

HYPERTENSION & EXERCISE

WHAT IS HIGH BLOOD PRESSURE (HYPERTENSION)?

Blood pressure (BP) refers to the pressure in the large arteries when the main pumping chamber of the heart — the left ventricle — is at maximal contraction (termed 'systole') and relaxation (termed 'diastole'). BP is usually presented as two numbers: the higher, systolic BP (normally less than 120 mmHg); and the lower diastolic BP (normally less than 80 mmHg). The two pressures are usually expressed together, for example '120 over 80'. These values represent an estimation of the pressure that the organs are exposed to. High BP is called hypertension. Hypertension is a major risk factor for cardiovascular disease (e.g. heart failure, stroke, coronary heart disease), chronic kidney disease and early death. Hypertension may not cause any symptoms, which is why it is sometimes referred to as a 'silent killer'.

Hypertension is described on a graded scale (1) from mild to severe (see table below).

Blood Pressure Category	Systolic BP (mmHg)	Diastolic BP (mmHg)
Normal	<120	<80
High-Normal	120–139	80–89
Grade 1 Hypertension (Mild)	140–159	90–99
Grade 2 Hypertension (Moderate)	160–179	100–109
Grade 3 Hypertension (Severe)	≥180	≥110

HOW IS BLOOD PRESSURE MONITORED?

Correct diagnosis and management of hypertension relies on careful measurement of BP. This is usually performed by a doctor using an automatic device. However, quite often, a person's BP is higher when measured by a doctor than if measured at home - the so-called 'white-coat effect'. This effect is probably caused by anxiety associated with having BP measured by a doctor. For this reason, many experts recommend that the BP recorded by doctors should not be the only measurement used to diagnose or manage patients with hypertension (2).

A better method to determine true underlying BP can be achieved by people monitoring their own BP at home for extended periods (e.g. 7 days). For home BP monitoring, devices are available to purchase in pharmacies. Buyers should ensure that the chosen device has been tested for accuracy before purchase (3). A well-fitting cuff for the upper arm is vital - too small a cuff will overestimate the true BP and too large a cuff will underestimate true BP. Tips for measuring BP at home are available (4).

Access to special devices that monitor BP intermittently over 24 hours while people go about their daily activities (called an ambulatory BP monitor) is often available through specialist clinics or in general practice.

The higher the BP, the higher the risk of cardiovascular events. Therefore, doctors prescribe lifestyle changes (e.g. diet and exercise) and/or medication for people with high BP to reduce the risk.

WHY IS EXERCISE IMPORTANT?

Regular aerobic exercise has a variety of effects that protect against heart disease and diseases of the blood vessels, including high BP. On average, exercise reduces blood pressure by about 6–7 mmHg (5). Scientific studies with large numbers of volunteers have shown that, if systolic BP is reduced by 5 mmHg, deaths from strokes decrease by 14% and deaths from coronary heart disease (i.e. blocking of the blood vessels that supply the heart) decrease by 9%. These results emphasise why lifestyle changes, including regular exercise, are important first steps in preventing and treating hypertension.

WHAT HAPPENS TO BP DURING EXERCISE?

It is normal for BP to fluctuate as people go about their daily activities. During aerobic exercise (i.e. jogging, cycling, swimming), systolic BP increases as the exercise intensity increases — the heart works harder to pump more oxygenated blood to the working muscles. At the same time, diastolic BP remains relatively stable and may even decrease slightly. Chest discomfort, irregular heart rhythm or abnormal breathlessness when exercising can indicate underlying heart disease and should be further investigated.

ABNORMAL BP RESPONSES TO EXERCISE

Some people have an abnormally high spike in BP when they exercise (termed 'exercise hypertension'), which is associated with higher risk for future cardiovascular events (6). When observed during low-moderate intensity exercise it is probably an early indicator of poorly controlled BP that has gone undetected via measurement and monitoring of BP at rest. Whilst exercise hypertension should not be interpreted as 'exercise is bad for you', it should serve as a warning sign to exercise professionals to provide follow-up BP care and/or lifestyle intervention to lower cardiovascular risk.

Low BP during exercise (such as a drop below resting BP values) may also signal serious heart disease and requires investigation.

WHAT TYPE AND AMOUNT OF EXERCISE IS BEST?

Regular exercise is the first treatment recommended to lower BP and improve cardiovascular health, both in the general population and in those people with hypertension (1).

