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Prevalence, Awareness, Treatment and Control of Hypertension in the Malaysian Adult Population: Results from the National Health and Morbidity Survey 1996

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ABSTRACT

We determined the prevalence of hypertension and the level of awareness, treatment and control of hypertension among Malaysian adults in a population based cross-sectional survey. Twenty-one thousand and three hundred ninety-one adults aged 30 or older in all 13 states of Malaysia in 1996 were sampled using a stratified two-stage cluster sampling design. Thirty-three percent of adults had hypertension with a higher percentage among women. Among hypertensives, 33% were aware of their hypertension, 23% were currently on treatment and a mere 6% had controlled hypertension. There was practically no difference in mean BP between treated and untreated hypertensives. Concerted public health effort is urgently required to improve the detection, treatment and control of hypertension in Malaysia.

Keywords: awareness, blood pressure, control, detection, hypertension, prevalence

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INTRODUCTION

Hypertension is an important risk factor for cardiovascular disease[1]. It is also common. Large population surveys in many countries[2,3] showed its prevalence varied from one to over 30 percent. A similar high prevalence was found in a previous national survey in 1986 (unpublished data) as well as in smaller surveys[4,5] in Malaysia. Hypertension is treatable. Many clinical trials have confirmed that the risk of cardiovascular disease is decreased by treatment[6-8].

Concerted public health effort is required to detect, treat and control hypertension in the community, as shown by the experiences of many countries[9-11]. In the United States (US) over the last two decades, the National High Blood Pressure Education Program of the US has been remarkably successful in increasing detection, treatment and control of hypertension in the US population[12]. The concomitant decline in cardiovascular mortality in the US is due in part to this progress in hypertension detection and control[12]. Malaysia on the other hand is experiencing a rising incidence of cardiovascular disease. Cardiovascular disease has emerged as the principal cause of mortality and hypertension is a prevalent cardiovascular risk factor in our population[4,5]. Further, hypertensives often remain undetected in the community until they present with cardiovascular complications[13]. Of those detected to have hypertension, their blood pressure often remained uncontrolled because they failed to comply with or dropped out of treatment[13,14], or that their treatment was simply inadequate[15].

We report here findings from the National Health and Morbidity Survey in 1996 on the prevalence of hypertension and current status of its awareness, treatment and control in Malaysian adults.

METHODS

Sampling design and sample

The National Health and Morbidity Survey (NHMS) was a multi purpose survey designed to describe the health status, health related behaviour and health services utilisation for a representative sample of the population of Malaysia. An up-to-date and representative sampling frame for this population was provided by the frame used for the annual Labour Force survey conducted by the Department of Statistics[16]. The sampling frame was stratified by state and urban/rural residence. A stratified two-stage cluster sampling design with self-weighting sample was used to draw a sample of 17,995 private dwellings. However, only 13,025 (87%) dwellings were contactable or responded. All residents of sampled dwellings were included yielding a sample size of 59,903 individuals. For NHMS component on blood pressure, 23,007 individuals aged 30 or older were eligible for inclusion. Twenty-one thousand and three hundred ninety-one (93%) of them agreed to have their blood pressure measurements taken or had evaluable responses. Tables I and II show the composition of the sample.

Interview and blood pressure measurement

During a home visit, the first hour was devoted to completing a questionnaire administered by an

interviewer. Either a Malay or an English language version of the questionnaire was used depending on the respondent's choice. The questionnaire included the following hypertension related items:

1. Are you known to have high blood pressure?
2. Have you ever been told by a doctor or other health personnel that you had high blood pressure?
3. Have you ever been on medication for treatment of high blood pressure?
4. Are you still taking the medication now?

