الايــة

" قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ "

سورة البقرة الاية (32)

Dedication

I dedicate my thesis to my family, *to the Soul of my parent and to the soul of my sister Dr: Nemat*

I dedicate my thesis affectionately to my husband Dr., Hashim Abdelwahab, without his caring and supports it would not possible,he has never left my side and he is very special indeed.

To my brothers and Sisters

To my friends and colleagues

With love and respect

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Abstract

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia; it is usually caused by an insufficient insulin secretion by the pancreas. The purpose of this study was to characterize the effects of diabetes on the patient‘s kidneys in order to differentiate these changes from normal ones and hence to help in providing better health care. The sample of this study was of convenient types which consisted of 100 normal and 50 diabetic patients covering various ages (10 up to 70 years)withdifferentdiabetes duration.The samples of diabetic patients were (77females and 73males). All patients underwent computed tomography for abdomen, gettingplain scans, and scan with contrast media. The study was done at general complex of Omer Sawy(Neusoft multi-slice CT Scanner System Model: 128slices,Antalya Medical Center (general electrical 4 slices) and Modern Medical Center (general electrical 16 slices)).The demographic data were collected including (age, gender, weight, and height).Both kidneys at the upper calyx, renal pelvis, and lower calyx were measured at all directions which showed that the medial upper calyces for the left kidney measured in axial direction were significantly larger than the right kidney at $p \leq 0.001$. The measurements were done for the right and left kidneys length, width, cortex and medulla.CT number (Hounsfield units) for cortex and medulla in the two studied groups (normal control and diabetes group), presented as mean, standard deviation and p-values. There were significant difference between the kidney width of the control and diabetes group for the right and left kidneys at $p \leq 0.000$ and 0.019 respectively.The measurements were also done in the axial planes for the cortex and medulla. Significant changes were detected for both kidneys in the cortex and medulla at $p \leq 0.000$ in each of the cortex and 0.010 and 0.001for the medulla as compared with the controls. The impact of the diabetes duration on the kidneys length and width presented the results and showed that as the diabetes duration increased the

left kidney width increased by 0.377mm starting from 42.59mm and the impact/contribution of the diabetes to cause effect on the left kidney width measurement was 82%. Whereas the right kidney width increased by 0.460mm starting from 41.31mm and the impact/contribution of the diabetes to cause effect on the width measurement was 70%. For the left kidney length, as the diabetes duration increased the left kidney length decreased by 0.060mm starting from 99.14mm and as the diabetes duration increased, the right kidney length decreased by 0.058mm starting from 96.74mm.

The research agreed with previous studies which showed that the left kidney was larger than the right.

The main finding of study showed that, diabetes affected theparenchyma thickness, and CT number. CT has greatvaluein detecting the renal changes that take place on people who suffer diabetes mellitus.

