

ORIGINAL ARTICLE

BLOOD PRESSURE PATTERNS AND THE PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED FACTORS IN A RURAL COMMUNITY IN NORTHERN MALAYSIA

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ABSTRACT

This study was conducted to study the blood pressure pattern and the prevalence of hypertension and its associated factors in a rural community in two coastal villages in rural Kedah, Malaysia. Out of the total population 504 were above 20 years of age and were eligible to participate. There were 227 males and 252 females. The mean systolic blood pressure was found to rise with age, peaking in the 61-70 years age group. For women the mean blood pressure rose earlier from the age group of 41-50 years. Mean blood pressures rose with increasing body mass index. It also varied with occupation and education. The retired and unemployed had a higher blood pressure than those employed and there was an inverse relationship with increasing education. The prevalence of hypertension was 33.6%. More females were hypertensive (36.5%) as compared to males (30.4%) and this finding was the same for both systolic and diastolic hypertension. Majority (71.4%) of the hypertensives were undiagnosed. 72.5% of hypertensives who were on treatment were not under control. Hypertension was more prevalent among retirees and illiterates. Prevalence of hypertension increased correspondingly with age. Obesity was associated with hypertension. There was no association with family history of hypertension. Multiple logistic regression showed a positive association only for obesity. In conclusion, given the high prevalence of hypertension at present, it appears that the prevalence will increase as each age cohort grows older. Obesity, especially among housewives is a significant assorted factor.

Key words: prevalence, hypertension, adult, rural, northern Malaysia.

INTRODUCTION

Hypertension is common in the general population worldwide and it is well known that the prevalence and its consequence increases with age¹. Elevated blood pressure, particularly systolic BP, represents a pathophysiologic manifestation of altered cardiovascular physiology and structure morbidity, ultimately manifesting as increased cardiovascular morbidity and mortality^{1,2,3,4,5,6,7}. Heart diseases is the second principal cause of death in Ministry of Health hospitals⁸ in Malaysia. Hypertension is also a risk factor for renal diseases^{2,7}.

Systolic/diastolic hypertension is defined as a systolic blood pressure greater than 140 mmHg and a diastolic blood pressure greater than 90mm Hg. Isolated systolic hypertension is defined as a systolic pressure equal to or greater than 140mm Hg with a diastolic pressure of less than 90mm Hg⁹.

The National Health and Morbidity Survey in 1996 found the prevalence of hypertension in Malaysian adults >30 years to be 33%¹⁰. In the United Kingdom, surveys have shown that there is substantial underdiagnosis, under treatment and poor rates of blood pressure control³ and the prevalence of hypertension has not decreased between 1994 and 1998 though the treatment and controlled rate has improved¹¹.

Overweight is related to hypertension^{12,13} and there is also an inverse relationship to socioeconomic status and increase in blood pressure and cardiovascular disease mortality^{1,14}.

A recent systematic review found that pharmacological treatment of hypertension effectively reduces morbidity and mortality from cardiovascular disease and stroke^{15,16,17,18}. Screening the population for hypertension is essential for determining the extent of the problem if we are to plan and develop health services to deal with high blood pressure¹. Thus baseline data on blood pressure and knowledge of its determinants is important.

The objectives of this study were to determine the blood pressure pattern and the prevalence of hypertension and its associated factors in a rural community in northern Malaysia.

METHODOLOGY

This study was conducted in two coastal villages in rural Kedah, Malaysia. The total population the villages was 895. All the villagers were Malays with the majority of them working as fishermen or farmers.

The study was a part of a general health survey conducted in the two villages. Data on blood pressure was collected from all those who were 20 years and above. Data obtained was anonymous at source. In addition to the blood pressure measurement, participants were interviewed using a standard questionnaire regarding their age, sex, education and occupation. Height and weight was recorded.

Blood pressure was measured as per standard procedures according to WHO guidelines. Blood pressure was measured thrice and when more than 140mmHg systolic or more than 90 mmHg diastolic on all 3 occasions, a positive diagnosis of hypertension was made. This is in line with current criteria for diagnosis of hypertension in all adults (including the elderly) from the World Health Organization (WHO) and International Society of Hypertension (ISH)¹⁹.

