

HYPERTENSION IN THE ELDERLY - A REVIEW

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ABSTRACT

This report reviews the recent studies on the risks of excess morbidity and mortality from untreated hypertension in the elderly (aged 60 and above), and the possible benefits derived from therapeutic intervention. These studies suggest that the 'young-old' (aged 60-80) have definite measurable risks associated with elevated blood pressure, which are reduced by appropriate treatment, but the benefits of conventional treatment on those above 80 years old are not so clear cut. With these findings the review examines the existing issues, the accompanying risks, criteria and recommendations for evaluating the elderly hypertensive, and the modalities of treatment.

Keywords : Hypertension, elderly, review

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INTRODUCTION

Hypertension is a common problem encountered in the primary care setting. In recent years hypertension in the elderly has become a subject of increasing interest as there are many aspects of its management which are controversial, of which there are as yet no definite answers. In view of the increasing proportion of elderly people in our society, and the fact that it is now quite well accepted that hypertension in the elderly should be treated, it is pertinent that we take a closer look at this subject which will gradually taken up a larger part of our practice.

DEFINITIONS

The WHO definition of limits of normal blood pressure is 160 mmHG systolic and 95 mmHG diastolic. Hypertension is defined as blood pressure levels of 160/95 mmHg and above. Isolated Systolic Hypertension is defined as elevation of systolic blood pressure (SBP) to 160 mmHG and above while the diastolic blood pressure (DBP) remains at below 95 mmHG whereas Isolated Diastolic Hypertension refers to systolic blood pressure of less than 160 mmHG and diastolic blood pressure of more than 95 mmHG⁽¹⁾.

The term 'elderly' is more difficult to define, as ageing is a continuous process, and 'old age' has no definite point of onset. Most papers discussing hypertension in the elderly define Elderly as being 60 or 65 and older. We shall take the general consensus while remembering that this refers to the chronological rather than the biological age, which may not be the same.

Epidemiology and Demography

In 1980, 25 million United States citizens were over the age of 65 years. This number is projected to reach 31 million by the year 2000⁽²⁾. In the Framingham Study⁽³⁾, it was reported that 39% of men and 48% of women over the age of 65 years were hypertensive. Comparable prevalence rates were reported in the Nhanes Study, with 38% for white men and 48% for white women aged 65-74 years⁽⁴⁾.

The Singapore population is also ageing. The number of old people aged 60 years and above is expected to increase from some 173,600 (7.2% of total population) in 1980 to 305,900 by the year 2000 (10.4%)⁽⁵⁾.

In the nationwide epidemiologic survey of blood pressures

in Singapore conducted in 1974, it was found that the prevalence of hypertension in the age group 60-69 years was 40%(6), which is comparable to Western figures.

Risks of Hypertension

It is well known that blood pressure increases with age, partly because of increased rigidity in the blood vessels. This is a phenomenon seen mainly in industrialised societies⁽⁷⁾. This increase is a pathological and not a physiological process, contributed by environmental influences, as Cassel in 1975 demonstrated, by comparing the blood pressures of people living in primitive conditions and those of the same genetic stock who have moved to live in industrialised cities⁽⁸⁾.

There is now a wealth of evidence to indicate that this progressive elevation in blood pressure is associated with an increase in morbidity and mortality from a variety of cardiovascular and cerebrovascular events, more so in the elderly.

Data from the Framingham Study⁽³⁾ showed that the incidence of cardiovascular disease was more than doubled in elderly hypertensives compared to their younger hypertensive counterparts. Cardiovascular mortality rates were 4 times greater in those aged 65-94 years compared to those aged 35 -64 years. The risk of stroke or transient ischaemic attack was almost doubled in older hypertensive men and 5 times greater in women, compared to normotensive controls. This was more closely related to SBP, though raised DBP is still a risk in the elderly.

Results from an 11-year follow-up of subjects from Goteberg showed a significantly higher mortality in subjects with the highest blood pressures at the age of 70 than in subjects with the lowest pressures⁽⁹⁾. There was no difference between SBP and DBP in this respect, and the effect was independent of other possible confounding variables, such as treatment of hypertension, body mass index and evidence of coronary heart disease.

