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Health-promoting behaviors among hypertensive adult patients with and without comorbidities in Indonesia: a cross-sectional study†

Original Article

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Abstract: **Objective:** The aim of this study was to evaluate health-promoting behaviors among hypertensive patients with and without comorbidities.
Methods: A cross-sectional study using multistage cluster sampling in Indonesia was applied. The health-promoting behaviors were assessed using Health-Promoting Lifestyle Profile 2 and analyzed using independent *t*-test, point-biserial correlation, and logistic regression.
Results: A total of 116 participants joined this study. The score of health-promoting behaviors in adults with and without hypertension was 2.90 and 2.79, respectively. Hypertensive patients with comorbidities had significantly higher results than those without comorbidities, with the following results for the considered subscales: total score (t = -2.00, P = 0.047); health responsibility (t = -3.46, P = 0.001); and nutrition (t = -2.82, P = 0.006). Positive correlations were found between health responsibility (r_{pb} = 0.260, $P < 0.01$), nutrition (r_{pb} = 0.255, $P < 0.01$), and health-promoting behaviors (r_{pb} = 0.185, $P < 0.05$) and the existing comorbidity. Only gender indicated a significant outcome for the existing comorbidity in hypertensive patients (odds ratio = 4.314, P = 0.027, 95% confidence interval = 1.185–15.706).
Conclusions: Hypertensive patients with comorbidities showed higher engagement in health-promoting behaviors and the male gender was a significant predictor for existing comorbidity among patients with hypertension.

Keywords: *behavior • comorbidity • health behaviors • health-promoting behavior • hypertension*

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1. Introduction

Health-promoting behaviors are beneficial for improving health because they reduce comorbidities associated with an illness, maintaining a healthy state for an individual.[1] They are important for adults, especially those who have chronic diseases, because they constitute the main strategy for maintaining and improving health as well as the quality of life.[2] The dimensions of health-promoting behaviors include health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationship, and stress management.[3]

Health-promoting behaviors have been recognized as a basic way to maintain health for sufferers of chronic diseases, such as hypertension, which is characterized by an increase in systolic blood pressure above 140 mmHg and diastolic blood pressure above 90 mmHg.[4,5] The results of basic health research in 2013 showed that the prevalence of hypertension in Indonesia reached 9.4%.[6]

Hypertension can be prevented and controlled by health-promoting behaviors that include physical activity, spiritual growth, health responsibility, interpersonal relationship, nutrition, and stress management.[7] Therefore, this research is important because health-promoting behaviors are very necessary for maintaining and improving the health of hypertensive adult patients with and without comorbidities. In addition, the prevalence of hypertension in Indonesia is quite high. The practice of health-promoting behaviors by hypertensive patients with and without comorbidities is expected to become a benchmark for the public in promoting better health.

Currently, no study has been conducted to investigate the health-promoting behaviors of hypertensive patients with and without comorbidities in Indonesia. This information is important to decide specific behavioral action (i.e., physical activity, dietary regimen, etc.) needed for improvement in health, in patients both with and without comorbidities. The aim of this research was to determine the health-promoting behaviors among hypertensive adults with and without comorbidities in Indonesia. Furthermore, the authors aim to identify predictive factors for the existing comorbidity among hypertensive patients.

2. Methods

2.1. Design and samples

This research was a cross-sectional study that used multistage cluster samples as the data collection technique. The sample was selected through several stages. In the first stage, we decided—using random lotteries—which area among the five villages in Mlati District, Yogyakarta (Indonesia), would be included. The village Sumberadi was chosen randomly. In the next step, researchers applied consecutive sampling using the inclusion and exclusion criteria for selection throughout the Sumberadi village area. We defined the inclusion criteria as follows: people living with hypertension, adults (age ≥18 years), registered as the residents of Mlati District, and willing to join the study voluntarily. All participants who had current cognitive, mental, and motor disorders were not included.

The researchers used a Lemeshow formula[8] to calculate the sample size, $z\alpha^2PQ/d^2$. The value of α was determined by 5% ($z\alpha^2 = 1.96$), proportion 0.5, and precision 10%. The total sample required 96 participants, and we added 10% more to avoid the missing data during data collection. A minimum of 107 participants were required for this study.

