CEREBROVASCULAR DISEASE — THE SINGAPORE PROFILE

By A. L. Gwee*, M.D., F.R.C.P.

Knowledge of the epidemiology of a disease is essential in order to appreciate fully the spectrum of the clinical picture and the prognosis, however, it can only be obtained with difficulty. A total population survey of morbidity and mortality provides the only accurate source of such an information, but this is prohibitively time-and labour-consuming, and expensive, and the labour and expenses increase in direct proportion with the degree of prevalence. Cerebrovascular disease is a common illness of modern life, and its prevalence makes total morbidity survey a prohibitive one. Hence, other than one or two surveys, there has been no report of such an undertaking. It is however possible to have a reasonable idea of the disease if a sample can be studied, provided in doing so, one has a knowledge of the nature of the sample and its relationship with the population at large. Hence, hospital figure is informative only in so far as its relationship with the population is known, and the figures from different years cannot be lightly added together, unless one has reason to believe that the pattern of admission and utilisation of hospital beds have remained the same.

In Singapore, a survey of chronic sick has enabled us to make a calculated guess of the incidence of cerebrovascular disease (Gwee *et al*, 1968), and over the last few years, computation of cerebrovascular diseases in Medical Unit III has been done regularly to see if there is any stability in the figures from year to year. It has become apparent that for the years 1967, 1968, 1969, the stability is sufficient to permit the pooling of figures, and this would give a reasonable size of population to permit an appreciation of the profile. The data are now presented and analysed, so that some tentative picture may be gained of the status of cerebrovascular disease in Singapore.

The total involves 755 patients (Table I). There is a racial difference of Chinese:Malay: Indian = 14:1:1·2 and a sex distribution of M:F = 1:0·9. If the population below 50 is excluded (about 20% of total) then the ratio of race would be 19:1:1·4 and sex distribution 1:0·9. The population distribution in Singapore at the 5th and 6th decade is Chinese:Malay: Indian = 21:7·5:1. This shows that the Malay figure is exceptionally low, and the Indian figure about 50% higher than expected. The reason for these differences has been discussed elsewhere (Gwee *et al*, 1970). It can be seen too that although cases were recorded below 30 years of age, 13·9% of the cases were in the 4th decade, 29·5% in the 5th decade and 49·3% from the 6th decade onwards. This shows that practically 80% of the cases were from 5th decade onwards.

In the same table, it can be seen that the case incidence in the Malays and Indians was a decade earlier in that in the 4th decade alone, there were 32% in Malays and 20·8% in Indians. Also, whereas the sex distribution shows little bias in Chinese and Malays, in Indians there is a strong male bias being M:F = 13:1. The male bias in Indians has been discussed previously (Gwee *et al*, 1970), and the reason for earlier case incidence in Malays and Indians will become more apparent when subdivisions of cerebrovascular disease into haemorrhage, thrombosis and ischaemia and predisposing factors are made.

From the tables, it can be seen that the 755 cases comprise 249 haemorrhages (33%) 418 thrombosis (55%), and only 66 ischaemia (12%). The relative scarcity of ischaemia has been discussed, (Gwee *et al*, 1968 and Chee *et al*, 1968), and is probably due principally to the lack of awareness of diagnostic criteria of this condition and the less crippling effect so that the percentage of hospital utilisation falls disproportionately.

In Table II showing cerebral haemorrhage, the racial bias is Chinese:Malay:Indian = 37:1:27 and the sex ratio is M:F = 1:0·9. Again the Malay cases are exceptionally low, and although there is a preponderance of female, the cases are too few to permit valid conclusions. The Indian shows a strong male bias being M:F = 15:1 as expected. The case incidence is of a significant size from 4th decade onwards, and is in fact 40% in the Indians, and 20·5% of the total cases. Since it is generally held that untreated hypertension increases the incidence of cerebral haemorrhage, the sizeable number (33% of total) and the early incidence (a decade earlier) in this series would strongly support this belief.

Table III shows cerebral thrombosis to be 418 cases with race distribution of Chinese: Malay:Indian = 10:1:1 and sex of M:F = 1:1. Only from 5th decade onwards (82% of all cases), Chinese:Malay:Indian = 9:1:1 showing that

*Address for reprints—152, East Coast Road, Singapore, 15.

