



Predictors of health-related quality of life in Koreans with cardiovascular disease

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ABSTRACT

Objectives: This study aimed to identify the predictors of health-related quality of life (HRQoL) in Korean adults with cardiovascular disease (CVD).

Methods: This was a cross-sectional study with a stratified multistage probability sampling design. Data from the 2016 to 2019 Korea National Health and Nutrition Examination Survey ($n = 32,379$) were used. Among the participants aged 19 years or older ($n = 25,995$), 1,081 patients with CVD were extracted after excluding those with missing data and those who had cancer. The participants' HRQoL was measured using the three-level EuroQoL Group's five-dimension questionnaire (EQ-5D) scale. Data were analyzed using the t-test, one-way analysis of variance, and general linear regression for complex samples.

Results: The most potent predictors of HRQoL in Korean adults with CVD were limited activity ($\beta = -0.103$, $p < 0.001$), poor perceived health ($\beta = -0.089$, $p < 0.001$), depression ($\beta = -0.065$, $p < 0.01$), low household income ($\beta = -0.033$, $p < 0.05$), unemployment ($\beta = -0.023$, $p < 0.05$), and older age ($\beta = -0.002$, $p < 0.01$), which explained 37.2% of the variance.

Conclusion: Comprehensive interventions that address both physical and mental factors and social systems that provide financial help need to be implemented to improve the HRQoL of Korean adults with CVD.

Keywords: Cardiovascular diseases; Myocardial ischemia; Quality of life; Stroke

Received: October 27, 2021

Revised: January 14, 2022

Accepted: February 6, 2022

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Introduction

Cardiovascular disease (CVD), which generally refers to ischemic heart disease and stroke, is a major cause of mortality and morbidity. According to the World Health Organization (WHO), ischemic heart disease and cerebrovascular disease are the 2 leading causes of death worldwide, accounting for 16% and 11% of all deaths, respectively [1]. As of 2019 in Korea, heart disease was the second leading cause of death, and cerebrovascular disease was the fourth leading cause of death [2]. In total, CVD accounted for 18.8% of deaths in the Korean population in 2019 [2]. It is the largest single disease in terms of the cause of death in Koreans, and the

diseases that cause CVD—stroke and diabetes mellitus—are ranked first and second in the list of diseases that incur the greatest cost of care [3]. In response, the Korean government announced a comprehensive plan to address the disease in 2007 and has implemented CVD prevention and management projects in various communities.

Health-related quality of life (HRQoL) is an important parameter for evaluating public health policy and is a strong predictor of mortality and morbidity [4,5]. Research on HRQoL is also important because it assesses patients' perspectives about their health and could also be used to assess healthcare systems. HRQoL measurement enables the evaluation of CVD prevention and management projects in various communities [6]. Quality of life (QoL) is a multidimensional concept that refers to subjective physical, mental, social, and financial well-being in relation to one's purpose and expectations with regard to one's own life [7].

Patients with recurrent ischemic heart disease have a mortality rate that is twice as high as that of their counterparts [8]. Stroke not only has a high mortality rate, but also results in permanent functional disability in 15% to 30% of survivors [9] and causes both physical and mental problems [10]. The condition therefore affects patients' activities of daily living [10], which highlights the importance of continuing disease management and prevention. CVD-inducing diseases such as hypertension, diabetes mellitus, hyperlipidemia, and obesity are related to individuals' health-related lifestyle [11,12]. Lifestyle habits that facilitate the prevention and management of CVD include abstinence from cigarettes and alcohol, reduced salt intake, appropriate exercise, body weight control, and stress reduction [12]. Therefore, individuals with CVD must engage in long-term and regular exercise and lifestyle management to enjoy a healthy life. For this reason, people with CVD are more likely to experience low QoL than the general population.

A previous study reported that the QoL of individuals with CVD was improved by engaging in regular physical activity, which contributed to improving heart disease, hypertension, obesity, depression, and immune functions [13]. Additionally, the QoL of older adults with CVD was improved through walking and CVD prevention programs [7,14]. Studies on individuals with CVD have primarily focused on health behaviors, which are individual factors. Since QoL is a multidimensional concept, research on QoL in people with CVD must include multidimensional factors, including mental, social, and financial domains. Therefore, more multidimensional support and efforts are required rather than emphasizing only individual efforts. In addition, CVD is a representative chronic disease of

old age. As Korea rapidly progresses toward becoming an aging society, there is increasing interest in, and demand for, health interventions to promote improvements in QoL. Although factors related to QoL in patients with CVD (e.g., physical activity, depression, and obesity) have been identified, the existing research is very limited. Therefore, a multidimensional investigation of the predictors of QoL in individuals with CVD is required. This will contribute to improving QoL in individuals with CVD.

