



## Thyroid Dysfunction in End Stage Renal Disease

Authors

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### Abstract

*The study is aimed to look at the prevalence of thyroid disorder in end stage renal disease. The data was collected from the patients reported to dialysis unit, OPD and wards. During the duration of 1 year, 30 patients who had been treated for chronic kidney disease had been followed up. Patients with chronic kidney disease confirmed by imaging and creatinine clearance, patients on hemodialysis were included in this study. Patients on thyroid hormone replacements, anti thyroid drugs, steroid and hormone therapy were excluded. In our observation, 9 patients (30%) had been diagnosed to have hypothyroidism. Among them, clinical features and investigations found out 2 patients with clinical hypothyroidism and 7 patients with subclinical hypothyroidism. No incidence of hyperthyroidism have been observed. In summary, this study finds that hypothyroidism is not unusual in all stages of chronic kidney disorder patients and reveals the significant association between chronic kidney sickness and thyroid disorder.*

**Keywords:** Chronic kidney disease, Thyroid Dysfunction, End Stage Renal Disease, Hypothyroidism, Subclinical Hypothyroidism.

### Introduction

The world is currently dealing with a global epidemic of chronic kidney disease (CKD). Among the chronic non infectious diseases, CKD is unique in that there may be a real window of Opportunity, to continue living inspite of being terminally ill.<sup>1</sup> Prevalence of chronic kidney sickness (CKD) - increased by 30%. Diabetes and hypertension account for over 2/3rd of the cases of CKD in India. In India, 73.6% patients report to Nephrologists after stage IV of disease. Today life expectancy of an Indian has increased from 41.38 years (in 1960) to sixty six years (2013) and prevalence of diabetes and hypertension is steadily rising. As per recent Indian Council of Medical

Research records, incidence of diabetes in Indian grownup populace has risen to 7.1%, the prevalence is as excessive as 28% in urbans. Likewise the suggested occurrence of hypertension within the adult population today is 17% (14.8% from rural and 21.4% from urban belt). Therefore prevalence of CKD is predicted to rise with the passage of time.<sup>2</sup>

### Need of the Hour

The management of CKD poses a tremendous financial burden on the provider – be it authorities, family, employers, charitable organisations or insurers. It is, consequently, the want of the hour to tackle this trouble not on the

therapeutic end of this disorder but at the ‘preventable’ beginning of it. Patients with Chronic Renal Disease display a variety of endocrine disturbances amongst which Thyroid function has been considerably evaluated in patients with Chronic kidney disease. Thyroid hormones have a significant effect on kidney disease in that appropriate treatment delays the progression of CKD.<sup>1</sup>

**Aim of the Study**

To estimate the prevalence of various thyroid dysfunction in chronic kidney disease and its prognostic importance.

**Inclusion Criteria**

Age 18 and above, Both gender, Chronic kidney disease – Stage V, Diabetes/ Hypertension.

**Exclusion Criteria**

Patients with a known case of thyroid disorder, Patients on thyroxin drugs, Pre renal azotemia, Obstructive nephropathy, Drug induced nephropathy, Chronic alcoholism.

**Materials and Methods**

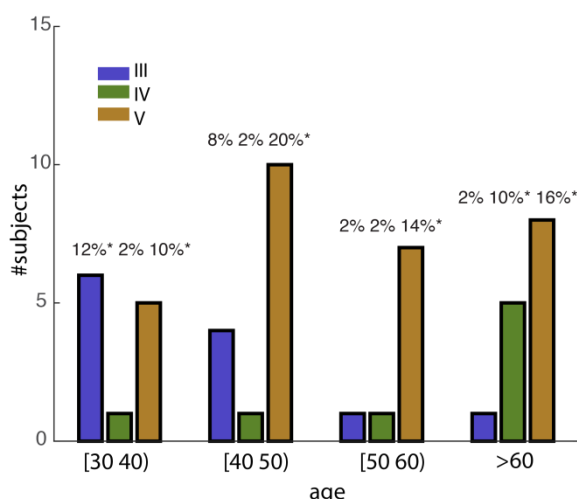
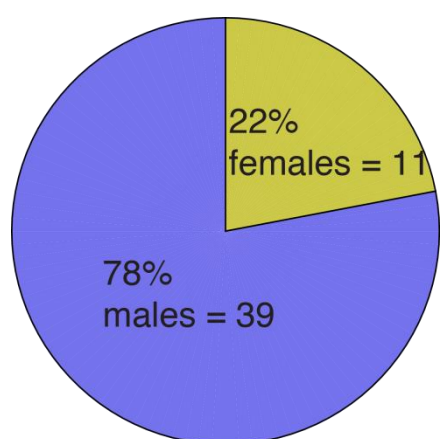
It is a prospective cross sectional study done in Rajah Muthiah Medical College and Hospital, Chidambaram which is a 1200 bedded tertiary

care center serving the rural population. This study included total number of thirty patients. This study was carried out among Patients on dialysis inside the dialysis unit at RMMCH, Chidambaram.

