

Descriptive Analysis of Patients with Chronic Kidney Disease Treated in the Hemodialysis Department of the General Hospital of Playa Del Carmen

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ABSTRACT

Introduction: Hemodialysis is the most common form of renal replacement therapy in the world, accounting for approximately 69% of all renal replacement therapy, and 89% of all dialysis. **Material and Methods:** An observational, retrospective study was carried out using descriptive statistics in a group of patients currently undergoing hemodialysis treatment in the hemodialysis service of the General Hospital of Playa Del Carmen. Two groups (male and female) with 9 patients each were formed. Measures of central tendency and dispersion (mean, standard deviation, and minimum and maximum) were used for quantitative variables, as well as frequency, and percentage analyses for qualitative variables. **Results:** Eighteen patients on current hemodialysis were analyzed. The most commonly used catheter was the Mahurkar type. The number of sessions was in men 4 cases 3 times a week, and 5 cases 2 times a week; in women there were 4 cases 1 day a week, 2 cases 2 days a week, and 3 cases 3 days a week. **Discussion:** Some aspects of that review included associations between surgical procedures for vascular access and amputation. In patients with, and without diabetes, both variables increased after the start of hemodialysis therapy. In our review, there were only 2 cases of knuckle amputation. **Conclusions:** Current trends are particularly worrying from a global perspective: current costs are not sustainable, even for high-income countries; most people who develop kidney failure forgo treatment, resulting in millions of deaths each year.

Keywords: Chronic Kidney Disease, Hemodialysis, Diabetes Mellitus 2, Anemia Amputations.

INTRODUCTION

Hemodialysis (HD) is the most common form of renal replacement therapy in the world, accounting for approximately 69% of all renal replacement therapies, and 89% of all dialysis. Over the past six decades since the inception of HD, dialysis technology, and patient access to therapy have

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advanced considerably, particularly in high-income countries. However, the availability, accessibility, cost, and outcomes of HD vary widely throughout the world, and rates of deterioration in the quality of life, morbidity, and mortality are generally high. Cardiovascular disease affects more than two-thirds of people receiving HD, is the main cause of morbidity, and accounts for almost 50% of mortality [1].

In one representative sample of the Chilean population, the prevalence of reduced renal function estimated by eGFR (estimated Glomerular Filtration) $<60\text{mL}/\text{min}/1.73\text{m}^2$ [Chronic Kidney Disease (CKD)] stages G3a–G5] in adults aged 18 years, and older was 3.2% in the most recent survey. Recent (ENS 2016–2017; National Health Survey) of Chile has a younger developing population structure compared to developed countries such as the United Kingdom; therefore we would expect a lower crude prevalence of CKD. In addition, there is great heterogeneity between countries in the prevalence of comorbidity. Conditions for CKD such as diabetes, hypertension, and other demographic and socioeconomic factors such as age, diet, educational level, geography, and pollution [2].

Courville K et al. [3], carried out a retrospective descriptive study in a nephrology reference hospital comparing a group of 15 patients with CKDnt with 91 patients with CKDt. Patients with (Chronic Kidney Disease no traditional (CKDnt)) had a median age of 58 years (IQR: 52–61), significantly younger ($p<0.001$) than patients with [Chronic Kidney Disease traditional (CKDt)] with a median age of 71 years (IQR: 64–78). Patients with CKDnt had a history of being agricultural (60%), and transportation (20%) workers, significantly higher than patients with CKDt (15%, $p<0.001$ and 0%, $p<0.01$, respectively). Renal atrophy and hyperuricemia are significant clinical markers of CKDnt ($p<0.001$ and $p<0.05$, respectively).

Keogh SA et al. [4], they conducted a study in Central America with farm, and construction workers where, despite efforts to recruit healthy workers, more than 7% of the participants had CKD at baseline, indicating hidden kidney disease within this population. The highest baseline prevalence was observed among sugar cane workers above 14%. They also observed a high prevalence of CKD in the non-agricultural brick-kiln industry, adding to the evidence that non-agricultural exposures are associated with kidney disease.

