

EVALUATION OF PROTEIN ENERGY WASTING AND INFLAMMATION ON CONTINUOUS AMBULATORY PERITONEAL DIALYSIS PATIENTS AND ITS CORRELATION.

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Background

Protein energy wasting and heightened inflammation are highly prevalent in CAPD patients and is a strong risk factor for morbidity and Mortality in these patients. Evaluation of Protein energy wasting, prevalence of inflammation as well as inter-relationship between various nutritional indices and inflammation has not been studied in much detail in CAPD patients.

Aim of the study

- Evaluation of Inflammation & Protein energy wasting in adults on CAPD by Clinical, Anthropometry, Biochemical and Bio impedance analysis method.
- To Correlate between inflammation and various other nutritional assessment indices

Methods

Sixty three CAPD patients (M=28, F=35) were assessed for their nutritional status and inflammation after minimum 3 months of CAPD initiation. Nutritional status was assessed by dietary diary, Anthropometry, Subjective global assessment, multi - frequency BIA and serum albumin, S.pre-albumin, S.transferrin, S.cholesterol. Inflammation was assessed by High - sensitivity C - reactive (hs - CRP > 3mg/l) and Interleukin-6 (IL-6 > 2 pg/ml). Based on different method, diagnosis of malnutrition was made. Correlation between inflammation and various other nutritional assessment indices were analyzed statistically.

Results

- Mean age of the patients was 57.6 years \pm 11.6 years. The average calorie and protein intake / Kg/ day were 25.5 \pm 4.6 Kcal and 0.81 \pm 0.2 gm respectively.
- The mean and standard deviation BMI(23.7 \pm 5), MAC(26.3 \pm 4.5)Cm, TST(1.624 \pm 0.4)Cm, MAMC(25.6 \pm 4.5), cMAMA(45.7 \pm 19.7), were respectively .
- The mean values of S.protein, S.Albumin S.Pre-albumin. S.Transferrin, S.Cholesterol, S. Triglyceride, hs-CRP and IL-6 were 5.9 gm/dl, 3.0 gm/dl, and 21.11 mg/dl, 130.6 mg/dl, 155.9 mg/dl, 136.1 mg/dl, and 8.8 \pm 7.6 mg/l and 8.4 \pm 12.2 pg/dl respectively.
- Based on SGA, 11/63 (17.4%); 34/63(54%); 18/65 (28.6%) ; S.albumin 13/63(21%); 39/63(62%):11/63(17%) : BMI 33/63(52%); 23/63(37%); 7/63(11%) percentage of CAPD patients had normal, moderate, severe malnutrition status respectively. 76.1% and 9.5% of CAPD patients were malnourished based on LTI and FTI respectively .
- Based on hs-CRP and IL-6, 70 % (44/63) and 71.8% (45/63) of CAPD patients were high inflammation respectively.

TABLE III: shows correlation of Inflammatory markers (Hs-CRP & IL-6) with various nutritional markers (p<0.05 is statistically significantly).

PARAMETERS	Hs-CRP	IL-6
KCal/kg/day	0.46	0.23
Protein/kg/day	0.02* (R= -0.28)	0.03 * (R= -0.28)
Body Mass Index	0.84	0.63
Mid Arm Circumference (Cm)	0.39	0.04 # (r _s = -0.25)
Tricipital Skinfold Thickness (Cm)	1.00	0.10
Mid Arm Muscle Circumference	0.27	0.04 # (r _s = -0.26)
Corrected Mid Arm Muscle Area	0.36	0.053
S.Phosphorous	0.11	0.79
S.Albumin	0.0006* (R=-0.42)	0.0498 *(R=-0.25)
S.PreAlbumin	0.04* (R=-0.26)	0.44
S.Transferrin	0.001* (R=-0.39)	0.004* (R= -0.36)
S.HCO3	0.44	0.11
S.Cholesterol	0.22	0.01* (R= -0.34)
hsCRP	1.0	<0.000001# (r _s = 0.7)
KT/V	0.51	0.55

*R = Pearson coefficient; r_s = Spearman constant

- High sensitive C - reactive protein (hsCRP) co-relates negatively (significantly) with S. Albumin, S.pre-albumin and S.transferrin: Interleukin -6 IL-6) co-relates negatively (significantly) with KCal/kg/day, MAC, MAMA, S.albumin, S. cholesterol and S.transferrin. There was significant positive correlation between hs-CRP and IL-6.

TABLE IV: shows mean and SD of various nutritional parameters of patient with and without inflammation and its significance. (p<0.05 is statistically significantly).

