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The Effects of Hypertension, Dyslipidemia, Myocardial Infarction, and Angina Pectoris on Stress by Cardiovascular Diseases

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Abstract

Background/Objectives: This study aimed to determine the effects of hypertension, dyslipidemia, myocardial infarction, and angina pectoris on stress by cardiovascular diseases.

Methods/Statistical analysis: The raw data from the Korea Health Statistics 2017: Korea National Health and Nutrition Examination Survey (KNHANES) Ⅶ-2 were used. A total of 6,458 out of 8,127 respondents were included, with the exception of 1,669 aged <20 years. The analyses were carried out by using an SPSS Version 20.0 program.

Findings: The group diagnosed with hypertension was more strongly correlated with stress than the group not diagnosed with hypertension (approx. 3.6 times, p<.001). It has been confirmed that hypertension among cardiovascular diseases is correlated with psychological, mental health related to stress. No statistical significance was found for the other items.

Improvements/Applications: The results of this study have demonstrated that hypertension among cardiovascular diseases is correlated with stress. Cardiovascular diseases can affect mental health (stress, depressive disorder, etc.); therefore, it is necessary to reinforce regular exercise and psychological relief programs. This is expected to help determine the morbidity of cardiovascular diseases and promote mental health.

Keywords: *Myocardial infarction, Angina pectoris, Dyslipidemia, Hypertension, Mental health, Stress*

Introduction

Cardiovascular diseases include hypertension, hyperlipidemia, myocardial infarction, and angina pectoris [1, 2]. Myocardial infarction and angina pectoris are classified as ischemic heart diseases [2, 3]. An ischemic heart disease is an acute or chronic type of heart disorder that can occur with a reduction or discontinuation of blood supply to cardiac muscles as coronary artery disease develops [2].

Due to high prevalence, cardiovascular diseases can have an impact on life expectancy as well as on the quality of life [4]. The occurrence of cardiovascular diseases is affected by the lifestyle factors, including smoking, alcohol intake, and nutrition, as well as by the irreversible factors, such as gender, age, race, and family history [3]. Jung et al. [5] noted that depression affected hypertension and dyslipidemia; Cho [6] reported that stress affected myocardial ischemia and arrhythmia. The occurrence of

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cardiovascular diseases is associated with various factors, including heredity, family history, lifestyle, anxiety, and stress.

The World Health Organization[7] reported that the main causes of death around the world included ischemic heart disease, stroke, lower respiratory infection, chronic obstructive pulmonary disease (COPD), and diarrhea in 2000 and that the most frequent cause of death was ischemic heart disease, followed by stroke, COPD, lower respiratory infection, and Alzheimer's disease and dementia, in 2016 [7]. The Korea National Statistical Office [8] reported that the most frequent cause of death in 2017 was malignant neoplasm, followed by heart disease, cerebrovascular disease, pneumonia, intentional self-harm (suicide), and diabetes.

Compared with WHO [7], the Korea National Statistical Office [8] was more likely to report noncommunicable diseases (NCDs) than communicable ones as principal causes of death. It was also more likely to report heart diseases related to the circulatory system [7, 8]. Cardiovascular diseases are associated with lifestyle, stress, and psychological factors [3, 5, 6]. Lamers et al. [9] noted that emotional well-being positively affected the prognoses of physical diseases. Prince et al. [10] contended that physical health might essentially coexist with mental health. Lamers et al. [9] and Prince et al. [10] emphasized that physical diseases might be correlated with psychological and mental convalescence. Cho [6] noted that there might be little confidence in stress and cardiovascular diseases despite a lot of research on stress and cardiovascular diseases.

This study aimed to determine the association between hypertension, dyslipidemia, myocardial infarction, and angina pectoris among cardiovascular diseases and stress in adulthood. This study intended to determine the association between cardiovascular diseases and mental health, which involves stress, on the basis of the raw data disclosed by the Ministry of Health and Welfare (MOHW) and the Korea Centers for Disease Control and Prevention (KCDC). It aimed to provide basic data that could help relieve stress caused by cardiovascular diseases in the circulatory system and develop a stress reduction program.

Method

1. Instruments of Study

The raw data from the Korea Health Statistics 2017: Korea National Health and Nutrition Examination Survey (KNHANES) Ⅶ-2 disclosed by MOHW and KCDC [11] were used.

The sampling framework was composed of the available data from the recent Population and Housing Census as the basic framework and those regarding the public noticed price for multi-unit houses. The □-1 and 2 (2016-2017) surveys had the sampling framework stratified by cities and provinces, eups, myeons, and dongs, and housing type and used the residence area ratio and the householder's education ratio as the stratification criteria. A circulatory sampling survey was conducted for 12 months from January to December. The sample size was 13,248 households in 576 research districts.