Motedayen M et al. [5], reports that arterial hypertension is a risk factor for kidney disease. Therefore, their study aimed to estimate the prevalence of hypertension in renal patients in Iran through a meta-analysis. In 35 reviewed studies with a sample of 39,621 subjects, the prevalence of hypertension in renal patients was 35% (95% CI: 29%–41%) (25% in women and 18% in men). The prevalence of systolic hypertension in renal patients was 5%, diastolic hypertension 26%, and diabetes 23%. The prevalence of hypertension in patients on hemodialysis was 34%, and CKDnt is common among sugar cane cutters.

Recurrent heat stress and dehydration is the leading hypothesis. CRP levels in cane cutters with kidney injury were higher than levels typically observed in populations with poorer kidney function; therefore, it is unlikely that reduced renal function per se causes elevated CRP. Rather, elevated levels of CRP appear to be associated with decreased kidney function, suggesting a systemic inflammatory condition causing kidney injury, systemic inflammation induced by recent kidney injury by another factor, or a process causing both systemic inflammation, and kidney injury in parallel whose resolution it can be affected by daily repetition of pro-inflammatory triggers [6].

MATERIAL AND METHODS

An observational, retrospective study was carried out using descriptive statistics in a group of 18 patients currently undergoing hemodialysis treatment in the hemodialysis service of the General Hospital of Playa Del Carmen. Two groups (male and female) with 9 patients each were formed. Measures of central tendency and dispersion (mean, standard deviation, minimum and maximum and confidence intervals) were used for quantitative variables as well as non-parametric analysis, and qualitative variables frequencies, and percentages. Inclusion criteria: patients currently undergo hemodialysis treatment, exclusion criteria: none. For the statistical analysis, the Excel Office program was used. As it is a descriptive analysis, no hypothesis was established for the study.

RESULTS

Eighteen patients on current hemodialysis (9 men, and 9 women) were analyzed. The general characteristics are presented in Table 1. The laboratory analyzes are presented in Table 2. The most used catheter was the Mahurkar type in

6 men, and 7 in women; 2 Permacath in men; 1 Niagara in men; 1 bilateral JJ, and 1 palindrome in women. The number of sessions was in men 4 cases 3 times a week, and 5 cases 2 times a week; in women there were 4 cases 1 day a week, 2 cases 2 days a week, and 3 cases 3 days a week. Regarding

the surgical history related to chronic renal failure, in men, there was one case of nephrectomy due to lithiasis, and two knee amputations; in women, one presented renal lithiasis, polycystic renal disease, and one case of preeclampsia.

Table 1. Clinical features of 18 patients of Department of Hemodialysis of General Hospital of Playa Del Carmen, Solidaridad, Q. Roo. México.

Relevant clinical features	CKD in men (n=9) mean \pm SD (maximum-minimum)	CKD in women (n=9) mean \pm SD (maximum-minimum)
Age	50 \pm 8.6 (37-62)	54 \pm 14 (29-76)
Gender	n (%)	n (%)
Men	9 (50)	9 (50)
History of alcohol intake	3 (33)	0 (0)
History of smoking	2 (22)	2 (22)
History Diabetes mellitus 2	9 (100)	4 (44)
History of hypertension	7 (77)	9 (100)
Urinalysis (proteinuria)	2 (22)	3 (33)
Uremia	6 (66)	4 (44)
History of transfusions	2 (22)	3 (33)
virus panel	9 (100)	9 (100)
Malnutrition	5 (55)	4 (44)
bone mineral disorder	7 (77)	6 (66)
Diabetic foot	2 (22)	0 (0)

Table 2. Laboratory results of 18 patients with CKD of Department of Hemodialysis of General Hospital Playa del Carmen, Solidaridad Q. Roo. México.

