# INTERDIALYTIC WEIGHT GAIN AND ITS RELATION TO OUTCOME AMONG PATIENTS ON MAINTENANCE HEMODIALYSIS

*Thesis*

***Submitted for Partial Fulfillment of Master Degree in Nephrology***


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*Masoud Khairy Ibrahim*

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# List of abbreviations

| | |
|---|---|
| **ADMA** | asymmetric dimethylarginine |
| **APC** | antigen-presenting cell |
| **AV** | Arteriovenous |
| **AVF** | arterio - venous fistula |
| **AVG** | Arterio- venous graft |
| **BIP** | Biolar |
| **BMI** | body mass index |
| **BP** | blood pressure |
| **Ca** | Calcium |
| **CAD** | coronary artery disease |
| **cAMP** | Cyclical adenosine monophopsphate |
| **CHOIR** | The Correction of Hemoglobin and Outcomes in Renal Insufficiency |
| **CKD** | Chronic kidney disease |
| **CKD-MBD** | chronic kidney disease – mineral and bone disorder |
| **CRF** | chronic renal failure |
| **CV** | Cardiovascular |
| **CVD** | cardio-vascular diseases |
| **DM** | DIABETES MILLITUS |
| **ECG** | Electrocardiogram |
| **ECV** | |
| **EDD** | End Diastolic Diameter |
| **EDV** | End Diastolic volume |
| **EF** | ejection fraction |
| **ESD** | End Systolic Diameter |
| **ESRD** | end stage renal disease |
| **ESV** | End Systolic volume |
| **FDA** | Food and Drug Administration |

| | |
|---|---|
| **FGF** | fibroblast growth factor |
| **FGF** | fibroblast growth factor |
| **GFR** | Glomerular filteration rate |
| **Hcy** | Homocysteine |
| **HD** | Hemodialysis |
| **HTN** | HYPERTENSION |
| **ICV** | inter cellular volume |
| **IDWG** | Interdialytic weight gain |
| **iPTH** | intact parathyroid hormone |
| **IVC** | inferior vena cava |
| **KDIGO** | Kidney Disease: Improving Global Outcomes |
| **KDOQI** | Kidney Disease Outcomes Quality Initiative |
| **LA** | left atrium |
| **LV** | left ventricular |
| **LVH** | left ventricular hypertrophy |
| **MACCE** | major adverse cardiac and cerebrovascular events |
| **MBF** | Myocardial blood flow |
| **MBF** | myocardial blood flow |
| **mTOR** | mammalian target of rapamycin |
| **NAR** | nitrogen appearance rate |
| **PD** | peritoneal dialysis |
| **Po4** | Phosphate |
| **PTH** | parathyroid hormone |
| **PW** | posterior wall |
| **RPV** | Relative plasma volume |
| **TTE** | Trans thoracic Echocardiography |

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# Introduction

# Introduction

Patients with end stage renal disease (ESRD) represent an important and increasingly prevalent portion of the medical patient, and the burden of concomitant illness is high in this patient population. Among ESRD patients treated with hemodialysis, the rate of hospitalization is 1.84/patient-year, with nearly one-third of these hospitalizations for cardiovascular (CV) causes ***(Cabrera et al., 2015).***

Fluid retention is a major clinical problem in individuals with ESRD, and is associated with lower extremity edema, anasarca, ascites, pulmonary vascular congestion or edema, hypertension and worsening heart failure ***(Kalantar-Zadeh et al., 2009)***.

Interdialytic weight gain (IDWG), which corresponds to ultrafiltration losses during hemodialysis (HD), is the result of salt and water ingestion minus urine outputbetween two consecutive dialysis sessions ***(Leeet al., 2014).***

Theoretically, the consequences of this variable have a double meaning. On one hand, the water and salt intake occur frequently with caloric and protein foods, which mean it, would be associated with a better nutritional status (***Kalantar-Zadeh et al., 2009)***

But, on the other hand, water and salt intake can give rise to a volume overload, which can be the key for the developing of high blood pressure and left ventriclular hypertrophy, both of which can increase the cardiovascular risk ***(Kalantar-Zadehet al., 2009).***

Other factors affecting IDWG include: residual renal function, sodium concentration in the dialysis fluid, saline solution infusions during the HD session, especially during its final minutes (***Lopez-Gomez et al., 2005)***

Chronic kidney disease (CKD) is associated with increased cardiovascular morbidity, even from early stages. Decreased glomerular filtration rat (GFR) is a strong predictor of cardiovascular events, even in the absence of other cardiac risk factors. Risk for cardiovascular disease in CKD patients is 10 – 30 times higher than in non-CKD individuals and mortality from cardio-vascular diseases (CVD) accounts for approximately 50% from all causes of death in dialysis population. Predisposing features for developing CVD in CKD patients include both traditional and nontraditional uremia associated factors ***(Nechita et al., 2015).***

The phenomenon of HD induced myocardial stunning is common and associated with reductions in myocardial contractile function and patient survival. Measurement of myocardial blood flow (MBF) during dialysis demonstrated that HD can precipitate myocardial ischemia ***(Burton et al., 2003).***

Myocardial stunning was originally described as ‘delayed recovery of regional myocardial contractile function after reperfusion despite the absence of irreversible damage and despite restoration of normal flow’. Transient episodes of myocardial ischemia leading to prolonged left ventricular (LV) dysfunction were established as a cause of heart failure ***(Zuidema & Dellsperge, 2012).***

In a multivariate analysis, age, predialysis cardiac troponin T levels, hypotension during dialysis, and ultrafiltration volumes independently predicted the occurrence of HD-induced cardiac injury and myocardial stunning ***(Zuidema and Dellsperger, 2012).***

Previous studies have revealed that excessive IDWG is associated with adverse clinical outcomes, and to be an independent predictor of all-causes and cardiovascular mortality in patients undergoing long-term HD. In addition, accumulating evidence shows that IDWG is significantly associated with increase in blood pressure (BP) and left ventricular hypertrophy (LVH), both of which can increase the risk of cardiovascular mortality in patients with end-stage renal disease (ESRD) ***(Leeet al., 2014).***

The mechanism by which IDWG affects cardiovascular morbidity and mortality can be speculated from the cardiovascular burden of volume overload, volume fluctuation, and arterial hypertension. Daily fluctuations in extracellular fluid volume might promote cardiac remodeling by the activation of mammalian target of rapamycin (mTOR) pathway**,** sympathetic nervous system, and renin-angiotensin-aldosterone pathway resulting in LVH and cardiac fibrosis ***(Lee et al., 2014).***

# Aim of the Work

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To assess interdialytic weight gain and (its relation to morbidity and mortality) among patients on maintenance hemodialysis.

# Review of Literature