Abstract

The Metabolic Syndrome and Associated Risk Factors Among Male Workers in an Electronics Manufacturing Company

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Objective: This study evaluated the determinants of the metabolic syndrome.

Methods: Data were collected through structured questionnaire survey and health examination from 201 male workers aged 30~51years in an electronics manufacturing company during September 2004. The metabolic syndrome and abdominal obesity were assessed according to the NCEP-ATP III definition and the Asia-Pacific guidelines (waist circumference >90 cm for men). Age adjusted odds ratios and 95% confidence intervals for the metabolic syndrome were computed using logistic regression.

Results: The unadjusted prevalence of the metabolic syndrome was 10.5% in male workers. Seventy three workers(35.4%) had 2 or more metabolic risk factors. The prevalence of the metabolic syndrome components was 48.3% for high triglyceride, 40.3% for abdominal obesity, 30.3% for high blood pressure, 8.0% for low HDL-cholesterol, and 2.5% for high blood sugar. The age adjusted odds ratio for the metabolic syndrome was significantly increased in the study population having physical inactivity (unit, 100 kcal/day; OR, 1.142; 95% CI, 1.014~1.286).

Conclusion: Weight reduction and physical exercise may decrease the prevalence of the metabolic syndrome among male workers.

Key Words: Metabolic syndrome, Worker

Zimmet, 1998)

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Reaven(1988)   " Syndrome X"   "   National Cholesterol Education
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1999   52. 4% (420),   2001
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(Ministry of Labor, 2000, 2002, 2004).

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19   (Assmann & Schulte,
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(Liese et al, 1997; Lim et
al, 2003; Park et al, 2004),
(Reaven & Chen, 1996; Isomaa et al,
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(Karlsson et al, 2001; Chang et al, 2004),

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13. 9%   .   10. 5%   .

30   30   9. 0%, 40

35. 8%,   64. 2%   30. 8%   (Table 3).

.   (±   ) 4. 4(±   87. 6 cm,

3. 0)   , 4   30. 4%, 4   7   168. 9 mg/dL, HDL   54. 1

55. 2%, 7   14. 4%   (Table 1).   mg/dL,   118. 9 mmHg,

78. 9 mmHg,   78. 4 mg/dL   (Table

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(p<0. 05)(Table 5).

48. 3%,   40. 3%,

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35. 4%   (Table 2).   ,

(Table 6).

Table 1. General characteristics (N=201)

	Characteristics	Frequency (%)	Mean (SD)	Range
Age (year)	30~39	188 (93.5)	32.8 (3.3)	30~51
	40~49	12 (6.0)		
	50	1 (0.5)		
Education	high school	62 (30.8)		
	junior college	11 (5.5)		
	college	97 (48.3)		
	graduate school	31 (15.4)		
Marital status	never married	49 (24.8)		
	married	146 (73.7)		
	divorced/separated etc.	3 (1.5)		
Income/year (10.000 won)	<2500	6 (2.9)	3831 (757)	1800~6000
	2500~3499	79 (37.8)		
	3500~4499	88 (43.8)		
	4500	28 (13.9)		
Job position	Team director	7 (3.5)		
	Part team leader	29 (14.4)		
	Engineer	93 (46.3)		
	Technician	23 (11.4)		
	Leader operator	36 (17.9)		
	Operator	13 (6.5)		
Career (year)	<4	61 (30.4)	4.4 (3.0)	1~18
	4 , <7	111 (55.2)		
	7	29 (14.4)		

(p<0. 01) .

(p<0. 05)　　　　　　　　　　　　　　.　　　　　　　　　　　　　　　　　　32. 8

100 kcal　　　　　　　　　　　　　　　　　　　　10. 5%　　　　.

1. 142(95% CI, 1. 014- 1. 286)　　(Table 7).　　30　　9. 0%, 40　　(　40~ 51)　30. 8%

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Table 2. Prevalence of each component of the metabolic syndrome and clustering of components(N=201)

Variables	n (%)
Abdominal obesity (WC 90 cm)	81 (40.3)
High TG (150 mg/dL)	97 (48.3)
Low HDL-C (<40 mg/dL)	16 (8.0)
High BP (130/85 mmHg)	61 (30.3)
High FBS (110 mg/dL)	5 (2.5)
1 component	136 (66.8)
2 components	73 (35.4)
3 components	21 (10.5)

Abbreviations: WC, waist circumference; TG, triglyceride; HDL-C, high density lipoprotein cholesterol; BP, blood pressure; FBS, fasting blood sugar

Table 3. The age-specific prevalence rate of the metabolic syndrome

age (year)	n	Prevalence rate, % (n)
30~39	188	9.0 (17)
40	13	30.8 (4)

Table 4. The mean and range of metabolic syndrome components (N=201)

