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Research Article

CLINICAL OUTCOMES OF END STAGE RENAL DISEASE AND ADEQUACY OF ADULT MAINTENANCE HEMODIALYSIS PATIENTS

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ABSTRACT

Background & Aim: End stage renal disease (ESRD) is an irreversible loss of kidney function caused by various risk factors and affected persons of lives mainly depending on the technology of renal replacement therapy (RRT) or renal transplantation (RT) to sustain the life. Aim of this study is to overview the clinical outcomes of ESRD and adequacy of maintenance hemodialysis among the patients. **Materials & Methods**: Currently, there are sixty two end stage renal disease patient's clinical data's were collected and included in the study. For all patients, pre and post hemodialysis samples were collected and processed through biochemical and hematology auto analyzer. The hemodialysis modalities 4008 H/S and high-flux & low flux ultra filter dialyzers had utilized to three dialysis sessions per week, 4 hrs per session for each individuals. Blood flow rates differed from 150 to 350ml min-[1] depending on conditions and standard dialysate flow was 500ml/ min-[1]. **Results:** Of total sixty two patients, 51.62% females and 48.38% males with mean age of 47.76 (18-72) years; gradually increased at the ages of 55 to 72 years then adult age. Concerning overall risk factors in ESRD, 61.30% of hypertension as a leading risk factor followed by 21% NIDDM, 11.30% other kidney diseases and 6.40% cardiac related diseases. Although, there are others clinical signs such as hypothyroidisms; extra-pulmonary infection, retinitis pigmentosa and infertility have been diagnosed. In addition, nearly 33.87%% of HCV, 6.45% HBV and 3.22% of co-infection have been prevalence in ESRD hemodialysis population. Relating to hepatitis C, B and co-infection during dialysis exposure were 29.41%, 2.94% and 2.94% in that order. In relation to overall adequacy of maintenance hemodialysis in this study nearly 75.80% (≥ 1.3 to 2.5 Kt/V) and 24.20% (1.05 to 1.3 Kt/V) were been analyzed through Kt/V formula for wastage clearance. **Conclusion:** The present study highlighted that the co morbidity of ESRD, current adequacy of adult maintenance hemodialysis, and suggesting to boost better by 90% (≥1.2Kt/V) of adequacy in all dialysis patients. In addition to that, exposure of hepatitis B and C virus during dialysis and advocating to implement current medical strategic to prevent ongoing clinical phenomenon within the patients.

Key words: Maintenance hemodialysis, End Stage Renal Disease, Co-morbidity, GFR

INTRODUCTION

The chronic kidney disease (CKD) is characterized to be an end stage renal disease (ESRD) with irreversible loss of kidney function needed of dialysis and renal transplantation (short term) to carry over life. The glomerular filtration rate (GFR) is one part of excretory function and if deficiency of GFR less than 60ml/min/1.73m^2 it is considered as CKD so it won't be cured permanently. Even if the disease is

curable, it must be a coincidence. The normal GFR in adult population is nearly 125ml/min/1.73m^2 but in ESRD individual is nearly <15ml/min/1.73m^2.The GFR deficiency might be quantifiable by recent formula for GFR based on serum creatinine and cystatin C radios but not a single marker. According to KDOQI practical guideline, general physiologic age-related changes in kidney function often lower GFRs to ~ 60-90 ml/min/1.73m^2.Hence,the age related deficiency in GFR is~ 1 ml/min/1.73m^2/year, starting after 30-40 years[1]. In addition and inconsistently, the decrease of muscle mass linked with aging may overestimate the GFR and potentially mislead the healthcare provider. Currently in type1&2 diabetes, the new biomarkers like serum tissue necrosis factors 1 and 2 (sTNFR1&2) having significant role to predict the kidney disease by ten years advance[2-3] and it is the best clinical marker than creatinine and cystatin C radios in kidney injury. The signs of chronic kidney diseases may not be noticeable for a year; hence the loss of kidney function may be slow down without symptoms until kidney stopped working. The symptoms might be loss of appetite, bone pain, common ill feeling with fatigue, excessive thirst, headaches, pruritus, nausea, numbness, breath odor, sleep and vomiting problem and weight loss[4].

