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ABSTRACT

Hypothyroidism is a common disorder of the endocrine system in which the thyroid gland does not produce enough thyroid hormone. The kidney plays a role in the clearance of iodine, TSH, and thyrotropin-releasing hormone. Thyroid hormones influence the renal development, kidney structure, GFR, sodium, and water homeostasis. It also influences the function of transport systems along the nephron. So, there is a strong correlation between thyroid hormonal status and kidney function. 30 hypothyroidism patients and 30 healthy individuals were used from the OP of Saveetha Dental College. Serum samples were analyzed for the renal status by using a kit method in autoanalyzer. There is a significant increase in serum urea levels ($p < 0.05$) and serum creatinine levels ($p < 0.05$) in hypothyroidism patients. This is due to the thyroid hormones influence renal function. In our study, we observed that there is a strong correlation between thyroid hormones and renal damage, it that changes in thyroid profile can damage the renal system.

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INTRODUCTION

Hypothyroidism is an endocrinal hormone-related disorder, mostly occurs in children. In this condition, the thyroid gland is unable to produce an adequate amount of thyroid hormones (Hollowell JG *et al.*, 2002). ESRD patients are more prone to hypothyroidism (Connie M. Rhee *et al.*, 2013). Hypothyroidism associated mortality of dialysis patients may be ameliorated by the replacement of thyroid hormones (Connie M. Rhee *et al.*, 2013). Thyroid hormones also associated with the low GFR, a decrease in plasma flow of kidney, less reabsorption of sodium and the improper dilution capacity urine (Eun Oh Kim *et al.*, 2014). Hypothyroidism shows the symptoms like elevation in liver

enzymes, creatinine, goitre, reduction in respiratory rate and cardiac output (Eun Oh Kim *et al.*, 2014, Subramaniam P *et al.*, 2014).

The physiologic determination of renal status is the measured glomerular filtration rate (mGFR) (Neves PD *et al.*, 2013). Reduced GFR is one of the associative factors of hypothyroidism (Neves PD *et al.*, 2013). Kidney takes part its function in clearance of iodine, TSH, and other thyroid-related residues. Thyroid hormones influence development, structure, and function of the Kidney. There is an interrelation between the thyroid functioning and as well as renal function in a different disease condition. Renal defects or problems may be able to cause the alteration in thyroid profile. Thyroid hormones (TH) play a crucial role in the structural and functional development of the kidney.

The kidney is involved in the metabolism and elimination of TH. The decline of kidney function is accompanied by changes in the synthesis, secretion, metabolism, and elimination of TH and leads to thyroid dysfunction (Joshua Becker *et al.*, 2013, Balaji Rajagopalan *et al.*, 2013).

The major function of the kidney is filtering of blood and maintaining the homeostasis it includes excretion of water, metabolic end products like urea, creatinine, as well as foreign particles like

drugs etc; By the production 1,25 di hydroxyl cholecalciferol and erythropoietin like hormones it also plays an endocrine role in the living system (Dr. Colin Tidy., 2015). Malnourished and not eating renal impairment patients have relatively normal blood urea levels (Abi Berger *et al.*, 2000). Hypothyroidism is an under-appreciated cause of renal impairment (Andrew Connor *et al.*, 2008).

MATERIALS AND METHODS

Patients were selected from those attending the outpatient department of Saveetha Dental College and Hospitals and divided into two groups.

Group I- normal healthy individuals- 30 individuals
Group II- known hypothyroidism patients-30 individuals

Inclusion criteria

Normal healthy individual

Known hypothyroidism patients

Exclusion criteria

Individuals with other systemic illness like cardiovascular disease, Renal failure, Stroke, other endocrine disorders.

Immunocompromised individuals

Sample collection

Informed consent was obtained from the patient before sample collection. 5ml of fasting venous blood was collected and distributed in plain collection tubes and centrifuges in 3000 rpm for serum. Then the serum was separated, and then it is analyzed for serum urea by Urease method and creatinine by Jaffe's method using ERBA CHEM 5 plus analyzer.

