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Original Article

Differences in health care indicators and their influencing factors according to the duration of illness in patients with hypertension

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ABSTRACT

Objectives: This study aimed to analyze the differences in health behaviors and hypertension care indicators according to disease duration, and identify the characteristics of health management according to hypertension progression. **Methods:** Data from the 2022 Community Health Survey were used to analyze 50,601 patients with hypertension aged 40–79 years. The analysis employed frequency analysis, chi-squared tests, one-way analysis of variance (ANOVA), and logistic regression models. **Results:** As hypertension duration increased, health behavior indicators such as regular tooth brushing, nutrition label use, and alcohol consumption decreased, whereas depressive symptoms and influenza vaccination rates increased. Hypertension management education and awareness of blood pressure levels tended to increase with longer hypertension duration. **Conclusions:** The findings of this study indicate that the health behaviors and hypertension management indicators of patients with hypertension differ significantly depending on the duration of illness. Notably, there is a tendency towards lower levels of oral health practices. Therefore, multifaceted dental hygiene intervention approaches are required to ensure continuous oral health care and effective management of hypertension.

Key Words: Health status indicators, Hypertension, Oral health, Tooth brushing

Introduction

Hypertension is a major risk factor for cardiovascular diseases such as heart attacks and strokes and is recognized as a significant global public health concern [1]. With the rapid aging of the population, the prevalence of hypertension has steadily increased, rising from 20.6% in 2023 to 21.1% in 2024 [2]. As a result, the economic and social burdens are also growing, underscoring the urgent need for effective prevention and management strategies. Early detection and continuous control of hypertention are more important than ever. Addressing this condition requires a comprehensive approach that extends beyond medication to include lifestyle changes, behavioral modifications, and increased awareness and understanding of the disease.

Recent research has increasingly examined the connection between chronic conditions such as hypertension and oral health. The human body and oral cavity operate as an integrated system, where chronic inflammation in the oral environment can initiate or worsen systemic inflammatory processes, thereby increasing the risk of cardiovascular diseases, including hypertension [3]. In particular, periodontal disease triggers systemic inflammatory responses through persistent inflammation of the periodontal tissues [4], which significantly contributes to elevated blood pressure and a greater risk of cardiovascular complications [5]. Additionally, poor oral hygiene fosters chronic inflammation, potentially affecting both the onset and progression of hypertension.

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Long-term use of antihypertensive medications may also lead to side effects such as dry mouth (xerostomia) or gingival hyperplasia, which negatively impact oral health [6]. Therefore, oral health is a vital indicator of overall well-being and should be considered an essential aspect of disease management for individuals with hypertension. It is important for patients with hypertension to increase their awareness not only of primary management factors like blood pressure control but also of related aspects such as oral care.

In this context, the oral health behaviors of individuals diagnosed with hypertension—particularly regular tooth brushing—are crucial for maintaining overall systemic health, extending beyond oral hygiene alone. Consistent tooth brushing helps remove dental plaque and prevent periodontal disease; moreover, by reducing inflammatory responses, it may aid in better hypertension management [7]. However, there is a notable lack of research examining changes in oral health behaviors relative to the duration of hypertension, especially using community-based data. Importantly, domestic studies that comprehensively assess various health management indicators according to hypertension duration in large cohorts, including middle-aged and elderly populations, remain very limited.

This study analyzed raw data from the 2022 Community Health Survey to examine variations in health behaviors and oral health indicators based on the duration of hypertension, with a particular focus on regular tooth brushing habits. Additionally, it sought to explore the relationships among these variables. By identifying behavioral changes associated with disease progression in individuals with hypertension, the research aims to provide foundational evidence to support the development of integrated health management strategies and oral health–focused preventive interventions for patients with chronic conditions in the future.

Methods

1. Subjects

This study is a secondary data analysis utilizing the raw dataset from the 2022 Community Health Survey. The Community Health Survey is a legally mandated investigation aimed at generating community health statistics and is conducted in accordance with Article 4 of the Regional Health Act and Article 2 of its Enforcement Decree.

The study focused on adults aged 19 and older from 254 cities, counties, and districts nationwide, employing a stratified cluster sampling method to select participants. Out of 231,785 respondents to the 2022 Community Health Survey, 70,581 individuals medically diagnosed with hypertension were identified. After excluding cases with missing data, the final analysis included 50,601 participants aged 40 to 79 years. Access to the data was granted following the submission of an application form and research proposal through the Community Health Survey website, along with the completion of the required approval procedures. The study was conducted with an exemption from review granted by the Institutional Review Board of Howon University (IRB No. 1041585-202504-HR-002-01).

