8-1-2017

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Wilbert S. Aronow
New York Medical College

Recommended Citation

Aronow, W. S. (2017). Lifestyle Measures for Treating Hypertension. *Archives of Medical Science, 13* (5), 1241-1243. https://doi.org/10.5114/aoms.2017.68650

Lifestyle measures for treating hypertension

Wilbert S. Aronow

Cardiology Division, New York Medical College, Valhalla, NY, USA

Submitted: 9 December 2016
Accepted: 15 December 2016

Arch Med Sci 2017; 13, 5: 1241–1243
DOI: https://doi.org/10.5114/aoms.2017.68650

Corresponding author:
Prof. Wilbert S. Aronow MD, FACC, FAHA
Cardiology Division
New York Medical College
Macy Pavilion
Room 141
Valhalla, NY 10595, USA
Phone: (914) 493-5311
Fax: (914) 235-6274
E-mail: wsaronow@aol.com

Hypertension needs to be adequately controlled to reduce cardiovascular events and mortality [1–4]. Lifestyle modification should be used to prevent mild hypertension and to reduce the dose levels of drugs needed to control hypertension. Weight reduction, consuming a diet rich in fruits, vegetables, and low-fat dairy products with less saturated fat and total fat, sodium reduction to not exceed 1.5 g daily, smoking cessation, regular aerobic physical activity, avoidance of excessive alcohol intake, avoidance of excessive caffeine, and avoidance of drugs which can increase blood pressure, including nonsteroidal anti-inflammatory drugs, glucocorticoids, and sympathomimetics, are recommended [4, 5]. Implementing a national salt reduction program is a simple and cost-effective way of improving public health [6, 7].

Long-term observational follow-up was performed in 744 persons in the first phase of the Trials of Hypertension Prevention (TOHP I) (10 years after its end) and in 2,382 persons in TOHP II (5 years after its end), in which persons with prehypertension were randomized to sodium reduction or to a usual diet (25–35% greater sodium intake) [8]. In these studies, sodium reduction reduced cardiovascular events by 25%. At 31-month follow-up of 1,981 Taiwanese veterans living in a retirement home, older men randomized to a potassium-enriched diet with 50% less sodium had a 41% decrease in cardiovascular mortality compared with those randomized to a regular salt diet [9].

At 14.8-year follow-up of 12,267 adults in the Third National Health and Nutrition Examination Survey, a higher sodium intake was associated with a 20% increase in all-cause mortality per 1,000 mg of sodium intake per day, whereas a higher potassium intake was associated with a 20% reduction in mortality per 1,000 mg of potassium intake per day [10]. For the sodium-potassium ratio, compared with the lowest quartile, the highest quartile increased all-cause mortality by 46%, cardiovascular mortality by 46%, and ischemic heart disease mortality by 215% [10]. A meta-analysis of 56 randomized controlled trials showed a mean blood pressure reduction of 3.7/0.9 mm Hg for a 100 mmol/day reduction in sodium excretion [11]. Current guidelines suggest no more than 2,300 mg of sodium daily in the general population and no more than 1,500 mg of sodium daily in older persons, in blacks, and in persons with hypertension, diabetes mellitus, chronic kidney disease, or heart failure [12].

A one-third decrease in dietary sodium intake in Finland was associated with a decrease in blood pressure and a 75% to 80% decrease in both coronary heart disease and stroke mortality [13]. Data from the Health Survey for England included 9183 persons in 2003, 8762 persons in 2006, 8974 persons in 2008, and 4753 persons in 2011 [14]. From 2003 to 2011, salt intake measured by 24-hour urinary sodium

was 1.9 g less per day, blood pressure in persons not taking antihypertensive medication was lower by 2.7/1.1 mm Hg, mortality from stroke was 42% lower, and mortality from ischemic heart disease was 40% lower [14]. A meta-analysis of 34 trials including 3230 persons showed that sodium reduction reduced blood pressure by 5.39/2.82 mm Hg in persons with hypertension [15]. A modeling study demonstrated that 1.65 million cardiovascular deaths in 2010 were caused by sodium consumption above a reference level of 2 g/day [16].

Reduction of dietary sodium intake by lowering sodium content in processed food and by not adding salt to food would lead to a lower blood pressure and to a decrease in cardiovascular events and mortality. A national salt reduction program is one of the simplest and most cost-effective ways of improving public health.

Other lifestyle measures in treating prehypertension and hypertension include weight control, smoking cessation, aerobic physical activity, reduction in dietary fat and cholesterol, adequate dietary potassium, calcium, and magnesium intake, avoidance of excessive alcohol intake (no more than 1 ounce daily in men and half an ounce daily in women and light-weight men), avoidance of excessive caffeine, and avoidance of drugs which increase blood pressure such as nonsteroidal anti-inflammatory drugs, sympathomimetics, glucocorticoids, etc. [4, 5].

