

Lifestyle Approaches to Prevention and Treatment of High Blood Pressure

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Hypertension is the leading reason for office visits to primary care physicians and is also the leading chronic disease of aging. Given the aging demographic in Canada, its burden on the health care system will grow, making prevention and treatment of hypertension a priority. Solid evidence regarding effective pharmacological therapies in hypertension is available, yet diagnosis and treatment rates remain poor. Likewise, solid evidence regarding the effect of non-pharmacological or lifestyle interventions also is available for clinicians. Furthermore, lifestyle interventions may potentiate the effects of pharmacological therapies due to their inherent modification of positive chronic disease behaviour, resulting in improved maintenance of treatment interventions. With pressure to see many patients in the busy primary care practice, clinicians should resist the “quick-fix” approach to treating hypertension solely by pharmacological means. Consideration of lifestyle modification is worth the time in terms of obtaining sustained control of a growing population at risk.

Key words: hypertension, lifestyle interventions, behaviour change.

Treatment of hypertension is the most common reason in Canada for office visits to physicians and for the use of prescription medications. It is therefore an essential part of every physician's practice, and will become even more so as the population ages. Despite the importance of hypertension in medical care, control is far from adequate. In Canada in the early 1990s, over four million adults were hypertensive, but only 16% were treated and controlled.¹ More alarming is that the pattern appears to be getting worse,² despite a myriad of new molecules developed and available to treat hypertension and despite remarkable reductions in the rates of stroke and coronary heart disease. Despite clear evidence supporting improved outcomes with lower blood pressure in the elderly, rates of control are poorest in this group. Hence, preventing, diagnosing and treating hypertension should be a priority in clinical practice.³

Although a range of effective pharmacological agents are available for treating primary hypertension, they can be expensive and can have real and per-

ceived side effects and drug interactions (especially among the elderly who consume more medications)—problems amplified by the chronic nature of hypertension and need for long-term therapy. These attributes reduce patient compliance and often result in poor control of the disease and desire among patients (and doctors) for alternative therapeutic options.

Why is Hypertension Not Controlled?

Lifestyle factors associated with age, including decreasing activity levels, increasing body weight and poor dietary habits, are likely primary factors in uncontrolled hypertension. Among adult North Americans, 55% are overweight (up from 40% in the 1970s), while over 60% of adults fail to meet recommended levels of physical activity. Other contributing factors may include lack of awareness and complacency about blood pressure among both patients and doctors, poor compliance with pharmacological therapy, failure to achieve recommended targets for blood pressure control, and a large number of

patients at risk for development of hypertension. A national survey of U.S. primary care physicians found that about one-third do not recommend treatment in patients with diastolic blood pressures 90–100mmHg and, furthermore, do not treat to target when systolic blood pressure ranged from 140–160mmHg.⁴ Treatment thresholds among these physicians worsened as the age of patients increased. Recently, these authors found that both undiagnosed and treated but uncontrolled hypertension occurred largely “under the watchful eye of the health care system”,⁵ and not among stereotypical young patients who do not see their doctor.

The Framingham Heart Study found that individuals with high-normal blood pressure (HNBP) were two to three times more likely to progress to hypertension than those with optimum blood pressure.⁶ A more recent report suggests that in older patients and in those with HNBP, the rate of progression to hypertension may be greater than previously thought.⁷ In fact, 37% of individuals with HNBP progressed to hypertension over four years follow-up. Among those with normal blood pressure, the lifetime risk of progression to hypertension in middle-aged men and women was 90%, and the probability of receiving medication was 60%.⁸ Particularly disturbing in terms of prevention is that the trend for progression to hypertension was worse for men over the last 20 years compared to the period 1952–1975, suggesting that an aging population and a population that is more obese and sedentary is placing the burden at epidemic levels.