2. Study instruments

This study analyzed variables related to sociodemographic characteristics, health behaviors, and hypertension management indicators, all derived from the Community Health Survey questionnaire. The sociodemographic variables included gender; age groups (40-49, 50-59, 60-69, and 70-79 years); type of residential area (dong versus eup/myeon); marital status (currently married, divorced or separated, widowed, never married); educational attainment (no formal education, elementary school, middle school, high school, college or higher); average monthly household income (less than 1 million KRW, 1 to 2.99 million KRW, 3 to 4.99 million KRW, and 5 million KRW or more); and employment status (employed versus unemployed).

Health behavior variables included current smoking status (categorized as current regular cigarette smoker versus former smoker or non-smoker), annual alcohol consumption (consumed alcohol within the past year versus abstained), use of nutrition labels

(whether nutrition label information influenced processed food selection versus no influence), frequency of tooth brushing (brushing at least twice daily after lunch and dinner versus fewer than twice), subjective stress levels (experiencing a high or considerable degree of daily stress versus minimal or no stress), occurrence of depressive symptoms (experiencing persistent feelings of sadness or hopelessness lasting two or more consecutive weeks within the past year, severe enough to affect daily functioning versus no such experience), and influenza vaccination status (receipt of influenza vaccination within the past year versus non-receipt).

Indicators related to hypertension management included awareness of one's blood pressure status (knowing personal blood pressure readings versus not knowing them), prior exposure to hypertension management education (having received instruction on hypertension management versus not having received such education), recognition of early myocardial infarction symptoms (identifying all five key early symptoms—jaw, neck, or back pain; dizziness; chest pain; arm or shoulder pain; and shortness of breath—versus recognizing four or fewer), and recognition of early stroke symptoms (identifying all five key early symptoms—limb weakness, slurred speech, vision loss in one eye, balance difficulties, and severe headache—versus recognizing four or fewer).

The duration of hypertension was determined by subtracting the age at diagnosis from the current age. This duration was then classified into five intervals: four years or less, five to nine years, ten to fourteen years, fifteen to nineteen years, and twenty years or more.

3. Data analysis

The sociodemographic characteristics and hypertension management indicators of the study participants, grouped by hypertension duration, were summarized using frequencies and percentages (%). Differences between groups were evaluated using the Chi-squared test. Age distribution across the hypertension duration categories was expressed as mean±standard deviation (Mean±SD), and statistical significance was assessed with one-way analysis of variance (ANOVA).

To examine the relationship between the duration of hypertension and various health management indicators, logistic regression analysis was performed. The duration of hypertension was used as the independent variable, while each health management indicator served as a dependent variable. Individuals with a hypertension duration of four years or less were designated as the reference group for comparison. Odds ratios (OR) were calculated for each duration category relative to this reference group. Both unadjusted OR and adjusted OR (aOR), which controlled for sociodemographic covariates, were reported. All statistical analyses were conducted using STATA (ver. 12.0; Stata Corp., College Station, TX, USA), with a significance level set at α=0.05.

Results

1. Characteristics according to hypertension duration

The mean age of the 50,601 individuals enrolled in the study was 64.7 years, with a standard deviation of 9.2 years. The duration of hypertension among participants was categorized as follows: 16,641 individuals (32.8%) had hypertension for 4 years or less, 11,264 (22.3%) for 5 to 9 years, 10,809 (21.4%) for 10 to 14 years, 4,906 (9.7%) for 15 to 19 years, and 6,981 (13.8%) for 20 years or more <Table 1>.

Significant differences were observed in the mean age among groups categorized by the duration of hypertension. The group with hypertension lasting 20 years or more had the highest mean age (4 years or less: 60.9±9.8 years; 20 years or more: 70.7±6.4 years; p<0.001). Gender distribution also varied significantly across these groups, with the highest proportion of females in the 20 years or more category (p<0.001). Similarly, residential area distribution differed notably, with the largest percentage of rural residents found in the group with hypertension lasting 20 years or longer (p<0.001). Additionally, marital status, educational

attainment, average monthly household income, and economic activity status showed statistically significant differences among the duration groups. The 20 years or more group had relatively higher proportions of widowed individuals and those not engaged in employment(p<0.001).

