years.

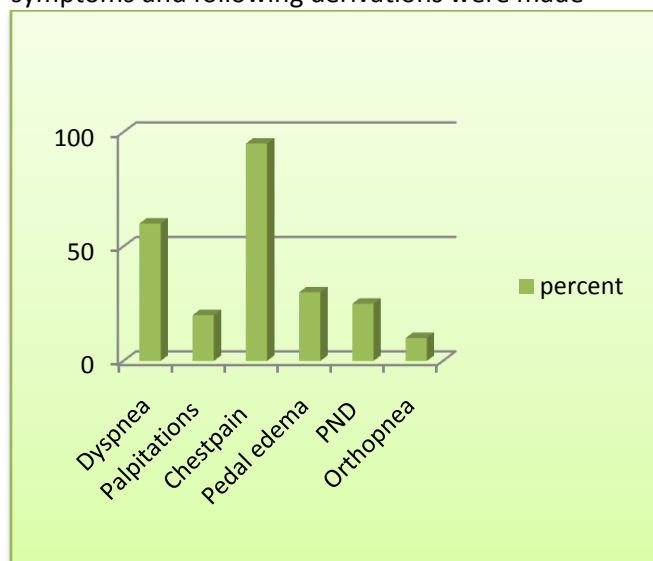
Table 2: Sex Distribution Of The Study Population

SEX	NO. OF PTS.	PERCENT
MALE	31	53.33
FEMALE	29	46.67
TOTAL	60	100%

Of the total study population 53.33% was constituted by male and the rest 46.67% by the female patients.

Graph 1: Symptom Complex Of Study Population

The were evaluated in terms of presenting symptoms and following derivations were made



60% of patients had dyspnea either on exertion or at rest. 25% patients had paroxysmal nocturnal dyspnea and 10% patients had orthopnea. 20% of patients had palpitations on presentation. 95% of patients had complains of chest pain. 30% of patients had complains of pedal edema on presentation.

Table 3: Distribution Of Class Of Dyspnea In Study Population.

NYHA CLASS	PERCENT OF PATIENTS
1	7
2	26
3	53
4	11

Out of 36 patients having dyspnea 7% of patients had NYHA Class 1 Dyspnea. 29% of patients had NYHA Class 2 Dyspnea. 53% of patients had NYHA

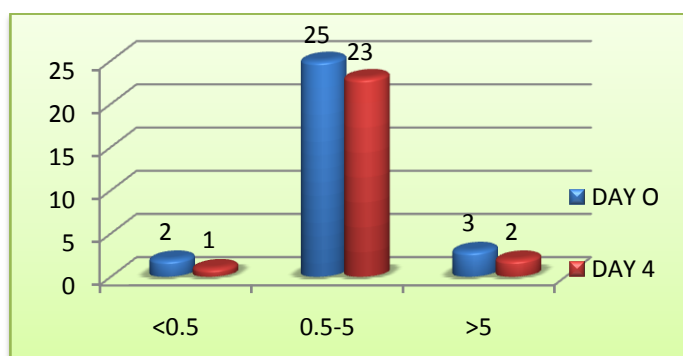
Class 3 Dyspnea and 11% of patients had NYHA Class 4 Dyspnea.

Table 4: Distribution Of Patients Having Hypertension And Diabetes Mellitus

	PTS	PERCENTAGE
HTN	24	40
DM	20	33.67

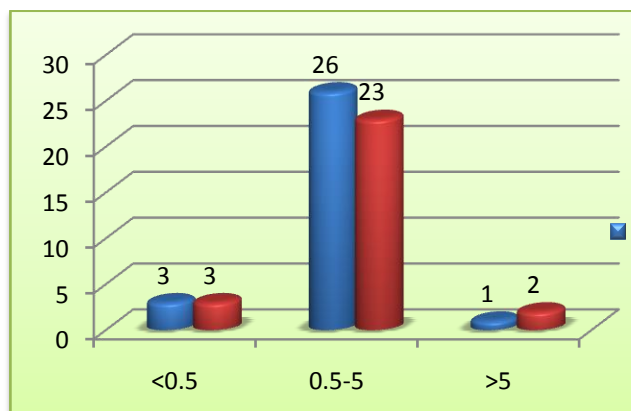
Of total 60 pts, 40% had HTN and 33.67% had Diabetes mellitus.

