Coping styles and lifestyle factors among hypertensive and non-hypertensive subjects

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ABSTRACT

Introduction: The objective of this study was to investigate the relationship between hypertensive patients and their coping style and associated lifestyle factors.

Methods: A total of 502 participants attending nine outpatient clinics completed the validated Bahasa Malaysia version of the Coping Inventory for Stressful Situations and sociodemographic questionnaires. The height, weight, pulse rate and blood pressure of all the participants were measured using standardised methods.

Results: A total of 264 (52.6 percent) participants were hypertensive, while 238 (47.4 percent) were not. Participants with a high task-oriented score showed a significantly lower risk of hypertension compared to those with a low score (odds ratio [OR] 0.546; 95 percent confidence interval [CI] 0.371–0.804). Those with a high emotion-oriented coping score were associated with an increased risk of hypertension (OR 1.691; 95 percent CI 1.107–2.582). Hypertension was also significantly associated with a higher mean body mass index, positive family history of hypertension, history of diabetes mellitus and hypercholesterolaemia. In multiple logistic regression analysis with hypertension status as the dependent variable, a high emotion-oriented coping score, a low task-oriented coping score, age, body mass index, positive family history of hypertension and history of diabetes mellitus remain significant factors in the final model.

Conclusion: These results indicated a significant relationship between hypertension and coping styles and lifestyle factors. They underscored the importance of further study as well as the development and implementation of intervention measures to improve coping skills among hypertensive patients, which may be incorporated into the management of hypertension.

Keywords: coping skills, hypertension, lifestyle factors

INTRODUCTION

Hypertension is an important public health concern worldwide due to its high prevalence and detrimental sequelae.[1,2] Hypertension is as prevalent in the developing countries as it is in the developed world. The estimated total number of people with hypertension in 2000 was 972 million, with 333 million in economically developed countries and 639 million in the developing countries. The number of adults with hypertension in 2025 is predicted to increase by about 60% to a total of 1.56 billion (1.54–1.58 billion).[3] In Malaysia, the prevalence of hypertension among those aged 30 years and above increased from 32.9% in 1996 to 40.5% in 2004.[4] With the increasing lifespan of the population, the prevalence of hypertension will continue to rise if effective preventive measures are not implemented.[5]

Since hypertension plays a central role in the incidence of coronary heart disease and stroke, one of the biggest challenges facing public health authorities and medical practitioners is the optimal control of hypertension worldwide. One of the reasons hypertension is a highly prevalent cardiovascular risk factor globally could be the increasing prevalence of obesity and increasing longevity. Although it has been shown that treating hypertension can prevent cardiovascular diseases as well as prolong and enhance life, this condition is still inadequately managed worldwide. According to the Third National Health and Morbidity Survey 2006, almost two-thirds of Malaysians with hypertension are unaware that they have it. Although there is an increase in the treatment rate among those who had been diagnosed, only 26% of patients on drug treatment had achieved the target blood pressure.[6]

Although it has been shown that lifestyle factors such as obesity, alcohol consumption, sodium and potassium

Table I. Characteristics of the hypertensive and non-hypertensive groups.

