# Evaluation of Fetuin-A Level and Valvular Calcification in Prevelant Hemodialysis Patients

*Thesis Submitted for Partial Fulfillment of Master Degree in Internal Medicine*


*BY*

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# Dedication

**To**

*My Family for their warm affection, patience, encouragement, and for always being there when I needed them*

**To**

*My fiancée and the future wife Marwa for always supporting, helping and encouraging me in performing the study*

بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا

إلا ما علمتنا إنك أنت

العليم الحكيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

# Contents

# List of Abbreviations

| | | |
|---|---|---|
| **ACE** | : | Angiotensin convertin enzyme |
| **ADMA** | : | Asymmetric dymethyl arginine |
| **AGEs** | : | Advanced glycation end products |
| **AHSG** | : | $\alpha_2$-Heremans and Schmid glycoprotein |
| **ALP** | : | Alkaline phosphatase |
| **AoC** | : | Thoracic aorta calcification |
| **APP** | : | Acute Phase Protien |
| **AS** | : | Aortic stenosis |
| **ATP III** | : | Third Adult Treatment Panel |
| **BBB** | : | Blood brain barrier |
| **BCP** | : | Basic calcium phosphate |
| **BMI** | : | Body mass index |
| **BMP** | : | Bone morphogenetic protein |
| **BP** | : | Blood pressure |
| **Ca** | : | Calcium |
| **CAC** | : | Coronary artery calcification |
| **CAD** | : | Coronary arteryt disease |
| **CAII** | : | Carbonic anhydrase II |
| **Cbfa 1** | : | Core binding factor a-1 |
| **CHD** | : | Coronary heart disease |
| **CIMT** | : | Carotid artery intima-media thickness |
| **CKD** | : | Chronic kidney disease |
| **CKD–MBD** | : | Chronic kidney disease–mineral bone disease |
| **CPPs** | : | Calciprotein particles |

| | | |
|---|---|---|
| **CRF** | : | Chronic renal failure |
| **CRP** | : | C-reactive protein |
| **CT** | : | computed tomography |
| **CVD** | : | Cardiovascular disease |
| **DAMPs** | : | Damage-associated molecular patterns |
| **DM** | : | Diabetes mellitus |
| **EN-RAGE** | : | Extracellular newly identified RAGE-binding protein |
| **ESRD** | : | End stage renal disease |
| **FGF-23** | : | Fibroblast growth factor-23 |
| **FMC** | : | Fetuin mineral complexes |
| **FRS** | : | Framingham Risk Score |
| **GFR** | : | Glomerular filtration rate |
| **GLA** | : | Glutamic acid |
| **GLUT-1** | : | Glucose transporter gene-1 |
| **HA** | : | Hydroxyapatite |
| **HD** | : | Hemodialysis |
| **HDL** | : | High density lipoprotein |
| **HDL-C** | : | High density lipoprotein - cholesterol |
| **HF:** | : | Heart failure |
| **Hgb** | : | Hemoglobin |
| **HMGB1** | : | High-mobility group box protein 1 |
| **HTN** | : | Hypertension |
| **IDL** | : | Intermediate-density lipoprotein |
| **IFN-γ** | : | Interferon gamma |
| **IL** | : | Interleukin |
| **i-PTH** | : | Intact parathormone |

| | | |
|---|---|---|
| **kD** | : | Kilo Dalton |
| **LDL** | : | Low density lipoprotein |
| **LDL-C** | : | Low density lipoprotein- cholesterol |
| **Lp(a** | : | Lipoprotein a |
| **LVH** | : | Left ventricular hypertrophy |
| **MAC** | : | Mitral annular calcification |
| **MCAo** | : | Middle cerebral artery occlusion |
| **MGP** | : | Matrix Gla protein |
| **MI** | : | Myocardial infarction |
| **MIA** | : | Malnutrition, inflammation, and atherosclerosis |
| **MMP-9** | : | Metalloproteinase-9 |
| **MMPs** | : | Metalloproteinases |
| **NTPPPH** | : | Nucleoside triphosphate pyrophosphohydrlase |
| **OPG** | : | Osteoprotegerin |
| **OPN** | : | Osteopontin |
| **PAMPs** | : | Pathogen associated molecular patterns |
| **PDGF** | : | Platelet-derived growth factor |
| **PEW** | : | Protein energy wasting |
| **Pit-1** | : | Sodium-dependent phosphate co-transporter |
| **PO4** | : | Phosphorus |
| **PP** | : | Pyrophosphate |
| **PTH** | : | parathyroid hormone |
| **PTHrP** | : | PTH-related peptide |
| **PTX3** | : | Pentraxin 3 |
| **PWV** | : | Pulse wave velocity |

| | | |
|---|---|---|
| **RANKL** | : | Receptor activator of nuclear factor-kappa B ligand |
| **ROS** | : | Reactive oxygen species |
| **RRT** | : | Renal replacement therapy |
| **Runx-2** | : | Runt-related transcription factor-2 |
| **SHP** | : | Secondary hyperparathyroidism |
| **SPP1** | : | Secreted phosphoprotein-1 |
| **sRAGE** | : | Soluble receptor for advanced glycation end products |
| **STCs** | : | Soft-tissue calcifications |
| **sTRAIL** | : | Soluble TNF-related apoptosis-inducing ligand |
| **sTWEAK** | : | Soluble TNF-like weak inducer of apoptosis |
| **TAVI** | : | Transcatheter aortic valve implantation |
| **TC** | : | Total cholesterol |
| **TGF** | : | Transforming growth factor |
| **TGF-β1** | : | Transforming growth factor-β1 |
| **tHcy** | : | Total plasma homocysteine |
| **TNF** | : | Tumor necrosis factor |
| **TRAIL** | : | Tumor necrosis factor-related apoptosis-inducing ligand |
| **ucMGP** | : | Under-carboxylated MGP |
| **USRDS** | : | United States Renal Data System |
| **VEGF** | : | Vascular endothelial growth factor |
| **VLDL** | : | Very-low-density lipoprotein |
| **VSMC** | : | Vascular smooth muscle cell |

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