Table 1. Sociodemographic characteristics according to duration of hypertension

Unit: N(%)

Characteristics	Total (N=50,601)	Duration of hypertension (N=50,601)					p^*
		≤4 years (N=16,641)	5-9 years (N=11,264)	10-14 years (N=10,809)	15-19 years (N=4,906)	≥20 years (N=6,981)	
Age[a]	64.79±9.24	60.96±9.82	63.74±8.85	66.36±7.93	68.36±7.52	70.70±6.41	<0.001
Age (yr)							<0.001
40-49	3,639(7.2)	2,373(14.3)	791(7.0)	336(3.1)	94(1.9)	45(0.6)	
50-59	9,974(19.7)	4,864(29.2)	2,624(23.3)	1,649(15.3)	502(10.2)	335(4.8)	
60-69	19,080(37.7)	5,720(34.4)	4,641(41.2)	4,592(42.5)	2,025(41.3)	2,102(30.1)	
70-79	17,908(35.4)	3,684(22.1)	3,208(28.5)	4,232(39.1)	2,285(46.6)	4,499(64.5)	
Gender							<0.001
Male	24,475(48.3)	8,113(48.7)	5,624(49.9)	5,331(49.3)	2,298(46.8)	3,109(44.5)	
Female	26,126(51.6)	8,528(51.3)	5,640(50.1)	5,478(50.7)	2,608(53.2)	3,872(55.5)	
Residential area							<0.001
Urban (dong)	25,401(50.2)	8,571(51.5)	5,668(50.3)	5,415(50.1)	2,381(48.5)	3,366(48.2)	
Rural (eup/myeon)	25,200(49.8)	8,070(48.5)	5,596(49.7)	5,394(49.9)	2,525(51.5)	3,615(51.8)	
Marital status							<0.001
Married	36,270(71.7)	12,177(73.2)	8,242(73.2)	7,766(71.9)	3,417(69.7)	4,668(66.9)	
Divorced or separated	5,163(10.2)	1,848(11.1)	1,195(10.6)	1,075(9.9)	474(9.7)	571(8.2)	
Widowed	7,557(14.9)	1,829(11.0)	1,446(12.8)	1,704(15.8)	925(18.8)	1,653(23.7)	
Never married	1,611(3.2)	787(4.7)	381(3.4)	264(2.4)	90(1.8)	89(1.2)	
Education level							<0.001
Non education	2,293(4.5)	500(3.0)	421(3.7)	466(4.3)	310(6.3)	596(8.5)	
Primary school	12,927(25.5)	3,258(19.6)	2,596(23.1)	2,979(27.6)	1,575(32.1)	2,519(36.1)	
Middle school	9,507(18.8)	2,766(16.6)	2,117(18.8)	2,253(20.8)	966(19.7)	1,405(20.1)	
High school	9,507(31.5)	5,919(35.6)	3,821(33.9)	3,243(30.0)	1,326(27.0)	1,616(23.2)	
College or more	9,949(19.7)	4,198(25.2)	2,309(20.5)	1,868(17.3)	729(14.9)	845(12.1)	
Household income							<0.001
<100	7,889(15.6)	1,894(11.4)	1,570(13.9)	1,776(16.4)	954(19.5)	1,695(24.3)	
100-299	16,366(32.3)	4,565(27.4)	3,477(30.9)	3,812(35.3)	1,779(36.3)	2,733(39.1)	
300-499	8,813(17.4)	3,224(19.4)	2,063(18.3)	1,801(16.7)	778(15.9)	947(13.6)	
≥500	17,533(34.7)	6,958(41.8)	4,154(36.9)	3,420(31.6)	1,395(28.4)	1,606(23.0)	
Economic activity							<0.001
Activity	29,662(58.6)	11,228(67.5)	7,057(62.7)	6,004(55.5)	2,402(49.0)	2,971(42.6)	
Non-activity	20,939(41.4)	5,413(32.5)	4,207(37.3)	4,805(44.5)	2,504(51.0)	4,010(57.4)	

*by chi-square test
[a]age for one-way ANOVA, Unit: Mean±SD

2. Health management indicator levels stratified by hypertension duration

Among the indicators of health behavior, the prevalence of current smoking varied significantly with the duration of illness. Individuals who had been ill for 20 years or more had the lowest smoking rate (10.4%), compared to 17.4% among those ill for 4 years or less (p<0.001). Similarly, the annual alcohol consumption rate decreased from 60.2% in the group ill for 4 years or less to 41.8% in the group ill for 20 years or more (p<0.001). Additionally, both the use of nutrition labeling and the frequency of regular tooth brushing differed significantly across groups, with notably lower rates observed in the long-term illness cohort (p<0.001) <Table 2>.

