

# **A Comparative Study of Risk Factors for Hypertension between Middle-aged Male and Female: Based on the 6<sup>th</sup> Korean National Health and Nutrition Examination Survey**

Eunjoo Lee

*Department of Nursing, Kyungnam University  
7 Kyungnamdaehak-ro, Masanhappo-gu, Changwon-si, Gyeongsangnam-do,  
Republic of Korea  
abigail@kyungnam.ac.kr*

## **Abstract**

*This study was done to compare risk factors for hypertension between middle-aged male and female. A nationally representative sample of 246 middle-aged (40-60 years of age) with hypertension from the sixth Korean National Health and Nutrition Examination Survey (KNHANES) was analyzed. The data were analyzed by descriptive statistics, Chi-square test, and t-test with SPSS version 19 program. The results showed that there were significant differences between genders in risk factors for hypertension: waist circumference ( $p < .001$ ), sodium intakes ( $p = .012$ ), smoking ( $p = .001$ ), annual rate of alcohol consumption ( $p < .001$ ), total cholesterol ( $p = .041$ ), HDL cholesterol ( $p < .001$ ), and triglycerides ( $p < .001$ ). But there were no significant differences in psychological factors and health habits. These findings suggest that, to prevent and control midlife hypertension, middle-aged men should abstain from smoking and drinking and reduce waist circumference and triglycerides, and middle-aged women should pay particular attention to reducing cholesterol.*

**Keywords:** *Hypertension, Male, Female, Risk factors, Comparative study*

## **1. Introduction**

### **1.1. Background**

Hypertension is one of the health threatening diseases, the long-term medical management is necessary because of the continually rising state of the arterial blood pressure [1]. Diagnostic criteria is defined when systolic blood pressure (BP) is more than 140mmHg or when diastolic blood pressure is more than 90mmHg [2]. It is not diagnosed until blood pressure is measured because there are usually no symptoms. If hypertension is left without treatment, structure of the heart, blood vessels, and EKG will change and develop to angina pectoris or myocardial infarction [3].

According to the US Center for Disease Control and Prevention, about 29% of American adults have blood pressure (BP) that's high, only half are managing their blood pressure, and it has been reported government is spending significant amount of money on service and medication for blood pressure treatment [3]. Hypertension prevalence in South Korea is relatively high (about 30%) [4], and has emerged as a

---

#### **Article history:**

Received (July 05, 2016), Review Result (September 11, 2016), Accepted (October 13, 2016)

major public health problem because it is highly relevant to cerebrovascular and cardiovascular disease which are the most common cause of death for people [5][6].

Midlife is when body begins to show symptoms of aging where physical, visual and hearing get weakened, in case of women menopause causes severe changes in physical and psychological state [7]. Alcoholism, gastric ulcer, heart disease, and hypertension are most common during this period [8]. Among them high blood pressure is very dangerous because it can develop into cardiovascular disease or cerebral infarction when accompanied by high cholesterol level and smoking [9]. Therefore, it is important to prevent hypertension and find it early.

There are risk factors that cannot be controlled by the patients such as age and history, but patients can modifiable risk factors such as drinking, smoking, old age, lack of exercise, obesity, sodium intake, stress, abdominal obesity, cholesterol, etc. [10]. There should be more effort in raising awareness of the adjustable risk factors and to take care of themselves to prevent the midlife hypertension.

Blood pressure shows difference in age and sex. Blood pressure rises when you are over 60 years old and half of them get high blood pressure. It will be effective in preventing hypertension that the risk factors for hypertension are actively managed before the age of 60. In particular, middle-aged women are expected to differ from man in the risk factors of hypertension because of weight, hormone, and psychological changes that occurs with menopause [4].

However, midlife hypertension related studies in Korea are limited [11][12]. The purpose of this study is to compare the risk factors for hypertension according to gender among middle adulthood (40-60 years of age) with hypertension from National Health and Nutrition Examination Survey. By finding the difference in risk factors for hypertension between male and female, it is expected to provide the basic data for developing intervention programs to prevent midlife hypertension.

## **1.2. Purpose**

The purpose of this study is to compare risk factors for hypertension according to gender in middle-aged adults with hypertension.

## **2. Research methods**

### **2.1. Research design**

This study is descriptive research to compare risk factors for hypertension according to gender in middle-aged adults with hypertension.

### **2.2. Research subjects**

This study used the 6<sup>th</sup> (2014) National Health and Nutrition Examination Survey's raw material which is example of citizens residing in Korea. 246 people of 40-60 years were analyzed. The institutional review board of Korea Centers for Disease Control and Prevention has approved the protocol.

## 2.3. Research measurements

### 2.3.1. General characteristics

General characteristics include age, gender, fourth quartile of income, education, marital status and private insurance.

### 2.3.2. Difference in risk factors for hypertension according to gender in midlife hypertension

Hypertension risk factors include age, BMI, waist circumference, smoking, annual rate of alcohol consumption, sodium intake, average sleep time per day, stress cognition, walking per day, aerobic activities, FBS (fasting blood sugar), total cholesterol, HDL-cholesterol, triglycerides, and LDL-cholesterol. Annual rate of alcohol consumption is generated by frequency of drinking and ‘0’ shows person who never drank to person who drank 1 or less per month for one year, ‘1’ shows person who drank more than 1 glass per month for one year.