At the end of the interview, respondent's blood pressure (BP) was measured by a trained nurse. The procedure was explained and verbal permission obtained from the respondent prior to the examination. Blood pressure was measured with the respondent in the sitting position and his/her arm supported at the same level as his heart. One of two calibrated electronic devices (Visomat® OZ 30 or OZ 2) was used to measure blood pressure according to the manufacturer's guidelines. Visomat (OZ 30 was used for patients with arm size 22-32 cm and Visomat (OZ 2 for obese patients with arm size more than 32 cm. The cuff was placed on the respondent's right arm 2-3 cm above the antecubital fossa. Two BP measurements were taken with an interval of three minutes apart. Respondents were informed of their BP measurements. All nurses attended centralised training on standardised protocol for BP measurement. During the field survey, supervisors conduct weekly checks on compliance with the BP measurement protocol.

Table I. Characteristics of respondents compared with total population of Malaysia aged 20 or older in 1996.

	% respondents (unweighted) n=21391 No. (%)	% Malaysia population aged 30 or older n=7.84 million %
Sex		
Male	10,003 (47%)	50%
Female	11,388 (53%)	50%
Age		
30-34	4,253 (20%)	21%
35-39	3,944 (18%)	19%
40-44	3,344 (16%)	16%
45-49	2,638 (12%)	12%
50-54	1,935 (9%)	9%
55-59	1,650 (8%)	7%
60-64	1,360 (6%)	6%
65-69	951 (4%)	4%
>=70	1,316 (6%)	6%
Ethnic		
Malay	9,656 (45%)	43%
Chinese	5,978 (28%)	31%
Indian	1,467 (7%)	8%
Other indigenous	3,194 (15%)	9%
Others	1,096 (5%)	10%

The decision to use electronic devices instead of the mercury sphygmomanometer was based on the assumption that the electronic device ought to be more robust. Survey field work can be difficult especially in outlying parts of the country. A previous national health survey in 1986 had encountered problems with mercury leaking rendering the device unusable or

Table II. Sample size by age, sex and ethnicity in the survey.

	Malay	Chinese	Indian	Other indigenous
Men, age in years				
30-34	821	433	130	322
35-39	799	420	155	278
40-44	705	422	120	233
45-49	592	406	82	145
50-54	420	304	49	155
55-59	399	243	39	91
60-64	282	195	36	101
65-69	212	150	31	55
>=70	273	173	37	102
Women, age in years				
30-34	1,002	556	165	433
35-39	971	543	172	343
40-44	854	532	124	210
45-49	599	421	101	199
50-54	453	316	46	123
55-59	400	264	57	112
60-64	325	217	56	105
65-69	221	161	29	72
>=70	329	222	38	115

Table III. Prevalence of hypertension in Malaysian adult population.

Ethnicity	sex	n	Prevalence % (SE)	Age adjusted* prevalence % (SE)	Estimated population (SE)
All	both	21,391	32.9 (0.5)	32.9 (0.4)	2,577,044 (56200)
	men	10,003	31.9 (0.6)	32.1 (0.5)	1,260,209 (33598)
	women	11,388	33.9 (0.6)	33.5 (0.5)	1,316,834 (31264)
Malay	both	9,656	33.5 (0.6)	33.5 (0.5)	1,138,790 (34917)
	men	4,502	29.9 (0.8)	30.0 (0.7)	496,390 (18062)
	women	5,154	37.1 (0.8)	36.9 (0.7)	642,400 (20792)
Chinese	both	5,978	33.1 (0.8)	31.1 (0.6)	791,090 (32277)
	men	2,746	35.2 (1.1)	34.0 (1.0)	420,028 (18848)
	women	3,232	30.9 (1.0)	28.2 (0.8)	371,062 (17080)
Indian	both	1,467	30.8 (1.3)	31.7 (1.3)	186,257 (14206)
	men	679	34.9 (1.8)	35.5 (1.9)	103,965 (8597)
	women	788	26.9 (1.7)	27.9 (1.5)	82,292 (7156)
Other indigenous	both	3,194	34.3 (1.0)	34.8 (0.9)	237,413 (12338)
	men	1,482	32.2 (1.3)	32.8 (1.3)	112,073 (6268)
	women	1,712	36.4 (1.3)	36.8 (1.2)	125,340 (6983)

