Available on line www.jocpr.com

Journal of Chemical and Pharmaceutical Research

J. Chem. Pharm. Res., 2010, 2(4):398-404

ISSN No: 0975-7384
CODEN(USA): JCPRC5

The assessment of etiology in with end – stage renal disease adult hemodialysis patients and blood serum albumin levels

Yazar H[1], Gocmen Y[2]

[1]*Bozok University Medicine Faculty, Biochemistry Department, MD, PhD*
[2]*Bozok University Medicine Faculty, Biochemistry Department, PhD.*

ABSTRACT

Hemodialysis is a commonly used treatment for renal failure when a kidney has lost its ability to regulate fluids, electrolytes, acid/base balance and toxin removal from the blood. It helps the kidneys to excrete wastes and maintains the electrolyte balance in approximately 90% of end – stage renal disease (ESRD) patients. Albumin consists of one polypeptide chain of 585 amino acids and contains 17 disulfide bonds. Hypoalbuminemia is associated with mortality in patients with ESRD and maintaining optimum albumin levels is crutial in on hemodialysis (HD). In this study, we ***aimed*** *to group ESRD patient having hemodialysis treatment in accordance to their etiology and investigate their blood albumin levels.* ***Methods:*** *This study etiology groups prevalent causes and groups the blood level albumin was designed to evaluate the long term hemodialysis treatment with in patients who are end-stage renal disease. In this retrospective study an annual 73-3=70 adult with end – stage renal disease accepted for renal replacement therapy (included 70 patients because 3 patients not used 4. criteria). The private hemodialysis center was analyzed % for the totally period 24 month and annual numerical. All the patients' permissions have been taken. The data were compared with National Hemodialysis, Transplantation and Nephrology of the dialysis and transplantation Registry Report of Turkey, 2008. The etiology of ESRD has been determined in eight groupsasfollows: 1: the etiology was undetermined 2.: hypertensive patients, 3: patients with type II diabetes mellitus, 4.: patients with familial Mediterranean fewer, 5.: patients with polycystic kidneys, 6.: patients with uropathy, 7.: patients with chronic pyelonephritis, 8.: patients with other etiology causes.* ***Results:*** *Our study has shown, in a two – year study of annual 73-3 = 70 adult patients with end – stage renal disease in hemodialysis center. The first etiology groups, 24 month totally incidence (%); 16.5 % was undetermined (n=11), the second group: 19.9 % (n=14), 3.group: 38.9 % (n=27), 4.group: 4.3 % (n=3), 5.group: 6.7 % (n=5), 6.group: 3.7 % (n=3), 7.group: 1.7 % (5), 8.group: 8.3 % (n=2), etiology causes was accounted. Serum albumin levels were found in minimal in group 3 (3.76 g/dl) and maximum in group 5 (4,15 g/dl).* ***Conclusion:*** *Patients*

with type II Diabetes mellitus and hypertension were found to be the principal causes of end-stage renal disease. On the other hand obesity was less seen as in developed countries.
Key words: Albumin, Etiology, End – stage renal disease.

