

## 폐경기 여성의 고혈압과 이상지질혈증의 연관성

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## The Association of Hypertension and Dyslipidemia in Postmenopausal Women

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## ABSTRACT

**Background and Objectives :** The purpose of this study was to figure out the correlation of hypertension and atherogenic dyslipidemia in postmenopausal women. **Materials and Methods :** The study population consisted of consecutive 380 postmenopausal women (age 50, FSH >40IU/L and triglyceride [TG] <400 mg/dl) visiting health promotion center at Samsung Cheil Hospital from March 1997 to July 1998. We measured blood pressure by automatic sphygmomanometer (A & Dco.LTD.TM-2654) and divided them into four groups by blood pressure (Group I; systolic blood pressure [SBP] <120 mmHg and diastolic blood pressure [DBP] <80 mmHg, n = 87. Group II; SBP 120 -139 mmHg or DBP 80 -89 mmHg, n = 109. Group III; SBP 140 -159 mmHg or DBP 90 -99 mmHg, n = 127. Group IV; SBP 160 mmHg or DBP 100 mmHg, n = 57). We measured their body mass index (BMI) and waist-hip ratio (WHR). We also measured their levels of glucose, total cholesterol and TG by automatic biochemical analyzer (Hitachi 7150) and HDL cholesterol by direct method using Auto DAIIICHI reagent. We calculated LDL cholesterol levels by Friedewald formula. **Results :** BMI, WHR and glucose level of group IV were significantly higher than those of group I. But there were no significant differences among the groups in the levels of total cholesterol, LDL cholesterol and apolipoprotein B. HDL cholesterol level of group IV was statistically higher than that of group I. TG level and LDL cholesterol/apo B ratio of group IV were significantly higher and lower than those of other groups respectively. **Conclusion :** Postmenopausal women who had moderate or severe hypertension show the trend toward abdominal obesity and atherogenic dyslipidemia. We might have to pay attention to these metabolic abnormalities in postmenopausal women with hypertension. (Korean Circulation J 1999;29(11):1195-1200)

**KEY WORDS :** Menopause · Hypertension · Atherogenic dyslipidemia..

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## 서 론

가 가

55

(HDL)

erline high - risk) LDL (130 159  
mg/dl) (" high normal range "150  
250 mg/dl) 가  
(small dense) LDL  
40 mg/dl , 50 mg/dl  
HDL  
(atherogenic dyslipidemia) <sup>1)</sup>

(insulin resistance), ,  
가 <sup>2)3)</sup>

가 <sup>4)</sup>

## 대상 및 방법

대 상

1997 3 1998 7  
50 ,

(FSH) 40 IU/L  
400 mg/dl 380  
4 , 1 87

the National High Blood Pre -  
ssure Education Program 가  
<sup>5)</sup> 120

mmHg 80 mm/Hg

, 2 109

120 mmHg 139 mmHg 80 mm

Hg 89 mmHg, 3 127  
140 mmHg 159 mmHg  
90 mmHg 99 mmHg, 4 57  
160 mmHg  
100 mmHg .

방 법

10

(A & Dco.LTD.

TM - 2654)

가 / (waist/hip ratio, WHR)

가

(Hitachi 7150)

HDL AutoDAIICHI

. LDL

Friedewald formula(LDL =

– HDL - /5)

<sup>6)</sup>

Apolipoprotein B(apo B) Nephelometer(Be -  
hring)

분 석

oneway ANOVA test

Tukey

posthoc test

Pearson' s correlation

±

P 0.05

## 결 과

각 혈압군의 평균혈압 및 연령

1 109.7 mmHg,

66.7 mmHg 58.4 . 2

, 3 4

128.0 mmHg/76.2 mmHg, 147.2 mmHg/84.1  
mmHg 165.8 mmHg/96.4 mmHg

59.4 , 58.0 59.4 .

59

(Table 1).

