THE RELATION BETWEEN BETA-BLOCKERS AND BONE MINERAL DENISTY AMONG ELDERLY PATIENTS

Thesis
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Master Degree in Geriatric Medicine
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List of Abbreviations

α : Alpha.

ACE : Angiotensin-converting enzyme.

Acute MI : Acute myocardial infarction.

ADL : Activities of daily living.

AF : Atrial fibrillation.

ANOVA : Analysis of variance.

APS : Antipsychotics.

AR : Aortic regurgitation.

ASH : Asymmetric septal hypertrophy.

AV conduction : Atrioventricular conduction.

AWS : Alcohol withdrawal syndrome.

β : Beta.

β-blockers : Beta blockers.

BD : Bone density.

BMD : Bone mineral density.

BMI : Body mass index.

CAD : Coronary heart disease.

Cbfa1 : Core-Binding Factor, Runt Domain, Alpha Subunit 1.

CCB : Calcium-channel blockers.

CGRP : Calcitonin gene-related peptide.

CHF : Congestive heart failure.

CIs : 95% confidence intervals.

CNS : Central nervous system.

COPD : Chronic obstructive pulmonary disease.

CT scan : Computerized tomography.

CTX : Serum C-terminal telopeptide of type I collagen.

DEXA : Dual x-ray absorptiometry.

DOPS : Danish osteoporosis prevention study.

fDPD : Urine free deoxypyridinoline.

GAD : Generalized anxiety disorder.

GDS : Geriatric depression scale.

GI : Gastrointestinal.

GIT : Gastrointestinal tract.

GMCSF : Granulocyte macrophage colony-stimulating factor.

HCM : Hypertrophic cardiomyopathy.

HDL : High density lipoprotein.

IADL : Instrumental activities of daily living.

IGF : Insulin-like growth factor.

IHSS : Idiopathic hypertrophic subaortic stenosis.

IL : Interleukin.

ISA : Intrinsic sympathomimetic activity.

LV : left ventricle.

MCSF1 : Membrane-bound isoform of CSF1 (macrophage colony-stimulating factor-1).

MMSE : Mini mental status examination.

MRI : Magnetic resonance imaging.

NIMH : The National Institute of Mental Health.

NKA : natural killer cell activity.

OCD : Obsessive-compulsive disorder.

OCIF : Osteoclastogenesis inhibitory factor.

ODF : Osteoclast differentiation factor.

OPGL : Osteoprotegerin ligand.

ORs : Crude odds ratio.

p.c. : personal computer.

PDGF : Platelet-Derived Growth Factor.

PGE2 : Prostoglandin E2**.**

PINP : Serum procollagen type-I-N-terminal propeptide.

PTH : Parathyroid hormone.

PTSD : Post traumatic stress disorder.

r : Pearson's correlation coefficient.

RANKL : Receptor Activator of NF-{kappa}B ligand ; it is a member of the TNF family of cytokines.

SCD : Sudden cardiac death.

SD : Standard deviation.

SNS : Sympathetic nervous system.

SP : Substance P.

TGF : Transforming growth factor.

TNF : Tumor necrosis factor.

TRANCE : Tumor necrosis factor-related activation-induced cytokine.

US Food and Drug Administration : United states food and drug administration.

VIP : Vasoactive intestinal peptide.

WHO : World Health Organization.

WPW : Wolff-Parkinson-White Syndrome.

X^2 : Chi square test.

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Introduction

Osteoporosis is a metabolic bone disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and increased fracture risk **(Heaney ,1998).**

World Health Organization (WHO) defines osteoporosis as bone density (BD) that is 2.5 standard deviation (SD) or more below the young adult mean value (T-score < -2.5), while individuals with BD between 1 and 2.5 SD below average (T-score = -1 to -2.5) are said to have osteopenia **(kanis et al.,2001).** Decreased BD imparts increased risk for bone fracture. Every 1 SD decrease in BD of the spine below the mean increases risk for new vertebral fracture by factor of 2.0 - 2.4 **(Stone et al.,2003).**

Dual x-ray absorptiometry (DEXA) is widely accepted as a standard technique for BMD measurements. The standard DEXA measurement consists of spine and hip imaging in anterior-posterior projection **(wasnich , 2001).**

All beta-blockers equally effective for hypertensive patients **(Prichard et al., 2001)**, reduce symptoms in stable angina **(Papine et al.,1994)** , reduce mortality when

administered long term after myocardial infarction **(William et al.,2003)**, control atrial fibrillation **(Komaroff,1999)**, hypertrophic cardiomyopathy, prevention of Intraoperative Cardiac Events, in prophylaxis of Migraine **(Limmroth et al.,2001)** , used in essential tremor and pheochromocytoma **(Sendón et al., 2004).**

Beta blockers build stronger bones; a study done by **(Pasco et al.,2004)** suggests that taking beta-blockers associated with reduced risk of a broken bone.

A role for osteoblastic beta adreceptors in bone regulation is suggested by finding that beta blockers reduce the risk of fracture partly by increasing bone mineral density **(Henry et al.,2004).**

The cental nervous system has been shown to regulate bone mass possibly by way of β2 adrenoceptors on osteoblasts. Animal studies have suggested that beta adrenergic blockers can increase bone formation by inhibiting the catabolic effect of sympathetic nervous system on bone **(Levasseur et al.,2005) .**