

# THE MENTAKAB HYPERTENSION STUDY PROJECT. PART I - COMPLICATED HYPERTENSIVES IN HOSPITAL : WHO ARE THEY?

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## ABSTRACT

*Consecutive hypertensives admitted with cardiovascular complications were studied. One hundred and eight complicated hypertensives (10%) out of 1,066 medical admissions were seen in the three month study. Thirty three per cent had cerebrovascular disease, 30% ischaemic heart disease, 2% had malignant hypertension and 85% had hypertensive heart disease.*

*All patients had uncontrolled hypertension at admission (mean blood pressure 184/115 mmHg). Twenty-four patients (22%) were newly diagnosed; of the rest of previously diagnosed hypertensives (78%), 3% had never been on treatment and 56% had dropped out of treatment, which explained their ineffective blood pressure control. However, 18% of patients had apparently been on regular follow up and treatment, and yet their blood pressure control was poor.*

*Many patients had evidence of renal disease. The prevalence of cardiovascular risk factors was also high; 56% had hypercholesterolaemia; 46% had hypertriglyceridaemia; 44% smoked, 38% were overweight or obese, and 18% were diabetic. This indicates that hypertension is best regarded as an ingredient of a cardiovascular risk profile and its management requires multifactorial correction of all risk factors identified.*

**Keywords :** Hypertension, cardiovascular complications, detection of hypertension, renal disease, cardiovascular risk factor.

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## INTRODUCTION

Cardiovascular diseases accounted for one third of all mortality in a year<sup>(1)</sup> and an unknown amount of morbidity in this country. It is well established from prospective studies done in Framingham (the Framingham study is a longitudinal study started in 1949 in Framingham, USA, to examine the epidemiology of cardiovascular disease in a representative sample of the general population<sup>(2,3)</sup>) that hypertension is not only a risk factor of cardiovascular diseases, but also the most potent one<sup>(2)</sup>; for example two thirds of the people in the community with cardiovascular diseases were hypertensives, and the cardiovascular mortality rate of hypertensives was twice that of non-hypertensives.

The significance of hypertension and its ineffective control in relation to its cardiovascular complications have not

previously been studied in this country. We therefore carried out a study on hospitalized complicated hypertensives. The objectives were:

1. To determine the frequency of complicated hypertension as a cause of admission into medical wards.
2. To describe the cardiovascular complications presented by hypertensives.
3. To determine the prevalence of various factors in the background or treatment record of hypertensives that were contributory to their ineffective blood-pressure control.
4. To describe the prevalence of other cardiovascular risk factors among hypertensives.

## METHODS

All patients admitted into the medical wards of Mentakab District Hospital over a period of three months (May to August 1989) who fulfilled both the following criteria were included in the study:

1. Hypertension : A positive history of hypertension on treatment or the presence of severe hypertension (diastolic pressure > 120 mmHg) and clinical condition such that (for example, malignant hypertension or acute pulmonary oedema) immediate antihypertensive treatment was indicated, or a patient with no previously diagnosed hypertension whose diastolic blood pressure was equal to or greater than 100 mmHg on 2 occasions at least 24 hours apart.

2. Presence of one or more of the following known cardiovascular complications of hypertension:

- (a) cerebrovascular disease, defined as presentation with acute focal neurological deficit lasting transiently or resulting in permanent residual deficit, with fundoscopic evidence of atherosclerosis. Other causes routinely excluded were systemic lupus erythematosus, hypoglycaemia, neurosyphilis, epilepsy, head injury, meningitis and subarachnoid haemorrhage.

- (b) ischaemic heart disease, defined as presentation with one of the ischaemic cardiac syndromes: acute myocardial infarction, angina, unstable angina, ischaemic cardiomyopathy. Electrocardiographic changes suggestive of ischaemic heart disease must be present. Where there was doubt, the patient was excluded from the study, pending further investigation.

- (c) malignant hypertension, defined as severe hypertension (diastolic pressure > 120 mmHg) with presence of bilateral

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retinal haemorrhages and exudates with or without presence of papilloedema.

(d) hypertensive heart disease, defined as presence of electrocardiographic left ventricular hypertrophy according to Sokolow-Lyon voltage criteria<sup>(3)</sup> or Cornell voltage criteria<sup>(4)</sup> with or without clinically overt cardiac failure. Other causes of heart disease routinely excluded on clinical grounds were ischaemic heart disease, valvular heart disease, congenital heart disease, myocarditis and thyrotoxic cardiomyopathy. Where there was doubt, patient was excluded pending further investigation.

The renal status of patients were also assessed by urine analysis and serum creatinine (Normal < 180 µmol/l). In view of the difficulty in determining whether any renal disease discovered was the primary cause or a secondary complication of hypertension, renal complication was not included as an inclusion criteria for this study.