Variable	No. (%)		X^2	OR (95% CI)	p-value
	HPT (n = 264)	Non- HPT (n = 238)			
Gender					
Male	155 (57.2)	116 (42.8)	5.01	0.669 (9 0.470, 0.952)	0.025*
Female	109 (47.2)	122 (52.8)			< 0.001
Mean age ± SD (yrs)	51.24 ± 9.02	44.53 ± 9.62		(8.344, 5.074)	< 0.001
History					
Diabetes mellitus					
Yes	87 (68.5)	40 (31.5)	17.29	2.433 (1.589, 3.725)	< 0.001
No	177(47.2)	198 (52.8)			
Hypercholestrolaemia					
Yes	21 (84.0)	4 (16.0)	10.41	5.056 (1.710, 14.950)	0.001**
No	243 (50.9)	234 (49.1)			
Cardiovascular disease					
Yes	9 (75.0)	3 (25.0)	2.48	2.765 (0.740, 10.335)	0.116
No	255 (52.0)	235 (48.0)			
Familial hypertension[†]					
Yes	206 (57.9)	150 (42.1)	14.22	2.120 (1.430, 3.144)	< 0.001
No	57 (39.3)	88 (60.7)			
Smoking					
Yes	28 (40.6)	41 (59.4)	7.26		0.027*
No	201 (53.0)	178 (47.0)			
Ex-smoker	35 (64.8)	19 (35.2)			
Employment status					
Employed	167 (49.7)	169 (50.3)	3.527	0.679 (0.453, 1.018)	0.060
Unemployed	80 (59.3)	55 (40.7)			
Mean SBP ± SD (mmHg)	142.78 ±17.04	122.63 ± 9.12		(22.521, 17.787)	< 0.001
Mean DBP ± SD (mmHg)	87.08 ± 9.24	75.85 ± 7.25		(12.678, 9.776)	< 0.001
Mean BMI ± SD (kg/m²)	27.81 ± 4.15	25.59 ± 4.04		(2.944, 1.493)	< 0.001
Mean coping strategy ± SD					
Task-oriented	49.05 ± 11.35	51.46 ± 11.15		(0.43163, 4.38585)	0.017*
Emotion-oriented	52.30 ± 9.61	51.2 ± 9.92		(−2.72235, 0.70452)	0.248
Avoidance-oriented	57.73 ± 10.08	57.89 ± 10.96		(−1.67326, 2.01703)	0.855
Distraction-oriented	57.25 ± 10.24	56.79 ± 10.49		(−2.27500, 1.36407)	0.623
Social diversion-oriented	53.90 ± 9.99	54.23 ± 9.67		(−1.40293, 2.05369	0.712

Independent t-test was used for continuous variables and X^2 test for categorical variables.
* $p < 0.05$; ** $p < 0.01$
† 1 participant did not respond.
HPT: hypertensive group; Non-HPT: non-hypertensive group; OR: odds ratio; CI: confidence interval; SBP: systolic blood pressure
DBP: diastolic blood pressure; SD: standard deviation

intake and physical inactivity are associated with hypertension, the role of psychosocial stressors is still unclear. Few studies have demonstrated that exposure and cardiovascular responses to stress may interact to predict the development of hypertension and atherosclerosis. The role of coping mechanisms in the relationship between external stressors, personality factors, lifestyle factors and blood pressure levels has not been adequately studied.[7] In this study, we investigated whether individual differences in the use of coping processes are associated with hypertension. We hypothesised that the use of certain coping styles may affect blood pressure.

METHODS

This was a cross-sectional study involving 600 randomly selected participants aged > 30 years who attended nine outpatient clinics in Klang Valley, Malaysia. Informed consent was obtained after the participants had been briefed on the study. This study was approved by the faculty ethics committee.

Participants who gave their consent were provided with self-administered questionnaires in Bahasa Malaysia to be completed. The first part of the questionnaire assessed the sociodemographic and health characteristics (age, gender, ethnicity, marital status, employment status, education level, and past medical, smoking and family history). The second part of the questionnaire was the validated Bahasa Malaysia version of the Coping Inventory for Stressful Situations (CISS) questionnaire, which was used to assess coping styles.[8,9] This is a self-report measure containing a 48-item multidimensional measure of coping styles, which assessed the task-oriented (16 items), emotion-

Table II. Correlation matrix of the observed variables.

Variable		2	3	4	5	6	7	8	9
1	SBP	0.663**	0.176**	0.342**	−0.068	0.078	−0.034	−0.014	−0.105*
2	DBP		0.235**	0.137**	−0.140**	0.134**	−0.022	0.067	−0.161**
3	BMI			−0.001	−0.007	−0.014	−0.014	0.008	−0.004
4	Age				−0.034	−0.044	−0.052	−0.091*	−0.029
5	Task-oriented score					0.081	0.371**	0.160	0.537**
6	Emotion-oriented score						0.360**	0.483	0.097*
7	Avoidance-oriented score							0.877**	0.757**
8	Distraction-oriented score								0.456**
9	Social diversion-oriented score								

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
SBP: systolic blood pressure; DBP: diastolic blood pressure; BMI: body mass index

oriented (16 items) and avoidance-oriented (16 items) components of coping. The Cronbach's alpha values were 0.91, 0.89 and 0.85 for task-, emotion- and avoidance-oriented components, respectively.[8] Avoidance-oriented coping was assessed as components of social diversion (five items) and distraction (eight items). The respondents were asked to indicate the extent of their engagement in certain types of activities when they encounter a difficult, stressful or upsetting situation by circling a number from 1 (not at all) to 5 (very much). The raw scores of the CISS were obtained by summing up the scores for the three main coping scales (task, emotion and avoidance) in addition to the two avoidance subscales (distraction and social diversion).

