



Medicine

A STUDY ON THE PREVELANCE OF LOW T3 SYNDROME IN HEART FAILURE WITH REDUCED EJECTION FRACTION AT NORTHERN RAILWAY CENTRAL HOSPITAL (NRCH), NEW DELHI.

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KEYWORDS :

AIM:

The main aim of the study was to evaluate the prevalence of Low- T3 syndrome in heart failure with reduced ejection fraction (LVEF < 40%) and its association with cardiovascular outcomes, at a tertiary care Indian hospital.

METHODOLOGY:

All patients presenting with heart failure with reduced ejection fraction < 40% in Medicine indoor of Northern Railway Central Hospital, New Delhi were enrolled prospectively. The thyroid function test was done and grouped into heart failure with Low -T3 syndrome and heart failure with normal thyroid function and followed up every month for a short term follow up period of 6 months telephonically/physically with at least two physical visits being mandatory from the date of enrolment to assess the mortality rate and number of hospitalizations. The cardiovascular outcomes – MACE five-point criteria of patient having HF with Low T3 syndrome and normal thyroid function were compared.

Notwithstanding advancements in heart failure treatment over the past decade, the prognosis for this condition remains dire. Overt, untreated hyperthyroidism and hypothyroidism have been identified as prevalent etiologies of heart failure in recent decades. Furthermore, chronic subclinical thyroid dysfunction has recently been linked to the development of heart failure in individuals, regardless of preexisting cardiac conditions. Comorbidities that might influence the prognosis of heart failure are diabetes, hypertension, dyslipidemia, and renal failure. Endocrine disorders, including thyroid dysfunctions, are also significant. Low T3 syndrome (LT3S) significantly impacts individuals with chronic heart failure and is defined by reduced levels of free triiodothyronine (FT3) while maintaining normal concentrations of free thyroxine (FT4) and thyroid-stimulating hormone (TSH). Due to the significance of thyroid abnormalities in patients with chronic heart failure and their influence on prognosis, the American Heart Association recommends routine assessment of thyroid function in these individuals. Despite the significance of this subject, there has been a paucity of research about the effects of thyroid dysfunction in heart failure patients within the Indian community; hence, this study was undertaken at a tertiary care hospital in India.

On follow-up, it was noted that 75% patients had heart failure as an outcome, 40% had an unstable angina episode, 23% had myocardial infarction while 7% had stroke, during the follow-up period. Proportionally, there was a higher number of low T3 syndrome cases experiencing heart failure (80% vs 71.67% in normal T3 group) and stroke (10% versus 5% in normal-T3 group), but this was not statistically significant ($p > 0.05$). Hence, there was a trend towards poorer outcomes in patients with low-T3 syndrome, but the significance was not noted in these findings. In the study by Kannan et al., based on the composite endpoint, it was found that low T3 syndrome along with subclinical hypothyroidism were significantly associated with poorer outcomes. Higher TSH, higher FT4 and lower TT3 were each associated with more severe symptoms of heart failure at baseline, and also with increased risk of a composite outcome of VAD placement, cardiac transplant or all-cause mortality. Free thyroxine level showed a consistent association with atrial fibrillation

across models. More severe subclinical hypothyroidism was associated with a greater than 3-fold risk and low T3 syndrome with a greater than 2-fold risk of incident VAD placement, cardiac transplantation, or all-cause mortality. A meta-analysis including 41 studies showed that the low T3 syndrome was the most prevalent in patients with heart failure, followed by acute myocardial infarction, and was also associated with increased all-cause mortality, cardiac mortality and MACE. Despite the recommendation of thyroid function tests in patients with newly diagnosed HF, the management of low T3 syndrome has not been well discussed. Low T3 syndrome has been considered as an “adaptive” response by the body to spare energy in patients with severe illness. Hence, it is important to not neglect the presence of low-T3 with normal TSH and even normal T4, as low-T3 can also be one of the key causes of poor outcomes when it comes to heart failure.

RESULTS:

A total of 200 patients were enrolled in the study. The mean age was noted to be 64.95 ± 12.99 years, with a median age of 65 years. The age range is 36 years to 89 years. 78 (39%) of the enrolled patients in the study are in the 61- 70 years age group, while 31 (15.5%) patients each were between 71-80 years, respectively. Most of the enrolled patients were males (115, 57.5%). The common comorbidities noted in the study were hypertension (59.5%), diabetes mellitus (53%), coronary artery disease (45%), obesity (12%), chronic obstructive pulmonary disease (11.5%), and rheumatic heart disease (9%). The clinical features noted in the study were shortness of breath (80.5%), pedal edema (18%), chest pain (3.5%), weakness on one side (1.5%) and palpitation (1%). The mean LVEF in the study was noted to be 24.22 ± 8.18 %, with a median noted to be 20% (range: 15% to 45%). Most of the patients had LVEF between 15-20% (50.5%), while 27% patients had LVEF between 20-30% and 22.5% patients had LVEF between 30-45%. The low T3 syndrome was noted in 40% of the enrolled patients in study. Page | 48 In the low T3 syndrome group, the mean TSH in the study was noted to be 1.88 ± 0.94 mU/L, with a mean serum T3 levels of 1.42 ± 0.5 mcg/dl and mean serum T4 levels of 1.46 ± 0.55 mcg/dl. In the normal-T3 group, the mean TSH in the study was noted to be 1.94 ± 0.98 mU/L, with a mean serum T3 levels of 2.96 ± 0.29 mcg/dl and mean serum T4 levels of 1.45 ± 0.51 mcg/dl. At the end of 6 months, 138 patients (69%) were alive at 6 months, while 62 patients (31%) were noted to have died at 6 months. Significantly greater proportion of patients in low T3 syndrome group dies at 6-month follow-up versus the normal T3 group (52.5% versus 16.67%, $p < 0.05$). Proportionally, there was a higher number of low T3 syndrome cases experiencing heart failure and stroke, but this was not statistically significant ($p > 0.05$).

LIMITATIONS:

The study had a few limitations. The sample size was limited and the study was done at one hospital. Hence, the results are not representative of all HF patients, and the results should be extrapolated for all HF patients with caution.

CONCLUSION:

More than one third patients of HF rEF were noted to have low-T3 syndrome in the study. There was a significant association noted between low-T3 syndrome and mortality as well as hospitalization.

There was a non-significant numerical trend also noted for low T3 syndrome cases experiencing heart failure and stroke. Future studies with a larger sample size and multicenter study design can help in validating our study findings.