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To Investigate the Relation of Hypertension and Anthropometric Measurement among Elderly in Malaysia

[1]A.L. Latiffah and [2]P. Hanachi
[1]Department of Community Health, Faculty of Medicine and Health Sciences,
University Putra Malaysia, Malaysia
[2]Women Research Center, Department of Biomedical, Alzahra University, Tehran, Iran

Abstract: This study aimed to determine the association between anthropometric measurement and dyslipidemia and their association with hypertension among older people. A cross sectional study was done among the residents in two old folks homes (Rumah Seri Kenangan Cheras and Little Sisters of the Poor) in urban Malaysia using a pre-tested guided questionnaire. Measurements taken were the blood pressure level, height and weight measurement and lipid profile. There were 92 respondents participated in the study. The prevalence of hypertension was 51.1%. The study found significant association between anthropometric measurement and hypertension although there was no difference in waist hip ratio measurement among hypertensive and normotensive individuals. Level of total cholesterol, LDL-C and triglycerides were significantly higher among hypertensive individuals compared to normotensive individuals. The prevalence rate of hypertension among residents in this study is higher compared to the national prevalence rate among the older adults. Appropriate invention programmes should be reinforced to reduce the complications of hypertension especially among institutionalized elderly.

Key words: Anthropometric, hypertension, lipids, aging

INTRODUCTION

Hypertension has challenged the public health around the world because of its high prevalence. It affects 1 billion worldwide (Chobanian, 2003) and 29.9% Malaysian adult aged 30 years and above (NHMS, 1997). Hypertension also act as a risk factor for stroke and coronary heart disease (the leading cause of death in Malaysia) and it is also known as a silent killer. Its numerous cases are not detected as a result of lack of routine check up (Gold and Franks, 1990; Jeyamalar, 1991). Elderly are especially at risk for hypertension and its related morbidity and mortality seeing that ageing is associated with health problem (Latiffah *et al*., 2008). Older people experience physiological and biological decline and they need special management because of higher dependency (Gold and Franks, 1990; Latiffah *et al*., 2005). As age increases, the structure of heart and vessel also experience changes for both men and women. Thus an increase in systolic blood pressure (which were common among older people) sometimes treated as a part of ageing instead of disease (Haslam, 2008). A recent report described associations between overweight and obesity and the prevalence of chronic conditions including high blood pressure and high blood cholesterol levels. Associations between obesity and high blood pressure, high blood cholesterol and low levels of high density lipoprotein-cholesterol (Brown *et al*., 2000) HDL-C) have been shown in men and women and in diverse race/ethnic groups. This study aimed to determine the association between obesity, dyslipidemia and hypertension among older people.

MATERIALS AND METHODS

This cross sectional study was conducted in two old folk's home around the Klang Valley, Malaysia from June to August, 2005. One hundred and sixty one residents of two old folk's homes, 92 were eligible for the study. All subjects were given informed consent thus giving a 100% of response rate. This study consisted of two categories. The first category was a descriptive research involving measurement of blood pressure, biochemical assay in blood sample followed by a brief face to face interview. The second category was a qualitative data to obtain information related to gender, marital and smoking behaviour.

Present study sample was limited to elderly aged 60 and above regardless sex and race, who able to communicate, not ribbed bed or on wheel chair, not

Corresponding Author: Dr. Parichehr Hanachi, Women Research Center, Department of Biomedical, Alzahra University, Tehran, Iran Tel: +989125426316 Fax: +982177498112

demented, no hearing problem. Ethical committee of Faculty Medicine and Health Science, University Putra Malaysia approved this study.

The participants were interviewed in the first half an hour using a pre-tested and structured questionnaire administered by an interviewer to collect information on socio-demographic variables, history of self-reported diagnosis hypertension, dietary habits, history of smoking, stress level and level of awareness. There were 92 respondents participated in the study. At the end of the interview, heights, weights and blood pressure were measured according the NHBP (1993).

Waist circumference was measured in a horizontal plane at the level of natural waist that was the narrowest part of the torso. Hip circumference was measured at the largest protrusion of the buttock without compressing the skin (Lohman *et al*., 1991).

Calculated body mass index (BMI), waist circumference and waist hip ratio (WHR) used as Indicator of obese and risk of co-morbidities (Keys *et al*., 1972; Seidell *et al*., 1990). To determine the cut off point for BMI were measured according the Douketis *et al*. (1999) and WHO recommendation to determine the cut off point for waist circumference and WHR (WHO, 1998). Subject with high risk are those with waist circumference more than 85 cm for male and more than 80 cm for female or WHR more than 0.9 for male and 0.85 for female.