INTRODUCTION

The sudden and temporary inability of a kidney to remove excess bodily fluid, minerals and can be the result of a surgical procedure, trauma or poisoning. Patients are often extremely catabolic, generating toxins at a much faster rate than those with chronic renal failure. In this circumstance, acute inpatient therapy is required and patients receiving renal replacement therapies until kidney function returns. Also known as end-stage renal disease (ESRD), it is the slow, progressive and permanent inability of a kidney to remove excess bodily fluid, minerals and wastes. Hemodialysis or transplant is required to maintain life and the condition affects more than 400,000 people in the U.S. Hemodialysis is the most commonly used method to treat kidney failure with approximately 90% of ESRD dialysis patients in the U.S. receiving this treatment (1). Using a machine and artificial kidney to remove toxins and water from a patient's blood, patients receiving hemodialysis typically travel to a dialysis clinic three times per week for 4 hours per session. Dialysis is usually used when a kidney is working at just 10 to 15 percent or less of its capacity. Hemodialysis patients were occurred malnutrition that resulted in hypoalbuminemia and loss of lean body mass in patients with end-stage renal disease (ESRD) is the most important predictor of mortality and morbidity. Poor nutritional status in ESRD is a consequence of anorexia, increased resting energy expenditure and disproportionate increase in protein catabolism resulting from activation of the inflammatory flow and proteolytic pathways and modified adipokine/neuropeptide signaling. In addition, enteropathy, medications, psychosocial conditions, underlying illness, taste abnormalities, loss of dentures, gastropathy and hemodialysis-related factors are some of the most frequent and important causes of malnutrition in hemodialysis patients. In spite of the fact that renal replacement therapy reduces in intensity some of the metabolic abnormalities, intradialytic amino acid deprivation and cytokine activation induce muscle protein catabolism and acute phase protein synthesis (2). Albumin has an ellipsoidal form, that means it does not intensify the viscosity of the plasma to the same extend and length of a molecule as an example of fibrinogen (protein which is converted into fibrin during the clotting of blood, coagulation factor I) does. Due to the fact that its comparatively level which is below what is normal molecular weight (approximately 69KDa) and elevated concentration, it is product of the mind to be dependable for 75-80 % of the osmotic pressure of human plasma. (3) Albumin (figure 2) (69 kDa) is the major protein of human plasma and makes up approximately % 60 of the total plasma protein. The liver derivates approximately 12 g of albumin per day, representing about 25% of total hepatic protein synthesis and half its discharged protein. Albumin is at the beginning synthesized as a preproprotein. Its signal peptide is removed as it passes into the cisternae of the become rough endoplasmic reticulum, and a hexapeptide at the resulting amino terminal is subsequently separated off farther along the secretary series of reactions that results in one substance being transformed into another (3). Serum albumin concentration is concluded by its rate of synthesis, by the catabolic rate constant (the fraction of the vascular pool catabolized per unit time), by external destruction, and by redistribution from the vascular to the extravascular space. Thus, ESRD does not immediately fallowing directly prevent from being disclosed suppress albumin synthesis. The rate of albumin synthesis is inversely proportional to the serum concentration of one potential acute phase protein (alpha2 macroglobulin), and albumin concentration is inversely proportional to that of either C-reactive protein or serum amyloid A in both HD patients. The cause of decreased albumin synthesis is primarily a response to inflammation (the acute phase response), in spite of

the fact that, although it is might be that unsatisfactory nutrition may also contribute. The reason of the inflammatory response is not right away evident. There exists is no show to be true in order for substitutions of albumin to the outside of blood vessels, extravascular space or that dilution which has been thinning of the plasma by volume expansion plays any role in causing hypoalbuminemia in ESRD patients. Hypoalbuminemia is a major risk factor for morbidity and mortality in hemodialysis adult patients. The proximate cause of hypoalbuminemia is in all likelihood responsible for this occurrence, and not the hypoalbuminemia itself. Because protein-calorie malnutrition decreases albumin synthesis, hypoalbuminemia has been attributed to poor nutritional intake resulting from under dialysis. In what way, serum albumin level is concluded by several other factors: plasma volume expansion, albumin redistribution, exogenous loss, increased fractional catabolic rate (FCR), and decreased synthesis (4). Decreased albumin synthesis is primarily responsible for hypoalbuminemia in hemodialysis (HD) patients (3). In place of, cytokines and positive acute-phase reactants, cultivated in response to inflammation, have been identified as important contributors to hypoalbuminemia in dialysis patients. However, the acute-phase response and malnutrition are closely interrelated, because inflammatory mediators also suppress appetite, increase muscle catabolism, and result in progressive cachexia. It is thought that amounts of the other plasma proteins increase and compensate for the lack of albumin. Hypoalbuminemia is associated with mortality in patients with end-stage renal disease (ESRD) maintained either on hemodialysis (HD). Hypoalbuminemia in dialysis patients is primarily a consequence of reduced albumin synthesis rate HD patents. In clinical studies in the all adult patients, hemodialysis was shown to be effective in reducing blood albumin level without causing significant etiology. Our study aimed primarily, determine the etiology causes in ESRD adult hemodialysis patients and the group them in accordance to these etiologies. Our second aim, is to measure the blood albumin levels and compare in different etiology groups to determine the most effected ESRD groups.

