شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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قسم

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The impact of low Sodium dialysate on different echocardiographic parameters in prevalent hemodialysis patients

Thesis

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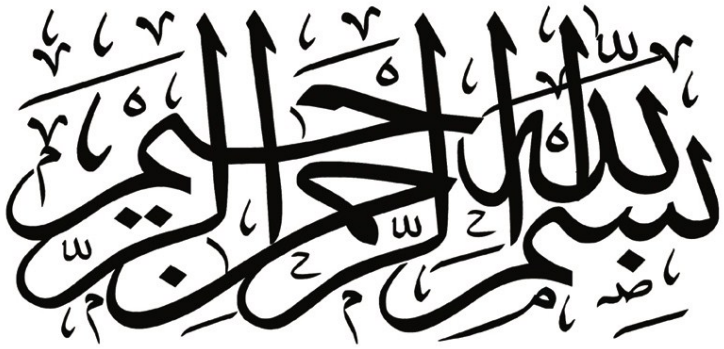

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة آية ٣٢

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List of Abbreviations

BP	blood pressure
BSA	body surface area
CRF	chronic renal failure
CVD	Cardiovascular disease
D-NA	Dialysate Na
ECV	extra cellular volume
ECW	extracellular water
EF	Ejection fraction
ESRD	end-stage renal disease
FO	Fluid overload
FS	fractional shortening
FTI	fat tissue index
HD	Hemodialysis
HTN	Hypertension
ICW	intracellular water
IDWG	incease both BP and intra-dialytic weight gain
IVCD	inferior vein cava diameter
IVS	interventricular septum
LA	Left atrium
LAV	Left atrial volume
LAVI	left atrial volume index
LTI	lean tissue index
LV	left ventricular
LV	left ventricle
LVDD	LV diastolic diameter
LVEF	Left ventricle ejection fraction
LVMI	left ventricle mass index
LVSD	LV systolic diameter
MR	mitral regurgitation
PA	phase angle
PAP	pulmonary artery pressure
RRF	residual renal function
SD	standard deviation
TAFO	time averaged fluid overload
TAPSE	tricuspid annular plane systolic excursion
TR	tricuspid regurgitation
UF	ultrafiltration
URR	urea reduction rate

ABSTRACT

Background; Chronic fluid overload is frequent in hemodialysis patients (P) and it associates with hypertension, left ventricular hypertrophy (LVH) and higher mortality. Moreover, echocardiographic data assessing fluid overload is limited, **Aim and objectives;** to determine the impact of decreased dialysate Na on cardiac functions and different echocardiographic parameters in prevalent heamodialysis patients, **Subjects and methods;** This study is Prospective study, was conducted on 45 patients on regular Hemodialysis at Al demerdash hemodialysis unit, through a period of 6 months, **Result;** there was high statistically significant difference between different periods as regard PR interval also there was statistically significant difference between different periods as regard QRS duration and QT interval., **Conclusion;** A reduction of the dialysate sodium concentration based on the predialysis sodium levels of the patients could reduce the SBP and decrease the volume load on heart. Within this short period, DBP could not be lowered. The effect of this approach should be studied in broad and lengthy series. A short follow-up period, lack of control group, and small sample size are the limitations of this study**, Keywords; renal failure; hemodialysis; low-sodium dialysate; echocardiography**.

INTRODUCTION

ESRD affects about 15% of adult population,leading to increased morbidity and mortality **(Gansevroot et al., 2011)**

Historically, hemodialysis treatments used low dialysate sodium (D-NA) in the range of 120mEq/L to enable elimination of excess sodium from the body. Over time, higher D-Na (~140mEq/L) was used to improve hemodynamic stability during dialysis. **(McCausland et al., 2014)**

Patients with renal failure who undergo HD cannot constrain their Na intake, thus develop significant saline excess between dialyses.

Dialysate Na concentrations are an important factor in Na overload. Large changes in circulating volume via Na intake or dialysate, including increase of left ventricular (LV) filling pressure have been demonstrated to result in significant alterations in transmitral flow Doppler indices. Doppler echocardiography has been reported as an effective none invasive tool for evaluation of left ventricular diastolic function with characteristic changes observed in transmitral Doppler flow caused by impaired left ventricular filling Diastolic dysfunction is associated with abnormal mechanical functions of the myocardium and consists of impaired filling and delayed LV relaxation, irrespective of whether the EF is normal or depressed **(Munos Mendoza J et al., 2015).**

Sodium loading by either excessive dietary intake or excessive diffusion viadialysate has been shown to incease both BP and intra-dialytic weight gain (IDWG). Moreover, elevation inplasma [Na+] can induce hypertension independently ofEC fluid volume, through

mechanisms that probably in-clude stiffening of vascular endothelium **(Heckingm et al., 2013).**

A number of observational studies as well as small and oftenun controlled clinical studies have shown that lower dialysate [Na+] associates with less thrist, lower IDWG, lower ECF volume, and lower BP, Patients with high fluid gains between dialysis sessions (interdialytic weight gain; IDWG) are wubjected to high UFR to achieve their dry weight within the limitation of their session length. Both high IDWG and high UFR are associated with high morbidity and mortality **(Flythe et al., 2013).**

A" Volume First" approach is needed to improve outcomes, Limiting salt intake and avoiding sodium is the main contributor to extracellular osmolality, and sodium loading is associated with water retention and inceased blood pressure. Patients requiring dialysis are advised to limit theiroral sodium intake to help reduce IDWG **(WEINER DE et al., 2014).**

As residual renal function declines, sodium is almost exclusively lost on dialysis. Through convection, sodium moves with water removed during ultrafiltration. The other process that affects sodium balance during dialysis is diffusion, with sodium moving down its concentration gradient from blood to dialysate or vice versa. Several factors come into play affect this process **(Basil C et al., 2016).**

The sum of these factors result in that if D-Na is higher than S-Na, sodium diffusion takes place from dialysate toserum, resulting in a postdialysis serum sodium that is higher than the predialysis

concentration. This in turn causes high BP and, bystimulating thrist, increases IDWG.

Lowering D-Na is associated with several other effects including:-

- lower pulmonary artery pressure,lower inferior vena cava diameter, improved left ventricular diastolic properties, regression of left ventricular hypertrophy , reduced left ventricular systolic diameter, and reduced tricuspid regurge **(Akyol et al.,2016).**
- Reported improvements in vascular endothelial function include reduced arterial stiffness as measured by pulse wave velocity **(Liu et al., 2016).**
- Improved endothelial function as measured by brachial artery flow – thickness **(Gumrukcuoglu et al, 2012).**

Patients with ESRD have a high prevalence of conventional and nonconventional cardiac risk factors nevertheless; traditional CV risk factors have been insufficient to explain the severity and extent of CV complications in ESRD patients. Reported that the combined use of endothelial dysfunction (asymmetric dimethyl larginine), biomarkers of inflammation (CRP), and myocardiopathy (BNP) in ESRD patients increases the explanatory power of all cause and CV mortality by approximately 20%. Moreover, recent studies have shown that cardiac troponin T, BNP, NT-proBNP, and high-sensitivity CRP are significantly related to one another, indicating a complex relationship among inflammation, cardiac biomarkers, malnutrition, and over hydration in dialysis patient **(Jacobs et al., 2010).**

*Aim Of The Wor*k

To determine the impact of decreased dialysate Na on cardiac functions and different echocardiographic parameters in prevalent heamodialysis patients.