* Age-adjusted to the 1996 Malaysian population.

measurements unreliable. Method comparison study between measurements taken with Visomat® and those taken with a mercury sphygmomanometer simultaneously was carried out in a clinic patient population. The intra-class correlation coefficient between measurements obtained by the two methods was 0.89 and 0.58 for systolic and diastolic BP respectively. Overall, systolic BP measurement taken with the Visomat® was 3% lower than that of the mercury sphygmomanometer. For diastolic BP, it was 6% lower. The 95% limits of agreement was 83%-114% and 72%-123% for systolic and diastolic BP respectively. The agreement was judged satisfactory for survey use.

Definitions

The mean of the two BP measurements was used for analysis unless only one was available. Hypertension was defined as a mean systolic blood pressure (SBP) ≥140 mmHg, mean diastolic blood pressure (DBP) ≥90 mmHg or on current treatment for hypertension with medications[9]. Blood pressure levels were further categorised as optimal, normal, high normal, stages 1, 2, 3 and 4 hypertension according to the classification system recommended by the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure[9]. Awareness of hypertension was defined as any prior knowledge or diagnosis or treatment of hypertension. Treatment of hypertension refers to treatment with medications only. Control of hypertension was defined as current treatment with medication that is associated with SBP<140 mmHg and DBP <90 mmHg[2].

Statistical methods

Prevalence estimates and standard errors were calculated by a method appropriate to the complex sampling design[17,18].The sampling weights were adjusted for household non-response using adjustment cells formed by state and urban/rural residence. Post stratification[19] was used to adjust the weighted sample totals to known population totals for age, gender and ethnicity based on 1996 census population projection. Prevalence estimates were standardised by the direct method to the age distribution of the 1996 adult Malaysian population. STATA[20] software package was used for analysis.

RESULTS

Prevalence

Thirty-three percent or an estimated 2.6 million Malaysian adults aged 30 or older had hypertension (Table III). Women had a higher prevalence of hypertension than men. Malay and other indigenous women had the highest crude and age-adjusted prevalence of hypertension while Chinese and Indian women had the lowest prevalence. Table IV shows the age-sex-ethnic specific prevalence estimates. Malay women had a higher prevalence of hypertension than all other sex-ethnic groups throughout the entire age range. The typical pattern in age-sex specific prevalence of younger men having a higher prevalence than younger women and the reverse for older men and women was observed only in the Chinese and Indian.

Mean blood pressures

Table V shows the age adjusted mean blood pressure (BP) values by gender and ethnicity. Malay and other

Table IV. Age-sex-ethnic specific prevalence of hypertension.

