

Hypertension

Dietary and lifestyle measures in a nutshell

Elevated blood pressure is affected by diet and activity and is the most important contributor to cardiovascular and cerebrovascular events. Elevated blood pressure and hypertension are preventable and, if present, can be reduced by lifestyle alterations.

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Cardiovascular and cerebrovascular diseases are the most common causes of death in the Western world and are becoming increasingly common in developing countries. It is an enormous expense for individuals, government and society in general. The most important overall contributor to cardiovascular death is increased blood pressure. It is a more important contributor than diabetes, smoking, obesity or elevated cholesterol.

Hypertension, defined as a blood pressure level higher than 140/90 mmHg, contributes to about 50% of the increased risk of cardiovascular disease due to blood pressure. The other half is contributed by blood pressure above the optimal level of less than 120/80 mmHg but below the International Society of Hypertension and European Society of Hypertension guidelines level of 140/90 mmHg for initiation of drug therapy.

Aetiology of hypertension

If the exact cause of essential hypertension was known, treatment paths could be clearly defined; however, hypertension is not caused by one factor alone. It is probably due to abnormalities in a variety of factors that contribute to the resulting increase in blood pressure.

There are specific inherited genetic defects that increase blood pressure. Most of these defects involve abnormalities in the handling of sodium by the body, either because of a defect in the kidney or because of an abnormality in the hormonal systems that control sodium excretion. An exception to this is pheochromocytoma, which causes blood pressure elevation because of high levels of catecholamines, which in turn causes a loss of sodium. Monogenetic diseases are relatively uncommon but it has been postulated that minor

IN SUMMARY

- Half of all heart attacks and strokes occur in people who do not meet the guidelines for drug treatment.
- A low plasma potassium level and/or a low potassium dietary intake is associated with a threefold or greater increase in strokes and sudden death.
- Successful implementation of sodium restriction lowers blood pressure to a similar extent as drug monotherapy.
- Dietary advice should be holistic, recommending a reduction in sodium, saturated fats and alcohol consumption, and an increase in potassium and complex carbohydrate consumption. This can be achieved by eating less processed foods and animal fat and more fresh fruit and vegetables and fish.
- No randomised trial has proven at what level lifestyle intervention should start. Common sense suggests that it is safe and worthwhile in all people.

deficiencies in the various inherited processes determine if a person is unable to cope with extremes of lifestyle and environment.

When populations moved from a 'hunter-gatherer' existence into our current form of society, cardiovascular disease and elevated blood pressure, which were almost nonexistent in the initial society, became more common. There is a genetic component involved but this is only expressed under appropriate conditions. When populations moved away from a hunter-gatherer existence the following lifestyle changes occurred:

- food intake changed with an increase in sodium chloride, refined carbohydrates and saturated fat and a decrease in potassium and fibre
- activity was usually reduced
- smoking was likely to increase.

The result was that people gained weight, developed diabetes and had increased blood pressure and cholesterol levels, which all contributed to the cardiovascular epidemic. There is a question of whether obesity, diabetes or high blood pressure is the most important problem but this does not need to be answered. The strategies to reduce all of them are based on similar principles.

Interventions for hypertension

There are three approaches for the prevention of hypertension. The first and ideal is to prevent blood pressure reaching a level at which it causes end-organ damage. This is primary prevention. It is debatable whether this approach should be applied to everyone or just groups and individuals at risk. A second approach is to wait until blood pressure is elevated and a diagnosis of hypertension is made. Then treatment with lifestyle interventions can be used to reduce blood pressure. The third important approach is to concentrate not only on interventions that reduce blood pressure but also on lifestyle changes that reduce total cardiovascular risk. The approach needs to be holistic, reducing all risk factors. All the major modifiable risk factors (raised blood pressure, high cholesterol, high blood sugar, obesity) are continuous variables and values inside the normal range contribute to cardiovascular risk (see the flowchart on page 48).