All patients in this study as well as their relatives were interviewed. For those with previously diagnosed hypertension, considerable effort was made to retrieve their records to verify their subjective responses. On the basis of the interview and the information obtained from their records, they were classified as follows:

1. Not previously diagnosed: These patients were further questioned to determine whether they had consulted a doctor in the previous three years for whatever reason.

2. No treatment: Patients who had previously been diagnosed hypertensive, and yet were never on treatment.

3. Irregular follow-up: Patients who had dropped out of treatment prior to their admission or had dropped out on at least one occasion in the previous one year.

4. Regular follow-up: Patients who had not dropped out of treatment in the previous one year.

Blood-pressure readings of patients when they were on treatment were also obtained from their case notes. Their blood-pressure control was considered adequate if the mean value of their diastolic pressure readings met the target level recommended by WHO/ISH<sup>(5)</sup>, which was 90 mmHg or less.

All patients in the study were further screened for other known cardiovascular risk factors as follows: family history of

cardiovascular diseases (ischaemic heart or cerebrovascular disease), smoking history, weight and height to determine obesity defined as percent desirable weight  $\geq 1.2^{(6)}$ , estimation of serum cholesterol, fasting serum triglyceride, uric acid, random blood sugar, (unless known diabetic on treatment), haemoglobin and packed cell volume. Sixty age, sex and race matched controls, without complicated hypertension were selected from medical and surgical wards and similarly screened for the above risk factors.

Results are evaluated using  $\chi^2$  test with Yates correction where appropriate.

**Table I**  
**Cardiovascular Complications and Renal Status of Hospitalized Hypertensives (n= 108)**

Cardiovascular Complication	Hypertensives (n = 108) No. (%)	
Cerebrovascular disease	36	(33)
Ischaemic heart disease	32	(30)
Malignant hypertension	2	(2)
Hypertensive heart disease:		
- Electrocardiographic left ventricular hypertrophy	92	(85)
- Radiographic cardiomegaly	68	(63)
- Overt cardiac failure	12	(11)
Renal Status	No.	(%)
Albuminuria $\geq 2+$	22	(20)
(Nephritis = Albuminuria > 2 gm/24 hours)	(9)	(8)
Renal failure:		
Serum creatinine > 180 µmol/l	16	(15)
Advanced renal failure:		
Serum creatinine > 700 µmol/l	4	(4)

**Table II**  
**Classification and Characteristics of Complicated Hypertensives**

Characteristics	All complicated hypertensives	Not previously diagnosed	Previously diagnosed hypertensive n = 84		
			No treatment	Irregular follow-up	Regular follow-up
No (%)	108 (100)	24 (22)	3 (3)	61 (56)	20 (18)
Mean age (years)	56	52	52	57	57
Sex ratio male : female	2 : 1	3.8 : 1	2 : 1	1.6 : 1	2 : 1
Mean duration of hypertension (from diagnosis to admission with complication) (years)	6.4	-	4.3	5.9	8.2
Mean blood-pressure at admission (mmHg)	184/115	173/111	190/116	190/119	176/110
Mean blood-pressure readings prior to admission (mmHg)	-	-	-	163/103	162/103
Number of patients with adequate blood pressure control prior to admission	-	-	-	1(2)	0 (0)
No. (%)	-	-	-	1(2)	0 (0)

## RESULTS

There was a total of 1,066 admissions into medical wards over the three month study period. Of these, 171 (16%) patients were known or diagnosed to have hypertension. However, only 108 hypertensives presented with one or more complications of hypertension and were included in this study. Complicated hypertension thus accounted for 10% of medical admissions.

The complications and renal status at presentation are shown in Table I. Many patients had more than one complication.

The classification and characteristics of complicated hypertensives are shown in Table II. In 22%, hypertension had not been previously diagnosed; 83% of these undiagnosed hypertensives had consulted a doctor at least once in the previous three years.

Seventy-eight percent of the patients had previously diagnosed hypertension: 3% had never been on treatment, 18% were on regular follow-up and 56% were on follow-up irregularly.

Of the 61 patients on irregular follow-up, 43(70%) had dropped out of treatment prior to admission, the duration of drop out varied from one month to five years. Another 13 patients (21%) had evidence of doctor hopping (followed treatment with more than one doctor, often at the same time).

**Table III**  
Prevalence of Cardiovascular Risk Factors Among Complicated Hypertensives and their Age, Sex and Race Matched Controls

	Complicated Hypertensives n = 108 No (%)	Controls n = 60 No (%)	P value
Family history of cardiovascular disease.	18 (16)	2(3)	P < 0.05
Smoker	48 (44)	33 (55)	NS.
Overweight (PDW > 1.1)	8 (7)	7 (12)	NS.
Obesity (PDW > 1.2)	34 (31)	10 (17)	NS.
Serum Cholesterol > 5.7 mmol/l	61 (56)	11 (18)	P < 0.001
Uric Acid > 420 mmol/l	27 (25)	5 (8)	P < 0.05
Triglyceride Fasting serum > 1.9 mmol/l	50 (46)	27 (45)	NS.
Diabetes	19 (18)	1 (2)	P < 0.01
Hb > 17 g/l and PCV > 50%	10 (9)	1 (2) all non-hypertensive medical admissions n = 958	NS.
gender ratio male : female	2 : 1	1.6 : 1	NS.