TABLE I AGE DISTRIBUTION

Age	Total	Chinese		Malay		Indian		Others	
		Male	Female	Male	Female	Male	Female	Male	Female
<31	14	3	4	0	2	2	2	0	0
31-40	28	14	8	1	2	3	0	0	0
41-50	105	48	31	8	5	11	0	1	1
51-60	223	111	72	8	6	25	0	1	0
>60	372	145	198	8	7	10	2	1	1
Unknown	13	5	6	0	0	2	0	0	0
TOTALS	755	326	320	25	22	53	4	3	2

TABLE II DIAGNOSTIC CHARACTERISTICS — CEREBRAL HAEMORRHAGE

Age	Total	Chinese		Malay		Indian		Others		Arteriogram Proved	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<31	7	3	2	0	1	0	1	0	0	0	1
31-40	12	5	5	0	1	1	0	0	0	1	1
41-50	51	29	14	0	1	6	0	1	0	7	4
51-60	78	40	31	1	2	4	0	0	0	4	0
>60	99	40	56	0	0	3	0	0	0	2	0
Unknown	2	1	0	0	0	1	0	0	0	0	0
TOTALS	249	118	108	1	5	15	1	1	0	14	6

TABLE III DIAGNOSTIC CHARACTERISTICS — CEREBRAL THROMBOSIS

Age	Total	Chinese		Malay		Indian		Others		Arteriogram Proved	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<31	6	0	2	0	1	2	1	0	0	1	2
31-40	14	8	3	1	1	1	0	0	0	2	2
41-50	48	16	17	5	4	5	0	0	1	5	3
51-60	114	53	34	5	4	17	0	1	0	7	1
>60	228	83	126	5	7	4	2	0	1	2	2
Unknown	8	3	4	0	0	1	0	0	0	0	0
TOTALS	418	163	186	16	17	30	3	1	2	17	10

TABLE IV DIAGNOSTIC CHARACTERISTICS — CEREBRAL ISCHAEMIA

Age	Total	Chinese		Malay		Indian		Others		Arteriogram Proved	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<31	1	0	1	0	0	0	0	0	0	0	0
31-40	2	1	0	0	0	1	0	0	0	0	0
41-50	3	2	0	1	0	0	0	0	0	0	0
51-60	28	16	7	1	0	4	0	0	0	2	1
>60	29	15	8	2	0	3	0	1	0	2	0
Unknown	3	1	2	0	0	0	0	0	0	0	0
TOTALS	66	35	18	4	0	8	0	1	0	4	1

TABLE V

SURVIVAL CHARACTERISTICS — CEREBRAL HAEMORRHAGE

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
31	Death on 1st admission	4	3	1	0	0	0	0	0	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
31-40	Death on 1st admission	5	3	1	0	0	1	0	0	0
	Previous similar attacks	1	0	0	0	1	0	0	0	0
41-50	Death on 1st admission	23	15	5	0	1	2	0	0	0
	Previous similar attacks	1	1	0	0	0	0	0	0	0
51-60	Death on 1st admission	41	18	20	1	0	2	0	0	0
	Previous similar attacks	2	1	1	0	0	0	0	0	0
60	Death on 1st admission	43	13	29	0	0	1	0	0	0
	Previous similar attacks	4	2	2	0	0	0	0	0	0
Unknown	Death on 1st admission	1	1	0	0	0	0	0	0	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
	TOTALS	248	119	107	1	5	14	1	1	0

TABLE VI

SURVIVAL CHARACTERISTICS — CEREBRAL THROMBOSIS

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
<31	Death on 1st admission	1	0	0	0	0	1	0	0	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
31-40	Death on 1st admission	0	0	0	0	0	0	0	0	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
41-50	Death on 1st admission	5	1	1	0	2	1	0	0	0
	Previous similar attacks	3	0	1	0	0	1	0	0	1
51-60	Death on 1st admission	6	4	2	0	0	0	0	0	0
	Previous similar attacks	9	6	2	0	0	1	0	0	0
>60	Death on 1st admission	28	8	18	0	1	0	0	0	1
	Previous similar attacks	25	7	16	0	0	1	0	0	1
Unknown	Death on 1st admission	1	1	0	0	0	0	0	0	0
	Previous similar attacks	1	0	1	0	0	0	0	0	0
	TOTALS	421	162	191	14	17	30	2	1	4

TABLE VII

SURVIVAL CHARACTERISTICS — CEREBRAL ISCHAEMIA

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
<31	Death on 1st admission	0	0	0	0	0	0	0	0	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
31-40	Death on 1st admission	0	0	0	0	0	0	0	0	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
41-50	Death on 1st admission	0	0	0	0	0	0	0	0	0
	Previous similar attacks	1	1	0	0	0	0	0	0	0
51-60	Death on 1st admission	3	1	2	0	0	0	0	0	0
	Previous similar attacks	4	3	0	0	0	1	0	0	0
>60	Death on 1st admission	5	2	2	0	0	0	0	1	0
	Previous similar attacks	0	0	0	0	0	0	0	0	0
Unknown	Death on 1st admission	0	0	0	0	0	0	0	0	0
	Previous similar attacks	1	0	1	0	0	0	0	0	0
	TOTALS	65	35	17	3	0	9	0	1	0

