شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

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جامعة عين شمس

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قسم

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HANAA ALY

Hand grip strength: A tool of nutritional assessment in prevalent hemodialysis patients

A thesis

For fulfillment of Master Degree in Internal Medicine

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم

صدق الله العظيم

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List of Contents

Subjects	Page
List of Abbreviations	I
List of Tables	II
List of Figures	III
Introduction	1
Aim of the study	4
Review of Literature:	5
PROTEIN-ENERGY MALNUTRITION	5
Tools of Nutritional assessment in CKD s5 D patients	18
Handgrip Strength Testing	36
Subjects and Methods	46
Results	55
Discussion	70
Summary	80
Conclusion	84
Recommendation	85
References	86
Arabic Summary	1

List of abbreviations

AVF	arteriovenous fistula
BCAA	branched amino acids
BIA	Bioelectrical impedance analysis
BMI	body mass index
BUN	Blood urea nitrogen
CANUSA	Canada and the United States
CAPD	continuous ambulatory peritoneal dialysis
CKD	chronic kidney disease
CNI	Composite nutritional index
CRF	chronic renal failure
CRP	C-reactive protein
CTD's	cumulative trauma disorders
DEXA	dual-energy x-ray absorptiometry
DMS	Dialysis Malnutrition Score
DOPPS	Dialysis Outcomes and Practice Patterns Study
DOQI	Dialysis Outcome Quality Initiative
DPI	Dietary protein intake
DXA	Dual-energy radiograph absorptiometry
ESRD	end-stage renal disease
FA	Free Amino acids
GFR	glomerular filtration rate
HD	Hemodialysis
HGS	Handgrip strength
IGF	insulin-like growth factor
ISRNM	International Society of Renal Nutrition and Metabolism
MAC	Mid Arm Circumference
MAMC	Mid-arm muscle circumference
MIS	Malnutrition-Inflammation Score
nPCR	normalized protein catabolic rate
PD	peritoneal dialysis
PEM	Protein–energy malnutrition
PEW	Protein–energy wasting
PNA	Protein equivalent of total nitrogen appearance
PTFE	Polytetrafluoroethylene
SGA	Subjective global assessment
TIBC	total iron-binding capacity
TN	Total Nitrogen
TNF	Tumor necrosing factor
TSFT	Triceps skin fold thickness

List of tables

List	Review	Page
Table (1):	Causes of Wasting and PEM in dialysis patient	8
Table (2):	Recommendations for Nutritional Intakes for Healthy Subjects and Chronic Renal Failure Patients Before and During Maintenance Dialysis Treatment	9
Table (3):	Some Acute-Phase Reactants used as markers of Inflammation inPatients with Renal Insufficiency	17
Table (4):	A variety of tools and techniques available to assess nutritional status in patients with chronic kidney disease	18
Table (5):	Physical signs of nutritional deficiency Assessment for features supportive of micronutrient deficiency	20
Table (6):	SGA form	31
Table (7):	Hand grip strength reference among males and females	52

List	Results	Page
Table (1):	Comparison between studied groups as regard Demographic data	55
Table (2):	Comparison between studied groups as regard SGA items	56
Table (3):	Comparison between studied groups as regard SGA rating	57
Table (4):	Comparison between studied groups as regard Anthropometrics	58
Table (5):	Comparison between studied groups as regard hand grip strength score	59
Table (6):	Comparison between studied groups as regard Laboratory findings	60
Table (7):	Comparison between group A Pre and Post as regard findings	61
Table (8):	Comparison between group B Pre and Post as regard findings	63
Table (9):	Comparison between studied groups as regard nPCR	65
Table (10):	correlation between nPCR and finding in group A	66
Table (11):	correlation between nPCR and finding in group B	68

List of figures

List	Review	Page
Figure (1)	prevalence of PEW in various CKD stages	5
Figure (2)	causes and consequences of PEW	12
Figure (3)	Protein-Energy Wasting (PEW) is associated with increasedmortality risk in HD patients	17
Figure (4)	Exam Area: Clavicle & Acromion Bone - Deltoid Muscle.Patientarms at side; observe shape	30
Figure (5)	Exam Area: Upper Arm Region Triceps/Biceps.Arm bent, rollskin between fingers, do not include muscle in pinch	30
Figure (6)	Exam Area: Anterior Thighs – Quadriceps&Patellar Region. ASkpatient to sit, leg propped up,knee bent.Grasp quads to differentiate muscle vs. fat tissue	30
Figure (7)	Triceps Skinfold Thickness	49
Figure (8)	Mid Arm Circumference	50
Figure (9)	Hand grip dynamometer	51

List	Results	Page
Figure (1)	correlation between nPCR and BMI in group A	66
Figure (2)	correlation between nPCR and TSFT in group A	66
Figure (3)	correlation between nPCR and MAC in group A	67
Figure (4)	correlation between nPCR and Handgrip strengthin group A	67
Figure (5)	correlation between nPCR and BMI in group B	68
Figure (6)	correlation between nPCR and TSFT in group B	68
Figure (7)	correlation between nPCR and MAC in group B	69
Figure (8)	correlation between nPCR and Handgrip strength in group B	69

ABSTRACT

Background: Malnutrition is a common problem in patients with end stage renal disease (ESRD) undergoing hemodialysis that is associated with increased morbidity and mortality. There are several clinical, nutritional, and biochemical parameters that may be indicative of PEW in patients using hemodialysis (HD). Handgrip strength is a simple, quick, non-invasive ،inexpensive, rapid, and objective procedure. In addition, it has other advantages as a diagnostic/screening tool for nutritional assessment. However ،HGS relies on the motivation of the subjects, and therefore it is imperative that researchers and clinicians are sufficiently trained in HGS assessment. L-Carnitine supplementation, levocarnitine is an amino acid derivative which is an essential cofactor of fatty acid metabolism, may improve several situations.

