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Prevalence of hypothyroidism in ischemic heart disease

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Abstract: Cardiovascular diseases affect younger population in developing countries like India and carry a higher mortality rate. Common risk factors responsible for myocardial infarction in India are dyslipidemia, smoking, hypertension, diabetes, abdomnial obesity, physical inactivity, low fruits and vegetables intake, and psychosocial stress. Other risk factors account for lesser number of cases, one such risk factor being hypothyroidism. A retrospective study was done using hospital records who were admitted with the diagnosis of acute coronary syndrome during the period January 2014 to June 2017. A total number of 326 patients were admitted with acute coronary syndrome, out of these patients 93 (28.53%) were screened with thyroid profile(male 30, female 63). Female patients were more likely to be screened with thyroid profile than male patients (p value <0.0001). 17.2% (16) of the patients had thyroid abnormality. Three female patients had subclinical hypothyroidism. Four male and nine female patients had 'low T3 syndrome'. Of the 93 patients there were 7 deaths (7.5%). In the low T3 group the mortality was 38.5%. The mortality in the low T3 group was significantly higher and statistically significant (p value 0.0062), compared to euthyroid subjects. The study highlights the fact that low T3 syndrome in patients with acute coronary syndrome (NSTEMI and STEMI) acts has a poor prognosis factor. The study also highlights to the fact that, screening is less commonly utilised in patients with acute coronary syndrome.
Keywords: hypothyroidism, acute coronary syndrome, atherosclerosis, throid profile, subclinical hpothroidism, low T3 syndrome.

INTRODUCTION

Cardiovascular diseases affect younger population in developing countries like India and carry a higher mortality rate [1].Coronary artery disease were resposible for 32% of adult deaths in India between 2010-13, according to The Registrar General of India [2]. The age adjusted CVD mortality in India, as per WHO data, is 349/100,000 in men and 265/100,000 in women. These rates are .2-3 times greater than in the United states [3]. The INTERHEART study[4], established 8 common risk factors responsible for .90% of myocardial infarction in India. These are dyslipidemia, smoking, hypertension, diabetes, abdomnial obesity, physical inactivity, low fruits and vegetables intake, and psychosocial stress. Other risk factors account for lesser number of cases, one such risk factor being hypothyroidism.

Rotterdam study [5], found that subclinical hypothyroidism was associated with atherosclerosis and with an increased incidence of myocardial infarction in aging female population. Subclinical hypothyroidism was associated with lipid abnormalities [6], atherosclerotic plaque progression [7] hypertension [8], and endothelial dysfunction [9]. Subclinical hypothyroidism was associated with increased mean platelet volume (MPV), which is a risk factor for infarction [10]. Patients with hypothyroidism have significantly increased level of homocysteine, vWf level and dyslipidemia [11]. Thyroid hormones critically regulate cardiac function through several genes encoding important structural and functional proteins in the myocardium [12].

Increased levels of TSH was associated with higher thrombus burden irrespective of other risk factors, in patients with NSTEMI [13]. Subclinical hypothyroidism was associated with increased risk of cardiovascular disease and cardiovascular disease related mortality [14, 15].

Correction of hypothyroidism with thyroxine supplementation was associated with improved endothelial function [16] reduced progression of

angiographic coronary artery disease [17], improve atherogenic lipid profile [18], and have positive effect on cardiac function [19,20]. Patients with adequate thyroid supplementation had lower major adverse cardiovascular events [21].

The low T3 syndrome, also called nonthyroidal illness syndrome or euthyroid sick syndrome, is defined by a drop in the serum free T3 levels, with normal serum free T4 and TSH levels, with increased reverse free T3 level [22]. Low T3 syndrome may be related to altered systemic homeostasis caused by acute ischaemic event [23] or inflammatory cytokines [24, 25], or both. Low T3 syndrome is related to increased early and late mortality in NSTEMI [26].

METHODS

Hospital records were retrospectively studied from the period of January 2014 to June 2017. Patients admitted with diagnosis of acute coronary syndrome during this period were included in the study. The case records were utilised to obtain the thyroid profile, whenever done. The final outcome of the patient was also recorded.

Patients with renal failure, chronic obstructive airway disease, liver cirrhosis, active infection, uncontrolled diabetes mellitus and / or using corticosteroids or amiodarone were excluded from the study.

RESULTS

A total of 326 patients were admitted during this period with a diagnosis of acute coronary syndrome (male 229 and female 97). Out of these patients 93 (28.53%) were screened with thyroid profile (male 30, female 63). Female patients were more likely to be screened with thyroid profile than male patients (p value <0.0001). 17.2% (16) of the patients had thyroid abnormality. Three female patients had subclinical hypothyroidism. Four male and nine female patients had 'low T3 syndrome'.

Low T3 syndrome was more common as the age of the patients increased. The avergae age of patient with euthyroid status was 55.1 years as against average age of 62.7 Yeats in low T3 syndrome.

Of the 93 patients there were 7 deaths (7.5%). In the low T3 group the mortality was 38.5%. The mortality in the low T3 group was significantly higher and statistically significant (p value 0.0062), compared to euthyroid subjects.

Table-1: Characteristics of the study subjects

	Euthyroid patients	Low T3 syndrome	Subclinical hypothyroidism
Age	55.1 ± 10.3 years	62.7 ± 5.2 years	58.4 ± 7.3 years
Male	26	4	0
Female	51	9	3
STEMI	19	2	1
NSTEMI	58	11	3
Mortality	2	5	0

DISCUSSION

In study conducted by Wang WY *et al.* [27], on 582 patients with STEMI 13% of the patients had thyroid abnormalities. 5.84% had low T3 syndrome, 4.81% had subclinical hypothyroidism and 2.41% overt ypothyroidism. TSH and FT4 had no correlation with cardiac biomarkers. Whereas, FT3 level negatively correlated with cardiac biomarkers and lower ejection fraction (EF).

In meta-analysis by Bin Wang *et al.* [28] low T3 syndrome was seen in 16.2% and 41.9% of the patients with acute coronary syndrome and acute myocardial infarction. The low T3 syndrome was associated with increased mortality (HR 1.75, 95% confidence interval).

Kazim SO *et al*. [29] studied 457 patients with STEMI and found thyroid abnormality in 15% of the patients(15). Low T3 syndrome was seen in 30 patients and was associated with poorest outcome. Kenan Iltumur *et al*, [30] studied patients with cardiac arrest and acute myocardial infarction. The FT3 levels in cardiac arrest group was significantly lower than in the acute myocardial infarction group and control group. After 2 months the FT3 had improved in the cardiac arrest group.

Of the 70 patients studied by Rodrigo CP *et a.*,[31] with acute coronary syndrome, 18.6% had low T3 syndrome and was associated with poor prognosis.There are clear recommendations for screening for hypothyroidism in patients with acute and chronic heart failure[32,33]. There is no mention on the same in patients with acute coronary syndrome.

CONCLUSIONS

The study highlights the fact that low T3 syndrome in patients with acute coronary syndrome (NSTEMI and STEMI) acts has a poor prognosis factor. The study also highlights to the fact that, screening is

less commonly utilised in patients with acute coronary syndrome.

Limitations

The retrospective nature of the study and low sample size are the major limitations of the study. The angiographic severity of the lesions were not available in the study subjects. The changes in the thyroid profile during the follow up period was not available.

The study points to the need of prospective study with good design to evaluate the need of screening patients with acute coronary syndrome with thyroid profile.

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DECLARATIONS

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