The raw scores were then entered into the appropriate column in the profile form, which gave the corresponding T-scores and percentiles. The higher the test scores for any one of the five subscales, the greater the degree of coping activity on the corresponding coping dimensions. The mean T-score was 50 ± 10. For the purpose of categorisation, a score ≥ 45 was assigned to the high-coping category while a score < 45 was assigned to the low-coping category for any particular coping scale. The third part of the questionnaire covered questions about perceived stress. Stress was defined as a feeling of tension, irritability or anxiety, or having sleeping difficulties due to conditions at work or at home.[10] We assessed perceived stress using three single-item questions relating to stress at work and at home, and financial stress. Participants were specifically asked to report how often they felt stress in these three situations in the last 12 months, using the following response options: never; sometimes; several periods; and permanent stress. The questions were adapted from the INTERHEART study by Rosengren et al.[10]

The height, weight, pulse rate and blood pressure (BP) of participants were assessed. Three seated BP

Table III. Perceived stress by hypertension status.

Type of stress	No. (%)		X²	p-value
	HPT	Non-HPT		
Stress at home (n = 500)			3.566	0.312
Never	53 (10.6)	36 (7.2)		
Sometimes	165 (33.0)	167 (33.4)		
Several periods	43 (8.6)	33 (6.6)		
Permanent stress	2 (0.4)	1 (0.2)		
Stress at work (n = 324)			6.35	0.096
Never	22 (6.8)	13 (4.0)		
Sometimes	107 (33.1)	127 (39.2)		
Several periods	28 (8.6)	22 (6.8)		
Permanent stress	1 (0.3)	4 (1.2)		
Financial stress (n = 499)			9.239	0.055
Never	75 (15.0)	61 (12.3)		
Sometimes	101 (20.2)	91 (18.3)		
Several periods	83 (16.6)	71 (14.2)		
Permanent stress	3 (0.6)	14 (2.8)		

HPT: hypertensive group; Non-HPT: non-hypertensive group

readings were taken using a validated Omron T5 (HEM-762) (Omron Healthcare Co Ltd, Kyoto, Japan) automated blood pressure set after the participants had rested for at least five minutes. The average BP was recorded. The body mass index (BMI) was calculated as weight (kg) divided by the square of height (m^2). Hypertension was defined as mean systolic blood pressure (SBP) ≥ 140 mmHg, and/or mean diastolic blood pressure (DBP) ≥ 90 mmHg, and/or currently on treatment with antihypertensive medication.[2]

Data analysis was performed using the Statistical Package for Social Sciences version 12.01 (SPSS Inc, Chicago, IL, USA). We calculated the mean and standard deviation in order to summarise the continuous effects and compared them using the t-test, or other appropriate non-parametric tests when distributional assumptions were in doubt. Chi-square test was used for analysing categorical data. All statistical tests of hypotheses were two-sided. A p-value < 0.05 was considered to be statistically

Table IV. Coping styles according to hypertension status.

Type of coping styles	No. (%)		X²	OR (95% CI)	p-value
	HPT	Non-HPT			
Task-oriented					
High	166 (48.0)	180 (52.0)	9.502	0.546 (0.371, 0.804)	0.002**
Low	98 (62.8)	58 (37.2)			
Emotion-oriented					
High	216 (55.5)	173 (44.5)	5.980	1.691 (1.107, 2.582)	0.014*
Low	48 (42.5)	65 (57.5)			
Avoidance-oriented					
High	243 (53.6)	210 (46.4)	2.063	1.543 (0.851, 2.798)	0.151
Low	21 (42.9)	28 (57.1)			
Distraction-oriented					
High	236 (53.9)	202 (46.1)	2.299	1.502 (0.886, 2.548)	0.129
Low	28 (43.8)	36 (56.3)			
Social diversion-oriented					
High	209 (51.5)	197 (48.5)	1.053	0.791 (0.505, 1.239)	0.305
Low	55 (57.3)	41 (42.7)			

* p < 0.05; ** p < 0.005
HPT: hypertensive group; Non-HPT: non-hypertensive group; OR: odds ratio; CI: confidence interval

significant. Logistic regression analysis was used to determine the factors associated with hypertension status and to control for confounders. Simple logistic regression for each independent variable was conducted, followed by the building of the preliminary main-effect models using both forward and backward stepwise variable selection procedures with log-likelihood ratio (LR) test. All possible two-way interactions were checked using the LR test. Multicollinearity problems were identified by fitting the data into a multiple linear regression model and obtaining the variance inflation-factors. The final preliminary model was then checked for model fitness using the Hosmer-Lemeshow goodness-of-fit statistics. Using the reasonably fit model, the results were interpreted.

