



CHRONIC RENAL FAILURE; STUDY OF THYROID HORMONE LEVELS IN UN-DIALYZED PATIENTS

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ABSTRACT: Objectives: To compare thyroid hormone levels in apparently healthy individuals and un-dialyzed chronic renal failure patients in local population. **Study Design:** Cross-sectional, descriptive, observational study. **Setting:** OPD patients in BMSI Biomedical Science Institute of Medical Jinnah Medical Karachi. **Period:** June 2010 to December 2010 in BMSI JPMC, Karachi. **Methods:** Ninety individuals including 30 healthy control and 60 patients of chronic renal failure were included in this study. Individuals were grouped based on severity of diseases (stages) as healthy (control) group and the diseased group. Patients with un-dialyzed CRF on conservative management, GFR < 60 ml/mint/1.73m², age between 20 to 60 years in both sexes were included in this study. Patients already taking thyroxine or antithyroid drugs, history of thyroid surgery and neck radiation and patients on maintenance haemodialysis were excluded. Measurement of thyroid hormone levels were done through Radio Immune Assay (RIA) method and GFR by Cock Craft Gault formula. **Results:** Serum FT₃ significantly low in patients with CRF of stage III 1.27±0.12, stage IV 1.04±0.09 vs 2.80±0.09 in controls, p=0.001. TSH was significantly high in patients of CRF as compared to control 4.41±0.87 and 3.3±0.34 vs 1.97±0.16, P=0.001. No significant difference was seen in serum FT₄ levels. **Conclusion:** In local population thyroid hormone level of FT₃ declines with the severity of Glomerular Filtration Rate as compare to healthy individuals. However, TSH level increases with this severity as also reported in other countries. Additionally, FT₃ level is helpful for early detection and prevention of complications. Local population need awareness to prevent CRF by reporting to hospital before stage 3.

Key words: Thyroid hormone, healthy individuals, TSH, chronic renal failure.

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INTRODUCTION

Thyroid gland is one of the largest endocrine gland in the body. Thyroid secretes two hormones, thyroxine (T₄) and tri-iodothyronine (T₃). It also secretes calcitonin, an important hormone for calcium metabolism.¹

Thyroid gland is composed of many spherical structure called follicles or acini as a functional unit.² The cells of the follicles produce this colloid which is largely composed of thyroglobulin. Between the follicles are the parafollicular or C (clear) cells.³

About 93% hormone produced by this gland is thyroxine and 7% is tri-iodothyronine. However, almost all the thyroxine is converted eventually to tri-iodothyronine in tissues.

The most common endocrinopathy and most preventable cause of mental retardation is deficiency of iodine or metabolic problem.⁴ Inadequate iodine supply leads first to inadequate thyroid hormone productions and then to inadequate tissue response i.e. hypothyroidism.⁵

The prevalence of hyperthyroidism/hypothyroidism varies in different countries while in our country Pakistan ratio of hyperthyroidism in chronic renal failure is about 5.1-5.8 % while hypothyroidism about 4 to 4.5 % much higher in female than male patients.⁶

Chronic renal failure is a state of irreversible deceleration in renal functions. It has been also observed that if < 10% of renal functions remain, it is termed as end stage renal disease (ESRD).

This permanent loss of renal functions culminates in sign and symptoms termed as uremia.⁷

CRF is also defined as either kidney damage or decreased renal functions (decreased GFR) for three months or more than three months.^{8,9}

Disturbances in endocrine functions are commonly seen in patients with chronic renal failure. Change in the secretion and metabolism of hormones as well as alteration in target organs sensitivity account for these alterations.^{10,11}

The kidney normally contributes towards clearance of iodide from the body. In chronic renal failure iodide excretion is diminished leading sequentially to an elevated plasma inorganic iodide concentration and initial increment in thyroidal iodide uptake.^{12,13}

PATIENTS AND METHODS

This was a cross-sectional, descriptive, observational study that required no therapeutic interventions was performed OPD patients in BMSI biomedical science institute of medical Jinnah Medical Karachi. This study conducted between June 2010 to December 2010 in BMSI jpmc Karachi, 90 pts included in this study with undialsed stage. There were 30 normal healthy control and 60 patients with CRF were recruited from out patients department (OPD) of Nephrology, JPMC. CRF was defined as an estimated GFR $< 60 \text{ ml/min/1.73m}^2$ for more than 3 months. The study based on 03 groups, in which patients were selected randomly. Age matched controls were selected among local population of same socioeconomic group through convenient sampling. Anthropometric and blood pressure measurement was done according to standard methods in all subjects.

Calculations

To segregates the patient according to the degree of renal dysfunction estimated GFR was calculated using Cock Craft Gualt formula.