The raw data from KNHANES Ⅶ-2 disclosed by MOHW and KCDC [11] were based on the data from the household member identification survey, health surveys, examinations, and the nutrition survey. The household member identification survey is to determine every residence and household status within selected districts through sample design and choose household members. The health surveys can be divided into household surveys, health interview, and health behavior surveys. The nutrition survey covered dietary life behavior, dietary supplements, nutritional knowledge, and food stability status and food consumption. The examinations were composed of somatometry, blood pressure and pulse rate measurement, blood test and urinalysis, oral examination, pulmonary function test, and so on.

To meet the theme of this study, the items concerning the household identification survey and the health surveys were included and the instruments related to the socio-demographic characteristics, cardiovascular diseases, and mental health were applied. The composition of the instruments is presented in [Table 1].

Table 1. Items of surveys

Category		Item
Household member identification survey		• Every household member's status and household member inclusion within selected districts through sample design
Health survey	• Household survey • Health interview • Health behaviour survey	• General characteristic • Morbidity • Medical check-up • Vaccination • Restricted activity • Quality of life • Damage • Smoking • Alcohol intake • Physical activity • Mental health • Safety consciousness • Obesity & weight control • Feminine health, etc.
Nutrition survey	• Dietary life behaviour & food stability survey	• Dietary life • Food safety • Food intake frequency • Food intake
Examination	•Somatometry & pulmonary Function test, etc.	• Somatometry • Blood pressure • Pulse rate • Blood test • Urinalysis • Oral examination •Pulmonary function test, etc.

2. Subjects of study

Based on the number of household members in the database (DB) of the raw data, 8,127 persons were included. Coding for the number of household members was identified to determine the concordance in the number of household members between health in basic DB and "cardiovascular diseases and mental health."

Among the 8,127 persons in the raw data, those aged <20 years were excluded from the research. This is not only because cardiovascular diseases often occur in adulthood but also because those aged ≥20 years are legally permitted to drink and smoke. With the exception of 1,669 respondents aged <20 years, a total of 6,458 respondents were finally included. Of the 6,458 respondents aged ≥20 years, those who had missing data or made no answer were excluded from the analysis. The subjects of this study are as presented in [Table 2].

Table 2. Subjects of study

Category		N : 6,458	%
Gender	Male	2,895	44.8
	Female	3,563	55.2
Age	20's	731	11.3
	30's	976	15.1
	40's	1,202	18.6
	50's	1,281	19.8
	60's	1,142	17.7
	70's≤	1,126	17.4
Self-rated health	Very good,	243	3.8
	Good,	1,278	19.8
	Average	3,118	48.3
	Bad,	931	14.4
	Very bad	235	3.6

3. Variable composition

The variables in this study included the general characteristics, morbidity of cardiovascular diseases, and mental health. The variables for the general characteristics included gender, age, household income, education, and occupation. The items concerning cardiovascular diseases were myocardial infarction, angina pectoris, hyperlipidemia, and hypertension. The variables for mental health included stress perception rate.

4. Ethical consideration and research procedure

For ethical consideration, approval exemption was obtained from the Institutional Review Board (IRB) of C University (human_007_20190523_1st)(Approval exemption) before starting the research. The procedure included research theme selection, literature review, IRB approval exemption, request of MOHW and KCDC for KNHANES □-2, KNHANES □-2 data review, selection of

items related to the cardiovascular system and stress, and result analysis.

5. Analysis

The analysis was performed by using an SPSS WIN 20.0 Version program. For empirical analyses, frequency analysis, $\chi 2$, and dichotomous logistic regression were used. The significance level was set at $p<.05$.

Result and Discussion

1. Variation in stress perception rate by general characteristics

The variation in the stress perception rate by the general characteristics is as presented in [Table 3]. Every group had a low stress status, regardless of gender, age, and self-rated health. Those who were male ($p<.01$) and who were in their thirties, forties, and fifties were more likely to perceive stress ($p<.001$). Those groups whose self-rated health was at the average level or bad were more likely to perceive stress ($p<.001$).

In terms of gender and age, 6,052 out of 6,458 respondents were included, with the exception of those having missing data. In terms of self-rated health, 5,785 out of 6,458 respondents were included, with the exception of those having missing data.

Table 3. Variation in stress perception rate by general characteristics

		Stress perception rate (6,052)		χ^2	p
		High : 1,662(27.5)	**Low : 4,390(72.5)**		
Gender	Male	686(25.5)	2,004(74.5)	9.340	.002**
	Female	976(29.0)	2,386(71.0)		
Age	20's	261(39.1)	407(60.9)	115.979	.000***
	30's	319(35.3)	585(64.7)		
	40's	307(27.4)	815(72.6)		
	50's	318(26.4)	886(73.6)		
	60's	227(20.9)	861(79.1)		
	70'≤	230(21.6)	4,143(78.4)		
Self-rated health (5,785)	Very good,	31(12.8)	836	221.057	.000***
	Good,	230(18.0)	1,045(82.0)		
	Average	833(26.8)	2,277(73.2)		
	Bad,	377(40.6)	551(59.4)		
	Very bad	114 (49.6)	116 (50.4)		
*p<.01, ***p<.001					

2. Effects of general characteristics on stress perception rate

Dichotomous logistic regression was used to determine the effects of the general characteristics on the stress perception rate. The independent variables were gender, age, and self-rated health. The dependent variable was the stress perception rate, which was "high" or "low." The results of this study are presented in [Table 4].