**Results and Analysis**

- Male population was more than female population.
- 40-50 years age group were found to be common among cases.
- The overall prevalence of thyroid dysfunction among patients with chronic kidney disease is 46% (n=14).
- Among which,
  - 6.6% (n=2) of them had Hypothyroidism.
  - 23.3% (n=7) of them had Subclinical Hypothyroidism
  - 16.6% (n=5) of them had Low T3 levels
  - Higher the degree of renal insufficiency, higher was the prevalence of thyroid hormone abnormalities were observed
  - There was a significant correlation between the prevalence of thyroid dysfunction and the stage of chronic kidney disease.

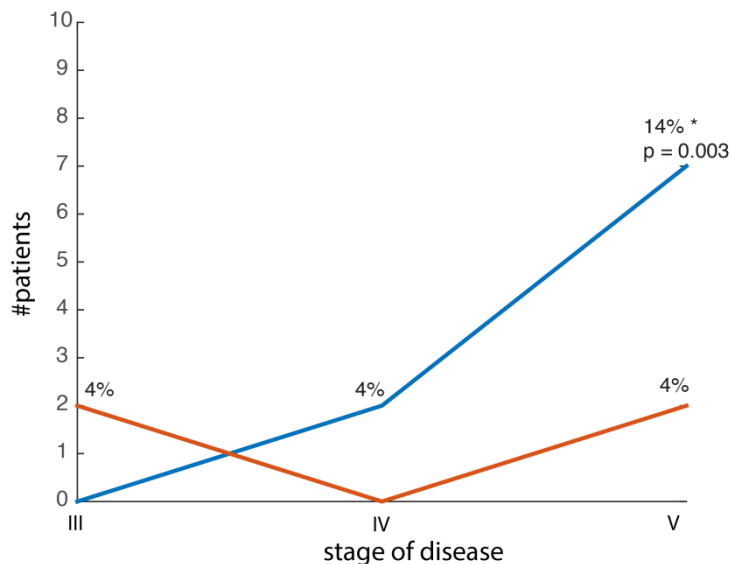
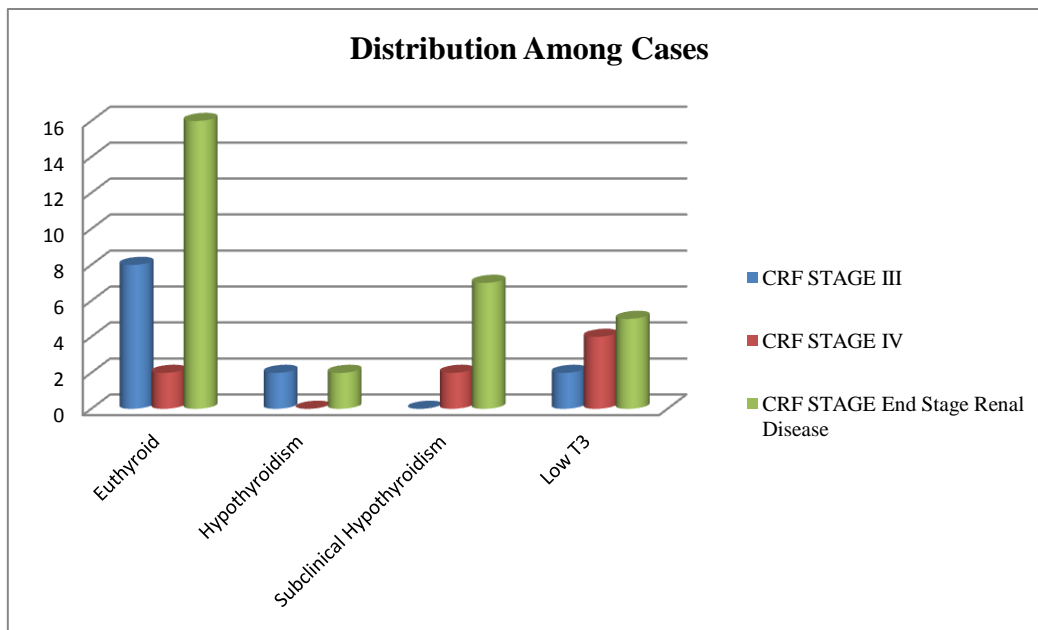
**Tables and Charts**



**Table -1:** Distribution of Thyroid dysfunction among various CRF stages

Thyroid dysfunction	CRF STAGE						P Value
	III		IV		End Stage Renal Disease		
	N	%	N	%	N	%	
Euthyroid	8	16.0	2	4.0	16	32.0	0.00509 (III&V) 0.000435 (IV&V)
Hypothyroidism	2	4.0	0	0	2	4.0	
Subclinical Hypothyroidism	0	0	2	4.0	7	14.0	
Low T3	2	4.0	4	8.0	5	10.0	
Total	12	24.0	8	16.0	30	60.0	

