

1

2

3

가 70 (± : 54.9 ± 7.1) 가 170, 119, 289 40
 가 168/289(62%) . EBT 3
 : 40%, 18.5% , 가 29.7
 9.9 가 (p=.001) 60 가
 1 가 141 , 2 가 41 , 3 19
 (p=.001, .002). 가
 103 (35.6%), 58 (20.1%) , 가
 , 90 (31.1%), 38 (13.1%) ,
 가 (p=.037, odds ratio=1.747).
 (p=.001), (p=.049), (p=.068)
 (p=.118) 가

가 가 (1). (Electron Beam Tomography, EBT) (atherosclerotic plaque) (3-5),
 (2). 가 (6,7), 가 (8),

(9,10). CT (computed tomography)

1
 2
 3
 1997 , 1998 (HMP , EBT
 097-M-I-0011)
 1998 11 4 1999 3 6 (11), 가

(12-15),
 가 ,
 가 ,
 , 가 , EBT
 가 289 (< 0.1
 170 , 119) 40
 70 ((: 54.9(7.1).
 3
 , body mass index (BMI),
 가 168 (58%)
 가 65
 140mmHg
 90mmHg
 140mg/dl 2
 BMI
 (weight(Kg)/ [height(m)]²) (16), BMI 25Kg/m²
 . EBT
 3mm 2-3
 , Triglyceride,
 (HDL-cholesterol),
 (LDL-cholesterol),
 (Electron Beam Tomography,
 Imatron XP-150, S. San Francisco, CA)
 40
 . 3mm
 (collimator) , 100ms, R-R
 80% (EKG-gating)
 Agatston (17)
 가
 Imatron 가
 (Fig. 1).
 SPSS

Mann-Whitney test
 chi-square test
 가
 Mann-Whitney test
 (partial correlation)
 가
 Kruskal-Wallis test p value < 0.05
 p value
 67%, 300
 60% 9
 62 , 64 , 가 (65) 21 ,
 (BMI>25 Kg/M²) 57 (Table 1).
 >240mg/dl 47 ,
 <35mg/dl 19 , >160 mg/dl 44
 0.82-77.8 % (39.8 ± 16.2 %)
 가 (40%), (25%), (20%)

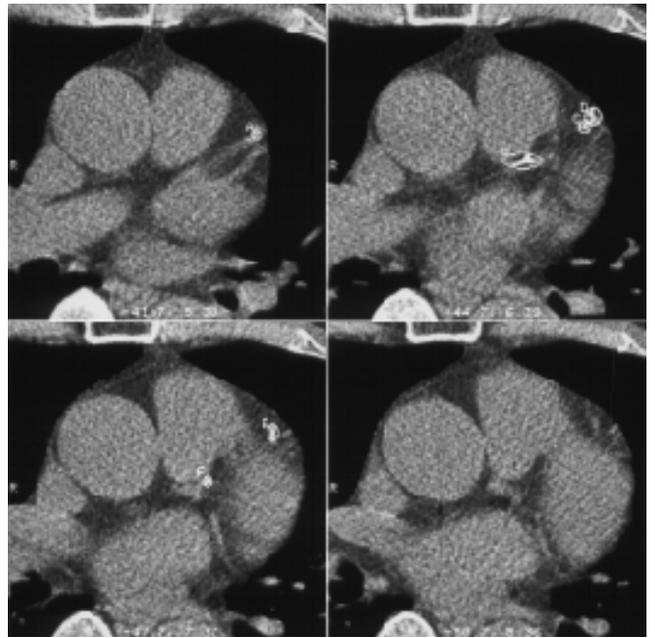


Fig. 1. The Regions of interest were drawn separately for each calcified lesion of coronary arteries. Then, the calcium score was calculated by multiplying area of calcification and score for the peak density of each lesion.

Table 2

	40 (p=.09)	50 (p=.004)
가	60	가
(Table 2).	50	60
60	가	가
103 (35.6 %),	58 (20.1 %)	
가	90 (31.1 %)	
38 (13.1 %)	가	

(p=0.037, odds ratio=1.747 , chi-square test).

