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Review

Treating hypertension and prehypertension in older people: When, whom and how

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ABSTRACT

Prehypertension should be treated with lifestyle measures and not with antihypertensive drug therapy in older adults. Lifestyle measures should be encouraged both to retard development of hypertension and as adjunctive therapy in those with hypertension. A meta-analysis of 11 randomized controlled trials of 40,325 older persons showed that antihypertensive drug therapy significantly reduced all-cause mortality 13% (7–19%), cardiovascular death 18% (7–27%), cardiovascular events 21% (13–27%), stroke 30% (23–37%), and fatal stroke by 33% (9–50%) (Ostrowski et al., 2014 [32]). The American College of Cardiology/American Heart Association 2011 expert consensus document on hypertension in the elderly recommended that the systolic blood pressure be lowered to <140 mm Hg in older persons younger than 80 years and to 140–145 mm Hg if tolerated in adults aged 80 years and older. A meta-analysis of 147 randomized trials including 464,000 persons with hypertension showed that except for the extra protective effect of beta blockers given after myocardial infarction and a minor additional effect of calcium channel blockers in preventing stroke, the use of beta blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), diuretics, and calcium channel blockers cause a similar reduction in coronary events and stroke for a given decrease in blood pressure. The choice of specific antihypertensive drugs such as diuretics, ACE inhibitors, ARBs, beta blockers, or calcium channel blockers depends on efficacy, tolerability, presence of specific comorbidities and cost.

Contents

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1. Introduction

Prehypertension is a systolic blood pressure (SBP) of 120–139 mm Hg with a diastolic blood pressure (DBP) of 80–89 mm Hg [1]. Hypertension is a SBP of ≥140 mm Hg or a DBP of ≥90 mm Hg [1,2]. Isolated systolic hypertension is a SBP of ≥140 mm Hg with a DBP <90 mm Hg [1,2]. Stage 1 hypertension is a SBP of 140–159 mm Hg or a DBP of 90–99 mm Hg [1]. Stage 2 hypertension is a SBP of ≥160 mm Hg or a DBP of ≥100 mm Hg [1]. Resistant hypertension is a blood pressure remaining above goal despite the use of 3 optimally dosed antihypertensive drugs from different classes with one of the drugs being a diuretic [3]. Hypertension is a major risk factor for cardiovascular disease in older adults [2]. Hypertension is present in 69% of patients with a first myocardial infarction [4], in 77% of patients with a first stroke [4], in 74% of patients with congestive heart failure [4], and in 60% of patients with peripheral arterial disease [5]. This review will discuss the treatment of hypertension and prehypertension in older adults.

2. Lifestyle measures

Prehypertension should be treated with lifestyle measures and not with antihypertensive drug therapy in older adults. Lifestyle measures should be encouraged both to retard development of hypertension and as adjunctive therapy in those with hypertension. Seven hundred and forty-four persons in the trial of hypertension prevention (TOHP) I and 2382 persons in TOHP II with prehypertension were randomized to a reduced sodium diet (18 months for TOHP I and 36–48 months for TOHP II) or a usual diet which contained 25–35% more sodium [6]. Long-term follow-up was 10–15 years after the original trial. Sodium reduction decreased cardiovascular events by 25% ($p = 0.04$) [6].

One thousand nine hundred and eighty-one Taiwanese veterans, mean age 75 years, in a retirement home were randomized to a regular salt diet or to a potassium enriched salt diet with 50% less sodium [7]. At 31-month follow-up, cardiovascular mortality was reduced 41% (95% CI, 5–63%), and medical expenses were reduced 426 US dollars per year by the increase in potassium and reduction in sodium diet [7].

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 [8]. Guidelines recommend no more than 2300 mg of sodium (6 g of sodium chloride daily) [2] to no more than 1500 mg of sodium daily, especially in black persons, elderly persons, and those with hypertension, diabetes mellitus, and chronic kidney disease [9].

A one-third reduction in dietary sodium intake in Finland was associated with a reduction in blood pressure and a 75–80% reduction in both stroke and coronary heart disease mortality [10]. The Third National Health and Nutrition Examination Survey included 12,267 US adults [11]. At 14.8-year mean follow-up, higher sodium intake was associated with a 20% (3–41%) increase in all-cause mortality per 1000 mg/day of increased sodium intake [11]. For sodium–potassium ratio, the adjusted hazard ratios comparing the highest quartile with the lowest quartile were 46% (27–67%) for all-cause mortality, 46% (11–92%) for cardiovascular disease mortality, and 215% (148–312%) for ischemic heart disease mortality [11].