**Table 1.** Mean age, BMI & WHR in each blood pressure group

Parameter	(n=87)	(n=109)	(n=127)	(n=57)	p
Age(year)	58.4 ± 3.0	59.4 ± 3.9	58.0 ± 5.5	59.4 ± 6.4	0.094
BP(S/D)*(mmHg)	109.7 ± 8.5/ 66.7 ± 7.6	128.0 ± 5.4/ 76.2 ± 7.9	147.2 ± 6.8/ 84.1 ± 9.5	165.8 ± 9.6/ 96.4 ± 10.0	
BMI† (kg/m²)	23.9 ± 2.8	24.8 ± 3.3	24.7 ± 3.2	25.7 ± 3.1	0.003 VS
WHR‡	0.86 ± 0.06	0.88 ± 0.07	0.88 ± 0.07	0.90 ± 0.06	0.002 VS

\*blood pressure(systole/diastole) † body mass index ‡ waist/hip ratio

**Table 2.** Blood glucose, total cholesterol, HDL cholesterol, LDL cholesterol and apolipoprotein B levels in each blood pressure group

Parameter(mg/dl)	(n=87)	(n=109)	(n=127)	(n=57)	p
Glucose	95.4 ± 17.2	102.0 ± 26.0	100.0 ± 16.7	108.0 ± 26.1	0.003 vs
Total cholesterol	200 ± 29	215 ± 41	216 ± 37	211 ± 46	NS
HDL cholesterol	55 ± 13	52 ± 12	53 ± 14	48 ± 15	0.011 vs
LDL cholesterol	130 ± 29	138 ± 37	136 ± 34	131 ± 43	NS
Apo B	107 ± 22	112 ± 25	112 ± 23	117 ± 29	NS

체질량지수(body mass index, BMI)와 복부비만도

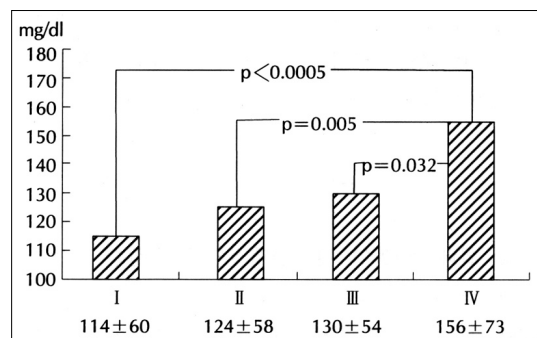
가  
(1 = 23.9 ± 2.8 kg/m², 4 = 25.7 ± 3.1 kg/m², p = 0.003).  
/  
(1 = 0.86 ± 0.06, 4 = 0.90 ± 0.06, p = 0.002, Table 1).

혈 당

(1 = 95.4 ± 17.2 mg/dl, 4 = 108.0 ± 26.1 mg/dl, p = 0.003, Table 2)

지질성분 분석

(Table 2).



**Fig. 1.** Triglyceride levels in each blood pressure group.

(1 = 114 ± 60 mg/dl, 2 = 124 ± 58 mg/dl, 3 = 130 ± 54 mg/dl, 4 = 156 ± 73 mg/dl, 1 vs 4 p < 0.0005, 2 vs 4 p = 0.005, 3 vs 4 p = 0.032, Fig. 1). HDL

가

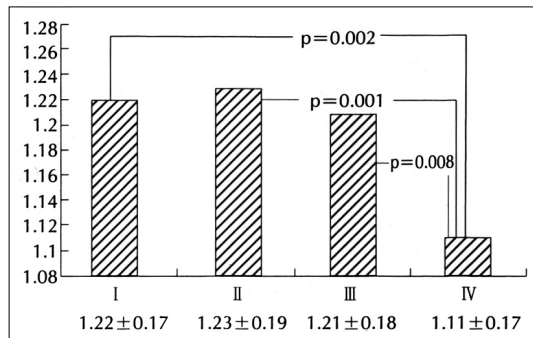
(1 HDL = 55 ± 13mg/dl, 4 HDL = 48 ± 15, p = 0.011, Table 2)

LDL

(Table 2). apo B

가

가



**Fig. 2.** LDL cholesterol/apoB ratio in each blood pressure group.

가 (Table 2).

LDL 콜레스테롤/apo B의 비율  
LDL /apo B  
가  
1.22 ± 0.17, 2  
3 1.21 ± 0.18, 4 1.11 ± 0.17  
p=0.002, 2 4  
p=0.008 (Fig. 2).

## 고 안

가 LDL  
LDL (particle)가  
(atherogenic response)  
1) Fisher가 LDL particle  
9) LDL particle  
가  
가 (small dense) LDL

1)10) the National Cholesterol Education Program(NCEP)

LDL

, LDL

가 LDL particle

, LDL particle apo B 가

LDL particle

apo B

1) LDL particles

가

LDL

/apo B

11)

가 (small dense)

LDL

, LDL  
apo B (Table

2) LDL /apo B

가

(Fig.

