In-center hemodialysis for end stage kidney disease at Nepal Medical College and Teaching Hospital

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ABSTRACT

End stage kidney disease (ESKD) is defined by glomerular filtration rate (GFR) less than 5ml/min. These patients need renal replacement therapy (RRT). Hemodialysis is an established form of RRT. Studies on in-center hemodialysis are very few. Here we would like to present our experience on in-center hemodialysis in Nepal Medical College and Teaching Hospital. Study period was one year (1st Baisakh 2065 to 31st Chaitra 2065). Total 33 patients (23 male, 10 female) were enrolled in the study. Average age was 42.33±15 years. Hypertension (55.0%), diabetes mellitus (24.0%), chronic glomerulonephritis (15.0%), rapidly progressive glomerulonephritis (3.0%) and others (3.0%) were the causes of ESKD requiring dialysis. Hypotension, hypertension, muscle cramps, chest pain were the common complications observed during dialysis. Average haemoglobin level was 9.44±1.88 g%. Majority of patients were physically inactive. Blood transfusion was the main modality for correction of anaemia. Approximate cost for one session of hemodialysis was Rs. 2000 (US$.25) and average monthly income of study population was Rs.16312.5 (US$.204) US$1=NRs.80, (4th May 2009).

Keywords: ESKD, in-center hemodialysis, causes, complications Nepal.

INTRODUCTION

Hemodialysis is an established form of renal replacement therapy (RRT). It was first conceptualized as an "artificial kidney" in the laboratory of Abel, Rowantree and Turner at Johns Hopkins University in 1913.[1] Later on this modality of therapy was successfully implemented as a continuing RRT by Scribner in 1960.[2] Since then hemodialysis became popular throughout the world for treatment of End Stage Kidney Disease (ESKD). In Nepal, it was first started in Bir Hospital in 1987[3] and in Nepal Medical College and Teaching Hospital (NMCTH) in 2005. Here, we present our experience about in-center hemodialysis for ESKD patients.

MATERIALS AND METHODS

This is a prospective study carried out over a period of one year (1st Baisakh 2065 to 31st Chaitra 2065) in hemodialysis unit of NMCTH. ESKD patients who were on regular hemodialysis for complete one year duration were included in the study. Hypertension (HTN), diabetes mellitus (DM), chronic glomerulonephritis (CGN), rapidly progressive glomerulonephritis (RPGN) and others were the causes of ESKD requiring dialysis. Dialysis was carried out for 8-12 hours per week. Baseline investigations such as haemoglobin (Hb), blood urea, serum creatinine, serum sodium and potassium, hepatitis B surface antigen (HBsAg), anti hepatitis C virus antibody (anti HCV), HIV (I and II) serology, ultrasonogram (USG) abdomen, urine routine and microscopic examination (RME), 24 hours urine for protein and creatinine clearance (Ccr) were performed to establish the diagnosis. Patient with Ccr < 5 ml/min were labeled as ESKD.[4,5] In some patients, Cockroft-Gault equation was used to estimate Ccr. Data collected were entered in Microsoft Excel datasheet. Means and standard deviations were calculated.

RESULTS

Thirty three patients (23 male and 10 female) were included in this study. Their mean age was 42.33±15 yrs (range: 18-74). About half of the patients were from Kathmandu Valley. Forty five percent patients were smokers. 36.0% patients consumed alcohol. Around 85.0% patients were unaware about the kidney disease and its treatment. Laboratory parameters of the study population are shown in Table-1.

In our study, HTN was the leading cause of ESKD (55.0%) followed by DM (24.0%), CGN (15.0%), RPGN (3.0%) and others (3.0%) as shown in Fig. 1.

Distal arteriovenous (AV) fistula was the common type of vascular access used (67.0%) followed by temporary vascular access in the form of internal jugular, subclavian and femoral catheter (18.0%) and proximal AV fistula (15.0%).

Hypotension was frequently observed complication in these patients (45.0%) followed by HTN (25.0%),

Table-1: Laboratory parameters of the study population

Laboratory Parameters	Mean ±SD
Predialysis Serum creatinine(mg/dl)	11.2±3.17
Postdialysis Serum creatinine(mg/dl)	6.05±2.23
Predialysis Serum urea (mg/dl)	166.7±47.65
Postdialysis Serum urea (mg/dl)	88.3±47.25
Haemoglobin (gm%)	9.44±1.88
Serum calcium (mg/dl)	7.72±0.40
Serum phosphorous (mg/dl)	5.56±1.54

muscle cramps (25.0%) and chest pain (5.0%) as shown in Table-2.

Anaemia was corrected by blood transfusion in about 75.0% of patients and by erythropoietin (EPO) and intravenous iron sucrose in about 25.0%. Majority (58.0%) of patients were unable to carry out their day to day activities.

