The Status of Diabetes Managemnt in Elderly Koreans

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Division of Endocrinology & Metabolism
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2012...
대한민국

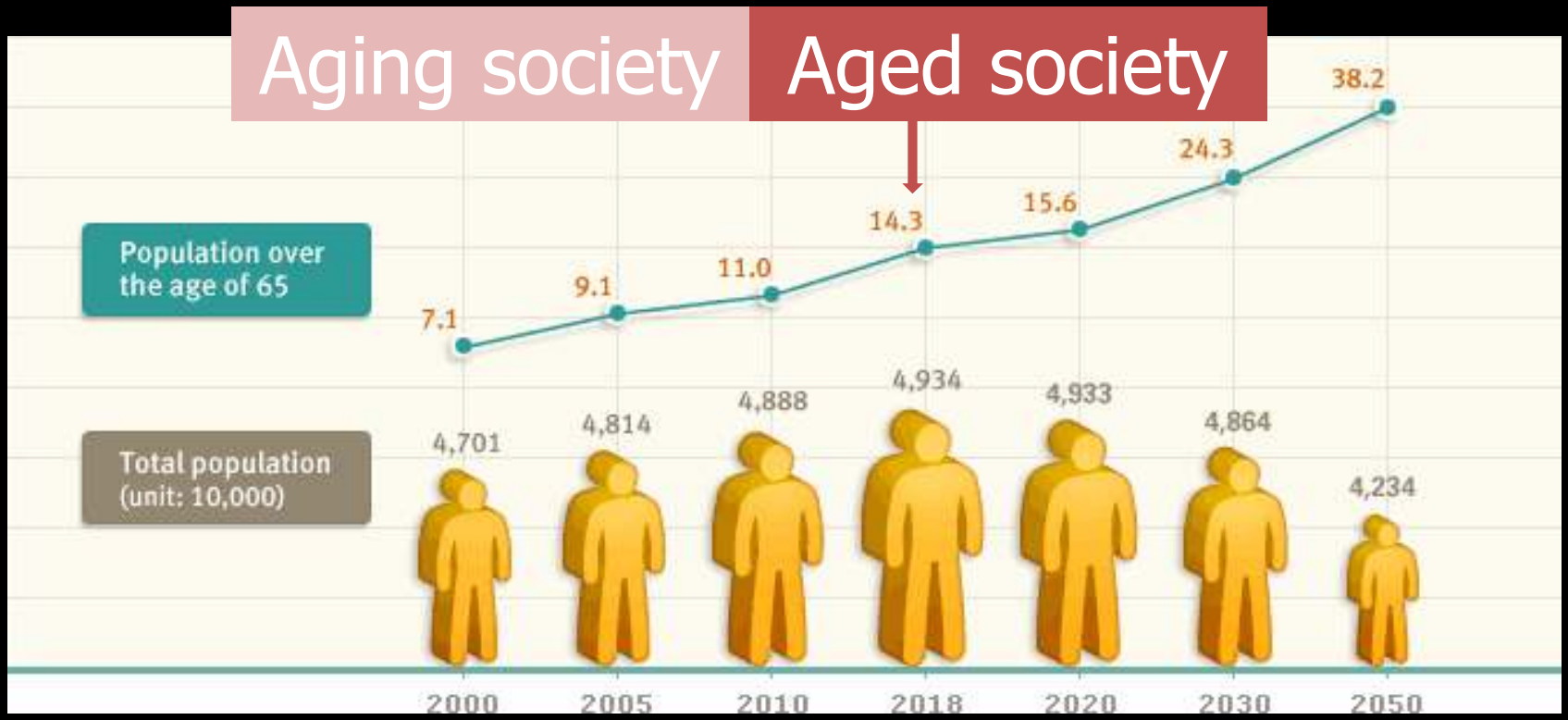


이런 모습,
상상은 해보셨나요?

아이보다 어른이 많은 나라, 상상해보셨나요?
2004년 OECD 국가 중 최저 출산율의 나라,
세계에서 고령화가 가장 빨리 진행 중인 나라,
2050년 노인인구비율이 37.3%에 이르는 나라,
그곳이 다름 아닌 우리나라입니다.
내 아이를 갖는 가족과 나라의 미래를 함께 생각해 주세요.
아이들이 대한민국의 희망입니다.