Methods

Hemodialysis is the most commonly used method to treat chronic kidney failure with approximately 90 % (in Turkey 73 %) (6) of ESRD dialysis adult patients in the US receiving this treatment in the week three sessions and every session four hours (1). The represented work has been studied in 73-3=70 adult patients with end – stage renal disease, accepted for hemodialysis therapy (criteria 70 patients, 3 patients not used for 4. criteria). The private hemodialysis center (Private Hemodialysis Center in KONYA, TURKEY) has analyzed them for between 2007 – 2009 (24 month). This assessment of 24 month have reported as % and in addition, the datum have been analyzed that annual numerical in all the groups' datum. All the patient bloods were taken pre-hemodialysis. All the etiology groups were evaluated statistically for blood albumin levels. Efficacy analyses were performed on all the patients adult who achieved 24 months and all data archived in hemodialysis center. Furthermore the datum was compared with National Hemodialysis, Transplantation and Nephrology of the dialysis and transplantation Registry Report of Turkey, 2008.

Criteria to be included to this work (All the patients permissions have been taken):
1.being an adult patient, no pediatric patients
2.being a hemodialysis patients, no peritoneal patients
3. Accepted to treatment three sessions in the week and each session minimal four hours
4. Accepted to special training with chronic renal failure diets.

All the patients' etiology of ESRD was determined in eight groups as; 1.group: the etiology was undetermined 2. group: patients with hypertension, 3.group: patients with type II diabetes mellitus, 4.group: patients with familial Mediterranean fewer, 5.group: patients with polycystic

kidneys, 6.group: patients with uropathy, 7.group: patients with chronic pyelonephritis, 8.group: patients with others etiology causes (malignant, e.t.c). Furthermore blood albumin levels were determined in all the groups. All the patient's bloods were taken prehemodialysis and centrifuged in 30 minutes. The blood serum has been analyzed by Vitros FS 5.1, Vitros 950 apparatus and Abott Architect 2000 SR in with Beckman Coulter Access 2.

