PROTEIN ENERGY WASTING IN CKD STAGES 3 AND 4 PATIENTS ON FIRST VISIT TO NEPHROLOGIST

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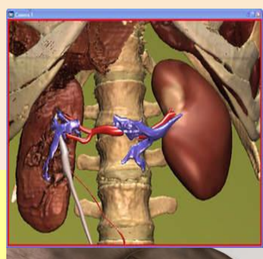
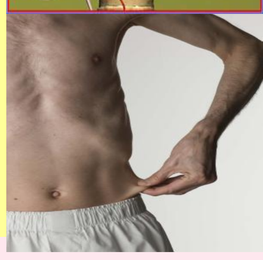




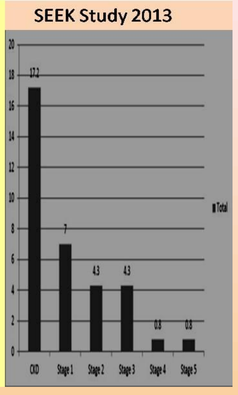
Chronic Kidney Disease - Indian Scenario

Chronic kidney disease is a major contributor to the global burden of non-communicable diseases.

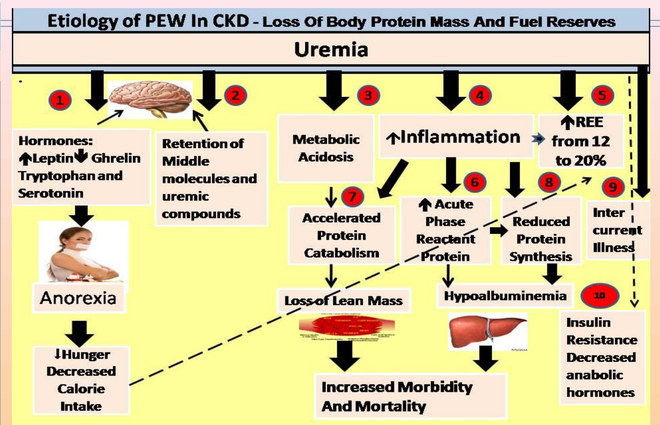
Three Principal Outcomes of CKD

1. Progressive loss of renal function
2. Development and progression of cardiovascular disease.
3. Development of protein–energy wasting.

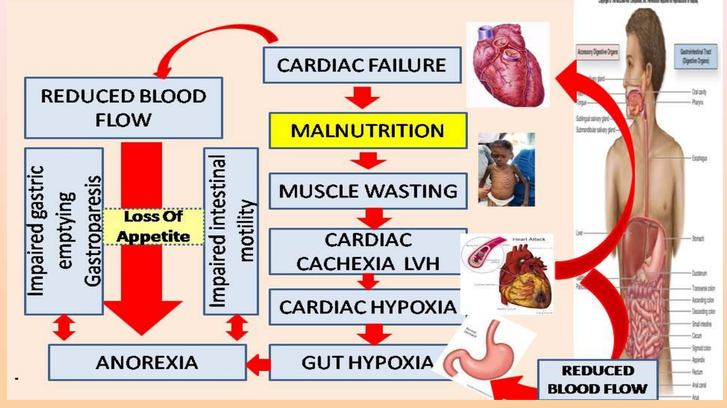
SEEK Study 2013



Etiology of PEW In CKD - Loss Of Body Protein Mass And Fuel Reserves



Muscle Wasting, Hypoxia And Appetite



Objectives

- 1. At which stage PEW can be documented?
- 2. Whether
  - Self-reported appetite
  - Body mass index and
  - Income

can be used as **indicators of protein energy wasting** (PEW) in predialysis patients on their first visit to a nephrologist.

Material And Methods

- Study Design: Prospective, cross sectional study conducted in the out-patient department.
- Sample Size: A total of 488 (348 male and 140 female)
- Inclusion criteria :
  - (i) First visit of a CKD stage 3 (GFR <60-30 ml/min) patient to a nephrologist.
  - ii) Exclusion criteria: Malignancy
- Data Collection: Data were collected between year 2013 and 2014.
- Statistical Analysis: SPSS Version 10

Groups Based on Appetite, BMI And Income

Appetite	Body Mass Index	Income
Four groups Normal Average Poor and Anorexic • Appetite was assessed with Appetite and Diet Assessment Tool (ADAT) • 3-days dietary recall. • National Institute of Nutrition (NIN) Tables used for analyzing Dietary energy, protein, fat, carbohydrate, calcium and phosphorus	Three groups Severely Underweight BMI <16 kg/m² Underweight BMI <18 kg/m². Normal BMI > 22 or 23 kg/m²	• Three groups • High Middle ≥ Rs 1,00,000 • Low Middle Rs ≥30,000 <1,00,000 • Poor ≤ Rs 5000 or less/month

ISRNM Criteria For Diagnosing PEW

1. Serum albumin level <3.8 g/dL
2. BMI <23 kg m² (for age <65 years
3. Dietary Intake:

Unintentional low dietary protein intake <0.60 g/kg/d for patients with CKD stage 2-5 with 5 g/d proteinuria for at least 2 months for maintenance dialysis patients.