To understand the QoL of individuals with CVD—a significant cause of death in the Korean population—a comprehensive and multidimensional approach to examining QoL predictors is needed. This study aimed to identify the predictors of QoL in Korean adults with CVD using data from the nationally representative Korea National Health and Nutrition Examination Survey (KNHANES). Ultimately, this investigation aimed to present foundational data for developing interventions to improve QoL in patients with CVD.

Materials and Methods

Data Source and Participants

This study conducted a secondary analysis of the 2016–2019 KNHANES data, which were originally collected by the Korea Disease Control and Prevention Agency (KDCA) of the Ministry of Health and Welfare.

The KNHANES is a legally grounded survey mandated by Article 16 of the National Health Promotion Act and approved by the KDCA's Institutional Review Board (IRB No. 2018-01-03-P-A, 2018-01-03-C-A). Data were collected through a health examination, health interview, and nutrition survey by trained investigators via face-to-face interviews. Participants provided written informed consent before completing the KNHANES survey. For this study, an agreement to adhere to the requirements for the use of statistical data was submitted through the KNHANES website to receive approval for the use of the KNHANES raw data. Upon receiving approval, the data were downloaded from the website.

Among the participants of the KNHANES VII (2016–2018) and VIII (2019), 1,081 adults aged 19 years or older who had been diagnosed with CVD (i.e., stroke, myocardial infarction, or angina) by a physician, did not have cancer, and had no missing values in terms of QoL, general factors, health-related factors, and disease-related factors were included in the analysis, as shown in [Figure 1](#).