The body mass index should be maintained between 18.5 and 24.9 kg/m^2 [4, 5]. A meta-analysis of 25 randomized, controlled trials including 4874 persons showed that a weight reduction of 5.1 kg by means of reduction of caloric intake, increased physical activity, or both, reduced the blood pressure by 4.44/3.57 mm Hg [17].

The Dietary Approaches to Stop Hypertension (DASH) diet is rich in fruits, vegetables, and low-fat dairy products with a decreased content of saturated and total fat [18, 19]. In 459 persons with blood pressures of <160/80–95 mm Hg, compared with a control diet, the DASH diet reduced blood pressure by 5.5/3.0 mm Hg more than the control diet [18]. In 412 persons, compared with a control diet with a high sodium content, the DASH diet with a low sodium content reduced systolic blood pressure by 11.5 mm Hg in persons with hypertension and by 7.1 mm Hg in persons without hypertension [19].

A meta-analysis of 33 randomized controlled trials including 2609 persons in which potassium supplementation was the only difference between the intervention and control groups demonstrated that potassium supplementation in the diet reduced blood pressure by 3.11/1/97 mm Hg [20]. Another meta-analysis of 22 randomized controlled trials including 1606 persons showed that increased potassium intake in the diet reduced blood pressure by 3.49/1.96 mm Hg [21]. A meta-analysis of 11 cohort studies including 127,038 persons showed that increased potassium in the diet reduced stroke by 24%, insignificantly reduced cardiovascular disease by 12%, and did not affect the incidence of coronary heart disease [21].

A meta-analysis of 40 randomized controlled trials including 2492 persons showed that calcium supplementation in the diet by a mean daily dose of 1200 mg reduced blood pressure by 1.86/0.99 mm Hg [22]. Magnesium supplementation in the diet has also been shown to cause a small reduction in blood pressure [23]. A meta-analysis of 40 randomized controlled trials including 3,277 persons showed that partially replacing dietary carbohydrate with increased dietary protein reduced blood pressure by 2.27/1.26 mm Hg for vegetable protein and 2.54/0.95 mm Hg for animal protein [24]. A meta-analysis of 25 randomized controlled trials showed that increased intake of dietary fiber may reduce blood pressure in persons with hypertension [25]. A meta-analysis of 7 randomized controlled trials comprising 9 treatment arms and including 587 patients showed that the dietary flavonol quercetin reduced blood pressure by 3.04/2.63 mm Hg [26]. With quercetin doses of ≥ 500 mg/day, quercetin reduced blood pressure by 4.45/2.98 mm Hg. There was no significant effect for blood pressure reduction for doses of quercetin less than 500 mg/day [26].

A meta-analysis of 54 randomized controlled trials including 2419 persons showed that aerobic exercise reduced blood pressure by 3.84/2.58 mm Hg [27]. Aerobic exercise reduced blood pressure in persons with and without hypertension and in overweight and in normal-weight persons [27]. A meta-analysis of 93 trials involving 105 endurance exercise trials, 29 dynamic resistance exercise trials, 14 combined exercise trials, and 5 isometric resistance exercise trials including 5223 persons (3401 exercise participants and 1822 control participants) showed that endurance exercise reduced blood pressure by 3.5/2.5 mm Hg, dynamic resistance exercise reduced blood pressure by 1.8/3.2 mm Hg, and isometric resistance reduced blood pressure by 10.9/6.2 mm Hg [28]. Combined training reduced diastolic blood pressure by 2.2 mm Hg. Endurance exercise reduced systolic blood pressure more in persons with hypertension (8.3 mm Hg) than in prehypertensive persons (2.1 mm Hg) [28].

A meta-analysis of 15 randomized controlled trials including 2234 persons showed that alcohol reduction reduced blood pressure by 3.31/2.04 mm Hg [29]. Alcohol reduction is recommended for the prevention and treatment of hypertension [4, 5, 29].

Sodium reduction, weight loss, increased physical activity, and limited alcohol intake are established lifestyle measures to reduce blood pressure. The DASH diet also reduces blood pressure. A study was performed in 4 clinical centers

which included 810 persons, mean age 50 years (62% women and 34% blacks) with above optimal blood pressure not taking antihypertensive drugs [30]. In this study, 268 persons were randomized to established lifestyle measures, 269 persons to established lifestyle measures plus the DASH diet, and 273 persons to an advice control group. After subtracting the reduction in blood pressure from the advice group, the mean net reduction in systolic blood pressure was 3.7 mm Hg with established lifestyle measures and 4.3 mm Hg with established lifestyle measures plus the DASH diet. At 6-month follow-up, the prevalence of a systolic blood pressure below 120/80 mm Hg was 19% in the advice group, 30% in the established lifestyle measures group, and 35% in the established lifestyle measures plus DASH diet group [30].

Conflict of interest

The author declares no conflict of interest.

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