Control of hypertension in out-patients. Experience of the Glasgow Blood Pressure Clinic

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Summary

Five hundred and sixty-two patients who had attended the Glasgow Blood Pressure Clinic regularly for 3 years between 1969 and 1978 were studied. The mean BPs for the group were 187/115 mmHg initially, 157/100 mmHg after 6 months, and 153/98 mmHg after 3 years. Twenty-eight per cent had 'normal' systolic pressure and 22% 'normal' diastolic pressure at 3 years. Thirty-seven per cent with mild, 83% with moderate, and 89% with severe systolic pressure elevation had moved into less severe categories by 3 years, as had 30% with mild, 60% with moderate and 84% with severe diastolic elevation. Those patients with severe hypertension, who did not attain a less severe grade, had a statistically significant drop in pressure. Four per cent of all patients, however, had moved into a more severe grade of systolic pressure elevation and 6% into a more severe diastolic pressure grade at 3 years.

These results suggest that the hospital Hypertension Clinic can play a useful part in the lowering of BP in out-patients. It is clear, however, that 'normal' BP levels are not achieved in a significant proportion of patients.

Introduction

High blood pressure is an important risk factor for the development of cardiovascular disease (Lew, 1973; Kannel, 1974). The knowledge that reduction of BP in severe hypertension reduces

complications implies long-term supervision of therapy for many patients. Surveys have shown, however, that a large proportion of those receiving antihypertensive therapy have poorly controlled BP levels (Schoenberger *et al.*, 1972; Hawthorne, Greaves and Beevers, 1974; Berglund, Andersson and Wilhelmsen, 1976; Alderman and Ochs, 1977). It has even been suggested (Freis, 1977) that the hospital out-patient clinic is unsatisfactory for the long-term management of hypertensive patients.

This communication attempts to evaluate the effectiveness of out-patient BP control at the Glasgow Blood Pressure Clinic.

Patients and methods

The Glasgow Blood Pressure Clinic began in January 1969 when hypertension clinics in 4 hospitals in the city adopted a common record format with storage of data in a central computer (Glasgow Blood Pressure Clinic, 1972). Patients are referred by their general practitioners and by other hospital departments. Most have essential hypertension, but patients with secondary hypertension also attend and many have vascular disease. From the inception of the Clinic until May 1978 when this study was made, documents from 3500 patients had been entered into store.

The records were obtained of all those patients who were not receiving antihypertensive therapy at the first attendance and who were reviewed at one month, 6 months (± 3 months), one year (-3

months $\pm$ 6 months), 2 years ($\pm$ 6 months) and 3 years ($\pm$ 6 months) after initial attendance.

The mean pre-treatment systolic and diastolic BPs were calculated for the group. When several readings were available for an individual patient the mean of the values was taken. Mean standing systolic and diastolic BPs were obtained at the appropriate review times. The numbers of patients with 'normal' systolic pressure (arbitrarily defined as ≤ 139 mmHg) or diastolic pressure (≤ 89 mmHg) were obtained for the initial attendance and for the follow-up times. Patients were then classified arbitrarily as regards severity by the untreated systolic pressures in mmHg into 3 grades—mild (140–179 mmHg), moderate (180–199 mmHg, or severe (≤ 200 mmHg); and again by the untreated diastolic BP into mild (90–99 mmHg), moderate (100–119 mmHg) and severe (≥ 120 mmHg). These 6 groups were considered separately and the numbers in each having normal pressure and mild, moderate or severe elevation of pressure as already defined were found for the respective review dates. The mean BP values of those patients with initial severe elevation of BP who still had severe pressure elevation at 3 years were obtained. Student's *t* test was used to assess the significance of changes in mean BP.

Results

Five hundred and sixty-two patients met the criteria for the Study.

Age and Sex

The mean age at initial acceptance was 48.7 years (s.d. ± 10.6 , range 17–74). Two hundred and eighty-four (50.5%) were male and 278 (49.5%) female.

Therapy

All except 34 (6%) received antihypertensive drugs (most of the exceptions had relatively mild hypertension and were participating as controls in a therapeutic trial).

Mean BPs are given in Table 1

The mean initial BP for the group was 186/115 mmHg indicating that the group as a whole had relatively severe hypertension. After one month the systolic BP fell by 9.5% and the diastolic by 7.4%. Between then and 6 months, there was a further drop of 7% in the systolic pressure and 5.9% in the diastolic. The levels were stable thereafter until at 3 years the systolic pressure had fallen by another 4.1% from the 6 months level and the diastolic by 2.3%.

