

Comparing Weight Reduction and Medications in Treating Mild Hypertension: A Systematic Literature Review

S Hamlin, T Brown

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Abstract

Hypertension is a major health issue in the United States. Currently, one in four American adults have hypertension at an estimated cost of \$33 billion in 1999. Studies have established the benefit of secondary prevention programs in the treatment of hypertension, with weight loss showing the most effective results. In addition, The Sixth Report of The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, recommend that risk factor modification be tried initially, in most cases, of mild hypertension. However, controversy remains over the appropriate initial therapy for treating mild hypertension. Many practitioners recommend weight loss as an initial therapy, while others believe medications are the best initial treatment. The purpose of this literature review is to examine the effect of weight reduction through diet modification compared to medications, as a first step approach to decrease mild hypertension in the adult population. Four randomized clinical trial studies published between 1992-1999 were reviewed. Using change in blood pressure as outcome criteria, all of the studies showed a decrease in blood pressure using weight reduction alone. However, in all of the studies, antihypertensive medications showed the greatest reduction in blood pressure. In conclusion, many patients with mild hypertension can lower and maintain their blood pressure using weight loss as monotherapy. Patients with moderate to severe hypertension who are taking antihypertensive medications should be placed on a weight loss program to not only lower blood pressure, but to possibly lower the required dosage of medication.

Hypertension is a major public health issue in the United States. The sequelae of uncontrolled hypertension includes heart disease, kidney disease, and stroke.¹ Studies have established the benefit of secondary prevention programs such as weight loss, physical activity, cholesterol lowering, and smoking cessation, in the treatment of hypertension.^{2,3,4} The advanced practice nurse (APN) is in a key position to encourage secondary preventative interventions. The purpose of this literature review is to examine the effect of weight reduction through diet modification compared to medications, as a first step approach to decrease mild hypertension in an adult population.

BACKGROUND

Studies indicate that one in four American adults have hypertension.³ In 1996, hypertension was the primary or contributing cause of death in 202,000 people in the United States.³ According to the The Sixth Report of The Joint National Committee on Prevention, Detection, Evaluation,

and Treatment of High Blood Pressure (JNC VI), improvements made in awareness, detection, treatment, and control of hypertension have declined.² Between 1991 and 1994, 68.4% of Americans were aware of their hypertension (a decline of 4.6%); Of these individuals, 53.6% were treated with medications (a decline of 1.4 %), of which 27.4 % had

controlled blood pressure (a decline of 1.6 %).² In addition, high blood pressure is the second leading cause of physician office visits.⁵

Estimates show that people 65 years or older number more than 34 million in the United States, and by the year 2030 this number is expected to reach 70 million, representing 20% of the population.⁶ Since more than 50% of the geriatric population have some form of hypertension, this is an important public health issue.⁷ The American Heart Association (AHA) estimates the cost of hypertension in 1999 will be \$33 billion.³ Furthermore, cardiovascular operations and procedures which are highest among the elderly, are expected to increase sharply as Americans continue to age.³

The etiology of a patient's hypertension is often not known. In fact, in 90%-95% of the cases, an identifiable cause can not be discerned.⁸ The term used to describe this type of high blood pressure is essential hypertension. In addition to genetic and environmental factors (for example obesity, alcohol use, salt intake, occupation/stress level), pathophysiologic conditions predisposing to essential hypertension include salt sensitivity, low/high renin levels, adrenal defects, low calcium intake, cell membrane defects, and insulin resistance.⁹

Essential hypertension is strongly associated with coronary artery disease. Forty to sixty-five percent of cardiac rehabilitation patients have high blood pressure.⁸ A five mm Hg elevation in diastolic blood pressure (DBP) has been associated with a 21% increase in risk of coronary heart disease and a 34% increase in risk of stroke.⁵

Secondary preventative programs are aimed at treating hypertension to reduce the risk of developing sequelae.^{3,5} Hypertension treatment focuses on lifestyle modifications such as weight reduction, smoking cessation, limited alcohol intake, exercise, reduced sodium, reduced fat and cholesterol intake, and adequate magnesium, potassium, and calcium intake.⁸ The antihypertensive effects of sodium restriction is believed to be related to simple volume contraction. However, this intervention has lost substantial support in recent years.⁹

Mild hypertension is defined as a systolic blood pressure (SBP) 140-159 and a DBP 90-99.^{2,3} At this stage of the disease, secondary preventive measures are the most widely used. JNC VI encourage lifestyle modification as definitive therapy for individuals with high-normal and stage 1

hypertension in risk group A and risk group B, and as adjunctive therapy for all persons with hypertension.² However, in the adult, depending on additional risk factors, some practitioners advocate pharmacological therapy with diuretics or beta-blockers instead of weight loss, as an initial treatment for mild hypertension.^{2,10}

