
Dedication
To my mother for her support
To my wife for her encourgement
To my children for their tolerance

استجابة الجهاز الدوري للتمرينات الهوائية في مرضى السكر المصحوب بالتهاب الجهاز العصبي اللاإرادي

رسالة مقدمة

توطئة للحصول على درجة الماجستير في العلاج الطبيعي

مقدمة من

محمد عبد الستار محمد حميدة

بكالوريوس العلاج الطبيعي ١٩٩٦

هيئة الإشراف

د. عوني فؤاد رحمي

أستاذ مساعد بقسم العلاج الطبيعي لاضطرابات الجهاز الدوري و التنفسي و المسنين. كلية العلاج الطبيعي - جامعة القاهرة

أ.د. أيمن فتحي قداح

أستاذ الأمراض الباطنة و القلب - كلية الطب. جامعة القاهرة

د. السيد عبد الحميد أبو شنب

مدرس بقسم العلاج الطبيعي لاضطرابات الجهاز الدوري و التنفسي و المسنين

كلية العلاج الطبيعي - جامعة القاهرة

كلية العلاج الطبيعي

جامعة القاهرة

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Contents

List of Abbreviations

ALC ——— AcetylLCarnitine

AVN ——— Atrio-ventricular node

BMI ——— Body mass index

CAN ——— Cardiac autonomic neuropathy

COX ——— Cyclooxygenase

DBP ——— Diastolic blood pressure

DM ——— Diabetes mellitus

ECG ——— Electrocardiograph

EFA ——— Essential fatty acid

E/I ratio ——— Expiration to inspiration ratio

EPO ——— Evening Primrose Oil

FBG ——— Fasting blood glucose

GLA ——— Gamma-linolenic acid

HR – – – – – – – – Heart rate

HR_{max} – – – – – – – Maximum Heart rate

IDDM – – – – – – – Insulin dependant diabetes mellitus

NIDDM – – – – – – Non-insulin dependant diabetes mellitus

OR – – – – – – – – Odds ratio

PGI2, – – – – – – – Prostaglandins

PVD – – – – – – – – Peripheral vascular diseases

SAN – – – – – – – – – Sino-atrial node

SBP – – – – – – – – Systolic blood pressure

SMBG – – – – – – – – Self-monitoring of blood glucose

TxA2 – – – – – – – Thromboxane A2

VO_{2max} – – – – – – Maximal O_2 consumption

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Chapter I
Introduction

Introduction

Diabetes Mellitus is a chronic, multifaceted disorder caused by reduction in insulin action and secretion or the both, it's characterized by hyperglycemia and disruption of the metabolism of carbohydrates, fats and proteins, over time, it results in small and large vessels complications and neuropathies. This disease is ranked as the third cause of death and leading factor of blindness (American Diabetes Association 1998).

Since 1979, diabetes has been classified according to the various types of glucose abnormalities, this classification system not only provide for the insulin dependant diabetes mellitus (IDDM) and non-insulin dependant diabetes mellitus (NIDDM), but also, includes persons with impaired glucose tolerance abnormalities (Goodman 1990).

The Complications of diabetes mellitus are macro and microvscular disorders, central, Peripheral and autonomic neuropathy. The autonomic neuropathy is the most common complication of the long standing diabetes, It's due to the accumulation of sorbitol in nerve cell that result in abnormal fluid and electrolyte shift, which causes nerve cell dysfunction, neuropathy may affect the central, peripheral and autonomic nervous system (Stansberry et al., 1994).

Diabetic Neuropathy is one of the most common complications of long-standing diabetes mellitus. The prevention of this poorly understood "syndrome" is very crucial and starts from the time of the diagnosis. The symptoms are

numbness, irritation and pain, usually in the extremities. The pain can be severe and effectively destroy the quality of one's life (Steven et al; 1991).

Postural hypotension is defined as a fall in systolic blood pressure than20 mmHg or diastolic blood pressure than 10 mmHg or more, it occurs in diabetic patients as a consequence of efferent sympathetic vasomotor denervation that cause reduced vasoconstriction of the splanchic and other peripheral vascularbeds (Aristidon 1998).

Postural hypotension is caused by the failure of reflex vasoconstriction in the splanchnic area and the subcutaneous tissues, its extent is related to the severity of baroreflex dysfunction (Kahn et al; 1988). As a result of this vasoconstrictive dysfunction, the blood pressure response to exercise does not increase to expect levels in these patients. A lower mean systolic blood pressure response at comparable relative exercise workloads in patients with autonomic neuropathy compared to diabetic subjects without this complication has been reported (Sisson et al; 1987). However, they also found these patients occasionally have severely exaggerated increases in blood pressure (Schneider et al; 1984).

Nearly everyone with diabetes can derive some benefit from an exercise program, although not all benefits will be realized by each person with diabetes. Both health care professionals and patients with diabetes need to remember this when determining the components of an exercise program. When chronic complications of diabetes develop the benefits and risks of exercise must be carefully considered maximize the benefits and assure safety. This is especially

true when evaluating the use of exercise in diabetes complicated by autonomic neuropathy (Devlin and Ruderman; 1995).

Statement of the Problem

Does acrobic exercise training has an effect on cardiovascular system in diabetic patients with and without autonomic neuropathy?

Aim of the Study

To evaluate the effect of aerobic exercises training on the cardiovascular changes in diabetic patients with autonomic neuropathy.

Significance of the study

Most studies were done to investigate autonomic neuropathy, its clinical features and impacts. Cardiovascular disorders and postural hypotension are the most clinical features of diabetic neuropathy, which may be the most common causes of recurrent falling, so, it's assumed that this study will provide a significant scientific basis used for constructing effective program for improving autonomic neuropathy, in turn will lead to reduce secondary complications such as recurrent falling and bed redden problems (Craig 1994).

Hypothesis

There are no significant changes in cardiovascular response to aerobic exercise training in diabetic patients with autonomic neuropathy.

Chapter II
Review of Literature