Unintentional low dietary energy intake <25 kcal/kg/d for least 2 months.

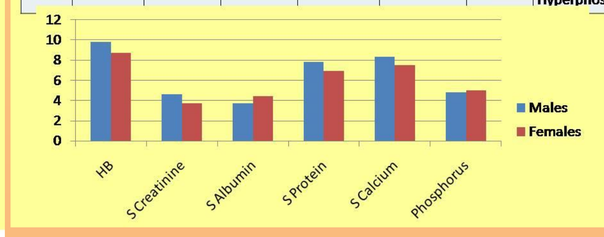
Demographic Profile of CKD Stage 3 Patients

	Age	Weight Kg	Height cm	BMI kg/m²
Male	45.01±18.53	61.63±14.08	164.74±8.90	22.54±4.30
Female	46.85±14.72	54.99±11.86	153.11±6.49	23.43±4.77

	Creatinine mg%	Creat Clear ml/min	BP Systolic mmHG	Diastolic Blood Pressure mmHG
Male	4.67±4.19	33.4±30.5	136.80±24.66/	84.94±14.44
Female	3.74±3.36	37.5±33.8	139.40±26.6	84.04± 13.90

Table 3 Biochemical Profile Of Patients

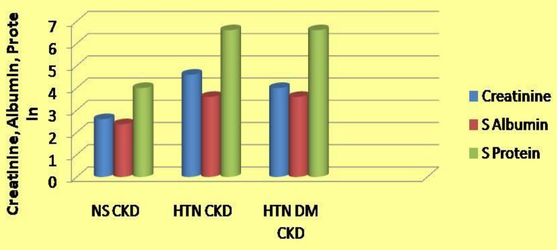
Sex/ N	Hemoglobin g/dL	Serum Albumin g/dl	S Total Protein g/dl	Serum Sodium mg/dl	Serum Potassium mg/dL	Serum Calcium mg/dL	Serum Phosphorus mg/dLw
M 348	9.80±2.59	3.77±0.83	7.03±1.27	135.4±12.7	5.36±10.9	8.86±9.8	4.86±1.55
F 140	8.71±2.25	3.68±0.81	6.94±1.26	135.4±5.7	4.70±0.7	7.5±2.1	5.03±1.41 Hyperphos



Biochemical Profile Based On Comorbidities

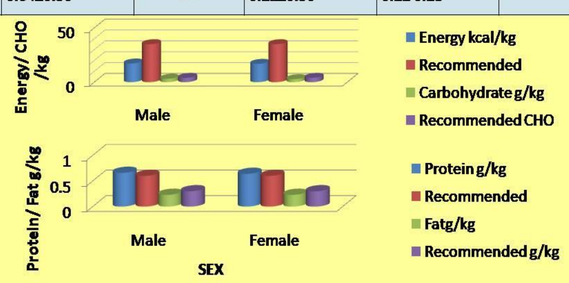
Comorbidity	BP Systolic	BP Diastolic	Creatinine	S Albumin	S Protein
NS+CKD = 71	128.34±19.8	85.63±13.3	2.61±3.4	2.37±.7	4.0±1.9
HTN CKD N=222	137.52±26.3	85.75±15.0	4.63±3.8	3.66±.6	6.63±1.3
HTN+DMN+ CKD=204	140.45±25.0	81.85±12.5	4.01±2.7	3.60±.8	6.61±0.84

Proteinuria was present in all the patients (+1 to +4)



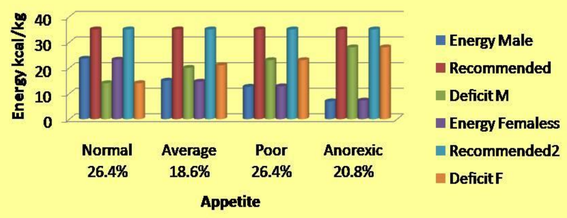
Results: Nutrient Intake: Energy Intake 50% less than RDA