P<0.01 Significant

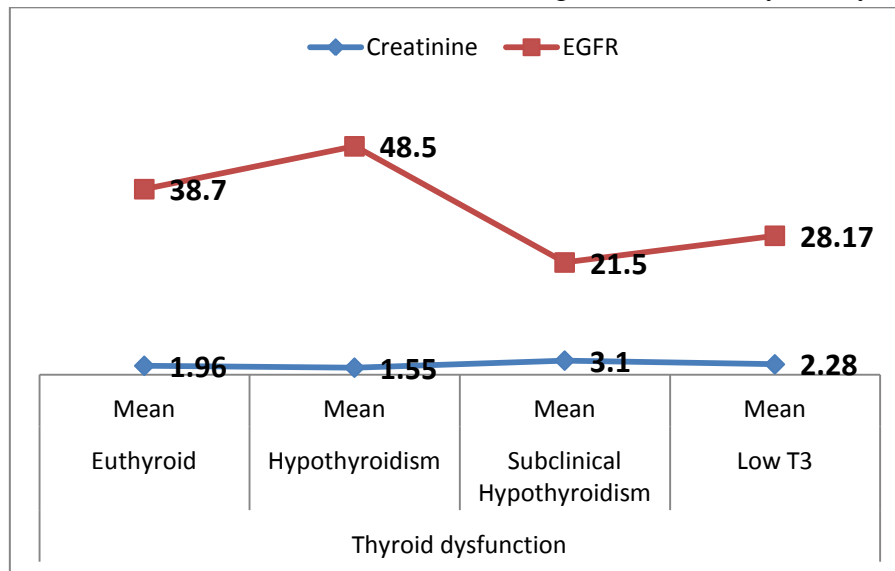


**Table -2:** Relationship between Thyroid dysfunction & Hematological parameters and their significance

Parameters	Thyroid dysfunction								'p' value and its significance
	Euthyroid		Hypothyroidism		Subclinical Hypothyroidism		Low T3		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Creatinine	1.96	0.62	1.55	0.35	3.10	0.13	2.28	0.45	0.041 Significant
EGFR	38.70	11.62	48.50	6.36	21.50	2.12	28.17	5.49	0.021 Significant

P<0.01 Significant

There were significant differences in creatinine and eGFR ranges in various thyroid dysfunction states.



**Discussion**

CKD (Chronic Kidney Disease) affects the pituitary-thyroid axis and the peripheral metabolism of thyroid hormones. Primary hypothyroidism is common in CKD patients.<sup>3</sup> Especially, the prevalence of SCH (Subclinical Hypothyroidism) will increase with a decline in estimated glomerular filtration rate (eGFR). The earliest and the commonest thyroid feature abnormality in CKD patients is “low T3 syndrome”.<sup>4</sup> However, the free T4 levels vary from being low to normal, in most cases due to impaired protein binding of T4. The thyroid profile is similar to that of as in several nonthyroidal ailments (NTIs) such as excessive infections, coronary heart failure, malignancies, and in several hospitalized patients without renal disease. This led to the consideration of a “sick euthyroid state” in CKD, that's now referred to as “nonthyroidal illness.(NTI)”<sup>5</sup> However, unlike different NTI states, there is no increase in overall rT3 levels in CKD.<sup>6</sup> Another difference from other

NTIs is that the thyroid- stimulating hormone (TSH) levels are increased. Thus, CKD patients have low T3 and normal or decreased T4 stages, and consequently elevated TSH.<sup>7</sup> The decreased T3 levels and related complications without an increase in rT3, the decreased free T4, along with an elevated TSH, and hyporesponsiveness of TSH to thyrotropin stimulating hormone questions the “euthyroid” state and raise the opportunity of gain from thyroid supplementation in CKD.<sup>5</sup> There is still a lack of consensus in cutting-edge guidelines on whether or no longer to treat Subclinical hypothyroidism.<sup>8</sup> Chronic renal failure impacts thyroid function in more than one ways, consisting of low circulating thyroid hormone, altered peripheral hormone metabolism, disturbed binding to carrier proteins and elevated iodine stores in thyroid glands inflicting wolf chaikoff impact. Lim speculate that the low thyroid state as low t3 syndrome in uremia serves to guard towards protein wasting and faulty attempts to replete thyroid hormone shops may worsen

protein malnutrition<sup>9</sup> however subclinical hypothyroidism profile has no longer been studied in detail. Studies confirms an accelerated occurrence of subclinical hypothyroidism in CKD patients. It has been estimated that primary hypothyroidism may additionally arise in upto 9.5% of ESRD patients 9 times better when as compared to 0.6 to 1.1% of general population, our observation has also given the similar results. When hypothyroidism becomes more severe it could cause reduced cardiac function and cause gradually worsening kidney function. Thus the prevalence of subclinical hypothyroidism in patients with CKD might be a risk factor for both cardiovascular disease and progressive kidney disease.<sup>10</sup> But, the reduced T3 ranges and associated complications without increase in rT3, the reduced free T4 degrees along with an elevated TSH, and hyporesponsiveness of TSH to TRH query the “euthyroid” state and lift the possibility of benefit from thyroid supplementation CKD.

### Conclusion

- Routine evaluation of thyroid features in all patients of CKD. Early identification and treatment for hypothyroidism might add few more years to the life of the affected person.
- Further research are wanted on a larger scale to have a look at the effect of thyroid dysfunction as an independant predictor of ckd development and decide the prognosis of the treatment.

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