Mal J Nutr 10(1) : 5-11, 2004

Prevalence of Cardiovascular Risk Factors in a Rural Community in Mukim Dengkil, Selangor

A. Mohd Yunus, M.S. Sherina, M.Z. Nor Afiah, L. Rampal & K.H. Tiew

Department of Community Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

ABSTRACT

Hypertension and obesity are established and independent risk factors for cardiovascular diseases. There are important inter-relationships between these two factors that may explain the aetiology of coronary heart disease. To determine the prevalence of hypertension and obesity in a rural community setting in Malaysia, and to identify their associated factors, a cross-sectional study was conducted among residents aged 15 years and above in *Mukim* Dengkil, Selangor from June to October 1999. Sample size was 570, giving a response rate of 86.7%. Prevalence of hypertension was 26.8%, with the highest prevalence among those aged 60 years and above (57.3%), and 50 to 59 years old (53.3%). Factors found to be significantly associated with hypertension were male (χ^2=4.71, df=1, p<0.05) and age (t=10.7, df=568, p<0.01). Prevalence of obesity was 11.4%, with the highest prevalence among those aged 40 to 49 years (22.7%) and 30 to 39 years (14.4%). The factors associated with obesity were age (p<0.01), female (χ^2=12.45, df=1, p<0.05) and ethnicity (Fisher's Exact probability, p<0.05) with Chinese and Malays having a higher prevalence compared to other ethnic groups. However, there was no significant association between hypertension and obesity (OR=1.14, 95% CI=0.65, 2.02). The prevalence of hypertension and obesity in this study is high. There is a need for prevention programs for these risk factors in rural communities in Malaysia.

INTRODUCTION

Cardiovascular diseases (CVD) are important causes of worldwide preventable morbidity and mortality (Ahmad, 1995; Hennekens, 1998). Many studies have found that two major manifestations of CVD are coronary heart disease (CHD) and stroke (Khoo, Tan & Liew, 1997; Khoo, Tan & Khoo, 1991; Jonas *et al.,* 1992; Teo, Chong & Abdul Rahman, 1998). CHD is by far the major contributor to the overall mortality (Cooper & Schatzkin, 1982). CVD are expected to become a major concern in developing countries (Tatsanavivat *et al.,* 1998). Since the early 1970s, CVD have been the major cause of mortality in Malaysia (Khoo *et al.,* 1997; Khoo, 1996; Khor *et al.,* 1997), with the mortality rates due to CHD still on the rise (Khoo *et al.,* 1991). Based on the increasing mortality rates, Malaysia is facing a major CHD epidemic (Yusoff, 1996).

The most established and independent risk factors of CVD in adults are hypertension and obesity (Hughes *et al.,* 1993; Semenciw *et al.,* 1987; Kanemoto & Hirose, 1988). These factors as well

Correspondence author: Dr. M.S. Sherina, e-mail: sherina@putra.upm.edu.my

as others such as smoking, diabetes mellitus, stress and diet are known modifiable risk factors, whereas age, male sex and positive family history are non-modifiable risk factors. A combination of risk factors has been shown to increase the risk as well as subsequent occurrence of CVD (Wood *et al.,* 1998).

Hypertension is a silent disease. Numerous hypertensive cases are not detected due to a simple lack of routine check-up (WHO MONICA Project, 1989). In addition, the onset of hypertension is insidious and there is an absence of overt symptoms in its early stages (Rimm, Stampfer & Giovannuci, 1995). However, it is a significant and independent risk factor for CHD morbidity and mortality, regardless of age, gender, ethnicity and history of CHD (Gensini, Comeglio & Colella, 1998). Hypertension may also potentially interact with other risk factors to speed up CHD development (Ministry of Health, 1998).

The prevalence of hypertension in Malaysia is between 14.0 to 24.1% (Ministry of Health, 1999). It contributes to more than one-third of premature mortality due to CHD and a greater proportion due to stroke (Ministry of Health, 1999; NHMS2, 1997). It is also an important risk factor for premature mortality in heart and kidney failures (Ministry of Health, 1999).