공익광고협의회
한국방송광고공사

Aging Society……Aged Society…



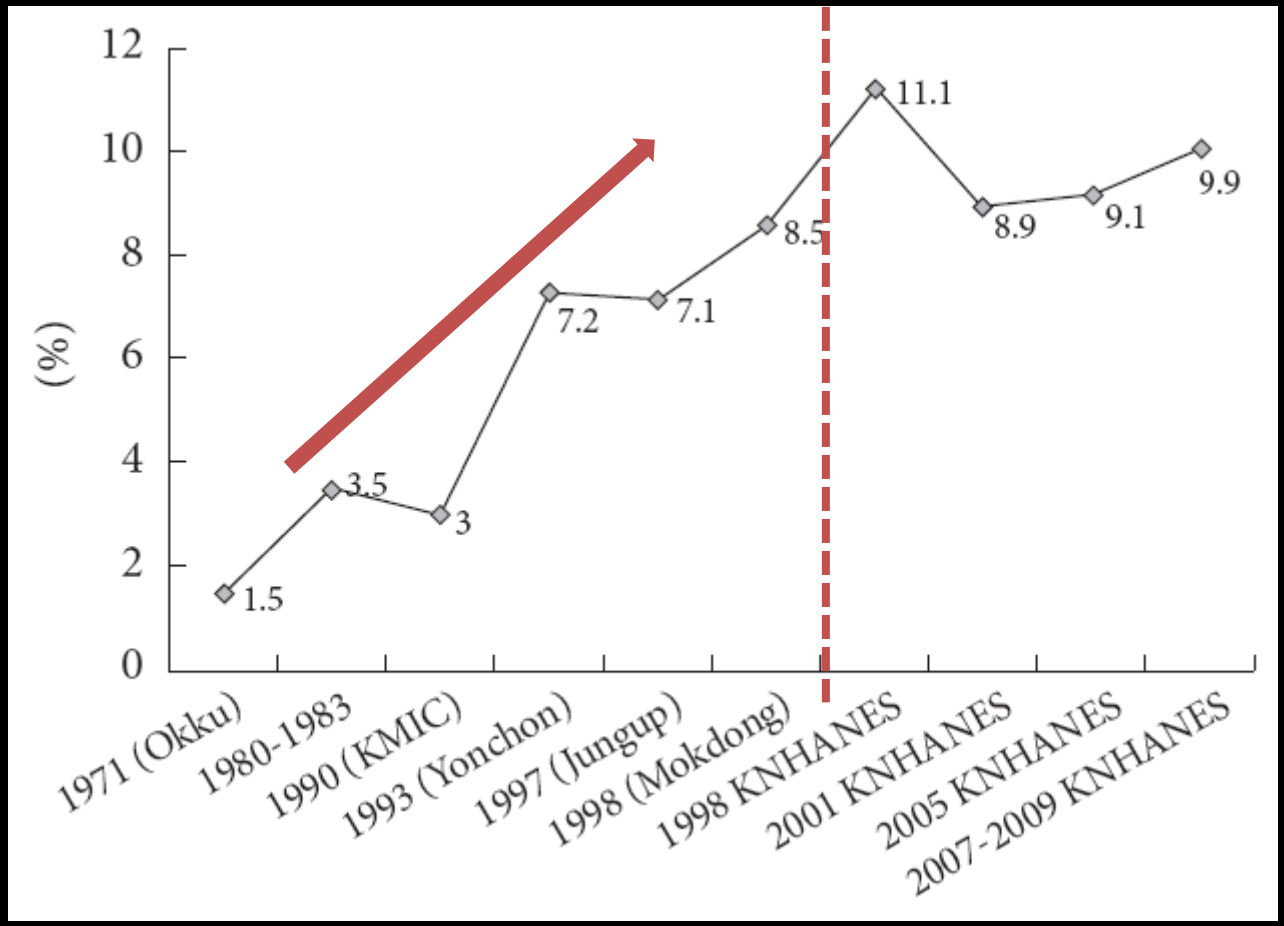
Korea National Statistical Office. Korean Statistical Information system(KOSIS)