A significant difference in subjective stress levels was observed among the groups; however, no consistent pattern of increase or decrease emerged (p<0.001). The prevalence of depressive symptoms and influenza vaccination rates varied significantly across groups categorized by illness duration, with the highest prevalence found in the cohort with an illness duration of 20 years or more (p<0.001). Regarding hypertension management indicators, both awareness of blood pressure levels and early recognition of myocardial infarction and stroke symptoms differed significantly according to illness duration (p<0.001). Notably, blood pressure awareness was lowest in the group with 20 years or more of illness (4 years or less: 88.2%; 20 years or more: 85.0%; p<0.001).

Table 2. Health care indicators according to duration of hypertension

Unit: N(%)

Variables	Duration of hypertension (N=50,601)					p^*
	≤4 years (N=16,641)	5-9 years (N=11,264)	10-14 years (N=10,809)	15-19 years (N=4,906)	≥20 years (N=6,981)	
Current smoking						<0.001
Yes	2,903(17.4)	1,789(15.9)	1,470(13.6)	554(11.3)	725(10.4)	
No	13,738(82.6)	9,475(84.1)	9,339(86.4)	4,352(88.7)	6,256(89.6)	
Alcohol drinking						<0.001
Yes	10,018(60.2)	6,416(57.0)	5,697(52.7)	2,391(48.7)	2,916(41.8)	
No	6,623(39.8)	4,848(43.0)	5,112(47.3)	2,515(51.3)	4,065(58.2)	
Utilizing food nutrition label						<0.001
Yes	3,109(18.7)	1,846(16.4)	1,526(14.1)	583(11.9)	752(10.8)	
No	13,532(81.3)	9,418(83.6)	9,283(85.9)	4,323(88.1)	6,229(89.2)	
Regular tooth brushing						<0.001
Yes	10,103(60.7)	6,606(58.6)	6,159(57.0)	2,726(55.6)	3,821(54.7)	
No	6,538(39.3)	4,658(41.4)	4,650(43.0)	2,180(44.4)	3,160(45.3)	
Perceived usual stress						<0.001
High	3,308(20.0)	2,070(18.4)	1,889(17.5)	892(18.2)	1,291(18.5)	
Low	13,333(80.0)	9,194(81.6)	8,920(82.5)	4,014(81.8)	5,690(81.5)	
Perceived depressive symptoms						<0.001
Yes	1,263(7.6)	866(7.7)	913(8.5)	474(9.7)	760(10.9)	
No	15,378(92.4)	10,398(92.3)	9,896(91.5)	4,432(90.3)	6,221(89.1)	
Influenza vaccination						<0.001
Yes	10,487(63.0)	7,781(69.1)	8,104(75.0)	3,903(79.6)	5,848(83.8)	
No	6,154(37.0)	3,483(30.9)	2,705(25.0)	1,003(20.4)	1,133(16.2)	
Awareness blood pressure levels						<0.001
Yes	14,675(88.2)	9,946(88.3)	9,454(87.5)	4,256(86.7)	5,935(85.0)	
No	1,966(11.8)	1,318(11.7)	1,355(12.5)	650(13.3)	1,046(15.0)	
Hypertension management education						0.222
Yes	3,569(21.5)	2,445(21.7)	2,286(21.2)	1,057(21.5)	1,418(20.3)	
No	13,072(78.5)	8,819(78.3)	8,523(78.8)	3,849(78.5)	5,563(79.7)	
Recognition of myocardial infarction early symptoms						<0.001
Yes	8,566(51.5)	5,839(51.8)	5,451(50.4)	2,461(50.2)	3,391(48.6)	
No	8,075(48.5)	5,425(48.2)	5,358(49.6)	2,445(49.8)	3,590(41.4)	
Recognition of stroke early symptoms						<0.001
Yes	10,127(60.9)	6,882(61.1)	6,454(59.7)	2,883(58.8)	3,943(56.5)	
No	6,514(39.1)	4,382(38.9)	4,355(40.3)	2,023(41.2)	3,038(43.5)	

