

## 한국 성인에서 성별과 연령에 따른 혈압과 혈중지질의 상관관계

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## The Relationships between Blood Pressure and Serum Lipids in Korean Adults

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## ABSTRACT

**Background and Objectives** : Since better understanding of the associations between blood pressure and blood lipids may provide insight into the mechanisms by which hypertension is associated with increased risk of coronary heart disease, this study is aimed to explore the associations of blood pressure with serum lipids, BMI, age, FBS and life style factors. **Methods and Results** : In this study, 20,826 men and 10,209 women were included for the assessment of the cross-sectional relations of blood lipids, BMI, Blood pressure and Life style factors. Stratified analyses and multivariable methods were used to control for potential confounding anthropometric and lifestyle variables. Total cholesterol and Triglyceride levels increased significantly with increasing systolic or diastolic blood pressure in both sexes. Men of 20 -29 years old had steeper regression slopes for blood pressure by total cholesterol level than did women of similar age. In men, the association between blood pressure and total cholesterol level decreased with age, whereas in women, no change was observed regarding age. Body mass index modified the relation, whereas smoking, exercise, and alcohol consumption had little influence on the association. HDL cholesterol level had little influence on blood pressure. In the group of age <40, age accounted more than BMI for hypertension, whereas in group of age ≥ 40, BMI accounted more. In the group of age <40, other variables, besides age and BMI, are suggested to influence more on male hypertension than female hypertension. **Conclusion** : These results provides evidence that there are interrelations between blood pressure, blood lipids and life style factors that may influence the mechanisms of coronary heart disease. (Korean Circulation J 1998; 28(9):1552-1560)

**KEY WORDS** : Hypertension · Serum lipid · BMI · Life style.

## 서 론

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108

가

: (02) 739 - 3211 · : (02) 734 - 7472

## 연구 방법

1997 1 3      1997 12 31

10,209 20,826  
39, 40 49, 50 59, 60 3.8%,  
50.4%, 30%, 11.5%, 4.4% (Table  
1). 5,099

Variables	N(%)	
Sex		
Male	20826(67.0%)	
Female	10249(33.0%)	
Age(year)	16( 0.1%)	
< 19	1156( 3.7%)	
20 - 29	15649(50.4%)	
30 - 39	9328(30.0%)	
40 - 49	3561(11.5%)	
50 - 59	1365( 4.4%)	
60	20826(67.0%)	
Blood Pressure(mmHg)	JNC	WHO
Normotensive	21282(68.5%)	30154(97%)
Hypertensive	9793(31.5%)	921(3.0%)
BMI(kg/m <sup>2</sup> )		
- 25	19829(63.3%)	
25 - 27.5	6184(19.9%)	
27.5	5055(16.3%)	
Regular Exercise*		
No	3462(71.4%)	
Yes	1386(28.6%)	
Alcohol*		
No	1936(39.1%)	
Yes	3018(60.9%)	
Smoking*		
No	3040(59.6%)	
Yes	2059(40.4%)	
FBS		
< 120	30107(96.9%)	
120	967( 3.1%)	

	(BMI, (kg)	(m)
)	가	20 25 , 25
27.5	, 27.5	.
63.3%가		, 19.9%가
, 16.3%가		.
		1 Korotkoff
	, 5 Korotkoff	
	.	
(	>140 mmHg,	>90 mmHg)
97%가		, 3.0%
	.	, Joint
		<b>1553</b>

of National Committee ( : 180/110 mmHg) 68.5%가  
: 130 - 139/85 - 89 mmHg : 140 - 159/90 - , 31.5%  
99 mmHg, : 160 - 179/100 - 109 mmHg, .