People with hypertension are generally overweight, and although the mechanism is not fully understood, weight reduction is one of the most effective secondary interventions aimed at reducing blood pressure.^{3,5,11} Overweight is defined by the AHA as a body mass index (BMI) of 30 or greater.³ The prevalence of obesity has increased over the last 20 years where currently 47 million Americans are overweight.⁸ In hypertensive patients, a small amount of weight loss can not only lower blood pressure, but can also maintain a normal blood pressure.^{4,11} In addition, along with other interventions, most practitioners recommend weight reduction for treating all forms of hypertension in the adult patient.^{7,12,13} However, controversy exists over the appropriate initial therapy for treating mild hypertension in the adult patient.

METHODS

Studies with the following characteristics were included: 1) randomized clinical trials, published between 1992-1999 with male and female subjects older than 20 years and 2) at least 65 years old with newly diagnosed mild hypertension (SBP 140-159 and/or DBP 90-99). The year 1992 was selected because the Fifth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC V) was developed in 1992. Appropriate diet modification criteria with or without nutritional counseling included low calorie/energy, low fat, low cholesterol, low sodium, and increased potassium diets. Diuretics and beta-blockers were the only antihypertensive medications considered. Finally, results showing any change in blood pressure were included along with studies examining short and long-term results.

Subjects were excluded that reported pre-existing co-morbid diseases or who were admitted to the study currently taking antihypertensive medications. In addition, subjects less than 21 years and a population not including at least 65 year old subjects were excluded. Studies using increased physical activity as an intervention or studies failing to compare weight loss and medications as a means of lowering blood pressure were also excluded.

A computerized literature search was performed on Medline, Cumulative Index to Nursing and Applied Health Literature, and the Cochran Collaboration in addition to cross-referencing, for all English language articles that fit the inclusion criteria. Search terms included “elderly and hypertension”, “counseling in hypertension”, “education in hypertension”, “hypertension”, and “weight loss in hypertension”. Four studies met the selection criteria and were reviewed. The purpose of this review was to summarize the studies in a narrative manner. No attempt was made to statistically aggregate the results.

RESULTS

The current integrated review of literature examined four randomized clinical trial studies (see Table 1). Three of the studies were from a larger study, The Trial of Antihypertensive Interventions and Management (TAIM).^{14,15,16} The purpose of the TAIM study was to compare antihypertensive medications and diet modification in the treatment of mild hypertension. The three studies (from the TAIM study) in this review, used subsets of the population to examine outcomes such as blood pressure control, cardiovascular risk, quality of life, short and long-term results. The Wassertheil-Smoller, Oberman, et al. study was incorporated into the current review of literature because of the study’s comparison of weight reduction and medications (with a placebo) in addition to the other outcomes examined.¹⁵ The fourth study by Koopman et al., looked at diet in comparison to diuretics in treating mild to moderate hypertension in the elderly.¹⁷

The four studies included male and female subjects between the ages of 21 and 80 years. All participants had previously unknown mild to moderate hypertension (SBP 143-220 and DBP 90-110) and averaged 110%-160% above ideal body weight. The sample sizes in the four studies ranged from 42-787. The total patient population for the current integrated review of literature was 1,945. The Davis et al. study had 24% of the participants withdraw for reasons such as refusal to participate, moved, medical reasons, study design reassignment, end of study and death (N=587).¹⁶ The Wassertheil-Smoller, Blaufox, et al. study excluded 258 patients who were in the sodium-restriction/increase-potassium group, leaving 529 subjects.¹⁴ This exclusion was done because the focus of the study was the effects of weight change on blood pressure.¹⁴ In the Koopman, et al. study, two participants withdrew from the study (N=42); one due to myocardial infarction and the other for side effects of the

study medications.¹⁷

All of the studies compared diet modification and antihypertensive medications in relation to reducing blood pressure. Diet interventions included weight loss, low energy/calorie, sodium restriction, and potassium increased diets. The three TAIM studies did not specify type of diet for “weight reduction”. In addition, only the TAIM study participants received nutritional counseling.

Treatment included diuretics, beta-blockers, and placebo. All of the studies compared chlorthalidone 25 mg with weight loss while the three TAIM studies also compared atenolol 50 mg to chlorthalidone and weight loss.