When diagnosed as hypertensive, the patient was referred to a doctor for management. Those with the reading of isolated systolic blood pressure of more than 140mmHg and diastolic pressure of more than 90mmHg were also referred.

Records for those who refused and those whose data was incomplete were excluded from this analysis. Results were tabulated, cross tabulated and analysed statistically using

SPSS. A multiple logistic regression analysis was attempted with hypertension as the dependant variable and sex, age, education, BMI and occupation as independent variables in the full model. Two models were run. In one, BMI was grouped as overweight and obese as the risk group. In the other only obese was marked as the risk group.

RESULTS

The total eligible villagers over the age of 20 years were 504; of these 241 were males and 263 females. Data was complete for 479 as the rest could not be contacted at the time of survey. Of these 227 were males and 252 were females. The mean age of the participants was 45.5 years.

The systolic pressure ranged from 68 to 230mmHg with the mean systolic pressure of 127.6mmHg. The mean diastolic pressure was 80.5mmHg, with the minimum diastolic pressure 55mmHg and the maximum 120mmHg.

Fig 1 shows the mean systolic and diastolic pressures for various age groups by sex. The mean systolic and diastolic pressure for each age cohort rise up to the age group of 61-70 years then reduces. For women the rise is similar except that it starts at an earlier age group of 41 - 50 years.