There are different types of clinical laboratory markers available in current medical practice to identify the co morbidity of ESRD in maintenance hemodialysis patients. Albumin is one of the plasma protein occur in urine if there is kidney diseases. The significance of albumin creatinine radios (ACR> 30mg/g); and albumin excretion radios (AER) in subsequent clinical risk factors such as CKD progression, cardiovascular and diabetic kidney disease in both types of diabetes with background of ESRD[5].The main causes of ESRD among prevalent individuals were; diabetic nephropathy, glomerulonephritis, hypertensive nephropathy, congeneital hereditary diseases and polycystic kidney diseases and others[6]. Also, higher albumineuria is significantly linked with severity of hypertension and insignificant lipid indication like elevated total cholesterol, triglycerides, lipoprotein-a, decline of HDL-c levels and malformation of coagulation[7]. Besides that, micro-albuminuria is sensitive early marker for detection of ESRD with diabetes-2 and an irregularity of systolic blood pressure is an independent risk factor for elevation of albuminuria[8]. The association of cardiac biomarkers such as brain natriuretic peptide (BNP), C-reactive protein (CRP), IL-6, IL-10 (interleukin), cardiac troponin T and asymmetric dimethyl arginine (ADMA) for inflammation, oxidative stress, endothelial dysfunction, myocardiopathy, renal insufficiency and atherosclerosis in ESRD patients with pre and post maintenance dialysis[9-10].The creatininekinase isoenzymess MB, and myoglobin are usual biomarkers for myocardial necrosis in patients with end stage renal failure[11] .The ischemia modified albumin (IMA) is sensitive marker for identifying ischemia and higher in ESRD, also significantly linked with larger left ventricular size, decline systolic function and higher estimated left ventricular filling pressures with life time treatment[12]. For diagnosis of anemia and management of ESRD patients, there are several parameters like target hemoglobin (11-12g/dl), ferritin (100-200ng/ml), transferring saturation (TSAT) (≥20%), HYPO<10% (hypo chromic percentage) and mean reticulocyte hemoglobin content (CHret->29pg) [13-14].

Renal osteodystrophy is caused by high turnover bone disease (HTBD) due to elevation of iPTH (intact parathyroid hormone) and low turnover bone disease (LTBD) due to deficiency of iPTH caused by hyperglycemic and hyper-insulinemia in ESRD with type-2 diabetes in maintenance hemodialysis population[15-16]. In ESRD MHD patients (maintenance haemodialysis), elevated levels of VLDL, IDL and LDL (very low density lipoprotein) cholesterol are considered uremic dyslipidemias and in same time decline of HDL (high density lipoprotein) as well as lipid and lipoprotein abnormality have been observed[17].These are all markers had significant roles to identifying several risk factors in co-morbidity of end stage renal disease and in fact needed of these marker to well-known of patho-physiological phenomenon of kidney damages. In present study primarily focused on clinical outcomes of end stage renal disease and adequacy of maintenance adult hemodialysis as a first scientific research work among hemodialysis individuals and also suggesting these biomarkers to be introduced in near feature.

MATERIALS AND METHODS

Patient and study blueprint: The study subjects incorporated both males and females of 62 ESRD

patients in the ages of 18-72 years with clinical history, receiving maintenance hemodialysis as free of charge from government healthcare sector. All the ESRD patients were admitted in the hospital with consultation of nephrologists and epidemiologist for the purpose of maintenance hemodialysis and it is running since establishment. The patients' samples were collected from the maintenance adult hemodialysis units at the department of hemodialysis in Ibn Sina Teaching Hospital. The ethics panel and internal review board of the organization approved the procedure. Informed consent was obtained from individual patients. The data's were included the age, gender, types of ultra filtration, dry weight, blood groups, hemodialysis doses, blood pressure, urea and creatinine (before & after hemodialysis), other laboraty data's and co morbidity of end stage renal diseases as inclusion criteria and others clinical sign were considered as exclusion criteria.

Patients' clinical status analysis: Data's were collected from patient's data registry in a month period in the years of 2014 at the department of hemodialysis. Co morbidity of ESRD among hemodialysis patients were comprised anemia, hypertension, NIDDM (Non-insulin dependence diabetes mellitus), dilated cardiac myopathy (DCM), coronary artery diseases (CAD), renal atrophy, renal transplantation, diabetic nephropathy, myocardial infarction, polycystic kidney diseases, hypothyroidisms, HCV, HBV and hepatitis B&C virus co-infections were predicted meticulously through proper investigation. Biostatical analyses were performed by using Minitab (v16) and Microsoft ware Excel-2007.