**Table 2.** Mean levels of total cholesterol, high density lipoprotein cholesterol, and triglycerides in 20,826 men and 10,249 women

Blood Pressure (mmHg)	n	Total cholesterol ( ± SD)	HDL cholesterol ( ± SD)	Triglycerides ( ± SD)
Men				
Systolic				
< 130	11907	188.2 ± 34.4	50.6 ± 11.2	126.7 ± 76.3
130 - 139	4626	194.7 ± 34.8	50.4 ± 11.2	145.5 ± 87.3
140 - 159	3514	200.0 ± 36.6	50.6 ± 11.4	158.9 ± 96.1
160 - 179	619	207.0 ± 37.9	50.5 ± 11.3	174.6 ± 104.8
180	159	204.8 ± 35.7	53.1 ± 13.2	157.0 ± 98.2
P value				
Equality		0.0001	0.0001	0.0001
Linear trend		0.0001	0.0674	0.0001
Diastolic				
< 90	13112	188.9 ± 34.7	50.7 ± 11.3	128.1 ± 77.2
90 - 99	5627	196.0 ± 35.1	50.4 ± 11.3	149.2 ± 91.0
100 - 109	1721	203.8 ± 37.4	50.1 ± 11.3	170.2 ± 100.4
110 - 119	283	205.9 ± 36.1	51.1 ± 11.6	168.3 ± 95.0
120	82	200.9 ± 32.8	52.4 ± 13.0	156.4 ± 101.8
P value				
Equality		0.0001	0.0001	0.0001
Linear trend		0.0001	0.0001	0.0001
Total or mean ± SD	20826	192.3 ± 35.4	50.5 ± 11.3	138.0 ± 84.7
Women				
Systolic				
< 130	8133	181.3 ± 34.2	0.5 ± 13.4	85.4 ± 49.9
130 - 139	1086	197.3 ± 37.8	57.5 ± 13.0	116.0 ± 78.3
140 - 159	800	207.6 ± 39.6	56.6 ± 13.4	137.1 ± 95.0
160 - 179	196	215.2 ± 38.1	55.3 ± 13.0	159.1 ± 114.1
180	34	232.2 ± 42.9	55.2 ± 11.3	176.3 ± 110.6
P value				
Equality		0.0001	0.5133	0.0001
Linear trend		0.0001	0.9536	0.0001
Diastolic				
< 90	8498	181.9 ± 34.4	60.4 ± 13.4	86.5 ± 51.8
90 - 99	1276	202.4 ± 39.0	56.9 ± 13.1	124.6 ± 85.3
100 - 109	351	210.0 ± 40.2	56.2 ± 13.5	149.2 ± 95.9
110 - 119	100	216.5 ± 40.4	55.8 ± 13.4	156.8 ± 112.1
120	24	228.5 ± 41.2	55.2 ± 12.5	210.9 ± 178.1
P value				
Equality		0.0001	0.6123	0.0001
Linear trend		0.0001	0.1115	0.0001
Total or mean ± SD	0.24	186.0 ± 36.4	59.8 ± 13.4	94.4 ± 63.2

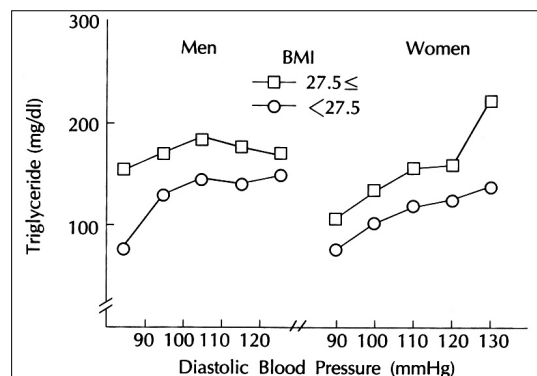
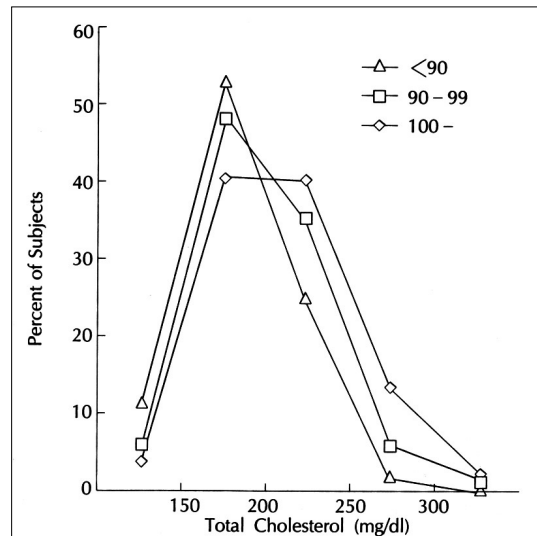
Total Cholesterol, HDL-cholesterol, and Triglyceride levels were adjusted for age and BMI  
Equality by analysis of covariance Linear trend by multiple regression analysis

