

A STUDY OF THYROID FUNCTION ABNORMALITIES IN PATIENTS WITH CHRONIC KIDNEY DISEASE.

General Medicine

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ABSTRACT

Background: Thyroid hormones are essential for growth and development of the kidney and for maintaining electrolyte and water homeostasis. On the other hand, kidney has its vital role in metabolism and elimination of thyroid hormones. CKD has known to affect the pituitary-thyroid axis also. We are aimed to study prevalence of thyroid dysfunction in chronic kidney disease. **Methods:** This a hospital based cross sectional study, conducted at Navodaya medical college and research centre, Raichur, Karnataka, over a period of 6 months. The study group comprised 30 patients with chronic kidney disease. The following investigations were done CBC, Urine routine, Renal function test and T3, T4 and TSH. **Results:** In the study population, 30 patients with CKD were evaluated for Thyroid function test out of which 16 patients had abnormal thyroid function. Among these 30 patients, 20 were males and 10 were females, their age varied from 20-68 years. Patients with age 30 years and below were 5, between 31-60 years were 21 and 60 years and above were 4 in number. **Conclusion:** This study shows increased incidence of hypothyroidism in patients with chronic kidney disease. The severity of thyroid hypofunction increases with a progressive reduction in eGFR.

KEYWORDS

CKD, Hypothyroidism, eGFR.

INTRODUCTION

Chronic kidney disease includes a spectrum of distinct pathophysiological processes which is associated with abnormal kidney function and a progressive reduction in glomerular filtration rate.¹ Chronic kidney disease is a clinical syndrome which occurs due to irreversible loss of renal function leading to metabolic, endocrine, excretory and synthetic function resulting in accumulation of non-protein nitrogenous substance.^{1,2}

The thyroid hormones are essential for growth and development of the kidney and for maintaining electrolyte and water homeostasis. On the other hand, kidney has its vital role in metabolism and elimination of thyroid hormones. The kidney is closely related to the thyroid as its the only other organ that competes with base iodine clearance. Circulating iodine is cleared from blood mainly by kidney (80%) and by the thyroid (20%)³.

In CKD patients reduction of renal function leads to change in the synthesis, secretion, metabolism and elimination of thyroid hormone. And also treatment strategies of one organ affect the other organ⁴.

In view of variability of thyroid profile in chronic kidney disease patients in previous studies, a prospective biochemical and clinical study on thyroid function has been undertaken in the department of medicine, Navodaya medical college hospital and research center, Raichur.

MATERIALS AND METHODS

The hospital based cross sectional study was conducted in the department of general medicine, Navodaya medical college hospital and research center, Raichur, Karnataka, India for period of 6 months. A total of 30 patients were included in this study after fulfilling the inclusion criteria. The written informed consent was obtained from the patients who were on conservative management fulfilling the criteria for chronic kidney disease admitted in department of general medicine, Navodaya medical college, Raichur.

Inclusion Criteria

All the patients of chronic kidney disease above 18 years of age. The CKD was diagnosed on the basis of history, examination and on KDIGO guidelines.

Exclusion Criteria

- Patients on peritoneal dialysis or hemodialysis
- Nephrotic range proteinuria.
- Hypoalbuminemia
- Acute illness
- Diabetes mellitus

- Recent surgery
- Trauma
- Burns
- Liver disease
- Drugs altering thyroid profile like Amiodarone, Phenytoin, Beta blockers, Dopamine, Steroids, Estrogen pills and iodine containing drugs.

Patient Workup

- History regarding diabetes mellitus, hypertension any associated illness
- Clinical examination
- Complete hemogram
- Urine routine
- Renal function test
- Thyroid profile.

OBSERVATIONS AND RESULTS

In our study, 30 patients of CKD who were on conservative management fulfilling the criteria were studied, among these 20 were males and 10 were females, their age varied from 20-68 years.

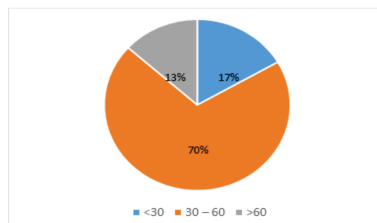


Figure 1: Age Distribution Among Participants

Figure 1 depicts the age distribution of patients with CKD, among 30 patients in our study, patient who were 30 years and below were 5, constituting 17%, patient who were 30-60 year were 21, constituting 70%, patient who were 60 years and above were 4, constituting 13%.