Reagent	Laboratory: mean \pm SD; maximum-minimum; (CI95%)			
	Men		Women	
Hemoglobin (12-15 g/dL)	8 \pm 1 (7-10)	95%CI(7-9)	9.4 \pm 2(7-11)	95%CI(92-95)
Glucose (60-100 mg/dL)	130 \pm 45 (45-188)	95%CI(95-164)	120 \pm 6(28-197)	95%CI(89-98)
Urea (17-43 mg/dL)	99 \pm 99 (4.3-310)	95%CI(23-175)	100 \pm 7(30-244)	95%CI(94-105)
Creatinine (6-23 mg/dL)	8 \pm 78 (0.62-25)	95%(-52-68)	8.6 \pm 5(3-20)	95%CI(82-90)
Sodium (136-144 mEq/L)	138 \pm 4 (133-144)	95%CI(135-141)	128 \pm 15(100-139)	95%CI(116-139)
Calcium (101-111 mg/dL)	7.7 \pm 1 (5.8-9.5)	95%CI(76-78)	8 \pm 1(6-10)	95%CI(7-9)
Potassium (3.6-5.1 mEq/L)	5 \pm 2 (2-7)	95%CI(3-6)	5 \pm 1(5-6)	95%CI(4-6)
Dry weight (kg)	66 \pm 12 (50-86)	95%CI(47-75)	51 \pm 3(47-58)	95%CI(49-53)

DISCUSSION

In a prospective 2-year follow-up study in hemodialysis patients with diabetic foot wounds who were treated with PTA, and minor amputation, it was found that only 42% of patients survived without reamputation with a 2-year postoperative mortality rate of 39%. Other aspects of that review included associations between surgical procedures for vascular access and amputation. In patients with and without diabetes, both variables increased after the start of hemodialysis therapy. In our review, there were only 2 cases of knuckle amputation in men [7].

Regarding hospital-acquired infections, some studies report that a longer duration of HD was a risk factor associated with nosocomial infections, while a positive correlation was determined between HD-associated Bloodstream infection (HABSI) and diabetes, the number of HD sessions, and the length of hospital stay. The risk of HABSI increased significantly with HbA1c levels greater than 7%. Some studies showed a significant relationship between nosocomial infections, and the age of the patients, with HBV infections being more common in young individuals, while there was a strong relationship between HCV infections in the older group. A positive history and the number of blood transfusions were significantly associated with HBV or HCV infection. In addition, it was found that patients with multiple comorbidities, with more catheter sites (two or more), low hemoglobin concentration, low leukocyte count, and longer duration of catheterization, had a higher risk of developing nosocomial infections; the patients reviewed were outpatients who attend their hemodialysis on a scheduled basis [8].

Multiple factors influence the risk of mortality in elderly patients on hemodialysis. Geriatric deterioration is related to poor outcomes. The decline and falls in elderly dialysis patients are strongly, and independently associated with mortality. Functional impairment, cognitive impairment, and falls were independently associated with increased mortality in elderly hemodialysis patients. Low body mass index conferred a mortality risk parallel to that of frailty as a marker of premature death. Of our cases, there were 3 cases of men older than 60 years, and 2 women older than 70 years [9].

There is gender, and sex differences that negatively affect women with CF from the initial diagnosis to access to renal replacement therapy, including kidney transplantation. Some studies have shown a lower quality of life among women on

HD. The gender differences in the care of renal patients have been scarcely studied. One study found that women had similar self-care skills to men, but had higher self-efficacy scores [10].

Frailty has been defined as an impairment syndrome or frailty state of 21% to 73% in hemodialysis patients. Of greater vulnerability to stressful situations, resulting from decline associated with aging. Patients on hemodialysis have a high prevalence of frailty. Frailty is associated with bad short-term results, and higher rates of mortality, visits to hospital emergency departments, and hospitalization [11].

More than 90% of patients who receive in-center hemodialysis for end-stage renal disease receive it three times a week. Most attend sessions on Monday, Wednesday, and Friday, or Tuesday, Thursday, and Saturday. As a result, there are two days consecutive periods without treatment at the end of the dialysis week. The data show an association between increased mortality, and hospitalization on the first day after this 2-day break from HD, regardless of whether this day falls on Monday or Tuesday [12].

The skeletal muscle is one of the main tissues affected by chronic kidney disease. Patients undergoing chronic hemodialysis (CHD) are known to experience loss of muscle mass (MM), muscle strength, and physical function (PF) due to many factors such as the dialysis procedure inducing a catabolic state, insufficient intake of food, multiple endocrine disorders, persistent inflammation, acidosis, and physical inactivity, among others. The reduction of MM, and PF, and poor nutritional status are directly associated with premature death, hospitalizations, frailty, and disability. The improvement of both MM domains (muscle size, and quality) is important for dialysis patients because both are strong predictors of mortality, and skeletal muscle dysfunction leads to limited mobility, and loss of functional independence, which can translate into poor quality of life [13].

