

# Healthy lifestyle interventions in general practice

## Part 7: Lifestyle and hypertension

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### Abstract

This article forms the seventh part of the series on the role of lifestyle modification in general practice with specific reference to hypertension. Hypertension is defined as sustained resting blood pressure (BP) above 140/90 mmHg. Approximately 17% of the adult westernised population suffer from this disease. In most cases (> 90%) the cause is unknown and this is referred to as essential or primary hypertension. Untreated hypertension is associated with an increased risk of cerebrovascular disease, heart failure, kidney disease, and coronary artery disease. Lifestyle modifications to introduce healthy behavior are important in both the prevention and management of hypertension<sup>3</sup> and details of these interventions are provided in this article.

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### Introduction

The most comprehensive estimates of the prevalence of hypertension in South Africa are provided by the first Demographic and Health Survey (SADHS) that was conducted in 1998. Using a cut-off of 140/90 mmHg, the prevalence rate, in both genders, was estimated to be 21%. Yet, in another cross-sectional study of adults conducted in a private setting, 55% of subjects had BP readings above 140/90 mmHg.<sup>1</sup> Hypertension was particularly prevalent amongst African subjects with 59% being affected. In the Heart of Soweto Study, 56% of predominantly black Africans, who attended the cardiac clinic at Chris Hani Baragwanath Hospital in Soweto, were diagnosed as hypertensive.<sup>2</sup>

Lifestyle modifications to introduce healthy behaviour are important in the primary prevention of high BP, and are an imperative part of the management of the patient with established hypertension<sup>3</sup> yet details of these interventions are seldom provided to the general practitioner. The lifestyle interventions shown to attenuate blood pressure, reduce cardiac risk and enhance the effects of antihypertensive medications include regular physical exercise, dietary modification and weight loss, stress management and smoking cessation.<sup>3</sup>

### Regular physical exercise

It is well established that participation in regular physical exercise leads to a lower risk of all-cause morbidity and mortality. Indeed, physical inactivity is associated with up to a two-fold risk of both hypertension and coronary artery disease.<sup>4</sup> Thus there are important benefits to the public health recommendations to participate in 30 minutes of moderate to vigorous physical activity on most days of the week.

In individuals with pre-hypertension (120/80 to 139/89 mmHg) lifestyle intervention including physical activity, optimal nutrition and weight management, and stress reduction prevented the onset of hypertension in almost 40% of individuals.<sup>5</sup>

There is compelling evidence that exercise training reduces blood pressure in hypertensive patients.<sup>6,7</sup> Because of differences among studies in the type, intensity, and duration of exercise and baseline blood pressure, there is wide variation in the magnitude of blood pressure reduction across studies. A study conducted in 2003 reported a decrease in blood pressure of about 6/6 mm Hg with 30 to 60 minutes of physical activity per week in previously sedentary hypertensive subjects.<sup>8</sup> Two meta-analyses of 47 and 68 studies respectively, estimated decreases in blood pressure of 6-8/5-6 mmHg in hypertensive patients.<sup>6,7</sup> The weekly exercise dose and BP response after eight weeks of training have been documented. It was found that the BP reduction response to increasing the dose of exercise was sigmoidal with peak effect at 90 minutes/week after which there was no further improvement. Indeed, the authors of this study concluded that relatively modest volumes (> 30 minutes/week) are required to attenuate BP in hypertensive patients. Intensity of exercise should be between 40 to 70% of age predicted maximal heart rate.

The effects of regular exercise appear to be more pronounced in certain hypertensive patient subgroups including i) females, ii) patients with higher diastolic blood pressures, iii) patients with lower body weights, iv) patients who perform less vigorous exercise, and v) patients who have made a long term commitment to participate in regular exercise. Regular exercise is thus an essential adjunct to the pharmacological management of hypertension and may in-fact offset some of the negative effects that some antihypertensive medications may have on risk factors for coronary artery disease, including lipoprotein metabolism.

