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Incidentally Detected Thyroid Dysfunction In Patients With Chronic Kidney Disease- Does It Have A Bearing On The Severity?

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ABSTRACT

Background- Subclinical hypothyroidism is the most frequent laboratory finding in Chronic Kidney Disease (CKD) patients, followed by low T3 levels. Hyperthyroidism/ thyrotoxic crisis is rare in CKD, but has been found to cause a rapid progression of the renal dysfunction. It has been observed that with adequate control of the thyroid disease with medication, the renal impairment and the progression there-of, can be controlled. That being said, it is essential to prevent a negative nitrogen balance in such patients. Therefore, it is important for doctors to have a solid understanding of how thyroid hormones relate to CKD in order to provide patients with the best care possible. To understand this, we performed this retrospective study to evaluate the relationship between thyroid dysfunction and the severity of CKD.

Methods and Materials- This is a retrospective study performed in the department of General Medicine in A J institute of medical sciences, Mangalore. 112 patients with chronic kidney disease between March 2022 and February 2023 were evaluated for the presence of concomitant thyroid dysfunction. Data was entered into an MS excel spreadsheet and analyzed using SPSS v20.

Results- Out of 112 patients, we observed that 22.21% had subclinical hypothyroidism, 11.45% had overt hypothyroidism and 1.3% had hyperthyroidism. When we correlated the presence of hypothyroidism with the grade of kidney disease, we found that there was a positive correlation between patients with thyroid dysfunction and the grade of the renal dysfunction, however, this difference was not statistically significant.

Conclusion- Thyroid dysfunction in patients with CKD is an important clinical finding, and can be associated with the severity or progression of CKD. Further prospective studies are required to assess the prognostic role of thyroid function tests in CKD.

I. INTRODUCTION

The regulation of metabolism, growth, protein synthesis, and other hormone functions is greatly influenced by thyroid hormones. Therefore, it is vital to take into account the physiological relationship between thyroid dysfunction and chronic renal disease. Several studies have shown that thyroid hormones can also have a big impact on chronic kidney disease (CKD). Apart from this, the pituitary-thyroid axis and the peripheral thyroid hormone metabolism have both been linked to CKD [1,2]. Chronic kidney disease, also known as CKD, is a disorder that affects a large percentage of the population and is associated with a wide range of adverse health effects, including an increased risk of cardiovascular disease, infections, reduced physical function, and even mortality. [1–3] . Those with CKD have a 1.5-fold higher risk of hospitalization and a 2-fold higher risk of death compared to those who do not have CKD[1,2]. Although hypertension and diabetes are well-established risk factors, the discovery of additional mechanistic linkages or risk factors for chronic kidney disease (CKD) may have an effect on therapeutic techniques.

Individuals diagnosed with chronic kidney disease have been found to have a significantly greater prevalence of hypothyroidism. [4–7] On the other hand, hypothyroidism has been proposed as a potential risk factor for reduced renal function. [8–12] In general, these clinical observations have only been conducted on a few different groups of people.

If hypothyroidism is found to have a direct link to chronic kidney disease (CKD), then this may have significant clinical repercussions for the CKD patient population. Hypothyroidism is not only quite common, but it is also very simple to diagnose and manage once it has been detected. [14,15] However, there are no universal screening standards for hypothyroidism, which is particularly problematic in the group of people with CKD. [15–18] In this study, we set out to evaluate the relationship between thyroid dysfunction and severity of CKD.

II. METHODS AND MATERIALS

This retrospective study was performed in the department of General Medicine in A J Institute of Medical Sciences, Mangalore. 112 patients with

chronic kidney disease between March 2022 and February 2023 were identified. These patients were evaluated for the presence of concomitant thyroid dysfunction from the case records. Other relevant data regarding the renal function, the eGFR and any relevant data regarding the severity of the CKD.

Data was entered into an MS excel spreadsheet and analyzed using SPSS v20. Categorical data was represented as percentage and frequencies. Continuous data was represented as mean and median. T-test and chi square test was performed where deemed necessary. A p value < 0.05 was considered to be statistically significant.

III. RESULTS

The mean (±SD) age of the study population was 68 (±8.6) years and 58.6% of patients were women.

We observed that 22.21% had subclinical hypothyroidism, 11.45% had overt hypothyroidism and 1.3% had hyperthyroidism. The remaining patients were euthyroid on initial examination. Of the patients with overt hypothyroidism, only 3.4% patients have complaints such as weight gain, cold intolerance, tremors and psychiatric disorders. However, these are undetected in the general population with CKD as these overlap.

The mean (±SD) eGFR was 74 ±18 mL/min/1.73 m2. The cohort was comprised of 43% with diabetes and 37.0% with hypertension. 21.22% had grade III renal disease, 10.91% had grade IV renal disease while 6.72% had grade V renal disease. The mean duration of disease was 5.62 +/- 2.1 years, while the mean duration of dialysis in these patients was 2.4 +/- 0.92 years.

When we correlated the presence of hypothyroidism with the grade of kidney disease, we found that there was a positive correlation between patients with thyroid dysfunction and the grade of the renal dysfunction, however, this difference was not statistically significant (p value 0.921).

IV. DISCUSSION

According to the findings of studies carried out by Lo JC et al. and Song et al. [16, 17], CKD may contribute to an increased prevalence of hypothyroidism. Song and his colleagues [17] demonstrated that there is a rising tendency for the population of individuals with low T3 levels in correlation with an increase in the stage of CKD in patients who had normal levels of TSH (eGFR 90, 8.2%; 60 eGFR 90, 10.9%; 30 eGFR 60, 20.8%; 15 eGFR 30, 60.6%; eGFR 15, 78.6%). In line with the findings of earlier research, a significant majority of patients with CKD 4–5 also had ESS (62.1% and 69.1%, respectively). In the meantime, low T3 is currently being employed as a marker of severe disease. According to Carrero et al. [18], low T3 levels are independent predictors of mortality from all causes as well as cardiovascular disease in euthyroid patients. This may be due to an intimate association with inflammation. Our research also found an increased level of CRP in patients with CKD, with the highest level being found in patients with CKD5. This finding was broadly consistent with previous reports of elevated levels of inflammatory markers in patients undergoing hemodialysis [19-21] and in earlier stages of CKD [22,23]. As a result, an elevated degree of inflammation in individuals with CKD, particularly those with CKD5, may increase the occurrence of ESS. According to the findings of the regression analysis, CRP was an independent risk factor of ESS.

Patients with CKD stage 4–5 typically experience symptoms including nausea, vomiting, loss of appetite, and anemia as a result of the accumulation of toxins in their bodies. As a consequence of this, malnutrition is frequently seen in people who have chronic kidney disease, particularly at the CKD5 stage. The amount of albumin in patients with CKD5 was measured to be 32.66 g/L with a standard deviation of 4.80 g/L in a study that was conducted in China by Pan B and colleagues [(22)], which was significantly lower than in the other groups. In agreement with the typical pathophysiology, the patient's hemoglobin level dropped in tandem with the GFR reduction. As a result, hypoalbuminemia and severe anemia were factors that led to the elevated ESS prevalence.

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