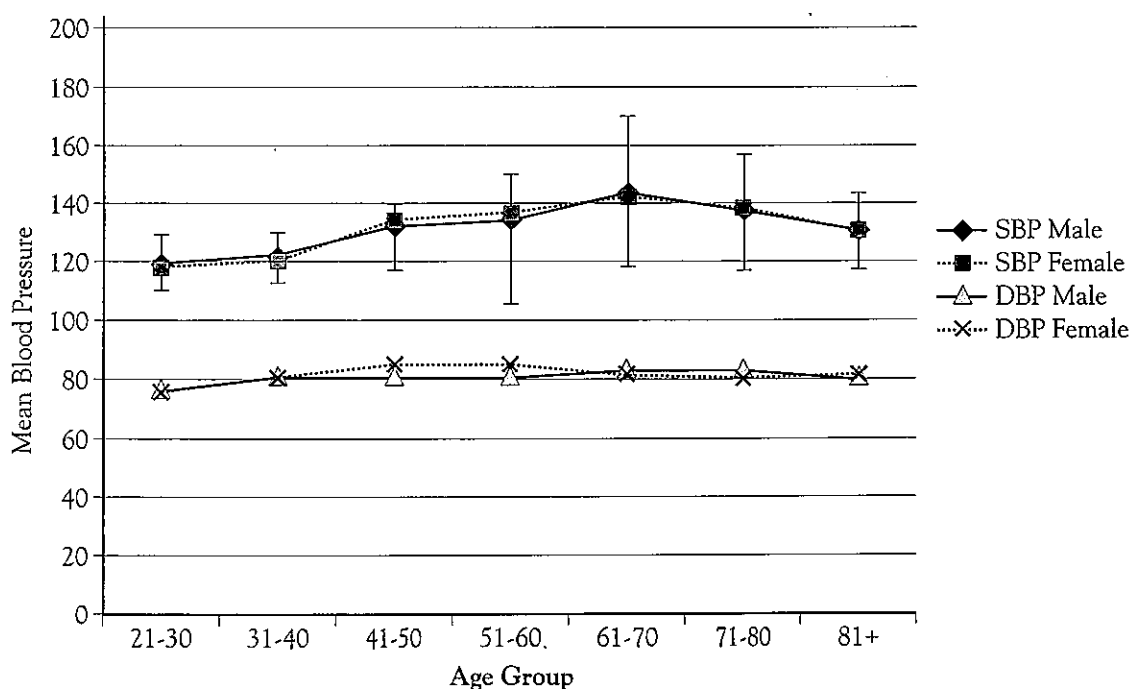


Fig 1. Mean Blood Pressure by age and sex

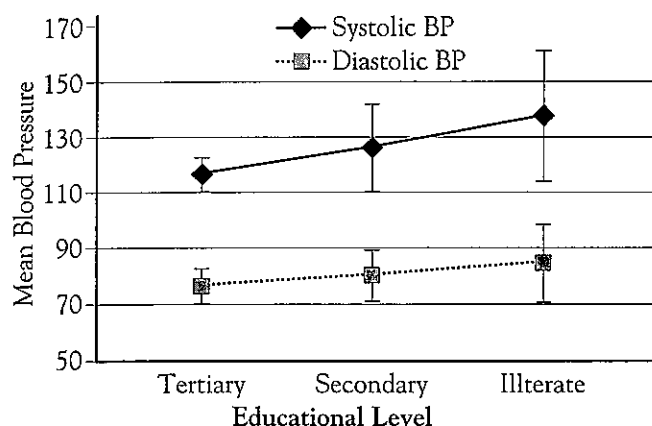


Fig 2. Mean Blood Pressure by Education

Figs 2 and 3 show the blood pressure distribution with education and occupation. Both systolic and diastolic pressures are higher among illiterates. Blood pressure was also found to be highest among the retirees and among housewives.

Table 1 and 2 show the prevalence of hypertension and its association with various risk factors. The overall prevalence of hypertension was 33.6% (n=161). Both diastolic and systolic hypertension was found equally in 24.4% (n=117). Among the females 36.5% (n=92) were hypertensive as compared to 30.4% (n=69) among the males. Both systolic and diastolic was higher among females.

Prevalence of hypertension was noted to be increasing with age. The prevalence peaked in the age group 61-70 years with 62.2% (n=38) suffering from hypertension. There was marginal decline in the highest age brackets. The increase of hypertension in age was similar among both sexes. However, among females, more numbers of the younger cohorts were hypertensives.

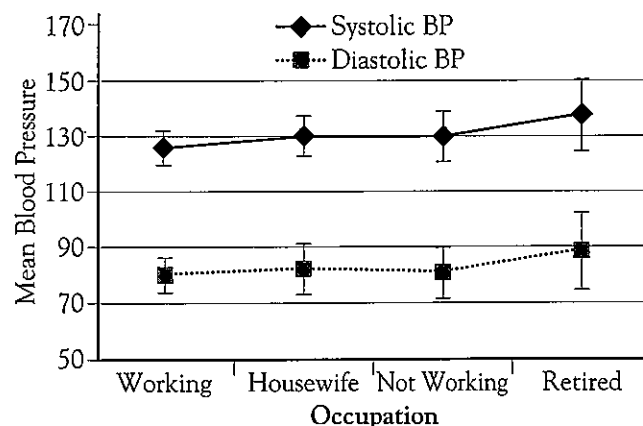


Fig 3. Mean Blood Pressure by Occupation

When analysed by occupational status 53.3% (n=8) of retirees had hypertension (p<0.05). Prevalence of hypertension was highest among illiterates 52.7%. (n=29) and the differences by educational status was significant.

Of the persons with hypertension 71.4% (n=116) were unaware they were hypertensive. The blood pressure of 72.5% of those who were on treatment was not under control. Inadequacy of control was higher among females (87.5%) than among males (58.6%), this difference was significant (p<0.05).

As shown in Figure 4 and Table 2, obesity was significantly associated with hypertension. Of those who were obese 52.7% (n=39) were hypertensive (p<0.05). Among the males 53.8% (n=14) who were obese were hypertensive (p<0.05) compared to 52.1% (n=25) among females who were obese (p<0.05). Those who were overweight had higher rates of hypertension than those with normal weight.