Graph 2: Distribution Tsh Level On Day 0 And Day 4 In Stemi Group



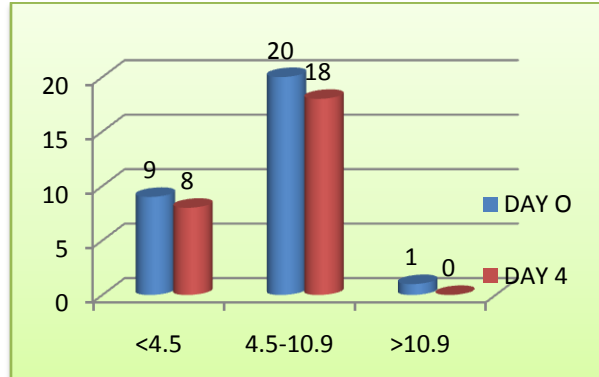
25 pts{83.33%} of STEMI had normal TSH level on day 0 and 23 pts{76.67%} had normal TSH on day 4, while 4 pt expired before day 4, with no significant difference on either day 0 or day 4 levels. 4 Pts OF STEMI EXPIRED BEFORE DAY 4 .

Graph 3: Distribution Tsh Level On Day 0 And Day 4 In Nstemi/Ua Group



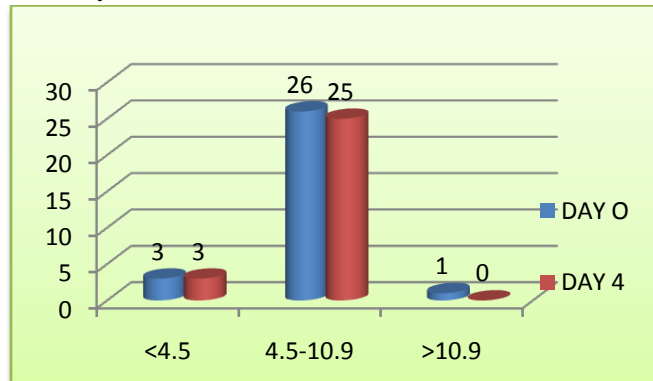
Of 30 pts of NSTEMI/UA ,26{86.67%} had normal TSH level on day 0 and 23{76.67%} had normal TSH on day 4, with no significant difference on either day 0 or day 4 levels. 2 Pts OF NSTEMI/UA EXPIRED BEFORE DAY 4.

Graph 4: Distribution Of Total T4 Level In Stemi Patients



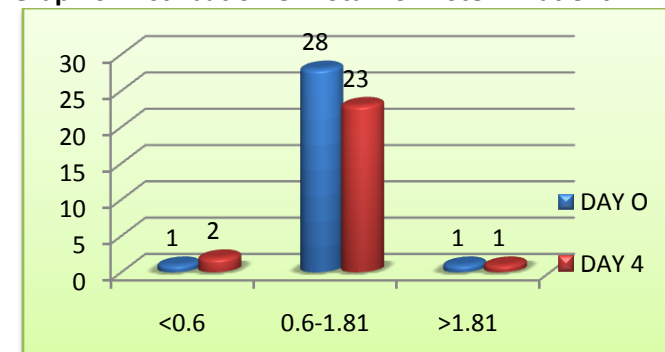
Of total 30 pts of STEMI, 20 {66.67%} had normal T4 level on day 0 and 18{60%} had normal level on day 4, while 9 pts{30%} had reduced T4 level on day 0 and 8 pts{26.67%} had reduced level on day 4, with no significant difference on either day 0 or day 4 levels.

Graph 5: Distribution Of Total T4 Level In Nstemi/Ua Patients



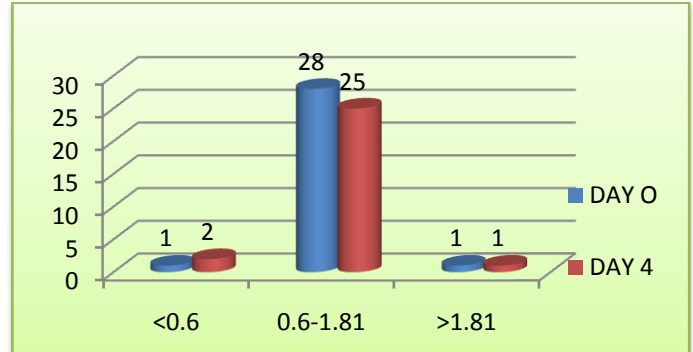
Of total 30 pts of NSTEMI/UA, 26{86.67%} had normal Total T4 level on day 0 and 25{83.33} had normal level on day 4, while 3 {10%} had decreased Total T4 level on both day 0 and day 4.

