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THYROID DYSFUNCTION IN PATIENTS WITH CHRONIC KIDNEY DISEASE

Dr.cheguri Shashi Kala*	Junior Resident , Kamineni Institute Of Medical Sciences ,narketpally*Corresponding Author
Dr.katta Manasa	Junior Resident, Kamineni Institute Of Medical Sciences , Narketpally
Dr.karnati Vaishnavi	Senior Resident, Kamineni Institute of Medical Sciences , Narketpally
Dr.praveen Naik	Associate Professor , Kamineni Institute Of Medical Sciences , Narketpally,
Dr.panuganti Raveen	Junior Resident, Kamineni Institute Of Medical Sciences , Narketpally
Dr.palwai Trishaala Reddy	MBBS, Kamineni Institute Of Medical Sciences,narketpally

ABSTRACT Chronic kidney disease (CKD) has been recognized as a leading public health problem worldwide. The global estimated prevalence of CKD is 13.4% (11.7-15.1%), and patients with end-stage renal disease (ESRD) needing renal replacement therapy is estimated between 4.902 and 7.083 million1. Through its effect on cardiovascular risk and ESRD, CKD directly affects the global burden of morbidity and mortality worldwide. The global increase in this disease is mainly driven by the increase in the prevalence of diabetes mellitus, hypertension, obesity, and aging. But in some regions, other causes such as infection, herbal and environmental toxins are still common. The large number of deaths for poor access to renal replacement therapy in developing countries, and also large increase of patients with ESRD in future, will produce substantial financial burden for even the wealthiest countries[2].

KEYWORDS : chronic kidney disease, ESRD.

INTRODUCTION

chronic kidney disease (CKD) is a clinical syndrome secondary to the definitive change in function and/or structure of the kidney and is characterized by its irreversibility and slow and progressive evolution. The main causes of CKD include diabetes, hypertension, chronic glomerulonephritis, chronic pyelonephritis, chronic use of anti-inflammatory medication, autoimmune diseases, polycystic kidney disease, Alport disease, congenital malformations, and prolonged acute renal disease2. The functions of thyroid and kidney are interrelated3-6. 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[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 organ. The kidney helps in the clearance of iodine mainly by glomerular filtration. So excretion of iodine is reduced in advanced renal failure. Impaired renal clearance of iodine leads to elevated serum levels of inorganic iodide that potentially blocks thyroid hormone production resulting in —Wolff Chaikoff effect[4].

Chronic kidney disease is associated with thyroid function abnormalities leading to low levels of serum total and free T3 concentration and normal reverse T3 and free T4 levels. The TSH levels are almost normal in most patients and found to be in euthyroid state.

CKD patients may have various symptoms and signs suggestive of hypothyroidism like cold intolerance, dry coarse skin, sallow complexion, lethargy, fatigue, edema, reduced basal metabolic rate, alopecia, hyporeflexia and asthenia. So it is difficult to exclude thyroid function abnormality in patients with chronic kidney disease merely on clinical background.

AIM:

To study the thyroid function status (T3, T4, TSH) in patients with chronic kidney disease

OBJECTIVES:

1) To study thyroid dysfunction in patients with chronic Kidney disease.

2) To study the relationship between thyroid dysfunction and severity of renal disease. (Severity assessed by serum creatinine, serum urea, creatinine clearance).

Inclusion Criteria:

Patients who fulfill the criteria for CKD and who are on conservative management.

Patients age above 18 years.
Both sexes are included.
Criteria for Chronic Kidney Disease :

1. Presence of uremic symptoms for 3 months or more
2. Raised blood urea, serum creatinine and reduced creatinine clearance 24HR
(estimated by cockroft-gault formula).
3. Ultra sonogram evidence of chronic kidney disease like Bilateral contracted kidneys ¡X size less than 9 cm.; Poor cortico-medullary differentiation.
4. Supportive laboratory evidence of CKD like anaemia, changes in serum electrolytes, etc.

Exclusion criteria:

Patients on peritoneal dialysis or hemodialysis.
Nephrogenic range of proteinuria (>3.5gm/24hrs).
Low serum protein especially albumin. Other conditions like:
a) Acute illness
b) Recent surgery, trauma or bums
c) Diabetes mellitus
d) Liver diseases
e) Drugs altering thyroid profile like amiodarone, steroids, phenytoin, beta-blocker, estrogen pills, hormonal therapy iodine-containing drugs

Methodology

After getting approval from the institutional ethics committee and

prior informed consent obtained from patients the study was conducted.

