AIN SHAMS UNIVERSITY
FACULTY OF SCIENCE
Biochemistry Department

Dietary Supplementation To Control Malnutrition in Chronic Hemodialysis Egyptian Patients

A thesis submitted for the degree of

Master in Science by

Zeinab Al Saad Eid Barakat

(B.Sc. Biochemistry, 2006)

Under Supervision of

Prof. Dr. Nadia Youssef Sadek Morcos

Professor of Biochemistry, Faculty of Science, Ain Shams University

Prof Dr. Ezzat Abdel-Rahman El Etreby

Professor of Internal medicine and Nephrology, Faculty of Medicine,
Al-Azhar University

Dr. Maha Mostafa kamal

Lecturer of Biochemistry, Faculty of Science, Ain Shams University

Biochemistry Department

Faculty of Science

Ain Shams University

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The Department Committee Agreement

Declaration

This thesis has not been submitted in this or any other university

Zeinab Al Saad Eid Barakat

Biography

Name: Zeinab Al Saad Eid Barakat .

Date and place of birth: 1/1/1985, Cairo, Egypt.

Date of Graduation: May, 2006

Degree awarded: B.Sc. of Biochemistry, 2006.

Grade: Very good.

Date of Registration: 5/2011

Supervisors:

(1) ***Prof. Dr. Nadia Y. S. Morcos***
(2) ***Prof. Dr. Ezzat Abdel-Rahman El Etreby***
(3) ***Dr. Maha Mostafa kamal***

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Zeinab Al Saad Eid Barakat

Abstract

Background & Aim: The majority of hemodialysis patients are hyperphosphatemic. Hyperphosphatemia in these patients can lead to renal osteodystrophy, vascular calcification, cardiovascular events, and is independently associated with mortality risk. The aim of this study is to find a suitable dietary intervention to improve hyperphosphatemia in maintenance-hemodialysis patients. These interventions should be simple, easily applied, related to Egyptian diets, and the patients could adhere to them.

Patients & Samples: Twenty one patients on maintenance-hemodialysis were selected from El Doaah and El Rayan hospitals, in Cairo. All patients were under treatment according to the dialysis unit. Twelve patients were first advised to adhere to a simple diet for 4 months, suggested by the National Nutrition Institute, Cairo, Egypt. On the 5^{th} month, 9 patients were included, and all patients received the diet + 2 cups of green tea/day, for 4 months. Blood samples were taken at baseline and monthly from all patients. Serum phosphorous, calcium, urea and creatinine were measured together with blood hemoglobin and Ca x P was calculated. Data were analyzed using paired t-test,

correlation analysis, and the intra-individual variation in each patient was calculated.

Results: The phosphorous levels were significantly reduced (from 6.58 to 4.4 mg/dL), while the calcium levels were elevated (from 7.9 to 9.2 mg/dL), resulting in a decrease in Ca x P (from 51.9 to 40.9 mg^2/dL^2) at all intervals, showing maximum effect after adding green tea to the diets. These effects were observed in total, male, and female patients. The within-subject biological changes due to the dietary interventions revealed that none of the patients suffered from deterioration in their phosphorous or calcium levels throughout the experimental period.

Conclusion: Advising the patients on maintenance-hemodialysis to adhere to simple Egyptian diets supplemented with green tea to alleviate their hyperphosphatemia and hypocalcemia. The strong individuality observed supports the preferential use of within-subjects biological variations and the reference change values (RCVs) rather than population-based reference intervals. Further studies with larger number of patients and longer periods of follow-up are recommended.

CONTENTS

LIST OF ABBREVIATIONS

ACAT	Acyl-coenzyme A Cholesterol Acyl Transferase
A/CR	Albumin-to-Creatinine Ratio
AER	Albumin Excretion Rate
AKI	Acute Kidney Injury
AKIN	Acute Kidney Injury Network
ARF	Acute Renal Failure
AV	Analytical Variation
α, KG	α, ketoglutarate
BMI	Body Mass Index
BUN	Blood Urea Nitrogen
BV	Biological Variation
CaR	Calcium-sensing Receptor
CD	Critical Difference
CKD	Chronic Kidney Disease
CKD-MBD	Chronic Kidney Disease–Mineral and Bone Disorder

CRF	Chronic Renal Failure
CRS	Cardiorenal Syndrome
CRS-Type4	Chronic Renocardiac Syndrome
CVD	Cardiovascular Disease
CVi	Intra-Individual Biological Variation Data
DM	Diabetes Mellitus
eGFR	Estimated Glomerular Filtration Rate
ESRD	End Stage Renal Disease
FF	Fast Food
FGF23	Fibroblast Growth Factor-23
GFR	Glomerular Filtration Rate
GH	Growth Hormone
GLDH	Glutamate Dehydrogenase
HD	Hemodialysis
HMG-CoA reductase	3-Hydroxy-3- Methyl Glutaryl CoA reductase

HP	Hypertension
HPT	Hyperparathyroidism
IR	Insulin Resistance
LDL	Low Density Lipoprotein
LDL-C	Low Density Lipoprotein –Cholesterol
MHD	Maintenance Hemodialysis
MPO	Myeloperoxidase
NADH	Nicotinamide Adenine Dinucleotide
NKF	National Kidney Foundation
PD	Peritoneal Dialysis
PEW	Protein Energy Wasting
PTH	Parathyroid Hormone
RAAS	Renin Angiotensin Aldosterone System
RCV	Reference Change Value
Reg	Regulare
RIFLE	Risk, Injury, Failure, Loss of function, and End stage renal disease

RO/NS	Reactive Oxygen/Nitrogen Species
ROS	Reactive Oxygen Species
SD	Standard Deviation
SDa	Analytical Standard Deviations
SDb	Biological Standard Deviations
Sl	Slice
SOD	Superoxide Dismutase
Tb	Tablespoon
TG	Triglycerides
VDR	Vitamin D Receptor

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