



STUDY OF THYROID PROFILE IN PATIENTS OF FIRST THREE STAGES OF CHRONIC KIDNEY DISEASE

Ms. Deepa Rawat

PhD student, Department of Biochemistry, LN Medical College, Bhopal

Dr. Jusmita Dutta

Professor and Head, Department of Biochemistry, LN Medical College, Bhopal

ABSTRACT

Introduction: It is considerable that thyroid hormone has a relation with chronic kidney disease but it is unknown. **Aim and Objective:** This study was made to see relation between thyroid hormone and patients with chronic kidney disease. **Material and Method:** Thyroid test done by automated VIDAS instrument using Enzyme Linked Fluorescent Assay (ELFA) method. Total 300 patients of CKD and 100 healthy subjects served as control group were included to do the study. **Result:** For T3 (nmol/L) the Control groups was 1.79 ± 0.55 which was significantly different than the other three groups. The values for T3 in CKD 1, CKD 2 and CKD 3 patients were 1.19 ± 0.50 , 1.22 ± 0.37 and 1.22 ± 0.56 respectively. Furthermore, T4 (nmol/L) levels for Control 94.26 ± 20.84 whereas for CKD 1 the values were 69.57 ± 41.61 . For CKD 2 and CKD 3 values were 66.77 ± 40.48 and 69.42 ± 42.00 respectively. The value of significance for all these was found to be highly significant when compared with a p value of 0.001. For TSH (mIU/L) control value was 2.93 ± 1.37 and for CKD1 patients the values were 3.30 ± 2.17 and 10.67 ± 7.91 and 5.10 ± 3.72 for CKD 2 and CKD 3 patients. The value of significance for TSH was found to be significant with a p value of 0.001. **Conclusion:** It was found that thyroid dysfunction is common in CKD patients. This study reveals that with progression of CKD there is dysfunction in thyroid. An attempt will be made to see the correlation between different stages of CKD and thyroid hormones.

KEYWORDS : Chronic Kidney Diseases (CKD), Triiodothyronine (T3), Thyroxine (T4), Thyroid Stimulating Hormone (TSH), Glomerular filtration rate (GFR)

INTRODUCTION:

Thyroid hormone has renal functions as well. The intrinsic renal effect of thyroid hormone influences the Glomerular filtration rate (GFR) on a larger basis, making thyroid hormone a risk factor for kidney dysfunctions (1). Both the major thyroid anomalies hypothyroidism as well hyperthyroidism are associated with higher and lower GFR rates respectively. Even slight change in GFR has enormous effect on concentration and dilution of urine (2). Furthermore, thyroid hormone also influences the aldosterone system that alongside with other endocrine mechanism controls metabolism. Interestingly enough recent reports have acknowledged the fact that thyroid hormone influences the integrity and structure of kidney by directly affecting its morphology (3). Thyroid hormone has direct implications on the structure and function of renal proximal tubules.

MATERIALS AND METHODS:

The present study was an observational study. This study was approved by institutional ethics committee. The total study sample size was 400 subjects. Out of this 100 normal control subjects and 300 diagnosed and known cases of CKD (stage 1 to stage 3) patients. Investigations for Thyroid Profile were done on automated VIDAS instrument using ELFA technique (Enzyme Linked Fluorescent Assay). The patients of the age-group between 40-60 years of age, both male and female were included in the study.

RESULTS:

The present study was conducted among patients of chronic kidney disease attending outpatient department (OPD) of Medicine department of L N Medical College and Research Center, Bhopal. A total of 300 diagnosed and known cases of CKD (stage 1 to stage 3) were included as study group. Simultaneously the same number of healthy subjects (n=100) served as control group. We performed this observational study relating the thyroid profile with the prognosis of chronic kidney disease in all three stages patients.

Table:- 1 Gender wise distribution of Control and different stages of CKD

Groups	Male	Female
Control	56 (56%)	44 (44%)

CKD 1	57 (57%)	43 (43%)
CKD 2	60 (60%)	40 (40%)
CKD 3	66 (66%)	34 (34%)

Table:- 2 Age wise distribution of control and different stages of CKD

Parameters	Controls (n=100)	CKD 1 (n=100)	CKD 2 (n=100)	CKD 3 (n=100)	p = Value
Age (years)	56.12 ± 6.01	58.20 ± 8.06	57.38 ± 9.27	59.12 ± 6.51	0.037*

Comparison drawn between the age distributions of all three groups reveals that the difference between the ages of participants was significant and the p value was found to be 0.037.