All Diseases run into one, Old Age



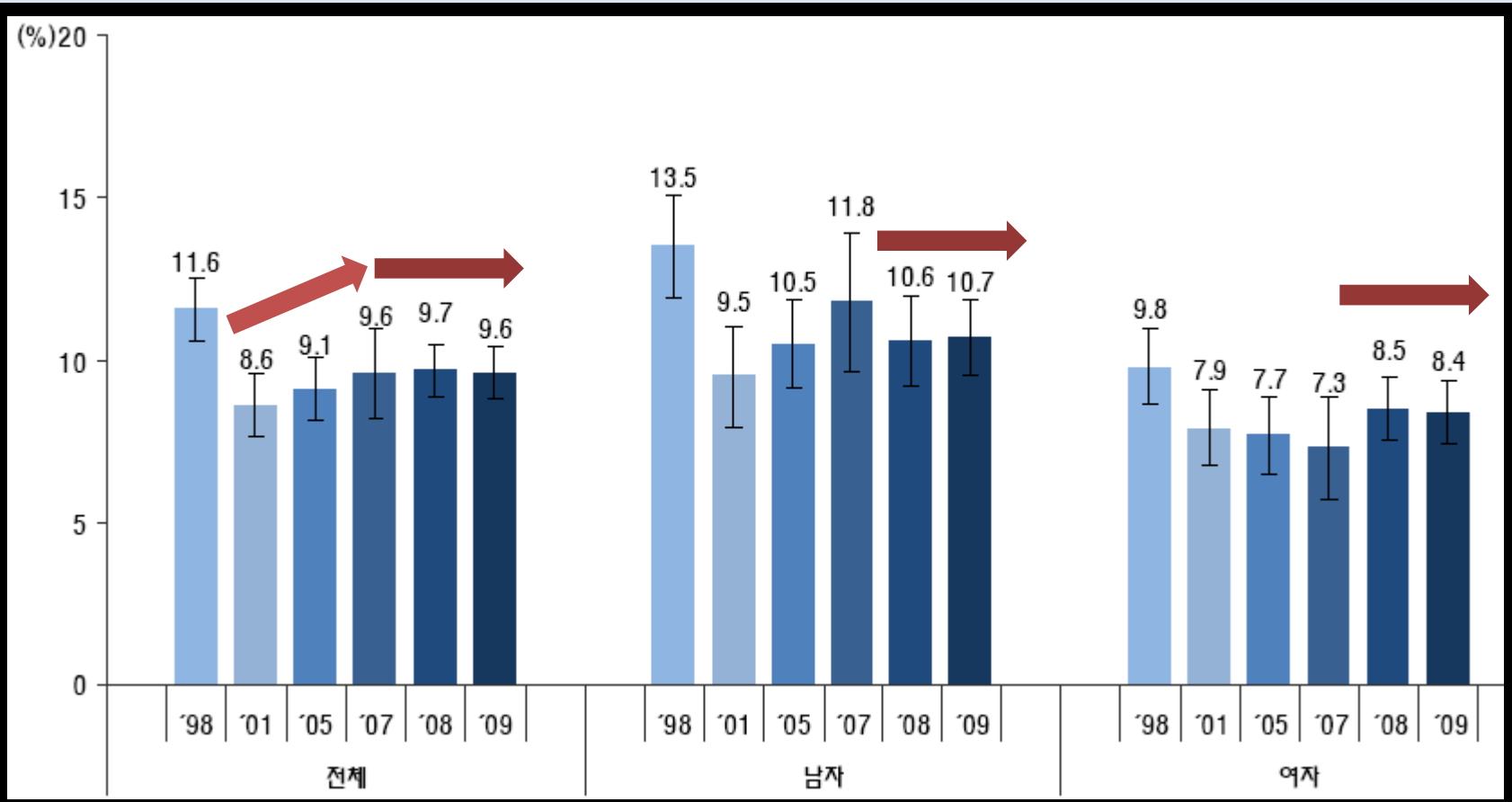
Ralph Waldo Emerson

Trends of Diabetes Prevalence in Korea



Diabetes Metab J 2011;35:303-308