The mechanisms whereby regular exercise reduces blood pressure in hypertensive patients include neurohumoral, vascular and structural adaptations. Sympathetic inhibition, decreased circulating catecholamine concentrations, decreased total peripheral resistance, improved insulin sensitivity, enhanced receptor sensitivity and alterations in vasodilators and vasoconstrictors as well as genetic factors are thought to explain the antihypertensive effects of exercise.<sup>9-15</sup>

#### Practical exercise prescription in hypertensive patients

The first step in prescribing exercise to hypertensive patients is to ensure that the exercise is safe. It is recommended that the following subsets of patients undergo a medical evaluation (including a stress electrocardiogram [ECG]) before embarking on an exercise programme:

- males older than 45 years or females older than 55 years; and
- any person with hypertension and one other risk factor for coronary artery disease; or
- any person with hypertension who has symptoms suggestive of cardiopulmonary disease, metabolic disease or other major disease

The second step is to educate patients with respect to aspects of safe exercise, in particular the symptoms and signs of an impending cardiac complication (chest pain, excessive shortness of breath, palpitations, dizziness).

The third step is to provide the patient with clear guidelines on the type, frequency, intensity and duration of exercise. Patients without cardiac complications can exercise on their own, but patients with known heart disease (or other major disease) may require supervision.

#### The following exercise guidelines are currently recommended for patients with hypertension

- Type of exercise: this should be predominantly endurance physical activity including: walking, jogging, cycling, swimming, or dancing. This should be supplemented by resistance exercise which can be prescribed according to the American College of Sports Medicine (ACSM) or American Heart Association (AHA) guidelines. Heavy resistance training with high static loads should be avoided in hypertensive patients (exercises with heavy lifting, pushing or pulling).
- Frequency of exercise: most or preferably all days of the week.
- Intensity of exercise: Moderate intensity, 40–70% of age predicted maximal heart rate.
- Duration of exercise: greater than 30 minutes of continuous or accumulated moderate physical activity per day.
- Patients with uncontrolled hypertension should embark on exercise training only after evaluation and initiation of therapy. No exercise should be undertaken if resting systolic BP > 200 mmHg or diastolic BP > 115mmHg.
- Many patients with hypertension are overweight and should therefore be encouraged to follow a programme that combines both exercise training and restricted calorie intake.

#### Practical recommendations for use of antihypertensive agents in exercising individuals

- Prescription of antihypertensive medications for active individuals should be individualised and based on the efficacy of the agent, response of the individual to the agent and the effects on exercise tolerance.

- As beta-blockers may have considerable negative effects on exercise tolerance in certain patients, clinicians should be vigilant for these adverse effects and, if present, should prescribe alternative antihypertensive agents.<sup>16</sup> ACE inhibitors, angiotensin II receptor blockers and calcium channel blockers are generally preferred in physically active hypertensive individuals as they do not alter exercise tolerance to the same extent as beta blockers.<sup>16,17</sup>
- If the prescribing clinician wishes to use a beta blocking agent (e.g. in hypertensive patients with ischaemia), beta1 selective blockers should be prescribed rather than non-selective beta blockers.
- Use of beta-blocking agents will alter heart rate based exercise prescription, thus patients ingesting these agents should undergo exercise testing whilst using the agents. Heart rate based prescription should be adjusted accordingly.
- Non-selective beta-blocking agents and diuretics might increase predisposition to hyperthermia and hypoglycaemia during exercise and therefore patients using these agents who participate in prolonged exercise in the heat should be encouraged to strictly adhere to accepted guidelines for the prevention of heat injury and methods to prevent hypoglycaemia.
- Vasodilators, calcium channel blockers and alpha blockers may cause hypotensive episodes on rapid cessation of exercise. A longer cool down period is therefore recommended.
- As blood pressure in hypertensive individuals tends to be attenuated by exercise training, hypotension at rest or during the exercise bout could become clinically significant over time. The clinician should be aware of this trend and adjust the dose of antihypertensive agent accordingly.

#### Stress, stress management and the relaxation response for hypertensive patients

Most lay people associate stress with hypertension; however the evidence that chronic, psychosocial stress can cause, or contribute to, essential hypertension is disputed. Recently an Australian Specialist Review Council determined that stress is one of the causes of hypertension after consideration of both the epidemiological data and the neural pathophysiology.<sup>18</sup>

While the supporting evidence is emerging, it is also worth considering, conceptually, how the very nature of the chronic stress response is likely to predispose susceptible individuals to either surges of, or sustained elevation in blood pressure.