Numbers achieving 'Normal' pressures

Table 2 gives the number of patients achieving a 'normal' systolic BP at the various stages in their follow-up and Table 3 gives similar information on numbers of patients achieving a 'normal' diastolic pressure. There was a steady increase in the numbers

TABLE 1. Mean systolic and diastolic BPs in mmHg ($\pm$ s.d.) at initial assessment and at follow-up in 562 patients

Systolic pressure	186.6 (30.2)	168.8* (28.6)	157 (24.9)	155.9 (25.0)	155.5 (25.6)	152.9** (25.4)
Diastolic pressure	115 (15.9)	106.5* (14.1)	100.2 (12.5)	100 (13.4)	99.2 (13.5)	99.9** (14.4)
Time	Initial	1 month	6 months	1 year	2 years	3 years

*Difference from initial figure significant at $P < 0.001$.

**Difference from 6 month figure significant at $P < 0.005$.

TABLE 2. Numbers (%) having normal systolic BP (≤ 139 mmHg) at initial assessment and at follow-up out of a total of 562 patients

Numbers (%)	15 (2.7)	68 (12.1)	124 (22.1)	133 (23.7)	149 (26.5)	155 (27.6)
Time	Initial	1 month	6 months	1 year	2 years	3 years

TABLE 3. Numbers (%) having normal diastolic BP (≤ 89 mmHg) at initial assessment and at follow-up out of a total of 562 patients

Numbers (%)	15 (2.7)	37 (6.6)	84 (15)	85 (15.1)	102 (18.1)	124 (22.1)
Time	Initial	1 month	6 months	1 year	2 years	3 years

TABLE 4. Numbers (%) as reclassified by systolic BP at follow-up out of a total of 223 patients with mild, 132 with moderate and 192 with severe elevation of systolic BP initially

	1 month			6 months			1 year			2 years			3 years		
	N	M	Mod.	N	M	Mod.	N	M	Mod.	N	M	Mod.	N	M	Mod.
Mild	35	161	19	8	63	141	15	4	62	141	16	4	83	119	15
	(15.7)	(72.2)	(8.5)	(3.6)	(28.3)	(63.2)	(6.7)	(1.8)	(27.8)	(63.2)	(7.2)	(1.8)	(37.2)	(53.4)	(6.7)
Initial grade	11	64	42	15	25	86	15	6	31	75	18	8	29	81	14
	(8.3)	(48.5)	(31.8)	(11.4)	(18.9)	(65.2)	(11.4)	(4.5)	(23.5)	(56.8)	(13.6)	(6.1)	(22)	(61.4)	(10.6)
Severe	16	69	39	68	29	89	42	32	31	106	28	27	30	98	40
	(8.3)	(35.9)	(20.3)	(35.4)	(15.1)	(46.4)	(21.9)	(16.7)	(16.1)	(55.2)	(14.6)	(14)	(15.6)	(51)	(20.8)

N = normal, M = mild, Mod. = moderate, S = severe.

TABLE 5. Numbers (%) as reclassified by diastolic BP at follow-up out of a total of 50 patients with mild, 286 with moderate and 211 with severe elevation of diastolic pressure initially

	1 month			6 months			1 year			2 years			3 years		
	N	M	Mod.	N	M	Mod.	N	M	Mod.	N	M	Mod.	N	M	Mod.
Mild	9	23	17	1	13	20	17	0	10	20	17	3	13	20	16
	(18)	(46)	(34)	(2)	(26)	(40)	(34)	(6)	(20)	(40)	(34)	(6)	(26)	(40)	(32)
Initial grade	20	62	168	36	51	95	126	14	55	96	119	16	63	101	106
	(7)	(21.7)	(58.7)	(12.6)	(17.8)	(33.2)	(44)	(4.9)	(19.2)	(33.6)	(41.6)	(5.6)	(22)	(35.5)	(37.1)
Severe	4	38	89	80	16	56	108	31	16	56	104	35	20	54	99
	(1.9)	(18)	(42.2)	(37.8)	(7.6)	(26.5)	(51.2)	(14.7)	(7.6)	(26.5)	(49.3)	(16.6)	(9.5)	(25.6)	(46.9)

N = normal, M = mild, Mod. = moderate, S = severe.

achieving normal pressures during the first 6 months of the follow-up but this increase was slower thereafter. Twenty-seven per cent. of the patients had achieved a 'normal' systolic BP at 3 years and 22% a 'normal' diastolic pressure. After the initial attendance more patients achieved 'normal' systolic values at each stage than achieved 'normal' diastolic values.

Reduction in severity of hypertension

The initial systolic BP was classed as mild in 223 patients (39.6%), moderate in 132 patients (23.5%), and severe in 192 patients (34.2%). The initial elevation of diastolic pressure was mild in 50 patients (8.9%), moderate in 286 patients (50.9%), and severe in 211 patients (37.5%).