The CRF Patients were grouped as Moderate (GFR $< 60\text{-}30 \text{ ml/min/1.73m}^2$) and Severe (GFR < 30). According to chronic kidney disease

classification by National Kidney Foundation.

All participants gave written informed consent and ethical committee of Jinnah Post Graduate Medical Centre Karachi.

All blood draws were performed at Nephrogy Laboratory, JPMC. Venous blood samples were taken and samples were centrifuged within 30 minutes of collection. Separated serum was immediately frozen at -20 C .

Inclusion Criteria

- Undialyzed pt with chronic renal failure on conservative management.
- Age between 20 - 60 years.
- Both group sex male and female

All patients included were recorded on specially designed proforma (Appendix I) for information.

Exclusion Criteria

Following patients were excluded from the study:

- Patients already taking thyroxine or anti thyroid drugs.
- Patients with history of thyroid surgery.
- Patients who have history of neck radiation.
- Patients on maintenance haemodialysis.

STATISTICAL ANALYSIS

Analysis were done on SPSS version 13.0 was used for data feeding and analysis. The results were given in the text as mean and standard error of mean (SEM) for continuous/qualitative variables (age, pulse rate, respiratory rate, weight, blood pressure, FT_3 , FT_4 and TSH etc.). p-value < 0.05 suggest that my study favor my results and reject null hypothesis.

RESULTS

90 patients registered 60 were recruited from out patient department of nephrology and 30 were healthy individuals (both gender) of local population. The study was divided into 03 groups, control group A consisting of healthy individuals, group B (test group), Stage III and group C (test group) stage IV of chronic renal failure.

Parameters	Control (Group A)	Stage III (Group B)	Stage IV (Group C)
Age (Years)	44.21±1.84	50.33±1.50	53.30±1.52
Weight (Kg)	53.63±1.37	68.37*±1.82	65.80*±2.25
Systolic blood pressure (mmHg)	109.33±1.26	137.00*±2.31	136.67*±1.68
Diastolic blood pressure (mmHg)	69.67±1.22	91.33*±1.63	91.00*±1.62

Table-I. Comparison of age (years) weight (kg) and blood pressure among different groups
*Difference were statistically significant as compared to controls p<0.01

Parameters	Control (Group A) (n=30) Mean±SEM	Stage III (Group B) (n=30) Mean±SEM	Stage IV (Group C) (n=30) Mean±SEM
Serum FT ₃ (pg/ml)	2.80±0.09	1.27±0.12	1.04±0.09*
Serum FT ₄ (ng/dl)	1.42±0.08	1.49±0.58	1.43±0.05
Serum TSH (μIU/ml)	1.97±0.16	4.14*±0.87	3.33±0.34*

Table-II. Comparison of ft₃, ft₄ and TSH levels among different groups
*Difference were statistically significant as compared to control p<0.01.

DISCUSSION

Body weight was significantly higher in group B and C as compared to control group representing fluid and salt retention. Similar findings were reported by Fauci et al. (2008).

Systolic and diastolic blood pressures were high in chronic renal failure patients representing change in renin angiotensin system.

This is in agreement with the study conducted by Vargas et al. (2006) Additionally, Weiner et al. (2004) also observed that hypertension and diabetes mellitus are leading cause of chronic renal failure.

Our study showed that FT₃ was low in patients with undialysed renal failure. Representing an impaired peripheral conversion of FT₄. This is in agreement with Lim (2001) and Zoccali et al. (2005).

Thus low FT₃ is a major feature of disturbances in chronic renal failure which is considered as a counter regulatory response and minimizing energy, protein wasting, uncontrolled diabetes mellitus with diabetic ketoacidosis.

Increased mortality is associated with low FT₃ as reported by (Zoccali et al., 2006). Lo et al.¹ found that thyroid disease and CRF increases public health problem. A number of alterations in thyroid hormone levels and metabolisms have

been reported in patients with CRF and also low level of T₃ has been found to be most common disturbances.^{2,3}

In the present study no significant difference was observed between level of FT₄ and controls.

CONCLUSION

In local population thyroid hormone level of FT₃ declines with the severity of Glomerular Filtration Rate as compare to healthy individuals.

However, TSH level increases with this severity as also reported in other countries.

Additionally, FT₃ level is helpful for early detection and prevention of complications.

Local population need awareness to prevent CRF by reporting to hospital before stage

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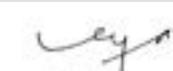
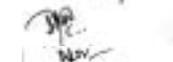
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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Noor Un Nisa Memon	Had helping, Idear, Concept	
2	Santosh Kumar	Idea, Sampling	
3	Bhagwan Das	Biostatisc, Reference	