

Evaluation of Electrolytes and Renal Function in Patients with Hyperthyroidism in Mirpur AJK

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ABSTRACT

Objective: The objective of this study to evaluate electrolytes and renal function in patients with Hyperthyroidism in Mirpur AJK.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Department Physiology and Biochemistry Department of Mohtarma Benazir Bhutto Shaheed Medical College Mirpur AJK from January 2018 to July 2019.

Materials and Methods: We take for study 200 hyperthyroid patients' and 100 health Control. Samples were centrifuged at 3000RPM for 10 min. T3, T4 and TSH were measured by Special Chemistry Analyze. Serum creatinine (Cr), blood urea nitrogen (BUN), uric acid (UA) was analyzed by Micro lab 300 and used Merk Kits. Sodium (Na), Potassium (K), and Chloride were analyzed by Electrolyte Analyzer and used Merk Kits. Statistically analysis by SPSS version 20 software for ANOVA.

Results: Result showed that in hyperthyroid patients' Uric acid (4.8 ± 1.3) and Creatinine (0.5 ± 0.4) mean concentration were lower as compared to control. The concentration of urea were normal in hyperthyroid patients and control both while the concentration of eGFR (203.2 ± 103.8) was higher in hyperthyroid patient as compare to control. The concentration of Sodium (139.7 ± 2.2) was higher in hyperthyroid patient as compare to control.

Conclusion: The present study demonstrated the hyperthyroidism are linked with alteration and changes of renal functions and also alter the electrolyte balance. Hormonal balance should be corrected properly

Key Words: electrolytes, renal function, Hyperthyroidism

Citation of article: Mahmood R, Khan KS, Shaukat Z, Bashir F, Asnad. Evaluation of Electrolytes and Renal Function in Patients with Hyperthyroidism in Mirpur AJK. Med Forum 2021;32(1):30-32.

INTRODUCTION

There is correlation exist between kidney and thyroid. The renal physiology of the person affects with thyroid dysfunction and also develops other abnormality and also caused renal failure.¹ Most common disorders Hyper- and hypothyroidism are exist in the entire world. 5% of the general population is with Hypothyroidism and primary hypothyroidism 99% affected patients. Depending on the concentration of T3 and T4 in the blood which is correlate with abnormalities of the synthesis of these hormone because in the abnormality of these hormones caused renal dysfunction and imbalance of electrolyte of the person.²⁻⁵

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Received: June, 2020
Accepted: October, 2020
Printed: January, 2021

Deficiency of thyroid hormone caused hypothyroidism and it is affects the metabolic process which is clinically and biochemical disorder.⁶ Hypothyroidism is also associated with other biochemical abnormalities uric acid and serum creatinine increased.⁷

It is also observed that some other physiological changes are occurred such as renal blood flow are reduced and sodium, chloride and water and glomerular filtration rate are affected.⁸ Chronic kidney disease (CKD) is caused by hyperthyroidism by many mechanism and overall system is enhanced of kidney increased filtration rate and renal injury caused proteinuria and hyperthyroidism also enhanced the energy metabolism and also increased free radicals generation.⁹ In the present study we evaluate electrolyte and renal function in patients with thyroid dysfunction in Mirpur AJK.

MATERIALS AND METHODS

We take for study 200 hyperthyroid patients' and 100 health Control. The study was conducted in the department of Physiology and Biochemistry Department of Mohtarma Benazir Bhutto Shaheed Medical College Mirpur AJK.

Samples were centrifuged at 3000RPM for 10 min. T3, T4 and TSH were measured by Special Chemistry Analyze. Serum creatinine (Cr), blood urea nitrogen

(BUN), uric acid (UA) was analyzed by Micro lab300 and used Merk Kits. Sodium (Na), Potassium (K), and Chloride were analyzed by Electrolyte Analyzer and used Merk Kits. Statistically analysis by SPSS version 20 software for ANOVA.

RESULTS

In this study, we were selected 200 hyperthyroid patients' and 100 normal health control for research work.

Result showed that in hyperthyroid patients' Uric acid (4.8 ± 1.3) and Creatinine (0.5 ± 0.4) mean concentration were lower as compared to control. The concentration of urea were normal in hyperthyroid patients and control both while the concentration of eGFR (203.2 ± 103.8) was higher in hyperthyroid patient as compare to control.

The concentration of Sodium (139.7 ± 2.2) was higher in hyperthyroid patient as compare to control.

