Markers of Protein Energy Wasting in Hemodialysis Patients

Thesis

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List of Abbreviations

Abb.	Full term
AGES	Advanced glycation end products
AIDS	Acquired immune deficiency syndrome
Alk.phase	Alkaline phosphatase
ALT	Alanine aminotransferase
ANG	Angiotensin
AOPPs	Advanced oxidation protein products
APKD	Autosomal dominent polycystic kidney disease
AST	Aspartate transaminase
AUC	Area under curve.
AVF	Arteriovenous fistula
AVG	Arteriovenous graft
BCM	Body cell mass
BIA	Bioimpedence analysis
BIVA	Bioimpedance vector analysis
BMI	Body mass index
BP	Blood pressure
BSFT	Biceps skin fold thickness
BUN	Blood Urea Nitrogen
CANUSA	Canada-United states of America study
CAPD	Continuous ambulatory peritoneal dialysis
CGN	Chronic glomerulonephritis
CHF	Congestive heart failure
CKD	Chronic kidney disease
CKDMBD	Chronic kidney disease-mineral bone disease

Abb.	Full term
CKDOPPS	Chronic kidney outcome and practice pattern study
CLD	Chronic liver disease
CMS	US Centers for Medicare and Medicaid Services
COPD	Chronic obstructive pulmonary disease
CPG	Clinical practice guidelines
CPK	Creatine phosphokinase
CPN	Chronic pyelonephritis
CRP	C- reactive protein
CVD	Cardio vascular disease
CVS	Cerebrovascular stroke
DM	Diabetes mellitus
DMS	Dialysis malnutrition score
DPS	Degaste proteico energetico
EBPG	European best practice guidelines
ECW	Extra cellular water
ESRD	End stage renal disease
FM	Fatty mass
GFR	Glomerular filtration rate
GH	Growth hormone
GIT	Gastro intestinal tract
GNRI	Geriatric nutritional risk index
HB%	Haemoglobin%.
HBV	Hepatitis B Virus
Hct	Haematocrite
HCV	Hepatitis C Virus
HD	Hemodialysis

Abb.	Full term
HDL	High density lipoprotein
HEMO	Hemodialysis study
HIV	Human immune deficiency virus
HRQOL	Health related quality of life
HTN	Hypertension
IDPN	Intradialytic parenteral nutrition
IGF-1	Insulin like growth factor 1
IHD	Ischemic heart disease
IL	Interleukin
ISRNM	International Society of Renal Nutrition and Metabolism
K/DOQI	Kidney Disease Outcome Quality Initiative
KDIGO	Kidney disease improving global outcomes
LBM	Lean body mass
LDH	Lactate dehydrogenase
LPD	Low protein diet
LVH	Left ventricular hypertrophy
MAMC	Mid arm muscle circumference
MBD	Mineral bone disease
MCC	Major comorbid conditions
MHD	Maintenance haemodialysis
MIS	Malnutrition inflammation score
MOH	Ministry of health
MPO	Myeloperoxidase
NADP	Nicotinamide adenine dinucleotide phosphate oxidase
NCDS	National cooperative dialysis study

Abb.	Full term
NF-KB	Nuclear factor kappa light chain enhancer of activated B cells
NKF	National Kidney Foundation
Npcr	Normalized protein catabolic rate
Npna	Normalized protein nitrogen appearance
PA	Phase angle
PCR	Protein catabolic rate
PO4	Phosphorous
PRU	Percent reduction in urea
PTH	Parathyroid hormone
PTX3	Pentraxin-3
PVD	Peripheral vascular disease
Q.CRP	Quantitative C-reactive protein
REE	Resting energy expenditure
rHuEPO	Recombinant human erythropoietin
ROC	Receiver operating curve
s.ALB	Serum albumin
s.Ca	Serum calcium
s.CHOL	Serum cholesterol
s.Cl	Serum chloride
s.K	Serum potassium
s.Mg	Serum magnesium
s.Na	Serum sodium
s.Ph	Serum phosphorus
s.Pre-alb	Serum pre-albumin
SBW	Standard body weight
SGA	Subjective global assessment

Abb.	Full term
SLE	Systemic lupus erythematosis
TIBC	Total iron binding capacity
TNF	Tumor necrosis factor
TPN	Total parenteral nutrition
Tsat	Transferrin saturation
TSFT	Triceps skin fold thickness
TWEAK	Tumour necrosis factor related weak inducer of appoptosis
UF	Ultrafiltration
UPS	Ubiquiitin-proeasome system
URR	Urea reduction ratio
UV	Ultra violet

Markers of Protein Energy Wasting in Hemodialysis Patients

Abstract

Background: International Society of Renal Nutrition and Metabolism (ISRNM) has recommended the term Protein-Energy Wasting (PEW) for loss of body protein mass and fuel reserves that may occur commonly in patients with chronic kidney disease (CKD). PEW is one of the strongest predictors of mortality in patients with CKD. Cachexia is a severe form of PEW. The proposed causes of PEW are multi-factorial and include nutritional and non-nutritional mechanisms. **Aim:** Detection of the prevalence of protein energy wasting in hemodialysis patients. Detection of the potential usefulness of the various nutritional-inflammatory markers and anthropometric measures in the diagnosis of PEW in CKD. **Subjects and Methods:** A cross-sectional study was undertaken on eighty hemodialysis (HD) patients (39 men and 41 women). Inclusion criteria were age 18–80 years, receiving HD treatment at least three times per week. The duration of the study was 3 months. Exclusion criteria at the entry of the study were age <18 years, comorbidities, medications, recent trauma or surgical intervention that might interfere with the nutritional status, and a life expectancy of <3 months. **Results:** Most of our PEW patients showed a mild degree of wasting, even though they all were clinically stable and had not experienced superimposed catabolic illnesses for at least 3 months before study enrollment. Wasted patients in our study showed lower anthropometric measurements. Interestingly. In the current study, PEW patients showed significant alteration of body water distribution and ECW than well nourished ones. In our study, six components of MIS showed statistically significant hazard ratios for first hospitalization.

Keywords: ISRNM: International Society of Renal Nutrition and Metabolism, PEW: Protein-Energy Wasting, CKD: chronic kidney disease, HD: hemodialysis.

Introduction

International Society of Renal Nutrition and Metabolism (ISRNM) has recommended the term Protein-Energy Wasting (PEW) for loss of body protein mass and fuel reserves that may occur commonly in patients with chronic kidney disease (CKD) **(Ruperto et al., 2014)**. Protein-energy wasting is diagnosed if three characteristics are present: (1) low serum levels of albumin, transthyretin, or cholesterol, (2) reduced body mass (low or reduced body or fat mass or weight loss with reduced intake of protein and energy), and (3) reduced muscle mass (muscle wasting or sarcopenia, reduced mid-arm muscle circumference) **(Ravel et al., 2013)**.

PEW is one of the strongest predictors of mortality in patients with CKD. Cachexia is a severe form of PEW. The proposed causes of PEW are multi-factorial and include nutritional and non-nutritional mechanisms. The literature indicates that PEW can be mitigated or corrected with an appropriate diet and enteral nutritional support that targets dietary protein intake **(Carrero et al., 2013; Mafra et al., 2010)**. Dietary requirements and enteral nutritional support must also be considered in patients with CKD and diabetes mellitus and in children with CKD, in addition to dialysis