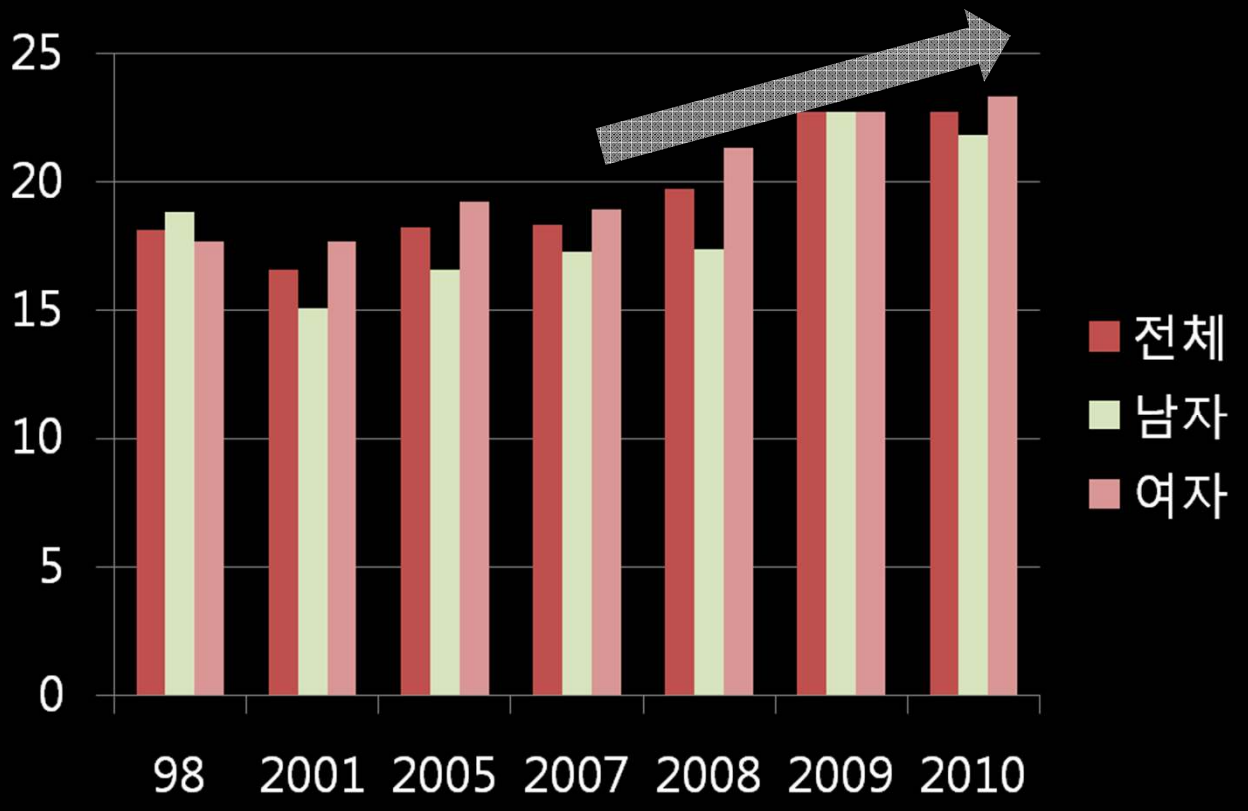
Trends of Diabetes Prevalence in Korea



•당뇨병 유병률: 공복혈당 126 mg/dL이상 or 의사진단 or 약제투여
•2005년 추계인구로 연령 표준화

KNHANES, 2009

Trends of Diabetes Prevalence in Korea (≥ 65 years)