RESULTS

Out of 600 randomly selected participants, 502 consented to participate in the study, giving a response rate of 83.7%. 271 (54%) were male and 231 (46%) were female. The mean age of the participants was 48.1 ± 9.9 (range 30–83) years. The majority of the respondents were Malay (78.0%), followed by Chinese (11.0%), Indian (10.2%) and other races (0.8%). Most of the respondents had secondary school education (61.4%), followed by university education (15.5%), primary school education (12.1%) and college education (11.0%). A total of 196 (39.0%) respondents reported a history of hypertension, 127 (25.3%) reported a history of diabetes mellitus, 25 (5%) reported hypercholesterolaemia and 12 (2.4%) reported cardiovascular disease. Only 69 (13.7%) participants were smokers, 54 (10.8%) were ex-smokers

and 379 (75.5%) were non-smokers. The mean SBP was 133.23 ± 17.13 mmHg, while the DBP was 81.75 ± 10.06 mmHg. The mean BMI was 26.76 ± 4.25 kg/m².

Table I shows that 264 (52.6%) participants were hypertensive, of which 155 (58.7%) were male and 109 (41.3%) were female. The mean age of those with hypertension was significantly higher (51.24 ± 9.02 years) compared to those who were non-hypertensive (44.53 ± 9.62 years, p < 0.0001). Furthermore, respondents with a history of diabetes mellitus (odds ratio [OR] 2.433, 95% confidence interval [CI] 1.589–3.725, p < 0.001), family history of hypertension (OR 2.120, 95% CI 1.430–3.144, p < 0.001) and history of hypercholesterolaemia (OR 5.056, 95% CI 1.710–14.950, p < 0.001) were found to have hypertension. There was no significant association between employment status and hypertension. The mean SBP, DPB and BMI were significantly higher among the hypertensive participants compared to those who were non-hypertensive (p < 0.001). The mean task-oriented coping score among the hypertensive group was significantly lower compared to that among the non-hypertensive group (p < 0.05).

Table II presents the results of the bivariate correlational analyses applied to the whole sample. SBP was positively correlated with BMI (r = 0.176, p < 0.001) and age (r = 0.342, p < 0.001) but negatively correlated with social diversion coping score (r = –0.105, p < 0.05). There were positive associations between DBP and BMI (r = 0.235, p < 0.001), age (r = 0.137, p < 0.01), emotion coping score (r = 0.134, p < 0.01), but negative correlations with task coping score (r = –0.140, p < 0.01) and social diversion coping score (r = –0.161, p < 0.001).

Table V. Factors associated with hypertension status[1] (variables which were significant in the final model) using simple and multiple logistic regression analyses.

Variable	Crude OR (95% CI)	p-value[2]	Adj OR (95% CI)	p-value[2]
Age (yrs)				
≥ 40	7.732 (4.476, 13.359)	< 0.001	5.801 (3.257, 10.332)	< 0.001
< 40	1.0		1.0	
BMI (kg/m²)				
≥ 25	2.611 (1.804, 3.779)	< 0.001	2.286 (1.508, 3.465)	< 0.001
< 25	1.0		1.0	
Family history of hypertension				
Yes	2.120 (1.430, 3.144)	< 0.001	2.221 (1.418, 3.478)	0.002
No	1.0		1.0	
History of diabetes mellitus				
Yes	2.433 (1.589, 3.725)	< 0.001	1.746 (1.088, 2.804)	0.021
No	1.0		1.0	
Task-oriented coping				
High	0.546 (0.371, 0.804)	0.002	0.530 (0.342, 0.823)	0.005
Low	1.0		1.0	
Emotion-oriented coping				
High	1.691 (1.107, 2.582)	0.015	1.831 (1.128, 2.974)	0.014
Low	1.0		1.0	

[1] Dependent variables as hypertension status: Non hypertensive = 0; hypertensive = 1
[2] Likelihood ratio test
Adj: adjusted; CI: confidence interval; OR: odds ratio; BMI: body mass index

Table III shows the participants' experience of home, work and financial stress. There was no significant difference of perceived stress between the hypertensive and the non-hypertensive groups. The relationship between different types of coping styles and hypertension is shown in Table IV. The group with a high task-oriented score showed a significantly lower risk of hypertension compared to the group with a low task score (OR 0.546; 95% CI 0.371–0.804, p < 0.005), while a high emotion-oriented coping score was associated with an increased risk of hypertension (OR 1.691; 95% CI 1.107–2.582, p < 0.05). There were no significant differences between the two groups for the other coping categories.