Fasting blood samples were taken to measure the serum lipid and blood glucose according to the standard enzymatic techniques. Cobas Mira Chemistry Analyzer determined the biochemical analyses for lipid profiles and glucose. Classification of the blood serum lipid profiles was based on the National Cholesterol Education Programme (NCEP, 2002). Criteria for individuals with high-risk of hypertension are those with cholesterol level of ≥ 5.2 mmol L^{-1} or LDL-C > 4.13 mmol L^{-1} or triglycerides of ≥ 1.7 mmol L^{-1} or HDL > 1.3 mmol L^{-1} for male and >1.40 mmol L^{-1} for female.

Blood pressure was measured based on recommendation by Malaysian Clinical Practice Guideline (2002). Blood pressure was measured after 30 min rest in the right arm supported on a table at heart level with the patient seated. They were also abstained from smoking or ingested caffeine within that time. Three readings were taken and their mean was recorded as the actual pressure. Hypertension for this study was a systolic pressure of greater than 140 mmHg and or diastolic pressure of above 90 mmHg regardless of age. Isolated systolic hypertension as SBP >140 mmHg and DBP <90 mmHg was also noted (JNC VI, 1997).

Data analysis: All statistical analysis were performed with using SPSS 10.0 (Statistical Package for Social Science). Descriptive statistics including means and SDs for the outcome variables of interest were computed. The probability levels of significance reported was based on the 2-tailed t-test. Correlations test were used to determine the association between hypertension and the different variables.

RESULTS

Population characteristics: Table 1 shows the mean age was 73.49±8.65 years, ranged from 62 to 92 years old. The sample included a greater proportion of male (41.3%) than female (58.7%), widow/widower (56.5) than single (43.5), Chinese (44.6%), Indian (28.3%) and Malay (25.0%). Majority of them never receive any formal education (85.9%) and do not have any source of income (88.0%).

Prevalence of hypertension: Table 2 summarized the findings on the proportion of hypertension based on risk in anthropometric measurement and lipid profile whereas Table 3 provided similar findings based on differences in median or mean. Compared to normal anthropometric measurement, the percentage of hypertension was significantly higher among elderly with high-risk waist circumference (83 vs 17%, $p<0.05$) and WHR (53.2 vs 46.8%, $p<0.05$). Hypertension was also significantly more prevalent among overweight and obese subject compared to normal BMI (68.1 vs 31.9%, $p<0.05$).

The study has found significant association between hypertension and dyslipidemia based on total cholesterol level, LDL-C and triglycerides ($p<0.05$) but not with

Table 1: Socio-demographic characteristics of the respondent (n = 92)

Socio-demographic characteristics	N	(%)
Age	73.49±8.65	
Sex		
Male	38	41.3
Female	54	58.7
Ethnic		
Malay	23	25.0
Chinese	41	44.6
Indian	26	28.3
Others	2	2.2
Marital status		
Single	40	43.5
Widow/er	52	56.5
Education		
Schooling	13	14.1
No schooling	79	85.9
Income status		
Got income	11	12.0
No Income	81	88.0

Data were expressed as Mean±SD

Table 2: Hypertension based on anthropometric measurements and lipid profiles

	Hypertensive (n = 47)		Non hypertensive (n = 45)			
Factors	N	(%)	N	(%)	χ^2	p-value
Waist circumference						
High risk	39	83.0	27	60.0	5.987	0.014*
Normal	8	17.0	18	40.0		
Waist hip ratio						
High risk	25	53.2	14	31.1	4.590	0.032*
Normal	22	46.8	31	68.9		
Body mass index						
High risk	32	68.1	18	40.0	7.309	0.007*
Normal	15	31.9	27	60.0		
Total cholesterol						
Dyslipidemia	29	61.7	11	24.4	12.986	0.000*
Normal	18	38.3	34	75.6		
LDL-C						
Dyslipidemia	14	29.8	2	4.4	10.277	0.001*
Normal	33	70.2	43	95.6		
HDL-C						
Dyslipidemia	21	44.7	27	60.0	2.162	0.141
Normal	26	55.3	18	40.0		
Triglycerides						
Dyslipidemia	21	44.7	5	11.1	12.778	0.000*
Normal	26	55.3	40	88.9		

*p-value is significance if ($p<0.05$) or ($p<0.01$)

Table 3: Mean of anthropometric measurements and lipid profile based on hypertension

Factors	Hypertensive	Normotensive	t-test	p-value
Weight (kg)	57.53±12.20	50.941±2.32	2.578	0.012*
Height (cm)	149.64±11.99	151.65±11.91	-0.807	0.422
Waist circumference	93.64±10.491	85.22±12.57	3.492	0.001*
Hip circumference**	101.00 (13.00)	94.00 (19.00)	681.500	0.003*
Waist hip ratio**	0.94 (0.07)	0.90 (0.08)	846.000	0.098
Body mass index	25.224±0.87	21.765±0.02	3.350	0.001*
Total cholesterol (mmol L^{-1})	5.86±1.50	4.55±1.372	4.387	0.000*
LDL-C** (mmol L^{-1})	3.43 (2.31)	2.55 (1.13)	595.000	0.000*
HDL-C** (mmol L^{-1})	1.26 (0.98)	1.19 (0.62)	868.000	0.139
Triglycerides** (mmol L^{-1})	1.55 (0.86)	1.20 (0.50)	627.500	0.001*
Systolic	159.72±10.38	122.96±13.47	14.697	0.000*
Diastolic	86.32±8.19	72.22±6.66	9.034	0.000*

**Presented in Median (IR) and non-parametric test Mann Withney-U, *p-value is significance if ($p<0.05$) or ($p<0.01$), Data were expressed as Mean±SD

HDL-C ($p = 0.141$) although the percentage of hypertensive individuals was higher among those with normal HDL-C (55.3% vs 44.7%).