## 2.4. Data analysis

Data analysis was conducted using descriptive statistics, independent t-test, and chi-square test with SPSS v. 19 .0 program.

## 3. Results

### 3.1. Characteristics of subjects

The average age of the subjects was 53.85 (5.20) years old, and it included 44.7% men and 55.3% women. The fourth quartile of income was low 14.4%, lower-middle 29.9%, high-middle 27.3%, and high 28.4%. Of those, people who graduated elementary school were 26.1%, middle school were 18.6%, high school were 34.1%, and university or higher were 20.1%. 86% were married or living with a partner, 1.1% were separated, 2.7% widowed, 6.8% divorced, and 3.1% were single. 80.7% had private health insurance and 19.3% did not have health insurance [Table 1].

Table 1. General characteristics of subjects (n=264)

Characteristics	Categories	M(SD), n (%)
Age		53.85(5.20)
Gender	Male	118(44.7)
	Female	146(55.3)
The fourth quartile of income	Low	38(14.4)
	Low – medium	79(29.9)
	Medium - High	72(27.3)
	High	75(28.4)
Education*	Elementary school	69(26.1)
	Middle school	49(18.6)
	High school	90(34.1)
	University ≥	53(20.1)

Marital status	Married, living together	227(86.0)
	Married, separating	3(1.1)
	Bereavement	7(2.7)
	Devoice	18(6.8)
	Not married	9(3.1)
Private insurance	Yes	213(80.7)
	No	51(19.3)

\*Missing value

### 3.2. Comparison of risk factors for hypertension according to gender

There were significant differences of risk factors for hypertension by gender in waist circumference ( $p<.001$ ), smoking ( $p=.001$ ), annual rate of alcohol consumption ( $p<.001$ ), sodium intake ( $p=.012$ ), total cholesterol ( $p=.041$ ), HDL cholesterol ( $p<.001$ ), and triglycerides ( $p<.001$ ). In other words, middle aged men with hypertension had wider waist circumference, higher frequency in smoking, and high sodium intake than middle aged women with hypertension. Blood test showed that men have lower level of total cholesterol and HDL cholesterol but high level of triglycerides than women. However, BMI, sleep time, stress cognition, 1 week walking days, LDL cholesterol, and aerobic activities did not make significant difference between the sexes [Table 2].

Table 2. Comparison of risk factors for hypertension according to gender (n=264)

Characteristics	Categories	Male (118)	Female (146)	$\chi^2$ or t(p)
		M(SD), n (%)	M(SD), n (%)	
BMI		25.99	25.56	.98(.326)
Waist circumference (cm)		89.87	83.28	.59(<.001)
Smoking	Yes	48(40.7)	5(3.4)	56.44(.001)
	No	70(59.3)	141(96.6)	
Annual rate of alcohol consumption	Yes	91(79.1)	57(39.3)	41.47(<.001)
	No	24(20.9)	88(60.47)	
Sodium intakes (mg)		4833.54	3736.52	2.52(.012)
Sleep time/ day		9.78(16.82)	7.48(7.75)	1.47(.143)
Stress recognition		3.15(1.31)	3.03(.83)	.89(.374)
Walking day/ week		4.61(2.79)	4.95(2.70)	-.87(.328)
Fasting blood glucose		112.09	107.26	1.42(.156)
Total cholesterol (mg/dL)		182.28	192.07	-2.05(.041)
HDL cholesterol (mg/dL)		45.06	52.31	-5.06(<.001)
Triglycerides (mg/dL)		200.04	153.46	3.57(<.001)
LDL cholesterol (mg/dL)		101.08	102.41	-.22(.822)
Aerobic exercise	Yes	58(49.2)	72(49.3)	.001(.979)
	No	60(50.8)	74(50.7)	

## 4. Conclusions

Although hypertension is a typical disease that threatens human health around the world, it is possible to prevent at an early stage by managing the adjustable risk factors. This study tried to compare risk factors for hypertension between middle-age men and women with hypertension.

The result of this study showed midlife hypertension prevalence was 44.7% in men and 55.3% in women. It indicates the risk for hypertension is higher in women compared to men. These results are due to the menopause in women which reduces estrogen level, affects the blood vessels, and elevates blood pressure [2]. Women in middle age had worse subjective health status compared to men in middle age. Especially, women in 50s had significantly worse mental health than women in 40s [11]. Thus, women who experienced menopause need special care and attention and should frequently measure blood pressure and take early diagnosis and treatment for hypertension.

The risk factors for hypertension according to gender showed statistical differences in waist circumference, smoking, annual rate of alcohol consumption, sodium intake, total cholesterol, and HDL cholesterol. First, waist circumference of men and women were 89.87cm and 83.28cm respectively. Men had 200mg/dL of triglycerides and women had 153.46mg/dL. Men had higher waist circumference and triglycerides rate than women. These results show high relevance between waist circumference and triglycerides. Kim et al., [13]'s research also showed waist circumference is associated with metabolic syndrome and highly relevant to triglycerides. In addition, high levels of triglycerides were caused by alcohol, overeating, obesity, and lack of exercise which may be the reason why it's higher in men. As a result of that context, this study showed higher rate of alcohol consumption and sodium intake in men than women.