Table 4 shows the comparison between the initial systolic BP elevation and that achieved at follow-up. Of those with mild elevation of systolic pressure initially, 36% were able to be re-classified as 'normal' after 3 years. However, 5.4% had moved up to moderate elevation and 0.4% (one patient) had moved to the severe category. After 3 years, therefore, about 57% remained in the mild systolic elevation category.

Those with initial moderate elevation of BP seemed to fare better in that after 3 years 22% were classified as 'normal' and 59% as mild. However, 9% remained in the moderate category and 8% had moved up to the more severe category.

Those initially regarded as having severe elevation of systolic BP seemed to do better still by this method of appraisal. After 3 years 19% were in the 'normal' category, 51% mild, 17% moderate, and only 11% remained in the severe category.

Table 5 shows the results of the follow-up on the severity grading for diastolic BP. The results were generally similar to the review of systolic pressures. In the group regarded initially as severe, however, 15% were finally classified at 3 years as 'normal', 31% as mild and 41% as moderate, in terms of their diastolic pressure. This left only 15% of the patients with severely elevated diastolic pressure who had not achieved some improvement in their category.

Patients with persistently severe hypertension

The 22 patients who had persistently severe elevation of systolic pressure after 3 years of follow-up had an initial mean systolic pressure for the group of $230.9 \pm \text{s.d.} 26.2$ mmHg, and at 3 years $210.1 \pm \text{s.d.} 12.9$ mmHg. This represents a mean fall in systolic pressure of 20.8 mmHg ($P < 0.005$).

The 33 patients with persistently severe diastolic pressure elevation after a 3-year follow-up had a mean diastolic pressure initially of $134.8 \pm \text{s.d.} 14.6$

mmHg and finally at 3 years of $128 \pm \text{s.d.} 10.5$ mmHg which is a mean fall of 6.8 mmHg ($P < 0.025$).

Discussion

It has been shown, at least in males, that lowering the BP in those with moderate or severe hypertension is accompanied by a reduced incidence of stroke, cardiac failure, uraemia and retinal damage (Veterans Administration Co-operative Study Group, 1967, 1970). The need for treatment in such patients and in those already suffering from vascular complications seems clear. Although full information is not available it is possible that benefits will also occur in treating females with hypertension (Hamilton, Thompson and Wisniewski, 1964) and those with milder hypertension. These groups are also at risk (Kannel 1974) and it has been recommended that they be treated (Committee on Hypertension, 1973; Ayers *et al.*, 1973; Report, 1977). The aim of treatment is usually accepted as a reduction to as near normal a BP level as possible, although this may be difficult to achieve. However, even incomplete control of the BP has been shown to reduce the incidence of vascular complications (Dorph *et al.*, 1970; Taguchi and Freis, 1974) and it has been suggested (Ingelfinger and Goldman, 1977) that there is little evidence to show that lowering BP to normal confers any additional advantage.

Although the merits of controlling high BP are recognized, surveys (Schoenberger *et al.*, 1972; Hawthorne *et al.*, 1974; Berglund *et al.*, 1976) have suggested that adequate BP control is difficult to achieve in practice, especially where large numbers of patients are concerned. Beevers *et al.*, (1973) have reported 60% of patients achieving a diastolic BP of 100 mmHg or less when followed over a 2-year period. In 40%, however, this standard could not be achieved and in 10% no form of satisfactory control was obtained.

The patients reported here represent those attending the clinic for whom full information was available as regards pre-treatment levels of BP and in whom the required follow-up visits up to 3 years had been achieved. We have thus excluded a large number who were already on treatment at their first referral to the clinic and those who died or defaulted within the required 3-year period. It should also be understood that the patients were not all attending simultaneously and that the information was collected from patients attending over the time span 1969 to 1978. A wide range of antihypertensive regimes was employed.

The results indicate that in many patients a reduction in both systolic and diastolic BP is present within one month of attendance and that further falls take place over the next 12 months.

By one year the average fall in systolic pressure was approximately 30 mmHg and in diastolic pressure was 15 mmHg. These mean reductions were maintained over the next 2 years.

The incidence of cardiovascular complications is related to the height of the BP (Kannel, 1974) and in this context it is important to note that the more severe the initial hypertension the more likely were the patients to have achieved a lower grade of BP at follow-up. Greater falls in absolute terms were achieved in systolic pressure than in diastolic pressure. This is acceptable, however, since the systolic pressure appears to be as important an indicator of hypertensive complications (Kannel, Gordon and Schwartz 1971).

The results, however, give no grounds for complacency. At the end of 3 years, 34 patients were still regarded as having severe elevation of systolic pressure and 48 patients severe elevation of diastolic pressure. These patients included some who had increased their severity of hypertension during the phase of attempted therapy.

This study does not seek to assess the value of lowering BP in the prevention of complications. It does, however, show some evidence that specialist clinics are capable of making a contribution to the control of BP in large numbers of patients over a period of years.

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