Ethnicity	sex	Age group, y	n	Prevalence % (SE)	Estimated population (SE)
Malay	men	30-39	1,620	17.5 (1.0)	116,974 (8265)
		40-49	1,297	27.2 (1.4)	127,119 (7803)
		50-59	818	44.6 (2.0)	122,958 (6697)
		60-69	494	50.1 (2.5)	81,074 (4769)
		>=70	273	54.4 (3.4)	48,265 (3520)
Malay	women	30-39	1,973	19.1 (1.0)	133,540 (7588)
		40-49	1,453	35.3 (1.4)	166,949 (8280)
		50-59	853	54.0 (1.9)	150,308 (7135)
		60-69	546	64.1 (2.3)	115,253 (5626)
		>=70	329	73.6 (2.7)	76,350 (4176)
Chinese	men	30-39	853	19.6 (1.6)	81,102 (7467)
		40-49	828	33.4 (1.8)	118,526 (7837)
		50-59	547	45.4 (2.3)	104,905 (6561)
		60-69	345	58.2 (2.9)	72,617 (4489)
		>=70	173	63.3 (4.4)	42,877 (4665)
Chinese	women	30-39	1,099	9.4 (1.0)	39,296 (4301)
		40-49	953	24.3 (1.5)	82,075 (5748)
		50-59	580	49.4 (2.3)	103,187 (6489)
		60-69	378	58.1 (2.7)	78,032 (4952)
		>=70	222	67.0 (3.8)	68,471 (5850)
Indian	men	30-39	285	20.7 (2.5)	25,544 (3434)
		40-49	202	36.1 (3.4)	31,807 (3483)
		50-59	88	51.5 (6.0)	22,397 (3636)
		60-69	67	60.2 (5.9)	16,850 (2029)
		>=70	37	48.8 (8.5)	7,366 (1596)
Indian	women	30-39	337	9.5 (1.7)	12,041 (2022)
		40-49	225	25.5 (3.1)	22,736 (3061)
		50-59	103	42.9 (4.8)	19,744 (2720)
		60-69	85	61.7 (5.5)	17,782 (2126)
		>=70	38	68.0 (7.9)	9,990 (1344)
Other indigenous	men	30-39	600	19.3 (1.8)	28,898 (2868)
		40-49	378	32.1 (2.6)	28,843 (2606)
		50-59	246	44.8 (3.5)	25,512 (2185)
		60-69	156	52.6 (4.0)	18,300 (1661)
		>=70	102	62.3 (4.8)	10,521 (1048)
Other indigenous	women	30-39	776	19.0 (1.5)	27,761 (2437)
		40-49	409	41.0 (2.6)	35,109 (2568)
		50-59	235	50.5 (3.4)	28,558 (2230)
		60-69	177	59.3 (4.1)	21,408 (1822)
		>=70	115	62.8 (4.6)	12,504 (1086)

indigenous women had the highest mean systolic BP (SBP), Chinese and Indian men had the highest diastolic BP (DBP) while Chinese and Indian women had the lowest DBP as well as SBP. The tendency of Malay and other indigenous women to have systematically higher SBP than all other sex-ethnic groups is further illustrated in Figs. 1 to 4. In all groups, mean SBP rose with increasing age but DBP tended to decline beyond the age 50-55. Younger women had lower SBP than men but the rise in mean SBP with age was steeper for women than men such that eventually the mean curves of the two sexes cross. The cross occurred at the young age of 35-40 in Malay and other indigenous women. As a result, they had higher mean SBP than their Chinese and Indian counterparts throughout the entire age range as shown in Figs. 5 and 6.

Table V. Age adjusted* mean systolic (SBP) and diastolic (DBP) blood pressure (mmHg) for all adults, normotensives, treated hypertensives and untreated hypertensives.