Weight, height, waist circumference, BMI and total cholesterol data were normally distributed. Table 3 shows the comparison of anthropometric measurement and lipid profile between hypertensive and normotensive individuals. Hypertensive individuals significantly have higher anthropometric measurement in weight ($p<0.05$), waist circumference ($p<0.001$), hip circumference ($p<0.003$) and BMI ($p<0.001$). Median for WHR was higher among hypertensive individuals compared to normotensive individuals (0.94 vs 0.90 $p = 0.098$).

Based on lipid profile, hypertensive individuals significantly has higher total cholesterol level ($p<0.001$), LDL-C ($p<0.05$) and triglycerides ($p<0.05$) compared to normotensive individuals (Table 3). As mention earlier, the level of HDL-C did not contribute to the prevalence of hypertension despite the fact that the median was higher among the hypertensive individuals compared to the normotensive individuals (1.26 vs 1.19 $p = 0.139$).

DISCUSSION

The prevalence of hypertension in the study was higher compared to Malaysia's National Health and Morbidity Survey II (NHMS II) data (Lim *et al*., 2000; Srinivas *et al*., 1998) data among rural elderly Malaysian. So far, there are no official references in the prevalence of hypertension among elderly in Malaysia. Present study population was not representative to be compared with NHMS II, since only 16 % of population in NHMS II were aged 60 years and above. Other reasons could be due to the smaller sample size and the difference in the male to female ratio in this study.

Previous studied (Woo *et al*., 2002; Olinto *et al*., 2004; Cox *et al*., 1998) found that hypertension, as the antecedent for CVD, was associated with the increasing measurement of anthropometric measurement. This present study also found a positive association between waist circumference and hypertension (Janssen *et al*., 2002; Abolfotouh *et al*., 2001; Sabuncu *et al*., 1999). Cross sectional study does not provide information on the sequence of the risk factor development and cause effect relationship cannot be inferred. However, our findings are consistent with the other cross sectional, prospective, retrospectives and clinical studies that show cardiovascular risk factors are more prevalent among overweight and obese people. According to Yusuf *et al*. (2005) study suggested that abdominal obesity, such waist circumference and waist hip ratio, was better risk indicator for CVD compared to BMI. Waist circumference cut-offs are more sensitive than BMI cut-offs in predicting the risk of CVD (Zhu *et al*., 2005). BMI provides an estimate of weight correction for height while the WHR estimates abdominal fat mass(Gaveler and Rosenblum, 2003). However, we could not provide evidence to suggest that the measurement for waist hip ratio among hypertensive patients were higher compared to the normotensive individuals.

In general, the prevalence of hypertension and high blood cholesterol increase with the increasing of BMI, as does the combined prevalence of both hypertension and dyslipidemia (Brown *et al*., 2000). Our study calculates the association between hypertension and dyslipidemia disregarding BMI. However, the results show that the level of total cholesterol, LDL-C and triglycerides are higher among hypertensive individuals. Lipid abnormalities, which are hypercholesterolemia, high LDL-C level, low HDL-C level and hypertriglyceridemia, are the most important risk factors for atherosclerotic complication of hypertension especially in patients aged older than 65 years (Castelli *et al*., 1986; Carlsson *et al*., 1999). Surprisingly although not statistically significant, the HDL-C level is higher among the hypertensive individuals. This result does not confirm the evidence that HDL-C as a marker for cardiovascular disease (Després *et al*., 2000; Assmann *et al*., 1996; Rubins *et al*., 1995).

CONCLUSION

Prevention of hypertension is important, given that treatment of established hypertension is only partly effective in reducing the associated morbidity and mortality. Primary prevention focusing on efforts to prevent the development of the disease and altering the hypertension risk factors have to be implemented. Secondary prevention should be carried out as well by focusing on slowing the progression of the disease after a diagnosis. Government should increase the public awareness on this establishing disease and the advantages on healthy lifestyle. Screening CVD factors among older adults above 50 years old is an important preventive measure. More research, especially longitudinal research should be carried out on cardiovascular disease especially among institutionalized elderly since research on this field is lacking. We need to do something through further studies to look into the management and treatment of hypertensive in the Malaysian rural and urban communities.

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