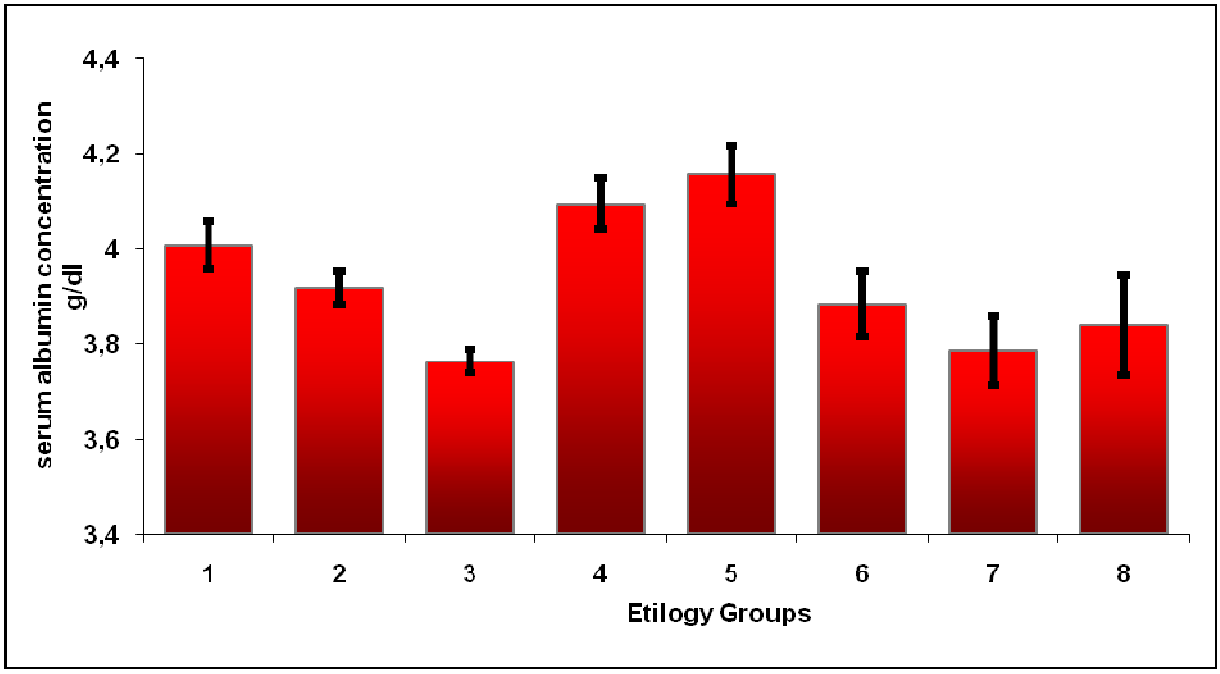
RESULTS AND DISCUSSION

Our study has shown, in a two – year study of annual 73-3=70 adult patients with end – stage renal disease in our hemodialysis center (3 patients were not used for 4. criteria). The etiology of ESRD was determined in eight groups. At the 24 month, the first etiology group's total incidence was 16.5 % undetermined, the second group: with hypertension has been seen in 19.9 %, 3.group: type II diabetes mellitus on the other word diabetic nephropathy in 38.9 %, 4.group: familial Mediterranean fever on the other word renal amyloidosis in 4.3 %, 5.group: polycystic kidneys in 6.7 %, 6.group: concerning urology causes on the other word uropathy in 3.7 %, 7.group: in with chronic pyelonephtitis ESRD patients in 1.7 %, 8.group: the other etiological causes, malignance and e.t.c in 8.3 % patients. According to the Registry Report of Turkey, 2008, the etiology incidinces in hemodialysis patients (as %)were as follows; diabetes mellitus 30.7 % (type I DM 6.3 % and type II DM 26.6 %), hypertension 26.6 %, chronic glomerulonephhritis 7.6 %, polycystic renal diseases 3.5 %, pyelonephtitis 3.1 %, amyloidosis 1.9 %, renal vascular disease 1.4 %, other causes 7.5 %, etiology unknown 15.5 %, messing data 2.2 % has been accounted. All groups were numerically analyzed annually; 1.group: 11 adult hemodialysis patients 2.group: 14 patients, 3.group: 27 patients, 4.group: 3 patients, 5.group: 5 patients, 6.group: 3 patients, 7.group: 5 patients, 8.group: 2 patients. The serum albumin levels of the groups were determined as 24 month totally incidence (%); and found to be; 16.5 % undeterminedin the first group, the second group: 19.9 %, 3.group: 38.9 %, 4.group: 4.3 %, 5.group: 6.7 %, 6.group: 3.7 %, 7.group: 1.7 %, 8.group: 8.3 % accounted for their etiology causes. The datum which all the groups were numerical analyzed an annual; 1.group: 11 adult hemodialysis patients 2.group: 14 patients, 3.group: 27 patients, 4.group: 3 patients, 5.group: 5 patients, 6.group: 3 patients, 7.group: 5 patients, 8.group: 2 patients. Our study furthermore, compared statistically according to distribution of 8 independent groups. The serum albumin levels has been not similarity determined in all the patients groups (table1, table2, figure1, value statistically, $p<0, 05$). These results on the other word this realties in consequently has shown, the importance of serum albumin in some groups (group3, group7 and group6) and hand less important other groups (group5, group4 and group1). This and similar researches have reported the importance of type II Diabetes mellitus and hypertension as the principal causes of end- stage renal disease (America, Europe, Turkey) (8,9,10,11,12,13). Our study has shown that, diabetic nephropathy and hypertension is the primary causes of ESRD. All these assessments resemble each other with national hemodialysis, transplantation and nephrology of the dialysis and transplantation registry report of Turkey, Europe, USA, 2006 - 2008. But in a similar analysis with ESRD in AFRICA (Nigeria), in a ten – year study of 368 patients, the etiology was ascertained, hypertension accounted for 61% and diabetes mellitus for 11%. This explains metabolic syndrome in the undeveloped regions like Africa which have the syndrome less seen. On the other hand obesity is rare at these regions while is common in developed countries (5). Our study also indicated remarkable changes in serum albumin levels in different etiology groups (table1, table2, figure2)

Table 1: The blood levels albumin (g/dl) in ESRD patients having hemodialysis treatment, grouped according to etiology of prevalent causes.