	All adults		Normotensives		Treated hypertensives		Untreated hypertensives	
	SBP (SE)	DBP (SE)	SBP (SE)	DBP (SE)	SBP (SE)	DBP (SE)	SBP (SE)	DBP (SE)
All	129 (0.1)	79 (0.0)	119 (0.0)	74 (0.0)	147 (1.4)	90 (0.7)	149 (0.1)	91 (0.1)
men	130 (0.1)	80 (0.0)	120 (0.1)	75 (0.0)	147 (3.1)	92 (1.9)	148 (0.2)	91 (0.1)
women	129 (0.1)	78 (0.0)	117 (0.1)	72 (0.0)	147 (2.5)	89 (1.1)	150 (0.2)	90 (0.1)
Malay	130 (0.1)	79 (0.1)	119 (0.1)	73 (0.0)	149 (3.1)	91 (1.7)	149 (0.2)	91 (0.1)
men	129 (0.2)	79 (0.1)	120 (0.1)	74 (0.1)	148 (7.7)	92 (3.6)	148 (0.5)	91 (0.3)
women	131 (0.3)	79 (0.1)	119 (0.2)	73 (0.1)	149 (5.2)	91 (3.1)	150 (0.4)	91 (0.3)
Chinese	127 (0.2)	79 (0.1)	118 (0.1)	74 (0.1)	145 (6.1)	90 (3.4)	147 (0.4)	91 (0.2)
men	129 (0.4)	81 (0.1)	120 (0.3)	75 (0.1)	144 (5.1)	90 (5.3)	146 (0.6)	92 (0.4)
women	125 (0.3)	77 (0.1)	116 (0.2)	72 (0.1)	145 (22.7)	89 (9.2)	149 (1.0)	90 (0.7)
Indian	127 (0.9)	79 (0.3)	117 (0.5)	74 (0.3)	148 (15.5)	93 (9.0)	147 (1.8)	93 (0.8)
men	129 (2.0)	82 (0.6)	119 (1.0)	76 (0.5)	148 (22.6)	93 (14.6)	148 (3.6)	94 (1.1)
women	124 (1.3)	77 (0.7)	115 (1.1)	72 (0.8)	145 (59.3)	92 (9.8)	144 (4.1)	91 (2.1)
Other indigenous	132 (0.4)	79 (0.1)	120 (0.2)	73 (0.1)	147 (5.6)	88 (2.8)	153 (0.7)	90 (0.5)
men	131 (0.8)	80 (0.3)	121 (0.4)	74 (0.3)	146 (17.9)	88 (32.7)	152 (1.6)	91 (0.9)
women	132 (0.9)	78 (0.3)	119 (0.4)	73 (0.2)	148 (8.6)	87 (2.4)	153 (1.4)	90 (1.1)

* Age-adjusted to the 1996 Malaysian population.

Overall and in each ethnic group, normotensive men had a higher mean SBP and DBP than women. However, among treated and untreated hypertensives the reverse is true with women having a higher mean SBP than men, except in Indians. Mean DBP in treated and untreated hypertensives remained higher for men than women. There was practically no difference at all in both mean SBP and DBP between treated and untreated hypertensives in all groups. Only in other indigenous ethnic group was some semblance of a difference in mean BP observed between treated and untreated hypertensives.

Awareness, treatment and control of hypertension

Table VI shows the percentage of hypertensives who were aware, ever treated, currently on treatment and controlled, and the percentage of treated hypertensives who were controlled. Among hypertensives, a third was aware of their hypertension status, 31% had ever been treated but only 23% currently remained on anti-hypertensive treatment. Only 6% of hypertensives had BP less than 140/90 (controlled hypertension). Women were more aware of their hypertension status than men in all ethnic-age groups. They were also more likely to have been treated and to remain on treatment for hypertension.

Among hypertensives currently on treatment, overall only 26% achieved BP control. Men had better BP control than women. Except in Indian and other indigenous men, BP control worsened with increasing age.

DISCUSSION

There are major limitations with the design of this survey. We therefore advise caution in its interpretation. Firstly, prevalence of hypertension was estimated based on two measurements taken on a single occasion only. The diagnostic criteria recommended by Joint National Committee 12 required BP measurements at two or more subsequent visits after an initial screen. It is clearly difficult to use such criteria to diagnose hypertension in large population surveys. Hence, the prevalence of hypertension in this survey may have been overestimated and the percentage of treated hypertensives who were controlled may be underestimated[21]. Secondly, BP was measured by Visomat® in this survey and its measurements of both systolic and diastolic BP were systematically lower than those obtained by the conventional mercury sphygmomanometer. Thus the results (prevalence and mean BP) would have been higher than those reported here had mercury sphygmomanometer been used in the survey. Caution should therefore be observed in comparing results with those from other national surveys.

These results are the first description of the prevalence and control of hypertension in Malaysia. Clearly, we are looking at an extremely grave situation. The prevalence rates found here are among the highest reported in the literature. Malay and other indigenous women bore a disproportionate share of the burden, and they also have more severe hypertension. Prevalence rates however are uniformly high across all ethnic,

Table VI. Percentage of hypertensives who were aware, ever treated, currently on treatment* and controlled, and percentage of treated hypertensives who were controlled.