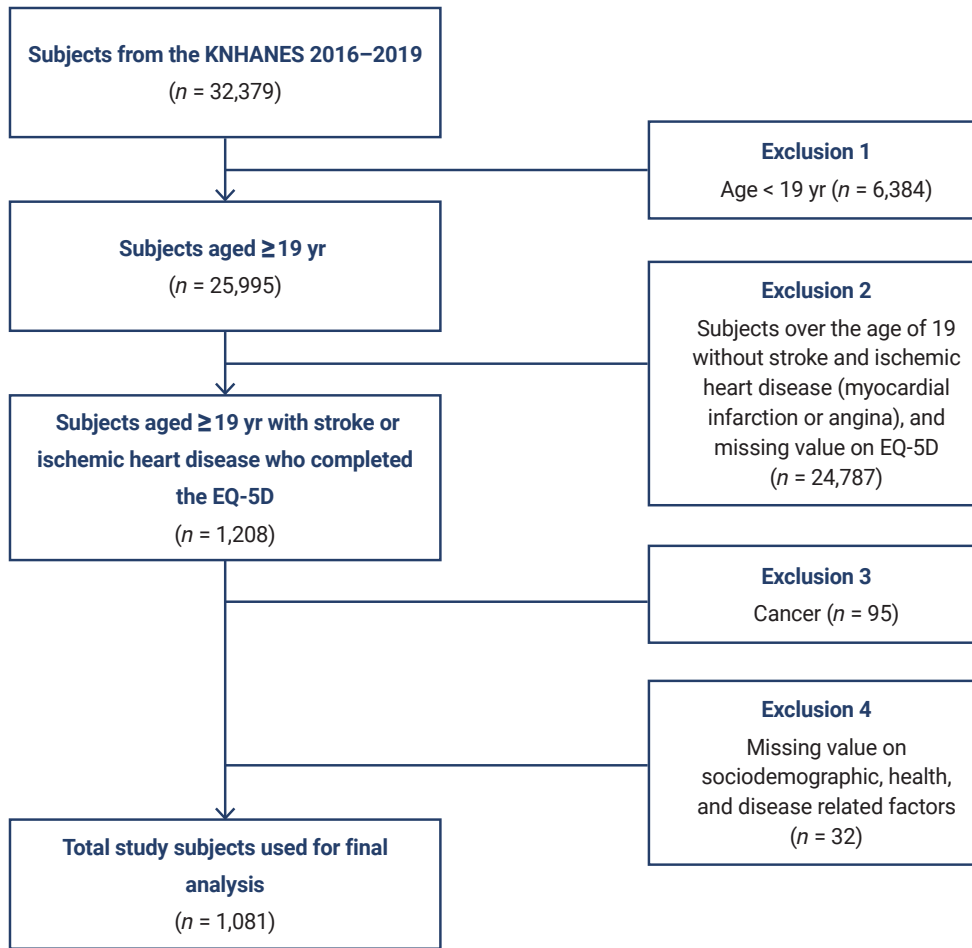


Figure 1. Flow chart of the study sample. KNHANES, Korea National Health and Nutrition Examination Survey; EQ-5D, three-level EuroQoL Group's five-dimension questionnaire.

Measurements and instruments

Sociodemographic characteristics

The queried sociodemographic characteristics included age, sex, marital status, education level, household income, and employment status. The mean age of patients with CVD was 65.81 years, and the raw data for marital status (married or unmarried (including those who are single, divorced or widowed)) and education level (elementary or below, ≤ 6 years; middle school, ≤ 9 years; high school, ≤ 12 years, or college or beyond, ≥ 13 years) were used as obtained. Household income was calculated by dividing the monthly household income by household size; the values were classified into quartiles (low, mid-low, mid-high, and high), and the corresponding raw data were used. The employment data were reclassified for analysis in this study to simply reflect whether the participants were employed or unemployed.

Health-related factors

Health-related factors included smoking, drinking, obesity,

activity restriction, physical activity, perceived health, perceived stress, and depression. The participants' current smoking status was classified as "yes" or "no," and drinking was used as shown in the raw data (defined as monthly drinking frequency: ≥ 1 drink/month in the past year, never drank alcohol, or < 1 drink/month in the past year). Obesity was reclassified to reflect whether the participants were obese (body mass index [BMI], ≥ 25 kg/m²) or non-obese.

With respect to the participants' physical characteristics, the raw data classified activity restriction as "yes" or "no" to indicate whether their activities of daily living or social activity were limited due to their condition, and the data were used as obtained. Using the WHO Global Physical Activity Questionnaire, the raw data classified physical activity into low or moderate-high based on the practice (moderate-high) or non-practice (low) of moderate physical activity for 2 hours and 30 minutes per week, vigorous physical activity for 1 hour and 15 minutes per week, or combined moderate and vigorous physical activity for the corresponding durations per week; the data were used as provided.

With regard to the participants' psychological characteristics, their perceived health was reclassified into good, moderate, and poor, and their perceived stress was used as provided in the raw data (high or low). In the raw data, depression was determined based on whether an individual had been diagnosed with it by a physician, and the data were used as obtained.

Disease-related factors

In this study, CVD was defined as ischemic heart disease (myocardial infarction or angina) and stroke. Participants who reported that they had been diagnosed with myocardial infarction, angina, or stroke by a physician in the raw data were considered as individuals with CVD. The presence of diabetes, hypertension, and dyslipidemia was also determined based on a "yes" response in the raw data to the item that queried whether they had been diagnosed with these conditions by a physician.

Health-related QoL

QoL was measured based on the 5 domains of the three-level EuroQoL Group's five-dimension questionnaire (EQ-5D) approved by the EuroQoL Group: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each item was rated on a 3-point Likert scale (1=no problem, 2=moderate problem, and 3=serious problem). The KDCA weighted the EQ-5D index for the Korean population, where a score closer to 1 indicates a better QoL. The EQ-5D index score range from 1 (no problems were reported for all 5 EQ-5D domains) to -0.171 (severe problems were reported in all 5 EQ-5D domains), where negative scores are considered worse than death, 0 represents death, and 1 indicates perfect health [15,16].

Statistical Analysis

The collected data were analyzed using IBM SPSS for Windows ver. 21.0 (IBM Corp., Armonk, NY, USA). The KNHANES data were collected using stratified 2-stage sampling, thus, a complex sample design using weights for all data analyzes was used. Prior to the analysis, the data were confirmed to have no multicollinearity based on a tolerance of above 0.1, and a variance inflation factor of less than 10 (0.998-1.298). The participants' general characteristics and health-related factors were analyzed using the frequency of the complex sample, weighted percentages, and descriptive statistics. The differences in QoL based on the participants' general characteristics, health-related factors, and disease-related factors were analyzed using the t-test and one-way analysis of variance for complex samples. The predictors of HRQoL in individuals with CVD

were identified using a 3-step hierarchical regression analysis. In step 1, significant demographic factors (age, sex, education level, household income, and employment) that were similar to those in previous studies were entered. In step 2, significant physical factors (drinking, obesity, and limited activity) and significant mental factors (perceived health, perceived stress, and depression) were added. In step 3, the significant causative diseases of CVD (diabetes and hypertension) were added.