Hemodialysis modalities (4008S/H) : All the patients have been on regular maintenance hemodialysis using ultra filtration membrane (GFS17,GFS14 &GF6); 4 hours per episode and 3 times per week, within permitted dialysis fluid concentration. Concerning about hemodialysis vascular access in ESRD, most of the patients had arteriovenous fistulas access (AVF). Blood flow rates varied from 150 to 350ml and standard dialysate 500ml/ min^{-1}. Heparin doses were differed according to the condition of patients and the heparin doses like free, priming, 2500, 5000, 7500 and 10000 IU. The minimum dialysis dose was set free at the dialysis unit Kt/V, according to the manufacture guideline. Online clearance monitor (OCM) is an extra option intended for use with these modality systems. This option permits resolve of the estimated efficient urea clearance (K), the dialysis dose Kt/V and the plasma sodium concentration during dialysis. All patients were dialyzed with high/low-flux ultra filtration membranes. The dialysate used was identical for all management and consisted of sodium 138mmol/l, potassium 2mmol/l,calcium1.75mmol/l, magnesium 0.50mmol/l, chloride 109.50mmol/l, acetate 3.0mmol/l and bicarbonate 32mmol/l. Dialot and citrosterile were been applied for clean-up instrument (4008S/H Fresenius Medicare Germany) after dialysis and new dialyzer have been used to treat patients for each treatment of hemodialysis. All patients laboratory parameter were screened in the beginning of month through the regular practice for adult maintenance hemodialysis and it is not difficulty even if it is sound because of technical advances.

Clinical Lab analysis: ESDRD patient's blood samples (5ml) were drawn correctly from overnight fasting pre-and post maintenance hemodialysis in serum and plasma vacationer. This sample used for quantification of complete blood count profile, serum creatinine, blood urea nitrogen (before/after hemodialysis), sodium, potassium, calcium, phosphorus, total protein, and liver enzymes. Fasting blood glucose was measured within this sample for diabetic patients. All patients' samples were immediately centrifuged and stored at 2-8C° until analysis for the others biochemical parameters. All the biochemical and hematology parameters were measured by using AU480 and ACT5 Diff-Beckman clinical laboratory auto analyzer.

RESULTS

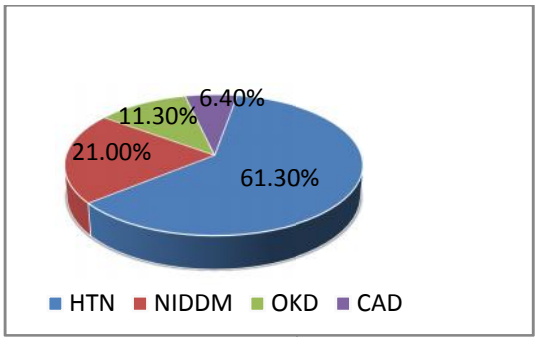

Fig 1: Co morbidity of ESRD

Generally, the prevalence of ESRD was higher among females 51.62% while in males 48.38% but it was very low in young patients. It has steadily increased between the ages of 55 to 72 years in both

genders and the mean age was 47.76 (18-72 years) in this region. Concerning blood groups, 54.84% O type (n-34), 37.10% A type (n-23), 4.84% B type (n-3) and 3.22% AB type (n-2) respectively, were observed in dialysis population. As sown in figure 1, about 61.30 % of patients (n-38) were clinically diagnosed as hypertension, 21%(n-13) type 2 diabetes with few of them had pulmonary hypertension, 11.30% had other kidney diseases (1n renal atrophy, 2n renal rejection, 2n poly cystic kidney diseases and 2n glomerular nephritides) and 6.40% had cardiac related diseases (1n coronary artery diseases, 2n dilated cardiac myopathy and 1n myocardial infarction).

Table.1: Clinical outcomes of End Stage Renal Diseases and Biochemical's profiles with adequacy of maintenance hemodialysis

