Effect of intradialytic exercise on the inflammatory markers in prevalent hemodialysis patients

Thesis

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تاثيرالتمرينات اثناء جلسه الغسيل على علامات الالتهابات لدى مرضى الفشل الكلوي الذين على غسيل الكلى بانتظام

رسالة

توطئة للحصول علي درجة الماجستير في الباطنة العامة

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Contents

List of Abbreviations

CKD:	Chronic kidney disease
DAMPs:.....	Danger-associated molecular patterns
HMGB1:.....	High-mobility group box 1
PAMPs:	Pathogens express pathogen-associated molecular Patterns
LPS:.....	Lipopolysaccharide
DC:	Dendritic cell
PRRs:	Pattern recognition receptors
IL-1:.....	Interleukin-1
IL-6:.....	Interleukin-6
TNF-α:.....	Tumor necrosis factor-alpha
CRP:	C-reactive protein
TGF-b1:	Tumor growth factor-b1
ESRD:.....	End-stage renal disease
PEW:	Protein-energy wasting
MICS:.....	Malnutrition-inflammation-cachexia syndrome
CVD:.....	Cardiovascular disease
HD:	Hemodialysis
PD:.....	Peritoneal dialysis
GFR:.....	Glomular filtration rate
AGEs:	Advanced glycosylation end-products
AVF:	Arteriovenous fistula
HTN:.....	Hypertension
DM:.....	Diabetis mellitus
IHD:.....	Ischemic heart disease
LVH:.....	Left ventricular hypertrophy
ED:.....	Endothelial dysfunction
MBD:	Mineral bone disease
METs:.....	Metabolic equivalent tasks
PRT:	Progressive resistance training
RPE:	Rate of perceived exertion
CHF:.....	Congestive heart failure
BMI:	Body mass index
6-MWT:	6- minute walk test
SPBT:	Short Physical Performance Battery test
ELISA:	Enzyme linked immune sorbent assay

COPD:..... Chronic obstructive pulmonary disease.
Hg: ..... Hemoglobin
WBC:..... White blood cell Count CRPTG : triglycerides

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ABSTRACT

Background: Chronic low-grade inflammation is a feature of chronic kidney disease associated with increased risk of multiple morbidities and mortalities. Dialysis patients lead a sedentary life style which could add to this risk.

Aim: assessment of the effect of intradialytic exercise IDE on inflammatory markers in prevalent hemodialysis HD patients**. Patients and Methods:** This longitudinal prospective study included 40 adult patients on regular HD, divided equally into 2 groups; Exercise Group (n=20); received IDE 3 times/ week for 3 months and Non-exercise Group (n=20) matched in age and sex acting as controls. Patients were subjected to full history taking and clinical examination. Physical performance assessment using Short Physical Performance Battery tests (SPBT), Laboratory investigations included; Complete blood picture, C-reactive protein (CRP) and interleukin 6 (IL6) assessed using Enzyme linked immunosorbent assay. All assessments were repeated 3 months after regular IDE. **Results:** At baseline, there was no difference between both groups regarding physical performance or inflammatory markers. After 3 months, SPBT was significantly increased in Exercise group ($P<0.001$). Also, both serum CRP and IL-6 levels showed significant decrease in Exercise group compared to baseline ($P<0.001$), while no similar change was noticed in non-exercise group.

Conclusion: The significant decrease in serum CRP and IL-6 levels after 3 months of regular IDE and the improvement in physical performance in exercise group implements that regular IDE exercise training program can improve physical function and inflammation in hemodialysis patients. Further studies on larger number of patients is warranted.

Keywords: Intradialytic exercise, Hemodialysis, CRP, IL-6

INTRODUCTION

Chronic, low-grade inflammation is considered a hallmark feature of chronic kidney disease (CKD), being involved in the development of multiple morbidities and mortality of these patients ***(Mihai et al., 2018).*** The etiology of chronic inflammation in CKD has not yet been completely elucidated. However, it has been described as multifactorial. These factors include; exogenous factors like dialysis membranes and central venous catheters, cellular factors like oxidative stress and cellular senescence. As well as tissue factors, like hypoxia and fluid and sodium overload, microbial factors like gut dysbiosis and finally, retention of uremic toxins ***(Cobo et al., 2018).***

In healthy individuals, studies have consistently shown an inverse association between markers of systemic inflammation and frequency of physical exercise ***(Lee et al., 2012, Sparling et al 2015, Streese et al., 2018).***

Physical exercise plays a key-role as non-pharmacological treatment of CKD. Exercise in dialysis patients has been shown to decrease oxidative stress ***(Wilund et al., 2010)***, improve endothelial function and reduce cardiovascular risk factors ***(*Oliveira e Silva et al., 2019)***. Furthermore, it may also reduce the inflammatory process in these patients ***(Dong et al., 2019)***. In a recent study by **Torres et al., 2020**, intradialytic exercise improved physical function, lipid and anemia profile in

dialysis patients. However, remains scarce studies that have verified the effect of exercise on chronic low- grade inflammation markers in patients undergoing haemodialysis.

Aim of the work

To assess the effect of intradialytic aerobic exercise on inflammatory markers in prevalent hemodialysis patients.

INFLAMMATION AND END STAGE RENAL DISEASE

Inflammation:

Definition:

The classical definition of inflammation comprising redness, warmth, pain and swelling, as described by Celsus, and loss of function as added by Galen ***(Paus et al., 2018)***.

Inflammation is a complex biological response of body tissues to harmful stimuli, to eliminate the cause of injury, protect from further damage, and initiate tissue repair. Inflammation is a rather generic term that covers a broad range of types of responses depending on the causal stimulus and subsequent actions involving pathogenic cells, stromal cells, and cells of the innate and adaptive immune system, in varying composition. All inflammatory conditions can lead to progressive tissue destruction. ***(Paus et al., 2018)***

Types of inflammation:

Inflammation can be acute or chronic.

Acute inflammation is rapid onset, short duration and lasting from a few minutes to as long as a few days, and characterized by fluid and plasma protein exudation and a predominantly neutrophilic leukocyte accumulation.