Biochemical Parameters in Detecting Malnutrition and Inflammatory Markers in CAPD Patients

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Abstract	Original Research Article

Background: The nutritional status of dialysis patients can be determined by biochemical Parameters, anthropometry, protein catabolic rate, and body composition methods. Over the past decade, various nutritional parameters have emerged. *Objective:* The aim of the study was evaluation of biochemical parameters in detecting Malnutrition and Inflammatory Markers in CAPD Patients. *Methods:* The cross-sectional study was conducted in the Department of Nephrology of National Institute of Kidney Diseases and Urology, Dhaka, Bangladesh to Detect Malnutrition and Inflammatory Markers in CAPD Patients. They were identified based on hospital registry and Peritoneal Dialysis service provider. 69 cases were randomly selected for the study. Clinical examination and evaluation were done from July 2018 to June 2019. Other necessary investigations were done if clinically indicated. Statistical analysis of the results was obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-22). *Results:* Out of 69 patients 39 were male (56.5%) and 30 were female (43.5%). 49.3% were diabetic, 30.4% had GN, 15.2% had HTN & 2.9% had OU & 1.4% had PKD. Mean Hb of Patients were 9.48 ± 1.77 (g/dl). Mean S Creatinine was 9.32 ± 3.94 (mg/dl). Mean CRP was 23.73 ± 26.67. Mean Albumin was 3.11 ± 0.60 (mg/dl). Mean Prealbumin was 0.30 ± 0.11 (ng/ml). Mean TIBC was 165.8 ± 59.5. S-albumin & S-prealbumin was significantly lower in patients with higher MIS-score (>5). *Conclusion:* Biochemical parameters and inflammatory markers significantly correlate with malnutrition among patients on CAPD.
Keywords: Biochemical Parameters; Malnutrition; Inflammatory; Peritoneal dialysis.

INTRODUCTION

Continuous ambulatory peritoneal dialysis (CAPD) is one of the therapeutic options at End-Stage Renal Disease. Despite potential advantages, Peritoneal Dialysis is an underutilized modality in low- and middle-income countries. CAPD is the treatment used for approximately 11% of the world's dialysis population [1]. Bangladesh has a PD penetration of

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fewer than 2% of prevalent patients [2]. Because of its relative simplicity, patient freedom, lower cost and better preservation of renal retention function, CAPD utilization is gradually increasing in the developing countries [1].
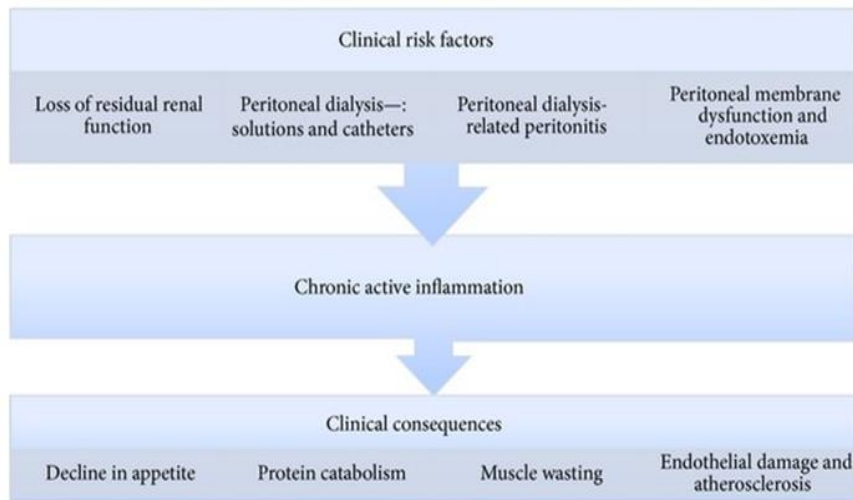

Fig-1: Clinical risk factors of inflammation in Peritoneal dialysis patients.

Inflammation can be defined as a localized protective response elicited by injury or destruction of tissues that serves to destroy, dilute, or sequester both the injurious agent and injured tissue. Hence, it is a physiological response and in the form of an acute response to infections, trauma, or toxic injury, it helps the body to defend against pathophysiological insults. However, if inflammation becomes prolonged and persistent in the form of the so called chronic acute-phase reaction, it may lead to adverse consequences, such as decline in appetite, increased rate of protein depletion in skeletal muscle, hypercatabolism, endothelial damage, and atherosclerosis [3].