KNHANES, 2010

Diabetes Management; *Complex!!*

Diabetes

Cognitive

Mood

Susceptibility

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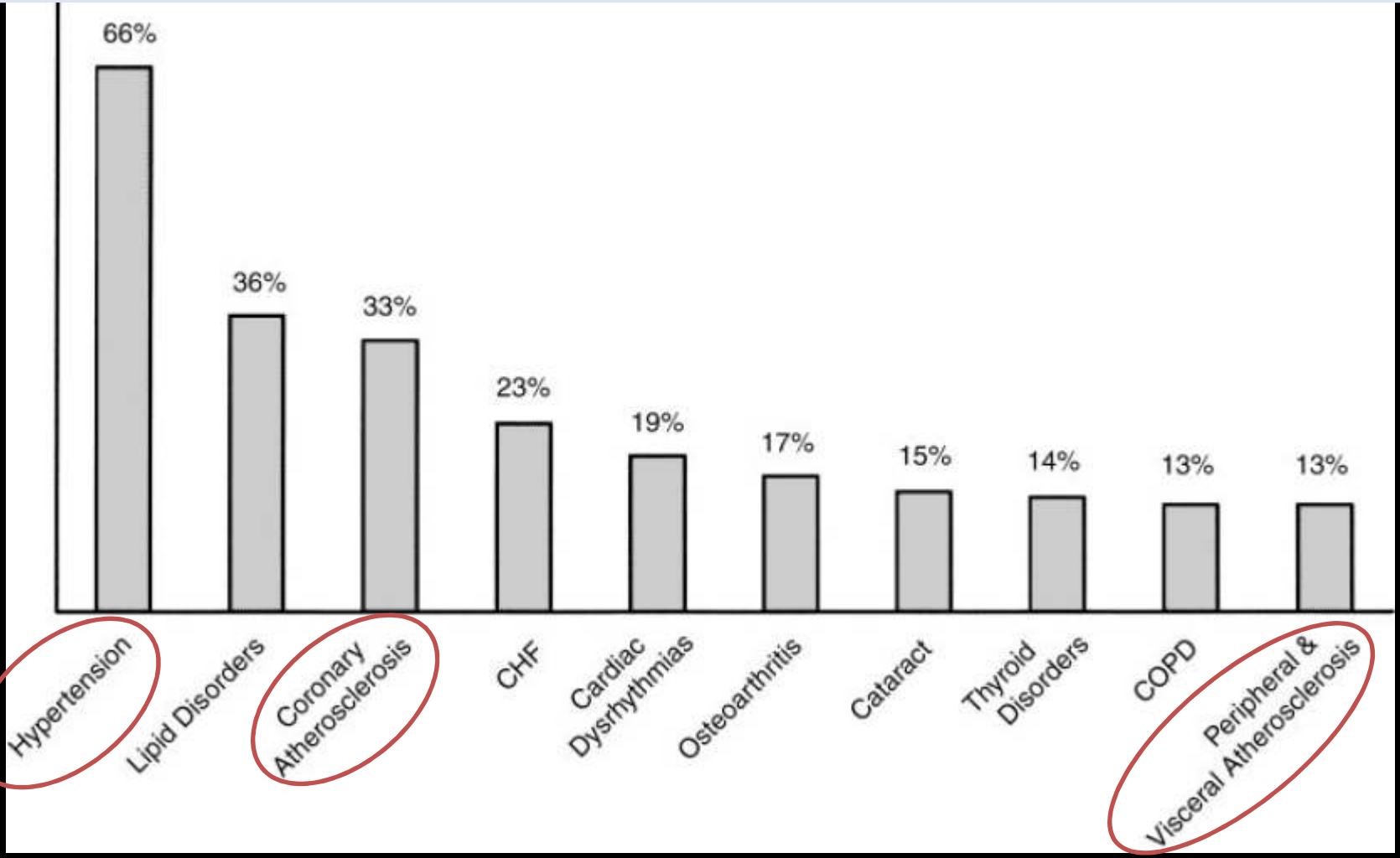
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Aging