In the community-based study by Coope et al in the United Kingdom⁽¹⁰⁾, of subjects followed-up for a mean period of 2.6 years, it was found that in those aged 60-79 years, both SBP and DBP were significantly related to stroke, cardiovascular disease and mortality. Similar results were reported by Miall and Brennan⁽¹¹⁾, Grimley Evans⁽¹²⁾ and the European Working Party on Hypertension in the Elderly (EWPHE) Study (DBP only)⁽¹³⁾.

Isolated systolic hypertension has also been found to be associated with a high incidence of stroke, myocardial infarction and other cardiovascular complications, as demonstrated in the studies conducted by Colandrea et al⁽¹⁴⁾ and Shekelle et al⁽¹⁵⁾. This was also reported in the Framingham⁽¹⁶⁾ and the Hypertension Detection and Follow-up program (HDFP) studies⁽¹⁷⁾.

In the very old, however, the adverse effects of hypertension are not so clear-cut. In a study of 561 people over the age of 85 years by Matilla et al⁽¹⁸⁾, it was reported that elevations

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of blood pressure may have a beneficial effect on morbidity and mortality.

Benefits of Antihypertensive Therapy

Having established that hypertension in the elderly carries definite increase in morbidity and mortality risks (though not definitely so in the very old), does it follow that treatment will decrease such risks? Several trials conducted recently seem to indicate so.

The European Working Party on Hypertension in the Elderly (EWPHE) Trial was designed specifically to assess the effects of antihypertensive drug therapy in patients aged 60 years and over. It was a placebo-controlled double-blind trial involving 840 patients from 18 centres in 10 European countries. Hydrochlorothiazide and triamterene were used, with methyl dopa as second line therapy. An analysis of the results after 5 years showed a statistically significant reduction in cardiac deaths in those receiving treatment (-47%; $p=0.048$). This included a substantial reduction in deaths from myocardial infarction (-60%; $p=0.043$). The fall in the rate of non-fatal, non-terminating cerebrovascular accidents was also statistically significant (-52%; $p=0.026$). The decrease in cerebrovascular mortality was appreciable, though not significant (-43%, $p=0.15$), as was the decline in total mortality (-26%, $p=0.077$)⁽¹⁹⁾.

The Open Randomised Trial in Elderly Hypertensives in General Practice by Coope and Warrender consisted of 884 patients aged 60-79 years, recruited from 13 general practices in England and Wales. The follow-up period averaged 4.4 years. It was found that there was a 58% reduction in all strokes ($p < 0.05$) and the rate of fatal stroke was reduced by 30% and total mortality (-26%) were not significantly reduced⁽²⁰⁾.

The Hypertension Detection and Follow-up Program (HDFP) recruited 10,940 participants of whom 2376 were 60-69 years old at the time of entry. The participants were randomised into two groups, viz those who were treated in specialised clinics (stepped care, SC) and those who were given community-based therapy (referred care, RC). After a five-year follow-up period, the mortality rate among the older patients in the SC group was 16.4% lower than in the RC group. The incidence of stroke was also lower (-45.5%)⁽²¹⁾.

The Australian Therapeutic Trial in mild hypertension included a subset of 582 patients aged 60-69 years. It was reported that active treatment in this group produced an average fall in diastolic pressure of 13 mmHg compared to the placebo group after a period of 2.9 years^(22,23).

It will be noted from the trials quoted that most do not involve the very old, that is, those aged 80 and over. An analysis of age cohorts from the EWPHE trial showed that the very old derived no benefit from intervention⁽²⁴⁾. This requires further study.

In addition, not all studies have found treatment of hypertension in the elderly to be beneficial. These other studies, however, involve small numbers of subjects, eg Morgan et al (375 patients)⁽²⁵⁾, Sprackling et al (120 patients)⁽²⁶⁾ and Kuramoto et al (91 patients)⁽²⁷⁾. In view of the small number of complications encountered, the power of the studies to detect any benefit of treatment was limited.

In the case of isolated systolic hypertension, the benefit of treatment is still uncertain. The outcome of the Systolic Hypertension in the Elderly Programme (SHEP) is still being awaited.

Evaluation of the Elderly Hypertensive

Having established that intervention does bring about beneficial results, it follows that a definite diagnosis should be made before treatment is instituted.