Biochemical's profiles - n62	Hypertension n38 (95% CI)	NIDDM n13 (95% CI)	Cardiac Diseases n4 (95% CI)	Other Nephropathy (95% CI) n7	HCV Infection (95% CI) n21	HBV infection (95% CI) n4
Blood Glucose (mg/dl)	108.80 134.24	156.70 285.50	91.495 370.00	92.33 132.53	106.11 134.85	127.00 129.00
Haemoglobulin (g/dl)	9.361 10.379	7.38 9.75	7.536 12.864	7.916 10.426	9.491 10.861	5.404 14.596
Urea (mg/dl) before dialysis	139.91 160.97	157.6 220.0	172.522 263.473	129.3 205.5	134.64 164.59	67.164 226.227
Urea(mg/dl) after dialysis	45.46 55.84	55.78 84.52	70.738 112.62	33.1 102.9	43.18 60.82	18.341 77.159
CREA(mg/dl) before dialysis	9.761 11.239	7.51 13.19	9.703 19.497	7.85 13.72	9.286 10.922	5.312 15.78
CREA(mg/dl) after dialysis	3.713 4.575	2.98 4.00	3.611 8.539	2.621 6.607	3.646 4.762	1.805 6.095
Sodium (Na) (mmol/l)	134.490 136.510	129.13 134.56	130.763 137.237	133.687 136.597	133.748 137.014	136.62 137.37
Potassium(K) (mmol/l)	4.773 5.167	4.445 5.447	4.696 6.354	4.354 5.830	4.89 5.29	2.845 7.135
Calcium(Ca) (mg/dl)	9.273 9.867	8.522 10.062	8.459 9.941	9.198 10.602	9.182 10.188	5.893 15.30
Phosphorus (mg/dl)	4.844 5.878	4.204 6.100	6.051 8.369	4.06 6.024	4.771 6.355	3.69 9.20
Total Proteins (g/dl)	7.118 7.466	6.851 7.655	6.824 7.685	6.504 7.666	7.139 7.651	4.099 11.01
ALT (U/L)	13.82 29.60	7.32 15.91	6.451 19.549	20.045 46.045	15.41 31.25	12.09 139.91
AST (U/L)	16.71 25.07	9.90 21.02	6.372 20.628	3.833 23.666	18.95 31.15	21.141 87.859
ALP (U/L)	98.80 254.00	83.0 161.1	42.620 421.88	113.533 269.533	138.7 418.5	27.327 207.17
Kt/V(≤1.4 to ≥1.5) %	31.60 68.40	69.30 30.70	75.00 25.00	42.90 57.10	Overall: 1.05-1.3 (24.20%) 1.3-2.4 (75.80%)	
URR ≤65 to ≥65% (Ureareduction radio)	44.80 55.20	69.30 30.70	100 (≤65%)	57.15 42.85	Overall: 40 to 64 (51.60%) 65 to 85(48.4 0%)	

Along with this population, there are two more cases were diagnosed as hypothyroidisms, retinitis pigmentosa, one infertility and one extra-pulmonary tuberculosis with background of renal rejection. In addition, 33.87% of hepatitis C (n-21), 6.45% of hepatitis B (n-4) and 3.22% co-infection (n-2) cases were been identified as infective agents in ESRD patients. These are infection had before and during dialysis. As well, there are more than 54.85% of patients (n-34) had multiples blood transfusions

during hemodialysis and 45.15% of (n-28) patients were under the treatment of erythropoiesis stimulating agent (ESA) after dialysis. Among the blood transfusion patients, there are 29.41% (n-10) of patients were hepatitis C virus infected through blood transfusion during hemodialysis and rest of them had pre exposure. Concerning hepatitis B virus infection, 2 .94%(n-2) of patients and , 2.94% (n-2) of patients co-infected with hepatitis C& B viruses in the course of transfusion therapy and rest of them had had pre exposure.

Relating to the current clinical studies, 61.30% of patients had hypertension as many dialysis patients receiving antihypertensive drugs, only 38.70% have best controlled blood pressure with or without treatment of hypertension during study period. The overall systolic blood pressure for defined hypertension (>140-182mmHg) were 37.09% in pre and 35.48% in post dialysis (>140-188mmHg). As well as in overall diastolic blood pressure for defined hypertension (>91-103 mmHg) were 12.90% in pre and 12.90% in post dialysis (91-103 mmHg). Hence, hypertensive stage1&2 cases were few more observed in type 2 diabetes, others kidney diseases and cardiac related diseases.

As shown in Table 1, regarding anemia the statics data were reported as 95% confidential intervals (CI): 9.361 - 10.379 in hypertensive cases; 7.38- 9.75 in type 2 diabetes; 7.536 - 12.864; in cardiac related diseases; in other nephropathies 7.916 - 10.426; 9.491 - 10.861 in HCV and in hepatitis B&C virus co-infections (5.404 -14.596) respectively. It is clearly understood that the most of the ESRD patients in hemodialyis having deficiency of hemoglobulin because of regular maintenance dialysis and they have been under several medications but needed more care in cardiac related cases than others.