Result is significant at the 0.05 level.

NS : denotes  $\chi^2$  test not significant at 0.05 level.

The mean blood-pressure of all patients in all classes were markedly elevated at admission (Table II), and of those with treatment records, their mean blood-pressure recordings while under treatment were also high. Only one patient had adequate control of blood-pressure prior to admission (Table II).

Table III summarizes the prevalence of cardiovascular risk factors among complicated hypertensives, and their age, sex and race matched controls. Complicated hypertensives had a high prevalence of cardiovascular risk factors. However, only the prevalence of family history, hypercholesterolaemia and diabetes were significantly higher than matched hospitalized controls without hypertension.

## DISCUSSION

Hypertension must be the foremost public health problem facing Malaysia. Its high prevalence (14% of population<sup>(7)</sup>) and the cardiovascular risk associated with it combine to emphasize its importance. Hypertensives presenting with cardiovascular complications accounted for 10% of medical admissions in this study. It is easily the most common cause of medical admissions; as has also been shown by another hospital morbidity study (13% of medical admission)<sup>(8)</sup>.

Given that the benefits of anti-hypertensive treatment are now so well documented<sup>(9,12)</sup> and many of the cardiovascular complications are thereby preventable, the marked prevalence of complicated hypertension as indicated by its admission rate must surely be regarded as a sign of medical failure. Almost all complicated hypertensives in this study had poorly-controlled hypertension. What is the cause of this failure to control hypertension?

Drop-out of treatment was the most important reason. More than half the complicated hypertensives in this study had dropped out of treatment, most of whom were no longer on treatment prior to their admission. Other studies have shown a wide range of drop-out rate, from as high as 71% to as low as 8%, depending on how well-organized the hypertension clinic was<sup>(13-16)</sup>. A community study in this country<sup>(7)</sup> had shown that 64% of diagnosed hypertensives (blood-pressure  $\geq 140/90$ ) were not on treatment, a certain proportion of this 64% had probably been on treatment before and had dropped out of treatment.

Failure of detection of hypertension was the second commonest reason for ineffective blood-pressure control. This is as expected. Community surveys<sup>(17)</sup> have shown that 40 - 50% of hypertensives remain undetected, and in a survey in this country<sup>(7)</sup>, 33% of hypertensives found were unaware of their blood-pressure status. More significantly, this study shows that 83% of undiagnosed complicated hypertensives had visited a doctor in the previous three years prior to their admission. The opportunities provided by their visit for hypertension detection were however missed. This highlighted the considerable potential of opportunistic case-finding as an effective method to screen for hypertension<sup>(18)</sup>.

A smaller but significant proportion (18%) of complicated hypertensives had excellent follow-up and treatment record, yet their blood-pressure control was found to be poor. This means that compliance with drug treatment was poor or the treatment they received had been less than adequate. Another study into this problem will be described in later Journal issues<sup>(19), (20)</sup>.

The renal status of hypertensives with cardiovascular complications was remarkable. While no more than 5% of a random population of hypertensives would be expected to have evidence of renal disease<sup>(21)</sup>, 20% of hypertensives in this study had greater than 2+ proteinuria, 15% had raised creatinine, 9 patients (8%) had definite glomerulonephritis (proteinuria > 2 gm/24 hr) and 4 (4%) were in advanced renal failure. This indicates that hypertensives with evidence of renal diseases

are at high risk of developing cardiovascular complications. Further study will be required to clarify this.

We still do not know the prevalence of many cardiovascular risk factors among the unselected population in this country (except perhaps for smoking 34%<sup>(22)</sup>, diabetes 2 - 3%<sup>(23)</sup>). Nevertheless, the prevalence of these factors among hypertensives in this study was undoubtedly impressive; 56% had hypercholesterolaemia, 46% hypertriglyceridaemia, 44% smoked, 38% were overweight or obese and 18% diabetic. The presence of these factors further accentuated the risk of cardiovascular complications. This finding serves to emphasize the point that hypertension is better not regarded as a disease entity, but as one ingredient of a cardiovascular risk profile, and therefore its appropriate management is more than just blood-pressure control but requires multifactorial correction of all risk factors identified<sup>(24)</sup>.

In conclusion, this study has found that drop-out of treatment and failure of detection of hypertension were the two most important reasons for ineffective blood pressure control contributing to occurrence of cardiovascular complications. It is however also noted that the prevalence of other cardiovascular risk factors was high among complicated hypertensives. Hypertensive with abnormal renal status appeared also to be at risk.

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