For reasons of accuracy and dependability, the Canadian

Consensus Conference⁽²⁸⁾ recommends the use of a mercury sphygmomanometer, recording the systolic level as 2 mm above first appearance of clear tapping sound (phase I Korotkoff) and the diastolic level as 2 mm above the point at which sounds disappear (phase V Korotkoff). If sounds persist to near 0 mmHg, then the point of muffling (phase IV Korotkoff) should be taken. Standing blood pressure should also be recorded whenever possible. Three separate readings of elevated blood pressure should be recorded over a period of 1 to 2 months before a definite diagnosis of hypertension is made, unless the diastolic pressure is very high (> 120 mmHg), or the presence of retinal haemorrhages and papilloedema with or without encephalopathy makes emergency diagnosis and management necessary.

Pseudohypertension (spuriously elevated blood pressure readings due to sclerotic brachial artery which is not occluded by the sphygmomanometer cuff) should be suspected in cases where blood pressure is elevated out of proportion to evidence of target organ involvement, eg cardiomegaly, left ventricular hypertrophy and fundal changes⁽²⁹⁾. It can be diagnosed using Osler's manoeuvre. This is positive when the brachial or radial artery is palpable after the sphygmomanometer cuff has been inflated high enough to obliterate the pulse⁽³⁰⁾.

Secondary causes of hypertension in the elderly are uncommon. Therefore, an extensive search for secondary hypertension should be done only in patients in whom invasive intervention is possible, and in patients who either have a rapid and high blood pressure elevation, or are resistant to standard treatment⁽²⁸⁾.

The Laboratory Workup should be limited. Recommended are urinalysis, a haemogram, and blood chemistry tests including serum creatinine, plasma glucose, serum electrolytes and, perhaps, lipid profile. A chest x-ray and an electrocardiogram are recommended as baseline assessment⁽³¹⁾. These measurements may need to be repeated during the course of therapy to monitor drug side effects, progression of renal disease, and other end organ damage.

TREATMENT OF THE ELDERLY HYPERTENSIVE

(1) Non-pharmacologic Measures

A non-pharmacologic approach should be the initial therapy in most elderly patients with mild to moderate hypertension, even though its place in the treatment of elderly hypertensives is not so well-established as that in the younger hypertensives. The measures include weight reduction, sodium restriction, limitation of alcohol and caffeine intake, exercise and tobacco avoidance^(31, 32).

Many cross-sectional, population-based studies have demonstrated a positive correlation between body weight and blood pressure⁽³¹⁾. The efficacy of weight reduction in decreasing blood pressure in hypertensive subjects has been demonstrated⁽³³⁾. A significant reduction in blood pressure occurs with only a modest weight loss⁽³⁴⁾. As these studies are conducted mainly in young and middle-aged subjects, further studies are needed to determine if this can be extrapolated to elderly subjects.

A recent review by Grobbee et al⁽³⁵⁾ suggested that the hypotensive effects of sodium restriction are most marked in older subjects, though this needs further confirmation. Moderate sodium restriction < 80 mEq sodium (equivalent to 2 gm NaCl) is recommended. More severe sodium restriction is not recommended as it may result in dehydration, postural hypotension, declining renal function and other hazards⁽³¹⁾.

Consumption of more than 2 oz of ethanol per day has been shown to cause significant elevation in blood pressure, and abstinence from alcohol for 6 months will often enable the maintenance of blood pressure⁽³⁶⁾. Furtive alcohol drinking⁽³⁷⁾ could be a factor in some geriatric hypertensives and should be carefully evaluated in suspected cases.

Exercise, in the form of walking, or isotonic exercises, have been shown to result in blood pressure reduction, and should be recommended^(32, 38, 39). Potassium and, perhaps, calcium supplementation may also be indicated in elderly hypertensives who are deficient in these nutrients.

(2) Pharmacologic Therapy

Drug treatment should be considered in mild hypertensives who do not respond to a 3-6 month trial of non-pharmacologic measures⁽²⁹⁾. The Canadian Consensus Conference Report⁽²⁸⁾ made the recommendations as shown in Table I.

Table I - Recommendations for Drug Treatment of the Elderly Hypertensive

| | SBP | DBP | Recommendations |
|--|-------------|-------------|----------------------------|
| Patients with no target organ damage | 179 mm or < | - | No treatment |
| | 180-199 mm | - | Decision left to physician |
| | 200 mm or > | 100 mm or > | Start treatment |
| Patients 75 years or more, with target organ damage or associated problems | < 160mm | - | No treatment |
| | 160-179mm | 90-99 mm | Decision left to physician |
| | 180 mm or > | 100 mm or > | Start treatment |

The goal in treatment is to reduce systolic blood pressure by 30 mmHg and diastolic pressure by 10-15 mmHg.

