



CLINICAL EXERCISE SPECIALIST MANUAL

A Fitness Professional's Guide
to Training People with
CHRONIC DISEASE

J. DANIEL MIKESKA DHSc

CLINICAL EXERCISE SPECIALIST MANUAL

**A FITNESS PROFESSIONAL'S GUIDE TO
EXERCISE AND CHRONIC DISEASE**

BY J. DANIEL MIKESKA, DHSC

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ISBN: 978-1-946533-98-2 hardcover

ISBN: 978-1-946533-99-9 eBook

Publishing Services provided by Niche Pressworks; Indianapolis, IN

<http://NichePressworks.com>

Printed in the United States of America



CHAPTER 8

HYPERTENSION

By the end of this chapter you will understand:

- Hypertension and comorbidities
 - o Prevalence
 - o Risk factors
- Characteristics of prehypertension and hypertension
- Current guidelines and recommendations
 - o Pharmacology
 - o Activity
 - Precautions
 - Contraindications
 - Nutrition

Characteristics

Hypertension (HTN) and prehypertension affect over 160 million U.S. adults, and nearly a billion individuals worldwide. HTN is an independent risk factor for coronary artery disease, stroke, renal failure, heart failure, atrial fibrillation, valvular disease, sudden cardiac death, cardiomyopathy, and aortic aneurysms (Appel et al., 2006). Accordingly, the higher the blood pressure, the greater the risk for a cardiovascular event, kidney failure, or stroke (Carretero & Oparil, 2000; Kenney & Alexander, 2015; Kokubo & Matsumoto, 2016). HTN is the most common chronic disease risk factor; adults over 50 years of age have close to a 90% chance of developing HTN; it is the costliest risk factor for

cardiovascular disease; it is also the most preventable (Appel, et al., 2006; Kenney & Alexander, 2015; Pescatello, MacDonald, Lamberti, & Johnson, 2015).

The cardiac cycle explains what happens when the heart beats. In the systole phase the ventricles contract and pump blood into the vascular system; in the diastole phase the ventricles relax and the heart again fills with blood (Siddiqui, 2011). HTN is characterized by blood pressure of $\geq 140/90$, and pre-hypertension starts at 120/80. Blood pressure is determined by cardiac output $\times$ total peripheral resistance. Cardiac output is the volume of blood pumped by the heart, and total peripheral resistance is systemic vascular resistance, or the resistance that must be overcome to push blood through the circulatory system (Siddiqui, 2011).

Primary HTN, sometimes referred to as essential or idiopathic HTN, accounts for 95% of all HTN cases where the cause is unknown, or there is no known secondary cause (Carretero, & Oparil, 2000). Secondary HTN has a known underlying cause, and can be attributed to obesity, insulin resistance, high alcohol consumption, aging, sedentary lifestyle, stress, high sodium consumption, low daily fiber consumption, or a lack of potassium and/or calcium. These health risks can be identified independently, but are often found in combinations.

Pharmacological Therapy

It is important for a CXS to know the medications a client is prescribed as many common medications used to treat HTN have side effects and may also affect exercise performance. Use, mechanisms, and side effects of common HTN medications are listed in Table 8.1.

Table 8.1

Hypertension medications and side effects

Drug	Mechanism	Side effects	Consideration
Beta Blockers	Blocks beta receptors	Stunts HR May stunt symptoms of hypoglycemia May cause dizziness or fatigue	Measure exercise intensity via RPE rather than HR
Diuretics	Reduces extra-cellular fluid	Dehydration May decrease exercise capacity May cause confusion or weakness	Hydrate. Hydrate, Hydrate
ACE inhibitors and ARBs	Vasodilation	None that effect exercise	May cause hypotension
Calcium channel blockers	Blocks calcium from entering cardiac muscle	Stunts HR May cause orthostatic hypotension, headaches, and dizziness	Measure exercise intensity via RPE rather than HR Stand up carefully and slowly
Angiotensin Receptor Blocker	Blocks angiotensin receptors	Stunts HR May cause orthostatic hypotension, headaches, and dizziness	Measure exercise intensity via RPE rather than HR Stand up carefully and slowly

American College of Sports Medicine [ACSM], 2018; Kenney & Alexander, 2015; Swank & Sharp, 2018