Hemodialysis carried out at home with self management for better quality of life but every one cannot be afford. In current study relating to the adequacy of hemodialysis in ESRD population, the serum blood glucose has been raised in type 2 diabetes (95% CI: 156.70 - 285.50) and in cardiac related diseases than others co morbidity. Thus, there was an elevation of serum glucose (95% CI 91.495 - 370) in cardiac diseases as history of type 2 diabetes and small sample size in estimation. Concerning about urea and creatinine intensity before dialysis the estimated values were reported as 95% CI:139.91-160.97; 9.761-11.239 in hypertensive patients; but after post dialysis its levels were 45.46-55.84; 3.714 - 4.574, respectively ; in type 2 diabetes pre and post dialysis its levels were 157.6 - 216.91; 7.51 - 13.90; 55.78 - 84.52; 2.98 - 4.007, respectively; in cardiac diseases before dialysis its levels were 172.522 - 263.473; 9.703 - 19.497 though after dialysis it quantity were 70.738 - 112.62; 3.611 - 8.539, respectively and in others nephropathies, before dialysis it quantity were 129.3 -205.5; 7.85 -13.72 while after dialysis the levels were 33.1 -102.9; 2.621 - 6.607, respectively. It seems that average wastages (urea/creatinine) have been removed through hemodialysis and medical consultant must concentrate more on cardiac and diabetes individuals to reduce the further wastage for better life and control the mortality. Hence, overall adequacy in this study close to 75.80% (≥ 1.3 to 2.5 Kt/V) and 24.20% (1.05 to 1.3 Kt/V) were been analyzed and the Kt/V formula has been used for wastage clearance estimation. For this imbalanced clearance, an organizations need to implement an international standard practice (above 90% of ≥1.2 Kt/V clearance), proper training of hemodialysis staffs and an updated technology to improve the better life of ESRD individuals.

Other biochemical molecules like sodium and calcium are within the expected limit in co morbidity of ESRD. Potassium was somewhat elevated in cardiac diseases and co-infection of hepatitis B& C viruses than expected values and others co morbidity were within the predicted ranges. Like total protein, the ALT and AST are within normal limit in co morbidity. However, ALT was merely elevated in co-infection and AST was very low in other nephropathies. Also, other important biomarker such as alkaline phosphates' (ALP) was highly increased and decreased in all ESRD population. The quantification values were reported as 95% CI; 98.80-254.0 in hypertension; 83.0 -161.1 in type 2 diabetes; 42.620 - 421.880 in cardiac related diseases; 113.533 - 269.533 in other nephropathies; 138.7 - 418.5 in HCV infection and 27.327 - 207.12 in co-infection of hepatitis B&C viruses, respectively. It showed that ALP is important marker in ESRD but need to differentiate weather vascular calcification or bone degeneration or hepatitis infections. Concerning hyperphosphatemia, most percentages have been observed in males individuals than females especially

in other nephropathies and cardiac related diseases but there was no cases found as a deficiency of phosphorus in the study.

DISCUSSION

An end-stage renal disease (ESRD) is usually prevalent in Libya like developed nation. To maintain this problem till date there are more than 40 maintenance dialysis centers established by government health care sector. The prevalence will increase at the rate of 8% yearly from 2417 to 7667(2009-2024)[18] and it was higher when compared with Middle East and North Africa regions (MENA). The overall clinical outcomes of ESRD in Libya were 26.5% of diabetic nephropathy, 21.2% of glomerulonephritis, 14.6% of hypertensive nephropathy, 12.3% of congenital and hereditary disease; 7.3% of unknown cases, 6.3% of polycystic kidney disease, 5% of obstructive nephritis, 2.9% of others, 2% of chronic pyelonephritis, 1.2% of interstitial nephritis, and 0.7% of auto immune disease[19]. Whereas, in present study showed that the clinical outcomes of ESRD in hemodialysis patients were 61.30% of hypertension, 21% of type 2 diabetes, 11.30% of other kidney diseases and 6.40% of cardiac related diseases and totally differed from earlier study. In addition, there were 29.41% of HCV infection, 2.94%of HBV infection and 2.94% of hepatitis B&C viruses co-infection of both viruses infected through the exposure of hemodialysis. Anemia is a usual deficiency in Sirt hemodialysis individuals were observed with conditions of chronic renal failure. Rectification of this deficiency might progress the dialysis individuals activity, cardiovascular function, lower mortality and better life. To correct this burden among individuals after dialysis, 45.15% of dependable dialysis patients were treated often with aid of erythropoiesis stimulating agent (ESA) to reach the target between 11.0 and 12.0 g/dl and if it is reach more than 5000 unit per month ESA medication might cause pruritus[20] (itchy skin) so proper clinical diagnosis and research work must be done on each ESA receiving individuals in maintenance dialysis. On the basic of estimated glomerular filtration rate after kidney disorder, the chronic kidney diseases are classified according to the modification of diet in renal diseases (MDRD) into five stages proposed by the US National Kidney Foundation. With this term to classify the patients; eGFR between 45-60ml/min/1.73m^2 (3A), eGFR between 30-45ml/min/1.73m^2 (3B), eGFR between 15-30ml/min/1.73m^2(stage4); GFR<15ml/min/1.73m^2 (stage5) and eGFR>90ml/min/1.73m^2 considered as stage 1&2.[21]