In Bangladesh periodic nutritional assessment of patients on CAPD is seldom carried out. Regular assessment of nutritional status and inflammatory condition may reduce mortality and morbidity and bring long term better outcome. There are very few studies related to CAPD patients. No up-to-date data is available regarding the nutritional status and inflammatory condition of patients on CAPD which is an important cause of mortality and morbidity. This study has shown nutritional status of CAPD patients and inflammatory condition which can be assessed simply by using malnutrition inflammation score and help in further management of CAPD patients for long term better outcome. This study will also be helpful for future study with CAPD population.

OBJECTIVE

The aim of the study was evaluation of biochemical Parameters in Detecting Malnutrition and Inflammatory Markers in CAPD Patients.

METHODS

The cross-sectional study was conducted in the Department of Nephrology of National Institute of Kidney Diseases and Urology, Dhaka, Bangladesh to Detect Malnutrition and Inflammatory Markers in CAPD Patients. They were identified based on hospital registry and Peritoneal Dialysis service provider. 69 cases were randomly selected for the study. Clinical examination and evaluation were done from July 2018 to June 2019. Inclusion criteria were Age group ≥ 18 years and End-Stage Renal Disease patients on CAPD for > 1 month. On the other hand, exclusion criteria were episodes of peritonitis in earlier 1 month, Patient with cognitive impairment and Terminally ill patients. Other necessary investigations were done if clinically indicated. Statistical analysis of the results was obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-22).

RESULTS

Mean age of patients is 58.3 ± 13.7 years. Mean BMI is (kg/m2) 26.1 ± 4.0. Mean Systolic BP is 140 ± 21 (mmHg). Mean Diastolic BP is 83 ± 11 (mmHg). Mean is MAC 25.94 ± 3.99. Mean Waist is 91.99 ± 8.92 CM. Mean Hip is 99.06 ± 8.04 CM. Mean WH ratio is 0.93 ± 0.08. Mean Biceps skinfold thickness is 3.83 ± 2.62. Mean Triceps skin fold thickness is 9.74 ± 5.14. Mean Duration of dialysis is 9.75 ± 14.7. Out of 69 patients 39 were male (56.5%) and 30 were female (43.5%). 49.3% were Diabetic, 30.4% had Glomerulonephritis, 15.2% had Hypertension & 2.9% had Oculus Uterque & 1.4% had Polycystic kidney disease. Mean Hb of Patients were 9.48 ± 1.77 (g/dl). Mean S Creatinine was 9.32 ± 3.94 (mg/dl). Mean CRP was 23.73 ± 26.67. Mean Albumin was 3.11 ± 0.60 (mg/dl). Mean Prealbumin was $0.30 \pm$

0.11 (ng/ml). Mean TIBC was 165.8 ± 59.5. S-albumin & S-parvalbumin is significantly lower in patients with higher MIS-score (>5).

Table-1: Demographic Profile of the patients (n=69).

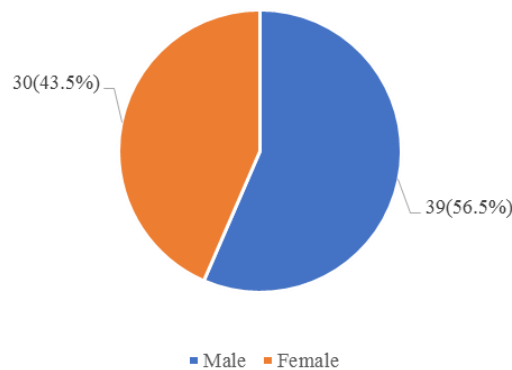| Variables	Mean ± SD	Min - max
Age (year)	58.3 ± 13.7	19 - 89
BMI (kg/m2)	26.1 ± 4.0	14.4 – 35.0
Systolic BP (mmHg)	140 ± 21	100 - 180
Diastolic BP (mmHg)	83 ± 11	40 – 110
MAC	25.94 ± 3.99	11.00 - 32.00
Waist	91.99 ± 8.92	60.96 - 106.00
Hip	99.06 ± 8.04	71.12 - 121.92
WH ratio	0.93 ± 0.08	0.71 - 1.05
Biceps	3.83 ± 2.62	1.10 - 12.70
Triceps	9.74 ± 5.14	1.50 - 25.20
Duration of dialysis	9.75 ± 14.7	0.5 - 88

Fig-2: Demonstrate and distribution of the study according to sex.