2.2. Variables

The variables in this study were health-promoting behaviors, and these were measured using the Indonesian version of the Health-Promoting Lifestyle Profile 2. The questionnaire was tested for validity (content validity index [CVI]: 0.83–0.96) and reliability (Cronbach's alpha = 0.81) before data collection.[9] The questionnaire consisted of 52 questions with 4-point responses, and the possible ranges of scores were between 52 and 208. It had 6 domains; health responsibility (9 items), physical activity (8 items), nutrition (9 items), spiritual growth (9 items), interpersonal relationship (9 items), and stress management (8 items); there was no negative or reverse scoring. To get the interpretation, the total and domain scores were accumulated and then divided by the total number of items. The final scores were 1–4 for the total and for each domain. A high score indicated higher health-promoting behaviors. For each domain, a higher score also indicated higher health promotion on specific (i.e., physical activity, health responsibility) behavior.[3]

In addition, demographic characteristics, such as gender, age, type of hypertension, smoking history, education level, and employment status, were also listed in the questionnaire, along with the respective blood pressure measurements. Blood pressure was assessed using an aneroid sphygmomanometer at least twice, after the participant agreed to participation and after filling the questionnaire. The average score was calculated for each report. A comorbidity was noted when participants reported other existing diseases beside hypertension, such as diabetes, heart failure, stroke, and coronary heart diseases.[10]

2.3. Data collection procedure

All the researchers followed the 1-day structural training about the research project and data collection procedure. The study was started after coordination and permission from the local government in Mlati District and the head of the village. Information about potential patients with hypertension was collected from the Public Health Care unit of Mlati. The researchers received a list of hypertensive patients, their addresses, and contact numbers from the public health care unit. Hypertension was identified when the systolic blood pressure was ≥140 mmHg and/or the diastolic blood pressure was ≥90 mmHg (from the average of two previous records of blood pressure).[11] Researchers approached the participants by home visit. If the participants were dead or had moved to another region, researchers deleted them from the list of participants. All eligible participants received brief information about the research purpose, procedure, and how they can participate. Participants who agreed to join received an informed consent form, which they signed. The researchers checked the blood pressure and asked the participants to fill in demographic data, existing comorbidities, and Health-Promoting Lifestyle Profile 2. After completing the questionnaire, the researchers rechecked the blood pressure, with minimum duration after the first measurement being 10 min. If the participants completed the questionnaire in <10 min, researchers waited for 10 min and then checked the blood pressure. The authors used the same package of digital sphygmomanometer. Before data collection, the tools were calibrated to ensure the outcomes. All the researchers were familiar and well-trained personnel. During the period of data collection, the principal investigator (ALW) supervised the process and required the researchers to weekly report the input data using the available research logbook. The barriers were discussed, when they occurred, to maintain the similar procedure for all participants. The data collection procedure was completed when all data were gained from the participants.

2.4. Data analysis

To answer the research questions, researchers conducted univariate, bivariate, and multivariate analyses. Univariate analysis was completed to describe both the characteristics of the respondents and their health-promoting behaviors using descriptive statistics. A bivariate analysis by using independent-sample *t*-test was conducted to determine the differences in health-promoting behaviors among hypertensive patients with and without comorbidities. The point-biserial correlation assessed the strength and magnitude to check the association between an existing comorbidity and health-promoting behaviors among patients with hypertension. Logistic regression was applied as a multivariate analysis to determine the adjusted odds ratio for predicting the existing comorbidities among hypertensive patients. All analyses used a significance level of P value < 0.05.

2.5. Ethical issue

The study received ethical approval from the institutional review board (No. KE/FK/0650/EC/2017). All steps of the research comply with the ethical consideration of the Declaration of Helsinki. Respondents received research explanation and free access for participation. If they agreed, respondents signed informed consent to start participation. Only the research team could access the data.

3. Results

A total of 125 participants were invited, and only 116 persons agreed to participate. Females (63.8%), unemployed (62.1%), and nonsmokers (85.3%) in the age range between 55 years and 74 years made up the pool of participants. More than 70% of participants were living without comorbidity. The average systolic and diastolic blood pressures were 159.65 ± 2.37 mmHg and 90.53 ± 1.28 mmHg, respectively (Table 1).

