Original Article

Evaluation of Risk Factors and Cadmium in Patients During Hemodialysis

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ABSTRACT

Objective: To evaluate the effectiveness of Hemodalysis for the heavy toxic metals.
Study Design: Observational study.
Place and Duration of Study: This study was conducted at the Institute of Biochemistry, Universitry of Sindh Jamshoro, Institute of M.A Kazi Chemistry, University of Sindh Jamshoro from August 2016 to February 2017.
Materials and Methods: During this research work, 73 subjects of kidney dialysis treatment from three hospitals of Hyderabad city were studied. Patients were divided in three groups Diabetic Patients (DP) Kidney Patients (KP) and Hepatitis Patients (HP). Own prepared questionnaire were filled by patients at hospitals. Cadmium were analyzed from serum by Atomic Absorption.
Results: 45.9% of subjects were founded Diabetic, 37.8% kidney failure patients and 16.3% were found Hepatitis patients. Number of male subjects was more affected than female. Vegetables, fruits and meat consumption was low in all groups. In this research work Cadmium were analyzed from before dialysis (Pre) and after dialysis (Post) samples. Mean±SD of cadmium in Diabetic Patients (DP), Kidney Patients (KP) and Hepatitis Patients (HP) was (1.17±0.15μg/L), (1.14±0.15 μg/l), (1.29±0.29 μg/l), (1.37±0.12 μg/l), (1.24±0.4 μg/l) and (1.14±0.10 μg/l) respectively.
Conclusion: Besides other reasons, Diabetic Mellitus and Hepatitus have been main cause of Kidney failure, leading to Hemodialysis. Majority of Hemodailysis patients despite being Daibetic have been using soda drinks and tape water which can further aggravate or complicate their disorder and needed guidance and precautionary measure. No significant variations in Cadmium could be seen after hemodailysis therefore necessitating special attention on removal of heavy or toxic metals from blood by hemodialysis process.
Key Words: Hemodislysis, Cadmium, Diabetes, Hepatitis and Kidney Patients.

INTRODUCTION

The kidneys excrete waste products formed during metabolism into urine. It contain the nitrogenous wastes and uric acid, from nucleic acid metabolism and it's also Hormone secretion, Reabsorption of essential nutrients and Osmolality regulation. The hemodialysis, is a mechanism filter wastes, salts and fluid throughout your blood while your kidneys are not working. Hemodialysis is technique to treat kidney failure and can assist you take on an active life despite failing kidneys.Hemodialysis be able to help control blood pressure and maintain the proper equilibrium of fluid and different minerals in your body. Generally causes of kidney failur, glomerulonephritis, hypertension, Kidney cysts.

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The risk of Hemodialysis are hypotension, Muscle pain, Itching, Sleep problems, Anemia, Hypertension, Depression,Bone diseases[1,2].

Heavy metals contain no positive function and nutritional values in our body & they also be toxic. They well recognized verity that contact to heavy metals may activate the instigation of autoimmune syndrome like diabetes mellitus. Metals are essential part of enzymes and co-enzym. Significant amount of metalsare plays very fundamental role in growth & maintain the body tissues. Therefore all these metals back to singular body parts and results comes into serious disorders[2,3].

MATERIALS AND METHODS

This study was done on the kidney patients who seeking hemodialysis from three hospital of Hyderabad city i.e Shah bhattai Government hospital, Memon charity hospital & Majee hospital, Hyderabad Sindh, Pakistan. Own prepared questionnaire were filled by all patients. Questionnaire consist questions about gender, age, marital status, kidney disease, blood pressure, family history, kidney or any other surgery, other disorders, question about dietary, number of dialysis etc. Before (Pre) and After (Post) hemodialysis

blood sample were also collected for the Cadmium analysis[4].

Blood sample collection for the analysis of Cadmium: The blood samples of hemodialysis patients taken two samples of one patient first was before the dialysis started that was PRE at 8:00AM and the second was taken post at 12:00PM. Aid vein puncture technique used for the collection of whole blood sample, using 5 ml disposable plastic syringes (BD Syringe Medical, Germany) and blood was collected. The entire patients were taught not to clasp the hand and during the handling of whole blood specimens, all these essential safety measures were taken to avoid chemical contamination and hemolysis. The sample were collected then centrifuged for 5 minutes at 4000 rpm. The supernatant was collected and cadmium was analyzed by Atomic Absorption.