*by chi-square test

3. The association between hypertension duration and indicators of health Behavior

The findings from the analysis investigating the association between the length of hypertension and health behavior indicators, while controlling for sociodemographic variables, are presented in <Table 3>. Annual alcohol consumption significantly decreased with longer hypertension duration, particularly among individuals with hypertension lasting 20 years or more (adjusted odds ratio [aOR] = 0.874, 95% confidence interval [CI]: 0.818–0.933, p<0.001). Although the use of nutrition labeling and the frequency of regular tooth brushing tended to decline as hypertension duration increased, these trends were not consistent (p<0.001). Additionally, both perceived subjective stress and the prevalence of depressive symptoms significantly increased with longer hypertension duration (p<0.001). While the likelihood of receiving an influenza vaccination appeared to rise with extended hypertension duration, this association lacked a clear or consistent pattern (p<0.001).

Table 3. Associations between duration of hypertension and health behaviors

Variables	Duration of hypertension					p^*
	≤4 years OR(95% CI)	5-9 years OR(95% CI)	10-14 years OR(95% CI)	15-19 years OR(95% CI)	≥20 years OR(95% CI)	
Current smoking						
Adjusted[a]	1.00(ref.)	0.972(0.904-1.045)	0.916(0.848-0.990)	0.818(0.734-0.912)	0.918(0.830-1.015)	<0.001
Unadjusted	1.00(ref.)	0.893(0.837-0.953)	0.744(0.695-0.797)	0.602(0.546-0.663)	0.548(0.502-0.598)	
Alcohol drinking						
Adjusted[a]	1.00(ref.)	1.000(0.947-1.055)	0.990(0.937-1.047)	0.966(0.899-1.038)	0.874(0.818-0.933)	<0.001
Unadjusted	1.00(ref.)	0.874(0.833-0.918)	0.736(0.701-0.773)	0.628(0.589-0.670)	0.474(0.448-0.501)	
Utilizing food nutrition label						
Adjusted[a]	1.00(ref.)	0.986(0.922-1.055)	0.944(0.878-1.015)	0.862(0.779-0.954)	0.907(0.825-0.996)	<0.001
Unadjusted	1.00(ref.)	0.853(0.800-0.908)	0.715(0.669-0.764)	0.586(0.533-0.645)	0.525(0.482-0.572)	
Regular tooth brushing						
Adjusted[a]	1.00(ref.)	0.963(0.916-1.012)	0.932(0.886-0.982)	0.904(0.846-0.967)	0.910(0.856-0..967)	<0.001
Unadjusted	1.00(ref.)	0.917(0.874-0.963)	0.857(0.816-0.900)	0.809(0.758-0.862)	0.782(0.739-0.827)	
Perceived usual stress						
Adjusted[a]	1.00(ref.)	1.014(0.953-1.080)	1.049(0.983-1.120)	1.136(1.043-1.237)	1.229(1.137-1.328)	<0.001
Unadjusted	1.00(ref.)	0.907(0.853-0.964)	0.853(0.801-0.908)	0.895(0.825-0.972)	0.914(0.851-0.982)	
Perceived depressive symptoms						
Adjusted[a]	1.00(ref.)	1.019(0.929-1.117)	1.118(1.019-1.227)	1.238(1.103-1.390)	1.379(1.244-1.529)	<0.001
Unadjusted	1.00(ref.)	1.014(0.926-1.109)	1.123(1.027-1.227)	1.302(1.165-1.454)	1.487(1.353-1.635)	
Influenza vaccination						
Adjusted[a]	1.00(ref.)	1.074(1.015-1.136)	1.123(1.057-1.192)	1.231(1.131-1.339)	1.174(1.083-1.272)	<0.001
Unadjusted	1.00(ref.)	1.310(1.245-1.379)	1.758(1.666-1.855)	2.283(2.115-2.464)	3.028(2.821-3.251)	

*by logistic regression analysis
[a]Adjusted for age, gender, residential area, marital status, education level, household income, and economic activity
OR: odds ratio; CI: confidence interval

4. The relationship between the duration of hypertension and hypertension management Indicators

The findings from the analysis examining the association between the duration of hypertension and hypertension management indicators, controlling for sociodemographic variables, are presented in <Table 4>. Awareness of blood pressure levels increased with longer hypertension duration, especially among individuals with hypertension lasting 20 years or more (adjusted odds ratio

[aOR] = 1.298, 95% confidence interval [CI]: 1.188–1.418, p<0.001). Similarly, participation in hypertension management education significantly rose with longer hypertension duration, with those having hypertension for 20 years or more showing an aOR of 1.401 (95% CI: 1.299–1.512, p<0.001). Although statistically significant differences were found in awareness of early symptoms of myocardial infarction and stroke, no clear increasing or decreasing trend was observed in relation to hypertension duration (p<0.001).