Loss of appetite is common in patients with end-stage renal disease undergoing maintenance hemodialysis and is a cause of protein, and energy-wasting syndrome. Loss of appetite is associated with symptoms of depression, and anxiety, high concentrations of pro-inflammatory cytokines, hospitalization, decreased quality of life and increased mortality. The Appetite and Diet Assessment Tool (ADAT) is a nutrition-specific instrument used to measure the prevalence of anorexia in hemodialysis patients. A low score is associated

with adverse clinical outcomes, such as hospitalization, and risk of death [14].

Regarding sleep quality in patients with CKD, and uremia, it was found that hemodialysis patients had several sleep quality problems, and the incidence of sleep disorders was 62%. Experimental results of this work show that the incidence of sleep disorders in diabetic nephropathy is 90%. This can be combined with many complications in patients with diabetes, which in turn affects the quality of sleep for patients. It can increase patient mortality and affect the quality of life, and survival [15].

Regarding the physical activity of these patients, aerobic exercise seems to improve systemic inflammation when performed at medium intensity, while resistance training produces better results when performed at high intensity. However, some studies did not report differences after exercise, and these results should be taken with caution [16].

Regarding the acid-base balance in renal patients, most of the research has focused on showing the importance of HCO₃ or pH measurements and establishing therapeutic goals for dialysis patients. Advanced CKD is associated with chronic metabolic acidosis. When evaluating the acid-base status in dialysis patients, it must be taken into account that the physiological response to respiratory disorders is abnormal, especially in anuric patients; therefore, serum bicarbonate levels depend on the HCO₃ provided by the dialysate bath; this implies the need to adjust the HCO₃ concentration in the dialysate bath depending on the associated respiratory disorders to avoid detrimental effects caused by the therapy (cardiac arrhythmias in patients with respiratory alkalosis receiving high bicarbonate loads with the dialysate bath to achieve a target serum HCO₃ greater than 22 mmol/L) [17].

Anemia in CKD can appear from early stages (stages 2, and 3 of the KDIGO guidelines), with drops in Hb when the glomerular filtration rate estimated (eGFR) is around 70 ml/min/1.73 m² (men), and 50 ml/min/1.73 m² (women). However, it is usual for it to appear in stage 4 (even earlier in diabetic patients), and worsens as CKD progresses. In advanced stages, and patients on dialysis, about 90% of patients have anemia; in this review, all patients presented normochromic normocytic anemia [18].

The diet of kidney patients on HD is restricted in different nutrients, such as potassium, phosphorus, and sodium, as well

as purines when hyperuricemia is detected. These restrictions, along with other dietary factors, may increase the patient's risk. Uric acid (UA) is the end product of purine metabolism, and hyperuricemia, defined as levels of 6.0, and 7.0 mg/dL in women, and men, has been linked to cardiovascular events. In addition, hyperuricemia has been associated with the incidence of CKD in healthy subjects; one reason has been the role of AU as an oxidizing molecule [19].

Patients undergoing hemodialysis develop both structural and functional cardiovascular abnormalities. The pathophysiological mechanisms of these changes are complex, and not well understood. Several non-traditional risk factors related to uremia, especially the long-term uremic state, have been postulated to affect the cardiovascular system. Many cardiovascular changes occur in CKD, including left ventricular hypertrophy, myocardial fibrosis, microvascular disease, accelerated atherosclerosis, and arteriosclerosis. These changes make them susceptible to myocardial ischemia [20,21].

CONCLUSIONS

The development of dialysis by pioneers like Willem Kolff and Belding Scribner launched several dramatic changes in epidemiology, economics, and frameworks. Ethics for the treatment of renal failure. Current trends are particularly worrying from a global perspective: current costs are not sustainable, even for high-income countries, and worldwide, the majority of people who develop kidney failure forgo treatment, resulting in millions of deaths each year.

CONFLICT OF INTEREST

None.

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