1000g 10 , 30  
1 10 , 24  
Hitachi 747  
, HDL  
71.4%가  
28.6% 39.1%  
가 60.9%가  
96.9%가 120 mg/dl  
, 3.1%가 120 mg/dl (Table 1).  
통계 분석  
, HDL  
, HDL  
SAS PC+  
V6.12  
연구 결과  
총 콜레스테롤  
가 (Table 2).  
가 0.34 ± 0.02(P<0.01), 0.33  
± 0.04(P<0.01)  
가 0.51 ± 0.03(P<0.01), 0.49 ± 0.03  
(P<0.01)  
(Table 3).

**Table 3.** Stratified Linear Regression of Blood Pressure on serum cholesterol

Dependent variables	Regression Coefficients ± SE	
	Systolic BP	Diastolic BP
Men		
Age		
< 30	**0.50 ± 0.16	*0.48 ± 0.19
30 - 39	**0.46 ± 0.03	**0.63 ± 0.04
40 - 49	**0.37 ± 0.03	**0.53 ± 0.44
50 - 59	**0.20 ± 0.04	**0.22 ± 0.07
60	*0.14 ± 0.07	**0.24 ± 0.12
BMI		
< 25	**0.26 ± 0.02	**0.38 ± 0.04
25 - 27.5	**0.22 ± 0.04	**0.30 ± 0.05
27.5	**0.29 ± 0.04	**0.42 ± 0.06
FBS		
< 120	**0.35 ± 0.02	**0.50 ± 0.03
120	0.11 ± 0.08	*0.35 ± 0.14
Exercise		
No	**0.39 ± 0.06	**0.57 ± 0.08
Yes	**0.29 ± 0.09	**0.40 ± 0.13
Smoking		
No	**0.28 ± 0.06	**0.43 ± 0.09
Yes	**0.33 ± 0.07	**0.47 ± 0.10
Alcohol		
No	**0.27 ± 0.08	**0.40 ± 0.11
Yes	**0.34 ± 0.06	**0.52 ± 0.08
All Men	**0.34 ± 0.02	**0.51 ± 0.03
Women		
Age		
< 30	0.23 ± 0.12	**0.42 ± 0.15
30 - 39	**0.33 ± 0.04	**0.48 ± 0.05
40 - 49	**0.32 ± 0.05	**0.48 ± 0.06
50 - 59	**0.25 ± 0.06	**0.34 ± 0.09
60	**0.35 ± 0.09	**0.55 ± 0.14
BMI		
< 25	**0.29 ± 0.03	**0.44 ± 0.04
25 - 27.5	**0.18 ± 0.07	**0.28 ± 0.09
27.5 <	**0.31 ± 0.01	**0.45 ± 0.10
FBS		
< 120	**0.31 ± 0.03	**0.46 ± 0.03
120	**0.40 ± 0.14	**0.63 ± 0.22
Exercise		
No	**0.27 ± 0.07	**0.29 ± 0.08
Yes	**0.38 ± 0.09	**0.46 ± 0.13
Smoking		
No	**0.32 ± 0.06	**0.36 ± 0.08
Yes	**0.25 ± 0.08	**0.28 ± 0.11
Alcohol		
No	**0.34 ± 0.08	**0.36 ± 0.11
Yes	**0.32 ± 0.07	**0.36 ± 0.09
All Women	**0.33 ± 0.04	**0.49 ± 0.03