Table No.1: Participant Characteristics

	Hyperthyroid patients' (n=200)	Control (n=100)
Age (years)	40.54 ± 10.48	40.55 ± 10.38
Education		
Basic	B-50%,	B-50 %
Secondary	S-25%	S- 31%
University	U-25%	U-19%
Body weight (Kg)	69.1 ± 11.4	70.4 ± 11.5
BMI (kg/m ²)	25.3 ± 2.6	25.4 ± 2.7

B: Basic, S: Secondary, U: University

Table No.2: Renal Function of Hyperthyroid patients' and Control health participants

Hyperthyroid patients' (n=200)	Control (n=100)
Urea (mg/dl)	
24.3 ± 14.8	21.8 ± 10.5
Creatinine(mg/dl)	
0.5 ± 0.4	0.8 ± 0.5
Uric Acid (mg/dl)	
4.8 ± 1.3	5.6 ± 1.9
eGFRml/min	
203.2 ± 103.8	116.8 ± 41.6

Table No.3: Electrolyte balance of hyperthyroid patients' and Control health participants

Hyperthyroid patients' (n=200)	Control (n=100)
Sodium mmol/L	
139.7 ± 2.2	136.4 ± 3.3
Chloride mmol/L	
106.5 ± 5.0	104.6 ± 2.7
Calcium mmol/L	
9.4 ± 0.5	9.4 ± 0.5
Potassium mmol/L	
4.3 ± 0.5	4.4 ± 0.9

DISCUSSION

In different studies showed that there is association exist between abnormal renal function tests and thyroid dysfunction. Creatinine, and uric acid are observed decreased in hyperthyroid patients in the present study and enhanced eGFR value significantly. Our study showed similarity with some other study in which eGFR, Urea and Creatinine changes observed.¹¹ There is correlation exist between kidney and thyroid. The renal physiology of the person affects with thyroid dysfunction and also develops other abnormality and also caused renal failure. Most common disorders Hyper- and hypothyroidism are exist in the entire world. 5% of the general population is with Hypothyroidism and primary hypothyroidism 99% affected patients. Depending on the concentration of T3 and T4 in the blood which is correlate with abnormalities of the synthesis of these hormone because in the abnormality of these hormones caused renal dysfunction and imbalance of electrolyte of the person. Deficiency of thyroid hormone caused hypothyroidism and it is affects the metabolic process which is clinically and biochemical disorder. Hypothyroidism is also associated with other biochemical abnormalities uric acid and serum creatinine increased. It is also observed that some other physiological changes are occurred such as renal blood flow are reduced and sodium, chloride and water and glomerular filtration rate are affected. Chronic kidney disease (CKD) is caused by hyperthyroidism by many mechanism and overall system is enhanced of kidney increased filtration rate and renal injury caused proteinuria and hyperthyroidism also enhanced the energy metabolism and also increased free radicals generation. GFR increases in hyperthyroid patients with positive effects of chronotropic and intro tropic of cardiac output.^{12,13} In hyperthyroid cases, eGFR is increased, growth factor type-I like Insulin.^{14, 15} We take for study 200 hyperthyroid patients' and 100 health Control. The study was conducted in the department of Physiology and Biochemistry Department of Mohtarma Benazir Bhutto Shaheed Medical College Mirpur AJK Samples were centrifuged at 3000RPM for 10 min. T3, T4 and TSH were measured by Special Chemistry Analyze. Serum creatinine (Cr), blood urea nitrogen (BUN), uric acid (UA) was analyzed by Micro lab 300 and used Merk Kits. Sodium (Na), Potassium (K), and Chloride were analyzed by Electrolyte Analyzer and used Merk Kits. Increased secretion of uric acid link to enhanced concentration of thyroid hormones, which cause increase rate purine metabolites and increased the production of uric acid and renal work is enhanced to excrete uric acid.¹⁶ In the present study serum creatinine is decreased which is against to other previous studies in which increased serum creatinine value were found due to a decrease in eGFR.^{17,18} Result showed that in hyperthyroid patients' Uric acid (4.8 ± 1.3) and Creatinine (0.5 ± 0.4) mean concentration were lower as compared to control. The concentration

of urea were normal in hyperthyroid patients and control both while the concentration of eGFR (203.2 ± 103.8) was higher in hyperthyroid patient as compare to control. The concentration of Sodium (139.7 ± 2.2) was higher in hyperthyroid patient as compare to control. In hyperthyroidism, increased thyroid hormones, increased sodium ions significantly and all segments of nephron proximal tubules, activity of Na-Pico-transporter and Na-H exchanger increased¹⁹⁻²¹. In the case of hypothyroidism, electrolyte balance decreased in hypothyroidism but statistically not significant.²²⁷ The present study demonstrated the hyperthyroidism are linked with alteration and changes of renal functions and also alter the electrolyte balance. Hormonal balance should be corrected properly.

CONCLUSION

The present study demonstrated the hyperthyroidism are linked with alteration and changes of renal functions and also alter the electrolyte balance. Hormonal balance should be corrected properly.

Author's Contribution:

Concept & Design of Study: Rashad Mahmood
 Drafting: Khuram Shahzad Khan, Zara Shaikat
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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