(Chi-square test, Table 1). (p= .001), (p= .049), (p= .068)

Table 1. The Analysis of CAC Score and Risk Factors

Risk factors*	Prevalence (% [†])	Chi-square test [‡]	Mann-Whitney test [§] (p)	Regression analysis** (p)
DM	9(3.1)	1.000	0.988	0.560
Hypertension	62(21.5)	0.003	0.001	0.144
Smoking	62(22.1)	0.202	0.118	0.246
BMI> 25kg/m ²	57(24.6)	0.055	0.068	0.471
Prec. FHx	21(7.3)	1.000	0.836	0.430
HDL< 35mg/dl	19(7.9)	0.039	0.049	0.120
Chol> 240mg/dl	47(19.4)	0.637	0.483	0.675
Mesent fat(%)				0.747

*DM : diabetes mellitus, fasting blood glucose 140mg/dl
 Hypertension: Blood pressure 140/90 mmHg
 Pre. FHx : precocious family history: onset of ischemic heart disease < 65 years old.
 BMI : body mass index
 HDL : high density lipoprotein
 Chol : cholesterol
 mesent : mesenteric

[†]Valid percentage: Missing data were excluded.
[‡]Chi-square test for risk factors and presence of CAC.
[§]Mann-Whitney test for the difference of CAC scores in the positive and negative groups of risk factors.
 **Regression analysis including age & sex(not shown in the table)

가 (p=.118)
 가 (p=.836), (p=.988),
 (p=.483) 가 (Table 1).
 (partial correlation)
 (p=.056) 가 (p=.131),
 (p=.328) 가
 (p=.129)
 가 (p=.385), (p=.549),
 (p=.752) 가
 (p=.000)

(Table 1).

(Chi-square test, Table 1).
 가 (n=141)
 (p= 27.0%, 18.9, (n=88) 28.4%, 24.3, (n=41)
 53.7%, 24.1, (n=19) 58.0%, 23.1
 가 가
 가 (p=.001, .002 respectively by
 Kruskal-Wallis test, Table 3).

Table 3. The CAC Score vs. No of Risk Factors

Number of risk factors	No (%)	Prevalence of CAC (%)	CAC score (mean ± SD)	CAC score of Americans (mean)*
0	141 (48.8)	27.0	18.89 ± 74.74	79.1
1	88 (30.4)	28.4	24.34 ± 89.93	158.2
2	41 (14.2)	53.7	24.10 ± 43.00	128.0
3	19 (6.6)	58.0	23.11 ± 35.44	220.0

*Wong et al (13).

Table 2. The Difference of CAC Score & Prevalence of Coronary Calcification in the Men and Women According to the Age Group

Age	No	CAC score			CAC prevalence	
		Men	Women	P*	Men(%)	Women(%)
41-50	73	1.11 ± 3.99	0.38 ± 2.30	0.091	5/36(13.5)	1/37(2.7)
51-60	158	27.82 ± 90.55	6.17 ± 23.91	0.004	38/94(40.9)	14/64(21.9)
61-70	52	54.19 ± 126.28	43.07 ± 7.53	0.764	21/36(58.3)	6/16(40.0)
71-	6	109.50 ± 129.99	62.00 ± 87.68	0.800	4/4(100.0)	1/2(50.0)
Total	289	29.69 ± 92.33	9.94 ± 31.41	0.001	68/170(40.0)	22/119(18.5)

* Mann-Whitney test

(remodeling), (r=0.72) (3).
 (19,21), 1/5, (3,28).
 가, 가
 “ ” (plaque in risk) 가
 (1%) (12,13). (Table 4,5)
 50% 10 20
 (22). 50
 (23,24), 가 (Table 4,5).
 가 40-70
 (24). 70
 (fibrous cap), 가 70
 T2 가
 EBT (EKG gating) 10 50 60 가 가
 (34). 50 60 가 가
 (26), National cholesterol Education Program
 가 (29) 가
 (27), (r = 0.93), (body
 (0.90) mass index 25.0 kg/m²), (30)

Table 4. Prevalence Rate (%) of Coronary Calcification in Asymptomatics.