Public interest in preventing cardiovascular disease and promoting health has been described by the World Health Organization as part of a global strategy to reduce high blood pressure whereby lifestyle modification is the

fundamental ingredient. This seems obvious. Community-based lifestyle intervention programs have been shown to be feasible and effective,⁹ while the interaction of a healthy lifestyle with other chronic health conditions will be an adjunct to pharmacological interventions at low cost but added benefit. The key barrier, however, has been delivery of and concordance with lifestyle intervention strategies.

How is Evidence Determined?

The areas of weight loss, exercise, stress modification and diet, including alcohol and salt consumption, are reviewed annually by a committee of Canadian experts in hypertension management using an extensive evidence-based approach to examining these factors in research trials in hypertensive patients.¹⁰ This annual review is unparalleled worldwide and will be re-released in early 2003. In general, this review encourages all Canadians to attain and maintain a healthy body weight, to consume only moderate amounts of alcohol, get regular exercise and reduce salt intake.

Lifestyle Modification Approaches

Unique to North America is a gradual increase in systolic blood pressure with age. Furthermore, we tend to gain weight, drink more, exercise less and add more salt to our food as we age. Only recently has research included multifactorial interventions and demonstrated that lifestyle modifications work in these circumstances. The challenge for clinicians and patients is to develop long-term behaviours and supports to maintain these interventions.

Diet

The amount of salt in an adult diet increases as the number of taste receptors decreases with age. However, controversy exists over the relationship between salt and hypertension, due, in part, to variance in methodologies and

Table 1

Lifestyle Interventions for Blood Pressure Control

Maintain body weight within 15% ideal
Limit daily alcohol intake to no more than 30mL ethanol (720mL beer; 300mL wine; 60mL liquor)
Increase aerobic exercise to 30 minutes on most days of the week at moderate intensity (as with a brisk walk)
Restrict sodium intake to 2–3g per day (1–2 teaspoons)
Maintain adequate intake of potassium, calcium and magnesium in a diet rich in fruits, vegetables and low-fat dairy
Combination of lifestyle interventions improve compliance, effect, maintenance and may reduce the dose or need for pharmacological therapy

patient characteristics. Typically, a North American eats about 5g of salt per day (2.5 teaspoons) while evidence suggests that restricting salt intake to 2–3g per day is effective in lowering high blood pressure.¹¹ Other dietary approaches to hypertension control are under active investigation but can be recommended more broadly for reducing associated cardiovascular risk factors. Epidemiological studies of mineral supplementation have shown that blood pressure varies inversely with dietary potassium, calcium and magnesium intake,¹² but these effects are in the order of 1–2mmHg blood pressure reduction.

The pressor effects of alcohol on blood pressure are well described.¹³ Some patients may have hypertension solely due to excess alcohol intake. Restricting alcohol intake to about 30mL of ethanol (about 720mL beer; 240–300mL wine; 60mL liquor) daily can reduce blood pressure by 5mmHg systolic and 3mmHg diastolic, and meets the goals of the Canadian low-risk drinking guidelines (two or fewer drinks per day).

The Treatment Of Mild Hypertension Study (TOMHS) demonstrated that a multifactorial lifestyle intervention program including changes in dietary and exercise patterns could reduce blood pressure 9–10mmHg systolic and 8–9mmHg diastolic and improve qual-

ity of life over four to five years of intervention.⁹ The Dietary Approaches to Stop Hypertension (DASH) trial¹⁴ compared a standard North American diet to either a high fruit and vegetable (doubling fibre and cations) diet or a high fruit/vegetable combined with low-fat dairy diet among hypertensive and normotensive adults. Over eight weeks, the combined diet (high fruit/vegetable + low-fat dairy) reduced systolic and diastolic blood pressure 5.5 and 3.0mmHg, respectively, compared to the North American diet—results similar in efficacy to that of simple drug interventions in these patients.