Results

Participants' General Characteristics

Table 1 presents the general characteristics of the participants. A total of 1,081 participants were included, and their mean age was 65.81 ± 0.45 years. In total, 59.2% of the participants were male and 40.8% were female. The majority (96.2%) of the participants were married. With regard to their education level, 40.5% of the sample had completed elementary school or lower and 25.6% had completed high school. The most common household income status was low (34.5%), followed by mid-low (26.6%), mid-high (22.9%), and high (15.9%). There were more unemployed participants (57.3%) than employed participants (42.7%).

Most of the participants were non-smokers (81.4%). In total, 45.7% of the participants drank at least once a month, whereas 54.3% did not consume alcohol. A total of 32.3% of the participants were obese ($BMI \geq 25 \text{ kg/m}^2$), whereas 67.7% were not ($BMI < 25 \text{ kg/m}^2$). Furthermore, 76.5% of the participants' physical activities were not limited by their condition. The participants reported that they engaged in either low (68.4%) or moderate to high (31.6%) physical activity. Almost half (44.5%) of the participants perceived themselves as having poor health, whereas 41.5% and 14.1% of them perceived themselves as having moderate and good health, respectively. In total, 26.1% of the participants reported a high level of perceived stress, whereas the rest (73.9%) reported a low level of stress. A total of 9.6% of the participants were diagnosed with depression. The prevalence of CVD-inducing diseases, namely hypertension, dyslipidemia, and diabetes mellitus, was 61.1%, 42.0%, and 28.3%, respectively.

HRQoL Differences according to the Characteristics of Patients with CVD

As shown in Table 2, the HRQoL of patients with CVD significantly differed based on their age, sex, education level, household income level, employment, drinking, obesity, activity restriction, physical activity, perceived stress and perceived health, and whether they had depression,

Table 1. General characteristics of individuals with cardiovascular disease (n = 1,081)

Characteristic	n or mean ± SE	Weighted %
Sociodemographic characteristics		
Age (y)	65.81 ± 0.45	
19–49	53	8.3
50–64	292	34.7
65–74	409	30.4
≥ 75	327	26.6
Sex		
Male	609	59.2
Female	472	40.8
Marital status		
Married	1048	96.2
Unmarried	33	3.8
Education level		
College or more	140	15.6
High school	253	25.6
Middle school	190	18.3
Elementary school or less	498	40.5
Household income		
High	144	15.9
Middle-high	221	22.9
Low-middle	290	26.6
Low	426	34.5
Employment		
Yes	424	42.7
No	657	57.3
Health-related factors		
Current smoking		
Yes	184	18.6
No	897	81.4
Monthly drinking		
Yes (≥ 1/mo)	456	45.7
No	625	54.3
Obesity		
Yes (≥ 25 kg/m ²)	356	32.3
No (< 25 kg/m ²)	725	67.7
Limited activity		
Yes	271	23.5
No	810	76.5
Physical activity		
Moderate to high	340	31.6
Low	741	68.4
Perceived health status		
Good	140	14.1
Moderate	453	41.5
Poor	488	44.5
Perceived stress		
High	268	26.1
Low	813	73.9
Depression		
Yes	105	9.6
No	976	90.4
Disease-related factors		
Stroke		
Yes	498	47.0
No	583	53.0
Ischemic heart disease (myocardial infarction or angina)		
Yes	645	58.4
No	436	41.6
Comorbidity (hypertension)		
Yes	680	61.1
No	401	38.9
Comorbidity (diabetes mellitus)		
Yes	304	28.3
No	777	71.7
Comorbidity (dyslipidemia)		
Yes	461	42.0
No	620	58.0

SE, standard error.

diabetes mellitus, and hypertension. The QoL of male was higher than that of female ($p < 0.001$). Additionally, the QoL of the employed participants was higher than that of the unemployed participants. The QoL of the participants with a higher education level and household income level was also higher ($p < 0.001$).