Obesity is mainly due to a reduction in spontaneous and work-related physical activity, and excessive consumption of foods with high fat content or rich in energy (Wood *et al.,* 1998). Being obese is defined as having a body mass index (BMI) value of 30.0 kg/m^2 or more that may be hazardous to health (WHO MONICA Project, 1989). BMI, waist-to-hip ratio, short stature and gaining of weight starting at the age of 21 are related to an elevated risk of CHD (Rimm *et al.,* 1995). Obesity is closely associated with its biologic effects such as hypertension, diabetes mellitus, hypercholesterolaemia and this association is responsible for an increase in CVD and all-cause mortality (Gensini *et al.,* 1998).

The identification and public intervention of hypertension and obesity are important to reduce the morbidity and mortality rates of CVD. In Malaysia, many studies have been done on CVD risk factors in hospital settings; however there is inadequate published data on CVD risk factors in the community, mainly rural communities. The objective of this study was to determine the prevalence of hypertension and obesity in a rural community setting in Malaysia.

METHODOLOGY

The Malaysian community is divided into rural or urban settings. A rural community can be further divided into small towns and villages depending on the size of the population. This study was conducted in the rural community of *Mukim* Dengkil, which covers an area of 29,400 hectares and consists of 25 villages and a population of 15,414.

This was a cross-sectional study using stratified proportionate systematic random sampling. Five villages were randomly selected. Of the 530 households in the 5 villages, 300 households were selected via proportionate sampling. All residents aged 15 years and above in the selected households were interviewed. Those who refused to participate were excluded from the study.

After obtaining verbal consent, respondents were personally interviewed by one of the authors using a pre-tested and structured questionnaire. The questionnaire included questions on socio-demographic factors (age, gender, ethnicity) and history of self-reported diagnosed hypertension.

For respondents who reported themselves as having hypertension, blood pressure measurements were also taken using an Accoson's mercury sphygmomanometer. The Malaysian Hypertension Consensus Guidelines (Ministry of Health, 1998) on measuring blood pressure was used. The average of two blood pressure measurements was used in the statistical analysis.

The measurements of height and body weight were done with the respondents standing in light garments and barefoot. Height was measured using a seca body meter which was suspended upright against a straight wall. The person to be measured stood underneath the bodymeter before the measuring beam was pushed down to rest on top of the head of the person. The visual display showed the person's height and this was recorded to the nearest tenth of a centimeter. Body weight was measured using a seca weighing scale with an accuracy of 0.5 kilogram (kg). Body Mass Index (BMI) was calculated as weight in kg divided by height in meter squared (m^2). BMI (kg/m^2) is used to determine obesity based on the classification by the Ministry of Health (1999) as shown below.

Table 1. Classification of Body Mass Index (BMI) by the Ministry of Health (1999)

BMI	Category
< 18.5	Underweight
18.5 - <25.0	Normal
25.0 - <30.0	Overweight
≥30.0	Obese

Source: Malaysia Consensus Guidelines on Hyper-lipidaemia, Ministry of Health, Malaysia (1999).

Data was analysed using the Statistical Package for Social Sciences Program version 8.0. Frequency distribution and cross-tabulation were used to determine the prevalence of hypertension and smoking. Further analyses involved using bivariate correlation, odds ratio and linear regression to determine the association between the different variables.

RESULTS

A total of 570 respondents agreed to participate in the study giving a response rate of 86.7%.

Table 2 shows the characteristics of the respondents. The age of the respondents ranged from 15 to 88 years. The mean age was 39.3 years, with a standard deviation of 16.7. 340 (59.6%) were females, and 230 (40.4%) were males. 55.6% were Malays followed by 38.6% Indians, 4.6% Orang Asli and 1.2% Chinese.