However, total cholesterol and HDL cholesterol rate was significantly higher in women than men. Despite this result, HDL cholesterol is usually higher in women by 10% which can be the reason of the difference. Blood test results showed difference between genders but it is thought that most maintaining the normal range is because compliance of hypertension treatment after hypertension diagnosis is high. However, waist circumference, triglycerides, and blood glucose level all meet criteria of metabolic syndrome [14], and we should not exclude the risk of cardiovascular disease and type 2 diabetes [15]. Therefore, it is necessary to manage weight and exercise as well as drug treatment for hypertension.

Meanwhile, BMI, sleep time, stress cognition, 1 week walking days, FBS, LDL-cholesterol, the practice of aerobic physical activity did not significant difference. In other words, men and women in middle age with hypertension didn't have significant difference in stress cognition and sleep time, as well as psychological factors and exercise such as walking.

In summary, midlife hypertension prevalence was higher in men than women. The risk factors for hypertension according to gender showed statistical differences in waist circumference, smoking, annual rate of alcohol consumption, sodium intake, total cholesterol, and HDL cholesterol. But there were no significant differences in psychological factors and health habits. Therefore, these factors should be considered in order to prevent and manage midlife hypertension. That is, in the case of middle-aged man should abstain from smoking and drinking and try to reduce waist circumference and triglycerides, and middle-aged women should pay particular attention to reducing cholesterol.

It was significant that this study proposed the basic data of nursing intervention for midlife hypertension by using National Health and Nutrition Examination Survey which is representative of our country. Subsequent research has a need to identify risk factors for high

blood pressure in lower age group who lacks the awareness of the seriousness of health care. We suggest repeated research through longitudinal data collection for clarification on risk factors for hypertension.

## References

- [1] J. Naish and D.S. Court, "Medical sciences (2 ed.)", Saunders, (2014).
- [2] N.R. Poulter, D. Prabhakaran and M. Caulfield, "Hypertension", *Lancet*, Vol. 386, No. 9995, pp. 801-812, (2015).
- [3] <http://www.cdc.gov/bloodpressure/facts.htm>
- [4] <http://health.mw.go.kr>
- [5] [http://www.kroeanhypertension.org/download/131107\\_01.pdf](http://www.kroeanhypertension.org/download/131107_01.pdf)
- [6] J.R. Sowers, M. Epstein and E. D. Frohlich, "Diabetes, hypertension, and cardiovascular disease an update", *Hypertension*, Vol. 37, No. 4, pp. 1053-1059, (2001).
- [7] F.J. Bourgeois, P.A. Gehrig, D.S. Veljovich and S. Daniel, "Obstetrics and Gynecology Recall", Lippincott Williams & Wilkins, (2005).
- [8] S.H. Jang, "Sociology of middle age", Sallim books, Paju-si, (2006).
- [9] J. Stamler, J.D. Neaton and D.N. Wentworth, "Blood pressure (systolic and diastolic) and risk of fatal coronary heart disease", *Hypertension*, Vol. 13, No. 5, pp. I2, (1989).
- [10] <http://terms.naver.com/entry.nhn?docId=927329&mobile&cid=51007&categoryId=51007>
- [11] S.G. Rhie and Y.J. Park, "The Comparison of Health Status and Dietary Health Practice with or without Hypertension of Middle-aged Rural Adults in Kyunggi Province", *The Korean Journal of Community Living Science*, Vol. 8, No. 2, pp. 131-143, (1997).
- [12] G.H. Han, J.H. Lee, C. Ryff, N. Marks, S.W. Ok and S.E. Cha, "Health Status and Health Behavior of Middle-aged Korean Men and Women: Focused on Gender and Age-group Differences", *Journal of the Korean Home Economics Association*, Vol. 41, No. 1, pp. 213-229, (2003).
- [13] J.I. Kim, B.C. Jeon, J.M. Kim, J.S. Choi, J.Y. Park, and Y.H. Lee, 'Correlation of Metabolic Syndrome with Waist Circumference and Waist-to-height Ratio", *Korean Journal of Obesity*, Vol. 18, No. 2, pp. 87-93, (2009).
- [14] <http://terms.naver.com/entry.nhn?docId=926836&mobile&cid=51007&categoryId=51007>
- [15] J. Kaur, "A Comprehensive Review on Metabolic Syndrome, Cardiology Research and Practice", vol. 2014, Article ID 943162, 21 pages, <http://dx.doi.org/10.1155/2014/943162>, (2014).

## Author



**Eun Joo Lee**

2014. 6: Ph. D in Nursing, Keimyung University, South Korea

2012. 9. – 2015. 2: Assistant Professor, College of Nursing, Daegu  
Science University, South Korea

2015. 3. – Present: Assistant Professor, Department of Nursing,  
Kyungnam University, South Korea

***This page is empty by intention.***