Graph 6: Distribution Of Total T3 In Stemi Patient



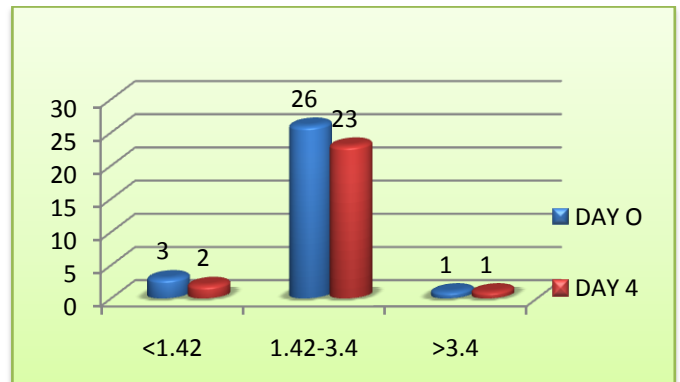
Of total 30 pts of STEMI, 28{93.33%} had normal level on day 0 and 23 {76.67} had normal level on day 4, with no significant difference on either day 0 or day 4 levels.

Graph 7: Distribution Of Total T3 Level In Nstemi/Ua Patients



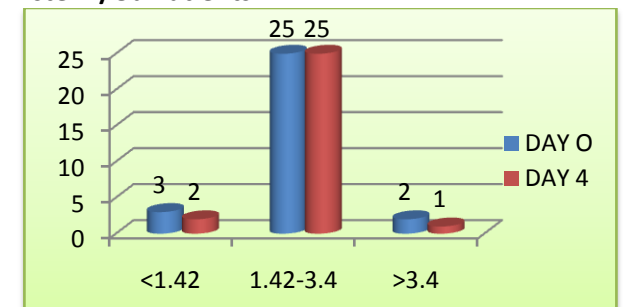
Of total 30 pts of NSTEMI/UA, 28 had normal level on day 0 and 25 had normal level on day 4, with no significant difference on either day 0 or day 4 levels.

Graph 8: Distribution Of Free {F}T3 Level In Stemi Patients



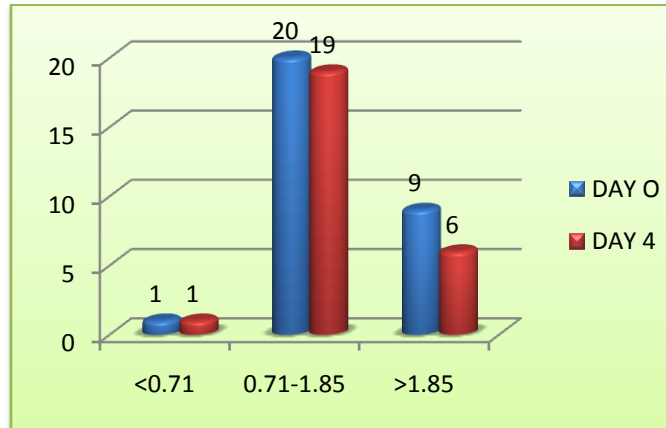
Of total 30 pts of STEMI, 26 had normal level on day 0 and 23 had normal level on day 4, with no significant difference on either day 0 or day 4 levels.

Graph 9: Distribution Of Free T3 Level In Nstemi/Ua Patients



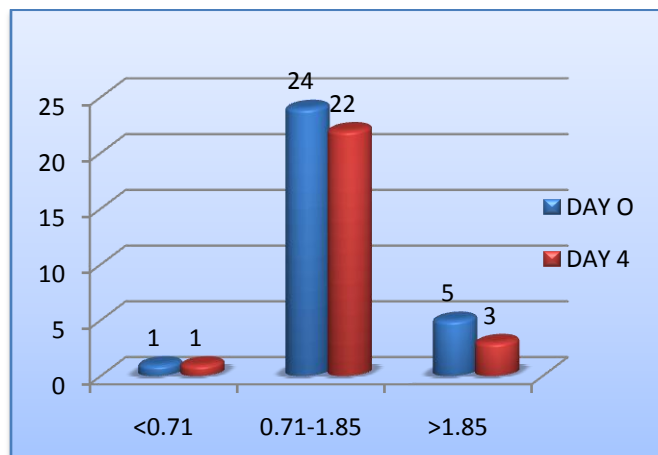
Of total 30 pts of NSTEMI/UA, 25 had normal level on day 0 as well as on day 4, with no significant difference on either day 0 or day 4 levels.