In terms of health-related factors, the QoL was higher among alcohol users ($p < 0.001$), individuals without physical activity limitations ($p < 0.001$), obesity ($p = 0.046$), and those who engaged in moderate to vigorous physical activity ($p < 0.001$) than among their counterparts. Furthermore, the QoL of those with better perceived health, low perceived stress, and no depression was higher ($p < 0.001$). The QoL of those who also had hypertension ($p = 0.004$) and those with diabetes mellitus ($p = 0.002$) was lower. The QoL of patients with CVD did not significantly differ based on their marital status, smoking status, and the presence of dyslipidemia.

Predictors of the HRQoL of Patients with CVD

Table 3 shows the results of the general linear regression for complex samples that was conducted to identify the predictors of QoL in patients with CVD.

In model 1, multiple sociodemographic factors (female sex, education level, low household income, and unemployment) were identified as significant negative predictors. Of these, unemployment was the most potent predictor. These predictors accounted for 16.1% of the variance in the QoL of patients with CVD.

Health-related factors were included in model 2. Older age, low household income, unemployment, limited activity, poor perceived health, and depression were identified as significant negative predictors of QoL. Of these, limited activity and poor perceived health were identified as the most potent predictors. These predictors accounted for 37.0% of the variance in the QoL of patients with CVD.

Diseases that increased the risk of CVD were included in model 3. Older age, low household income, unemployment, limited activity, poor perceived health, and depression were identified as significant negative predictors of QoL. The causative diseases of CVD (hypertension and diabetes mellitus) did not predict QoL. Limited activity and perceived health were identified as the most potent predictors. These predictors accounted for 37.2% of the variance in the QoL of patients with CVD.

Discussion

This study aimed to present foundational data for developing interventions to improve QoL in Korean adults with CVD by identifying predictors of their QoL using data from the

Table 2. Differences in HRQoL based on the characteristics of individuals with cardiovascular disease (n = 1,081)

Characteristic	Mean ± SE	p
Sociodemographic characteristics		
Age (y)	0.87 ± 0.00	< 0.001
19–49	0.93 ± 0.02	
50–64	0.89 ± 0.01	
65–74	0.88 ± 0.01	
≥ 75	0.81 ± 0.01	
Sex		< 0.001
Male	0.90 ± 0.07	
Female	0.83 ± 0.01	
Marital status		0.624
Married	0.87 ± 0.01	
Unmarried	0.86 ± 0.03	
Education level		< 0.001
College or more	0.95 ± 0.01	
High school	0.89 ± 0.01	
Middle school	0.87 ± 0.01	
Elementary school or less	0.83 ± 0.01	
Household income		< 0.001
High	0.93 ± 0.01	
Middle-high	0.91 ± 0.01	
Low-middle	0.88 ± 0.01	
Low	0.80 ± 0.01	
Employment		< 0.001
Yes	0.93 ± 0.01	
No	0.82 ± 0.01	
Health-related factors		
Current smoking		0.165
Yes	0.89 ± 0.01	
No	0.87 ± 0.01	
Monthly drinking		< 0.001
Yes (≥ 1/mo)	0.91 ± 0.01	
No	0.84 ± 0.01	
Obesity		0.046
Yes (≥ 25 kg/m ²)	0.89 ± 0.01	
No (< 25 kg/m ²)	0.86 ± 0.01	
Limited activity		< 0.001
Yes	0.74 ± 0.01	
No	0.91 ± 0.01	
Physical activity		< 0.001
Moderate to high	0.91 ± 0.01	
Low	0.85 ± 0.01	
Perceived health status		< 0.001
Good	0.95 ± 0.01	
Moderate	0.93 ± 0.01	
Poor	0.79 ± 0.01	
Perceived stress		< 0.001
High	0.82 ± 0.01	
Low	0.89 ± 0.01	
Depression		< 0.001
Yes	0.73 ± 0.03	
No	0.88 ± 0.01	
Disease-related factors		
Comorbidity (hypertension)		0.004
Yes	0.86 ± 0.01	
No	0.89 ± 0.01	
Comorbidity (diabetes mellitus)		0.002
Yes	0.84 ± 0.01	
No	0.88 ± 0.01	
Comorbidity (dyslipidemia)		0.238
Yes	0.86 ± 0.01	
No	0.88 ± 0.01	
HRQoL (EQ-5D)	0.87 ± 0.01	

HRQoL, health-related quality of life; SE, standard error; EQ-5D, three-level EuroQoL Group's five-dimension questionnaire.