† Age-adjusted regression coefficients, \*P<0.05, \*\*P<0.01



**Table 4.** Stratified Linear Regression of Blood Pressure and Triglycerides

Dependent variables	† Regression Coefficient ± SE	
	Systolic BP	Diastolic BP
<b>Men</b>		
BMI		
< 25	**0.71 ± 0.05	**1.01 ± 0.07
25 - 27.5	**0.75 ± 0.10	**1.12 ± 0.14
27.5 <	**0.66 ± 0.10	**1.03 ± 0.16
FBS		
< 120	**0.97 ± 0.04	**1.46 ± 0.06
120	**1.15 ± 0.28	**1.95 ± 0.47
Exercise		
No	**0.96 ± 0.14	**1.51 ± 0.20
Yes	**0.93 ± 0.19	**1.44 ± 0.28
Smoking		
No	**0.91 ± 0.15	**1.46 ± 0.22
Yes	0.89 ± 0.18	**1.13 ± 0.27
Alcohol		
No	**0.86 ± 0.19	**1.48 ± 0.27
Yes	**0.87 ± 0.14	**1.34 ± 0.21
<b>Women</b>		
BMI		
< 25	**0.62 ± 0.05	**0.79 ± 0.06
25 - 27.5	**0.61 ± 0.14	**0.99 ± 0.19
27.5 -	**0.78 ± 0.16	**1.15 ± 0.22
FBS		
< 120	**0.76 ± 0.04	**1.02 ± 0.06
120	**1.04 ± 0.43	**1.75 ± 0.68
Exercise		
No	**0.59 ± 0.10	**0.61 ± 0.13
Yes	**0.77 ± 0.16	**1.14 ± 0.21
Smoking		
No	**0.76 ± 0.10	**0.86 ± 0.13
Yes	**0.51 ± 0.14	**0.64 ± 0.18
Alcohol		
No	**0.52 ± 0.12	*0.70 ± 0.16
Yes	**0.74 ± 0.11	**0.90 ± 0.14

† Age-adjusted regression coefficients, \*P&lt;0.05, \*\*P&lt;0.01

혈압에 영향을 미치는 다인자

가 ,  
40  
40  
40

**Table 5.** Stepwise multiple regression of systolic and diastolic blood pressure for selected variables over the age of 40

Variables	Regression Coefficients	Partial $r^2$	Model $r^2$	P-value
Systolic BP				
Men				
Age	0.50 ± 0.02	0.0616	0.0616	0.0001
BMI	1.21 ± 0.05	0.0588	0.1204	0.0001
FBS	0.05 ± 0.01	0.0068	0.1272	0.0001
Total cholesterol	0.03 ± 0.00	0.0044	0.1316	0.0001
Women				
Age	0.68 ± 0.03	0.1782	0.1782	0.0001
BMI	1.27 ± 0.07	0.0693	0.2474	0.0001
Total cholesterol	0.04 ± 0.01	0.0079	0.2554	0.0001
FBS	0.05 ± 0.01	0.0039	0.2593	0.0001
Diastolic BP				
Men				
BMI	0.89 ± 0.03	0.0736	0.0736	0.0001
Age	0.21 ± 1.12	0.0289	0.1025	0.0001
FBS	0.03 ± 0.00	0.0055	0.1079	0.0001
Total cholesterol	0.02 ± 0.00	0.0034	0.1113	0.0001
Women				
Age	0.37 ± 0.02	0.1303	0.1303	0.0001
BMI	0.92 ± 0.05	0.0762	0.2065	0.0001
Total cholesterol	0.03 ± 0.00	0.0096	0.2161	0.0001
FBS	0.03 ± 0.01	0.0032	0.2194	0.0001

가

(Table 5).

20.65%

고찰

30 49

81%가

가

가

3)7 - 13)

가 20<sup>20)21)</sup>

가 가 가 가 가

가 가 가

가 가<sup>8)9)11)</sup> 가<sup>13)</sup>

가

가

20,826<sup>24)25)</sup>

10,249  
30 40

가<sup>22)</sup> 가<sup>3)</sup>

0.2<sup>8)</sup> 가<sup>5)26-29)</sup> 3

가 가

가 가

가

가<sup>5)19)</sup>

7

$r=0.13$   
 $r=0.20$ <sup>7)</sup> <sup>30)</sup>

LDL

가<sup>15)16)</sup>

가 1,053

가 HDL 가

LDL 가<sup>32)</sup>

가 HDL





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