Graph 10: Free T4 Levels In Stemi Patients



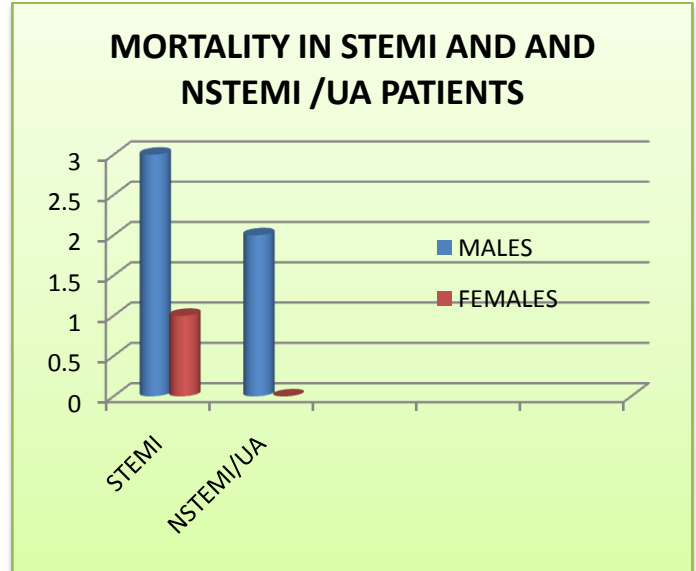
Of total 30 pts of STEMI, 20{66.67%} had normal level on day 0 and 19 {73.07%} had normal level on day 4, while 9 {30 %} had increased level on day 0 and 6 {23.07} had increased values on day 4.

Graph 11: Distribution Of Free T4 In Nstemi/Ua Patients



Of total 30 pts of NSTEMI/UA, 24{80%} had normal level on day 0 and 22 {84.6%} had normal level on day 4, while 6 {20 %} had increased level on day 0 and 4 {14.28} had increased values on day 4.

Graph 12: Mortality In Stemi And And Nstemi /Ua Patients



Of the total 6 expired patients, 4 had stemi; of which 3 were males and 1 female and remaining 2 of nstemi/ua were males.

Discussion: We sought to evaluate thyroid hormone plasma levels in patients with Acute Coronary Syndrome and to deduce any significant deviation from normal and to correlate any prognostic significance of the same, if any.

We compared findings between the unstable angina and/or non-ST-segment elevation acute myocardial infarction (UA/NSTEMI) and ST-segment elevation acute myocardial infarction (STEMI) groups.

This two-group division was used to investigate whether thyroid hormone levels would present a distinct behaviour and a prognostic value between the groups.

Analysis of hormonal behavior in patients admitted for Acute Coronary Syndrome showed increased mean plasma unbound T4, while the other hormones mostly remained within normal limits. In our series, mean free T4 in patients admitted was above the normal range on days 1 and 4, As for the other hormones, namely TSH, T3, free T3, T4, all means were within the normal range on days 1 and 4, but for lower normal levels of mean TSH.

All patients taken into account, mean hormonal profile was not consistent with the “euthyroid sick syndrome”.

However, in the analysis of hormone plasma levels on the first day of admission, 13 patients (21.67%) showed serum concentrations consistent with those found in the “euthyroid sick syndrome”.

Of the 13 patients having SES, 8 had STEMI and remaining 5 had NSTEMI/UA. .

When the UA/NSTEMI and STEMI groups were compared, increased free T4 concentration was more marked in the latter, but with no significant difference. Of the Total 60 patients evaluated in this study, six (10%) died within the first four days, of which 4 were of STEMI and 2 of NSTEMI/UA. Of the 4 STEMI pts expired, 3 were found to have Sick Euthyroid Syndrome and all 2 NSTEMI pts were having their Thyroid profile within normal range.

This profile may suggest the presence of “euthyroid sick syndrome” in the STEMI group, associated with a poorer prognosis.

Some theories have been proposed to justify the “euthyroid sick syndrome”, such as decrease in the extrathyroidal conversion of T4 to T3 secondary to lower extracellular clearance of T4 or reduced 5’deiodinase enzyme activity.

Other mechanisms may be involved: reduced thyrotropin secretion, with decreased T3 and T4; thyroxine-binding globulin, albumin and the affinity of both to thyroid hormones may be reduced, impairing 5’ monodeiodinase’s action2 and T4 and T3 uptake, as well as these post-receptors action.

All the above may be directly affected by catecholamine levels. These mechanisms corroborate the hypothesis of the thyroid gland adapting its metabolism according to the disease involved, characterizing the “euthyroid sick syndrome”

The hormonal profile characterized by the “euthyroid sick syndrome” seems to be associated with pathophysiological features and the prognosis of these diseases, and further studies are needed to prove assumption.

Conclusion: 13 patients{21.67%} of pts had evidence of Sick Euthyroid Syndrome on day of admission.Of the total 6 pts expired before day 4, 3 patients had evidence of Sick Euthyroid Syndrome at the time of admission. The association of Sick Euthyroid syndrome was found to be significant for mortality in patients of STEMI with 3 out of 4 expired patients pf STEMI having SES at the of admission.

There was no significant difference in mortality in patients of NSTEMI/UA having SES. Our results show the importance of recognizing the “Euthyroid Sick Syndrome” in coronary heart disease patients, suggesting an association with poorer prognosis in patients with ST elevated Myocardial Infarction in form of increased mortality and no association was found with mortality in patients having Non ST elevated Myocardial Infarction or Unstable Angina.

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