Reducing blood pressure

High sodium intake and low potassium, calcium and magnesium intakes all have epidemiological



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associations with elevated blood pressure and cardiovascular deaths. The significance of the association (p value) may be high but the correlation coefficient (r value) may be low. Therefore, low calcium and/or low magnesium intakes only account for a very small number of people with elevated blood pressure.

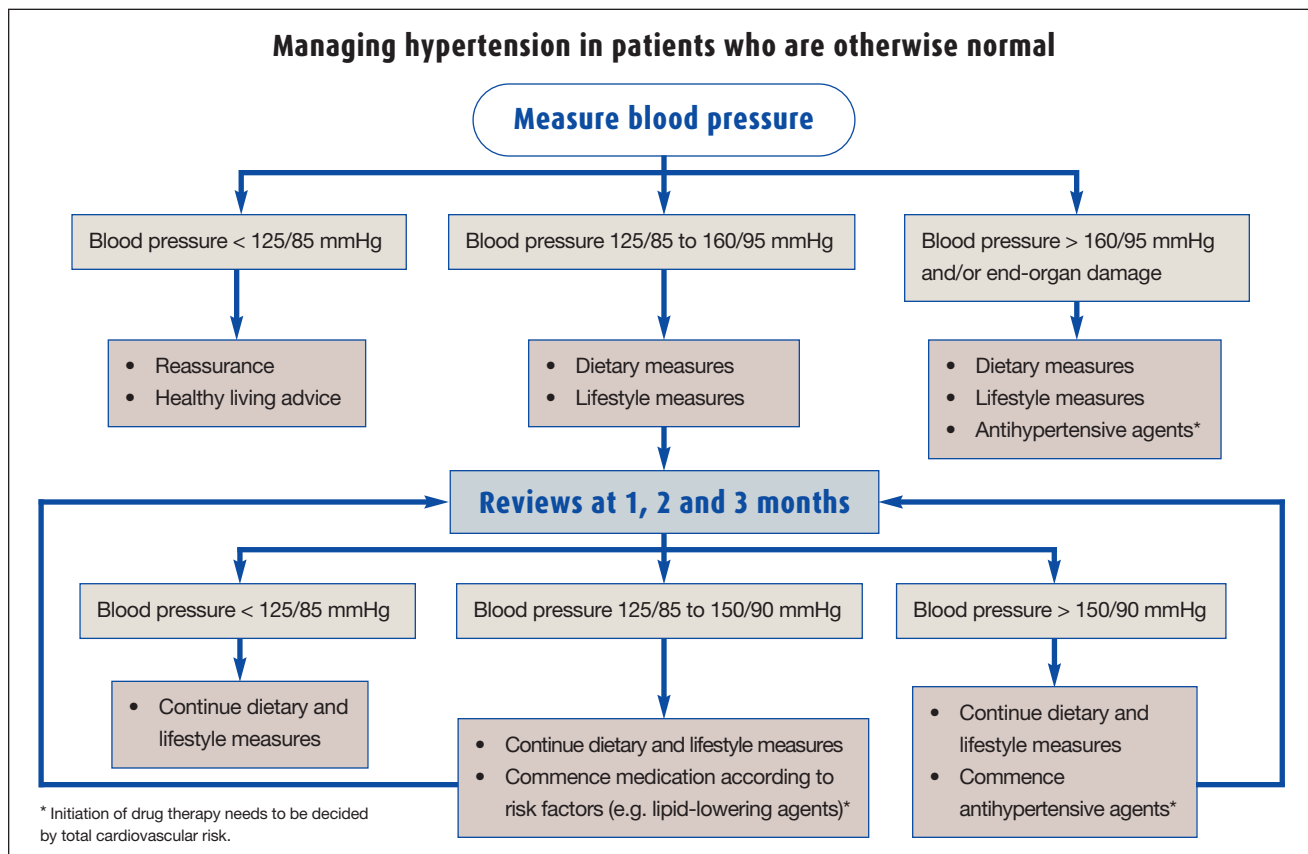
Calcium and magnesium

Studies have shown that calcium and magnesium supplementation have little or no effect on blood pressure. However, a diet with an adequate intake of calcium and magnesium is justifiable to prevent bone disease and possible arrhythmias.