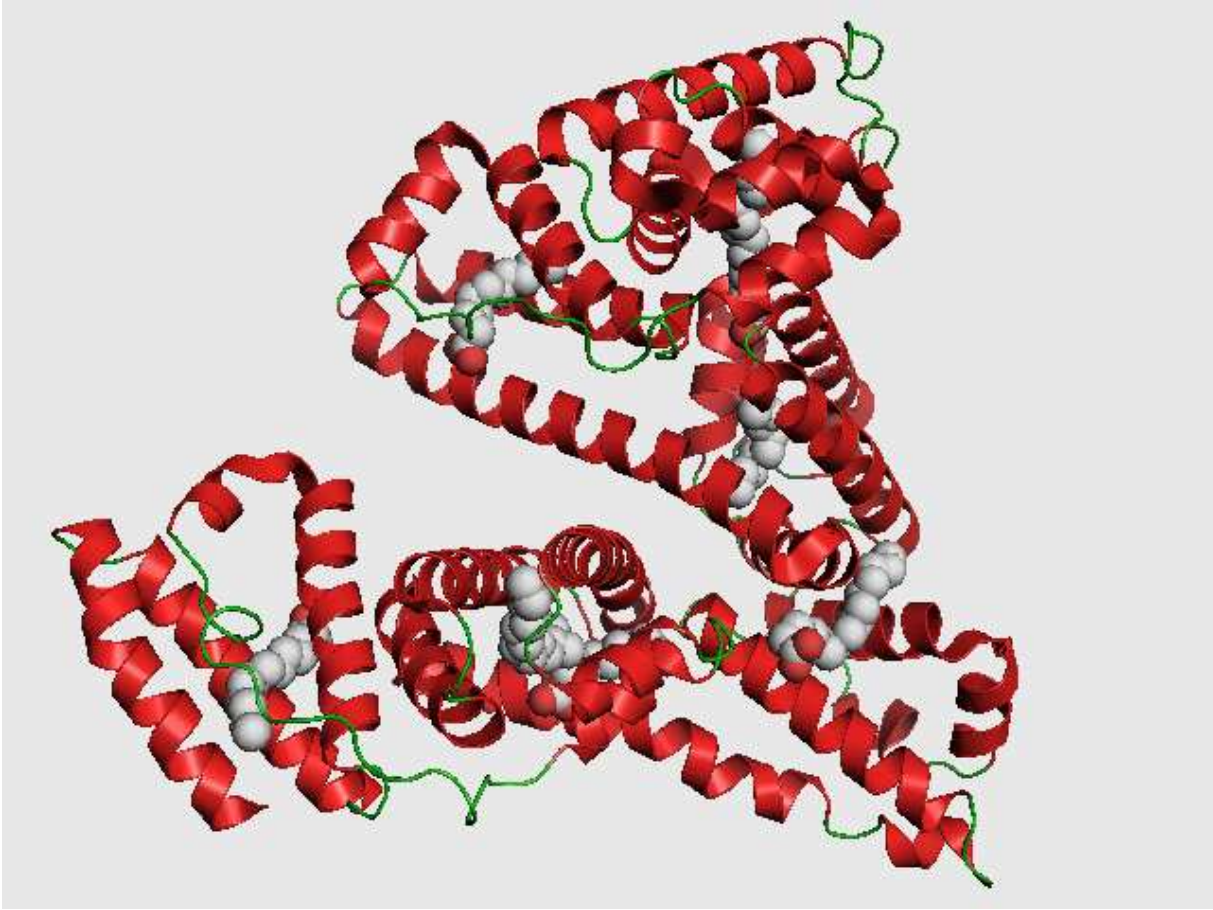
Etiology	N (annual)	Albumin g/dl	Std. Deviation	Std. Error	Minimum	Maximum
1	11	4,0067	0,58911	0,05070	2,90	9,00
2	14	3,9182	0,44273	0,03447	3,10	5,80
3	27	3,7643	0,42870	0,02378	2,50	6,00
4	3	4,0944	0,31977	0,05330	3,30	4,60
5	5	4,1554	0,46979	0,06278	3,30	5,30
6	3	3,8839	0,38566	0,06927	2,90	4,60
7	5	3,7857	0,26849	0,07176	3,30	4,30
8	2	3,8391	0,87753	0,10564	1,90	6,40

The blood levels albumin (g/dl) in ESRD patients having hemodialysis treatment, grouped according to etiology of prevalent causes.