Table:- 3 Thyroid Profile distribution of control and different stages of CKD

Parameters	Controls (n=100)	CKD 1 (n=100)	CKD 2 (n=100)	CKD 3 (n=100)	p = Value
T3 (nmol/L)	1.79 ± 0.55	1.19 ± 0.50	1.22 ± 0.37	1.22 ± 0.56	< 0.001***
T4 (nmol/L)	94.26 ± 20.84	69.57 ± 41.61	66.77 ± 40.48	69.42 ± 42.00	< 0.001***
TSH (mIU/L)	2.93 ± 1.37	3.30 ± 2.17	10.67 ± 7.91	5.10 ± 3.72	< 0.001***
FT3 (pmol/L)	5.03 ± 0.83	3.79 ± 0.70	3.38 ± 0.74	2.95 ± 1.04	< 0.001***
FT4 (pmol/L)	17.24 ± 3.44	8.98 ± 5.64	10.40 ± 7.03	9.96 ± 5.98	< 0.001***

Comparisons drawn for Thyroid profile in Control and test groups. For first thyroid profile, T3 (nmol/L) the values for Control groups was 1.79 ± 0.55 which was significantly different than the other three groups. The values for T3 in CKD 1, CKD 2 and CKD 3 patients were found to be 1.19 ± 0.50 , 1.22 ± 0.37 and 1.22 ± 0.56 respectively.

Furthermore, T4 (nmol/L) levels for Control subjects were 94.26 ± 20.84 whereas for CKD 1 the values were 69.57 ± 41.61 . For CKD 2 and CKD 3 the values were found to be 66.77 ± 40.48 and 69.42 ± 42.00 respectively. The value of significance for all these was found to be highly significant when compared with a p value of 0.001. For TSH (mIU/L) was also found to be significant when compared between control and CKD patients

in all the stages of the disease. For control subjects, the value of TSH was found to be 2.93 ± 1.37 and for first stage CKD patients the values were 3.30 ± 2.17 , the values were 10.67 ± 7.91 and 5.10 ± 3.72 for CKD 2 and CKD 3 patients. The value of significance for TSH was found to be significant with a p value of 0.001. Free serum levels of T3 and T4 both were analysed and for Control subjects the values were 5.03 ± 0.83 and 17.24 ± 3.44 respectively. For CKD 1, the values were found to be 3.79 ± 0.70 and 8.98 ± 5.64 for free T3 and T4. For CKD 2 and CKD 3, the numeric values for FT3 and FT4 were found to be 3.38 ± 0.74 , 2.95 ± 1.04 and 10.40 ± 7.03 and 9.96 ± 5.98 respectively. The values when compared were found to be significant amongst each other with a p value of 0.001.

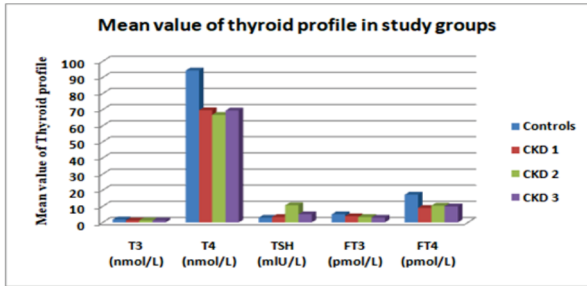


Figure:- 1. Thyroid Profile distribution of control and different stages of CKD

Table:- 4 Thyroid Profile Comparison of control and different stages of CKD

Parameters	Control vs CKD 1	Control vs CKD 2	Control vs CKD 3	CKD 1 vs CKD 2	CKD 1 vs CKD 3	CKD 2 vs CKD 3
T3 (nmol/L)	<0.001* **	<0.001* **	<0.001 ***	0.31	0.34	0.50
T4 (nmol/L)	<0.001* **	<0.001* **	<0.001 ***	0.31	0.48	0.32
TSH (mIU/L)	0.07	<0.001* **	<0.001 ***	<0.00 1***	<0.00 1***	<0.00 1***
FT3 (pmol/L)	<0.001* **	<0.001* **	<0.001 ***	<0.00 1***	<0.00 1***	<0.00 1***
FT4 (pmol/L)	<0.001* **	<0.001* **	<0.001 ***	0.058	0.11	0.31