Table 4. Associations between duration of hypertension and hypertension management indicators

Variables	Duration of hypertension					p^*
	≤4 years OR(95% CI)	5-9 years OR(95% CI)	10-14 years OR(95% CI)	15-19 years OR(95% CI)	≥20 years OR(95% CI)	
Awareness blood pressure levels						
Adjusted[a]	1.00(ref.)	1.135(1.050-1.227)	1.188(1.099-1.285)	1.271(1.149-1.406)	1.298(1.188-1.418)	<0.001
Unadjusted	1.00(ref.)	1.010(0.938-1.088)	0.934(0.868-1.006)	0.877(0.797-0.964)	0.760(0.701-0.824)	<0.001
Hypertension management education						
Adjusted[a]	1.00(ref.)	1.141(1.075-1.212)	1.227(1.152-1.307)	1.365(1.258-1.482)	1.401(1.299-1.512)	<0.001
Unadjusted	1.00(ref.)	1.015(0.958-1.076)	0.982(0.925-1.042)	1.005(0.930-1.086)	0.933(0.871-1.000)	0.218
Recognition of myocardial infarction early symptoms						
Adjusted[a]	1.00(ref.)	1.033(0.984-1.085)	1.007(0.958-1.059)	1.037(0.971-1.108)	1.035(0.975-1.099)	<0.001
Unadjusted	1.00(ref.)	1.014(0.967-1.064)	0.959(0.913-1.006)	0.948(0.890-1.011)	0.890(0.841-0.941)	<0.001
Recognition of stroke early symptoms						
Adjusted[a]	1.00(ref.)	1.054(1.002-1.108)	1.051(0.998-1.107)	1.072(1.001-1.147)	1.063(0..999-1.130)	<0.001
Unadjusted	1.00(ref.)	1.010(0.961-1.060)	0.953(0.907-1.001)	0.916(0.859-0.978)	0.834(0.788-0.883)	<0.001

*by logistic regression analysis
[a]Adjusted for age, gender, residential area, marital status, education level, household income, and economic activity
OR: odds ratio; CI: confidence interval

Discussion

Evaluating whether health management indicators deteriorate and become problematic in individuals with a long history of hypertension is essential for reducing hypertension-related complications and mortality, as well as for enhancing their quality of life. In this context, the present study aimed to assess the need for developing targeted hypertension management strategies based on the duration of the condition by examining variations in health management indicators among hypertensive patients aged 40 to 79 in South Korea. Utilizing raw data from the 2022 Community Health Survey, the study investigated differences in health management indicators and health behaviors according to hypertension duration, along with associated factors. The findings are presented below.

A prolonged duration of hypertension was linked to a significantly higher average age among affected patients, along with notable shifts in sociodemographic characteristics, including a greater proportion of individuals living in rural areas and those who were widowed. Lee et al. [8] reported that sociodemographic factors—such as educational level, income, and age—were significantly associated with the frequency of tooth brushing and the use of auxiliary oral care products. These findings suggest that patients with long-term hypertension tend to be older and may experience disparities in access to health information, healthcare services, health literacy, and educational resources. Moreover, these socioeconomic and environmental vulnerabilities may exacerbate declines in oral health behaviors and disease management outcomes, underscoring the importance of developing region-specific, tailored hypertension management programs that address these contextual factors.

A prolonged duration of hypertension is linked to a significant decrease in smoking and alcohol consumption. This indicates that

extended experience with the condition enhances health awareness and encourages the voluntary adoption of healthier behaviors. Consistent with previous research, a longer duration of chronic illness tends to promote the habitual integration of disease management practices, resulting in better treatment adherence and a reduced likelihood of engaging in risky behaviors [9]. Furthermore, patients often make healthier lifestyle choices to minimize the risk of complications [10]. Importantly, quitting smoking and moderating alcohol intake are crucial for controlling blood pressure and preventing cardiovascular disease in individuals with hypertension, reflecting positive management outcomes. Over time, as hypertension persists, patients demonstrate complex changes in health behaviors and management indicators, highlighting the beneficial impact of long-term disease experience in reducing key risk factors such as smoking and drinking. These findings also suggest that patients' health awareness gradually improves throughout the course of disease management.

