Lifestyle Modification as a Prescription for Hypertension:

Dietary counselling, weight reduction

Luc Trudeau, MD
Cardiovascular Prevention Centre
Jewish General Hospital, Assistant-Professor of Medicine
McGill University, Montreal, Quebec

About 1 out 5 Canadian adults suffers from hypertension. A high sodium intake is an important cause of this condition. Not surprisingly, a sodium excess in meals increases the incidence of cardiovascular events and mortality (1).

Sodium is usually bound to chloride in table salt and increases blood pressure (BP) acutely by inducing a fluid retention at the kidney level and chronically by modifying the renal excretion threshold causing a diminished sodium clearance, as well as elevating the vascular peripheral resistance and decreasing its vasodilator capacity. According to our eating habits, sodium is mainly found in prepared meals, mainly the fast food kind, but also in frozen meals, cold cuts, food in cans, dairy products (especially cheese), soups and sauces. Only 12% of our total sodium intake is the natural content of food, but up to 77% of the total amount has been added at time of processing. A reduction in salt intake decreases significantly systolic and diastolic BP. This beneficial effect is observed in normotensive as well as in hypertensive subjects.

A recent meta-analysis update by the Cochrane Library on the effects of long-term modest reductions of sodium intake shows a linear and robust relationship between lower sodium intake and decreasing BP levels (2). A reduction in sodium of 100mmol/day generates an average reduction of 7.2 mmHg for the systolic BP and of 3.8 mmHg for the diastolic BP in hypertensive subjects. In normotensive individuals, the same decrease in sodium intake will reduce the average systolic BP by 3.6 mmHg and the diastolic BP by 1.7 mmHg. These numbers are valid for all ages. Furthermore, BP reductions are now documented using 24-hour ambulatory BP monitoring with a decrease of daytime systolic BP of 12.1 mmHg and diastolic BP of 6.8 mmHg using a «no added salt» diet (3). Finally, in refractory hypertension, applying a stringent salt restriction (50 mmol/day) to patients taking an average of 3.4 medications per day reduced the systolic BP by 20.7 mmHg and the diastolic BP by 9.6 mmHg (4).

Population cohort studies have shown us the usefulness of restricting sodium intake from a public health standpoint. Using a salt substitute with 35 % less sodium, a randomized controlled study performed in rural China reached a mean reduction of systolic BP of 3.7 mmHg over a period of 12 months. No difference was noted in both groups for food taste. Earlier, through public education in the media and governmental regulation, Finland reduced its average sodium intake by 40% over nearly 30 years. In that country, the average diastolic BP dropped by up to 15 mmHg with an ensuing reduction in the incidence of stroke and coronary disease mortality in excess of 70%. In two separate randomized controlled trials, the reduction of sodium intake has decreased the incidence of cardiovascular events. In Taiwan, a salt substitute (about 50% less sodium) was given to Veterans in retirement homes. This lead to a reduction of 35 % cardiovascular related deaths (5). In a long-term...
follow-up of pre-hypertensive patients (Trials Of Hypertension Prevention), teaching on salt reduction translated in an average reduction of 25% of cardiovascular events (6).

The cornerstone diet strategy used in the Canadian hypertension guidelines found in CHEP (Canadian Hypertension Education Program) is the DASH (Dietary Approaches to Stop Hypertension) diet (7). Promoting a healthier diet based on less fat by the intake of more fruits and vegetables, less meat, more fish and skimmed milk products, the DASH diet decreases blood pressure. If a sodium restriction is added to this strategy, the average BP decrease can reach 11.4/5.5 mmHg. The average reduction in systolic BP is therefore comparable to the use of a prescription medication in monotherapy. To establish its therapeutic sodium intake goals, CHEP has used the widely accepted figures of daily adequate intake (AI) and upper level (UL) of sodium. The AI level is the recommended daily intake of sodium that accounts the body’s requirements in fluid, nutrition and for losses; there are no health benefits above these levels. The UL is the highest average daily intake level likely to pose no risk of adverse effects, for nearly everyone. This is not a target. Individuals should not routinely exceed the UL. The recommended AI’s and UL’s are listed in Table 1.

| Table 1. Sodium intake recommendations (mg/day) - Institute of Medicine |
|-----------------|-----------------|----------------|
| Age-sex         | Adequate Intake | Upper Limit   |
| 19-31 men       | 1500            | 2300          |
| women           | 1500            | 2300          |
| 31-50 men       | 1500            | 2300          |
| women           | 1500            | 2300          |
| 51-70 men       | 1300            | 2300          |
| women           | 1300            | 2300          |
| 71 and over men | 1200            | 2300          |
| women           | 1200            | 2300          |

CHEP is now using the recommended AI levels as its target for daily salt intake. From the robust linear relationship between the drop in sodium intake and the reduction in BP levels as mentioned earlier, these more stringent guidelines are a call for better nutrition at a national level and for an improved prevention of hypertension and control of BP. At this time, the actual sodium intake of Canadian adults exceeds the UL’s. The average daily consumption ranges from 2,400 to 3,900 mg. It has been estimated that a reduction from 3,500 to 1,700 mg of sodium daily in Canada would prevent 23 500 cardiovascular events per year, a decrease of 13%. This would result in direct health care savings of $ 1.38 billion per year.

Hypertension Canada, CHEP and other national scientific committees are now involved in a sodium working group that includes Health Canada and associations in the food industry to start reducing gradually on a voluntary basis the amount of salt in prepared food items. Also, education of patients, health professionals and the public is underway. A better food labeling will appear shortly and consumers will be called upon to choose low salt items. The ultimate goal is to lower sodium intakes
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to a population mean whereby as many individuals as possible (greater than 95%) have a daily intake below the tolerable UL of 2,300 mg per day.

Another effective intervention for lowering BP in patients with hypertension is weight loss. Weight reduction by caloric reduction decreases both systolic and diastolic BP. Though difficult to attain solely by diet, patients with body mass indexes greater than 25 can benefit from this strategy. In a meta-analysis published in 2003 (8), the average systolic and diastolic BP reductions were 4.44 and 3.57 mmHg respectively. Roughly, this is equivalent to about 1 mmHg drop for both pressures per kilogram lost. Nevertheless, if we consider only studies of longer duration (at least 2 years), there is no significant weight loss and therefore no improvement in BP levels underlying the difficulties in adhering to a weight reducing diet over time (9). A recent study (10) combining the DASH diet with weight reduction and regular aerobic physical activity over 4 months generated a better average weight reduction (-8.7 kg) which improved the total BP reductions (-16.1/-9.9 mmHg). In the TONE study (11), a combination of weight loss with salt restriction improved the clinical outcome as measured by the reduction in the incidence of cardiovascular events. Longer duration studies with multiple lifestyle interventions are still needed.

In conclusion, strategies on salt intake and weight reduction are both effective in reducing BP. This has an impact on preventing and treating hypertension. Furthermore, these lifestyle improvements can lead to a lower incidence of cardiovascular events. Since a better BP control in the Canadian population and a reduction of the cost burden on the health system is foreseen, CHEP and Hypertension Canada will continue their partnership with national societies, associations and governments to curtail the amount of salt added in food processing and promote healthier alternatives. Implementation of these lifestyle changes is underway for the Canadian public and health professionals. Adherence to a healthier lifestyle is a challenge and this can be better addressed by a multi-disciplinary approach that includes nutritionists, kinesiologists and nurses.

References:


7. Sacks FM & al. DASH-Sodium Collaborative Research Group. Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. NEJM 2001; 344:3-10


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