General considerations before drug therapy

- Orthostatic Hypotension is noted in 25% of elderly people, and a fall in BP of 20 mmHg with change in posture is frequently encountered⁽³¹⁾.
- Postprandial hypotension was demonstrated to occur in the elderly by Lipsitz et al in 1983⁽⁴⁰⁾.
- Coexistent diseases are common in the elderly and these patients may be on several medications at the same time, with possibility of drug interactions and increased side effects. One must also be on the look-out for over-the-counter drugs bought by the patients which may compound the problem.
- Drug-induced hypertension should be looked out for in view of the above, especially in patients on estrogens, sympathomimetic amines, non-steroidal anti-inflammatory drugs and steroids with mineralocorticoid activity⁽⁴¹⁾.
- Age-related changes in the elderly should be borne in mind. These include decrease in renal and hepatic function which may decrease the elimination of certain antihypertensive drugs; prostatic hypertrophy in elderly men which may pose a problem when diuretics are prescribed; physical and mental impairment which may interfere with the patients' compliance in adhering to the treatment regime.

General recommendations⁽²⁸⁾

- Antihypertensive therapy should be started at one half the usual recommended dosage; increments should be made gradually, preferably at intervals of not less than 4 weeks, with special attention paid to the change in blood pressure and the development of adverse effects.
- Systolic hypertension should be treated in the same way as combined systolic-diastolic hypertension while awaiting the outcome of further studies eg. the SHEP, which should be concluded in the early 1990s.
- The number of doses, tablets and different drugs should be kept to a minimum to increase compliance, and to avoid problems of polypharmacy.

Which Antihypertensive to Choose?

In the selection of drugs for treatment, it is important to con-

sider efficacy, safety, cost and impact of side effects on quality of life. Monotherapy should be adequate in the control of blood pressure in 50% of patients, while another 40% can achieve control with carefully selected combinations⁽⁴²⁾.

The recommendations of the 1988 Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure(USA)⁽⁴³⁾ can be used as a guide, with special reference to the particular problems of the elderly.

In the above report, the traditional Step-Care Therapy has been modified as follows:-

Non-pharmacologic Approaches

- Diuretic or Beta-blocker or Calcium Channel Blocker or Ace Inhibitor
- Add second drug of different class or increase dose of first drug or substitute another drug
- Add third drug of different class or substitute second drug
- Further evaluation and/or referral or add third or fourth drug

Listed below are a brief consideration of different classes of antihypertensives which may be used in the elderly.

I. Diuretics

Diuretics have been proven to reduce mortality and morbidity associated with hypertension^(19,22). In addition, they are also found to be well-tolerated by the elderly, causing few side-effects^(19,44), and they are cheaper than most other antihypertensives.

The metabolic side-effects of diuretics, however, should be taken into consideration, and these include :- (a) hypokalaemia - which needs to be looked out for 2-4 weeks after starting treatment and thereafter every 6-12 months, more frequently if the patient is also on digoxin; potassium supplementation to be given when necessary⁽⁴⁵⁾; (b) hyperglycaemia - which may be related to diuretic-induced hypokalaemia⁽⁴⁶⁾; (c) hyperuricaemia - which is asymptomatic in most patients; and (d) hyperlipidaemia - which is transient, with no evidence that it increases the risk of cardiovascular disease⁽⁴⁷⁾. Nevertheless, diuretic therapy should probably be avoided in patients with diabetes mellitus, symptomatic hyperuricaemia and hyperlipidaemia.

II. Beta-Blockers

Beta blockers have been found by some workers to be less effective in the elderly when compared to diuretics or calcium channel blockers^(48,49), though Wikstrand et al demonstrated the contrary when compared with diuretics⁽⁵⁰⁾. They are suitable as first-line monotherapy in hypertensives with angina or previous myocardial infarction, as secondary prevention of heart disease have been demonstrated with their use⁽⁵¹⁾. They should not be used in patients with bronchial asthma, obstructive airway disease, peripheral vascular disease, diabetes mellitus and heart failure.