Sodium and potassium

Modestly restricting daily sodium intake to between 70 and 150 mmol/day reduces blood pressure by 6/3 mmHg, similar to the decrease of 8/5 mmHg achieved by placebo-controlled monotherapy. All guidelines advocate sodium restriction and most doctors advise patients to reduce sodium intake; however, in most cases this is lip service, because few doctors measure patients' 24-hour excretion of sodium. Unless this is measured there is little information about what has been achieved. Dietary recall is notoriously inaccurate for sodium intake, unless performed in a research centre. Sodium is so universally present in processed and fast foods that individuals find it difficult to reduce their salt intake. In Australia, the addition of salt in cooking and at the table

continued



probably accounts for about 10 to 15% of daily salt intake.

Potassium supplementation has been shown to reduce blood pressure in humans, as well as in rats but it is not commonly practiced. Increased potassium intake reduces the incidence of strokes. Low plasma potassium levels in the Systolic Hypertension in the Elderly Program (SHEP) were associated with a three- to fourfold increase in stroke and sudden death. The epidemiological factor that has the strongest correlation with the prevalence of high blood pressure is the sodium to potassium ratio, either in the diet or the urine. If this ratio is less than one, hypertension is uncommon.

The effects of sodium reduction and potassium increase are usually assessed by short-term studies measuring blood pressure. However, the benefits are probably much greater because there is epidemiological and experimental evidence of an association between a high

sodium intake and cardiac hypertrophy, vessel stiffness osteoporosis and other conditions, all of which have adverse contributions to health.

Reducing weight

There is a clear association of obesity with hypertension. Obesity causes activation of the sympathetic nervous system and a variety of hormones that can alter blood pressure. These almost certainly contribute to increased blood pressure but it is likely that the sodium content of the diet makes a further contribution. Blood pressure falls during weight loss.

Morbidly obese people frequently have high blood pressure, diabetes and elevated cholesterol levels. Hyperbariatric surgery may cause major weight loss and resolution of these factors. It is tempting to assume that this benefit is because of the weight loss but as the dietary intake is markedly restricted, the effect may be due to the altered food intake.

Moderating alcohol intake

One or two standard units (10g) of alcohol each day appear to have a beneficial effect on cardiovascular outcomes, although this is likely to be confounded. Higher alcohol intake is associated with an increase in blood pressure and adverse events. Blood pressure rises by 1 mmHg for each standard drink. Some people who drink six or more drinks a day have an elevated blood pressure that is unresponsive to drugs or they have poor compliance, and the only way to achieve control is by reducing or stopping alcohol ingestion.

Increasing physical activity

Increased physical activity has the beneficial effect of reducing blood pressure. Exercise only needs to be of modest intensity for 30 minutes five times a week to see a reduction in blood pressure. This exercise can also be completed in 10-minute sessions. Increased activity reduces cardiovascular events and should be encouraged, especially

in the sedentary. Exercise associated with a dietary program may also help weight loss. However, the absence of the need for weight loss is not a reason to cease exercise. It has beneficial effects on glucose metabolism independent of weight loss due to its beneficial effects on lean body mass.

Reducing complications

Smoking cessation

There is little direct association between smoking and elevated blood pressure. When smoking is ceased there may be a modest weight gain. However, the benefits of stopping smoking on cardiovascular outcomes exceed any harmful effect of the gain in weight, although this should be limited as much as possible.