Metabolic syndrome components	M (± SD)	Range
WC (cm)	87.6 (± 8.0)	67.8~117.7
TG (mg/dL)	168.9 (± 156.0)	26~1089
Log TG (mg/dL)	4.9 (± 0.7)	3.3~7.0
HDL-C (mg/dL)	54.1 (± 12.0)	31~124
SBP (mmHg)	118.9 (± 10.3)	90~160
DBP (mmHg)	78.9 (± 8.2)	60~105
FBS (mg/dL)	78.3 (± 12.4)	60~148

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; Log TG, TG transformed by Log function

Table 5. Pearson's correlation coefficients among metabolic syndrome components(N=201)

	WC	TG	Log TG	HDL-C	SBP	DBP	FBS
WC	1						
TG	$0.28^{‡}$	1					
Log TG	$0.36^{‡}$		1				
HDL-C	$-0.33^{‡}$	$-0.43^{‡}$	$-0.53^{‡}$	1			
SBP	$0.22^{†}$	0.08	0.09	0.00	1		
DBP	0.18^{*}	0.13	0.13	-0.09	$0.68^{‡}$	1	
FBS	-0.01	0.04	0.06	0.09	0.21^{*}	0.11	1

* $p < 0.05$, † $p < 0.01$, ‡ $p < 0.001$

NCEP-ATP III   37. 9%,

.   34. 1%,   HDL   20. 7%,

1998   12. 9%,   10. 3%   .

20   9. 4%, 30   19. 5%, 40

27. 5%   (Park et al, 2003).

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6. 5%, 30   19. 4%, 40   18. 9%

(Lym et al, 2003).   .

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48. 3%,   .

40. 3%,   30. 3%   HDL

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NCEP ATP III-BMI25   NCEP-ATP III

3   30~ 60   (Shiwaku   (Ford et al, 2002; Park et al, 2003;

et al, 2005)   ,   Shiwaku et al, 2005)

Table 6. Metabolic syndrome risk for each associated factor (N=201)

Characteristics		Metabolic syndrome	Non metabolic syndrome	t/x²	p
Biologic factor	Age	34.0 (4.5)	32.7 (3.2)	-1.76	0.080
	Family history yes	6 (12.8)	41 (87.2)	0.35	0.553
	no	15 (9.7)	139 (90.3)		
Socioeconomic factor	Education level high school	6 (9.7)	56 (90.3)	0.06	0.812
	college & graduate	15 (10.8)	124 (89.2)		
	Income (10,000 won/year)	4052.4 (629.0)	3772.3 (767.2)	-1.61	0.109
	Family or friend support	11.9 (1.7)	11.8 (1.6)	0.18	0.853
Health behavior	Smoking amount (pack-year)	9.3 (8.1)	5.7 (6.5)	-1.98	0.060
	Drinking amount (g/day) <30	15 (8.8)	155 (91.2)	3.11	0.078
	30	6 (19.4)	25 (80.6)		
	Physical activity amount (kcal/day)	2089.7 (318.9)	2329.9 (428.8)	3.14	0.004
	Diet pattern	92.5 (6.5)	93.3 (7.0)	0.51	0.608
Work environment	Work pattern day time fixed	17 (12.0)	125 (88.0)	1.20	0.273
	rotating shift	4 (6.8)	55 (93.2)		
	Job strain*	54.0 (8.4)	52.8 (8.4)	-0.59	0.553
	Supervisor support	11.2 (1.3)	11.3 (1.4)	0.33	0.739
	Colleague support	12.3 (1.2)	11.9 (0.9)	-1.95	0.052

*: Job strain=(Job demand/Job control)× 100

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Table 7. Age adjusted odds ratio for the metabolic syndrome

Characteristics			Age adjusted odds ratio (95% CI)
Biologic factor	Family history	yes	1.261 (0.454~3.504)
		no	1
Socioeconomic factor	Education level	high school	1
		college & graduate	1.285 (0.459~3.592)
	Income (10,000 won/year)		1.000 (0.999~1.001)
	Family or friend support		1.004 (0.764~1.319)
Health behavior	Smoking amount (pack-year)		1.059 (0.987~1.136)
	Drinking amount (g/day)	<30	1
		30	2.064 (0.700~6.089)
	Physical inactivity amount (× 100kcal/day)		1.142* (1.014~1.286)
	Diet pattern		0.976 (0.912~1.045)
Work environment	Work pattern	day time fixed	1
		rotating shift	0.603 (0.191~1.909)
	Job strain		1.025 (0.971~1.082)
	Supervisor support		0.940 (0.676~1.308)
	Colleague support		1.572 (0.999~2.474)

*: p<0.05

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48. 3%, 40. 3%, 30. 3% HDL

8. 0%, 2. 5% .

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(p<0. 01) .

(p<0. 05). 100 k cal

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CI, 1. 014- 1. 286) .

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