Hypertension is caused by an augment of extra-cellular volume duo to renal failure and it is one of the leading risk factor in these ESRD dialysis populations. National Kidney Foundation Kidney Diseases Outcomes Quality Initiative (NKF-K/DOQI) procedure advocate that pre and post dialysis BPs must be <140/90 and 130/80mmHg as well[22]. Moreover in the study, nearly 37.09% patients had systolic hypertension in pre dialysis (>140-182 mmHg) and 35.48% had post hemodialysis (>140-188mmHg) but most of them under the control of antihypertensive drug management. Likewise, >91-109 mmHg as diastolic hypertension in pre and post dialysis it was 91-103 mmHg. Certainly, perfect dry weight estimation and ultra filtration of wastage have significant role in hypertension management. The average dry weights in these hemodialysis individuals were between 41-90 kg and wastage filtration was 0.5 to 4kg after dialysis; it is depending on the dosage and body weight during dialysis period. Indeed require to maintain hypertension through restricting sodium dietary intake as a best practice in maintenance hemodialysis.

Type 2 diabetic is the second foremost cause of end stage renal disease after the hypertension and serum glucose was increased totally in all type 2 diabetes patients. Proteinuria elevation in urine is sign of disease but not predictors of kidney disease. Generally, in normal metabolisms more than 2400 metabolic molecules produced and released in plasma and among this only 16 uremic solute were considerable role in progressive stage of end stage renal disease. Thus, tissue necrosis factor receptors (TNFR1&2) are significant role to predict the loss of renal function in early stage without proteinuria in diabetes and ESRD individuals[23]. In upcoming year, it is necessary to do broad research work on metabolite which is relative to the clinical disorder in ESRD for early diagnosis and prevention of disease. Blood group A, AB and Rh having significant link with type-2 diabetes and hypertension than blood group B and O[24-25]. In current analysis, frequency of blood group O is higher in Libyan hemodialysis ESRD patients followed by groups A, B and AB.

This genetics factors and blood groups system needed to investigate thoroughly in hemodialysis population to get quality of life and control the sudden death rate. Imbalanced condition of serum potassium is known as hypokalemia (<3.5 mEq/L) and hyperkalemia (> 5.0mEq/L) in ESRD[26] patients, while in current analysis revealed that hypokalemia was very unusual event and hyperkalemia had (4.69-6.35 mmol/L) excessive levels in several hemodialysis patients. So many biomarkers (BNP and cardiac troponin) and imagine methods (cardiac MRI, PET and cardiac CT) are introduced in current medical practice to diagnosis and distinguish the diseases condition. Current study also advised to follow the current medical practice and to concentrate further research works very deeply on cardiac related diseases and others nephropathy disorder in aspect.

Concerning about adequacy of hemodialysis, sufficient quantity of wastage elimination using often maintenance hemodialysis doses from body is described as outcomes of maintenance dialysis. There are so many aspects are allied for outcomes of hemodialysis such as exclusion of middle particles (high-flux dialyzers), phosphate over load, uremic toxins, fortification of retention of renal function (2-3ml/min-urea clearance), vascular access, quality of life with care and better clinical practice with acceptance of international standard[27]. In present study relating to vascular access, 51.60% of branchio-cephalic arteriovenous fistulas access (AVF), 38.70% of radiao-cephalic arteriovenous fistulas access and others 9.70% of were unknown data but the radial AVF access is primary option for best outcomes of hemodialysis and it was recommended by American society of nephrology.