The acute stress response is an adaptive process which is activated in the face of threat or perturbation to the system, real, implied or imagined. The essence of the neurophysiological cascade is to generate and distribute energy to systems essential for fighting, freezing or fleeing (in the face of the threat) viz the brain and musculoskeletal system. Cardiovascular and pulmonary tone are increased to rapidly distribute energy substrates (glucose and oxygen) as part of this process. Hence, elevated blood pressure and heart rate are adaptive in this context.

The mechanisms underlying the pathophysiology of chronic stress are now being described.<sup>19</sup> In essence, the very processes which protect the system in the short term are damaging in the long term. The

adaptive stress response, in the face of on-going activation becomes a maladaptive process. Psychosocial factors are invariably involved in the progression from acute to chronic stress. In this context it is possible to understand how an adaptive elevation in blood pressure in the short term, in genetically susceptible individuals, may become pathologically elevated in chronic stress. For example, blood pressure responses to experimental stress predicted elevated ambulatory blood pressure during periods of perceived stress in everyday life,<sup>20</sup> while many people whose blood pressure remains elevated for several hours after an arithmetic test have a parent with hypertension.<sup>21</sup>

Lifestyle interventions are often recommended as initial treatments for mild hypertension. The evidence for the therapeutic value of stress reduction in this context, while a logical extension of what has been discussed above, is less clear. This is due probably to the lack of a coherent definition of what actually constitutes stress reduction. A Cochrane review by Dickinson et al shows the tendency to see stress reduction as primarily relaxation rather than as an integrated multidimensional mind/body intervention (which might or might not include relaxation). Their meta-analysis of relaxation therapies for the management of primary hypertension in adults concluded that the evidence of a causal association between relaxation and blood pressure reduction is weak, mainly as a result of poor quality of included trials.<sup>22</sup>

It is worth distinguishing here between relaxation therapies and what is termed the relaxation response. The latter describes a neurophysiological process which appears to counterbalance aspects of the stress response.<sup>23,24</sup> When elicited on a regular basis (through either meditation or a generic/secular version of meditation), there is good evidence supporting its effectiveness in reducing both systolic and diastolic blood pressure. Initial evidence suggests that the mechanisms for this effect include reduction in peripheral vascular resistance<sup>25</sup> and a reduction in sympathetic adrenergic receptor sensitivity.<sup>26</sup>

While these studies require replication, and with larger numbers, they reinforce the more recent evidence cited earlier linking stress, the sympathetic nervous system and hypertension. As is the case in all diseases of lifestyle, an integrally-informed view of both causality and therapeutic interventions is preferable, combining pharmacology and proven behavioural and psychophysiological tools and techniques.

## Dietary intervention

The effective dietary recommendations to form part of a lifestyle modification programme aimed to manage a hypertensive patient are listed in Table I. These include adopting the DASH (Dietary Approaches To Stop Hypertension) eating plan, weight reduction, dietary sodium restriction and moderation in alcohol consumption. These will be discussed in greater practical detail.

### The DASH diet

The DASH dietary guidelines focus on a low saturated fat, cholesterol and total fat intake and emphasise the consumption of fruits, vegetables and fat-free dairy products, including whole grain products, fish, poultry and nuts. The diet is reduced in lean red meats, sweets, added sugars and sugar-containing beverages.<sup>27</sup> The DASH diet also focuses on increasing

**Table I: Dietary lifestyle modifications for patients with hypertension**

Modification	Recommendation
Weight reduction	Maintain normal body weight (BMI 18.5–24.9 kg/m <sup>2</sup> )
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables and low-fat dairy products with a reduced content of saturated and total fat
Dietary sodium reduction	Reduce dietary sodium intake to no more than 2.4 g sodium or 6 g sodium chloride per day
Moderation of alcohol consumption	Limit consumption to no more than two drinks per day in most men and to no more than 1 drink per day in women and lighter weight persons

intake of foods rich in nutrients that are expected to lower blood pressure, mainly minerals (such as potassium, calcium and magnesium), protein and fibre. The DASH diet is endorsed by the American Heart Association and the National Institutes of Health.<sup>28</sup> Randomised, controlled studies of the DASH diet with hypertensive guidelines proved that blood pressure is dramatically reduced compared to patients who remained on a typically westernised diet.<sup>27</sup> The DASH eating plan is shown in Table II.