				Hypertensives				Currently treated hypertensives
Ethnicity	sex	Age group, y	n	Aware % (SE)	Ever treated % (SE)	Currently treated* % (SE)	Controlled** % (SE)	Controlled*** % (SE)
All	both	all	7225	33 (0.7)	31 (0.7)	23 (0.6)	6 (0.4)	26 (1.3)
	men	all	3296	29 (0.9)	27 (0.9)	21 (0.8)	6 (0.5)	28 (1.9)
	women	all	3929	37 (0.9)	35 (0.9)	25 (0.8)	6 (0.5)	25 (1.9)
Malay	both	all	3346	31 (1.0)	29 (0.9)	19 (0.8)	4 (0.4)	23 (1.9)
Malay	men	all	1403	27 (1.3)	25 (1.3)	17 (1.1)	4 (0.6)	25 (3.0)
		30-49	633	22 (2.0)	21 (1.9)	13 (1.5)	4 (0.8)	31 (5.1)
		50-64	513	33 (2.3)	31 (2.3)	22 (2.1)	5 (1.1)	22 (4.3)
		≥65	257	26 (3.0)	25 (3.0)	18 (2.6)	3 (1.0)	18 (5.6)
Malay	women	all	1943	34 (1.3)	31 (1.2)	20 (1.0)	5 (0.5)	22 (2.3)
		30-49	899	30 (1.7)	26 (1.6)	15 (1.4)	4 (0.7)	29 (4.1)
		50-64	660	41 (2.1)	39 (2.1)	28 (2.0)	6 (1.0)	21 (3.3)
		≥65	384	32 (2.6)	30 (2.6)	19 (2.3)	2 (0.9)	13 (4.3)
Chinese	both	all	2021	36 (1.3)	34 (1.2)	29 (1.1)	7 (0.7)	26 (2.1)
Chinese	men	all	1013	32 (1.7)	29 (1.6)	25 (1.5)	7 (0.9)	29 (3.0)
		30-49	454	22 (2.1)	19 (2.0)	15 (1.8)	5 (1.0)	34 (5.7)
		50-64	355	42 (3.0)	39 (3.0)	34 (2.9)	11 (1.8)	31 (4.7)
		≥65	204	38 (3.7)	35 (3.4)	32 (3.3)	6 (1.9)	18 (5.6)
Chinese	women	all	1008	41 (1.8)	39 (1.8)	34 (1.7)	8 (1.0)	23 (2.8)
		30-49	351	32 (2.9)	30 (2.9)	24 (2.8)	8 (1.8)	34 (6.4)
		50-64	408	49 (2.7)	47 (2.7)	41 (2.7)	10 (1.7)	23 (3.8)
		≥65	249	40 (3.3)	39 (3.4)	35 (3.2)	5 (1.5)	14 (4.2)
Indian	both	all	449	36 (2.4)	34 (2.3)	28 (2.3)	9 (1.4)	32 (4.5)
Indian	men	all	235	35 (3.3)	33 (3.3)	26 (2.9)	9 (1.8)	34 (6.3)
		30-49	133	30 (4.5)	28 (4.4)	20 (4.1)	7 (2.3)	34 (9.4)
		50-64	66	42 (7.2)	41 (7.1)	34 (6.7)	13 (4.3)	37(10.6)
		≥65	36	38 (8.7)	38 (8.7)	32 (8.3)	9 (4.5)	28(13.1)
Indian	women	all	214	37 (3.5)	36 (3.5)	31 (3.6)	9 (2.2)	29 (6.3)
		30-49	93	23 (4.1)	21 (3.9)	19 (3.9)	5 (2.1)	23(10.2)
		50-64	74	53 (6.3)	53 (6.3)	45 (6.8)	15 (4.9)	33 (9.4)
		≥65	47	37 (7.0)	35 (7.0)	28 (6.8)	7 (3.8)	26(12.0)
Other indigenous	both	all	1112	40 (1.9)	37 (1.9)	24 (1.5)	8 (0.9)	32 (3.1)
Other indigenous	men	all	491	35 (2.6)	32 (2.6)	22 (2.2)	7 (1.2)	34 (4.8)
		30-49	235	29 (3.3)	25 (3.2)	17 (2.7)	5 (1.4)	29 (7.5)
		50-64	159	43 (4.3)	41 (4.3)	29 (3.9)	10 (2.6)	33 (7.3)
		≥65	97	36 (5.4)	36 (5.4)	23 (4.2)	11 (3.4)	47(11.9)
Other indigenous	women	all	621	44 (2.3)	42 (2.3)	26 (1.9)	8 (1.1)	30 (3.7)
		30-49	320	43 (3.0)	40 (3.0)	22 (2.5)	8 (1.7)	35 (6.2)
		50-64	180	50 (3.9)	49 (3.9)	34 (3.5)	10 (2.2)	29 (5.7)
		≥65	121	38 (4.5)	34 (4.3)	21 (3.7)	3 (1.5)	16 (7.0)