Approximately Rs. 2,000 (US $.25) was the cost of hemodialysis per session. Average monthly income of the study population was Rs.16,312.5 (US $.204). US $1=NRs.80, (4th May 2009)

DISCUSSION

Majority of patients on hemodialysis were male (70.0% *vs.* 30.0%). This shows male dominance for seeking the treatment in the third world countries. In our study average age of patient was 42.33 yrs which was comparable with age of patients with ESKD from neighboring countries like India.[6]

HTN was the leading cause of ESKD (55.0%) followed by DM (24.0%), CGN (15.0%), RPGN (3.0%) and others (3.0%) where studies from neighboring countries like

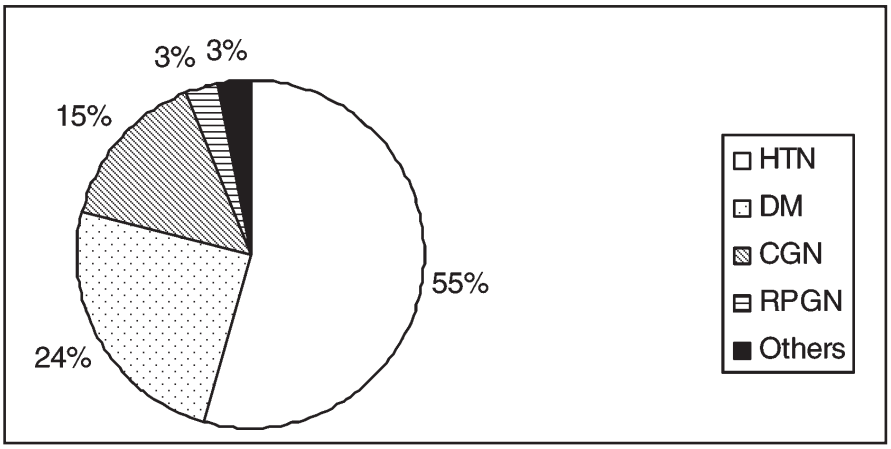
Table-2: Complications during hemodialysis

Complications	%
Hypotension	45.0
Hypertension	25.0
Muscle cramps	25.0
Chest pain	5.0
Total	100.0

India showed DM and CGN as the leading causes.[6-7] One study from Tribhuwan University Teaching Hospital shows CGN as leading cause of chronic kidney disease (CKD).[8] But study on CKD 5 in NMCTH by author and colleagues showed HTN as the leading cause of CKD.[9] To address this variable results, large scale multicentered study is required.

Distal AV fistula was the common vascular access used for hemodialysis (67.0%) followed by temporary vascular catheter (18.0%) and proximal AV fistula (15.0%). This is similar to other part of the world. In most places, nephrologists prefer placing of Scribner shunt and later converting it into AV fistula.[10]

Hypotension was commonly observed complication during dialysis (45.0%) followed by HTN (25.0%), muscle cramps (25.0%) and chest pain (5.0%). Cause of hypotension is multifactorial. Excess removal of fluid, use of antihypertensives, anaemia, food ingestion during dialysis, use of acetate dialysate and autonomic neuropathy are the common factors responsible for intradialytic hypotension. Hypotension may be associated with myocardial ischaemia, cardiac arrhythmias, seizure etc. It is a commonly observed complication in other centers too.[11] HTN during or immediately after dialysis is associated with significant



HTN= Hypertension, DM= Diabetes mellitus, CGN= Chronic Glomerulonephritis, RPGN= Rapidly Progressive Glomerulonephritis

Fig.1. Causes of end stage kidney disease

cardiovascular morbidity and mortality. Approximately 75.0% of ESKD patients need therapy for HTN. HTN is due to hyperactive Renin Angiotensin System (RAS) in response to excess fluid removal.[12]

Muscle cramp is usually seen in later part of dialysis. It is due to increased tonic muscle electrical activity throughout dialysis and associated with raised serum creatinine kinase. Exact pathogenesis is not known but dialysis induced volume contraction and hypo-osmolar state are common predisposing factors.[13] Mild chest pain or discomfort occurs in 1-4 % of dialysis patients which is comparable with our study where 5.0 % of patients complained of chest pain during hemodialysis. Exact cause is unknown. Hemodialysis air embolism, pericarditis and angina are the probable causes of chest pain during dialysis. Chest pain should be diagnosed and treated accordingly.

Average Hb was 9.4 g% which is lower than the recommended target Hb (11-13 g%).[14] Low Hb is also observed in the study of hemodialysis patients in Iran.[15] This could be due to inadequate nutrients and blood and/ or EPO use. Low Hb could be responsible for physical inactivity in most of our patients. Blood transfusion was the main modality of anaemia correction (75.0% vs. 25.0% cases). EPO along with intravenous iron sucrose for correction of anaemia was used less frequently. Cost could be the reason behind it. Just reverse is the scenario in developed world. Correction of anaemia is associated with improved quality of life.[16,17] High phosphorus observed in our study is comparable with the study done in Iran.[15]

A well functioning vascular access is essential for delivery of adequate dialysis. For long term vascular access, endogenous AV fistula at wrist (distal) or arm (proximal) is constructed. But for immediate use as well as in patients with poor vascular access, temporary catheter and artificial grafts are recommended.[18]

HTN was the leading cause of ESKD on hemodialysis. Distal AV fistula was the common vascular access used for dialysis. Hypotension, HTN, muscle cramps and chest pain were the common complications observed during dialysis. Average Hb was low in the study population. Blood transfusion was main modality for correction of anaemia. Majority of patients on dialysis were physically inactive and unaware of their disease and its treatment modality.

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