Cholesterol and lipid management

Management of cholesterol and lipids should be routine in all patients with hypertension. In obese people, reduction of fat and oil intake assists in weight loss. In non-obese people, substitution of saturated fat with mono- or polyunsaturated fats will lower cholesterol. Reduction of saturated fat intake is far more important than reduction of cholesterol intake. Intake of omega-3 unsaturated fatty acids (fish oils) lowers plasma cholesterol and has some blood pressure-lowering effect. Use of mono- or polyunsaturated margarine is recommended over butter and the use of margarines with naturally occurring sterols may be helpful, although the cost may be greater than using pharmacological therapy for the effect achieved.

Patient selection

Most people with hypertension will eventually need drug therapy to attain the ideal blood pressure goal (less than 130/80 mmHg). Initiation of drug therapy is based on an individual's absolute risk score rather than a single risk factor measurement such as blood pressure. Nonpharmacological therapy should be initially used in most people and this consists of reducing sodium chloride intake,

increasing potassium intake, reducing weight if overweight and initiating an exercise program if sedentary.

If a patient's initial blood pressure is less than 160/90 mmHg it is probable that nonpharmacological therapy should be continued for up to three months. It should be instituted at the first visit because three or four visits will be required before it is known if blood pressure needs to be pharmacologically treated. To determine whether your advice or that of the dietitian is being followed, a 24-hour urine sample should be collected to determine the sodium and potassium excretion and, therefore, intake. Patients with hypertension should have their renal function, fasting cholesterol and fractions, triglycerides and glucose measured. All patients should be given advice to reduce their intake of saturated fat, although how strongly this advice is stressed will depend on the patients' plasma levels.

If drug therapy is required, the reduction in sodium intake makes patients more responsive to most drug therapies, particularly ACE inhibitors (e.g. perindopril [Coversyl, Indopril, Perindo] and ramipril [Prilace, Ramace, Tritace, Tryzan Caps and Tabs]) and angiotensin receptor blocking drugs (e.g. irbesartan [Avapro, Karvea], telmisartan [Micardis] and candesartan [Atacand]). The response to dihydropyridine calcium blocking drugs (such as amlodipine [Amlol, Norvasc, Ozlodip, Perivasc], felodipine [Felodil XR, Felodur ER, Plendil ER], lercanidipine [Zanidip] and nifedipine [Adalat, Addos XR, Adefin, Nifehexal, Nyefax]) is independent to sodium intake, and if a person continues with a high salt intake or has a disorder that retains sodium, these may be the drug of choice.

Lifestyle changes and dietary restriction in many people with established hypertension will frequently not be adequate to control blood pressure because of either end-organ damage or failure to implement drug therapy to the required degree. More than one antihypertensive drug is

usually required to achieve the blood pressure target and the use of combined tablets (amlodipine and valsartan [Exforge], enalapril and lercanidipine [Zan-Extra], felodipine and ramipril [Triasyn], indapamide and perindopril [Coversyl Plus, Perindo Combi] and trandolapril and verapamil [Tarka]) can improve compliance and reduce the cost to the patient. Diuretics have usually been part of such combinations, particularly with ACE inhibitors and angiotensin receptor blockers as this improves their effectiveness.

The Avoiding Cardiovascular Events Through Combination Therapy in Patients Living with Systolic Hypertension (ACCOMPLISH) trial showed that treatment with an ACE inhibitor and amlodipine resulted in improved outcomes. Many patients with elevated blood pressure also have elevated cholesterol and combination tablets across the therapeutic classes, such as amlodipine and atorvastatin (Caduet), are indicated in such cases.

Nonoptimal blood pressure or patients with prehypertension

The role of lifestyle interventions is probably most important in patients who do not meet the guidelines' indication for drug therapy or have nonoptimal blood pressure. Half of all strokes and heart attacks occur in people who do not qualify for drug treatment according to the guidelines. Blood pressure levels track so a person with a blood pressure of 130/85 mmHg is more likely to become hypertensive than a person with a blood pressure of 120/80 mmHg.

