Effect of Omega 3 Fatty Acids Supplementation on Patency of Arteriovenous Access in Hemodialysis Patients

Thesis
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List of Contents

List of Tables

List of Tables (Cont.)

Table No.	Title	Page

List of Figures

List of Figures (Cont.)

List of Figures (Cont.)

List of Figures (Cont.)

List of Abbreviations

AA .....Arachidonic Acid

ACE .....Angiotensin-Converting Enzyme

ACR.....Albumin to Creatinine Ratio

AHA.....American Heart Association

AKI.....Acute Kidney Injury

ALA .....α-Linolenic Acid

ARBs .....Angiotensin Receptor Blockers

AusDiab.....Australian Diabetes

AV .....Arteriovenus

AVF .....Arteriovenous Fistula

AVG.....Arteriovenous Graft

CARI.....The Australian Caring for Australasians with Renal Impairment

CHD.....Coronary Heart Disease

CKD.....Chronic kidney Disease

COX.....Cyclooxygenase

Cr .....Creatinine

CS .....Cross-Sectional

CSN .....Canadian Society of Nephrology

CVD .....Cardiovascular Disease

DHA.....Docosahexanoic Acid

DOQI .....The National Kidney Fondation Dialysis Outcomes Quality Initiatives

ECM .....Extracellular Matrix

eGFR .....Estimated Glomerular Filtration Rate

EPA .....Eicosapentanoic Acid

EPIC.....European Prospective Investigation into Cancer Study

List of Abbreviations (Cont.)

EPO ..... Erythropoietin

ePTFE ..... Expanded Polytetrafluoroethylene

ESRD ..... End Stage Renal Disease

F ..... Female

FA ..... Fatty Acid

GFR ..... Glomerular Filtration Rate

GISSI ..... Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto miocardico

HDL ..... High Density Lipoprotein

INR ..... International Normalised Ratio

K/DOQI ..... The Kidney Disease Outcomes Quality Initiative

KDIGO ..... The Kidney Disease: Improving Global Outcomes

L ..... Longitudinal

LDL ..... Low Density Lipoprotein

LOX ..... Lipooxygenase

LT ..... Leukotriene

M ..... Male

MA ..... Microalbuminuria

MDRD ..... The Modification of Diet in Renal Disease

N ..... Number of Participants

n-3 PUFAs ..... Omega 3 Polyunsaturated Fatty Acids

NEJM ..... The New England Journal of Medicine

NEOERICA ..... New Opportunities for Early Renal Intervention by Computerised Assessment

NFkB ..... Nuclear Factor Kappa Light Chain

NHANES ..... National Health and Nutrition Evaluation Survey

List of Abbreviations (Cont.)

NICE.....National Institute of Health and Clinical Excellence

NP .....Nonpredictive

NSAIDs.....Non Steroidal Anti-Inflammatory Drugs

PDGF.....Platelet-Derived Growth Factor

PET .....Polyethylene Terephthalate

PKD.....Polycystic Kidney Disease

PR .....Predictive

PREVEND.....Prevention of Renal and Vascular Endstage Disease

PTFE .....Polytetrafluoroethylene

PTH.....Parathyroid Hormone

RAAS.....The Renin-Angiotensin-Aldosterone System

RCM.....Radiocontrast Material

RCT.....Randomized Controlled Trial

RR.....Relative Risk

RRT.....Renal Replacement Therapy

T3.....Tri Iodothyronine

T4.....Thyroxine

The pl-TFE.....The Plasma Tetrafluoroethylene

TxA.....Thromboxane

U.K.....The United Kingdom

US .....United State

USRDS.....The United States Renal Data System

Introduction

Maintaining vascular access in hemodialysis patient is considered a challenge since the portal is vulnerable to infection, stenosis, and thrombosis. Vascular access options for hemodialysis patients include the placement of arteriovenous fistulas, arteriovenous grafts, and double lumen, cuffed central venous catheters ***(Frederick 2010).***

Catheter use is generally associated with higher rates of infection and could compromise the adequacy of hemodialysis ***(Quarello et al., 2006).*** Other risk factors linked to catheter use include increased thrombosis, unreliable blood flows, central venous stenosis and patient cosmetic concern ***(Quarello et al., 2006).***

In United States, 55% of patients are allocated towards AV fistula, 21% towards AV grafts and 24% double lumen dialysis catheter ***(Charmaine et al., 2012).***

Thrombosis occurs in more than 50% of all arteriovenous grafts within 1 year after placement, necessitating a salvage procedure in more than 75% ***(Charmaine et al., 2012).***

Risk factors for access failure include increased age, female gender, hypertension, diabetes mellitus, and positive HIV status ***(Schild 2004).***

Various studies have attempted to discover a pharmacological approach to minimize vascular access failure induced by thrombosis most of them were equivocal and needed further time to reassess ***(Frederick 2010).***

Novel strategies to prevent dialysis access thrombosis are needed to reduce the cost and morbidity of maintenance hemodialysis. Diets enriched with ω-3 fatty acids, derived from fish oil, may offer such an opportunity. Such diets may favorably impact the vascular perturbations that could contribute to synthetic graft thrombosis.

Lok 2007, in his study reported the value of ω-3 fatty acids in protecting the vascular access against thrombosis.

Other pharmacological agents such as warfarin were deemed ineffective and the trial was prematurely terminated due to increased bleeding episodes in hemodialysis patients ***(Crowther 2002).***

Aim of the Work

Our study is a prospective study aiming to evaluate the role of ω-3 fatty acids in preserving the patency of arteriovascular fistulas and grafts in hemodialysis patients.

Chapter (I): Epidemiology and Pathophysiology of Chronic Kidney Disease

Definition

Chronic kidney disease (CKD) is defined as kidney damage or glomerular filtration rate (GFR) below 60 ml/min per 1.73 m2 for 3 months or more irrespective of the cause. The Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines have classified CKD into five stages ***(K/DOQI, 2002).***

This classification, although useful in simplifying the categorization of CKD, has its limitations, which include classifying people with isolated microalbuminuria as suffering from CKD, labeling mild and stable kidney damage as CKD, and not differentiating between age-related impaired kidney function and progressive disease-induced CKD ***(Glassock and Winearls, 2008).***

In 2005, the Kidney Disease Improving Global Outcomes (KDIGO) group suggested clarifications including the addition of the suffix T for patients with renal allografts and D to identify CKD stage 5 patients on dialysis ***(Levey et al., 2007).***

The U.K. National Institute of Health and Clinical Excellence (NICE) has modified, in 2008, the KDOQI CKD classification by subdividing CKD stage 3 into 3A and 3B,