The 2004 Canadian recommendations for the management of hypertension: Part III – Lifestyle modifications to prevent and control hypertension

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OBJECTIVE: To provide updated, evidence-based recommendations regarding the role of lifestyle modification in the treatment and prevention of hypertension.

OUTCOMES: Lifestyle modification interventions including exercise, weight reduction, alcohol consumption, dietary modification, intake of dietary cations and stress management are reviewed. Antioxidants and fish oil supplements are also reviewed, although specific recommendations cannot be made at present.

EVIDENCE: MEDLINE searches were conducted from January 2002 to September 2003 to update the 2001 recommendations for the management of hypertension. Supplemental searches in the Cochrane Collaboration databases were also performed. Reference lists were scanned, experts were contacted, and the personal files of the subgroup members and authors were used to identify additional published studies. All relevant articles were reviewed and appraised independently using prespecified levels of evidence by content and methodology experts.

RECOMMENDATIONS: Key recommendations include the following: lifestyle modification should be extended to nonhypertensive individuals who are at risk for developing high blood pressure; 30 min to 45 min of aerobic exercise should be performed on most days (four to five days) of the week; an ideal body weight (body mass index 18.5 kg/m^2 to 24.9 kg/m^2) should be maintained and weight loss strategies should use a multidisciplinary approach; alcohol consumption should be limited to two drinks or fewer per day, and weekly intake should not exceed 14 standard drinks for men and nine standard drinks for women; a reduced fat, low cholesterol diet that emphasizes fruits, vegetables and low fat dairy products, and maintains an adequate intake of potassium, magnesium and calcium, should be followed; salt intake should be restricted to 65 mmol/day to 100 mmol/day in hypertensive individuals and less than 100 mmol/day in normotensive individuals at high risk for developing hypertension; and stress management should be considered as an intervention in selected individuals.

VALIDATION: All recommendations were graded according to the strength of the evidence and voted on by the Canadian Hypertension Education Program Evidence-Based Recommendations Task Force. Individuals with irreconcilable competing interests (declared by all members, compiled and circulated before the meeting) relative to any specific recommendation were excluded from voting on that recommendation. Only those recommendations achieving at least 70% consensus are reported here. These guidelines will continue to be updated annually.

Key Words: *Alcohol; Blood pressure; Body weight; Diet; Exercise; Minerals; Salt; Stress*

Recommandations 2004 relatives au traitement de l'hypertension au Canada : modifications du mode de vie pour prévenir et maîtriser l'hypertension artérielle (3^e partie)

OBJECTIF : Formuler des recommandations à jour, fondées sur des preuves, sur le rôle des modifications du mode de vie dans le traitement et la prévention de l'hypertension artérielle.

RÉSULTATS : Nous avons passé en revue des interventions visant à modifier le mode de vie, notamment l'activité physique, la perte de poids, la consommation d'alcool, le régime alimentaire, l'apport d'ions métalliques d'origine alimentaire et la gestion du stress. Nous avons fait de même pour les antioxydants et les compléments d'huile de poisson, bien qu'il ne soit pas possible pour le moment de formuler des recommandations précises à cet égard.

DONNÉES : Nous avons fait des recherches dans la base de données MEDLINE entre janvier 2002 et septembre 2003 pour procéder à la mise à jour des recommandations 2001 relatives au traitement de l'hypertension. Des recherches complémentaires ont également été effectuées dans les bases de données du Centre de collaboration Cochrane. Nous avons numérisé les listes de références, communiqué avec des experts et utilisé les fichiers personnels des membres du sous-groupe de travail et d'auteurs à la recherche d'autres études publiées. Tous les articles pertinents ont été examinés et évalués par des experts indépendants en contenu et en méthodologie, selon des degrés prédéterminés de fiabilité.

RECOMMANDATIONS : Voici les principales recommandations : 1) étendre les modifications du mode de vie aux patients normotendus mais prédisposés à l'hypertension; 2) faire des exercices aérobiques pendant 30 à 45 minutes presque tous les jours de la semaine; 3) maintenir un poids idéal et recourir à des stratégies de perte de poids faisant appel à une approche pluridisciplinaire; 4) limiter la consommation d'alcool à 2 verres par jour et ne pas dépasser 14 verres par semaine pour les hommes et 9 verres par semaine pour les femmes; 5) suivre un régime pauvre en graisses et en cholestérol, riche en fruits et légumes et composé de produits laitiers allégés, et maintenir un apport suffisant en calcium, en potassium et en magnésium; 6) restreindre l'apport en sel entre 65 et 100 mmol/jour chez les patients hypertendus et à moins de 100 mmol/jour chez les patients normotendus mais fortement prédisposés à l'hypertension; 7) envisager des mesures de gestion du stress chez certains patients.