Conversely, the frequency of using nutrition labels and maintaining regular tooth brushing habits decreased as the duration of illness increased. This finding aligns with An and Kim [4], who reported that individuals with hypertension often neglect oral health care. It also supports research [11] showing that stroke patients with longer hospital stays experience a decline in oral health-related quality of life, which negatively impacts their oral health status. Additionally, this trend is consistent with the study by Choi et al. [12], which found that individuals who brush their teeth once daily or less have a higher prevalence of hypertension compared to those who brush regularly after meals, suggesting a potential link between oral hygiene practices and hypertension. Periodontal disease and the number of remaining teeth have both been associated with an increased risk of long-term hypertension [13]. Moreover, antihypertensive medications can cause side effects such as xerostomia (dry mouth) [14] and gingival enlargement [6]. Individuals who brush their teeth less frequently are 1.53 times more likely to have fewer than 20 teeth remaining [15]. Additionally, as tooth loss increases [16], reduced adherence to regular tooth brushing may contribute to a decline in the overall effectiveness of hypertension management [17]. Brushing teeth two or more times daily reduces the prevalence of periodontal disease [18]. Moreover, frequent tooth brushing is associated with improvements in blood pressure, non-HDL cholesterol, triglyceride levels, and fasting blood glucose, as well as reductions in inflammatory markers such as high-sensitivity C-reactive protein (hsCRP) and white blood cell count (WBC) [19]. Therefore, regular tooth brushing extends beyond oral hygiene, playing a beneficial role in regulating systemic inflammation and preventing cardiovascular disease [17]. Since blood pressure control significantly affects both oral and overall systemic health [13], maintaining oral health—particularly through basic practices like tooth brushing—should be regarded as an essential component of systemic health management and disease prevention. Additionally, individuals with long-term hypertension often adopt behaviors directly related to managing their condition, such as quitting smoking and reducing alcohol consumption, but may overlook health behaviors indirectly related to their illness, including diet and oral care. Consequently, it is vital to develop programs for patients with chronic hypertension that promote proactive oral health management alongside regular dental care to support sustained oral health.

This study confirmed that a longer duration of hypertension is significantly associated with higher levels of perceived subjective stress and an increased prevalence of depressive symptoms. These findings suggest that the chronic nature of hypertension may lead to neglect of routine health management behaviors and the development of psychological difficulties over time, resulting in an accumulated mental burden. Prolonged exposure to the disease may also cause emotional exhaustion and a decline in quality of life [20]. Additionally, previous research has shown that individuals with hypertension have more than an elevenfold increase in depressive symptoms [21], that perceived stress significantly raises the incidence of depression among hypertensive patients [22], and that psychosocial stress increases the risk of developing hypertension by 2.4 times, with hypertensive individuals experiencing 2.7 times greater psychosocial stress compared to control groups [23]. These findings support the results of the present study. Since mental stress and depression often contribute to lapses in health management and neglect of oral health care, hypertension management programs should include mental health assessments and interventions as essential components. Such programs must take a holistic approach that addresses not only physical factors, such as blood pressure control, but also the psychological

well-being of patients.

The influenza vaccination rate appeared to rise with the longer duration of hypertension, although the findings were not entirely consistent. This suggests that individuals with chronic hypertension may have better access to and utilization of healthcare services. However, because accessibility can vary depending on factors such as educational level or geographic location, further analyses adjusting for these variables are needed.

Awareness of blood pressure levels and participation in hypertension management education generally increase with the duration of the illness. This trend suggests that patients with chronic hypertension gradually acquire knowledge and practical experience in managing their condition, leading to improved awareness and a greater willingness to engage in educational programs. In contrast, recognition rates of early symptoms related to myocardial infarction and stroke tend to decline or vary inconsistently as the illness progresses. This indicates that, despite having basic knowledge and experience in hypertension management, patients may become less vigilant about their condition and less able to promptly identify and respond to cardiovascular disease symptoms. Indeed, previous studies have shown that individuals with hypertension often have limited awareness of cardiovascular emergency symptoms, which can contribute to delays or failures in early intervention [24].