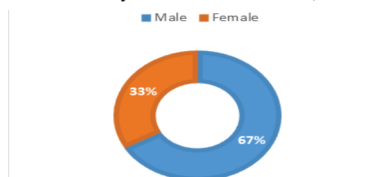
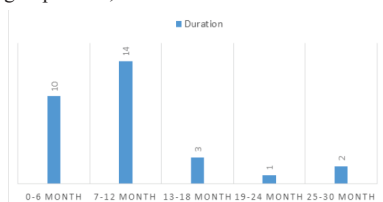


Figure 2: Sex Distribution Among Participants

The above figure 2 shows, sex distribution of patients with CKD in our study, among 30 patients, 20 were male and 10 were female.



Graph 1: Duration Of Symptom Among Participants.

The bar graph depicts the duration of symptoms of CKD patients ranges from 4-30 months, while most were in 7-12 month. Mean duration of symptoms being 9.8 months.

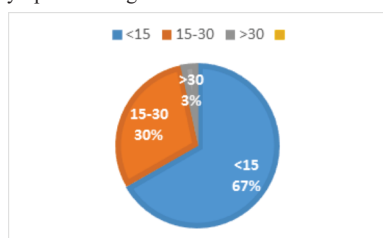


Figure 3: eGFR Of The Participants.

The Pie chart shows the distribution of eGFR in patient with CKD. Of 30 patients, 20 patients had GFR less than 15 ml/min/1.73m² accounting to 67%, 9 patients had GFR ranging from 15-30 ml/min/1.73m² accounting to 30%, 1 patient had GFR more than 30 ml/min/1.73m² accounting to 3%. Among the patients studied, most were in the range of creatinine clearance <15 ml/min/1.73m².

Table 1: Analysis Of T3, T4, TSH Among The Participants.

Thyroid dysfunction	Number of patients with		
	Normal value	Low value	High value
T3	14	16	Nil
T4	21	9	Nil
TSH	27	Nil	3

This table shows the TSH values in our study ranged from 0.6-20 µIU/ml, mean value being 6.494.

Among 30 patients, 16 patients had low T3 levels accounting to 53% and 9 patients had low T4 level accounting to 30%. TSH levels were raised in 3 patients, accounting to 10%.

In our study, patient with low T3 levels, 12 patients had eGFR less than 15 ml/min/1.73m², indicating the severity of renal failure in hypothyroid patients, whereas the mean TSH values in several stages of renal failure were found to be in normal range.

DISCUSSION

The present study was aimed to assess the prevalence of thyroid dysfunction in CKD patients and to determine the correlation between thyroid dysfunction and severity of renal disease. Various studies were conducted about thyroid dysfunction and severity of CKD which showed different results.

In our study 30 patients of CKD who were on conservative management fulfilling the criteria for CKD were studied, among these 30 patients, 20 were males and 10 were females, their age varied from 20 - 68 years. Among these 30 patients, 21 patients were between 31 – 60 years.

In our study the duration of symptoms of CKD varied from 4 months to 30 months, mean duration being 9.84 months, with majority of patients with eGFR <15 ml/min/1.73m² accounting to 67%.

Among 30 patients, 16 patients had low T3 levels accounting to 53% and 9 patients had low T4 level accounting to 30%. In our study, patient with low T3 levels, 12 patients had eGFR less than 15 ml/min/1.73m², indicating the severity of renal failure in hypothyroid patients, whereas the mean TSH values in several stages of renal failure were found to be in high range.

Several studies reported in CKD patients showed low T3 values and

subclinical hypothyroidism. Low T3 had been reported in Ramirez et al, Hegedus et al, Beckett et al, PonAjlil Singh et al, P Iglesias and JJ Diez and many others. Ramirez and Spector et al study showed linear correlation between mean serum T3 and T4 and severity of renal failure

One similar study showed similar results which was conducted by Spector and Ramirez et al Dudani et al, Karunanidhi et al". These studies depicted abnormality in hypophyseal mechanism of TSH release in uraemic patients as the TSH response to the TRH was blunted.

Another study which was conducted by Joseph et al and Hardy et al revealed low T3 T4 level with high TSH level suggesting maintenance of pituitary thyroid axis.

CONCLUSION

In my study population, 30 CKD patients who were on conservative management were studied. Among them 53% of the patients had low T3 values. The change in the serum levels of T3 and T4 in patients with CKD can be considered as being protective, promoting conservation of protein. There is progressive increase in the number of patients with Low T3 and T4 syndrome with the severity of renal failure. There is increase in incidence of hypothyroidism in patients with chronic kidney disease. In patients with low eGFR the serum T3 level was found to decreased. This shows a direct linear relationship between eGFR and T3 levels.

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