* Treatment refers to treatment with anti-hypertensive medication.

** Controlled refers to proportion of hypertensives with SBP<140mmHg and DBP<90 mmHg

*** Controlled refers to proportion of hypertensives on anti-hypertensive medication with SBP<140mmHg and DBP<90 mmHg

Fig. 1 Mean systolic and diastolic BP for Malay.

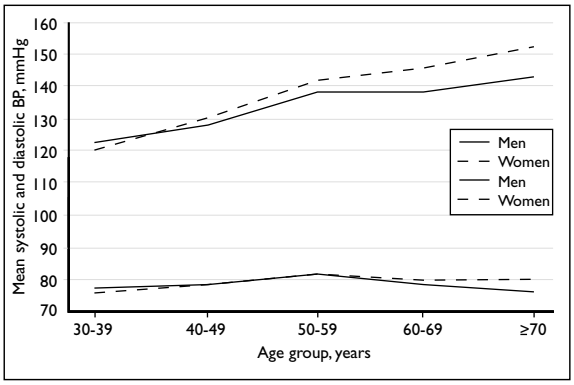


Fig. 2 Mean systolic and diastolic BP for Chinese.

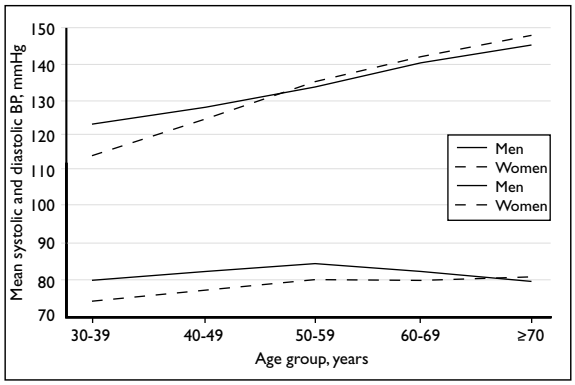


Fig. 3 Mean systolic and diastolic BP for Indian.

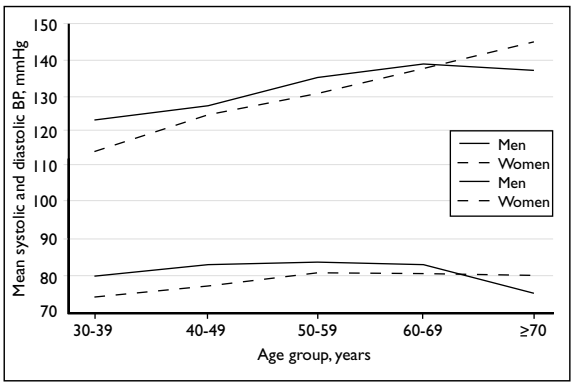


Fig. 4 Mean systolic and diastolic BP for other indigenous ethnic group.

