The Effect of Left Ventricular Geometry on Myocardial Performance Index in Hypertensive Patients

Thesis Submitted for fulfilment of Master Degree in Cardiology

By

Mohammed Yasser Allam

M.B.B.Ch

Supervised by

Dr. Ramez Guindy

Professor of Cardiology

Faculty of medicine- Ain Shams University

Dr. Mohamed Ahmed Abd El Rahman

Lecturer of Cardiology

Faculty of medicine- Ain Shams University

Faculty of medicine

Ain Shams University

2016

Acknowledgement

First and foremost, thanks to **Allah the Almighty** to whom I relate any success in achieving any work in my life.

I would like to express my very great appreciation to **Dr., Ramez Guindy,** Professor of cardiology Faculty of Medicine, Ain Shams University, for his precious instructions, expert supervision and valuable comments during the course of this work.

I would like to offer my special thanks and deep appreciation to **Dr. Mohamed Ahmed Abd El Rahman**, Lecturer of cardiology Faculty of Medicine, Ain Shams University, for his help and valuable advice and suggestions throughout the performance of this work.

I wish to thank my wife D**r. Noura** who support me from the first step and do everything to complete my study.

I wish to thank **my parents, sisters and brothers** for their undivided support; they helped and encouraged me to complete my work.

I would like also to thank my dear friend **Dr. Azza Omran;** she helped me a lot to complete my work. And also my friends in **El Matrya Teaching Hospital.**

List of content

List of the Figures

List of the Tables

List of the abbreviation

ACE	angiotensin converting enzyme
ANG	angiotensin
AT	angiotensin type
BMI	body mass index
BP	blood pressure
BSA	body surface area
CAD	coronary artery disease
CH	concentric hypertrophy
CKD	chronic kidney disease
CR	concentric remodling
CVD	cardiovascular disease
DBP	diastolic blood pressure
ECFV	extracellular fluid volume
EF	ejection fraction
EH	eccentric hypertrophy
ESRD	end stage renal disease
ET	ejection time
FS	fractional shortening
GFR	Glomerular filtration rate
HCM	hypertrophic cardiomyopathy

HDL	high density lipoprotein
HTN-CM	hypertensive cardiomyopathy
ICT	isovolumetric contraction time
IHD	ischemic heart disease
IRT	isovolumetric relaxation time
IVSd	interventricular septal thickness diastole
LDL	low density lipoprotein
LV	left ventricle
LVH	left ventricular hypertrophy
LVIDd	left ventricle internal dimension diastole
LVIDs	left ventricle internal dimension systole
LVM	left ventricle mass
LVMI	left ventricular mass index
MAP	mean arterial pressure
MI	myocardial infarction
MPI	myocardial performance index
NG	normal geometry
NHP	Egyptian National Hypertension Project
NSAID	non-steroidal anti-inflammatory drug
PWTd	posterior wall thickness diastole
RAAS	renin–angiotensin–aldosterone system
RAS	renin angiotensin system
RWT	relative wall thickness

SBP	systolic blood pressure
TGF	tubuloglomerular feedback
TI	Tei index
VSMC	vascular smooth muscle cell
WHO	world health organization

Introduction

Introduction

Systemic arterial hypertension is defined as a resting systolic blood pressure (SBP) 140 mm Hg or greater, and diastolic blood pressure (DBP) 90 mm Hg or greater in patients with these BP values treatment induced BP reductions are beneficial **(Mancia et. al., 2013).**

Almost three-quarters of people with hypertension (639 million people) live in developing countries with limited health resources. The overall prevalence rate of pre-hypertension and hypertension in Egypt were 57.2% and17.6% respectively. Only 25.2% of the population had normal blood pressure levels of <120/80 mmHg. (**Zawilla, 2013).**

The changes in left ventricular (LV) structure and geometry that evolve after myocardial injury or overload usually involve chamber dilation and/or hypertrophy. Such architectural remodeling can be classified as eccentric or concentric. Consideration of LV volume, mass, and relative wall thickness (or mass/volume) allows classification of LV remodeling that includes virtually all LV remodeling changes that are seen in health and diseased person. LVH is a strong independent predictor of cardiovascular morbidity and mortality. In case of hypertension, it increases the risk of stroke, ischemic heart disease, and eventually congestive heart failure. Pressure overload of the left ventricle results in an increment in ventricular mass with a high relative wall thickness (RWT); the earliest change appears to be an increase in RWT before there is a detectable increase in LV mass. These architectural changes seen in concentric hypertrophy and concentric remodelling provide a mechanism for maintenance of normal LV systolic wall stress in the presence of a high systolic pressure. Such preservation of systolic wall stress allows maintenance of normal or near-normal LV systolic function and performance **(Gaasch and Zile , 2011).**

The combination of left ventricular mass index (LVMI) and relative wall thickness (RWT) were be used to identify different patterns of left ventricular geometry:

- Concentric hypertrophy (increased LVMI and RWT).
- Concentric remodelling (normal LVMI and increased RWT).
- Eccentric hypertrophy (increased LVMI and normal RWT).
- Normal geometry (Normal LVMI and RWT) **(Drazner, 2011).**

The Tei index of myocardial performance is a combined index of systolic and diastolic dysfunction and has been shown to be a predictor of cardiovascular outcome in heart disease. The relationship between the Tei index and left ventricular geometry has not been well studied **(Akintunde et al., 2011)**

Aim of the Study

Aim of the study

To assess the relationship between left ventricular geometry and the myocardial performance index among hypertensive patients.