

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

Thesis

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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	Arteriovenous
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 Foundation 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	.....	Lipoxygenase
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
NFκB	.....	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 (*Glasscock 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,