Table-2: Demonstrate and distribution of the study according to primary diseases.

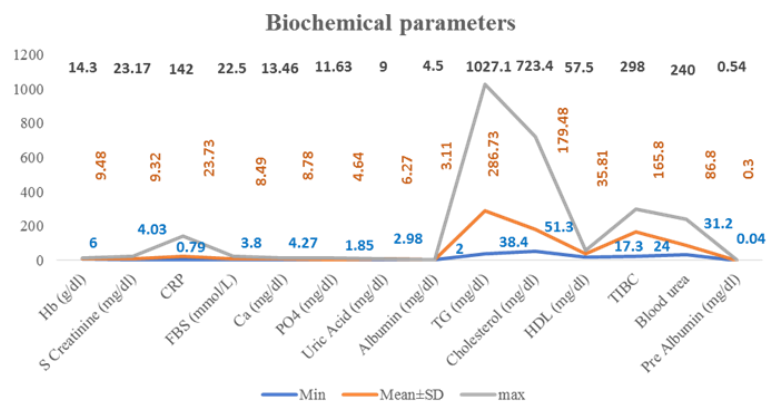| Primary diseases	n=69	%
Diabetes mellitus	34	49.3
Glomerulonephritis	21	30.4
Hypertension	11	15.9
Obstructive Uropathy	2	2.9
Polycystic kidney disease	1	1.4
Total	69	100

Fig-3: Biochemical parameters of the patients (N=69)

DISCUSSION

We examined the nutritional status & inflammatory markers of CAPD patients and also observed the correlation of MIS with several nutritional variables and Inflammatory markers like hsCRP, TIBC, prealbumin, albumin and BMI.

In this study, among 69 patients 56.5% were male & 43.5% were female. Which indicates, the male patients are predominately receiving CAPD. In a study, among 90 patients 51% was male and 49% was female [4].

A study shows Primary cause of CKD was unknown in 41% of patients, followed by DM 33%, HTN 11%, others 14% [4]. But in our study, primary disease was DM in 49.3% cases followed by GN 30.4%, HTN 15.9% and OU 2.9% cases. So, there are more diabetic patients who developed CKD & ESRD and underwent to CAPD. Even percentage of GN is also higher as primary disease.

In this study 78.3% were malnourished. An Indian study shows 74.9% of Indian CAPD population were malnourished [5]. Which is consistent with our study. MIS cut-off score ≥ 5, indicates the presence of malnutrition patients. Sensitivity value of MIS was 82% in PD patients [4]. Prevalence of malnutrition among Malaysian CAPD population was about 90%. Our study result was found to be similar with Indian study [4].

Mean value of MIS in this study was 11.2 ± 4.7. MIS of 50 CAPD patients was 8.1 ± 5.0. which was done in Turkey study [6]. In comparison to that study our PD patients are higher scorer. But in both studies, in an average patient are malnourished as they are scoring (MIS) ≥5. Different variables were compared between nourished and malnourished patients like age, BMI, MAC, waist, hip, biceps skin fold thickness, triceps skin fold thickness, duration of dialysis, S. albumin, prealbumin, CRP, nPCR, Kt/V, out of which albumin and prealbumin showed significant difference. All the variables were compared between male and female in which WH ratio was significantly lower in female patients. Biceps skin fold thickness was also low in female patients. S. TG and cholesterol value is significantly higher in female patients.
Malnutrition inflammation score was higher among CAPD patients in our country. There was also significant negative correlation of albumin, prealbumin, BMI and TIBC with MIS. hsCRP had significant positive correlation with MIS. So, MIS can be used as a useful tool to detect malnutrition and inflammatory condition among CAPD patients.

LIMITATION OF THE STUDY

This was a cross-sectional study with a small sized sample. So, the findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION

According to the study findings biochemical parameters and inflammatory markers significantly correlate with malnutrition among patients on CAPD. The obtained results indicate that irrespective of the etiology malnutrition is associated with a greater risk of inflammation.

RECOMMENDATION

This study can serve as a pilot to a much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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