Study of inorganic Iodine level in Patients with chronic kidney disease

Thesis

Submitted for partial fulfillment of Master Degree in Internal Medicine

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2017

دراسة مستوى اليود الغير عضوى فى مرضى القصور المزمن بالكلى

رسالة

توطئة للحصول علي درجة الماجستير فى أمراض الباطنة العامة

مقدمة من

الطبيبة/ وداد عادل محمود عبده

بكالوريوس الطب و الجراحة

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٢٠١٧

سورة البقرة الآية: ٣٢

Acknowledgement

First and foremost thanks to ALLAH, the Most Merciful.

I wish to express my deep appreciation and sincere gratitude to ***Prof. Mohamed Aly Ibrahim,*** *Professor of Internal Medicine and nephrology, Ain Shams University, for his close supervision, valuable instructions, continuous help, patience, advices and guidance. He has generously devoted much of his time and effort for planning and supervision of this study. It was a great honor to me to work under his direct supervision.*

I wish to express my great thanks and gratitude to ***Dr. Mohamed Saeed Hassan,*** *lecturer of Internal Medicine and nephrology, Ain Shams University, for his kind supervision, indispensable advice and great help in this work.*

I wish to express my great thanks and gratitude to ***Dr. Essam Mohamed Abdel-Hafiz,*** *Lecturer of radiodiagnosis, Ain Shams University, for his kind supervision, indispensable advice and great help in this work.*

Last and not least, I want to thank all my family, my colleagues, for their valuable help and support.

Finally I would present all my appreciations to my patients without them; this work could not have been completed.

Contents

List of Abbreviations

ACE-I	: Angiotensin converting enzyme inhibitor
ACR	: Albumin –creatinine ratio
AER	: Albumin excretion rate
AIT	: Amiodarone induced thyrotoxicosis
AKI	: Acute kidney injury
ATP	: Adenosine triphosphate
CHD	: Coronary heart disease
CHF	: Congestive heart failure
CKD	: Chronic kidney disease
CKD-EPI	: Chronic Kidney Disease-Epidemiology
CRF	: Chronic renal failure
CVD	: Cardiovascular disease
CVE	: Cerebrovascular event
DIT	: Diiodityrosine
ESRD	: End stage renal disease
ESS	: Euthyroid sick syndrome
Free T3	: Free triiodothyronine
Free T4	: Free thyroxine
GFR	: Glomerular filtration rate
HD	: Haemodialysis
I	: Iodine
IDD	: Iodine Deficiency Disorders
IFN	: Interferon
IGF-1	: Insulin like growth factor-1
IL	: Interleukin
LDH	: Lactate dehydrogenase
LDL	: Low density lipoprotein
MDRD	: Modification of Diet in Renal Disease
MIT	: Monoiodotyrosine
NIS	: Sodium/ iodine symporter
NS	: Nephrotic syndrome
NSAIDs	: Non steroidal anti inflammatory drugs
NTI	: Non thyroidal illness
PKC	: Protein kinase C
PVN	: Paraventricular nucleus
RAAS	: Renin–angiotensin–aldosterone system
RBF	: Renal blood flow
rT3	: reverse triiodothyronine
SCD	: Sudden cardiac death
SU	: Sulfanylurea

TBG	: Thyroxine-binding globulin
TH	: Thyroid hormone
THRT	: Thyroid Hormone Replacement therapy
TRH	: Thyrotropin releasing hormone
TSH	: Thyroid stimulating hormone
UIC	: Urinary iodine concentration
VCAM-1	: Vascular adhesion molecule-1
VEGF	: Vascular endothelial growth factor

List of Table

List of Figures

Abstract

In our study, we aimed to assess the level of inorganic iodine in patients with chronic kidney disease and to correlate the findings with thyroid function tests and thyroid ultrasound.

Our study was conducted on 60 randomly selected patients with chronic kidney disease from Ain Shams University Hospitals, and control group formed of 30 randomly selected healthy volunteers similar in age and sex with the patients group .

Patients group included 39 male patients and 21 female patients. Age of CKD patients ranged from 18-50 years .

We excluded patients with history of thyroid disease, history of frequent de-compensated medical conditions (exacerbations of congestive heart failure or obstructive lung disease, cancer patients), diabetics and patients with history of recent admission in ICU and patients receiving medications including iodine or affecting thyroid function.

Keyword: Chronic Kidney Disease, Thyroid, Iodine

Introduction

Renal disease leads to significant changes in thyroid functions and vice versa. In one hand, thyroid hormones (TH) are necessary for growth and development of the kidney and for the maintenance of water and electrolyte homeostasis. On the other hand, kidney is involved in the metabolism and elimination of TH ***(Rajagopalan et al., 2013).***

Thyroid dysfunction such as hypothyroidism and hyperthyroidism affects RBF, GFR, tubular function, electrolyte homeostasis and kidney structure. Studies have observed the high incidence of thyroid dysfunction in patients with kidney disease such as acute kidney injury AKI, CKD with or without dialysis and kidney transplantation ***(Mohamedali et al., 2014).***

The incidence of thyroid dysfunction in CKD patients is greater than that found among the general population**.** In CKD, thyroid hormone metabolism is impaired. Pre-dialysis CKD patients have an increased risk of hypothyroidism ***(Rajeev et al., 2015).***

Acute kidney injury and CKD are accompanied by notable effects on the hypothalamus–pituitary–thyroid axis as the secretion of pituitary thyrotropin (TSH) is impaired in uremia ***(Rajagopalan et al., 2013).***

The kidney also plays a role in clearance of iodine, TSH and thyrotropin-releasing hormone. However, most patients with CKD are euthyroid with normal TSH and free T4 levels ***(Rhee et al., 2014).***

The kidney contributes to the iodine clearance primarily by glomerular filtration. Serum iodine concentrations are elevated in patients with chronic kidney disease (CKD) but not correlated with the degree of kidney failure**.** The excess of serum iodine has been linked to increased prevalence of goiter and hypothyroidism in patients with CKD ***(Mariani&Berns, 2012).***

Previous studies have shown that CKD patients have low triiodothyronine (T3), normal or reduced thyroxine (T4) levels and consequently elevated thyroid-stimulating hormone (TSH) ***(Miulescu et al., 2014).***

The reduction in T3 levels (low T3 syndrome) is the most frequently observed thyroid alteration in these patients. This reduction in T3 concentrations has been linked to a decrease in the peripheral synthesis of T3 from T4 ***(Miulescu et al., 2014)***.

Aim of the work

To assess the level of inorganic iodine in patients with chronic kidney disease in different stages and to correlate the findings with thyroid function tests and thyroid ultrasound.

Thyroid disorders in patients with chronic kidney disease

CKD is defined as abnormalities of kidney structure or function, present for more than 3 months, with implications for health and is classified based on the cause of the disease, the estimated glomerular filtration rate (eGFR) class and albuminuria ***(KDIGO, 2005)***.

Chronic kidney disease (CKD) is a global health burden with a high economic cost to health systems and is an independent risk factor for cardiovascular disease (CVD). All stages of CKD are associated with increased risks of cardiovascular morbidity, premature mortality and/or decreased quality of life ***(Hill et al., 2016)***.

The prevalence of CKD exceeds 10% and is more than 50% in high-risk subpopulations ***(Eckardt et al., 2013).***

Chronic kidney disease was ranked 27th in the list of causes of total number of global deaths in 1990, but rose to 18th in 2010 **(*Jha et al., 2013)***.