Table 1. Factors Associated with Prevalence of Hypertension

Sl.		Hypertension		Systolic Hypertension		Diastolic Hypertension	
		N	Prevalence %	N	Prevalence %	N	Prevalence %
1	Hypertension	161	33.6	117	24.4	117	24.4
	Male	69	30.4	47	20.7	52	22.9
	Female	92	36.5	70	27.7	65	25.8
2	** Occupation						
	Not working	31	38.3	22	27.5	25	31.3
	House wife	49	42.2	38	32.8	32	27.6
	Retired	8	53.3	5	33.3	7	46.7
	Working	73	26.2	52	19.4	53	19.8
4	** Do not Know of HPT status	116	71.4	76	65	81	69.2

** p<0.05

Table 2. Factors Associated with Hypertension

Sl. No.		Total N	Male HPT		Female HPT		Total	
			N	%	N	%	N	%
1	** Education							
	Uneducated	55	5	45.5	24	53.5	29	52.7
	Primary and secondary school (up to form five)	403	63	31	68	34.0	131	32.5
	Form six and higher	21	1	7.7	0	0	1	4.8
2	** Age (years)							
	21-30	123	5	8.2	7	11.3	12	9.8
	31-40	76	9	24.3	8	21.6	17	22.3
	41-50	100	13	27.1	24	46.2	37	37.0
	51-60	86	13	35.3	25	51	38	44.2
	61-70	60	20	71.4	18	56.3	38	62.2
	71-80	26	5	55.6	10	58.8	15	57.7
	>81	10	4	57.1	0	0	4	40.0
3	** BMI							
	Underweight	35	4	23.5	2	11.1	6	35
	Normal weight	208	23	20.4	29	30.5	52	25
	Over weight	114	19	37.3	26	41.3	45	39.5
	Obese	74	14	53.8	25	52.1	39	52.7
4	** Not on treatment	161	52	75.3	64	69.5	116	72
	On treatment but not controlled	45	9	58.6	24	87.5	33	72.5

** p<0.05

Table 3. Logistic Regression for Obesity and Hypertension.

Model 1	Odds Ratio	S.E.	Confidence Interval (95%)
Overweight/Obesity	2.7	0.257	2.2 - 3.2
Age	1.8	0.09	1.62 - 1.98
Model 2			
Obesity	3.0	0.29	2.43 - 3.57

Table 3 shows the results of the logistic regression analysis. Overweight and obesity had 2.7 higher odds of hypertension and the obese had a 3 times higher risk of hypertension. Increasing age too had a significant risk of hypertension.

DISCUSSION

This study found that mean blood pressure peaked in the age group of 61-70. Among women, the blood pressure rose earlier in the age group of 41-50 years. The pattern of blood pressure was similar for males and females. Blood pressure was found to rise with age in the Framingham heart study⁶ and in the UK¹¹ except that in the Framingham study there was no decline in the mean pressure in highest age group. In the United Kingdom the rise in mean blood pressure was sooner among males. Obesity has been recognized to be a risk factor for increased blood pressure^{1,2}. Similarly in our study, we found an increase in mean blood pressure with overweight and obesity.

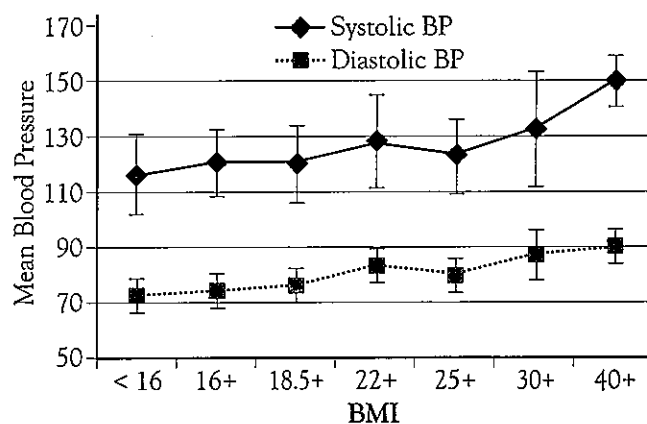


Fig 4. Mean Blood Pressure by BMI

The overall prevalence of hypertension was 33.6%. This finding is similar to that of the national health survey where the prevalence of hypertension among all races was 33% and among Malays 33.5%¹⁰. However, a study done in a rural community in central Malaysia found the prevalence of hypertension to be 26.8%²⁰. A prevalence of 37% was found in a study among railway workers²². In Singapore, there was a decreasing trend in crude prevalence of hypertension among those aged 30 to 69 years from 27.3% in 1998 to 24.9% in 2004²³. The difference in prevalence rate from other rural studies could be explained by the differences between regions of a country as in China where the prevalence rates in the northern regions are higher (33.8%) than that of the southern regions (23.3%) but similar between those living in urban and rural areas²¹.