VALIDATION : Toutes les recommandations ont été cotées en fonction de la fiabilité des données et acceptées par le groupe de travail sur les recommandations fondées sur des preuves, rattaché au programme de formation en matière d'hypertension au Canada. Les personnes présentant des intérêts opposés irréconciliables (déclarés par tous les membres, dépouillés et portés à la connaissance de tous avant la réunion) à l'égard de certaines recommandations se sont abstenus de voter sur ces recommandations. Seules celles ayant recueilli au moins 70 % des votes figurent dans le présent document. Les lignes de conduite continueront à faire l'objet d'une révision annuelle.

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Increasing evidence suggests that lifestyle modification, previously termed 'nonpharmacological therapy', is beneficial for both non-hypertensive and hypertensive individuals. Lifestyle changes not only have blood pressure (BP) lowering effects, but also may act to prevent hypertension in selected individuals (1,2). When applied on a population-wide basis, lifestyle modification has the potential for major benefit because cardiovascular disease causes significant morbidity and mortality in the Canadian population, a significant proportion of the Canadian adult population with hypertension is inadequately treated and controlled, and even modest changes in BP on a population-wide basis may significantly reduce cardiovascular events (3-5). For example, a 3 mmHg reduction in systolic BP (SBP) in the general population has the potential to reduce stroke mortality by 8% and coronary artery disease mortality by 5% (2,5).

In hypertensive patients, lifestyle modification should constitute initial treatment before the commencement of pharmacological therapy and serve as an adjunct to medication in patients already on drug therapy. In highly motivated drug-treated patients who achieve and sustain lifestyle changes, these therapies could facilitate drug step down and possibly drug withdrawal. Accordingly, in principle, education and instructions concerning lifestyle measures should also be given to non-hypertensive patients, particularly those at risk for developing hypertension. For patients with cardiovascular risk factors such as hyperlipidemia, obesity and diabetes, lifestyle measures are particularly important (1,2,6).

METHODS

This is an update to the previous Canadian Hypertension Education Program (CHEP) Evidence-Based Recommendations on lifestyle modifications in the prevention and management of hypertension (7). A detailed outline of the CHEP recommendations process is provided in the accompanying paper in this issue of the *Journal* (pages 41-54) (8). For the lifestyle modification section, a detailed literature search of MEDLINE was conducted for the period from January 2002 to September 2003 with the help of a medical librarian. This search was supplemented with searches in the Cochrane Database of Systemic Reviews, the Cochrane Registry of Clinical Trials and the Cochrane Evidence-Based Medicine Review Database. Literature searches were limited to human studies and English-language articles.

RECOMMENDATIONS

I. Physical exercise

1. For non-hypertensive individuals, to reduce their possibility of becoming hypertensive, prescribe the accumulation of 30 min to 45 min of moderate intensity dynamic exercise (such as walking, jogging, cycling or swimming) three days to five days per week (Grade B). Higher intensities of exercise are no more effective (Grade B).
2. For hypertensive patients, to reduce BP, prescribe the accumulation of 30 min to 45 min of moderate intensity dynamic exercise (such as walking, jogging, cycling or swimming) on most days (four days to five days) of the week (Grade B). Higher intensities of exercise are no more effective (Grade B).

Background: The Consensus Symposium on Physical Activity and Health has recently published an evidence-based review of the relationship between exercise and health outcomes (including BP) (9). A single session of exercise at an intensity of 50% to 100% of maximum aerobic power reduces SBP by 18 mmHg to 20 mmHg and diastolic BP (DBP) by 7 mmHg to 9 mmHg (9,10). These changes persist for up to 12 h to 16 h following exercise (10,11). An exercise training program at 50% of maximum aerobic power significantly reduces BP and high intensity exercise does not appear to provide additional benefit (11). Data from two recent meta-analyses indicate that net changes in BP are not significantly related to training intensity or the duration of individual training sessions (11,12). Clinically significant improvements in both SBP and DBP may be achieved from as little as 30 min to 60 min per week of moderate intensity aerobic exercise, particularly in adults (13-16).