	Energy Kcal/kg	RDA	Energy Deficit	CHO g/kg	CHO g/kg RDA
M	17.22±8.29	35 kcal/kg	17.78±8.29	3.12±2.10	3-5g/kg
F	16.88±7.66	35 kcal/kg	18.12±7.66	2.79±1.36	3-5 g/kg
Sex	Protein G/kg	RDA g/kg	Protein Deficit	Fat g/kg	
M	0.66±0.28	0.6	0.09±28	0.23±0.24	
F	0.64±0.30	0.6	0.11±0.30	0.22 0.28	



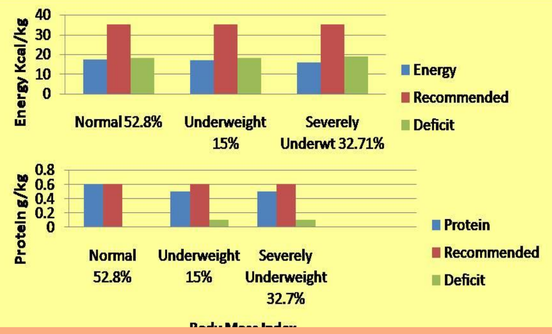
Energy And Protein Intake According To Appetite

Variable/Sex	Normal N (m/f) 1/126	Average N(m/f) 70/20	Poor N (m/f) 88/47	Anorexic N (m/f) 64/36
N%	26.4%	18.6%	26.4%	20.8%
Energy cal/kg /Male	21.57 ± 7.85	15±3.70	12.36±4.26	6.92±4.36
Energy cal/kg /Fem	21.19±5.81	14.67±3.09	12.79±3.92	7.25±3.95
Protein g/kg /Male	0.79±0.23	0.58 ±0.17	0.50 ± 0.20	0.27±0.17
Protein g/kg /Fem	0.7±0.23	0.56±0.16	0.48±0.15	0.29±0.20



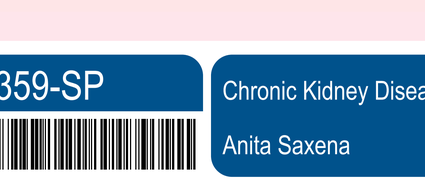
Energy Intake Based On BMI 50% of RDA for Predialysis CKD

BMI	Normal	Underweight	Severely Underweight
N%	52.8%	15.0%	32.71%
Energy Intake Deficit kcal/kg	17.2 ±9.0 18 Kcal	17.0±10.0 18 kcal/kg	15.91±11.1 19 kcal/kg
N%	52.8%	15.0%	32.71%
Protein Intake g/kg/d	0.6 ±0.34	0.5±0.4 (0.1 deficit)	0.5±0.44 (deficit 0.04)



Effect of Income On Dietary Intake Sig Diff Between Group

Nutrient	HIGH MIDDLE	LOW MIDDLE	POOR
N (%)	83 (17.2%)	257 (53.9%)	144 (29.8)
Energy Kcal/kg/d **	17.0(1037.11±331.99	15.0(918.47±396.15	14.9 (913.15±392.84) Lo
Protein g/kg/d*	0.63 (38.92±14.17)	0.57 (35.34±15.30)	0.50 (35.48±16.22)
Carbohydrate g/kg*	2.9 (179.72±60.09)	2.6 (161.19±86.95)	2.5 154.97±70.7 LOW
Fat g/kg/d*	2.3 *(13.73±10.71)	2.2 (12.62±10.25)	2.3 (14.18±16.85)
BMI kg/m² **	23.98±4.98	23.59±4.41	20.84±3.46 LOW
Serum Creatinine**	6.45±21.70	4.46±4.07	5.22±4.13
Serum Albumin*	3.26±0.38	3.57±0.97	3.07±0.92 LOW

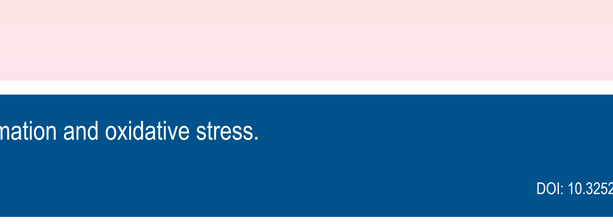


*Significant at <0.05 %
** Significant at <0.000%

Based on income there was significant difference between groups in energy (p 0.019), protein (p 0.031), albumin (p 0.001) and BMI (p 0.000).