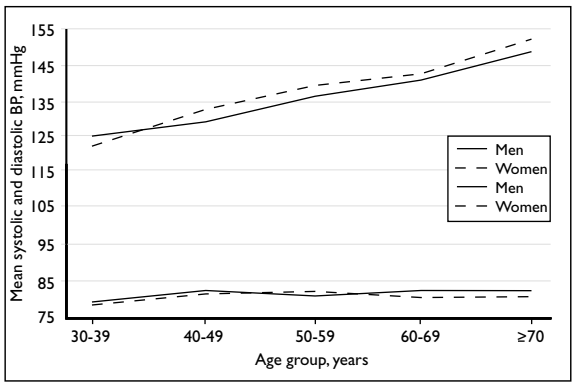


Fig. 5 Mean systolic and diastolic BP for men.

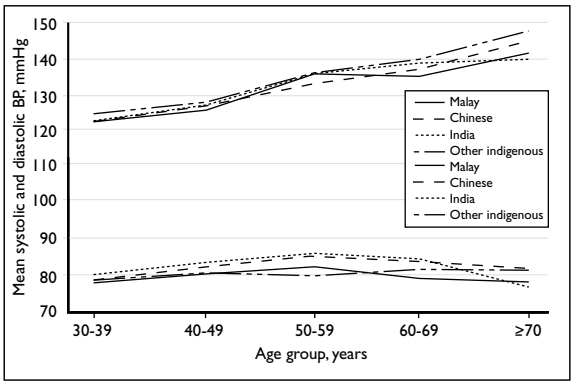
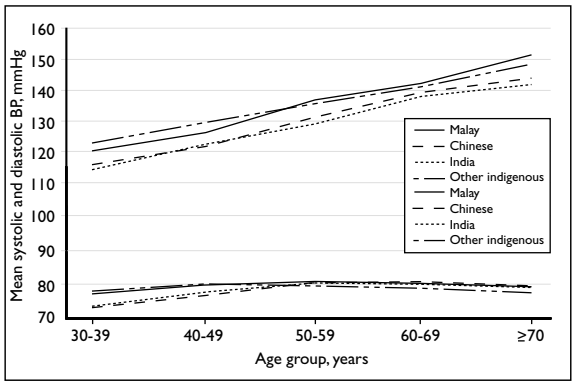


Fig. 6 Mean systolic and diastolic BP for women.



sex and age groups. Even young Malaysian adults have unusually high prevalence as well as severe hypertension.

While Malaysia no doubt has a serious problem with hypertension, its detection and treatment is less than satisfactory as shown in this survey. The survey found low awareness, low treatment, and poor control rates across all groups. Overall, only a third of hypertensives were aware of their hypertension, a quarter on treatment and a mere 6% of hypertensives had blood pressure less than 140/90 (controlled hypertension). The results are considerably poorer than those found in recent studies assessing the effectiveness of hypertension control in different populations[9-11,22,23]. In the 1960s to 1970s, the pattern of detection, treatment and control of hypertension followed the so-called rule of halves[24,25]. Since then, considerable progress has taken place in many countries. In a recent review of 24 studies[26], the authors concluded that in industralised countries, the rule of halves is no longer valid. Unfortunately, in Malaysia, the rule of halves does not even come close to describing the situation. Worse yet, this must be the only survey on BP control in the community that found practically no difference in mean blood pressure between treated and untreated hypertensives. In contrast, US survey[2] had found 9/5 mmHg reduction in mean BP on treatment overall and the difference found in a Belgian survey[9] was 12/13 mmHg.

In conclusion, hypertension is highly prevalent and severe in Malaysia, and its care grossly inadequate. The situation is grave. Concerted public health effort is urgently required to improve the detection, treatment and control of hypertension in Malaysia.

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