A detailed history was elicited. Emphasis regarding history of onset, duration, progression of chief complaints and associated complaints such as pain, nausea and vomiting, headache, bowel habits, fever, abdominal distension and any family history were taken.

RESULTS:

100 patients fulfilling the criteria for chronic kidney disease (CKD) who were on conservative management were studied.

Among the 100 patients in our study,their age varied from 18-70 years, of these patients who were below 30 years old, were 19 constituting 19%, between 30-60 years were 63 constituting about 63 % and above 60 years of age, were 18 in number constituting 18 %.Among these 100 patients 76 were male and 24 were female and the ratio between male and female was 3:1. Mean age of females 48.32 ± 11.87,Mean age of males 47.18 ± 10.91 t = 0.548, p>0.05 NS In our study the duration of CKD varied from 6 months – 6 years, mean duration being 4.6 ± 1.71 years Of the 100 patients, 15 patients had GFR of <15ml/min accounting to 15%, 47 patients had GFR ranging from 15-29 ml/min accounting for another 47% and the remaining 38 patients had GFR 30-60 ml/min accounting for 38%. Among the 100 patients in our study 48 of them had low serum T_3 levels (48%), 28 patients had the low serum T_4 level (28%) and 18 patients were diagnosed with primary hypothyroidism, as they had high TSH value of >20µIU/ml with low serum $T_{3\ and}$ T_4 levels and also symptoms suggestive of hypothyroidism. So excluding 18 patients of primary hypothyroidism, 30 patients had isolated low T3 syndrome in our study (30%).

And excluding 18 patients of primary hypothyroidism, 10 patients had isolated low T4 syndrome in our study (10%).Mean value of serum T_3 among Creatinine Clearance ml/mm 30-60 ml/min patients was 0.91 ± 0.21, 15-29 ml/min patients was 0.80 ± 0.34 and <15 ml/min patients was 0.52 ± 0.41.

Mean value of serum T_4 among Creatinine Clearance ml/mm 30-60 ml/min patients was 7.87 ± 2.34, 15-29 ml/min patients was 6.81 ± 2.42 and <15 ml/min patients was 4.92 ± 2.11.

Mean value of serum TSH among Creatinine Clearance ml/mm 30-60 ml/min patients was 9.14 ± 6.15, 15-29 ml/min patients was 11.51 ± 6.34 and <15 ml/min patients was 16.32 ± 8.51.Among 48 Low T3 syndrome patients, 10 (20.83%) Patients have Creatinine Clearance less than 15 ml/min, 30 (62.5%) Patients have Creatinine Clearance 15-29 ml/min is and 8 (16.66%) Patients have Creatinine Clearance 30-60 ml/min. Among 28 Low T4 syndrome patients, 3 (10.71%) Patients have Creatinine Clearance less than 15 ml/min, 18 (64.28%) Patients have Creatinine Clearance 15-29 ml/min is and 7 (25.00%) Patients have Creatinine Clearance 30-60 ml/min

Among 18 Hypothyroidism patients, 2 (11.11%) Patients have Creatinine Clearance less than 15 ml/min, 11 (61.11%) Patients have Creatinine Clearance 15-29 ml/min is and 5 (27.77%) Patients have Creatinine Clearance 30-60 ml/min.Among 42 Normal thyroid function Patients, 4 (09.52%) Patients have Creatinine Clearance less than 15 ml/min, 10 (23.80%) Patients have Creatinine Clearance 15-29 ml/min is and 28 (66.66%) Patients have Creatinine Clearance 30-60 ml/min.

CONCLUSIONS:

In our study of 100 patients with chronic kidney disease who are on conservative management, thyroid dysfunction is seen in 58% of the patients, the alteration in the values of T_3 and T_4 in CKD can be viewed as protective, promoting conservation of protein.

In our study out of 100 patients, 48 patients had low serum T3 levels (48%). Among them 18 patients also had low T4 and high TSH suggesting primary hypothyroidism (18%). So excluding 18 patients of hypothyroidism, 30 patients had low T3 syndrome in our study (30%). 28 patients had low T4 levels in our study (28%), out of which 18 patients had low T3 and high TSH suggesting primary hypothyroidism. Excluding hypothyroidism, 10 patients had low T4 in our study (10%).

Incidence of hypothyroidism is increased in patients with chronic kidney disease.

Number of patients with low T3 and T4 syndrome progressively increase with the severity of chronic kidney disease

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