Exercise Training

Due to a reduction in peripheral vascular resistance, exercise training and a high level of fitness are associated with lower levels of HTN. It has been estimated for a 10% weight gain, there is a 6.5 mm Hg increase in systolic BP. Because of the deleterious effects of weight on BP, clients should work toward an expenditure of 2000 kcal/week with a focus on aerobic exercise. For adults with HTN, aerobic exercise training lowers blood pressure 5–7 mmHg, while resistance training lowers blood pressure 2–3 mmHg (Carretero & Oparil, 2000; Pescatello et al., 2015). Due to post-exercise hypotension, it is recommended clients with HTN perform aerobic exercise on most days of the week with an intensity of 40-60% HRR or an RPE of 11-13. Because aerobic training lowers BP to a greater extent than resistance training, resistance training should be used as adjunct to aerobic training and performed 2-3 days per week at an intensity of 60-80% 1RM. Because of the combination of light weights and fast pace, high intensity interval training should also be considered. FITT recommendations for clients with HTN are detailed in Table 8.2.

Similar to CHD, a CXS should not work with clients who have uncontrolled HTN.

Table 8.2

FITT recommendations for hypertension

Controlled HTN	Frequency	Intensity	Time	Type
Aerobic	Preferably all days of the week	Most clients should perform at a moderate intensity: 40-60% HRR RPE of 11-13 Vigorous: 60-80% HRR RPE of 14-16	Most people: 30-60 Min Deconditioned or at-risk: 1-10 min bouts, 3x/day	Rhythmic motion using large muscle groups.
Resistance Training	2-3 days/week with at least 48 hours between bouts	60-70% 1RM (low-moderate) Progress to 80% 1RM Novice and beginners start at 40-50% 1RM	8-12 reps A minimum of one set. 1-4 sets 8-10 exercises (all of major muscle groups) No less than 20 minutes per session	Free weights and machines Avoid the Valsalva maneuver
Flexibility	2-3 days/week	Slight discomfort or mild tightness	Static stretch each major muscle group 2-4 reps 10-30 seconds 10 minutes each session	Static Dynamic PNF
Neuromuscular	2-3 days/week	Low to moderate	20-30 minutes	Yoga Pilates Tai Chi Involve all major muscle groups, using functional movement patterns and flexibility exercises to increase motor skills.

Combined Ideal	Everyday	Low, moderate, or vigorous, with an emphasis on moderate	20-30 minutes/day Total of 90->150 minutes/week	Combine all types, with an emphasis on aerobic and resistance with flexibility and neuromuscular added in.
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ACSM, 2018; Kenney & Alexander, 2015; Pescatello, et al., 2015; Pescatello, 2019; Swank & Sharp, 2018

Caution

It is possible, in clients with HTN, that an increase in arterial blood pressure may dislodge arterial plaque causing a myocardial infarction or stroke. Further, any existing endothelial damage may be exacerbated (ACSM, 2018). Because of a reduction in skin blood flow, clients with HTN may not be able to dissipate heat effectively, disrupting normal thermoregulation (Kenney & Alexander, 2015). Therefore, exercise load needs to be carefully monitored and modified, or ended at the first sign of heat stress. Also, keep in mind, beta-blockers blunt the normal heart rate response nullifying the recommendation of 40-60% HHR, and the RPE scale will have to be used to gauge exercise intensity.

Contraindications and indications for stopping exercise include:

- Onset of angina
- Failure of HR to increase with intensity
- A drop in SBP of ≥ 10 with an increase in intensity
- A change in heart rhythm
- A rise of SBP > 250 or DBP > 115
- Shortness of breath
- Leg cramps or claudication
- Light headedness or confusion
- Pallor or cold and clammy skin
- Nausea
- Signs of severe fatigue

Nutritional Considerations

Although specific meal planning is the responsibility of a registered dietitian, nutrition basics can be discussed as they may affect some aspects of exercise. The list provides general guidelines for clients who suffer from HTN (Appell et al., 2006; Carretero & Oparil, 2000; Kenney & Alexander, 2015; Van Horn et al., 2016).

Keep in mind, it is outside the scope of practice of a CXS to provide nutrition counseling.

- Sodium levels should be kept to 2400mg/day for the general population, and no more than 1500mg/day for individuals suffering from HTN.
- The recommended intake for fiber is 28–30 gm/day.
- The recommended intake for potassium is 4700 mg/day.
- The recommended intake for calcium is 1000-1300 mg/day.
- Fruits and vegetables provide other vitamins and minerals; therefore increasing the consumption of fruits and vegetables is preferable over taking supplements.

Discussion and application

1. Discuss the benefits and concerns of exercise as it relates to HTN.
2. Using FITT, design an exercise program for a client with controlled HTN and explain your decisions

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