ملخصالدراسة

داء السكري هو مجموعة من الأمراض الاستقلابية التي تتسم بارتفاع مستويات السكر في الدم وعادة يوجد بسبب نقص افراز الانسولين من البنكرياس.هدفت هذه الدراسة إلى وصف آثار مرض السكري على كلى المرضي لكي نميز هذه التغييرات عن المظهر الطبيعي ومن ثم المساعدة في توفير رعاية صحية أفضل.تتكون عينة هذه الدراسة من 100شخصسليم و50شخص مريض بالسكر و تغطي مختلف الأعمار(10الى70سنة)مع اختلاف مدة مرض السكرى .وقد احتوت العينة علي77اناث , 73 ذكور.وقد خضع جميع المرضى الى فحص بالاشعة المقطعية المحوسبة للبطن، وتم الحصول على صور سطحيةوصوربعد استخدام وسيط التباين.تمت الدراسة في السودان بمجمع اللواء عمر ساوى (جهاز اشعة مقطعية نيوسوفت متعدد الشرائح موديل 128 شريحة) و مركزأنطاليا الطبي (جنرال الكتريك 4 شرائح)و المركز الطبي الحديث(جنرال الكترك 16 شريحة). تم جمع المعلومات البيوغرافية مثل (العمر، الجنس، الوزن، الطول) وتم اجراء القياسات لكلا الكليتين حيث شملت منطقة الكاس العلوى والحوض الكلوى والكاس الاسفل.وقد اخذت القياسات من حميع الاتجاهات واظهرت ان الكاسات العليا الداخلية فى الكلية اليسرى التى تم قياسها فى الاتجاه المحورى اكبر بشكل ملحوظ من نظيرها فى الكلية اليمنى في درجة معنوية$P \leq 0.001$. تم قياس الطول والعرض والقشرة والنخاع للكليتينوالرقمالمقطعي للمجموعتين .وقد تم حسابالمتوسطوالانحرافالمعياريوقيمة p .وجد ان هناكفرقاكبيرابينعرضالكليةومجموعةالضبطوالسكريللكليتينااليمنواليسرى عند $P \leq 0.000$ 0.000 0.019.علي التواليوقد تم اجراء فحوصات اخرى للكلى فى الوضع المحورى للقشرة والنخاع. ومن خلال القياسات فيالقشرة و نخاع الكلية وجد ان هناك تغيرات معنوية لكل من الكليتين في القشرة و النخاع ب $P \leq 0.000$ و 0.010 0.001مقارنة مع مجموعة الضبط. وقد اظهرت الدراسة ان هنالك تاثيرا لمدة مرض السكر على طول وعرض الكليتين بحيث ان زيادة مدة المرض ادت الى زيادة عرض الكلية اليسرى ب 0.377 مم بدءا من 42.59مموان مساهمة مرض السكرى في احداثاثر على عرضالعرض الكلية اليسرى كانت 82%بينما زادة عرض الكلية اليمنى بمقدار 0.460مم ابتداءا من41.31مم وكانت المساهمة فى احداث الاثر على عرض الكلية 70% اما بخصوص طول الكلية اليسرى فان زيادة مدة المرض تؤدى الى نقصان طول الكلية اليسرى بمقدار 0.060مم ابتداءا من 99.14مم وكلما زادة مدة مرض السكرى يقل طول الكلية اليمنى بمقدار 058مم ابتداءا من 96.74مم

هذه الدراسة تتفق مع الدراسات السابقة وذلك بأن الكلية اليسرى اكبر من اليمنى واهم ماتوصلت اليه هذة الدراسة هي أن مرض السكري يؤثر على سمك القشرة و رقم الأشعةالمقطعية , كما ان التصوير بالاشعة المقطعية له دور كبير فى كشف التغييرات التى تصيب الكلى لدى المصابين بمرض السكرى.

List of Abbreviations

Abbreviation	Phrase
IV	Intravenous
CT:	Computed Tomography
HU	Hounds unit
IVC	Inferior vena cava
US	Ultrasound
MRI	Magnetic resonance imaging
NM	Nuclear medicine
Ml	Mile
Tc-99m DMSA	technetium-99m Dimercaptosuccinic acid
Tc-99m DTPA	Diethylenetriaminepentaacetate
Cm	Centimeter
L1-L2	Lumbar1-Lumbar2
300mOsm	Osmollary
VB	vertebral body
Mw	Megawatt
TBW	Total body water
ICF	Intracellular fluid
K+	Potassium.
Mg2+	Magnesium
ATP	adenosine triphosphates
ADP	adenosine monophosphates
AMP	adenosine monophosphates
ECF	Extracellular fluid
Cl	Chlorine.
IVP	intravenous pyelography
DM	Diabetes Mellitus
GFR	Glomerular filtrating rate glomerular filtrate
DN	diabetic nephropathy
Mg	Milligram
KUBs	kidney, ureter, and bladder
MSCT	multislice computed tomography
ROI	Region of interest.
MR	Magnetic resonance
DICOM	Digital imaging and communication on medical in computer
IDL	Interactive Data Language
kV	Kilovolt
MAs	milli-amperage
Mm	Millimeter
CSI	Cesium iodide.

TFT	thin-film transistor
CTA	Computed axial Tomography
RICK	Radio-Isotopes Centers in Khartoum
PT	Parenchymal thickness
VB	vertebral body
USA	United States of America
SD	standard deviation
SPSS	Statistical Package for the Social Sciences
N	Number
ANOVA	analysis of variance,
BMI	body mass index
GFR	glomerular filtration rate
KBR	kidney body ratio
ST	standard transform
RPV	Renal parenchymal volume
BSA	Body weight in women
CW	cortical width
LPP	pole-to-pole kidney length

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