Weight Reduction

Obesity is central to a cluster of risk factors for cardiovascular disease. For obese patients with hypertension, weight reduction of 1kg can produce a 1mmHg drop in blood pressure.¹⁵ When combined with other lifestyle and pharmacological interventions, the effects are additive.¹⁶ While maintenance of weight reduction is a challenge, its sustainability is improved when combined with other lifestyle interventions and behavioural support.

Exercise

Sedentary living and reduced physical activity is the most important, modifiable risk factor for cardiovascular dis-

ease. Sedentary living doubles the risk for cardiovascular disease compared to more active Canadians. Sedentary lifestyle is more risky than smoking 20 cigarettes per day, having an elevated cholesterol level or even having mild hypertension. In addition to being a proven strategy for preventing and treating hypertension, regular exercise can reduce other associated risk factors, such as diabetes mellitus and coronary artery disease. Furthermore, exercise can complement compliance and the effect of other lifestyle interventions such as losing weight and improving diet, while improving quality of life. These effects are not dependent on age of onset of intervention, gender or race. Exercise effects are presently limited to aerobic forms (walking, running) while resistance exercise (weight lifting) has not consistently demonstrated blood pressure lowering effects to date; those with poorly controlled hypertension should be monitored closely if engaging in resistance exercise.¹⁷

Mild to moderate aerobic exercise (brisk walking) for 30 accumulated minutes or more on three or more days per week has a greater antihypertensive effect than more vigorous exercise,¹⁸ making the recommendation more generalizable to those just starting to exercise and to those who are more frail. A level of exercise promoted by Canada's Physical Activity Guide to Healthy Living (1998) should be encouraged for most patients. This level of exercise adoption has been shown to achieve a reduction of 5–10 mmHg blood pressure in as little as four to five weeks.¹⁹ Again, as with most lifestyle interventions, the key is long-term maintenance and behaviour change.

Conclusion

In describing the effects of lifestyle interventions on blood pressure control, it is clear that general health benefits are complemented by interactions among interventions. Vasan and colleagues⁸ estimated that greater than 50% of the lifetime risk of progression

to hypertension is experienced over the first 10 years of middle-age; hence, primary prevention such as with lifestyle modification is best suited to prevent this trend. The approach of “waiting” for hypertension to develop and only then to treat pharmacologically is contrary to best evidence and best practice, and is injudicious. Stamler noted that current practice is “late, defensive, reactive, time consuming, associated with side effects and non-compliance, costly, only partially successful (this may be generous) and endless.”²⁰

Recommendations suggest strong support for patients following lifestyle modifications to lower blood pressure and reduce overall cardiovascular risk. Further, if no additional risk factors or evidence of end-organ damage are found, lifestyle modifications (Table 1) may be continued for one year before pharmacological therapy must be instituted due to failed control.

In the limited time available to see patients, clinicians should resist the “quick-fix” of prescribed medications first, and instead “prescribe” proven antihypertensive and health-promoting lifestyle changes. Treating hypertension with lifestyle interventions complements other health-promoting activities. Clinicians also should be supported to develop strategies including behaviour change models to motivate and guide patients to maintain improvements over the long term. To improve physician action in controlling hypertension among the population, new strategies need to be implemented. Some of these should include the production of innovative guidelines,¹⁰ commitment to implementation of these guidelines, coordinated systems improvements in patient tracking, new partnerships between patients-clinicians and government-industry,²¹ and perhaps of greatest potential, the greater use of lifestyle interventions in concert with pharmacological treatment to gain long-term behaviour change among those at risk.²² These coordinated activities are important in achieving a reduction in uncon-

trolled high blood pressure by 10% by 2005 and prevent at least half the 90% risk in Canada.²³ ♦