The exact amount and type of exercise that is best for BP control is not really known. However, scientific studies support that regular aerobic exercise reduces resting BP and also reduces BP during light exercise and daily activities. Additionally, aerobic exercise protects against developing hypertension in the future. These effects occur in both men and women, with normal or raised BP. Resistance exercise training (e.g. lifting weights) and isometric exercises (i.e. holding a contraction) also produces small, but measurable, benefits for BP. An Accredited Exercise Physiologist or Physiotherapist can design an individualised exercise program for people with hypertension.

Current recommendations on the type, intensity and duration of exercise for people with hypertension are shown below (7). High intensity aerobic training is considered safe (with appropriate supervision) and will also lead to BP lowering.

People with a resting systolic BP of 180 mmHg or more, or a resting diastolic BP of 110 mmHg or more, should postpone their exercise program and seek medical advice.



Type of training	Intensity	Frequency (times/week)	Duration
Aerobic training (e.g. jogging, cycling, swimming)	Moderate	5 days/week	30 min
	Vigorous/High	3 days/week	25 min
AND			
Strength training (e.g. lifting weights)	8-12 repetitions	1 set of 8-10 exercise	2 or more non-consecutive days/week
AND			
Isometric resistance training	2 min at 30% max voluntary contraction	4 sets with 2-3 min rest between	3 non-consecutive days/week

ADDITIONAL CONSIDERATIONS

It is important to discuss starting an exercise program with your doctor. Sport and Exercise Physicians have advanced training in understanding the impact of exercise on specific chronic conditions. Exercise is usually very safe and beneficial whether or not BP-lowering (antihypertensive) medication is used. Depending on the type of medications being taken, it is pertinent to ensure adequate hydration, appropriate warm up and cool down periods and to avoid exercise in very hot conditions.

Additionally, comorbidities such as diabetes is often associated with elevated BP and these individuals can display adverse changes in their blood vessels (8) , putting them at increased risk of heart disease and early death. Regular exercise training in people with diabetes is important for lowering BP and minimising the excess risk.



RELATED INFORMATION AND REFERENCES

Exercise is Medicine Australia www.exerciseismedicine.org.au
 Exercise Right www.exerciseright.com.au
 Find a Physiotherapist www.choose.physio

Prepared by Dr Martin Schultz and Dr Rachel Climie.

Find an Accredited Exercise Physiologist www.essa.org.au
 Find a Sport and Exercise Physician www.acsep.org.au

1. National Heart Foundation of Australia. Guideline for the diagnosis and management of hypertension in Adults - 2016. Melbourne, Australia; 2016.
2. Kaplan NM, Gidding SS, Pickering TG, Wright JT. Task Force 5: systemic hypertension. Journal of the American College of Cardiology. 2005;45(8):1346-8.
3. Menzies Institute for Medical Research. How to check that a blood pressure monitor has been properly tested for accuracy 2021 [Available from: <https://www.menzies.utas.edu.au/documents/pdfs/Blood-pressure-devices.pdf>.
4. Sharman JE, Howes F, Head GA, McGrath BP, Stowasser M, Schlaich M, et al. How to measure home blood pressure: Recommendations for healthcare professionals and patients. Global Health. 2016;45(1):31-4 <https://www.racgp.org.au/afp/2016/januaryfebruary/how-to-measure-home-blood-pressure-recommendations-for-healthcare-professionals-and-patients/>.
5. Cornelissen VA, Smart NA. Exercise training for blood pressure: a systematic review and meta-analysis. Journal of the American heart association. 2013;2(1):e004473.
6. Schultz MG, Hughes AD, Davies JE, Sharman JE. Associations and clinical relevance of aortic-brachial artery stiffness mismatch, aortic reservoir function, and central pressure augmentation. American Journal of Physiology-Heart and Circulatory Physiology. 2015;309(7):H1225-H33.
7. Sharman JE, Smart NA, Coombes JS, Stowasser M. Exercise and sport science australia position stand update on exercise and hypertension. Journal of human hypertension. 2019;1-7.
8. Climie RE, van Sloten TT, Bruno R-M, Taddei S, Empana J-P, Stehouwer CD, et al. Macrovasculature and Microvasculature at the Crossroads Between Type 2 Diabetes Mellitus and Hypertension. Hypertension. 2019;73(6):1138-49.