Parameters	Patient with Inflammation Mean \pm S.D	Patient without Inflammation Mean \pm S.D	P value
Total Calorie Intake Kcal /Day	1585.72 \pm 138.00	1435.51 \pm 218.19	0.17*
Total Protein Intake gm /Day	52.56 \pm 13.14	46.05 \pm 11.08	0.049*
Protein Intake gm/ Kg/Day	0.89 \pm 0.17	0.78 \pm 0.14	0.01*
Body Mass Index	23.72 \pm 4.54	23.68 \pm 5.16	0.95#
Mid Arm Circumference (Cm)	26.81 \pm 4.14	26.11 \pm 4.61	0.44#
Tricipital Skinfold Thickness (Cm)	1.68 \pm 0.43	1.60 \pm 0.43	0.45#
Mid Arm Muscle Circumference	26.28 \pm 4.02	25.30 \pm 4.63	0.30#
Corrected Mid Arm Muscle Area	47.95 \pm 17.32	44.74 \pm 20.70	0.37#
B. Hemoglobin	10.86 \pm 1.45	10.14 \pm 1.59	0.10*
B.Urea(mg/dl)	99.33 \pm 29.81	92.08 \pm 28.68	0.48#
S.Creatinine(mg/dl)	6.27 \pm 2.11	6.62 \pm 2.01	0.55*
S. Potassium(mg/dl)	4.49 \pm 0.53	4.53 \pm 0.54	0.79*
S. Phosphorous (mg/dl)	4.88 \pm 1.29	4.70 \pm 1.05	0.56*
S. Protein (gm/dl)	6.18 \pm 0.57	5.81 \pm 0.69	0.049*
S. Albumin (gm/dl)	3.20 \pm 0.41	2.88 \pm 0.46	0.03#
S.Prealbumin(Mg/Dl)	23.12 \pm 6.53	22.64 \pm 6.16	0.78*
S.Transferrin (mg/dl)	149.67 \pm 34.70	126.24 \pm 34.85	0.02*
S. Hco3 (mmol)	20.12 \pm 2.65	19.31 \pm 2.81	0.27#
S. Cholesterol (mg/dl)	171.50 \pm 28.45	149.64 \pm 40.93	0.04*
S.Triglycerides (mg/dl)	139.06 \pm 27.98	134.84 \pm 36.94	0.66*
Lean Tissue Index kg/m ²	9.03 \pm 2.11	9.86 \pm 2.53	0.36#
Fat Tissue Index kg/m ²	11.19 \pm 4.95	9.87 \pm 4.49	0.31*
Lean Tissue Mass (Kg)	22.88 \pm 6.82	25.08 \pm 7.01	0.26*
FAT	27.83 \pm 12.72	24.41 \pm 9.86	0.26*
Phase Angle	3.71 \pm 0.61	3.58 \pm 0.72	0.50*

- Mann-Whitney test; * - t-test

There is statistically significant difference in Total Protein Intake gm / Day, Protein Intake gm/ Kg/Day, S. Protein (gm/dl), S. Albumin (gm/dl), S.Transferrin (mg/dl) and S. Cholesterol (mg/dl) between patients with and without inflammation