The studies showed a reduction in DBP using weight loss alone. Wassertheil-Smoller, Blaufox et al. showed the greatest reduction in blood pressure (DBP decrease of 11.6 mm Hg) followed by Wassertheil-Smoller, Oberman et al. (DBP decrease of 8.8 mm Hg).^{14,15} Weight loss was the only variable significantly correlated to change in DBP ($r=0.50$, $p < 0.05$).¹⁷ In addition, Davis et al. showed a 25% reduction in long-term risk of treatment failure in the weight reduction/placebo group.¹⁶ Although the patients in this study generally regained the weight over a five year period, the weight loss benefits in relation to blood pressure continued.¹⁶ Therefore, the researchers concluded weight loss was an effective long-term intervention for the treatment of hypertension.¹⁶

A weight reduction of 4.5 kg was associated with a reduction in DBP of 11.6 mm Hg in comparison to the usual diet groups reduction of 7 mm Hg.^{14,15} Less than ten pounds is reported to have less effect on blood pressure than greater amounts of weight reduction.^{14,15} However, any amount of weight loss, even in patients who are not seriously overweight, can reduce blood pressure.¹⁷

A diet low in sodium produced less effect on blood pressure than weight reduction. A sodium restricted diet was associated with a DBP decrease of 7.9 mm Hg and a decrease of 8.3 mm Hg when combined with a weight reduction diet.¹⁵ However, only 25% of the participants were able to reduce their sodium to appropriate levels.¹⁵ Koopman and colleagues studied the effects of sodium restriction on blood pressure, but reported the results in terms of urinary excretion, not decreased blood pressure values.¹⁷ Koopman et al. however, did point out their study was not designed to individually examine the effects of weight loss and sodium restriction.¹⁷ No statistically

significant changes in urinary sodium were found.¹⁷ The researchers further reported that the consistent sodium density per energy unit of food, in a weight loss program, would result in a reduced intake of sodium.¹⁷

The above studies showed that antihypertensive medications produced the greatest reduction in DBP, 10 mm Hg in the chlorthalidone group and 12 mm Hg in the atenolol group.^{14,15,17} Davis et al. reported only 4 mm Hg decrease in DBP with chlorthalidone at six months and 2 mm Hg decrease with atenolol.¹⁷ Davis and colleagues reported that after six months, treatment failures increased with subsequent increases in antihypertensive therapy.¹⁶ However, the researchers reported a 75% and 62% reduction in treatment failure with chlorthalidone and atenolol respectively.¹⁶ Adding weight reduction to medications further decreased DBP by 4 mm Hg for chlorthalidone (total DBP reduction 15.6 mm Hg) and 2 mm Hg for atenolol (total DBP reduction 14.81 mm Hg).^{14,15}

Antihypertensive medications, although effective at significantly reducing mild hypertension, were associated with increased cost and side effects.¹⁶ Wassertheil-Smoller, Blafox et al., who are proponents of drug therapy especially in combination with weight reduction, reported that the cost aspect of antihypertension medication versus weight reduction has not been established.¹⁴ Furthermore, for a weight loss program to be successful at reducing blood pressure, a nutritionist must be consulted to manage the program.¹⁴

In the hypertensive elderly patient, drug therapy was reported by Koopmen et al. to be superior.¹⁷ However, weight reduction was encouraged as an initial therapy because of the added benefit of improvements in cardiovascular risks, in particular lipid levels.¹⁷

DISCUSSION

Both weight loss and medication were shown to decrease blood pressure in all of the studies. As monotherapy, however, reducing dietary sodium did not seem to significantly lower blood pressure. According to the literature, the medication group followed by the weight loss group produced the greatest reduction in blood pressure.

Weight loss as monotherapy has been shown to be an effective treatment for patients with mild hypertension. A weight loss of 4.5 kg is adequate to lower blood pressure in patients who are not significantly overweight. Weight loss as

an intervention alleviates the cost and side effects associated with antihypertensive medications. In addition, weight loss can lower cholesterol levels, decrease glucose levels in diabetics, decrease cardiovascular risks, and finally improve a patient's quality of life.^{16,17}

Patients with moderate or severe hypertension who are taking antihypertensive medications should also be placed on a weight loss program. Not only does weight loss lower blood pressure, but patients may require a lower dose of medication to control or maintain a normal blood pressure.

This literature review has direct application to the advanced practice nurse's clinical practice. These studies reviewed provide research-based evidence for treating mild hypertensive patients with weight loss as monotherapy. Using weight loss as treatment, however, requires greater time and effort on part of the APN in terms of teaching and monitoring. In addition, non-compliance may be a major factor in treating these patients because of the greater time and personal effort required for the patient.^{2,8} Adherence to the weight loss program can be encouraged through education, correcting misconceptions, enhancing family and social support, and frequent counseling/monitoring.^{8,18}

Limitations of this review include inability to generalize the results to the elderly population. Because Americans are aging at a rapid pace, the elderly are expected to represent a significant portion of the population in the near future. Treating an elderly population with research proven interventions will most likely be cost effective and improve patient outcomes. Therefore, additional research should be conducted using elderly subjects, comparing their response to weight loss and antihypertensive medications.