TABLE VIII

CLINICAL CHARACTERISTICS — CEREBRAL HAEMORRHAGE

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
31	(R) Hemplegia	4	1	2	0	0	0	1	0	0
	(L) Hemplegia	5	2	2	0	1	0	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	7	3	2	0	1	0	1	0	0
	Ambulant Discharge	1	0	1	0	0	0	0	0	0
31-40	(R) Hemplegia	4	2	1	0	1	0	0	0	0
	(L) Hemplegia	9	5	3	0	1	0	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	10	4	4	0	1	1	0	0	0
41-50	(R) Hemplegia	20	11	7	0	1	1	0	0	0
	(L) Hemplegia	27	15	7	0	1	4	0	0	0
	Dysphasia	2	2	0	0	0	0	0	0	0
	Conscious Impairment	33	20	10	0	0	2	0	1	0
	Ambulant Discharge	15	7	4	0	0	3	0	1	0
51-60	(R) Hemplegia	44	26	14	1	0	3	0	0	0
	(L) Hemplegia	45	25	17	0	2	1	0	0	0
	Dysphasia	6	4	0	0	0	2	0	0	0
	Conscious Impairment	60	30	25	1	1	3	0	0	0
	Ambulant Discharge	8	6	2	0	0	0	0	0	0
>60	(R) Hemplegia	53	18	34	0	0	1	0	0	0
	(L) Hemplegia	56	22	32	0	0	2	0	0	0
	Dysphasia	10	6	4	0	0	0	0	0	0
	Conscious Impairment	82	31	49	0	0	1	0	0	0
	Ambulant Discharge	9	5	4	0	0	0	0	0	0
Unknown	(R) Hemplegia	0	0	0	0	0	0	0	0	0
	(L) Hemplegia	1	0	0	0	0	1	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	1	1	0	0	0	0	0	0	0
	Ambulant Discharge	0	0	0	0	0	0	0	0	0

TABLE IX

CLINICAL CHARACTERISTICS — CEREBRAL THROMBOSIS

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
<31	(R) Hemplegia	3	0	1	0	0	1	1	0	0
	(L) Hemplegia	2	0	0	0	1	1	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	2	0	0	0	0	1	1	0	0
	Ambulant Discharge	4	0	1	0	1	1	1	0	0
31-40	(R) Hemplegia	8	4	2	1	1	0	0	0	0
	(L) Hemplegia	5	3	1	0	0	1	0	0	0
	Dysphasia	3	1	0	1	1	0	0	0	0
	Conscious Impairment	3	1	2	0	0	0	0	0	0
	Ambulant Discharge	6	5	0	0	1	0	0	0	0
41-50	(R) Hemplegia	35	12	11	4	3	4	0	0	1
	(L) Hemplegia	16	6	5	1	2	1	0	0	1
	Dysphasia	13	5	2	1	2	2	0	0	1
	Conscious Impairment	12	5	4	1	1	1	0	0	0
	Ambulant Discharge	25	10	8	4	0	3	0	0	0
51-60	(R) Hemplegia	52	24	14	2	2	10	0	0	0
	(L) Hemplegia	56	25	19	3	2	6	0	1	0
	Dysphasia	23	11	7	1	0	4	0	0	0
	Conscious Impairment	25	16	5	0	0	4	0	0	0
	Ambulant Discharge	54	25	14	3	1	10	0	1	0
>60	(R) Hemplegia	113	38	67	4	2	2	0	0	0
	(L) Hemplegia	108	40	57	1	5	2	2	0	1
	Dysphasia	43	12	27	1	0	2	0	0	1
	Conscious Impairment	67	23	40	0	3	0	0	0	1
	Ambulant Discharge	84	41	37	2	1	3	0	0	0
Unknown	(R) Hemplegia	3	1	2	0	0	0	0	0	0
	(L) Hemplegia	5	2	2	0	0	1	0	0	0
	Dysphasia	2	0	2	0	0	0	0	0	0
	Conscious Impairment	4	1	3	0	0	0	0	0	0
	Ambulant Discharge	1	0	0	0	0	1	0	0	0