Figure: I

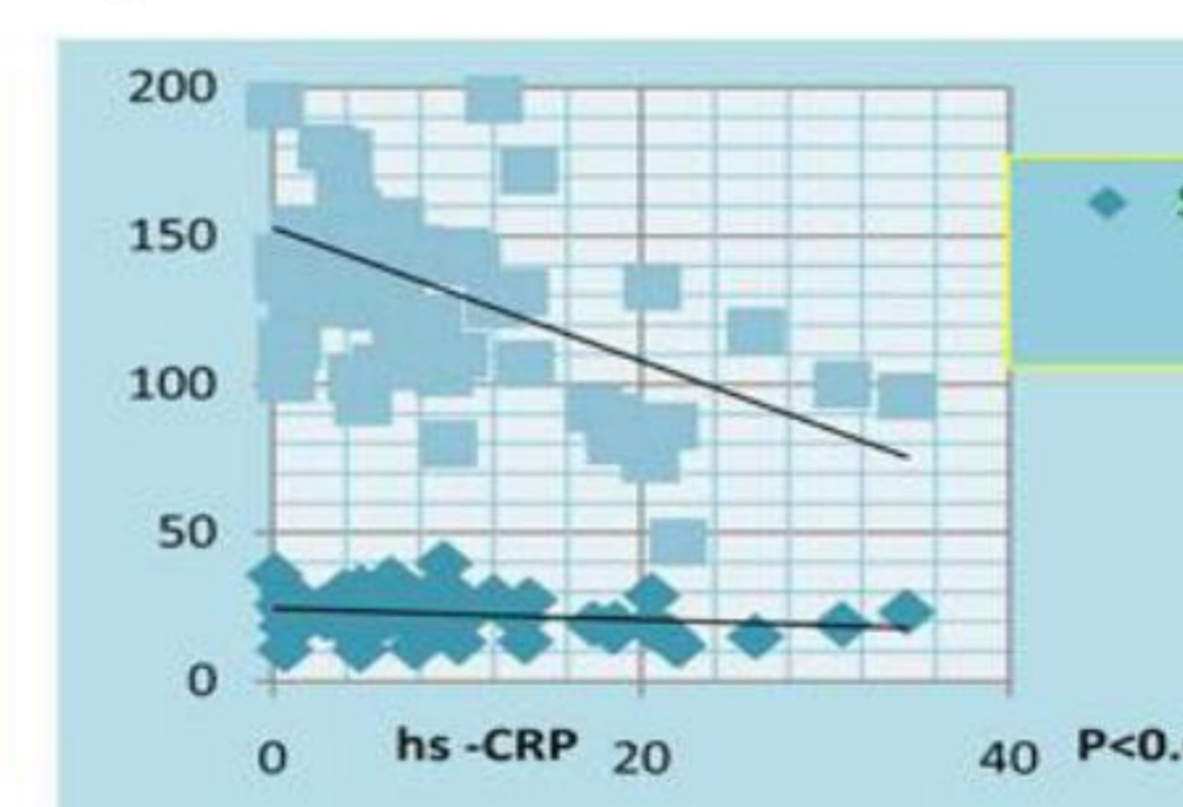


Figure: II

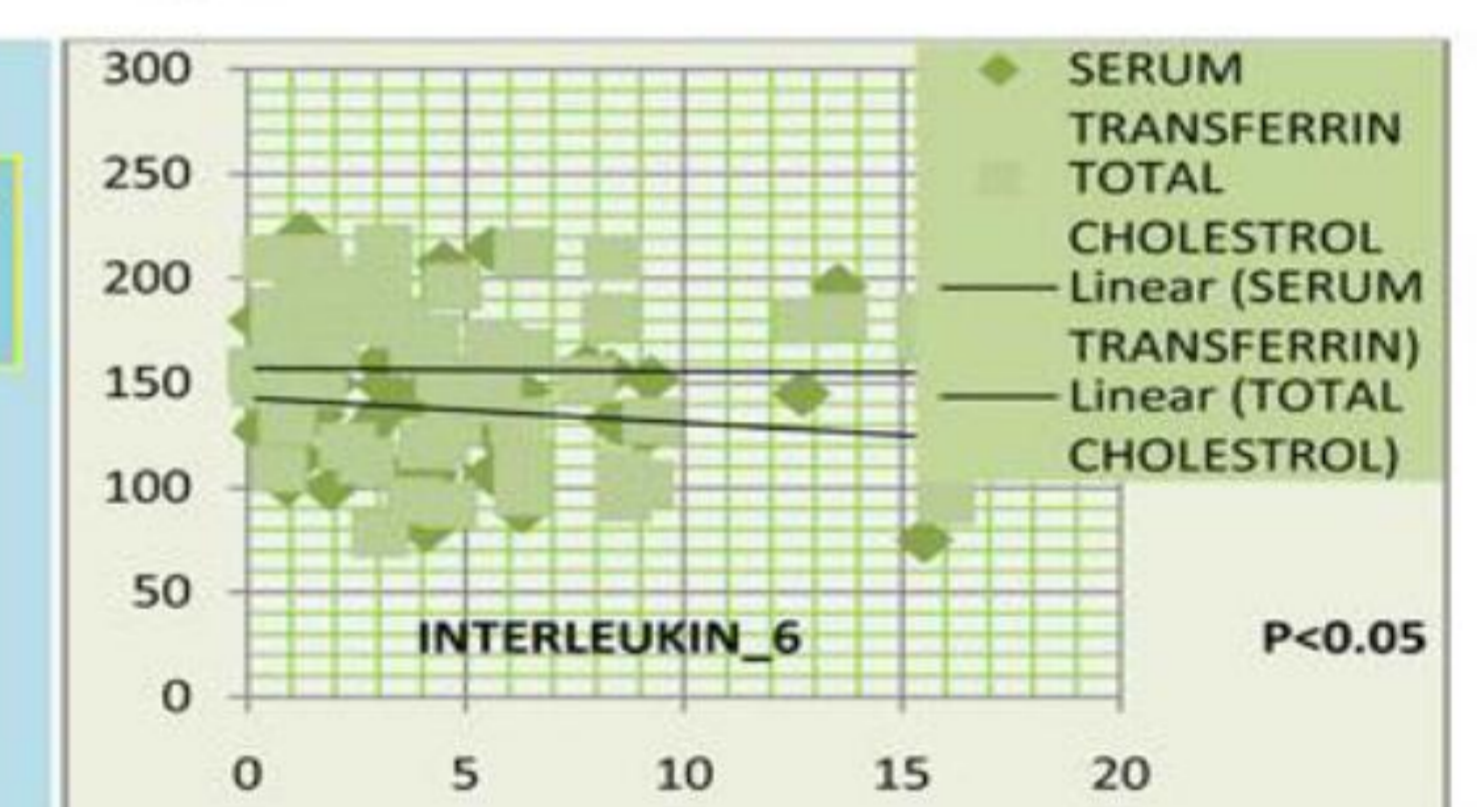


Figure: III

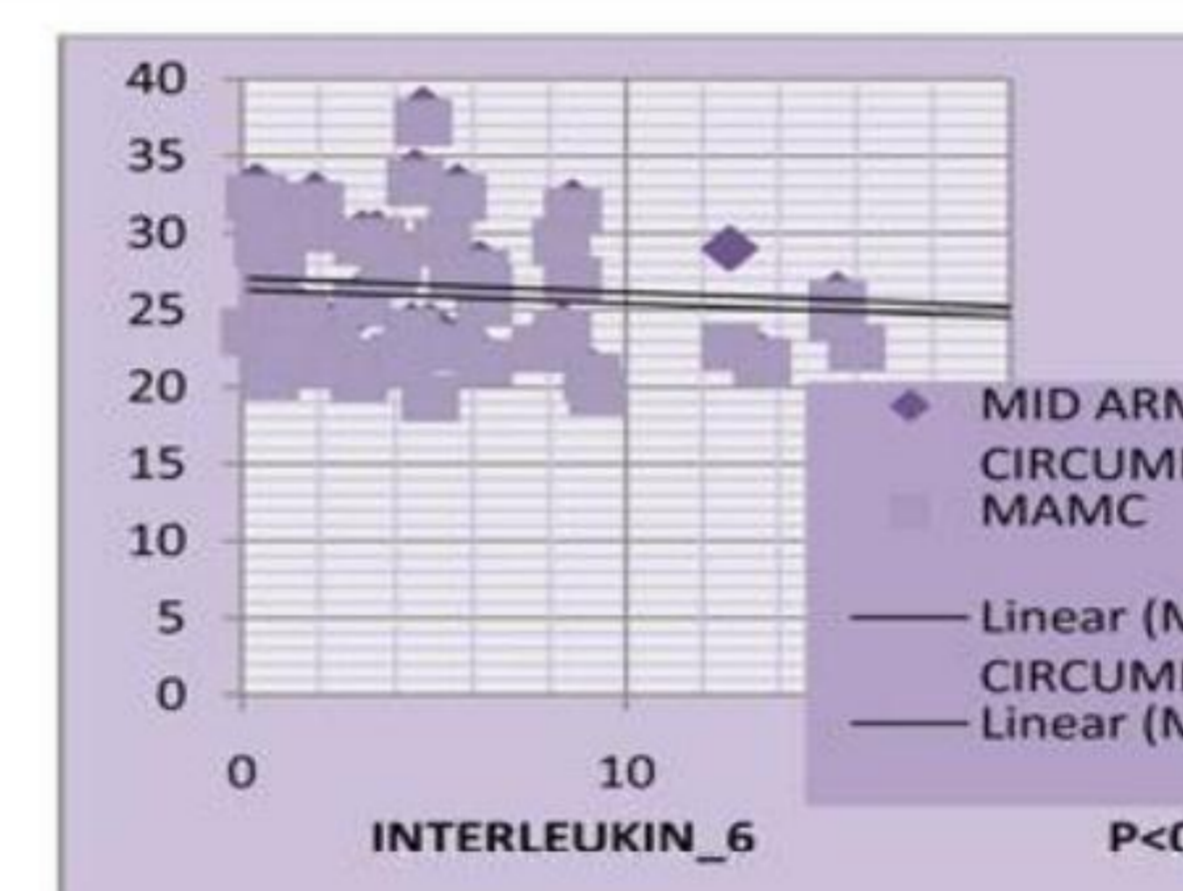
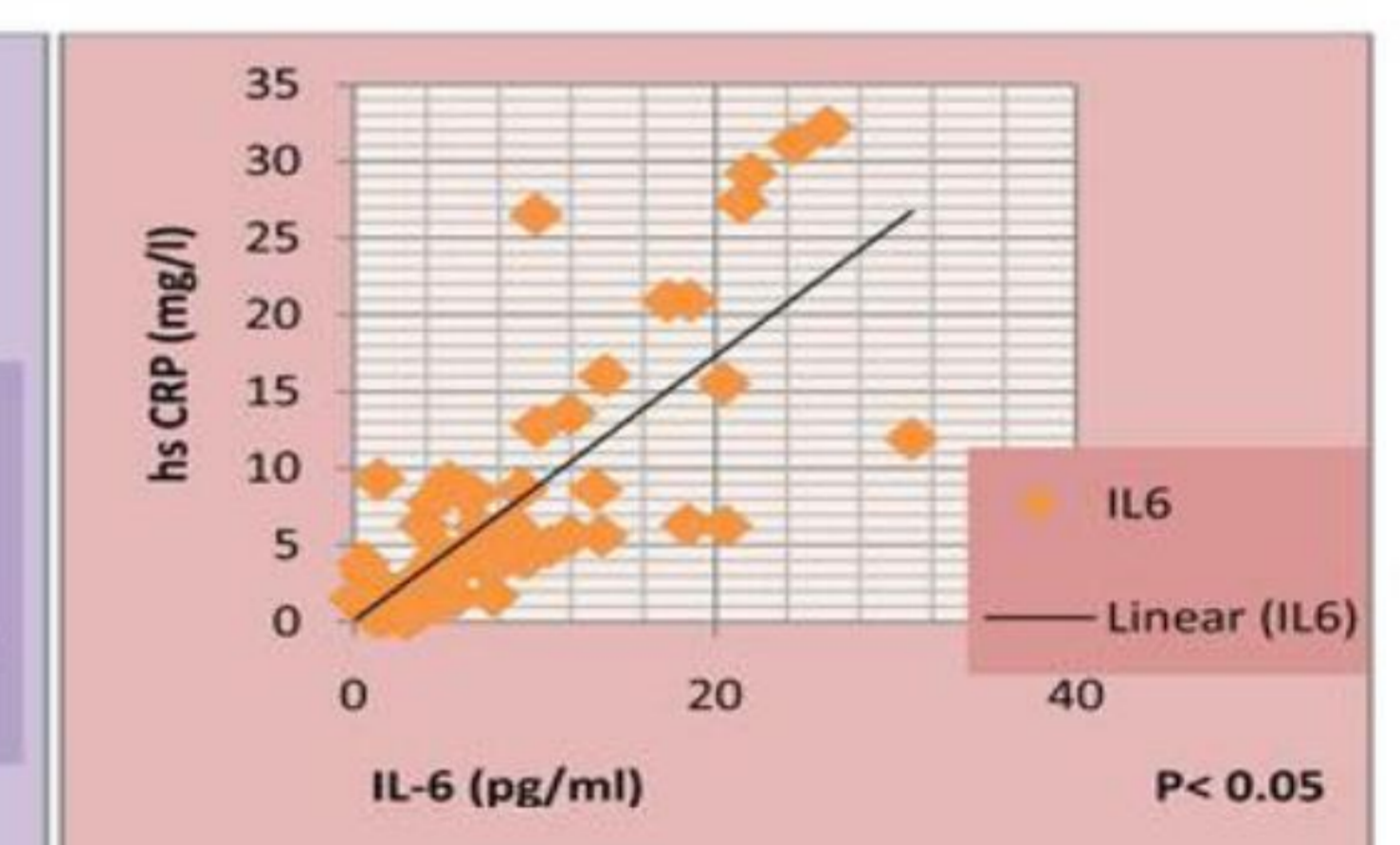


Figure: IV



Scatter dot diagram shows (Fig: I) hsCRP correlates negatively (significantly) with S. Prealbumin and S.transferrin (Fig: II) IL-6 co-relates negatively significantly with S.Cholesterol and S.transferrin (Fig: III) IL-6 co-relates negatively (significantly) with MAC and MAMC (Fig: IV) IL-6 correlates positively with hs-CRP

Conclusions

- Protein energy wasting (80-85%) by various methods and inflammation (70%) was very highly prevalent among CAPD patients.
- Inflammatory markers shown significant negative correlation with Anthropometry and serological markers.
- Inflammatory markers should be included in the regular assessment of CAPD patients, for the better management of protein energy wasting.

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