2)

가

LDL

12)

,

,

(hyperinsulinemia)

X

13)

Maheux, Krass

,

,

가

16)

dl)

156 ± 73 mg/

dl)

(" high normal range "

LDL

small LDL particles

HDL

mg/dl)

.

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연구목적 :  
가  
.  
.  
방 법 :  
1997 3 1998 7  
(380 , 50 ,  
FSH>40IU/L).  
(1 87 , 120 mmHg  
80 mmHg ), (2 109 ,  
120 mmHg 139 mmHg 80  
mmHg 89 mmHg), (3 127 ,  
140 mmHg 159 mmHg

90 mmHg 99 mmHg),  
(4 57 , 160 mmHg  
100 mmHg ) ,  
/ , , , HDL  
, LDL , apolipoprotein B(apo  
B), LDL /apo B .

결 과 :

LDL / apo B 4 1 , LDL . HDL 4 1 , 4 , LDL /apo B

중심 단어 : . . . . .

## REFERENCES

- 1) Scott M, Small LDL. *Atherogenic Dyslipidemia, and the Metabolic Syndrome*. *Circulation* 1997;95:1-4.
- 2) Austin MA, Hokanson JE, Brunzell JD. *Characterization of low-density lipoprotein subclasses: methodologic approaches and clinical relevance*. *Curr Opin Lipidol* 1994;5:395-403.
- 3) Reaven GM, Chen YD, Jeppesen J, Maheux P, Krauss RM. *Insulin resistance and hyperinsulinemia in individuals with small, dense low density lipoprotein particles*. *J Clin Invest* 1993;92:141-6.
- 4) Johansson S, Vedin A, Wilhelmsson C. *Myocardial infarction in women*. *Epidemiol Rev* 1983;5:67.
- 5) Jeremiah S, Rose S, James D. *Blood Pressure, Systolic and Diastolic, and Cardiovascular Risks*. *Arch Intern Med* 1993;153:598-615.
- 6) William TF, Robert IL, Donald SF. *Estimation of the Concentration of Low-Density Lipoprotein Cholesterol in Plasma. Without Use of the Preparative Ultracentrifuge*.

- Clinical Chemistry* 1972;18:499-502.
- 7) Shepherd J, Cobbe SM, Ford I, Isles CG, Lorimer AR, Macfarlane PW, *et al.* for the West of Scotland Coronary Prevention Study Group. Prevention of coronary heart disease with pravastatin in men with hypercholesterolemia. *N Engl J Med* 1995;333:1301-7.
  - 8) Sacks FM, Pfeffer MA, Moye LA, Rouleau JL, Rutherford JD, Cole TG, *et al.* for the Cholesterol and Recurrent Events Trial Investigators. The effect of pravastatin on coronary events after myocardial infarction in patients with average cholesterol levels. *N Engl J Med* 1996;335:1001-9.
  - 9) Fisher WR. Heterogeneity of plasma low density lipoproteins: manifestations of the physiologic phenomenon in man. *Metabolism* 1983;32:283-91.
  - 10) Lamarche B, Tchernof A, Moorjani S, Cantin B, Dagenais GR, Lupien PJ, *et al.* Small, dense low-density lipoprotein particles as predictor of the risk of ischemic heart disease in men: prospective results from the Quebec Cardiovascular Study. *Circulation* 1997;94:69-75.
  - 11) Hannia C, Erling B, Judith R, McNamara, Jose M, Barbara M, *et al.* LDL Particle Size Distribution. *Arteriosclerosis and Thrombosis* 1992;12:1410-9.
  - 12) Assmann G, Oberwittler W, Schultle H, Schriewer H, Funke H, Epping PH, *et al.* Prediction and early detection of coronary heart disease. *Internist* 1980;21:446.
  - 13) Reaven GM. Role of insulin resistance in human disease. *Diabetes* 1988;37:1595-607.
  - 14) Krauss RM, Burke D. Identification of multiple subclasses of plasma low density lipoproteins in normal humans. *J Lipid Res* 1982;23:97-104.
  - 15) Austin MA, King M-C, Vranizan KM, Krauss RM. Atherogenic lipoprotein phenotype: A proposed genetic marker for coronary heart disease risk. *Circulation* 1990;82:495-506.
  - 16) Reaven GM, Ida C, Jorgen J, Pierre M, Krauss RM. Insulin Resistance and Hyperinsulinemia in individuals with Small, Dense, Low Density Lipoprotein Particles. *J Clin Invest* 1993;92:141-6.