In conclusion, medications are a convenient alternative to weight reduction and many practitioners utilize them at the time of diagnosis regardless of the individual patient. Clearly, medications offer rapid and substantial reductions in blood pressure. However, in every patient with newly diagnosed mild hypertension, medications may not be required initially. A trial of weight reduction may be the best and only intervention needed.

References

1. Treadway K K: Management of hypertension. In Goroll AH, May LA, Mulley AG, ed. Primary care medicine, 3rd ed. Philadelphia: Lippincott, 1995:125-138.
2. National High Blood Pressure Education Program: The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood

Pressure. Bethesda: National Institutes of Health: National Heart, Lung, and Blood Institute, 1997: Available FTP: www.nhlbi.nih.gov/nih.gov/nhlbi/nhlbi.htm.

3. American Heart Association: High Blood Pressure. 1999: Available: www.amhrt.org/newhome/html.

4. Brand MB, Mulrow CD, Chiquette E, et al. Dieting to Reduce Body Weight for Controlling Hypertension in Adults: The Cochrane Collaboration, 1998: Available: www.updateusa.com/CLIB/CLIBINET.E...D=1&L=26&N=50&M=125&C=160&T=HYPERTENSION.

5. Tobin LJ: Evaluating mild to moderate hypertension. *Nurse Pract* 1999; 24(5): 22-41.

6. Administration on Aging: Profile of Older Americans: 1998. 1998: Available: www.aoa.gov/default.htm.

7. Feldman FB: Nonpharmacologic interventions successfully treat hypertension on older persons. *Nutr Rev* 1998;56(11): 341-343.

8. Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs, 3rd ed. Champaign, IL: Human Kinetics, 1999: 97-129.

9. Williams GH: Hypertensive vascular disease. In Fauci AS, Braunwald E, Isselbacher KJ, et al. ed. *Harrison's principles of internal medicine* 14th ed. New York: McGraw-Hill, 1998: 1380-1394.

10. Moser M: Hypertension treatment and the prevention of coronary heart disease in the elderly. *Am Fam Physician* 1999;59(1): 1248-1256.

11. De Simone G, Mancini M, Mainenti G, et al.: Weight reduction lowers blood pressure independently of salt restriction. *J Endocrinol Invest* 1992; 15(5): 339-343.

12. Schotte DE, Stunkard AJ: The effects of weight reduction on blood pressure in 301 obese patients. *Arch*

Intern Med 1990;150(8): 1701-1704.

13. Whelton PK, Appel LJ, Espeland MA, et al.: Sodium reduction and weight loss in the treatment of hypertension in older persons: A randomized controlled trial of nonpharmacologic interventions in the elderly (TONE). TONE Collaborative Research Group. *JAMA* 1998;279(11): 839-846.

14. Wassertheil-Smoller S, Blaufox MD, Oberman AS, et al.: The trial of antihypertensive interventions and management (TAIM) study-Adequate weight loss, alone and combined with drug therapy in the treatment of mild hypertension. *Arch Intern Med* 1992;152: 131-136.

15. Wassertheil-Smoller S, Oberman A, Blaufox MD, et al.: The trial of antihypertensive interventions and management (TAIM) study. Final results with regard to blood pressure, cardiovascular risk, and quality of life. *Am J Hypertens* 1992;5(1): 37-44.

16. Davis BR, Blaufox MD, Oberman A, et al.: Reduction in long-term antihypertensive medication requirements. Effects of weight reduction by dietary intervention in overweight persons with mild hypertension. *Arch Intern Med* 1993;153(15): 1773-1782.

17. Koopman H, Deville W, van Eijk JT, et al.: Diet or diuretic? Treatment of newly diagnosed mild to moderate hypertension in the elderly. *J Hum Hypertens* 1997;11(12): 807-812.

18. Schiller MR, Miller, M, Moore C, et al.: Patients report positive nutrition counseling outcomes. *J Am Diet Assoc* 1998;98(9): 977-982.

19. Garrard J: *Health Sciences Literature Review Made Easy*. Gaithersburg, MD: Aspen, 1999:131.

Author Information

Shannan K Hamlin, BSN, RN, CCRN

Acute Care Nurse Practitioner Student, Health Science Center, The University of Texas

Tammy R Brown, BSN, RN

Staff Nurse, Graduate Student, Health Science Center, St. Luke's Episcopal Hospital, The University of Texas