



Evaluation of Thyroid Function Test in Patients of Chronic Renal Failure

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ABSTRACT

Chronic kidney disease is a serious health problem which is now known to be associated with further complications. This study was designed to evaluate the correlation of thyroid hormones and chronic kidney disease.

Present Study includes total 120 individuals with 60 cases and 60 controls. Serum Urea, Creatinine, TSH, FT3, FT4 were estimated after getting informed consent from the subjects.

The level of Urea and creatinine were significantly elevated in cases as compared to controls. Thyroid hormones FT3 and FT4 were significantly low as compared to controls while level of TSH does not show any significant elevation.

Hence from this study it is concluded that chronic kidney disease is associated with decreased thyroid function.

KEYWORDS : Chronic Kidney Disease, TSH, FT3, FT4

INTRODUCTION

Chronic kidney disease is worldwide public health problem and now recognised as a common condition that is associated with increased risk of cardiovascular disease and renal failure. Chronic Kidney Disease means progressive loss in renal function over a period of months or years, Chronic Kidney Disease is a spectrum of various patho-physiological processes associated with abnormal kidney function and progressive decline in glomerular filtration rate.

Chronic Kidney Disease is clinical condition due to irreversible kidney dysfunction leading to excretory, metabolic and synthetic failure leading to accumulation of non protein nitrogenous substances and presenting with various clinical manifestations the prevalence of Chronic Kidney Disease in India is 0.79%.^{1,2,3}

Renal disease leads to significant changes in thyroid function and vice-versa. Hence thyroid function has been extensively evaluated in points with Chronic Kidney Disease. However variable results are obtained.^{4,5,6}

Thyroid Hormones are necessary for growth and development of kidney and for maintenance of water and electrolyte homeostasis.^{7,8} On the other hand kidney is also involved in metabolism and elimination of TH therefore the decline of kidney function is accompanied by changes in synthesis secretion, metabolism and elimination of Thyroid Hormone causing thyroid dysfunction.⁹

All levels of hypothalamic pituitary thyroid axis may be involved

Thus, the main aim of present study is to evaluate the thyroid hormone status in Chronic Kidney Disease Patients and to observe any correlation between renal function markers and level of thyroid hormones

MATERIALS AND METHODS

The present study was carried out in Department of Biochemistry Chirayu Medical College and Hospital Bhopal. This study was carried out from November 2015 to September 2016 after approval of ethical committee and research committee of institute after obtaining informed consent from individuals.

Total 120 individuals were part of this study among them 60 were patients of chronic renal failure selected from Department of Nephrology, along with 60 age matched healthy controls.

Participants with diabetes mellitus, past history of thyroid disorders hepatic disorders hepatic dysfunction acute and chronic illness were excluded from the study. Chronic Kidney Disease patients who were on conservative line of management were included and on dialysis were excluded

Healthy controls and cases were grouped on the basis of age. Two groups were prepared of 25-40 years and 41-60 years

Blood Collection and Testing

After 8 hours of fasting 5ml blood was collected from all individuals involved in the study. After sufficient time of clotting samples were centrifuged at 3000 RPM for 15min and serum is utilised for estimation of biochemical and immunochemical parameters

TSH, FT3 and FT4 were estimated through Enzyme Linked Fluorescence Assay in Minividias.

Urea and Creatinine were estimated through photometry in fully automated Cobas Integra 400 plus

The normal reference ranges of TSH, FT3, FT4, Urea and Creatinine are:

S.No	Parameters	Normal Range
1	Urea	15-45 mg/dL
2	Creatinine	0.9-1.3 mg/dL(Males)0.6-1.1 mg/dL(Females)
3	TSH	0.25-5 µU/ml
4	FT3	2.1-4.1 pg/ml
5	FT4	0.8-2.7 ng/dL

STATISTICAL ANALYSIS

All data obtained was presented as Mean \pm SD. Any difference in parameters between groups was tested for significance by unpaired T test. Comparison was done between cases versus. A 'P' Value <0.05 was considered as statistically significant

Peason's correlation analysis was done to analyse any correlation between chronic kidney disease and thyroid abnormalities.

RESULTS

The results were obtained from total 120 patients who include 60 Controls and 60 Cases. The subjects were divided into two groups' cases and controls.

Cases (n=60) were chronic kidney cases and controls (n=60) were healthy individuals.

Statistical analysis was done by unpaired T Test and shown in table given below:

S.No	Parameters	Controls	Cases	P Value
1	Urea	24.50 \pm 6.55	122.20 \pm 25.86	<0.001
2	Creatinine	1.06 \pm 0.14	6.96 \pm 1.58	<0.001
3	TSH	3.02 \pm 1.35	6.97 \pm 1.62	>0.05
4	FT3	3.20 \pm 0.63	0.95 \pm 0.41	<0.001
5	FT4	1.97 \pm 0.59	0.99 \pm 0.16	<0.001

The table shows comparison between cases and controls of

biochemical parameters.

Pearson's correlation showed positive correlation between chronic kidney disease and thyroid function test.

DISCUSSION

The level of serum Urea was found to be significantly elevated in cases as compared to controls (p value <0.001) In Chronic Kidney Disease the number of functioning Nephrons are reduced hence excretion of urea impaired and its blood concentration increases the levels of serum contains is also elevated due to same reason of impairment in functioning of Nephrons. Serum creatinine is index of the severity of the degree of the failure in patients suffering from renal failure while serum urea shows better correlation with degree of failure in acute renal failure.¹⁰

The level of free T3 was significantly low in cases as compared to controls (p value <0.001). This is most common and frequent reduction observed.^{11,12,13,14,15}

this reduction in FT3 is due to impairment in process of deiodination of T4 from which T3 is produced chronic metabolic acidosis associated with Chronic Kidney Disease is main cause of this effect. This study is main cause of this effect. The present study was in accordance with Iglesias P and Dieaz JJ¹⁶, Elain may kaptein¹⁷, A Gomez Pan F Alvarezude, PPB Yeo R, Hall D.C. evered DNS kerr¹⁷.

The level of serum FT4 was also significantly low in cases as compared to controls (p value <0.001). This can be explained as binding of thyroid binding globulin and circulation hormone is affected in uremia

This inhibition explains why patients of chronic renal failure have low serum T4 levels¹⁸. In the study serum TSH level was not significantly increased (p value <0.001) when compared to control the normal TSH is due to its response to its releasing hormone (TRH)^{19,20,21,15}

These finding suggests the presence of intra thyroidal and pituitary disturbance associated with uremia.²¹ The inhibited response is due to TSH glycosylation and TSH circadian rhythm being altered in chronic kidney disease which may compromise TSH bioactivity.

CONCLUSION

From the present study it is established that the chronic renal failure is associated with disturbance in thyroid function characterised by low serum FT3 and FT4 but normal serum TSH and patients are clinically Euthyroid. Low activity of thyroid function is a risk factor for cardiovascular disease which can also lead to progressive worsening of Kidney function Thyroid Dysfunction is often ignored aspect is Chronic Kidney Disease but it should be kept in mind for better management of patients of Chronic Kidney Disease.

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