Also, the overall estimation of urea levels in pre and post hemodialysis of ESRD patients were 67 to 263mg/dl but after dialysis 18-112mg/dl. Concerning serum creatinine, most of the patients had values between 5-19mg/dl before dialysis, whereas after dialysis patients had values 1.8 to 8.5mg/dl. In addition to that, hemoglobin (Hb) levels were between 5.4 to 14.5 g/dl and most of them under anemic condition even after treatment. So many factors concerned for anemic such as blood omitted in the dialysis route nearly 2-3g[28] in a year per patient, recurrent blood drawn for investigation, vascular access procedures and genetics factors. Adequacy of hemodialysis is termed the total amount of uremic toxin removal as well as phosphorus but 4 hrs duration hemodialysis (3times per week), it purge near 900 mg of phosphorus every time[29.] Thus, the ranges in present analysis were 3.69 to 10.68 mg/dl of phosphorus estimated during study period and need to assess the phosphorus removal in each time of dialysis. Raised amounts of serum alkaline phosphatase are significant role with ESRD maintenance dialysis patients; especially in coronary artery calcification[30] but current study were observed in overall between 17.94-421.88 U/L and need to investigate about vascular calcification disorder very sincerely. Also others aspects regarding adequacy of dialysis required to investigate thoroughly in forthcoming years. Relating to overall adequacy amount of wastage removal (urea/creatinine) was 75.80% (≥ 1.3 to 2.5 Kt/V) and 24.20% (1.05to1.3 Kt/V) been analyzed. The goal of Kt/V is 1.2 in adult hemodialysis individuals and this measurement was guided by KDOQI. So need to update the better service according to the global clinical society acceptance.

Finally, the current study advised to introduce vaccines against some of viruses and bacteria such as hepatitis A & B, Influenza type A&B, Staphylococcus *aureus* and Streptococcus *pneumonia* through the global vaccination guideline programs before receiving a renal replacement therapy among ESRD patients in this locality. The immunization against hepatitis B might be control the hepatitis C virus infection which is infecting through hemodialysis modality[31-32]. Therefore, an organization ought to implement vaccination programme mainly against hepatitis B virus and make compulsory nucleic acid test screening before blood transfusion or avoid frequent of blood transfusion. The transfusion medicine has major role for infection of hepatitis in hemodialysis patients because of improper performance of global health practice in this locality. Feature goal of adequacy are concerned with different roles in this region such as implementing new adequacy panel, assess monthly lab data with data manager, patients specific care chart, better training to staffs and patients, early referral and evaluate current process.

CONCLUSION

Present study highlighted that the risk factors of ESRD and current study adequacy of adult maintenance hemodialysis. In addition, an improving over 90% of adequacy in dialysis patients is an important goal in this local ethnicity similarly to the population of chronic kidney diseases in developed countries and its co-morbidity literally differing from inhabitants and geography so this study were revealed both function with supervision and forwarding it to the national hemodialysis society in Libya to renew further scenario.

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Conflict of interest: None

REFERENCES

1. Levey AS, Coresh J. Chronic kidney disease. Lancet. 2012; 379: 165–80
2. Gohda T, Niewczas MA, Ficociello LH, Walker WH, Skupien J and Krolewski AS, et al. Circulating TNF receptors 1 and 2 predict stage 3 CKD in type 1 diabetes. J Am Soc Nephrol. 2012; 23: 516-24
3. Niewczas MA, Gohda T, Skupien J, Smiles AM, Walker WH and Krolewski AS, et al. Circulating TNF receptor 1 and 2 predict ESRD in type 2 diabetes. J Am Soc Nephrol.2012; 23: 507-15
4. Abboud H, Henrich WL. Clinical practice. Stage IV chronic kidney disease. N Engl J Med. 2010; 362:56-65
5. Gansevoort RT, Matsushita K, Van Der Velde M. Lower estimated GFR and higher albuminuria are associated with adverse kidney outcomes. A collaborative meta-analysis of general and high-risk population cohorts. Kidney Int.2011; 80:93–104
6. Van der velde M, Matsushita K, Coresh J. Lower estimated glomerular filtration rate and higher albuminuria are associated with all cause and cardiovascular mortality. A collaborative meta-analysis of high-risk population cohorts. Kidney Int. 2011; 79: 1341–52
7. Hemmelgarn BR, Manns BJ, Lloyd A. Relation between kidney function, proteinuria, and adverse outcomes. JAMA. 2010; 303: 423–29
8. Noshad S, Mousavizadeh M, Mozafari M, Nakhjavani M, Esteghamati A.Visit-to-visit blood pressure variability is related to albuminuria variability and progression in patients with type 2 diabetes. Journal of Human Hypertension.2014; 28:37-43
9. Francesca M, Giovanni T, Sebastiano C, Lorenzo S. Malantino and Carmine Z, et al. Prognostic value of combined use of biomarkers of inflammation, endothelial dysfunction and myocardiopathy in patients with ESRD. Kidney International. 2005; 67:2330-37
10. Lara B, Pupim JH, Ellen M, Yu shyr, and Alp Ikizler T. Influence of initiation of maintenance hemodialysis on biomarkers of Inflammation and oxidative stress. Kidney International. 2004; 65:2371-79
11. Robbins MJ, Epstein EM, Shah. S. Creatine kinase subform analysis in hemodialysis patients without acute coronary syndrome. Nephron. 1997; 76: 296-99
12. Sharma R, Gaze DC, Pellerin D. Ischemia-modified albumin predicts mortality in ESRD. Am J Kidney Dis. 2006; 47: 493-502
13. Locatelli F, Aljama P, Barany P. Revised European Best Practice Guideline for the management of anemia in patients with chronic renal failure. Nephrol Dial Transplant.2004; 19: ii1-ii47
14. KDOQI. KDOI clinical practice guideline and clinical practice recommendations for anemia in chronic kidney diseases: 2007 update of hemoglobin target. Am J Kidney Dis. 2007;50: 471-530.
15. Vincenti F, Hattner R, Amend WJ. Decreased secondary hyperparathyroidism's in diabetic patients receiving hemodialysis. JAMA. 1981; 245: 930-33
16. Murakami R, Murakami S, Tsushima R, Ueda C, Mikami K and Ebina T, et al. Glycaemic control and serum intact parathyroid hormone levels in diabetic patients on haemodialysis therapy. Nephrol Dial Transplant.2008;23:315-20