Table 2. Socio-demographic profile of the respondents (n=570)

Factors	n	%
Age group		
15-19 years	76	13.3
20-29 years	123	21.6
30-39 years	118	20.7
40-49 years	88	15.4
50-59 years	90	15.8
60 years and above	75	13.2
Gender		
Female	340	59.6
Male	230	40.4
Ethnicity		
Malays	317	55.6
Indians	220	38.6
Chinese	7	1.2
Orang Asli	26	4.6

Prevalence of self-reported diagnosed hypertension

Of the 570 respondents, 153 reported that they have hypertension, giving a prevalence of 26.8%. The mean ages for hypertensives and non-hypertensives were 50.6 ± 15.9 and 35.1 ± 15.0 years, respectively and this result was significant ($t=10.695$, $df=568$, $p<0.01$). There was a significant and direct relationship between hypertension and age ($p<0.01$). A variation of 16.8% in hypertension was explained by age ($r^2=0.168$).

The males (31.7%) had a significantly higher prevalence of hypertension compared to the females (23.5%) ($p<0.05$). There was no significant difference in the prevalence of hypertension among the different ethnic groups (Table 3).

Blood pressure (BP)

The Systolic Blood Pressure (SBP) of the respondents with hypertension ranged from 90 to 233 mmHg respectively, with a mean of 125.3 ± 18.8. The Diastolic Blood Pressure (DBP) ranged from 70 to 120 mmHg with a mean of 79.6 ± 11.8. Of the 153 self-reported hypertensives, 34.4% were controlled (BP < 140/90).

Prevalence of obesity (BMI>30)

The prevalence of obesity was 11.4%. The mean and median of BMI were 23.7 kg/m^2 and 23.2 kg/m^2 , respectively with a SD of 5.2. The BMI of the respondents ranged from 13.3kg/m^2 to 45.7kg/m^2. Obesity prevalence was highest in the 40-49 age-group compared to other age-groups. Obesity also had a higher prevalence among females compared to males, and among the Chinese compared to other ethic groups. (Tables 3).

Association between hypertension and obesity

There was no significant association between hypertension and obesity in this study (OR=1.14, 95% CI=0.65, 2.02). (Table 4)

Table 3. Association of socio demographic factors with hypertension and obesity among the respondents (n=570)

Factors	Self-Reported Diagnosed Hypertension		Obesity (BMI>30)	
	Prevalence (n=153)	p-value	Prevalence (n=65)	p-value
Age group+				
15-19 years	10.5	*p<0.01	1.3	p>0.05
20-29 years	9.8		9.0	
30-39 years	16.1		14.4	
40-49 years	26.1		22.7	
50-59 years	53.3		10.0	
60 years and above	57.3		9.3	
Gender++				
Female	23.5	*p<0.05	14.7	*p<0.05
Male	31.7		6.5	
Ethnicity++				
Malays	23.3	p>0.05	12.0	*p<0.05
Indians	30.5		10.5	
Chinese	57.1		14.3	
Orang Asli	30.8		11.5	

+ t-test
++ chi-square test
* significance (p< 0.05.)

Table 4. Prevalence of hypertension by obesity

Category of BMI	Hypertension	
	Non-Hypertensives (%)	Hypertensives (%)
Non-obese	371 (73.5)	134 (26.5)
Obese	46 (70.8)	19 (29.2)

OR=1.14, 95% CI=0.65, 2.02

DISCUSSION

The overall prevalence of hypertension in this study was 26.8%. This figure corresponds to the report of the 2nd Malaysian National Health and Morbidity Survey (NHMS2, 1997) where the prevalence of hypertension was 24.1%.