### Dietary sodium reduction

A high salt intake has been implicated in hypertension, cardiovascular and kidney damage. Evidence from a variety of studies supports lowering blood pressure by reducing dietary sodium. Such data provide the basis for current dietary guidelines to limit salt intake to 6 g/day or sodium intake to 2.4 g/day and for those with hypertension to limit sodium intake to 1.5 g/day.<sup>29,30</sup>

Because most dietary salt comes from processed foods and eating out, changes in food preparation and processing can help patients reach the sodium goal. In addition to advice to select minimally processed foods, dietary counselling to lower sodium should include instruction on reading food labels for sodium content, avoidance of discretionary salt in cooking or meal preparation (1 teaspoon salt = 2 400 mg sodium), and the use of alternative flavourings to satisfy individual taste. Because the DASH eating plan is rich in fruits and vegetables, which are naturally lower in sodium than other foods, adopting the DASH diet will enable individuals to consume less salt and sodium. Practical tips to reduce sodium intake are presented in Table III.

### Dietary potassium intake

Consuming a diet rich in potassium has been shown to lower blood pressure. The recommended intake of potassium for adults is 4.7 g/day. Potassium-rich fruits and vegetables include leafy green vegetables, fruits and root vegetables. It is advisable to obtain potassium from natural food sources instead of potassium supplements, as these supplements may be potentially harmful to individuals.

### Dietary calcium and magnesium intake

Increased intakes of calcium and magnesium may have blood pressure benefits. Recommendations suggesting the adequate intake for calcium and the recommended daily allowance for magnesium from food sources rather than supplements. The DASH diet encourages foods that would be good sources of both nutrients, including low-fat dairy products, dark-green leafy vegetables, beans and nuts.

**Table II: The DASH eating plan – number of daily servings based on 2 000 calories/day<sup>29</sup>**

Food groups	Examples and notes	Significance of each food group to the DASH eating pattern	Servings Per Day
Grains	Whole wheat bread and rolls, whole wheat pasta, English muffin, pita bread, bagel, cereals, oatmeal, brown rice, unsalted pretzels and popcorn	Major source of energy and fibre	8
Vegetables	Broccoli, carrots, collards, green beans, green peas, kale, lima beans, potatoes, spinach, squash, sweet potatoes, tomatoes	Rich sources of potassium, magnesium and fibre	5
Fruits	Apples, apricots, bananas, dates, grapes, oranges, grapefruit, grapefruit juice, mangoes, melons, peaches, pineapples, raisins, strawberries, tangerines	Important sources of potassium, magnesium and fibre	5
Fat-free milk products	Fat-free (skim) milk, low fat (1%) milk, fat-free, low fat or reduced fat cheese, fat-free or low fat regular or frozen yoghurt	Major sources of calcium and protein	3
Lean meats, poultry and fish	Select only lean; trim away visible fats; broil, roast or poach; remove skin from poultry	Rich sources of protein and magnesium	6
Nuts, seeds, and legumes	Almonds, hazelnuts, mixed nuts, peanuts, walnuts, sunflower seeds, peanut butter, kidney beans, lentils, split peas	Rich sources of energy, magnesium, protein and fibre	1
Fats and oils	Soft margarine, vegetable oil (such as canola, corn, olive or safflower) low fat mayonnaise, light salad dressing	The DASH study had 27 percent of calories as fat, including fat in or added to foods	3
Sweets and added sugars	Fruit-flavoured gelatin, fruit punch, hard candy, jelly, maple syrup, sorbet and ices, sugar	Sweets should be low in fat	≤ 1

