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Original Article

Thyroid function evaluation in patients of acute coronary syndrome and its prognostic significance

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ABSTRACT:

Background: The relationship of thyroid hormonal abnormalities and cardiovascular disease goes well beyond the risk of atherosclerosis in association with hypothyroidism and the risk of atrial fibrillation in persons with hyperthyroidism. Hence; we planned the present study to assess the thyroid profile of patients with acute coronary syndrome. **Materials & methods:** This was a cross-sectional study in which 50 patients with acute coronary syndrome that presented to the emergency department of Guru Nanak Dev Hospital Amritsar. On admission, detailed history and clinical examination of the patients was done. Samples were collected and were assessed for routine baseline blood investigations. For serum thyroid hormone profile was measured by Enzyme linked immunosorbent assay (ELISA) technique. **Results:** The patients with subclinical hypothyroidism and subclinical hyperthyroidism were 3 (17.6%) and 1 (5.9%) respectively whereas 13 (76.5%) number of patients were suffering from Sick Euthyroid Syndrome. Mortality was found to be present in the patient of the Sick Euthyroid Syndrome group only. **Conclusion:** The clinicians have to consider thyroid function test for predicting the prognosis in patients of acute coronary syndrome particularly patients having sick euthyroid syndrome

Key words: Acute coronary syndrome, Thyroid.

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INTRODUCTION

Acute coronary syndrome (ACS) describes the range of myocardial ischemic states that includes unstable angina (UA), non-ST elevated myocardial infarction (NSTEMI) or ST-elevated MI (STEMI). ACS is associated with substantial morbidity and mortality and places a large financial burden on the health care system.[1, 2]

The thyroid gland is a vital hormone gland. It plays a major role in the metabolism, growth and development of the human body. It helps to regulate many body functions by constantly releasing a steady amount of thyroid hormones into the bloodstream. Thyroid hormone (TH) is required for normal development as well as regulating metabolism in the adult.[3, 4] Thyroid hormone has a major role in the cardiovascular system function and cardiac hemodynamic as well as to maintain the cardiovascular homeostasis. A slight change in thyroid status affects ventricular function, serum cholesterol levels, heart rate and rhythm and increases risk of coronary artery disease and cardiovascular mortality. Nevertheless, the relation between anomalous thyroid function and cardiovascular effects remains indistinct.[5, 6]

The relationship of thyroid hormonal abnormalities and cardiovascular disease goes well beyond the risk of atherosclerosis in association with hypothyroidism and the risk of atrial fibrillation in persons with hyperthyroidism. The two organ systems are intimately linked by their embryological anlage and the ubiquitous effects of thyroid hormone on the major components of the entire circulatory system: the heart, the blood vessels and the blood as defined by the flow law. Cardiac output is normally modulated by peripheral arteriolar vasoconstriction and dilatation, venous capacitance, and blood volume in response to tissue metabolic needs.[7- 9]Hence; we planned the present study to assess the thyroid profile of patients with acute coronary syndrome.

MATERIAL AND METHODS

The present study entitled study of thyroid hormone levels and its prognostic significance in acute coronary syndrome was conducted in the department of Medicine, Guru Nanak Dev Hospital attached to Govt. Medical College, Amritsar. This was a cross-sectional study in which 50 patients with acute coronary syndrome that presented to the emergency department of Guru Nanak Dev Hospital Amritsar and fulfilled the inclusion criteria of the study.

INCLUSION CRITERIA

- Patients with acute coronary syndrome irrespective of their age and sex.
- Diagnostic criteria for Acute Coronary Syndrome

All the patients with acute coronary syndrome were included in the study. On admission, detailed history and clinical examination of the patients was done.In this study, routine baseline investigations were performed i.e. Haemoglobin (Hb), Total leucocyte count (TLC), Differential leucocyte count (DLC), Peripheral blood film (PBF), Fasting blood sugar (FBS) Random blood sugar (RBS), blood urea, serum creatinine, serum lipid profile, serum Thyroid stimulating hormone (TSH) level, serum Triiodothyronine (T3) level, serum Tetraiodothyronine (T4) level, Electrocardiogram (ECG). Serum Creatinephosphokinase (CPK–MB), Troponin T and 2D-Echocardiography was done for further evaluation.

COLLECTION OF SAMPLES

A collection of venous blood samples was done in the study group on the day of admission within 24 hours from antecubital vein with all aseptic precautions in plain and vacutainers for routine baseline blood investigations. For serum thyroid hormone profile was measured by Enzyme linked immunosorbent assay (ELISA) technique

DATA ANALYSIS

The data was collected systematically and analysed statistically according to the standard statistical methods. SPSS software was used for assessment of level of significance. Chi- square test and student t test were used. P-value of less than 0.05 was taken as significant.

RESULTS

Mean age of the patients of the present study was 56.26 years. There were 26 males and 24 females in the present study. 20 patients were of STEMI while the remaining 30 patients were of NSTEMI. Mortality rate in the present study was 8 percent. Mortality rate among the NSTEMI patients was 0 percent while mortality rate among the STEMI patients was 20 percent. While comparing the mortality among STEMI and NSTEMI patients, significant results were obtained. In the present study, 17.6, 5.9 and 76.5 percent of the patients had subclinical hypothyroidism state, subclinical hyperthyroidism state and sick euthyroid state respectively. Significant results were obtained while comparing the mortality among subjects with different thyroid dysfunction in the present study.