The total scores of health-promoting behaviors were significantly different (t = –2.00, M ± SE = 2.79 ± 0.34, 95% confidence interval [CI] = 0.277 to –0.001, P = 0.047) between hypertensive patients with and those without hypertension. It corresponded with the health responsibility (t = –3.46, M ± SE = 2.68 ± 0.66, 95% CI = –0.600 to –0.162, P = 0.001) and nutrition (t = –2.82, M ± SE = 2.45 ± 0.43, 95% CI = –0.413 to –0.072, P = 0.006) domains. For both groups, interpersonal relationship (M ± SE = 3.19 ± 0.48) and physical activity (M ± SE = 2.34 ± 0.69) indicated the highest and lowest scores, respectively, among other domains (Table 2).

The correlation results between health-promoting behaviors and existing comorbidity among patients with hypertension were examined. There were positive correlations (Table 3) between health responsibility (r_{pb} = 0.260, $P < 0.01$), nutrition (r_{pb} = 0.255, $P < 0.01$), and health-promoting behaviors (r_{pb} = 0.185, $P < 0.05$) and the existing comorbidities among patients with hypertension.

The logistic regression assisted in identitying the odds ratio and the 95% CI of existing comorbidity among patients with hypertension. We applied a stepwise mode for the regression. From the logistic regression outcomes, we found that only gender indicated a significant result. The existence of comorbidity in male hypertensive patients had an odds ratio four times higher

(P = 0.027, Wald χ^2 = 4.918, 95% CI = 1.185–15.706) than among females (Table 4).

4. Discussion

The total score of health-promoting behaviors in people with hypertension in Indonesia was 2.79 out of 4.0. The health-promoting behavior scores in hypertensive patients with and without comorbidities were 2.90 and 2.76, respectively. On a scale of 1–4, the higher the score obtained, the better are the health-promoting behaviors. The scores were >2.50 and tended to reach the highest score of 4.0. The mean score of each subscale was >2, and this result was in accordance with the findings of several studies on health-promoting behaviors in patients with chronic diseases.[12] This indicated that hypertensive patients had a higher score and better engagement with health-promoting behaviors.[3] The score of health-promoting behavior in hypertensive patients with comorbidities was significantly higher, especially on the subscales of health responsibility (P = 0.001) and nutrition (P = 0.006). This study highlighted that hypertensive patients with existing comorbidities had better engagement in health-promoting behaviors compared with hypertensive patients without comorbidity.

The interpersonal relationship and spiritual growth subscales obtained the highest total scores compared with other subscales (with total scores >3), while physical activity had the lowest score. This result was also found in a study of women who had no history of coronary heart disease; however, nearly half of the sample (48%) had a history of hypertension.[13] The kinship influence of Indonesian culture and perspective is dominant, and it is one of the contributing factors to the high score on the interpersonal relationship subscale. Furthermore, the high score of the spiritual growth subscale was related to the culture, beliefs, and values among the Indonesian population.[13,14] The physical activity subscale ranked the lowest, similar to the results of previous research.[12–15] Most of the participants experienced a barrier to performing regular exercise and engaging in adequate physical activity with moderate intensity due to their housework duties. Two third of the participants were females and unemployed, but they performed the role of housewife. Another reason was the lack of motivation to plan and do exercise. The female participants indicated that they did not have adequate time for regular exercise because of household duties. It resulted in low interest

Characteristics	N, (M ± SE)	%
Gender		
Male	42	36.2
Female	74	63.8
Age (years)		
35–54	36	31.0
55–74	71	61.2
>74	9	7.8
Level of education		
Low	59	50.9
Intermediate	52	44.8
High	5	4.3
Employment status		
Yes	44	37.9
No	72	62.1
Smoking history		
Yes	17	14.7
No	99	85.3
The presence of existing comorbidity		
Yes	33	28.4
No	83	71.6
Blood pressure, mmHg (M ± SE)		
Systolic blood pressure	159.65 ± 2.37	
Diastolic blood pressure	90.53 ± 1.28	

Note: M, mean; SE, standard error.

Table 1. The characteristics of respondents (N = 116).