KNHANES (2016–2019).

In this study, the most potent predictor of HRQoL in individuals with CVD was limitation of physical activity. Limited activity refers to the restriction of one's activities of daily living or social activities due to health problems or physical or mental disabilities. A low level of mobility has been reported as a predictor of QoL in stroke survivors [17]. A stroke could potentially induce severe disability, and Korean adults aged 50 years or older who had experienced stroke had a low HRQoL [18]. Our results also corroborated the high positive correlation between stroke patients' activities of daily living and QoL [10]. Approximately 46% of stroke survivors require assistance with their activities of daily living, and 30% of them are incapable of independent living [19]. Patients who are dependent on others or require assistance with activities of daily living have been shown to have a markedly lower QoL than others [20]. Limited physical activity has also been identified as a predictor of the HRQoL of individuals with diabetes mellitus [21] and older adults with osteoarthritis [22]. Therefore, limitation of physical activity is an important predictor of HRQoL. The management of physical mobility can improve QoL and extend the lifespan [23]. Until now, CVD management has mainly focused on disease prevention. Of course, interventions that prevent the deterioration of motor function/disabilities of individuals with CVD should be continued. At the same time, however, interventions should be strengthened to enable people with CVD to perform their daily activities well. A program for strengthening physical function should be prepared in the current community-centered CVD prevention project. Social assistance and related systems should be further strengthened so that there is no inconvenience when moving due to physical activity limitations. Reducing discomfort caused by limitation of physical activity will improve the QoL of people with CVD. Thus, in addition to health-related interventions, better support for individuals with limited physical activity during their activities of daily living and systems that facilitate their movement are needed.

In this study, the second predictor of HRQoL of individuals with CVD was perceived health. We can predict that in individuals with CVD, poor perceived health will be associated with lower HRQoL. Individuals with other chronic diseases also had lower HRQoL when they perceived their health as poor [21,22]. Perceived health has been found to be more important than other clinical indicators as a strong predictor of risk for mortality [24]. CVD is a chronic disease that requires lifestyle modifications through regular exercise and lifestyle management. Therefore, individuals with CVD must monitor the status of their health on an

Table 3. General linear regression analysis of the HRQoL of individuals with CVD (n = 1,081)

Variable	Model 1		Model 2		Model 3	
	β	SE	β	SE	β	SE
Sociodemographic factors						
Age (y)	0.000	0.001	-0.002**	0.001	-0.002**	0.001
Sex						
Female (ref.: male)	-0.035**	0.013	-0.013	0.012	-0.014	0.012
Education level (ref.: college or more)						
High school	-0.031**	0.014	-0.009	0.013	-0.008	0.013
Middle school	-0.038**	0.015	-0.009	0.012	-0.009	0.013
Elementary school or less	-0.048**	0.017	-0.024	0.014	-0.023	0.014
Household income (ref.: high)						
Middle-high	0.010	0.014	0.003	0.013	0.004	0.013
Low-middle	-0.005	0.015	-0.003	0.013	-0.002	0.013
Low	-0.059**	0.018	-0.034*	0.016	-0.033*	0.015
Employment						
No (ref.: yes)	-0.069***	0.012	-0.024*	0.010	-0.023*	0.010
Health-related factors						
Monthly drinking						
No (ref.: yes)			-0.009	0.010	-0.009	0.010
Obesity (ref.: yes, ≥ 25 kg/m ²)						
No (< 25 kg/m ²)			-0.012	0.009	-0.016	0.008
Limited activity						
Yes (ref.: no)			-0.102***	0.014	-0.103***	0.014
Physical activity						
No (ref.: yes)			-0.016	0.008	-0.016	0.008
Perceived health status (ref.: good)						
Moderate			0.008	0.011	0.008	0.011
Poor			-0.091***	0.012	-0.089***	0.012
Perceived stress						
High (ref.: low)			-0.010	0.011	-0.010	0.012
Depression						
Yes (ref.: no)			-0.065**	0.022	-0.065**	0.003
Disease-related factors (ref.: no)						
Comorbidity (diabetes mellitus)					-0.010	0.023
Comorbidity (hypertension)					-0.001	0.010
Comorbidity (diabetes mellitus and hypertension)					-0.016	0.015
R ²	0.161***		0.370***		0.372***	

HRQoL, health-related quality of life; CVD, cardiovascular disease; SE, standard error.