1: The etiology was undetermined, 2: hypertensive patients, 3: patients with type II diabetes mellitus, 4: patients with familial Mediterranean fewer, 5: patients with polycystic kidneys, 6: patients with uropathy, 7: patients with chronic pyelonephritis, 8: patients with other etiology causes ($p<0.05$ among 8 groups).

Figure 2: **Human albumin, with bounded molecule 6 palmitic acid.**



Description: The structure of ALB complexed with 6 palmitic acid molecules (from PDB 1E7H) Author: BorislavMitev-borislav_mitev@hotmail.comPrograms:PyMOLSource: http://en.wikipedia.org/w/index.php?title=Image:ALB_structure.png&action=edit [[Cat)

CONCLUSION

Patientswith ESRD must ben protected against hypoalbuminemia in diet (with consumption of more eggs, e.t.c), because it is the most important predictor of mortality and morbidity in ESRD patients.

Acknowledgement
We would like to thank, Ass Prof. Dr. Esef Bolat, Md Cahit B Kayhan, Prof.Dr. Sadık Buyukbas for their support to our work.

REFERENCES

[1] L. A. Szczech, D. N. Reddan, P. S. Klassen et al. *Dial. Transplant*.**2003**; 1 18(8): 1585 – 1591.
[2] Yazar H, Basaralı M K, Pekgör A, Polat M, Buyukbas S, *Journal of Medicine Education Periodical Sourches.* **2009**; 49, (4):246-251.
[3] M. Allon, T. A. Depner, M. Radeva *et al. J. Am. Soc. Nephrol*. **2003**, 1, 14(7); 1863 – 1870.
[4] N. Joki, H. Hase, Y. Tanaka *et al.* Relationship between serum albumin level before initiating. **1999**; 130: 461–470

[5] F. Locatelli, D. Fouque, O. Heimburger, T. B. Drueke, J. B. Cannata-Andia, W. H. Horl, and E. Ritz, *Nephrol. Dial, Transplant*.**2002**; 1 17(4): 563 – 572.
[6] Erek E, Süleymanlar G, Serdengeçti K National et al. National Hemodialysis, Transplantation and Nephrology of the dialysıs and transplantation Registry Report of Turkey.**2007**; 17 (4):5-18
[7] Erek E, Süleymanlar G, Serdengeçti K National et al. Hemodialysis, Transplantation and Nephrology of the dialysıs and transplantation Registry Report of Turkey. **2006**; 17 (4):4-23
[8] Yazar H, Basaralı M K, Pekgör A, Polat M, Buyukbas S, *Haydarpasa Numune Journal of Medicine Education Periodical Sourches.* **2009**; 49, (4):234-239.
[9] Yazar H, Kayhan B. Cahit, Pekgör A, Polat M, Buyukbas S, *Haydarpasa Numune Journal of Medicine Education Periodical Sourches*. **2009**; 49 (4): 240-245.
[10] Yazar H, Tiftik A.M, Buyukbas S et al, *Asian Journal of Chemistry*. **2009**; 1 No: 9:7191-7194.
[11] Yazar H, Tiftik A.M, Buyukbas S, *Asian Journal of Chemistry*. **2009**; Cilt: 21, No: 8: 6473-6478,
[12] Yazar H, Basaralı M K, Pekgör A, Polat M, Buyukbas S, *Haydarpasa Numune Journal of Medicine Education Periodical Sourches*. **2009**; 49(4):246-251.
[13] Yazar H, Basaralı M K, Pekgör A, Polat M, Buyukbas S, Adult, *Haydarpaşa Numune Journal of Medicine Education Periodical Sourches* **2010**; 50(1),3-5.