TABLE X

CLINICAL CHARACTERISTICS - CEREBRAL ISCHAEMIA

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
31	(R) Hemplegia	0	0	0	0	0	0	0	0	0
	(L) Hemplegia	0	0	0	0	0	0	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	1	0	1	0	0	0	0	0	0
	Ambulant Discharge	1	0	1	0	0	0	0	0	0
31-40	(R) Hemplegia	0	0	0	0	0	0	0	0	0
	(L) Hemplegia	0	0	0	0	0	0	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	2	1	0	0	0	1	0	0	0
	Ambulant Discharge	2	1	0	1	0	0	0	0	0
51-60	(R) Hemplegia	10	5	4	0	0	1	0	0	0
	(L) Hemplegia	8	5	2	0	0	1	0	0	0
	Dysphasia	1	1	0	0	0	0	0	0	0
	Conscious Impairment	7	5	2	0	0	0	0	0	0
	Ambulant Discharge	18	9	5	1	0	3	0	0	0
60	(R) Hemplegia	17	9	4	1	0	2	0	1	0
	(L) Hemplegia	13	5	4	1	0	2	0	1	0
	Dysphasia	2	2	0	0	0	0	0	0	0
	Conscious Impairment	12	7	4	0	0	0	0	1	0
	Ambulant Discharge	18	11	3	2	0	2	0	0	0
Unknown	(R) Hemplegia	3	1	2	0	0	0	0	0	0
	(L) Hemplegia	0	0	0	0	0	0	0	0	0
	Dysphasia	0	0	0	0	0	0	0	0	0
	Conscious Impairment	1	0	1	0	0	0	0	0	0
	Ambulant Discharge	1	1	0	0	0	0	0	0	0

TABLE XI(a)

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
31	Hypertension	0	0	0	0	0	0	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia +	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
31-40	Hypertension	8	3	4	0	1	0	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	1	0	1	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia +	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
51-60	Hypertension	54	25	24	1	1	3	0	0	0
	Diabetes Treated	1	0	0	0	1	0	0	0	0
	Diabetes Untreated	1	0	0	0	1	0	0	0	0
	Coronary Heart Disease	3	0	3	0	0	0	0	0	0
	Arrhythmia +	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
>60	Hypertension	53	19	31	0	0	3	0	0	0
	Diabetes Treated	4	0	4	0	0	0	0	0	0
	Diabetes Untreated	5	1	2	0	0	2	0	0	0
	Coronary Heart Disease	4	2	1	0	0	1	0	0	0
	Arrhythmia +	1	1	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
Unknown	Hypertension	2	1	0	0	0	1	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	1	0	0	0	0	1	0	0	0
	Arrhythmia +	1	1	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0

TABLE XI(b)

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
31	Hypertension	1	0	0	0	0	1	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	1	0	1	0	0	0	0	0	0
	Arrhythmia	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
31-40	Hypertension	8	5	1	0	1	1	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia	0	0	0	0	0	0	0	0	0
	Valvular Disease	1	0	1	0	0	0	0	0	0
51-60	Hypertension	59	24	23	2	3	7	0	0	0
	Diabetes Treated	6	4	0	0	0	2	0	0	0
	Diabetes Untreated	7	1	2	0	0	4	0	0	0
	Coronary Heart Disease	11	4	4	0	1	1	0	1	0
	Arrhythmia	7	4	0	1	1	1	0	0	0
	Valvular Disease	3	2	1	0	0	0	0	0	0
60	Hypertension	115	42	52	4	5	2	0	0	0
	Diabetes Treated	15	6	9	0	0	0	0	0	0
	Diabetes Untreated	16	8	6	1	0	0	1	0	0
	Coronary Heart Disease	19	4	8	3	0	1	2	0	1
	Arrhythmia	12	5	6	0	0	1	0	0	0
	Valvular Disease	1	1	0	0	0	0	0	0	0
Unknown	Hypertension	8	3	4	0	0	1	0	0	0
	Diabetes Treated	1	1	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia	2	1	1	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0

TABLE XI(c)

Age		Total	Chinese		Malay		Indian		Others	
			Male	Female	Male	Female	Male	Female	Male	Female
<31	Hypertension	0	0	0	0	0	0	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
31-40	Hypertension	0	0	0	0	0	0	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
41-50	Hypertension	2	1	0	1	0	0	0	0	0
	Diabetes Treated	0	0	0	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	0	0	0	0	0	0	0	0	0
	Arrhythmia	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
51-60	Hypertension	11	8	2	0	0	1	0	0	0
	Diabetes Treated	1	0	1	0	0	0	0	0	0
	Diabetes Untreated	4	3	0	0	0	1	0	0	0
	Arrhythmia	1	0	0	0	0	1	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
>60	Hypertension	11	5	2	1	0	2	0	1	0
	Diabetes Treated	1	0	0	0	0	1	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	6	4	1	0	0	0	0	1	0
	Arrhythmia	2	2	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0
Unknown	Hypertension	2	1	1	0	0	0	0	0	0
	Diabetes Treated	1	0	1	0	0	0	0	0	0
	Diabetes Untreated	0	0	0	0	0	0	0	0	0
	Coronary Heart Disease	1	0	1	0	0	0	0	0	0
	Arrhythmia	0	0	0	0	0	0	0	0	0
	Valvular Disease	0	0	0	0	0	0	0	0	0