In this study, hypertension was found to be significantly higher among females compared to males. Distribution of hypertension across age groups also showed a significant steady increase with age ($p<0.01$), particularly after the 20s age group. The lowest prevalence of hypertension was seen in the youngest age groups of 15–19 years (10.5%) and 20–29 years (9.8%). Hypertension was most prevalent in respondents aged 50–59 years (53.3%) and 60 years and above (57.3%). Hypertension, namely systolic hypertension has been shown to increase steeply with age. Currently, hypertension is the major killer in males aged 45 years and above, and females aged 65 years and above (Hennekens, 1998). This study found that the prevalence of hypertension was significantly higher in males compared to females. This finding is comparable to the Task Force Report by Wood *et al.* (1998). However, this finding differs from the report by the NHMS2, which could be due to the smaller sample size in this study and the difference in the male to female ratio in both studies. There was no significant association between hypertension and ethnicity in this study, which corresponds to the findings of another study done in Malaysia (Kandiah *et al.* 1980). The concern in this study is that only 34.4% of the self-reported hypertensives had normal blood pressure. Further studies need to be done to look into the management and treatment of hypertensives in the Malaysian rural communities.

BMI can indicate and estimate the population-specific risks for non-communicable diseases, including CVD (NHMS2, 1997). The effect of obesity on CVD risk is due to its adverse influence on blood pressure (Wood *et al.,* 1998). In this study, the mean BMI was 23.7 kg/m^2, which means that the majority of the respondents had normal body weight. The overall prevalence of obesity in this study based on the BMI was 11.4%, which is much higher than the report of 4.4% by the NHMS2 (1997). Prevalence of obesity increased with an increase in age-group of respondents with 1.3%, 9.0%, 14.4% and 22.7% for 15-19, 20s, 30s and 40s, respectively. This is comparable to another study that found obesity to increase with age (Diez-Roux *et al.,* 1999). However, it started to decrease with further advances in age-groups from the 50s, 60s to 88 years of age. There was a significantly higher prevalence of obesity in the age group of 40s at 22.7%, compared to the other age-groups ($p<0.01$).

In this study, the prevalence of obesity in females (14.7%) was significantly higher than in males (6.5%) ($p<0.01$). This is comparable with the report by NHMS2 (1997) which also found a higher prevalence of obesity among females. This study also found that obesity was significantly more common among the Malays (12.0%) and Chinese (14.3%), compared to the Indians (10.5%) and Orang Asli (11.5%). However, this finding is not comparable to the NHMS2 (1997) report. The prevalence of obesity among the different ethnic groups in this study may not reflect the true prevalence due to the small representation of respondents among the Chinese (n=26) and Orang Asli (n=7).

Both hypertension and obesity are independent risk factors of CVD. When both are present together, each factor contributes to worsen adverse effects of the other factor (Hughes *et al.,* 1993; Kanemoto & Hirose, 1988). In this study, there was no significant association between hypertension and obesity. Another study in Malaysia found hypertension to be significantly associated with obesity only in older subjects aged 50 – 64 years (Teo & Idris, 1996).

This study is a prevalence study where the characteristics of the affected respondents can be compared to the characteristics of respondents who were not affected. It is primarily useful in the generation of hypothesis, but not in hypothesis testing. The findings of this study can be used as a baseline for future studies done in greater depth.

CONCLUSION

In conclusion, the prevalence of hypertension and obesity in this study were 26.8% and 11.4% respectively. Age and gender were found to be significantly associated with both hypertension and obesity. Ethnicity was significantly associated with obesity, but not with hypertension. There was no significant association between hypertension and obesity in this study.

ACKNOWLEDGEMENT

We thank the Medical Officer of Health, Sepang and all villagers involved in the study for their support and cooperation.

REFERENCES

Ahmad AMM (1995). The health fatal concept in the primary prevention of coronary artery disease. *Singapore Med J* 36:600-605.

Diez-Roux AV, Northridge MN, Morabia A, Basset MT & Shea S (1999). Prevalence and social correlates of cardiovascular disease risk factors in Harlem. *Am J Pub Health* 89:302-307.