Blood sample preparation for the analysis of Cadmium: Firstly we have to take 100ml of distilled water in a beaker then add 10g of Sulfocylic acid in it mix it well. After the preparation of this we separately take 1ml of serum of post dialysis and pre dialysis patients in centrifuge tube and also add 0.5ml of sulfocylic solution for centrifugation, place all sample tubes in centrifugation, centrifuge all pre and post samples for 20 minutes. Supernatant were collected after centrifugation. Now the sample is ready for further testing

Analysis of Cadmium: Cadmium was analyzed by Atomic Absorption Spectroscopy (Perkin-Elmer AA40 flame). Firstly air compresser KIT on (oxylation air used) than on flame carfuly than set the computer methood (time 4-5 second) and also set the cadmium flame. Acetylene set on 1.5. first we taken calibaration samples and sip samples from 5second than note reading one by one than all samples sip and note down reading on the monitor[5,6]. The cross-cofficient of all samples were 0.995602.

RESULTS

Details of results have been incorporated in table1, table 2 and table 3 respectively.

Table No.1: Demographic character of hemodialysis patients

Parametters	Diabetic Patients(DP)	Kidney Patients(KP)	Hepatitis Patients(HP)
Total Patients (N-73)	45.9%	37.8%	16.3%
Age Group			
(20-30)	5.8%	5.8%	33.3%
(31-40)	11.7%	11.7%	25.7%
(41-50)	17.6%	17.6%	16.6%
(51-60)	35.2%	35.2%	14.1%
(61-80)	29.4%	29.4%	10.3%
Gender:			
Male	64.7%	42.8%	66.6%
Female	35.2%	57.4%	33.3%

Table No.2:Complications and factors of Hemodialysis patients

Parameters	Diabetic Patients (DP)	Kidney Patients (KP)	Hepatitis Patients (HP)
Blood in urine			
Yes	5.8%	72.2%	3.34%
No	94.2%	92.8%	66.6%
Urine in a day			
1 time	2.14%	33%	33.4%
2 times	28.5%	50%	50%
8 times	7%	0.1%	0%
No	42.9%	17%	16.6%
Urological surgery.			
Yes	5.8%	0%	0%
No	94.2%	100%	100%
Fatigue after dialysis			
Yes	47.1%	57.1%	3.34%
No	52.9%	42.9%	66.6%
Length of dialysis			
2h	17%	17%	16.6%
2:30h	17%	17%	17%
3h	50%	50%	50%
3:30h	16%	16%	16.7%
4h	0%	0%	0%
Dialysis per week			
2times	41%	42%	99%
3times	53%	28%	1%
4times	7%	0%	0%
Specific allergy			
Yes	23.5%	50%	50%
No	76.5%	50%	50%

Table No.3: Nutrition of Hemodialysis pateints.

Parameters	Diabetic Patients (DP)	Kidney Patients (KP)	Hepatitis Patients (HP)
Water			
Tap	41.7%	42.8%	35.2%
Mineral	58.8%	58.8%	64.7%
Hand Pump	0.1%	0.1%	0.1%
Glasses			
1 to 4	23.6%	28.5%	33%
5 to 8	58.8%	42.8%	66%
More than 8	17.6%	28.5%	1%
Soda drink			
Once a week	41.1%	35.7%	35.2%
Twice a week	17.7 %	21.4 %	22%
Daily	17.7%	7.1%	8.2%
NO	35.5%	21.7%	34.4%
Vegetables and fruits			
Once a week	58%	21.4%	9%
Twice a week	41%	21.4%	41%
Daily	52.9%	57.1%	50%
NO	0.2%	0.1%	0%
Meat			
Once a week	5.88%	35.7%	58.8%
Twice a week	117%	28.5%	11.7%
Daily	29.4%	35.1%	29.4%
NO	0.1%	0.1%	0%

DISCUSSION

The signs and symptoms of a kidney infection may include fever, backside (flank) or groin ache, abdominal pain, puss or blood in your urine (hematuria) with bad smell or urine is cloudy. Hemodialysis is a method that is used to complete removal of waste products like creatinine and urea. hemodialysis treats in a health center are handled by specific paramedical nurses and technicians[7]. During this research work, 73 subjects of kidney dialysis treatment from three hospitals of Hyderabad city were studied. 45.9% of subjects were found Diabetic[8], 37.8% kidney failure patients[6] and 16.3% were found Hepatitis patients[3,9] Therefore, results of patients were divided in to three groups i.e Diabetic Patients (DP), Kidney Patients (KP) and Hepatitis Patients (HP). All female were house wives and belonged to low income category. Number of male subjects was more affected than female and mostly vegetables and fruits and meat consumption was low in all groups[5].