Indians are twice expected figure and Malays exceptionally low. The peak incidence reflects the total sample since cerebral thrombosis forms the bulk of the cases, and is markedly increased from 5th decades, but in the Malays however, there is an earlier increase as the 4th decade already shows 27% of cases.

Table IV shows cerebral ischaemia of only 66 cases, of which less than 10% occurred under the 5th decade. The race distribution is not worth noting, because of the instability of this group as previously discussed (Gwee *et al*, 1970), but it may be of passing interest to see that M:F = 2·6:1, probably reflecting more of health consciousness between the sexes locally than of true distribution.

Tables V to XI show the groupings of data, and shows that with respect to (1) cerebral haemorrhages; (2) cerebral thrombosis and (3) cerebral ischaemia, 45·5% in the first group died during the first admission, 9·7% in second, and 9·2% in the third and episodes of previous attack occurred in (1) 3·2%; (2) 15·3% and (3) 9·2%. Reserving judgement for ischaemics which has a variable status as stated, it shows that cerebral haemorrhage has a fourth fold immediate mortality, and expectedly far less incidence of previous attacks. Also mortality in both increases with age.

Right hemiplegia occurs at the rate of (1) 54%; (2) 50·8% and (3) 49·1%, whereas left hemiplegia is (1) 58·5%; (2) 45·6% and 33·8% (some cases being quadriplegics). This shows little difference in laterality and between haemorrhage and thrombosis. Dysphasia on the hand is (1) 7·2%; (2) 20·0% and (3) 4·6% being three times as common in thrombosis. This is accountable by the fact that a good number of haemorrhagic cases were unconscious and hence speech disturbances could not be detected, as shown by the fact that impairment of consciousness occurs in (1) 77·8%; (2) 33·7% and (3) 36·9% being three times as common in haemorrhage as compared to thrombosis.

At discharge, ability to walk indicate a fair degree of independence. This occurs in (1) 13·7%; (2) 43·2% and (3) 64·6%. This is expected as the brain damage must necessarily be more severe, irreversible and extensive in haemorrhagic cases.

As regards aetiological factors, pre-existing valvular disease of the heart is so low as to be insignificant. Cardiac arrhythmias being (1) 0·8%; (2) 6·2% and (3) 4·6% and coronary heart disease (1) 3·6%; (2) 7·6% and (3) 15·4% are suggestive, but may be no more than a reflection of the fact that cerebral haemorrhage is younger in age and would hence have fewer degenerative heart disease. The same conclusion may be applicable to co-existent diabetes mellitus being (1) 5·7%; (2) 11·6% and (3) 10·8%. But with hypertension, there is a much stronger association being (1) 61·3%; (2) 51·1% and (3) 40% respectively. Even allowing for the fact that at ages when cerebrovascular diseases occur, hypertension is more common, the commoness of hypertension must mean that it is of a serious aetiological significance. That it appears even more so in cases of cerebral haemorrhage would support the view that control of hypertension may be of value in reducing the incidence of cerebral haemorrhage.

In conclusion, cerebrovascular disease is a common disease in the later part of life, increasing from 4th decade onwards, and maximal in the 5th and 6th decade. The cerebral haemorrhages occur about a decade earlier, and is affected directly by the presence of hypertension. Hypertension too favours the probability of occurrence of cerebral thrombosis, and hence in prophylaxis, the control of hypertension would appear not only practical but desirable. The morbidity increases with age, hence dysphasia gets commoner in the older patients, but the presence of associated diseases such as coronary heart disease, valvular disease, and diabetes mellitus may be more an expression of the age structure than a true cause and effect relationship.

ACKNOWLEDGEMENTS

This study has been greatly facilitated by a grant from the Brain Research Fund, Singapore.

REFERENCES

1. Gwee, A. L., Tham, N. B., Chee, K. H. and Chew, L. S. (1970): "Cerebrovascular disease—Epidemiological and Clinical Considerations." Sing. Med. J., 11/1, 1.
2. Select Committee Report (1968): "The Problem of Chronic Sick in Singapore." Sing. Med. J., 9/4, 306.