A large segment of the population has nonoptimal blood pressure and treatment needs to be based on community education, individual advice (including communication of absolute risk) and government action. The government should act on issues such as food labelling, reducing the sodium content of foods either by introducing voluntary standards or by legislated levels, and providing incentives for people to eat 'healthy cardiovascular foods'.

Similar issues are relevant for measures to reduce obesity and diabetes in our society.

Specific groups at risk

A population-based approach to managing hypertension would probably achieve the best outcome at a lower cost. However, there are certain groups in whom lifestyle advice should be given earlier (Table). If there is a family history of stroke, heart attack or hypertension, nonpharmacological and lifestyle changes should be implemented as early as possible. Patients with diabetes have salt-sensitive hypertension and patients with renal disease are salt sensitive. Older patients develop renal impairment and are unable to handle a sodium load. In these groups, salt restriction should be started early together with an increase in potassium intake, except in the case of people with renal failure.

Advice to patients

Alterations to food intake should be multifaceted, as well shown in the Dietary Approaches to Stop Hypertension (DASH) study. The advice from this study to be given to patients is to eat more fresh and less processed foods. Most processing involves the removal of potassium and the addition of sodium chloride. Processed meats and many cereals have salt added, which is unnecessary and converts a potentially healthy food into one with negative health values. Unprocessed muesli meets the requirements of being a healthy food but most people eat toasted muesli that has had sodium chloride and/or sugar added to it and has been toasted in oil, again converting a healthy food into one with negative health values. A fruit muesli bar may be a less healthy option than a chocolate bar.

The advice is to eat more fruit and vegetables, avoid animal fat and refined carbohydrates. Patients should also be advised to eat fish one or two times a week and exercise at least three times a week for a minimum of 30 minutes.

Patients should learn to read food labels and avoid foods with a high saturated fat

continued

Table. Factors that emphasise need for early lifestyle intervention*

Family history

- Hypertension
- Heart attack
- Stroke
- Diabetes

Personal history

- Obesity
- Diabetes
- Elevated lipid concentration
- Metabolic syndrome
- End-organ damage
- Elevated absolute risk score

At-risk populations

- Aboriginies
- Torres Strait Islanders
- Polynesians
- South Asians

* Intervention independent of blood pressure level but essential if blood pressure is more than 130/85 mmHg.

and sodium content. If the sodium content is greater than 300 to 400 mg per 100 g the food is salty and should be eaten in small quantities or avoided. It is difficult to find many staple foods that do not contain this much sodium.

The problem for the patient is to understand what the food label means and to obtain staple foods that meet their requirements. Most breads contain more salt than is recommended and a low-sodium high-potassium bread is needed. Unfortunately, food labelling does not include the potassium content; if it was present the advice would be to choose foods with more potassium than sodium.

Achieving lifestyle alterations for an individual is difficult due to the demands of life in our society and the ‘convenience’ of processed foods. A program based on education coupled with alterations in the foods consumed is required to reduce blood pressure (prevent hypertension), diabetes and obesity, and thereby restore cardiovascular health.

Conclusion

Cardiovascular disease is the most common cause of death in Australia and hypertension is the most important modifiable risk factor for cardiovascular disease on a population level. Hypertension is a lifestyle disease and can be treated and ideally prevented by lifestyle management. Hypertension, diabetes, abnormal lipids and obesity all interact and lifestyle management should be directed at all of these rather than one in isolation.

Half of all cardiovascular deaths and strokes occur in people who do not meet the blood pressure level for drug treatment set out in the guidelines but have nonoptimal blood pressure. Hence, the importance of ascertaining an individual’s absolute risk score.

A dietary reduction of sodium and increase in potassium can reduce blood pressure and cardiovascular mortality. Lifestyle advice should be given to all individuals at risk of cardiovascular disease and backed up with education programs to alert the patient to the dangers of hypertension. Foodstuffs to enable patients to follow dietary advice need to be more readily available. MT

COMPETING INTERESTS: None.

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