Subscale	M	SD	HT+ (N = 33)	HT– (N = 83)	*t*-test	Sig.	95% Confidence interval
Interpersonal relationship	3.19	0.48	3.17	3.21	0.376	0.707	–0.161 to 0.236
Spiritual growth	3.07	0.49	3.04	3.09	0.459	0.647	–0.154 to 0.247
Stress management	2.99	0.47	3.08	2.96	–1.15	0.251	–0.308 to 0.081
Health responsibility	2.68	0.66	2.96	2.58	–3.46	0.001**	–0.600 to –0.162
Nutrition	2.45	0.43	2.63	2.39	–2.82	0.006**	–0.413 to –0.072
Physical activity	2.34	0.69	2.48	2.29	–1.32	0.188	–0.469 to 0.093
Total	2.79	0.34	2.90	2.76	–2.00	0.047*	–0.277 to –0.001

Note: HT+, hypertension with comorbidities; HT–, hypertension without comorbidities; M, mean; SD, standard deviation; Sig., significance level.
*P < 0.05, **P < 0.01.

Table 2. Scores of health-promoting behaviors among adult hypertensive patients with and without comorbidities (N = 116).

Variable	1	2	3	4	5	6	7	8
1. Existing comorbidity	1							
2. Health responsibility	0.260**	1						
3. Physical activity	0.123	0.395**	1					
4. Nutrition	0.255**	0.430**	0.401**	1				
5. Spiritual growth	–0.043	0.080	0.215*	0.049	1			
6. Interpersonal relationship	–0.035	0.203*	0.261**	0.130	0.633**	1		
7. Stress management	0.107	0.271**	0.233*	0.151	0.355**	0.363**	1	
8. Health-promoting behaviors	0.185*	0.680**	0.698**	0.563**	0.584**	0.658**	0.588**	1

Note: *$P < 0.05$, **$P < 0.01$.

Table 3. The association between health-promoting behaviors and existing comorbidity among patients with hypertension (N = 116).

Variable(s)	B	SE	Wald	df	Sig.	Exp (B)	95% CI for Exp (B)	
							Lower	Upper
Health responsibility	0.370	0.549	0.454	1	0.501	1.448	0.493	4.247
Physical activity	0.198	0.445	0.197	1	0.657	1.219	0.509	2.917
Nutrition	1.153	0.812	2.016	1	0.156	3.166	0.645	15.543
Spiritual growth	−1.108	0.835	1.761	1	0.185	0.330	0.064	1.697
Interpersonal relationship	−0.036	0.838	0.002	1	0.966	0.965	0.187	4.987
Stress management	0.581	0.730	0.633	1	0.426	1.787	0.428	7.471
Gender	1.462	0.659	4.918	1	0.027*	4.314	1.185	15.706
Age	−0.007	0.034	0.047	1	0.828	0.993	0.929	1.060
Employment	0.457	0.652	0.492	1	0.483	1.580	0.440	5.669
Smoking	−2.376	1.274	3.474	1	0.062	0.093	0.008	1.130
Systolic blood pressure	−0.032	0.019	7.700	1	0.100	0.969	0.933	1.006
Diastolic blood pressure	−0.008	0.029	0.083	1	0.773	0.992	0.936	1.050
Cholesterol	0.004	0.005	0.585	1	0.444	1.004	0.994	1.014
Body mass index	−0.033	0.072	0.208	1	0.648	0.968	0.840	1.115
Constant	1.888	4.614	0.167	1	0.682	6.604		

Note: B, beta; CI, confidence interval; df, degree of freedom; Exp (B), adjusted beta; SE, standard error; Sig., significance level.
*$P < 0.05$.

Table 4. Logistic regression outcomes for existing comorbidities among hypertensive patients (N = 116).

and decreased their motivation for doing physical activity. Previous studies found that the level of physical activity was influenced by a person's motivation.[14,16]

Health-promoting behaviors among hypertensive patients with comorbidities were significantly different—relatively higher—than among patients without comorbidities. Almost all subscales indicated a trend of higher score for patients with comorbidities; however, only health responsibility and nutrition subscales suggested significant differences. The total score of health-promoting behavior and two subscales also showed a significant association, supporting the difference between the two groups. The correlation of health-promoting behavior and comorbidity was identified in elderly hypertensive patients.[17] Strength and direction of associative outcomes showed a moderate and positive correlation. A moderate or typical correlation is regarded when the absolute value is between 0.1 and 0.3 or the shared variance around 9%.[18] A positive association means that the existence of comorbidities induced higher engagement in specific health-promoting behaviors. Furthermore, health-promoting behaviors showed strong, positive, and significant correlation with 6 subscales. It showed that these subscales constituted the health-promoting behaviors, as proposed in theory.[3,7] All these findings concluded that health-promoting behaviors in hypertensive patients with comorbidities were better than in patients without comorbidities.[3,7,13]