Effect of Comorbidities On Biochemical Profile and Dietary Intake CKD Patients

Comorbidity	BMI kg/m² (p 0.000)	Hemoglobin*	Energy kcal/kg (P 0.005)*	Protein g/kg (p 0.000)*	CHO g/kg*
NS = 71	22.04±4.3	11.30±2.3	18.96±11.32	0.69±0.36	3.66±2.88
HTN N=222	22.42±4.4	9.45±2.63	14.19±6.90	0.52±0.25	2.57±1.34
HTN+DM N 204	24.21±4.3	9.18±2.14	13.90±5.86	0.56±0.24	2.51±1.05



Declining trend in Hemoglobin and energy (p 0.005) intake with increasing comorbidities. Energy Deficit increased with increasing comorbidities. Appetite worsened with increasing morbidity (p 0.001)

Negative Correlation Anemia And Appetite (p 0.003)

Varible/Sex	Normal N =162	Average N = 90	Poor N = 135	Anorexic N = 100
Hemoglobin g/dL	9.88±2.34	9.85±2.66	9.50±2.46	8.73±2.68
Sex Wise				
Male	10.00±2.43 N =126	10.16±2.71 N =70	10.06±2.53 N = 88	8.90±2.66 N = 64
Female	9.53±2.05 N = 36	8.33±1.90 N = 20	8.50±2.01 N = 47	8.44±2.72 N = 36

DISCUSSION

- Decreased appetite was associated with low markers of nutritional status such as energy intake, serum albumin, BMI and low creatinine clearance.
- The average dietary energy intake was 50% less (17.0±9.0 kcal/kg/day) than K/DOQI targets (30–35 kcal/kg/day) as the creatinine clearance was 33.4± 30.5 - 37.5±33.8ml/min.
- These data are consistent with the hypothesis that low energy intake is a major contributor to PEW in patients with CKD and confirm previously published work.
- Based on comorbidities there was significant difference (Anova) in BMI (p 0.000)
- Appetite (p 0.001) worsened with increasing comorbidities.
- Energy (p 0.005) in take decreased with increasing comorbidities
- Limitation of The Study :CRP levels - not available to confirm underlying inflammation in PEW on the first visit to our OPD.

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DISCUSSION

Anorexia is a key component in the development and progression of PEW, inflammation, and MICS.

Very few studies have investigated independent associations between appetite and clinical outcomes.

In the study decreased appetite was associated with low markers of nutritional status such as energy intake, serum albumin, BMI and low creatinine clearance.

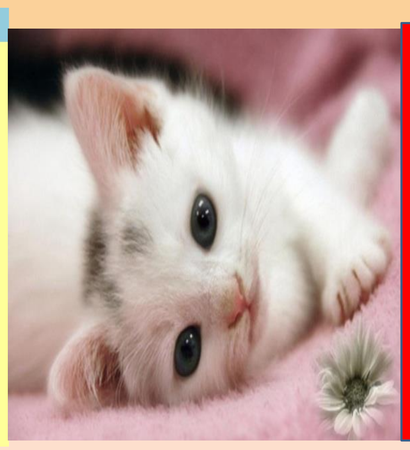
Subjects in CKD stages 3-5 have lower median peak oxygen consumption. Low hemoglobin (<10 g/dl) affects fatigue as assessed by anorexia physical activity, sleep disturbance using **multi dimensional fatigue inventory (MFI-20)**

Summary

Nutritional assessment is **important** at the time of presentation of patient to detect and correct PEW.

In developing country like India, very few patients are aware of their body weight in good health. Therefore the ISRNM criteria for loss of weight cannot be used.

- **Appetite, Low income and low BMI are risk factors for PEW and can be used for quick assessment of PEW in the out patient department.**
- Although insufficient food intake (true undernutrition) due to poor appetite and dietary restrictions is critical in activating pathogenic mechanisms of PEW, there are features of the syndrome that cannot be explained by undernutrition alone.
- To prevent PEW, factors like inflammation acidosis, endocrine disorders which contribute to development of anorexia and PEW should be corrected.



Thank you

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53 ERA

Chronic Kidney Disease. Nutrition, inflammation and oxidative stress.

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DOI: 10.3252/pso.eu.53era.2016

ePosters supported by F. Hoffmann- La Roche Ltd.

53rd CONGRESS ERA-EDTA VIENNA AUSTRIA MAY 21st-24th 2016

Hold jointly with Österreichische Gesellschaft für Nephrologie

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