The older the respondents in their forties to seventies were, the more likely they were to have the stress perception rate affected ($p<.001$). The poorer self-rated health the respondents had, the more likely they were to have the stress perception rate affected ($p<.001$).

Lee et al. [12] noted that the better self-rated health, the more satisfied with life and the less depressed. Park and Yang [13] contended that self-rated health affected stress perception. Lee et al. [12] and Park and Yang [13] suggested the association between self-rated health and stress, which is consistent with the results of this study.

Table 4. Effects of general characteristics on stress perception rate

Category		B	P	Exp(B)	95% Confidence interval	
					Lower	Upper
Gender		-.113	.069	.893	.791	1.009
Age	20's			1		
	30's	.218	.048*	1.243	1.002	1.544
	40's	.617	.000***	1.854	1.499	2.293
	50's	.735	.000***	2.086	1.689	2.575
	60's	1.244	.000***	3.469	2.760	4.360
	70'≤	1.295	.000***	3.652	2.896	4.607
Self-rated health	Very good,			1		
	Good,	-.346	.097	.707	.470	1.065
	Average	-.957	.000***	.384	.260	.568
	Bad,	-1.742	.000***	.175	.117	.263
	Very bad	-2.379	.000***	.093	.058	.149
*p<.05, ***p<.001						

3. Cardiovascular disease and stress perception rate

The association between cardiovascular diseases and the stress perception rate is as presented in [Table 5]. The group diagnosed with hypertension was wider-ranging than the group not diagnosed with hypertension. As for the association between hypertension and stress, the group diagnosed with hypertension showed a low rate of stress perception and the group not diagnosed with hypertension showed a statistically significantly low rate of stress perception (p<.001).

No significance was found for the other items. 6,050 persons were included to determine hypertension and dyslipidemia diagnosis status, with the exception of missing data. 5,781 and 5,780 persons were included to determine myocardial infarction and angina pectoris diagnosis status, respectively, with the exception of missing data.

Table 5. Cardiovascular disease and stress perception rate

		Stress perception rate (6,050)		χ^2	p
		High: 1,661 (27.5)	Low: 4,389 (72.5)		
Hypertension diagnosis status	Yes	340(22.6)	1,165(77.4)	23.789	.000***
	No	1,321(29.1)	3,224(70.9)		
Dyslipidemia diagnosis status	Yes	300(26.0)	853(74.0)	1.474	.225
	No	1,361(27.8)	3,563(72.2)		
Myocardial infarction diagnosis status (5,781)	Yes	17(23.6)	55(76.4)	.522	.470
	No	1,566(27.4)	4,143(72.6)		
Angina pectoris diagnosis status (5,780)	Yes	29(25.2)	86(74.8)	.274	.601
	No	1,553(27.4)	,4112(72.6)		
***p<.001					

4. Effects of cardiovascular disease on stress perception rate

Dichotomous logistic regression was used to determine the effects of cardiovascular diseases on the stress perception rate. The independent variables were hypertension diagnosis status, dyslipidemia diagnosis status, myocardial infarction diagnosis status, and angina pectoris diagnosis status. The dependent variable was the stress perception rate, which was "high" or "low." The results of this study are presented in [Table 6].

The group diagnosed with hypertension was more strongly associated with stress than the group not diagnosed with hypertension (p<.001). No significance was found for the other items. As mentioned before, Lamers et al. [9] and Prince et al. [10] found that emotional well-being and mental health affected physical diseases. Similarly, this study found that the emotional, psychological condition of stress significantly affected the physical disease of hypertension. This result is also consistent with the finding of Jung et al. [5] that depression affected hypertension and dyslipidemia. Because emotional, psychological status is also associated with cardiovascular diseases and other diseases, it is necessary to develop relevant prevention programs.

Table 6. Effects of cardiovascular disease on stress perception rate

Category	B	P	Exp (B)	95% Confidence interval	
				lower	upper
Hypertension diagnosis status	-.347	.000***	.707	.609	.821
Dyslipidemia diagnosis status	.046	.569	1.047	.893	1.229
Myocardial infarction diagnosis status	-.097	.733	.907	.518	1.588
Angina pectoris diagnosis status	-.004	.986	.996	.644	1.540
***p<.001					

Conclusion

This study aimed to determine the association between hypertension, dyslipidemia, myocardial infarction, and angina pectoris and the stress perception rate by cardiovascular diseases. The results of this study have demonstrated that hypertension among cardiovascular diseases is correlated with stress. Hypertension among cardiovascular diseases can affect stress and depressive disorder; therefore, it is necessary to reinforce regular exercise and psychological relief programs. This is expected to help determine the morbidity of cardiovascular diseases and promote mental health.

Ethical Clearance: Not required

Source of Funding: Self

Conflict of Interest: Nil

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