Deaths and complications from hypertension

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SUMMARY. In a long term follow-up over 25 years in a general practice the observed courses of complications and deaths in a group of 704 hypertensives were recorded and compared with those that occurred in the practice as a whole over the same period. The risks to the hypertensives were calculated as ratios of the observed : expected (O/E) complications and mortalities.

Of the total number of complications and deaths (418), one half were cardiovascular and one-third were strokes.

The O/E rates for coronary artery diseases as a whole showed no extra risks for the hypertensives, but the risks for young female hypertensives were appreciably higher. The O/E rates were nearly three times higher for females. The risks of hypertensives suffering from coronary artery diseases fell with age in both sexes.

The observed rates for strokes were nearly four times greater than those expected. The O/E rates were similar in males and females. There was a decline with age.

An unexpected finding was the higher O/E rate for dementia in elderly female hypertensives.

The findings confirm the higher risks of complications and deaths for hypertensives, but within the whole spectrum of hypertension are some groups who are more vulnerable than others. These are males and those under 60 years of age. These vulnerables probably account for less than one half of all hypertensives diagnosed. It is suggested that a much more discriminating policy for the management of hypertension is accepted in order to make diagnosis and treatment of those hypertensives who really need intensive care practical, feasible, and possible.

Introduction

Although high blood pressure presents hazards and risks to life, it is possible to define some vulnerable groups (Fry, 1974). Thus, while the observed mortality was 1·85 times greater than expected in hypertensives in my practice, the mortality rate was twice as high in males as in females. It was no more than expected in the over 60s and it was related directly to the level of the diastolic blood pressure in younger hypertensives.

There are many reports (Society of Actuaries, 1959; *Health Bulletin*, 1971; Office of Health Economics, 1971; and Taguchi and Freis, 1974) which attribute the extra risks of high blood pressure to coronary artery disease and heart failure, to cerebrovascular complications and to renal damage. There are others, such as Stewart (1974), who question the association between high blood pressure and coronary artery disease and Stewart positively warns against hypotensive therapy in those with serious coronary artery disease.

From the experience of over 20 years' observations on a group of 704 hypertensives in my practice, the great majority untreated, it has been possible to record all the complications and the causes of death and to compare them with the experience of the practice as a whole, and to reassess the possible extra risks of hypertensives. The objectives of this review are to define further those at special risk and, therefore, in need of specific therapy. I also wanted to identify those with fewest risks.

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Method

The methods have been stated (Fry, 1974). Briefly, during 1949–1969 all hypertensives have been recorded separately in my practice. Hypertension was diagnosed when a diastolic blood pressure of 100 mm Hg or more was recorded in a sitting position on at least three separate occasions.

My policy in management has been to withhold specific hypotensive drugs unless there were strong indications for their use. Only 35 out of the 704 hypertensives reviewed received hypotensives during this period.

The population at risk was known during the whole period and it was possible to calculate the age and sex distribution at any time.

The course and outcome of hypertension was observed in those who remained in the practice until 1974 and careful records were made of any complications or associated diseases. In particular, attention was paid to strokes, dementia, coronary artery disease, heart failure, and renal disease. The rates of these disorders as complications or causes of death in the hypertensives were calculated.

Coronary artery disease included all those with angina of effort, with proved myocardial infarctions, on an electrocardiogram or at autopsy, and those in heart failure with ECG evidence of myocardial ischaemia. Strokes included all ' maxi ' and ' mini ' cerebrovascular episodes.

The continuing recording system of the practice, during the same period, made it possible to pick out those persons without hypertension who had suffered from strokes, dementia, coronary artery disease, and renal disorders.

It was possible to calculate the incidence of these conditions in the practice population. The observed rates (O) of these conditions in hypertensives could thus be compared with those expected (E) for the whole practice during this 20-year period. The O/E ratios represent the possible risks of hypertensives to complications or deaths from these conditions.

Results

During the 20 years, 704 people (256 males and 448 females) were diagnosed as having hypertension. The population at risk in 1960 was 5,500. Follow-up was possible in 574 (82 per cent); 130 (18 per cent) had moved and could not be contacted. Complications occurred in 68 (nine per cent) and deaths in 322 (46 per cent). Fry (1974) gives further details.