Aim of the Work: The aim of our study, a longitudinal observational study, is to assess HGS as an independent tool for assessment of the nutritional status in hemodialysis patients. This study can also show the significance of the commitment to high protein diet (1.2- 1.4 g/ kg/ d) and receiving L-carnitine (10-20 mg/kg intravenously after each dialysis session) and its effect on the handgrip strength and other studied nutritional tools .

Patients and Methods: In our study, a longitudinal observational study, study duration was 3 months after washout period; our population is all End Stage Renal Disease patients in Kasr Al-Ainy Hemodialysis Unit, Cairo University. The unit provides hemodialysis and medical service for 104 patients from whom 50were excluded and 54 patients were enrolled.

Results: the study showed comparison between both studied groups regarding the studied laboratory parameters and different nutrition assessment tools showed no statistically significant differences. The study showed Comparison between the effect of high protein diet and L Carnitine (pre and post) in patients of group B on the studied nutritional tools and laboratory parameters. Again HGS was the only tool that showed statistical significance. %BF(body fat) assessed by anthropometry was negativelycorrelated with HGS. Also they found lower HGSvalues in patients on HD with higher estimates of abdominal fatdeposition. Thus, it seems that low muscle mass can occurdespite fat accumulation, and one possible explication for thiswould be the proinflammatory phenotype presented by individualswith abdominal fat deposition. This confirms that subjects can have normal or higher BMI and have a depletionprocess, thus increasing the need for screening proceduresrelated to functional status.

Conclusion: In this study, we concluded that HGS was the only significant (p value: <.001), while all other nutrition assessment tools didn't show any significant difference.The correlation between nPCR and HGS was statistically significant (p value:.001, r:.616). L-carnitine supplementation has no role over commitment to high protein diet only regarding improving the nutritional status and hemoglobin level in hemodialysis patients.

Keywords: Hemodialysis, Handgrip strength, L-carnitine, Nutritional assessment, High protein diet.

INTRODUCTION

Protein–energy wasting (PEW) is common in patients with chronic kidney disease and is associated with increased morbidity and mortality. There are several clinical, nutritional, and biochemical parameters that may be indicative of PEW in patients undergoing hemodialysis (HD) **(Mafra et al., 2008)**. Protein–energy malnutrition (PEM) is defined as a lack in supply of sufficient energy or protein to meet the body's metabolic demands as a result of either an inadequate dietary intake of protein, intake of poor quality dietary protein, increased demands due to disease, or increased nutrient losses **(Kuhlmann et al.,2007).**

Malnutrition develops during the course of chronic kidney disease (CKD). CKD stages 3 and 5 are associated with a spontaneous reduction of the mean protein intake from 1.0 g/kg body weight/day to about 0.6-0.8 g/kg body weight/day accompanied by a reduction in energy intake. There are little data on the prevalence of PEM in pre-dialysis CKD stages, but a change in body composition including a reduction in body cell mass has been reported **(Bellizi et al., 2006).** The presence of protein energy malnutrition at the initiation of dialysis therapy is associated with higher risks of mortality and morbidity **(Segall et al., 2014)**.

According to the International Society of Renal Nutrition and Metabolism (ISRNM) expert panel, PEW is diagnosed if there are low serum levels of albumin, transthyretin or cholesterol as well as decreased body mass (low or decreased body/fat mass or body mass loss with low intake of protein and energy), and decreased muscle mass (muscle wasting or sarcopenia) **(Fouque et al., 2008)**. Decreased muscle mass appears to be the most valid criterion for the presence of PEW **(Axelsson et al., 2006)**.

However, it is often difficult to diagnose decreased muscle mass or muscle loss accurately **(Mak et al., 2006)**. In this setting, functional tests may be the most sensitive and relevant indicator of nutritional status alterations **(Norman et al., 2005)**.

An ideal method for assessing the nutritional status of patients should include dietary intake, nutritional requirements, functional status and body composition. However, in the absence of a gold standard, scientists tried to identify new methods capable of accurately diagnosing malnutrition. Many tools have been used, however; their validity is still controversial **(Garcia et al., 2013).**

Handgrip strength (HGS), a measurement of the maximal voluntary force of the hand/arm, has been described as a useful tool in assessing muscle function because it is a noninvasive, rapid, objective, and inexpensive procedure **(Leal et al., 2011)**.

Testing grip strength is a popular assessment used by occupational therapists in a range of clinical settings. It is fast, easy to perform, reliable and produces a result which is simple to record. Results of grip strength testing have been used to determine a baseline measure of performance against which change can be compared, as well as comparison of results to normative data **(Mills et al., 2002).**

Grip strength was the only assessment technique recommended for the measurement of muscle strength, and was the simplest method for assessment of muscle function in clinical practice. Longitudinal studies confirm that grip strength declines after midlife, with loss accelerating with increasing age and through old age **(Bohannon, 2001)**.

Grip strength can be measured quantitatively using a hand dynamometer (**Stalenhoef et al., 2002)**.