Prevalence of hypertension was higher among females (36.5%) than among males (30.4%). This was true for both systolic and diastolic hypertension. This finding is lower than that found in a health survey in England¹¹ where the prevalence rate of hypertension was 42.5% in men and 33.3% in women. The findings in our study are similar to the national health survey findings where the prevalence of hypertension among Malay females is 37.1% compared to Malay males 29.9%¹⁰. But our results are different from the finding of a study conducted in rural Malaysia which found males to have higher prevalence²⁰. In China the prevalence of hypertension has been increasing with 43% for male and 36% for female from early 1980s to early 1990s²⁴. The sedentary life style of women in this community could be a reason for the higher prevalence among females and needs to be investigated.

Among those with hypertension, 71.4% were unaware they had hypertension. Again the results are comparable to the national health survey where only a third of hypertensives knew of their status¹⁰. A screening survey in an out-patient department of a hospital in Malaysia found the prevalence of undiagnosed hypertension to be 30%²⁵.

Many studies have found non compliance to treatment and/or inadequate control to be a problem. Similarly in our study, the control of blood pressure of 72.5% of those on treatment was inadequate. The national health survey¹⁰ found only 26% of those who were on treatment achieved adequate control. In this study, females who were on treatment, 87.5% had inadequately controlled blood pressure as compared to 58.6% among males who were on treatment. A study conducted in an out-patient clinic in Malaysia found 55.8% as the non compliance rate and it was associated with age, overall satisfaction and medication barrier like complex regime, cost and effectiveness²⁶. The findings are similar in developed countries. According to the British survey conducted, overall 9.3% of hypertensives had their blood pressure controlled and only 7.4% of men and 10.3% of women had reached the British hypertension society target. The high rate of non compliance in our study is a matter of concern. This could be due to poverty and ignorance as, patients are quite likely to be unaware of the need for life long treatment. The non-compliance of medication especially among the females need to be studied further.

The prevalence of hypertension rises with age in both sexes. Prevalence rises earlier among females. Similarly in the national health survey and the study in rural Malaysia the highest numbers of hypertensives were in the age groups above 60^{10,20}.

Body Mass Index (BMI) is strongly associated with blood pressure¹. Higher BMI has been associated with a higher prevalence of hypertension in all ethnic groups¹³. A nationwide survey in America, groups in the overweight categories had prevalence rates of hypertension 50% to 300% higher than others screened.

In our study, 52.7% of those who were obese were hypertensive, rates being similar for males and females. We also found that the risk of having hypertension when one was obese was three times higher. A study conducted in rural central Malaysia however, found no association between obesity and hypertension²⁰.

The study could not go into the dietary, exercise and other risk factors of the population due to the lack of time and resources. Given the high rates of hypertension there is urgent need to identify other modifiable risk factors.

Rising prevalence of hypertension in a population means that a greater number of persons will need treatment for hypertension. It is also likely that more cardiovascular diseases will need to be treated in the future¹. Thus there is an urgent need for primary prevention by weight control, exercise and reduced salt and alcohol intake.

CONCLUSIONS & RECOMMENDATIONS

The mean blood pressure in the rural community increases in the 41-50 years age group and is sustained to the 61-70 age group. This translates to a high prevalence of hypertension with many unaware of their status. Women tend to show a higher rise in the 41-50 years age group. Those who are overweight or obese have a three time higher risk of developing hypertension.

Based on the findings, we feel that a three pronged strategy is required.

- a) Identify factors influencing non-compliance to treatment, ensure that those who are currently hypertensive are under adequate control and secondary complications are detected early.
- b) Identify risk factors influencing development of hypertension and set up a mechanism for early detection of new cases and provide them with adequate treatment.
- c) Set up a mechanism for primordial prevention of hypertension.

There is urgent need therefore to set up a surveillance system for this important non communicable disease (NCD). The STEPS approach recommended by WHO, needs to be implemented quickly. The pilot project by the Ministry of Health for primary prevention of NCD is a step in the right direction.

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