Effect of Progressive Resistive Exercise on Systemic Hypertension

A Thesis

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By

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تأثير تمرينات المقاومة المتزايدة على مرضى ارتفاع ضغط الدم

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تأثير تمرينات المقاومة المتزايدة على ضغط الدم المرتفع /عماد محمد ابراهيم طه / قسم العلاج الطبيعى لاضطرابات الجهاز الدورى التنفسى والمسنين ، كلية العلاج الطبيعى ، جامعة القاهرة ، ٢٠٠٨ ، رسالة ماجستير./ هيئة الإشراف: أ.د/ **زينب حلمى**. أستاذ ورئيس قسم العلاج الطبيعى لاضطرابات الجهاز الدوري التنفسي و المسنين ، كلية العلاج الطبيعي - جامعة القاهرة. **أ.د/ نجوى عيد صبحى**. أستاذ امراض الباطنة، كلية الطب – جامعة القاهرة. د. أكرم عبد العزيز. مدرس بقسم العلاج الطبيعى لاضطرابات الجهاز الدوري التنفسي و المسنين ، كلية العلاج الطبيعي - جامعة القاهرة.

المستخلص

هدف الرسالة هو تقييم تأثير تمرينات المقاومة المتزايدة على ضغط الدم المرتفع. أجري البحث على أربعين سيدة مريضة يعانين من ارتفاع ضغط الدم - تتراوح أعمارهم بين ثلاثين و خمسين عاما ويتراوح معدل كتلة الجسم ما بين ٢٥ – ٣٥ كجم/م^{٢}. تم تقسيمهن الى مجموعتين، كل مجموعة تتكون من عشرين مريضة. المجموعة الاولى (أ) تلقت تمرينات المقاومة المتزايدة بالاضافة الى الانتظام على ادوية الضغط المعتادة، بينما التزمت المجموعة الثانية (ب) بأدوية الضغط المعتادة فقط. وقد استمر البرنامج لمدة عشرة اسابيع (بمعدل ثلاث جلسات اسبوعيا). وقد تم قياس و تسجيل مستوى ضغط الدم قبل بدء و بعد البرنامج العلاجى لكلا المجموعتين **وقد أظهرت النتائج وجود فروق ذات دلالة إحصائية تشير إلى وجود تحسن ملحوظ في مستوى ضغط الدم لدى المرضى المشاركين فى المجموعة الاولى (أ) ونقص ملحوظ فى جرعات أدوية علاج الضغط، بينما لم تظهرالمجموعة (ب) أية فروق ذات دلالة إحصائية فى مستوى ضغط الدم لدى المرضى المشاركين فيها.. لذلك يوصى باستخدام** تمرينات المقومة المتزايدة بالاضافة الى ادوية الضغط المعتادة لخفض مستوى ضغط الدم عند مرضى ضغط الدم المرتفع.

الكلمات الدالة: ارتفاع ضغط الدم ، تمرينات المقاومة المتزايدة.السيدات

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Abstract

The aim of this study was to assess the effect of progressive resistive exercise (PRE) on essential hypertension. Forty Essential Hypertensive female with mild hypertension participated in the study, their age ranged from 30 to 50 years. They were divided into two equal groups. Group (A) performed the PRE program plus taking their ordinary anti-hypertensive medications while group (B) only took their anti-hypertensive medications. The program continued for 10 weeks (three sessions per week). Blood pressure was measured at the beginning of and after the exercise program for both groups. It can be concluded that PRE program for 10 weeks together with antihypertensive drugs produced significant change of the dose of antihypertensive drugs with significant reduction of the systolic blood pressure.

Keywords: Hypertension, Progressive resistive exercise, Females.