II. Weight reduction

1. Height and weight should be measured and body mass index (BMI) calculated for all adults (Grade D).
2. Maintenance of an ideal body weight (BMI 18.5 kg/m^2 to 24.9 kg/m^2) is recommended for non-hypertensive individuals to prevent hypertension (Grade C).
3. Maintenance of a healthy BMI (18.5 kg/m^2 to 24.9 kg/m^2) is recommended for hypertensive patients to reduce BP. All overweight (BMI greater than 25 kg/m^2) hypertensive individuals should be advised to lose weight (Grade B).
4. Weight loss strategies should use a multidisciplinary approach and include dietary education, increased physical activity and behavioural modification (Grade B).

Background: BP is reduced by 1.6/1.1 mmHg for each 1 kg of weight loss (17). The incidence of hypertension and associated cardiovascular risk factors increases substantially within the overweight (BMI 25 kg/m^2 to 29.9 kg/m^2) and obese (BMI greater than 30 kg/m^2) BMI categories (18). Waist circumference may more accurately measure visceral adipose tissue stores and predicts the presence of cardiovascular risk factors, even within normal ranges of BMI (19). Therefore, in addition to calculating BMI, measuring abdominal girth is recommended, and a waist circumference of less than 88 cm in women and 102 cm in men should be maintained (20,21). Multidisciplinary approaches to weight loss appear more effective in reducing BP and promoting weight loss (1,22,23).

III. Alcohol consumption

Alcohol consumption should be in accordance with Canadian low risk drinking guidelines: healthy adults should limit alcohol consumption to two drinks or fewer per day, and consumption should not exceed 14 standard drinks per week for men or nine standard drinks per week for women (grade B).

Background: Health care professionals should determine the alcohol consumption of all adult patients. These recommendations are valid for both hypertensive and normotensive individuals. One drink is considered 13.6 g or 17.2 mL of ethanol, or approximately 1.5 oz of 80 proof (40%) spirits, 12 oz of 5% beer or 5 oz of 12% wine. Limiting alcohol consumption can reduce SBP by 2 mmHg to 4 mmHg (24-26) and improves endothelial function (27).

IV. Dietary recommendations

It is recommended that hypertensive patients consume a diet that emphasizes fruits, vegetables and low fat dairy products and that is reduced in fat and cholesterol (Dietary Approaches to Stop Hypertension [DASH] diet (Grade B).

Background: Among non-hypertensive individuals, the DASH diet (Table 1) reduced BP by 3.5/2.1 mmHg. In hypertensive patients, the DASH diet reduced BP by 11.4/5.5 mmHg (28-33). *Canada's Food Guide to Healthy Eating* is in accordance with the DASH diet (34).

V. Salt intake

1. In normotensive individuals at increased risk of developing hypertension who are considered salt sensitive such as Canadians of African descent, people over 45 years of age, and individuals with impaired renal function or diabetes, salt intake should be restricted to less than 100 mmol/day (Grade D).
2. In hypertensive patients, dietary sodium intake should be limited to 65 mmol/day to 100 mmol/day (Grade B).

Background: The general public should avoid consuming an excessively high salt diet. To reduce salt intake, it is advisable that patients are educated about the salt content of foods, that they select low sodium containing foods and avoid foods high in salt (preprepared and preserved foods), and that they limit the amount of salt added to food, both during food preparation and at the table. Sodium consumption should be determined by interview in hypertensive patients and monitored periodically by 24 h urine collection because long-term compliance is difficult to sustain without follow-up support and reinforcement. It is suggested that physicians work closely with nutritionists to evaluate the dietary salt intake of patients as accurately as possible. Dietary sodium restriction may lower BP by 4.2/2.0 mmHg to 5.2/3.7 mmHg in hypertensive patients and by 1.1/0.5 mmHg to 2.0/1.1 mmHg in normotensive individuals (35-38). The long-term benefits diminish markedly in part due to low compliance with dietary advice.

VI. Potassium, calcium and magnesium intake

1. Hypertensive patients or normotensive individuals at increased risk of developing hypertension who are considered salt sensitive such as Canadians of African descent, people over 45 years of age, and individuals with impaired renal function or diabetes should ensure an adequate intake of potassium, calcium and magnesium by consuming a diet rich in these micronutrients (Grade D).
2. Supplementation of potassium, calcium and magnesium is not recommended for the prevention or treatment of hypertension (Grade B).
3. Individuals who require a diet rich in these cations, but who can not tolerate or afford this diet, should supplement their diet with potassium to obtain a daily intake of more than 80 mmol/day (Grade D).