Cooper R & Schatzkin A (1982). Recent trends in coronary risk factors in the USSR. *Am J Public Health* 72:431-439.

Gensini GF, Comeglio M & Colella A (1998). Classical risk factors and emerging elements in the risk profile for coronary artery disease. *Eur Heart J* 19:A53-A61.

Hennekens CH (1998). Increasing burden of cardiovascular disease. Current knowledge and future directions for research on risk factors. *Circulation* 97:1095-1102.

Hughes K, Leong WP, Sothy SP, Lun KC & Yeo PP (1993). Relationships between cigarette smoking, blood pressure and serum lipids in the Singapore general population. *Int J Epidemiol* 22:637-643.

Jonas MA, Oates JA, Ockene JK & Hennekens CH (1992). Statement on smoking and cardiovascular disease for health care professionals. *Circulation* 86:1664-1669.

Kandiah N, Lekhraj R, Paranjothy S & Gill AK (1980). A community-based study on the epidemiology of hypertension in Selangor. *Med J Malaysia* 34:211-220.

Kanemoto N & Hirose T (1988). Ischaemic heart disease. *Asian Med J* 31(2):94-102.

Khoo KL, Tan H & Khoo TH (1991). Cardiovascular mortality in Peninsular Malaysia: 1950-1989. *Med J Malaysia* 46:7-20.

Khoo KL, Tan H & Liew YM (1997). Serum lipids and their relationship with other coronary risk factors in health subjects in a city clinic. *Med J Malaysia* 52:38-52.

Khoo KL, Tan H, Sambhi JS, Aljafri AM & Hatijah A (1996). Screening for blood pressure, cholesterol and glucose during National Heart Weeks 1992-1994. *Med J Malaysia* 51:307-315.

Khor GL, Hsu-Hage BH, Sundram K & Wahlqvist ML (1997). Prevalence of coronary risk factors in a sample of Chinese women in Kuala Lumpur. *Med J Malaysia* 52:367-376.

Ministry of Health, Malaysia (1998). Malaysia Consensus Guidelines on Hypertension.

Ministry of Health, Malaysia (1999). Malaysia Consensus Guidelines on Hyperlipidaemia.

NHMS2 Conference (1997). Report of the Second National Health and Morbidity Survey Conference. Hospital Kuala Lumpur, 20-22 November, pp. 71-80,114-125.

Rimm EB, Stampfer MJ & Giovannuci E (1995). Body size and fat distribution as predictors of coronary heart disease among middle-aged and older US men. *Am J Epid* 141:1117-1127.

Semenciw RM, Morrison HI, Mao Y, Jonanseu H, Davies JW & Wigle DT (1987). Major risk factors for cardiovascular disease mortality in adults: Results from the Nutrition Canada Survey cohort. *Int J Epidemiol* 17:317-324.

Tatsanavivat P, Klungboonkrong V, Chirawatkul A, Bhuripanyo K, Manmontri A & Chitanondh H (1998). Prevalence of coronary heart disease and major cardiovascular risk factors in Thailand. *Int J Epidemiol* 27:405-409.

Teo PH, Chong YH & Abdul Rahman MZ (1998). Coronary risk factors among Malaysian male executives in two urban areas. *Med J Malaysia* 43:125-133.

Teo GS & Idris MN (1996). Prevalence of hypertension among Chinese elderly and its relationship to behavioural and nutritional factors. *Med J Malaysia* 51:33-40.

WHO MONICA Project (1989): Risk factors. *Int J Epidemiol* 18:S46-S55.

Wood D, De Becker G, Faergeman O, Graham I, Mancia G & Pyorala K (1998). Task Force Report. Prevention of Coronary heart disease in Clinical practice: Recommendations of the Second Joint Task Force of European and other Societies on Coronary Prevention. *Atherosclerosis* 140:199-270.

Yusoff K (1996). Defining risks and their implications (Editorial). *Med J Malaysia* 51:305-306.