When we compared the values of significance between control and CKD 1, CKD 2 and CKD 3 we observed that all the thyroid parameters are found significantly different with a p value of 0.001, except TSH which was found to be $p = 0.07$. When compared amongst each other, CKD 1, CKD 2 and CKD 3 were not observed to be significantly different (except for TSH and FT3).

DISCUSSION:

Chronic kidney disease (CKD) can be described as a type of kidney disorder wherein there is a gradual loss of kidney function over a period of time ranging from months to years. Reports have established enormous correlation between concomitant diseases such as hyperglycemia, hypertension, thyroid dysfunction and cardiovascular diseases with CKD (4).

In this piece of work we aimed at evaluating association between thyroid dysfunction in patients of chronic kidney diseases pertaining to the three crucial stages of kidney disease. In our study we also found that in all the three stage being considered, the patients were all above the age of 55. It is well proven fact that the gender affects the etiology of any disease at a very vast levels (5).

S. K. Tripathy et al (6), This study revealed low T3 despite a near normal T4 and it worsens with the progression of CKD but metabolic status remains normal.

T3 and T4 in patients with CKD can be considered as being protective, promoting.

We observed a decline in the serum levels of Thyroid hormone with disease progression. Thyroid hormone plays an important role in overall development, metabolism and differentiation. Thyroid and renal functions, both have mutual inter-dependence in a person (8). Few researchers have termed this thyroid assisted lower renal filtration as thyrotoxicosis (9).

CONCLUSION:

In recent years there is an abrupt elevation in the CKD cases. Thyroid hormone is of integral importance with reference to growth and metabolism. We observed that with less or no filtration being done by the kidneys, the metabolism becomes lowered leading to low Thyroid levels in circulation. Lower level of thyroid in circulation further contributes to the CKD progression. Major fraction of thyroid hormone is usually found in protein bound state which is severely affected in CKD. It can be suggested that with better life style choices a person can have a better outlook towards these disorders.

REFERENCES:

- Elsayed EF, Samak MJ, Tighiouart H, Griffith JL, Kurth T, Salem DN, et al. Waist-to-hip ratio, body mass index, and subsequent kidney disease and death. *American Journal of Kidney Diseases*. 2008;52(1):29-38
- Iorember FM. Malnutrition in chronic kidney disease. *Frontiers in pediatrics*. 2018;6:161.
- Mancini GJ, Hegele RA, Leiter LA. Dyslipidemia. *Canadian journal of diabetes*. 2018;42:S178-S85.
- Ruggenenti P, Cravedi P, Remuzzi G. Mechanisms and treatment of CKD. *Journal of the American Society of Nephrology*. 2012;23(12):1917-28.
- Silbiger S, Neugarten J. Gender and human chronic renal disease. *Gender medicine*. 2008;5:S3-S10.
- S. K. Tripathy, N. Dhal, M. Kanungo, S. Das, S. K. Mishra, Sai Swaroop, M. R. Behera, M. Panigrahi. Study of thyroid dysfunction and dyslipidemia in chronic kidney diseases, *International Journal of Research in Medical Sciences* 2018 Jan;6(1):110-116.
- Dr.K.Swaminathan, Dr. S.Rajesh, Dr.S.Avudaiappan. A Study of Thyroid Function Abnormalities in Patients with Chronic Kidney Disease. *IOSR Journal of Dental and Medical Sciences*. Volume 15, Issue 8 Ver. VIII, PP 07-15.
- Rhee CM. The interaction between thyroid and kidney disease: an overview of the evidence. *Current opinion in endocrinology, diabetes, and obesity*. 2016;23(5):407.
- Sargent JR, Tocher DR, Bell JG. The lipids. *Fish nutrition*. 2003:181-257.

Dr.K.Swaminathan et al (7), The change in the serum levels of