	Author		Japan(Aizawa)		American(Wong)	
	M	F	M	F	M	F
< 40			29.4	0	15	30
40s	13.5	2.7	30.4	16.7	45	30
50s	40.9	21.6	43.6	23.8	67	27
60s	58.3	40.0	64.1	35.7	83	71
> 70	100.0	50.0	63.6	77.1	93	75

Aizawa et al (15)
 Wong et al (13)

(31), 35%
 45% (32),
 (13)
 (Table 3).
 가
 Schmermund (33)

Table 5. The Average Score in Asymptomatics and NIDDM Korean, and Asymptomatic Japanese and American.

	Author		Korean(Yun)		Japan(Aizawa)		American(Wong)	
	M	F	M	F	M	F	M	F
< 40					0.7	0	23.7	1.6
40s	.1	0.4	93.9	3.6	7.4	4.9	34.9	7.6
50s	27.8	6.2	370.0	83.7	25.0	6.0	115.7	36.5
60s	54.2	43.1	464.9	111.7	147.0	18.6	291.9	69.5
> 70	109.5	62.0	681.2	549.3	50.6	225.3	928.4	147.3

NIDDM; non-insulin dependent diabetes mellitus

Yun et al (40)
 Aizawa et al (15)
 Wong et al (13)

Distribution of Coronary Calcium Score in Healthy Middle-aged Korean¹

Kyu Ok Choe, M.D., Min Jung Kim, M.D., Byoung Wook Choi, M.D., Jung Ho Kim, M.D.²,
Ki Suh Noh, M.D., Si Yon Kim, M.D., Heung Kyu Ko, M.D., Il Suh, M.D.³

¹Department of Diagnostic Radiology and Research institution of Radiological Science

²Department of Clinical Pathology, Yonsei University, College of Medicine Seoul, Korea

³Department of Preventive Medicine, Yonsei University, College of Medicine Seoul, Korea

Purpose : To determine the prevalence and degree of CAC (coronary artery calcification) in apparently healthy middle-aged Koreans, and the relation of CAC to risk factors for atherosclerosis.

Materials and Methods : A total of 289 apparently healthy personnel at Yonsei University (male: 170, female: 119, age: mean(SD)= 54.9 ± 7.1 years) underwent EBT (electron beam tomography). The risk factors for atherosclerosis, which included diabetes mellitus, hypertension, smoking, a family history of precocious onset, obesity, hyperlipidemia, and high intraperitoneal fat, were scrutinized. One hundred and sixty-eight subjects (58 %) had at least one risk factor. The CAC score was calculated for all subjects and for each coronary artery separately and was then analyzed by age and sex and in relation to the risk factors.

Results : The prevalence of CAC was 40% in men and 18.5% in women (mean score: 29.7 vs. 9.9). The number of individuals who had one, two, or more than two risk factors was 141, 41, and 19, respectively. The number of risk factors and the prevalence and score of CAC were significantly correlated ($p=0.01$, 0.02 respectively). The number of individuals with no risk factor, with without CAC, was 58(20.1%) and 103(35.6%), respectively, while the number with some risk factor, with or without CAC, was 38(13.1%) and 90(31.1%), respectively. The CAC score was significantly higher in the presence of hypertension, low HDL, or obesity ($p=0.001$, 0.049 , and 0.068 , respectively). Smoking appeared to have a borderline effect on the calcium score ($p=0.118$).

Conclusion : This study should provide useful information for interpreting CAC scores and establishing a treatment strategy for Koreans. The comparison of our results with other studies will enable a better understanding of the process and risk factors of atherosclerosis in Koreans.

Index words : Coronary vessels, calcification
Coronary vessels, CT
Coronary vessels, stenosis or obstruction

Address reprint requests to : Kyu Ok Choe, M.D., Department of Diagnostic Radiology Yonsei University, College of Medicine
CPO Box 8044 Seoul, Korea.
Tel. 82-2-361-5834 Fax. 82-2-393-3035