**Table III: Tips to reduce salt and sodium intake<sup>29,30</sup>**

#### Tips to reduce salt and sodium intake

- Choose low- or reduced-sodium, or no-salt-added versions of foods and condiments when available.
- Choose fresh, frozen, or canned (low-sodium or no-salt-added) vegetables.
- Use fresh poultry, fish and lean meat, rather than canned, smoked or processed types.
- Choose ready-to-eat breakfast cereals that are lower in sodium.
- Limit cured foods (such as bacon and ham); foods packed in brine (such as pickles, pickled vegetables, olives, and sauerkraut); and condiments (such as mustard, horseradish and tomato sauce). Limit even lower sodium versions of soy sauce and teriyaki sauce. Treat these condiments sparingly as you do table salt.
- Cook rice and pasta without salt. Cut back on instant or flavoured rice, pasta and cereal mixes, which usually have added salt.
- Choose convenience foods that are lower in sodium. Cut back on frozen dinners, mixed dishes such as pizza, packaged mixes, canned soups and salad dressings, which often have a lot of sodium.
- Rinse canned foods such as tuna and canned beans, to remove some of the sodium.
- Use spices instead of salt. In cooking at the table, flavour foods with herbs, spices, lemon, lime, vinegar or salt-free seasoning blends. Start by cutting salt in half.

#### When eating out

- Ask how foods are prepared. Ask that they are prepared without added salt, MSG or salt-containing ingredients. Most restaurants are willing to accommodate requests.
- Know the terms that indicate high sodium content: pickled, cured, smoked, soy sauce, broth.
- Move the salt shaker away.
- Limit condiments, such as mustard, tomato sauce, pickles and sauces with salt-containing ingredients.
- Choose fruit or vegetables instead of salty snack foods.

**Table IV: Food label interpretation for patients with hypertension**

Phrase	What it means
<b>Sodium:</b>	
• Sodium free or salt free	Less than 5 mg per serving
• Very low sodium	35 mg or less of sodium per serving
• Low sodium	140 mg or less of sodium per serving
• Low-sodium meal	140 mg or less of sodium per 100 g
• Reduced or less sodium	At least 25% less sodium than the regular version
• Light in sodium	50% less sodium than the regular version
• Unsalted or no salt added	No salt added to the product during processing
<b>Fat:</b>	
• Fat-free	Less than 0.5 g per serving
• Low saturated fat	1 g or less per serving and 15% or less of calories from saturated fat
• Low-fat	3 g or less per serving
• Reduced fat	At least 25% less fat than the regular version
• Light in fat	Half the fat compared to the regular version

#### Reading of food labels

Patients with hypertension should be taught how to read and interpret the nutrition fact labels on foods to compare the amount of sodium in products. The patient should look for the sodium content in milligrams and the Percent Daily Value and should be encouraged to aim for foods that are less than 5% of the daily value of sodium. Foods with 20% or more of the daily value of sodium are considered high.

Food labels can help the patient choose items lower in saturated fat, trans fat, cholesterol and calories and higher potassium and calcium. Table IV provides practical interpretation for the label information on cans, boxes, bottles and other packaging.

#### Smoking cessation

The smoking habit increases both cardiovascular and non-cardiovascular morbidity and mortality and no lifestyle modification programme can be seen as complete without a smoking cessation component. The general practitioner has a critical role to play in advising and assisting smokers



to quit by integrating the various aspects of nicotine dependence. Counselling and pharmacotherapeutic interventions for smoking cessation are among the most cost-effective clinical interventions and will be discussed elsewhere in this series of articles.

## Conclusion

This article has provided an overview of the basic lifestyle modifications to consider in the management of patients with hypertension. A holistic view with respect to exercise training, dietary modification, psychosocial interventions and smoking cessation are all important in patient management. General practitioners should particularly be aware of the benefits of exercise, the interactions with antihypertensive medications, and healthy nutritional interventions and should assist their patients by suggesting adherence to accepted physical activity and nutritional guidelines. All patients should therefore be afforded the time and interest of their general practitioner so that they may assist their patients in making well informed choices with respect to their lifestyle to promote health and manage disease.

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