Diabetic Mellitus is multi metabolic disorder during which many organic and inorganic compounds are released in blood along with excess glucose which causes damage to kidneys. In Diabetic Patients (DP) group; highest percentage were belonging to 51-60 years age and 5.8% (n=18) patients placed on hemodialysis were under 30 years. 41.1% patients were still using tape water (local water) and devour soda drink even after disorder which might have caused complications of kidney and hemodialysis[8]. 82% patients were not having history of Diabetes. 5.8% patients were having urological surgeries. 47% patients were feeling fatigue after dialysis[10]. 50% patients' length of hemodialysis was three hours. 53% patients were three days under dialysis process in a week (Table no. 01 and 02).

Cadmium is a well known toxic heavy metal that can cause renal dysfunction, cardiovascular disease (CVD) and numerous cancers demonstrated that exposure of cadmium produce toxicity in kidney. Cadmium revelation from ingestion of impure food & water (water pipes or industrial pollution) it produced long-term health bad causes[12]. In this research Mean±SD of cadmium in Diabetic Patients (DP) before dialysis (Pre) was 1.29±0.29 µg/l and after dialysis (Post) was 1.14±0.10 µg/l. There has been no significant variation (p>0.05) before and after dialysis process. Same findings were reported by[11] in which he also observed no prominent changes in Cadmium concentration after hemodialysis[6].

Kidneys infection or stones slowly spoiled the filtration function, eventually affecting both kidneys and failing to filter the blood. Kidney Patients (KP) were more affected from 51-60 years age group. We also founded 5.8% (n=14) Kidney patients were from 20-30year on hemodialysis. 42.8% were still using tape water (local water) and 35.7% utilize soda drink. 5.8% patients were having urological surgeries. 57.1% patients were fatigue after dialysis[10]. 50% patient's length of hemodialysis was three hours. 72% patients were two days under dialysis process in a week. Mean±SD of cadmium[12] in Kidney Patients (KP) before dialysis (Pre) was 1.17±0.15 µg/l, whereas after dialysis (Post) was 1.14±0.15 µg/l. There had been no statistically significant variation (p>0.05) before and after dialysis hemodialysis.

Liver metabolized all molecules and produced different metabolites for excretion mostly radicals or acids which damaged kidneys gradually. Hepatitis is disorder of liver caused by viruses which destroys liver cells. Age group from 31-40 years was more effected among the Hepatitis Patients (HP), 33.3% (n=06) Hepatitis patients who were on Hemodialysis were of 20-30years. 47.4% were still using tape water (local water) and 35.2% using soda drink even after disorder which might have contributed towards complications of kidneys and hemodialysis. 33.3% patients were feeling fatigue after dialysis[13,10]. 50% patient's length of hemodialysis process was three hours. 99% patients were two days under dialysis process in a week. Mean±SD of cadmium[12] in Hepatitis Patients (HP) before dialysis (Pre) was 1.37±0.12 µg/l, whereas after dialysis (Post) was 1.24±0.4 µg/l. Statistically no significant variations (p>0.05) was observed before and after dialysis process[13,14]. In our research we founded no remarkable change in cadmium concentration after Hemodialysis in all groups. Hemodialysis of kidney might be useful for removal of organic compounds i.e Urea and Creatinine but many studies reported that metals retained in blood might be due to membrane permeability of dialyzer instruments, necessitating special attention on removal of heavy or toxic metals from blood by hemodialysis process.

CONCLUSION

Besides other reasons, Diabetic Mellitus and Hepatitus have been main cause of Kidney failure, leading to Hemodialysis. Majority of Hemodailysis patients despite being Daibetic have been using soda drinks and tape water which can further aggravate or complicate their disorder and needed guidance and precautionary measure. No significant variations in Cadmium could be seen after hemodailysis therefore necessitating special attention on removal of heavy or toxic metals from blood by hemodialysis process.

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