This study utilizes a cross-sectional design based on raw data from the 2022 Community Health Survey, which inherently limits the ability to establish definitive causal relationships between the duration of hypertension and related health management indicators. Nevertheless, the findings are noteworthy: although patients' knowledge about hypertension tends to improve with longer disease duration, adherence to routine and fundamental health behaviors—especially oral health care—declines. These results highlight the need for integrated hypertension management strategies that go beyond blood pressure control to address broader aspects such as mental health, oral health, and general health behaviors. Additionally, longitudinal studies using panel data are essential to clarify temporal changes in health behaviors and to incorporate objective oral health measures, including periodontal disease diagnosis and tooth loss assessment. Since prolonged hypertension duration is associated with increased health management fatigue, reduced attention to oral health, and potential mental health challenges, there is a critical need for targeted, ongoing educational programs and phased management approaches that integrate oral health, nutrition, and mental health support for patients with long-standing hypertension. Such comprehensive interventions are expected to reduce disease burden and improve patients' quality of life.

Conclusions

This research employed raw data from the 2022 Community Health Survey to examine health behaviors and hypertension care indicators in relation to the duration of hypertension. The study sample comprised 50,601 individuals aged between 40 and 79 years who had received a diagnosis of hypertension. Analytical methods utilized included frequency analysis, chi-square tests, one-way analysis of variance (ANOVA), and logistic regression modeling. The findings are presented as follows.

1. The duration of hypertension among individuals exhibits a positive correlation with increasing mean age and is associated with higher proportions of rural residents, widowed persons, and unemployed individuals.

2. As the duration of hypertension extends, there is a significant decline in health-related behaviors, including the frequency of tooth brushing, the use of nutritional labels, and alcohol consumption.

3. A longer duration of hypertension corresponds with an elevated prevalence of depressive symptoms and a greater likelihood of receiving influenza vaccinations.

4. Furthermore, both participation in hypertension management education and awareness of blood pressure status tend to increase as the duration of hypertension lengthens.

The findings presented above indicate that health behaviors and hypertension management indicators among individuals diagnosed with hypertension vary significantly depending on the duration of the condition. Notably, there is a marked deterioration

in oral health practices over time. Therefore, it is imperative to develop and implement a comprehensive dental hygiene intervention strategy aimed at enhancing sustained oral health maintenance and overall healthcare outcomes for this population.

Notes

Author Contributions

Conceptualization: MY Kim, YJ Jang; Data collection: MY Kim; Formal analysis: MY Kim; Writing-original draft: MY Kim, YJ Jang; Writing-review&editing: MY Kim, YJ Jang

Conflicts of Interest

The authors declared no conflicts of interest.

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Ethical Statement

None.

Data Availability

Data can be obtained from the first author.

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고혈압 유병자 이환 기간에 따른 건강관리 지표의 차이와 영향 요인

초록

연구목적: 본 연구는 고혈압 이환 기간별 건강행태 및 고혈압 관리 지표의 차이를 분석하고, 고혈압 진행 단계별 건강관리 특성을 규명하고자 하였다. **연구방법:** 2022년 지역사회건강조사 자료를 활용하여 40세부터 79세까지의 고혈압 환자 50,601명을 대상으로, 빈도 분석, 카이제곱검정, 일원배치분산분석, 로지스틱 회귀모형을 적용하여 분석하였다. **연구결과:** 고혈압 지속 기간이 증가함에 따라 정기적 칫솔질, 영양표시 활용, 음주량 감소 등의 건강행동 지표는 감소한 반면, 우울증 증상 경험률과 인플루엔자 예방접종률은 증가하였다. 고혈압 관리 교육 경험과 혈압 수준에 대한 인식은 고혈압 지속 기간이 길수록 증가하는 경향을 보였다. **결론:** 이상의 결과로 고혈압 유병자의 건강행태 및 고혈압 관리 지표는 이환 기간에 따라 유의한 차이를 보이며, 특히 구강건강 실천 수준이 낮아지는 경향이 나타나는 것을 확인하였다. 따라서 고혈압 유병자의 지속적인 구강건강 관리를 통해 건강관리가 이루어지도록 다각적인 치위생 중재적 접근이 요구된다.

색인: 건강지표, 고혈압, 구강건강, 칫솔질

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