The summary results of the simple and multiple logistic regression analyses of the factors significantly associated with hypertension status are shown in Table V. Age, gender, BMI, a positive family history of hypertension, task-oriented coping, emotion-oriented coping, smoking, a history of diabetes mellitus and a history of hypercholesterolaemia were significant factors using simple logistic regression analysis. However, in the multiple logistic regression analysis with hypertension status as the dependent variable, high emotion-oriented coping score, low task-oriented coping score, age, BMI, a positive family history of hypertension and a history of diabetes mellitus remain significant factors in the final model. There was no significant two-way interaction or multicollinearity problem (variance-inflation factor of 1.019–1.069). The model was reasonably fit, according to Hosmer-Lameshow goodness-of-fit test (p = 0.807).

DISCUSSION

Hypertension is a non-communicable disease that is lifestyle-related and is a major modifiable risk factor for cardiovascular and kidney disease. The high prevalence of hypertension worldwide has contributed to the present pandemic of cardiovascular disease. In our study, we found significant differences in coping styles and lifestyle factors between hypertensive and non-hypertensive groups. We have shown that the group with a high task-oriented coping score showed a significantly lower risk of hypertension than the group with a low task-oriented coping score. On the other hand, a high emotion-oriented coping score was associated with an increased risk of hypertension. These findings could be explained by the fact that a task-oriented coping style is considered to be a well adaptive and functional coping style. According to Endler and Parker, task-oriented coping refers to purposeful efforts to solve a problem, cognitive restructuring of the problem or attempts to alter the situation.[9] Those who adopted task-oriented coping were able to adapt well and to effectively reduce their stress or anxiety level. This indirectly lowered their BP. The incorporation of task-oriented coping skills may likely be helpful for the prevention of hypertension. However, in emotional-oriented coping, although the aim is to reduce stress, this is not always successful. In fact, it might even result in increased stress in some cases. This implies that those who scored high on emotion-oriented coping might benefit from counselling strategies that utilise cognitive-behavioural therapies to provide insights into why emotions are never the best way to solve

stressful problems. Further research (both qualitative and quantitative) needs to be conducted to provide insights into the reasons behind the different preferences of coping styles between the two groups.

In addition, SBP had a positive correlation with BMI and age, but a negative correlation with social diversion coping score. There were positive associations between DBP and BMI, age and emotion coping score, but a negative correlation with task coping and social diversion coping scores. These findings are consistent with a previous study that reported a significant relationship between BP and stress coping styles instead of only work stress.[11] Furthermore, analyses between participants in the hypertensive and non-hypertensive group revealed that the former was associated with a higher mean BMI, a positive family history of hypertension and a history of diabetes mellitus and hypercholesterolaemia. Past studies have shown that all these risk factors are associated with hypertension.

The results of our study highlight the importance of the need for more research in this area and the development of effective behavioural or non-pharmacological strategies for the prevention and management of hypertension. This is in line with the World Health Organization recommendation that lifestyle measures for reducing hypertension include the cessation of smoking, weight loss, limiting alcohol consumption, reducing salt intake, making healthier food choices, regular exercise and learning to cope with stress.[12]

There are a number of limitations in this study. Firstly, the cross-sectional design of this study, although cost-effective and convenient, precludes the determination of causality. Nonetheless, this was an important first step in exploring the relationship between hypertension and lifestyle factors, before more definitive prospective studies can be conducted. The second limitation is the issue of generalisation of the findings to the general population, since the participants were selected from outpatient clinics. It would be prudent to repeat this study among the general population. Lastly, the CISS instrument did not measure spiritual and religious means of coping as well as "maladaptive" or negative coping strategies such as alcohol, drug abuse or binge eating, which might also be associated with hypertension. Despite these limitations, the findings of this study are useful for future research in this area.

In conclusion, these results indicate that a significant relationship between hypertension and coping styles exists. This underscores the importance of further study into this area and the need for development and implementation of intervention measures to improve coping skills among hypertensive patients, which may be incorporated into the management of hypertension.

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