TABLE 1

NUMBERS OF DEATHS AND COMPLICATIONS IN HYPERTENSIVES (1949–1974)

Age	*Coronary artery disease*			*Heart failure*			*Cerebrovascular disease*			*Dementia*		
	M	F	T	M	F	T	M	F	T	M	F	T
30–39	1	3	4	—	—	—	1	3	4	—	—	—
40–49	5	5	10	2	3	5	5	5	10	—	—	—
50–59	17	19	36	3	4	7	18	13	31	1	1	2
60–69	22	35	57	11	19	30	16	21	37	3	8	11
70+	16	21	37	7	17	24	15	15	30	1	12	13
ALL	61	83	144	23	43	66	55	57	112	5	21	26

TABLE 1—*continued*

Age	*Renal diseases*			*Others*			*Total*		
	M	F	T	M	F	T	M	F	T
30–39	—	1	1	—	1	1	2	8	10
40–49	6	2	8	4	3	7	22	18	40
50–59	4	—	4	5	8	13	48	45	93
60–69	—	1	1	9	13	22	61	97	158
70+	1	1	2	8	3	11	48	69	117
ALL	11	5	16	26	28	54	181	237	418

Causes of death and complications

The causes of death and complications are shown in table 1. The 418 complications and deaths were noted in 390 hypertensives, some having more than a single condition.

In numbers, the largest groups were coronary artery diseases followed by strokes, and heart failure. A most unexpected finding was that there were more females than males with coronary artery disease in hypertension. This was quite different from the experience of the practice as a whole when males outnumbered females by more than two to one.

Coronary artery disease

Table 2 shows the incidence rates per 1,000 of those hypertensives who developed clinical features of coronary artery disease or who died and were found at autopsy to have had myocardial infarctions or other evidence of coronary artery disease.

TABLE 2
CORONARY ARTERY DISEASE IN HYPERTENSIVES IN RATES PER 1,000

Age	*40–49*	*50–59*	*60–69*	*70+*	*All*	*Number of persons*
Males	148	250	375	330	238	61
Females	94	151	227	215	185	83
ALL	103	187	244	266	206	144
Number of people	14	36	57	37	—	144

TABLE 3
CORONARY ARTERY DISEASE IN RATES PER 1,000

Age	*40–49*	*50–59*	*60–69*	*70+*	*All*	*Number of persons*
Males	92	285	450	445	280	286
Females	14	44	179	245	77	120
ALL	53	160	290	327	216	406
Number of persons	45	117	138	106	—	406

Table 3 presents the incidence rates for the same conditions for the whole practice during the 20-year period 1949–1969.

From tables 2 and 3, the O/E rates were calculated (table 4). From table 4 it is clear that the risks of developing or dying from coronary artery disease were no greater than expected in males, in fact they were less; but in females the risks were 2·4 times greater. In both sexes the risks (O/E rates) became less with age. After the age of 60 in males and females the risks of coronary artery disease associated with hypertension were less than expected, the O/E rates being less than 1. The most unexpected findings were the high O/E rates for females in the 40–49 and 50–59 age bands. The numbers were small but it may be that hypertension does make young women more liable to coronary artery disease.

TABLE 4

OBSERVED/EXPECTED (O/E) RATES OF CORONARY ARTERY DISEASE IN HYPERTENSION COMPARED WITH THE PRACTICE POPULATION

Age/O/E rates	*40–49*	*50–59*	*60–69*	*70+*	*All*
Males	1·5	0·94	0·83	0·74	0·85
Females	6·9	3·4	1·2	0·88	2·4
ALL	2·0	1·2	0·85	0·80	0·95

Strokes

During the period of review there were 112 strokes in the hypertensives. Of these, 20 were cerebral haemorrhages and 92 cerebral thromboses. Table 5 shows the incidence rates per 1,000 of strokes in hypertension and table 6 those for the practice population.

TABLE 5

STROKES IN HYPERTENSIVES IN RATES PER 1,000

Age	*40–49*	*50–59*	*60–69*	*70+*	*All*	*Number of people*
Males	113	268	200	355	215	55
Females	102	107	137	148	134	57
ALL	105	162	160	215	160	112
Number of people	14	31	37	30	—	112

TABLE 6

STROKES IN PRACTICE POPULATION IN RATES PER 1,000

Age	*40–49*	*50–59*	*60–69*	*70+*	*All*	*Number of people*
Males	22	30	90	140	54	94
Females	10	18	56	90	37	76
ALL	16	26	76	106	40	170
Number of people	20	26	60	64	—	170

Tables 5 and 6 show that the incidence of strokes rose with age in both sexes; the total incidence and the rate of increase with age were greater in males.

In table 7, the O/E rates for strokes show that hypertensives were four times more likely to suffer strokes, the risks being greater in males, but there were no large differences in the two sexes. As with coronary artery disease the O/E rates fell progressively with age, but even in the over 70s the risks were twice those expected.