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List of Abbreviations

ACE	Angiotensin Converting Enzyme
BP	Blood pressure
BMI	Body Mass Index
CBC	Complete Blood Picture
CV	Cardiovascular
CO	Cardiac Output
DA	Dopamenrgic
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
EH	Essential Hypertension
HTN	Hypertension
HR	Heart Rat
LVH	Left Ventricular Hypertrophy
MET	Metabolic Equivalent
MVC	Maximum Voluntary Ventilation
PIH	Pregnancy Induced Hypertension
PRE	Progressive resistance exercise
RM	Repetition Maximum
SBP	Systolic Blood Pressure
SNA	Sympathetic Neural Activity

Chapter I

Introduction and Aim of the work

The American Society of Hypertension (ASH) announced an expanded definition of hypertension. The new description extends the definition of hypertension beyond a simple blood pressure (BP) reading to include overall cardiovascular (CV) risk, and incorporates the concept that, in many cases, elevated BP may be the effect and not the cause of hypertension. The new definition incorporates the presence or absence of risk factors, early disease markers and target-organ damage, and more accurately represents the different physiological abnormalities in the CV (cardiovascular) system and other organs caused by hypertension**. (Carman et al., 1994)**

Although exercise programs have traditionally emphasized dynamic lower-extremity exercise, research increasingly suggests that complementary resistance training, when appropriately prescribed and supervised, has favorable effects on muscular strength and endurance, cardiovascular function, metabolism, coronary risk factors, and psychosocial well-being. This advisory reviews the role of resistance training in persons with and without cardiovascular disease,

with specific reference to health and fitness benefits, rationale, the complementary role of stretching, relevant physiological considerations, and safety. Participation criteria and prescriptive guidelines are also provided. **(Michael et al., 2000).**

Systolic blood pressure increases in proportion to the rise in cardiac output, whereas diastolic blood pressure is determined by the balance between vasodilatation and vasoconstriction in the vascular beds (i.e. total peripheral resistance). During dynamic exercise with a large active muscle mass, diastolic blood pressure may decrease at higher exercise intensities. Despite this, the increase in systolic blood pressure results in an elevated mean arterial pressure during incremental exercise. The simultaneous increase in blood pressure and heart rate occurs due to resetting of the baroreflex during exercise **(Norton et al., 1999).**

The principles of progressive resistance exercise (PRE) for increasing force production in muscles have remained virtually unchanged since they were described by DeLorme and Watkins almost 60 years ago. These principles are (1) to perform a small number of repetitions until fatigue, (2) to allow sufficient rest between exercises for recovery,

and (3) to increase the resistance as the ability to generate force increases. These principles are detailed in the guidelines of the American College of Sports Medicine (ACSM), where it is recommended that loads corresponding to an 8- to 12-repetition maximum (RM) be lifted in 1 to 3 sets, training 2 or 3 days each week. An 8RM to 12RM load is the amount of weight that can be lifted through the available range of motion 8 to 12 times before needing a rest**. (DeLorme et. al.; 1948 and American College of Sports Medicine. 2002).**

Meta-analytic review of different studies suggests that dynamic resistance exercise reduces resting systolic and diastolic blood pressure in adults. However, it is premature to form strong conclusions regarding the effects of dynamic resistance exercise on resting blood pressure. A need exists for additional, well-designed studies before a recommendation can be made regarding the efficacy of dynamic resistance exercise as a nonpharmacological therapy for reducing resting blood pressure in adults, especially in hypertensive adults. **(George Kelley**, **1997)**

Anti-hypertensive medications has a lot of side effects that require more effort from Physical therapists to establish

a physical program to decrease the dose of these drugs, the side effects ranged between unsteadiness, weight gain, urinary problems, headache, tiredness and sexual problems. (**John Benson and Nicky Britten, 2006).**

Statement of the problem

As the hypertension became one of the most common diseases facing the health professionals, with increasing number of hypertensive subjects, so this study was made as a trial to control hypertension by using the resistive exercise.

Purpose of the study

The purpose of the study is to determine the effect of progressive resistive exercise on reducing the systemic blood pressure or not.

Limitation

The study will be limited according to:-

1. The patient ability to follow the whole program (10 weeks).
2. Difficulty facing the female patients during the resistive exercise program (musculoskeletal injuries).
3. Small sample size.