RESULTS AND DISCUSSION

The mean values of urea control and creatinine control are 19.72 and 0.82 respectively. The mean values on urea case and creatinine case are 21.4 and 0.99 respectively. The normal level of urea is 7-20 mg/dl. Normal serum creatinine levels in male are 0.6 to 1.2 mg/dl and 0.5 to 1.1 mg/dl in females. More than two percent of creatine present in the body get converts into the form of creatinine with the help of thyroid hormones. When there is a lack in this TH, the renal system can not able to perform its normal conversion of creatinine (Barb., 2014, Charles Patrick Davis., 2018). This leads to a decreased glomerular filtration rate (GFR) and reduced clearance of creatinine, so creatinine levels start to rise (Barb., 2014, AbhilashChandra., 2016).

Pathological changes in the glomerular structure in hypothyroidism like glomerular basement membrane thickening and mesangial matrix expansion

contributes to a reduction in RBF. There is a reversible reduction in the kidney to body weight ratio in hypothyroidism, where the renal mass almost doubles with treatment (Connie M. Rhee., 2016). Hypothyroidism results in a reversible elevation in serum creatinine due to the reduction in GFR as well as possible myopathy and rhabdomyolysis. Hypothyroidism can also result in increased glomerular capillary permeability to proteins. The consequent proteinuria precedes the reduction of GFR in hypothyroidism. Thyroid profile can change due to dialysis and also due to chronic renal failure. Dialysis can also change serum status of TH in patients with renal failure (Gopal Basu *et al.*, 2012, Aarathy Kannan *et al.*, 2017).

Table 1: Mean, SD and Significance value of Urea, Creatinine in two groups

parameters	Controls	Hypothyroidism patients	p-Value
Urea	19.72 ± 5.88	21.4 ± 5.89	<0.05*
Creatinine	0.82 ± 0.18	0.99 ± 0.14	<0.05*

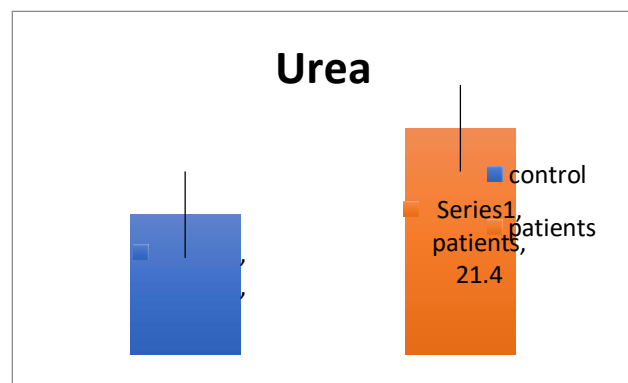


Figure 1: Mean, SD value of Urea in two groups

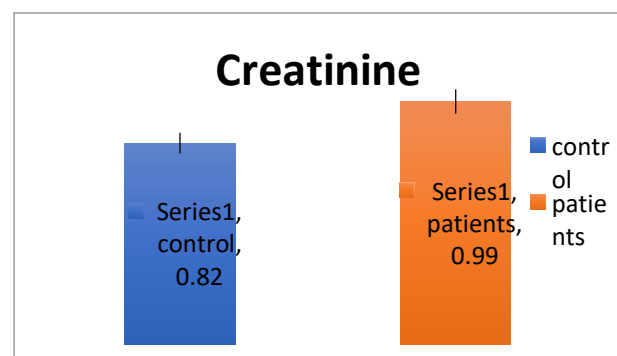


Figure 2: Mean, SD value of Creatinine in two groups

Persons with CKD (chronic kidney disease) have increased the incidence of primary hypothyroidism and subclinical hypothyroidism (Gopal Basu *et al.*, 2012). Subclinical hypothyroidism is an elevation in serum TSH concentration (Vahab Fatourechi., 2009). With the decline in Glomerular filtration rate (GFR), the prevalence of subclinical

hypothyroidism increases consistently (Mohamed Mohamedali *et al.*, 2014). Within two weeks of the time span, there will be a significant increase in serum creatinine in hypothyroidism (Kreisman SH *et al.*, 1999). In an initial phase of hypothyroidism, there is a chance of normalizing renal profile instantly by the hormonal therapy, but it is not helpful in the prolonged periods of severe hypothyroidism (Laura H. Mariani *et al.*, 2012).

CONCLUSION

In our study, we observed that there is a strong correlation between thyroid hormones and renal damage, it that changes in thyroid profile can damage the renal system. The prolonged damage to the kidney due to the hormonal imbalance may lead to chronic kidney disease which may also lead to other problems like cardiovascular disease etc.,

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