TABLE 7

OBSERVED/EXPECTED (O/E) RATES OF STROKES IN HYPERTENSION COMPARED WITH THE PRACTICE POPULATION

Age/O/E rates	*40–49*	*50–59*	*60–69*	*70+*	*All*
Males	5·1	8·9	2·0	2·5	4·1
Females	10·2	2·4	2·2	1·6	3·7
ALL	6·5	6·3	2·1	2·0	3·9

Dementia

When the records of the hypertensives were being analysed, I was surprised by the frequency of the numbers of admissions for dementia in my practice. Table 1 shows that in 26 of the hypertensives (five males and 21 females) there were features of severe dementia requiring admission to a mental hospital or some special care. The rates were compared with the practice population, and in table 8 the O/E rates are higher than expected in females, but not in males. The O/E rates for dementia increased with age in females, but not in males.

This observation does not appear to have been noted previously and it is likely to represent the results of cerebrovascular damage that may be more apparent in females than in males.

TABLE 8

OBSERVED/EXPECTED (O/E) RATES OF DEMENTIA IN HYPERTENSIVES COMPARED WITH THE PRACTICE POPULATION

Age/O/E rates	*40–49*	*50–59*	*60–69*	*70+*	*All*
Males	0	1·4	2·0	1·0	1·4
Females	0	0·6	2·5	3·3	2·1
ALL	0	0·9	2·3	2·8	1·8

Renal disorders

There were 16 hypertensives (11 males and five females) who had evidence of some major renal disorder. This represented rates of 43 per 1,000 for males and 11 per 1,000 for females. These were small numbers and rates. It was not easy to compare them with the practice population because of difficulties in finding comparable cases.

From table 1, it is seen that renal disorders were more frequent in males than in females and that contrary to the cardiac and cerebral complications, the renal disorders were seen more in younger hypertensives.

Discussion

It has been estimated that ten per cent of all Americans are hypertensive (Taguchi and Freis, 1974) and my experience in my practice suggests that between 15–20 per cent of adults will become hypertensive at some time (Fry, 1974). It is stated also that less than

half of hypertensives have been diagnosed and few are receiving appropriate therapy (Miall and Chinn, 1974). If the implications are that we should plan to screen whole populations for hypertension (Hart, 1970) and to treat all those found to have high blood pressure, this would require tremendous efforts and the use of many resources. It is questionable whether we can accept such proposals.

Admittedly hypertension does create extra risks and hazards for the hypertensive, but these are selective. Thus, whereas I found that the O/E mortality risks for hypertensives were 1·85 greater than expected (Fry, 1974), these risks could be related to certain vulnerable groups, those below 60, males and those younger hypertensives with a high diastolic blood pressure. Since more than half of all hypertensives are over 60, two-thirds of all hypertensives are women and only 14 per cent have high diastolic blood pressures, the proportions deserving specific long-term hypotensive therapy may be small.

This paper extends further the selective process of defining vulnerable groups. It is assumed generally that vascular conditions lead to complications and deaths in hypertensives. This is true and in my series one half of all deaths and complications were cardiovascular (210 out of 418) and a third (138 out of 418) were cerebrovascular. However, within these it has been possible to identify more vulnerable groups by comparing the observed rates with those that occurred in the same practice population during the period of observation.

The most surprising finding was that there were no greater risks for the hypertensives suffering from coronary artery disease. The O/E rate was 0·95. This is contrary to the experiences at Framingham (Dawber and Kannel, 1961) and the Society of Actuaries (1959) where the extra risks were more than two-fold. In looking more closely, there were some noteworthy findings.

The risks were much greater in women. The female hypertensives had a 2·4 greater than expected rate of coronary artery disease. In both sexes the risks became less as the hypertensives were older when first diagnosed. These observations tend to support Stewart (1974) who questioned the association between coronary artery disease and hypertension.

Strokes occurred 3·9 times more often than expected. This was in keeping with the Framingham (1971) and the Society of Actuaries (1959), who also found the rates four times greater than expected. My experience was that strokes were more likely to occur in males at all ages, but that the O/E rates fall with age.

An unexpected discovery was the higher than expected occurrence of dementia in female hypertensives. The O/E rates rose with the age at first diagnosis of hypertension. In females aged 70 and over the rate was three times greater than expected.

What are the practical implications of my findings? They stress the need for selective and discriminating attitudes in the management of high blood pressure. There are hazards, but not all hypertensives have the same risks.

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