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References

1. Joffres MR, Ghadirian P, Fodor JG, et al. Awareness, treatment, and control of hypertension in Canada. *Am J Hyperten* 1997;10:1097-102.
2. Joffres MR, Hamet P, MacLean DR, et al. Distribution of blood pressure and hypertension in Canada and the United States. *Am J Hyperten* 2001;14:1099-105.
3. Petrella, RJ. New directions-new approaches to diagnosis and treatment of high blood pressure: The 1999 Canadian Recommendations for the Management of Hypertension. *Can Fam Phys* 2000;46:1479-84.
4. Hyman DJ, Pavlik VN. Self-reported hypertension treatment practices among primary care physicians: blood pressure thresholds, drug choices, and the role of guidelines and evidence-based medicine. *Arch Intern Med* 2000;160:2281-6.
5. Hyman DJ, Pavlik VN. Characteristics of patients with uncontrolled hypertension in the United States. *N Engl J Med* 2001;345:479-86.
6. Leitchuk M, Cupples LA, Kannel W, et al. High normal blood pressure progression to hypertension in the Framingham Heart Study. *Hypertension* 1991;17:22-7.
7. Vasan RS, Larson MG, Leip EP, et al. Assessment of frequency of progression to hypertension in non-hypertensive participants in the Framingham Heart Study: a cohort study. *Lancet* 2001;358:1682-6.
8. Vasan RS, Beiser A, Seshadri S, et al. Residual lifetime risk for development of hypertension in middle-aged men and women. The Framingham Heart Study. *JAMA* 2002;287:1003-10.
9. Elmer JP, Grimm R, Laing B, et al. Lifestyle intervention: results of the Treatment of Mild Hypertension Study (TOHMS). *Prev Med* 1995;24:378-88.
10. McAlister FA, Levine M, Zarnke KB, et al for the Canadian Hypertension Recommendations Working Group. The 2000 Canadian recommendations for the management of hypertension: Part 2, therapy. *Can J Cardiol* 2001;17:543-59.
11. Cutler JA, Follmann D, Elliott P, et al. An overview of randomized trials of sodium reduction on blood pressure. *Hypertension* 1991;17:127-33.
12. Burgess E, Lewanczuk R, Bolli P, et al. Lifestyle changes to control hypertension. Potassium, magnesium, calcium and hypertension: the evidence and recommendations. *Can Med Assoc J* 1999;160:S35-S45.

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13. Campbell NRC, Ashley MJ, Carruthers SG, et al. Lifestyle modifications to prevent and control hypertension: recommendations on alcohol. *Can Med Assoc J* 1999;160:S13-S20.
14. Appel LJ, Moore TJ, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *N Engl J Med* 1997;336:1117-24.
15. Beilin LJ. Non-pharmacological management of hypertension: optimal strategies for reducing cardiovascular risk. *J Hypertens* 1994;12:S71-S81.
16. Leiter LA, Abbott D, Campbell NRC, et al. Lifestyle modifications to prevent and control hypertension: recommendations on obesity and weight loss. *Can Med Assoc J* 1999;160:S7-S12.
17. Petrella RJ. How effective is exercise training for the treatment of hypertension? A critical review. *Clin J Sports Med* 1998;8:224-31.
18. Marceau M, Kouame N, Lacourciere Y, et al. Effects of different training intensities on 24-hour blood pressure in hypertensive subjects. *Circulation* 1993;88:2803-11.
19. Cleroux J, Feldman RD, Petrella RJ. Lifestyle modifications to prevent and control hypertension: recommendations on physical exercise training. *Can Med Assoc J* 1999;160: S21-S28.
20. Stamler J. Setting the TONE for ending the hypertension epidemic. *JAMA* 1998; 279:878-9.
21. Lenfant C. Reflections on hypertension control rates. A message from the Director of the National Heart, Lung, and Blood Institute. *Arch Intern Med* 2002; 162:131-2.
22. Chobanian AV. Control of hypertension-an important national priority. *N Engl J Med* 2001;345:534-5.
23. Chockalingam A, Campbell N, Ruddy T, et al. (for the expert working group). Canadian national high blood pressure prevention and control strategy. *Can J Cardiol* 2000;16:1087-93.