Background: The BP lowering benefits of the DASH diet have been repeatedly demonstrated in hypertensive patients and normotensive individuals at risk of developing hypertension who are consuming a diet deficient in potassium, calcium and magnesium, and high in total and saturated fat (28,29). An adequate intake of potassium, calcium and magnesium is an important component of the DASH diet. It mitigates salt sensitivity and appears to have a wide range of benefits beyond lowering BP including reducing insulin resistance and improving lipid metabolism (39-41). The importance of ensuring adequate intake of potassium, calcium and magnesium cations by dietary means rather than by supplements should be emphasized in hypertensive patients and normotensive individuals.

TABLE 1
Dietary Approaches to Stop Hypertension (DASH) diet*

Food group	Daily servings	Examples and notes
Grains and grain products	7-8	Whole wheat bread, oatmeal, popcorn
Vegetables	4-5	Tomatoes, potatoes, carrots, beans, peas, squash, spinach
Fruits	4-5	Apricots, bananas, grapes, oranges, grapefruit, melons
Low fat or fat free dairy foods	2-3	Fat free (skim) or low fat (1%) milk, fat free or low fat yogurt, fat free or low fat cheese
Meats, poultry, fish	≤2	Select only lean meats. Trim away fats. Broil, roast or boil. No frying. Remove skin from poultry.
Nuts, seeds, dry beans	4-5/week	Almonds, peanuts, walnuts, sunflower seeds, lentils
Fats and oils	2-3	Soft margarines, low fat mayonnaise, vegetable oil (eg, olive, corn, canola or safflower oil)
Sweets	5/week	Maple syrup, sugar, jelly, jam, hard candy, sorbet

**DASH eating plan is available at <www.nhlbi.nih.gov>*

VII. Dietary antioxidants and fish oil supplements

No recommendations are given at present.

Background: Evidence from epidemiological studies suggests that the Mediterranean-style diet or dietary supplementation with omega-3 polyunsaturated fatty acids can reduce BP (42-44). However, only small, underpowered trials have tested this effect (45-47). Although small studies have suggested that vitamin C and/or vitamin E may reduce BP in hypertensive patients (48-53), large, well-controlled studies are needed before more definitive recommendations can be made.

VIII. Stress management

In hypertensive patients in whom stress may be implicated in contributing to BP elevation, stress management should be considered as an intervention (Grade D). Individualized cognitive behavioural interventions are more likely to be effective when relaxation techniques are used (Grade B).

Background: Evidence emerging within the past several decades suggests that psychosocial factors from emotional states such as depression, behavioural dispositions such as hostility, and psychosocial stress can directly influence both physiological function and health outcomes (54,55). A recent systematic review (56) determined that stress related to depression, social isolation and lack of quality social support increased the risk of coronary artery disease similar to more conventional risk factors such as smoking, dyslipidemia and hypertension. These findings suggest a link between psychosocial factors and atherosclerosis; however, the specific nature of the association is not known and it still remains unclear exactly what the role of stress management on long-term outcomes related to hypertension morbidity may be (57-64).

CONCLUSIONS

A lack of long-term persistence with therapy is a major potential barrier to the effectiveness of lifestyle interventions

in the management of hypertension. Results from long-term follow-up studies demonstrate that many patients fail to sustain lifestyle changes (65). Another limiting factor in studies of lifestyle modification is the lack of mortality data because most trials are underpowered or of insufficient duration to fully evaluate the effects on cardiovascular outcomes. Nevertheless, lifestyle modifications should be encouraged because such therapies are safe, inexpensive and, when combined with drug therapy, may result in better BP control and improved quality of life (66). Many individual lifestyle interventions, if successfully and maximally adopted, may lead to BP reductions similar to those observed with single drug therapy, and the combined effects of comprehensive lifestyle modification can result in greater BP reductions (23,67,68). Although modification of a single lifestyle factor may only have a modest BP lowering effect in an individual patient, such small reductions in BP in the general population may lead to significant reductions in cardiovascular disease on a population-wide basis (5). Thus, lifestyle modification for the treatment of hypertension is an important intervention both from a public health perspective and in the routine management of the individual hypertensive patient.

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