The subscale of health responsibility and nutrition showed a significant difference between hypertensive patients with and without comorbidities. According to our data, hypertensive patients with comorbidities showed

more engagement on health responsibility and nutrition than those with no comorbidity. Health responsibility focuses on a patient's effort to seek help while having health problems. To date, many patients with cardiovascular diseases take the benefit of health technology to get valid information, maintain their health, approach the health care providers, and minimize the disadvantages of disease progression.[19] Nutrition concerns the healthy diet that needs to be consumed on a daily basis to maintain the health status.[1,3] The findings indicated that hypertensive patients with comorbidities paid more attention to maintaining a healthy diet. This finding was supported by the fact that people living with hypertension and comorbidities had sufficient knowledge about the allowed daily diets and had access to nutrition-related education and counseling. Another study identified that both controlled and uncontrolled hypertensive patients in Indonesia had limited knowledge, attitude, and behavior in the context of dietary salts,[11] and only 18.8% followed the prescription of restricted sodium intake.[20] Although participants agreed on the benefits of sodium restriction, 21.6% of them reported difficulty to restrict their diet in terms of high-sodium foods.[20]

We identified that male hypertensive patients were four times more likely to have comorbidity than females. This finding was in accordance with the higher rate of mortality among hypertensive men than in women. This is because women have higher levels of estrogen to protect them against heart disease. Gender can affect blood pressure regulation. In general, blood pressure in men has a tendency to be higher than in women. In women, the risk of hypertension is increased after menopause due to lack of estrogen.[21] Coronary heart disease is two times higher among men than among women and occurs almost 10 years earlier in men than in women. The mechanism is related to the endogenous estrogen present in females that protects them from this disease.[21] This phenomenon also influenced the higher risk of comorbidity among men. Other studies on chronic disease have found that women have greater increases in the risk of comorbidity because of psychosocial and biological factors. Stress can affect the psychosocial status, and sex hormones have a great impact on energy metabolism, body composition, vascular function, and inflammatory responses.[22]

A previous study showed that smoking could affect the risk of comorbidity, contributing up to 25% of the risk.[21] Smoking could influence the internal blood vessels and lead to atherosclerosis or higher blood pressure ressistance.[21] In our findings, we identify no significant odds ratio of smoking status contributing toward the existing comorbidity. It was due to the imbalance in proportion of smokers and nonsmokers in our study (only 15% of respondents were smokers). This situation happened because the participants were mostly females, and notably, smokers in Indonesia are dominantly males.

5. Conclusions

The interpersonal relationship and physical activity subscales have the highest and lowest scores, respectively, among the health-promoting behavior subscales. The total score of health-promoting behaviors in hypertensive patients with comorbidities was significantly higher and correlated, remarkably on health responsibility and nutrition subscales. It indicated that hypertensive patients with comorbidities engaged in better health-promoting behaviors than those without comorbidities. Male hypertensive patients were four times at risk for comorbidity than were female patients. It is suggested that hypertensive patient without any comorbidities should improve their awareness and concern regarding health-promoting behaviors. It benefits to prevent further comorbidities and enhance individual health. On the other hand, male hypertensive patients are a high-risk group for developing comorbidities. This group should receive support to perform more engaging health-promoting behaviors.

5.1. Limitations

This research has limitations that might limit generalization. All participants were recruited in the community setting from a single province in Indonesia. Moreover, the data were collected using a self-reported questionnaire, and this potentially may induce a bias. Generality is inappropriate for hospital-based hypertensive patients and nationwide data. Therefore, further research should be conducted for comparing hospital-based patients and those in community or nationwide settings.

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Ethical approval

The institutional review board approved this study (No. KE/FK/0650/EC/2017). All the research procedures followed the ethical considerations contained in the Declaration of Helsinki.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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