*p < 0.05, **p < 0.01, ***p < 0.001.

ongoing basis. A positive perception of one's health can bring about lifestyle changes. Mental interventions that instill a positive outlook toward one's health should thus be implemented alongside interventions that target individuals' physical function. Instilling a positive attitude among such individuals with respect to their health through a combination of physical and mental interventions could contribute to improving their HRQoL.

Another predictor of HRQoL in individuals with CVD was depression, a psychological factor. Korean adults aged 50 years or older with depression had a lower HRQoL than

their counterparts without depression [25]. The incidence of depression was higher among patients with ischemic heart disease than among those without ischemic heart disease [26]. The 2018 European Society of Cardiology guidelines stated that the prevalence of depression among patients with coronary artery disease ranges from 15% to 30%, which is higher than that among the general population (10%) [27]. Another study reported that approximately 40% of stroke patients had depression [19]. Depression is negatively associated with QoL [28], and post-stroke depression is negatively correlated with QoL and activities

of daily living [10]. Depression has also been reported to be associated with physical and mental factors in individuals with chronic diseases [27,29]. Therefore, interventions to prevent and alleviate depression to improve HRQoL in CVD patients should also be implemented. In Korea, various community-led CVD prevention and management projects are underway. However, these projects have mainly focused on disease-related knowledge education. An intervention to screen depression in individuals with CVD should also be included. It is also necessary to prepare a system to manage individuals with confirmed depression. Identifying and preventing depression, which is a predictor of HRQoL in individuals with CVD, in advance will improve their QoL.

Age, household income, and employment status were also predictors of HRQoL in individuals with CVD. Individuals with CVD who had a low household income and were unemployed had a low HRQoL. In a previous study, Korean adults aged 50 to 69 years who had a low household income and were unemployed displayed a low HRQoL [25]. The mean age of our participants was 65.81 years, suggesting that Koreans with CVD are primarily older adults. The prevalence of various diseases and the burden of their costs of care increase as they age. Older people are unable to address these changes because most of them are unemployed and economically inactive. This situation negatively impacts their QoL. In particular, CVD is the disease that consumes the most medical expenses, so this patient population would inevitably have a high financial burden. In particular, the main predictors of HRQoL in individuals with CVD were perceived health and depression, age, household income, and employment, in addition to physical factors. In other words, the HRQoL of individuals with CVD constitutes interactions among physical, psychological, and economic factors. In this context, strengthened social welfare programs that can alleviate psychological and economic problems should be implemented to help improve the QoL of individuals with CVD.

The limitations of this study are as follows. The measure of HRQoL used in this study included mobility and anxiety/depression. Therefore, these factors may have influenced the predictors of QoL in individuals with CVD. To address this limitation, we suggest further studies on QoL in individuals with CVD in the future. Another limitation is the cross-sectional design of this study. Therefore, there is a limit to elucidating the causal relationships of variables that were identified as predictors of QoL.

Conclusion

This study aimed to identify the predictors of HRQoL in

individuals with CVD using data from the KNHANES. The results of this study indicated that the negative predictors of HRQoL among Korean adults with CVD were older age, low household income, unemployment, limited activity, poor perceived health, and depression. The most potent predictor was limited activity, followed by perceived health and depression. Thus, the current community-led CVD prevention projects should implement interventions that target both physical and mental aspects in order to simultaneously instill healthier routines and positive perceptions about one's health. Furthermore, the financial hardship experienced by patients should not be simply deemed an individual problem. Instead, it should be addressed by society through bolstered social welfare and support systems in order to improve the QoL of this patient population.

The main limitation of this study is attributed to the fact that its results are focused only on the Korean population. Thus, the generalizability of the study's findings is limited. Future studies that focus on different ethnic and global populations will enable the development of support policies specifically tailored to the populations of different countries, thereby improving the QoL of cardiovascular patients.

Notes

Ethics Approval

The KNHANES is a legally grounded survey mandated by Article 16 of the National Health Promotion Act and was approved by the KDCA's Institutional Review Board (IRB No. 2018-01-03-P-A, 2018-01-03-C-A).

Conflicts of Interest

The author has no conflicts of interest to declare.

Funding

This study was supported by research fund No. 2020-030 from Changshin University, and the data were provided with permission from the Korea Centers for Disease Control and Prevention. The author thanks all entities who assisted with this study for their support.

Availability of Data

All data analyzed in this study are included in this article. For other data, these may be available through the author upon reasonable request

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