بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

Cardiac Affection in Pediatric CKD Patients in Relation to Hyperuricemia and its Treatment

Thesis

Submitted for Partial Fulfillment of Master Degree in Pediatrics

By

Ayaat Abd Elmoniem Masry

M.B., B.Ch, Faculty of Medicine, Ain Shams University (2015)

Under supervision of

Prof. Dr. Ihab Zaki EL- Hakim

Professor of Pediatrics

Faculty of Medicine, Ain Shams University

Dr. Eman Mohamed Elsayed

Lecturer of Pediatrics

Faculty of Medicine, Ain Shams University

Dr. Mohamed Nasr El-Sharawi

Lecturer of Pediatrics

Faculty of Medicine, Ain Shams University

Faculty of Medicine
Ain Shams University
2021

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to **ALLAH,**
The Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Ihab Zaki EL- Hakim,** *Professor of Pediatrics, Faculty of Medicine, Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to **Dr. Eman Mohamed Elsayed,** *Lecturer of Pediatrics, Faculty of Medicine, Ain Shams University, for her kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

I am deeply thankful to **Dr. Mohamed Nasr El-Sharawi,** *Lecturer of Pediatrics, Faculty of Medicine, Ain Shams University, for his great help, active participation and guidance.*

Ayaat Abd Elmoniem

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List of Abbreviations

Abb.	Full term
AKI	Acute kidney disease
BMI	Body mass index
CKD	Chronic kidney disease.
CKD-EPI	Chronic Kidney Disease Epidemiology Collaboration
eGFR	Estimated glomerular filtration rate
ESRD	End stage renal disease
GFR	Glomerular filtration rate.
hsCRP	High sensitive C-reactive protein
LVH	Left ventricular hypertrophy
MDRD	Modification of Diet in Renal Disease
NAD+	Nicotinamide adenine dinucleotide
Scr	Serum creatinine
SUA	Serum uric acid
UA	Uric acid
Uox	Uricase
XDH	Xanthine dehydrogenase
XO	Xanthine oxidase
XOIs	Xanthine oxidase inhibitors

INTRODUCTION

Uric acid has long been considered as an inert end product of purine catabolism; however, chronic hyperuricemia, causing deposition of urate crystals in the body, and considered as an independent risk factor for the development of chronic kidney disease (CKD) and cardiovascular diseases ***(Johnson et al., 2018).***

Hyperuricemia occurs when the serum uric acid exceeds the normal level which is different according to age and changed from male to female above age of 15 years old, at this point starts to crystalize within the human body ***(Yamanaka, 2011).***

High uric acid might be a predictor for occurrence of cardiac changes, in the form of structural remodelling, through increase in oxygen free radicals' production and its reactive metabolites may contribute to cardiac pathological consequences such as thrombosis, inflammation, and tissue remodelling in the form of cardio hypertrophy, interstitial fibrosis, and impaired diastolic relaxation ***(Dudley et al., 2005).***

Hyperuricemia has been associated also with left atrial remodelling, leading to an increase its size, which might be a risk factor to atrial fibrillation ***(Cho et al., 2013).***

Xanthine oxidase inhibitors (XOIs) still remain the first line of treatment as recommended by all guidelines of gout. Among these, allopurinol is the first-line agent for treatment of hyperuricemia ***(Khanna et al., 2012).***

AIM OF THE WORK

To assess:

1. The Prevalence of hyperuricemia among CKD paediatric patients and its effect on cardiac indices.
2. The impact of treatment with allopurinol for 6 months in hyperuricemic CKD pediatric patients on cardiac indices.

Chapter 1

CKD AND CARDIAC AFFECTION

Definition of CKD:

CKD is defined as abnormalities of kidney structure or function, present for >3 months or GFR<60 ml/min/1.73m^2 for ≥ 3 months, with implications on health ***(Schwartz et al., 2009).***

Chronic kidney disease (CKD) refers to a condition related to irreversible kidney damage that can further progress to end stage renal disease (ESRD) ***(Shroff et al., 2009).***

It is a major public health problem worldwide and there is extensive epidemiological research in the adult population. But, little is known about the epidemiology of CKD in the pediatric population ***(Shroff et al., 2009).***

Risk factors for CKD in pediatrics:

- Vesicoureteric reflux with recurrent urinary tract infection
- Obstructive uropathy
- Past history of acute nephritis, nephrotic syndrome,Henoch-schonlien purpura
- History of renal failure in perinatal period
- Family history of kidney disease
- Renal dysplasia or hypoplasia

- Low birth weight infants
- Diabetes, hypertension
- Systemic lupus erythromatosis

Criteria for CKD:

The criteria for definition of CKD are objective and can be ascertained by means of simple laboratory tests without identification of the cause of disease.

1. Duration >3 Months Kidney diseases

The duration of CKD defined as duration of >3 months (>90 days) as delineating ‘‘chronic’’ kidney disease. For example, a patient with decreased kidney function or kidney damage in the midst of an acute illness, without prior documentation of kidney disease, may be inferred to have AKI**.**

2. Reversibility

Most kidney diseases donot have symptoms or findings until later in their course and are detected only when they are chronic. Most causes of CKD are irreversible with a life-long course, and treatment aimed at slowing progression to kidney failure. However, chronicity is not synonymous with irreversibility ***(Froissart et al., 2005).***

3. Decreased GFR (GFR<60 ml/min/1.73 m^2):

Decreased GFR The kidney has many functions, including excretory, endocrine and metabolic functions. The

GFR is one component of excretory function, but it is widely accepted as the best overall index of kidney function because it is generally reduced after widespread structural damage and most other kidney functions decline in parallel with GFR in CKD ***(Rule et al., 2010).***

***Glomerular filteration rate (*GFR):**

The ability to accurately, and efficiently assess kidney function is essential in clinical medicine to facilitate staging CKD and monitoring its progression, and the early detection of acute kidney injury (AKI), to monitor medication-related nephrotoxicity, to make dose adjustments of medications which are toxic to and/or excreted by the kidney, to perform risk assessments for contrast-enhanced imaging studies ***(Kolz et al., 2009).***

- **Assessment of glomerular function:**

GFR is considered the best overall indicator of kidney function but remains challenging to accurately and efficiently measure in clinical practice. Conceptually, it represents the volume of plasma that can be completely cleared of a substance per unit of time.