Table 1: Comparison of mortality between subjects of the STEMI and NSTEMI/Unstable Angina group with Sick Euthyroid Syndrome

Group	Died	Survived	Total	p- value
STEMI	4	3	7	0.049 (S)
NSTEMI/UNSTABLE ANGINA	0	6	6	
Total	4	9	13	

(S: Significant)

Table 2: Prevalence of thyroid dysfunction in the present study

Thyroid dysfunction	Frequency	Percentage
Subclinical hypothyroidism	3	17.6%
Subclinical hyperthyroidism	1	5.9%
Sick Euthyroid Syndrome	13	76.5%
Total	17	100%

Table 3: Distribution of patients of the STEMI and NSTEMI group according to thyroid status

Thyroid status	STEMI	NSTEMI/Unstable angina	Total
Subclinical hypothyroidism	2	1	3
Subclinical hyperthyroidism	1	0	1
Sick Euthyroid syndrome	7	6	13
Total	10	7	17

Table 4: Mortality among subjects with different thyroid dysfunction in the present study

Thyroid dysfunction	Mortality		p- value
	Frequency	Percentage	
Subclinical hypothyroidism	0	0%	0.00
Subclinical hyperthyroidism	0	0%	
Sick Euthyroid Syndrome	4	100%	
Total	4	100%	

DISCUSSION

The present study was conducted to assess the thyroid profile of patients of acute coronary syndrome. A total of 50 patients with confirmed diagnosis of ACS were included in the present study. Mean age of the patients of the present study was 56.26 years. Our results were in concordance with the results obtained by Qari et al and Sah et al, who reported that, mean age of the patients of their study group to be 59.9 years and 64.73 years respectively.[3, 10]

In the present study, 8 percent of the total patients died during the study period. Similar results have been reported by Qari et al, who reported a mortality rate of 9.5 percent in their study.[3] It has been observed that of total 50 patients, STEMI group has 20 patients and NSTEMI/UA group has 30 patients and 4 deaths were seen in STEMI group while no deaths occurred in NSTEMI/UA group.

Out of 50 patients of ACS included in the present study, subclinical hypothyroidism was detected in 6 percent of the patients (3 patients), while subclinical hyperthyroidism was detected in 2 percent of the patients (1 patient). Sick euthyroid syndrome was detected in 26 percent of the patients (13 patients). Therefore, the overall prevalence of thyroid dysfunction was present in 34 percent of the patients (17 patients).Similar results have been reported by Sah et al, who also reported similar findings.[10] Their study depicted changes in thyroid hormone profile were observed in 25(25%) of the patients where 15(60%) had Sick euthyroid syndrome, 7(28%) had subclinical hypothyroidism, 2(8%) had subclinical hyperthyroidism and 1(4%) had low fT4 with normal fT3 and normal TSH. In a study of 400 patients of ACS by Qari, thyroid dysfunction was reported in 23.3% of patients.[11] Khalil et al in their study of 196 patients of ACS, reported changes in thyroid hormone profile in 23% of their patients.[11]

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 action 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 fact that serum TSH levels are unchanged or little changed is likely to be explained by two theories: failure of the hypothalamic-pituitary axis to respond to the low serum T3 concentration and/or suppressed TSH secretion due to normal or little elevated serum T4.[12, 13]

In the present study, no significant difference was observed while comparing the prevalence of thyroid dysfunction among ACS patients divided on the basis of gender. Our results were in concordance with the results obtained by Sah et al, who also reported similar findings. There was no statistically significant difference in prevalence of abnormal thyroid hormone profile in males and females group in their study being present in 27.5% in males and 21.42 % in females (p =0.322).[10] Not many figures are available about difference in prevalence in males and females in other studies.

While comprising the mortality in between STEMI and NSTEMI/Unstable Angina in the present study, it was observed that mortality rate was higher in the STEMI group in comparison to the NSTEMI/Unstable Angina group, the results of which were found to be statistically significant (P- value < 0.05). Also alterations in thyroid profile were more common in STEMI group in comparison to the NSTEMI/Unstable Angina group. Our results were in concordance with the results obtained by Sah et al, who also reported similar findings.[13] In their study, a higher prevalence of abnormal thyroid hormone profile was seen in patients of STEMI group as compared to NSTEMI/Unstable Angina group being 18 out of 25 (72%) in STEMI group and 7 out of 25 (28%) in NSTEMI/Unstable Angina group. The difference is statistically significant (p=0.031).[10]

In our study, 3 out of 17(17.6%) had subclinical hypothyroidism. In agreement to our study, Khalil noted 24.5% had subclinical hypothyroidism. Lovely et al reported that hypothyroidism and subclinical hypothyroidism was found in 26% patients suffering from ischemic heart disease.[11, 14]

In the present study, 5.9 percent of the patients (1 patient) out of 17 patients with thyroid abnormalities presented with subclinical hyperthyroidism. Our results were in concordance with the result obtained by Sah et al who reported that 2 out of 25(8%) had subclinical hyperthyroidism. In agreement to our study, Khalil et al also reported similar findings. They reported that 6.6% of the patients with thyroid dysfunction had subclinical hyperthyroidism.[10, 11]

Our study showed that Sick euthyroid syndrome, especially with low T3 is an important predictor of mortality in critically ill patients of ACS especially in STEMI. However, other thyroid function abnormalities like subclinical hypothyroidism and subclinical hyperthyroidism did not increase the predictability of mortality in our study group.

CONCLUSION

Thyroid hormone has an essential role in the cardiovascular homeostasis. Abnormal thyroid status increases risk of coronary artery disease and cardiovascular mortality affecting ventricular function and rhythm. Sick euthyroid syndrome is an important predictor of mortality in ACS patients. The clinicians have to consider thyroid function test for predicting the prognosis in patients of acute coronary syndrome particularly patients having sick euthyroid syndrome.

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