Data from the Health Survey for England included 9183 adults in 2003, 8762 adults in 2006, 8974 adults in 2008, and 4753 adults in 2011 [12]. These data showed that from 2003 to 2011, salt intake measured by 24 h urinary sodium decreased by 1.9 g per day ($p < 0.01$), blood pressure in persons not on antihypertensive medication was lowered by 2.7/1.1 mm Hg ($p < 0.001$), mortality from stroke was decreased by 42% ($p < 0.001$), and mortality from ischemic heart disease was decreased by 40% ($p < 0.001$) [12].

On the basis of the available data, reduction of dietary sodium intake by reducing sodium content in processed food and by not adding salt to food would lead to a reduction in blood pressure and to a reduction 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 oz daily in men and one-half ounce daily in women and light-weight men), avoidance of excessive caffeine, and avoidance of drugs which increase blood pressure such as nonsteroidal antiinflammatory drugs, sympathomimetics, glucocorticoids, etc. [1,2].

3. Clinical trials of antihypertensive drugs on cardiovascular events and mortality

Numerous antihypertensive drug trials have demonstrated that antihypertensive drug therapy reduces cardiovascular events in persons younger than 89 years [2]. The Systolic Hypertension in Elderly Program (SHEP) randomized 4736 patients, mean age 71.6 years (14% aged 80 years and older and 57% women), with isolated systolic hypertension to antihypertensive drug therapy or double-blind placebo [13]. The mean follow-up was 4.5 years. The 5-year mean blood pressure was 155/72 mm Hg on placebo and 143/68 mm Hg on drug therapy. The primary outcome of stroke was reduced 36% by drug therapy from 8.2 to 5.2 strokes per 100 patients ($p = 0.0003$) [13]. The number needed to treat to prevent 1 stroke in 5 years was 33 persons. Ischemic strokes were reduced 37% from 132 to 85 by drug therapy [14]. Hemorrhagic strokes were reduced 54% from 19 to 9 by drug therapy [14]. The treatment effect was seen within 1 year for hemorrhagic stroke but not until the second year for ischemic stroke [14]. Reduction of SBP to <160 mm Hg by drug therapy caused a 33% reduction in stroke, to <150 mm Hg caused a 38% reduction in stroke, and to <140 mm Hg caused a 22% reduction in stroke [14].

Major cardiovascular events in SHEP were reduced 32% by drug therapy with 55 major cardiovascular events per 1000 patients reduced in 5 years [13]. The NNT to prevent 1 major cardiovascular event in 5 years was 18 persons [13]. All-cause mortality was insignificantly reduced 13% by drug therapy [13]. Fatal or nonfatal heart failure was reduced 49% by drug therapy ($p < 0.001$) with 50 fewer persons on drug therapy developing heart failure in 5 years [15]. The NNT to prevent 1 heart failure event in 5 years was 48 persons. Among persons with prior myocardial infarction, drug therapy reduced heart failure by 81% ($p = 0.002$). The NNT to prevent 1 heart failure event in 5 years in persons with prior myocardial infarction was 15 persons [15].

The Systolic Hypertension in Europe (Syst-Eur) trial randomized 4695 patients (67% women), mean age 70.3 years with isolated systolic hypertension to antihypertensive drug therapy or to double-blind placebo [16]. Median follow-up was 2 years. The blood pressure was reduced 13/2 mm Hg by placebo and 23/7 mm Hg by drug therapy. Drug therapy reduced the primary endpoint of fatal and nonfatal stroke by 42% ($p = 0.003$), all fatal and nonfatal cardiovascular endpoints by 31% ($p < 0.001$), and all-cause mortality by 14% (p not significant) [16].

The Systolic Hypertension in China (Syst-China) trial alternately assigned 2394 patients (36% women), mean age 66.5 years, with isolated systolic hypertension to placebo or antihypertensive drug therapy [17]. Mean follow-up was 3 years. Blood pressure was reduced 10.9/1.9 mm Hg by placebo and 20.0/5.0 mm Hg by drug therapy. Drug therapy reduced all strokes by 38% ($p = 0.01$),