III. Angiotensin converting enzyme (ACE) inhibitors

ACE inhibitors have been found to be effective and well-tolerated in the elderly^(52,53), and have also been shown to improve survival in congestive heart failure⁽⁵⁴⁾. They are especially useful in those with multiple concomitant illnesses, such as diabetes mellitus, hypercholesterolaemia and peripheral vascular disease, because they do not adversely affect these conditions and, in some instances, may be beneficial⁽⁴¹⁾. They are, however, expensive to use.

The main concerns regarding their use are: (a) Hypotension - This usually occurs after the first dose, especially in hypovolemic and hyponatremic patients (as in some patients on high dose diuretics), and can be potentially dangerous. This can be minimised by identifying those at risk, and closely

supervising the initial treatment. It is advisable to stop or reduce the dose of diuretics before starting treatment with ACE inhibitors. (b) Impairment of renal function - This may occur and become progressively severe with the use of ACE inhibitors, especially in those with pre-existing renal problems, renal artery stenosis and in the elderly^(55, 56). Concurrent treatment with NSAID's or potassium-sparing diuretics may increase this risk. Patients on ACE inhibitors should be monitored closely for any change in renal function.

IV. Calcium Channel Blockers

Calcium channel blockers have been shown to be effective as monotherapy in older individuals⁽⁵⁷⁾. They are expensive. Their advantages over the other antihypertensives are: They do not induce biochemical abnormalities, central nervous system dysfunction, postural hypotension or salt and water retention. They can thus be used safely in patients with diabetes mellitus, chronic obstructive pulmonary disease, peripheral vascular disease, and chronic renal failure⁽⁴¹⁾. In addition, they can also be used to treat patients with angina, tachyarrhythmias, and have been demonstrated to be similar to beta-blockers and nitrates in preventing the recurrence of myocardial infarction⁽⁵⁸⁾.

Calcium channel blockers should, however, be used with extreme caution in the presence of conduction defects in view of their negative inotropic and chronotropic properties (especially in verapamil). Side effects which may be troublesome in the elderly include constipation (verapamil), diuretic-resistant ankle oedema and headaches (nifedipine). Drug interactions with numerous agents eg. prazosin and beta-blockers (synergistic effect), digoxin, phenytoin and theophylline (increased drug levels) should be looked out for⁽⁵⁹⁾.

V. Other Antihypertensive Agents

Other antihypertensive agents namely alpha-1-blockers and central/peripheral sympatholytics are not preferred as primary therapy for the treatment of elderly hypertensives in view of increased side effects. They are only considered if blood pressure is not well controlled with use of the accepted regimens.

Recommendations

In view of their proven efficacy, lack of unpleasant side effects and relative low cost, diuretics should be the first choice. Calcium channel blockers can be used as first-line monotherapy in patients in whom diuretics are contraindicated, as the elderly respond better to these two classes of drugs. ACE inhibitors are the third choice if diuretics or calcium channel blockers cannot be used. Beta-blockers are useful for those with specific indications eg. angina.

If, after a one-to-three month interval, the response to the initial choice of therapy is inadequate, then any of the step 2 options can be considered⁽⁴³⁾.

Combining antihypertensive drugs with different modes of action using the step-care approach will often allow small doses of drugs to be used to achieve control, thereby minimising the potential for dose-dependent side effects. When additional drugs are used and the combination succeeds, a later attempt should be made to reduce the dose and, if possible, to eliminate the drug. Step-down therapy and drug withdrawal should be considered for patients with mild hypertension, whose blood pressures have been satisfactorily controlled for at least a year⁽⁴³⁾.

CONCLUSION

Hypertension is a major health care problem in the elderly, and this problem will increase as the population ages and the proportion as well as the number of old people increase. As hypertension is a major risk factor for cardiovascular and cerebrovascular disease, and as treatment has been shown to decrease these risks, it is now well accepted that elderly hypertensives should be treated.

With the availability of newly developed antihypertensives which are effective and well-tolerated, the traditional step-care regimen can now be individualised, catering to the particular needs of each patient. Monotherapy is preferred, and the use of multiple drugs is reserved for 'difficult' cases. Cost and 'quality of life' issues are important determinants of patient compliance.

At this point in time, there are several areas in the management of hypertension in the elderly which are undergoing or need further study and evaluation. Hence, this topic will be of continued interest to everyone involved in the care of the elderly hypertensive.

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