17. Shoji T, Ishimura E, Inaba M, Tabata T, Nishizawa Y. Atherogenic lipoproteins in end stage renal diseases. Am J Kidney Dis. 2001; 38(pt4): 303.
18. Akkari KB. Projecting Requirements for End Stage Renal Diseases Services in Libya 2014-2024.Ibnosina J Med BS.2013; 5(6): 354-62
19. Alashek WA, Mclntyre CW, Taal MW. Epidemiology and aetiology of dialysis-treated end stage kidney diseases in Libya. BMC Nephrology. 2012; 13:33
20. Pisoni RL, Wikstrom B, Elder SJ. Pruritus in haemodialysis patients: International results from the dialysis outcomes and practice patterns study (DOPPS).Nephrol Dial Transplant.2006; 21(12):3495-05
21. National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. Am J Kidney Dis. 2002; 39: S1–266
22. K/DOQI clinical practice guidelines for cardiovascular diseases in dialysis patients. Am J Kidn Dis.2005; 45: 1-153
23. Niewczas MA, Gohda T,Skupien J, Smiles AM, Walker WH and Rosetti F, et al. Circulating TNF receptor 1 and 2 predict ESRD in type 2 diabetes. J Am Soc Nephrol.2012; 23(3): 507-15
24. Nemesure B, Suh YW and Anselm H. Hypertension, Type 2 diabetes and blood groups in a population of African ancestry. Ethnicity and Diseases 2006; 6:822-29
25. Gloria-Bottini F,Antonacci E,Bottini N. Rh blood groups and diabetic disorders: is there an effect on glycolated hemoglobin level? Hum Biol.2000; 72: 287-94
26. Gennnari FJ. Disorders of potassium homeostasis: Hypokalemia and Hyperkalemia. Crit Care Clin.2002; 18: 273-88
27. Feehally J, Floege J, Johnson R. The comprehensive Clinical Nephrology. Chapter 90 ; Hemodialysis: Outcomes and Adequacy. Elsevier. 2010;pgnso
28. National Kidney Foundation Kidney Disease Outcomes Quality Initiative. Clinical practice guidelines and clinical practice recommendations for anemia in chronic kidney disease in adults. Am J Kidney Dis. 2006;47:S16-S85
29. Gotch FA, Panlilio F, Sergeyeva O, Rosales L, Folden T and Kaysen G, et al. A kinetic model of inorganic phosphorus mass balance in hemodialysis therapy.Blood Purif.2003;21:51-57
30. Ronney S, Kovesdy CP, Youngmee K, Naser A, Amanda L and Claudia L, et al. Association of serum alkaline phosphatase with coronary artery calcification in Maintenance hemodialysis patients. Clin J Am Soc Nephrol.2009; 4: 1106-14
31. Centers for Disease Control and Prevention. Advisory Committee on Immunization Practices (ACIP): Available at URL: http://www.cdc.gov / vaccines/pubs/ACIP- list.htm;
32. KDIGO Guideline: http://www.kdigo.org/ clinical_practice_guidelines/Pdf/kdoqi_hepc_ commentary.pdf; Accessed 01/08/2011.