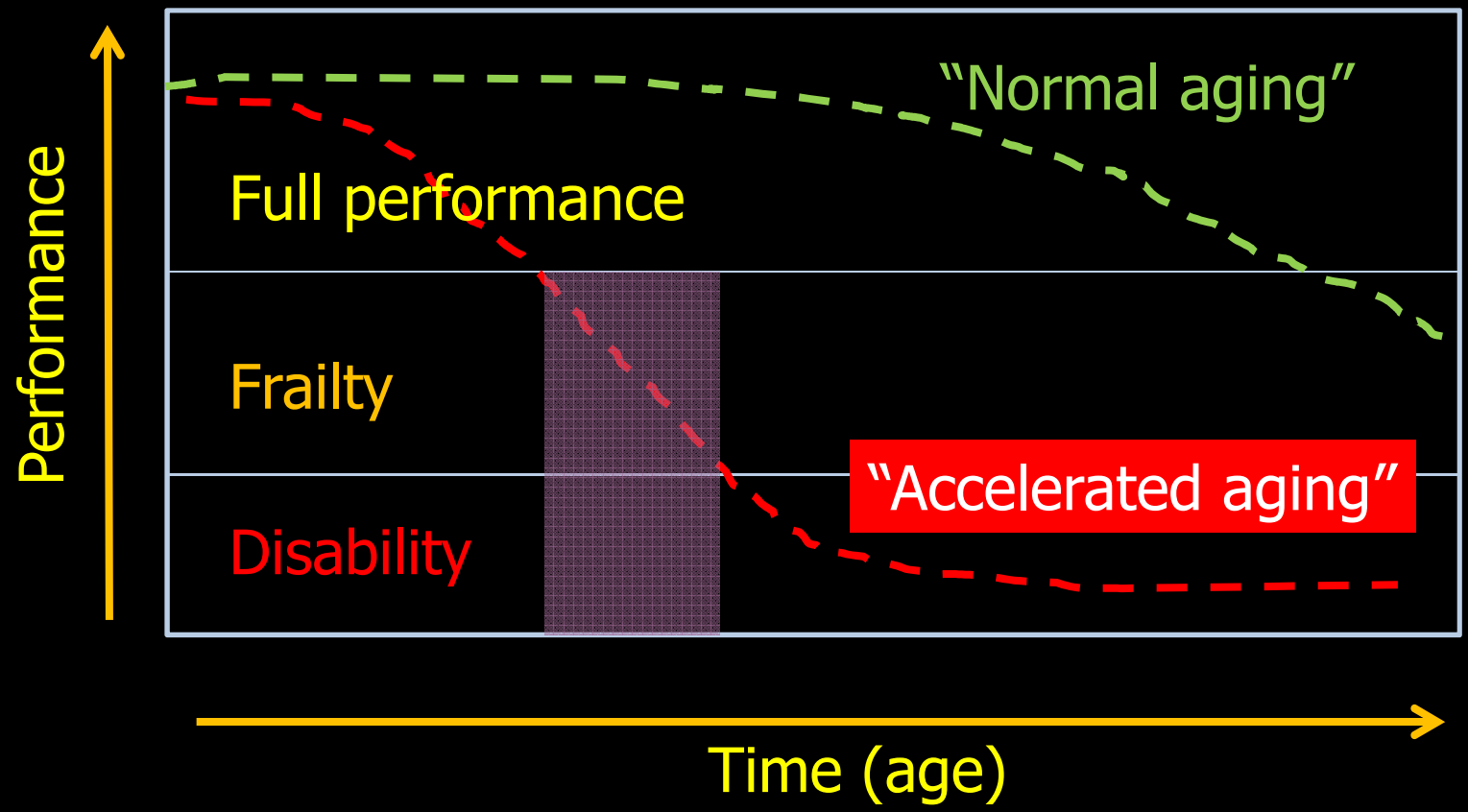


Comorbid Conditions in Type 2 Diabetes (≥ 65 years)



Diabetes Care 26:1344–1349, 2003

Accelerated or Advanced Aging



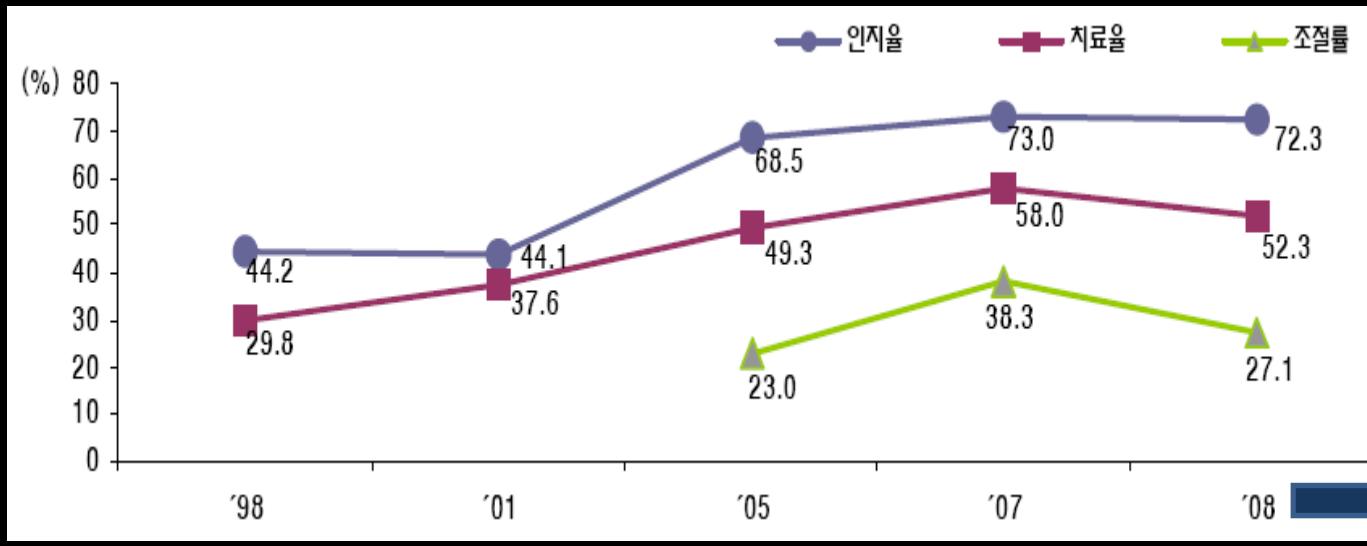
Ferruci et al. J Endocrin Invest, 2002

A Diabetic Battle Plan





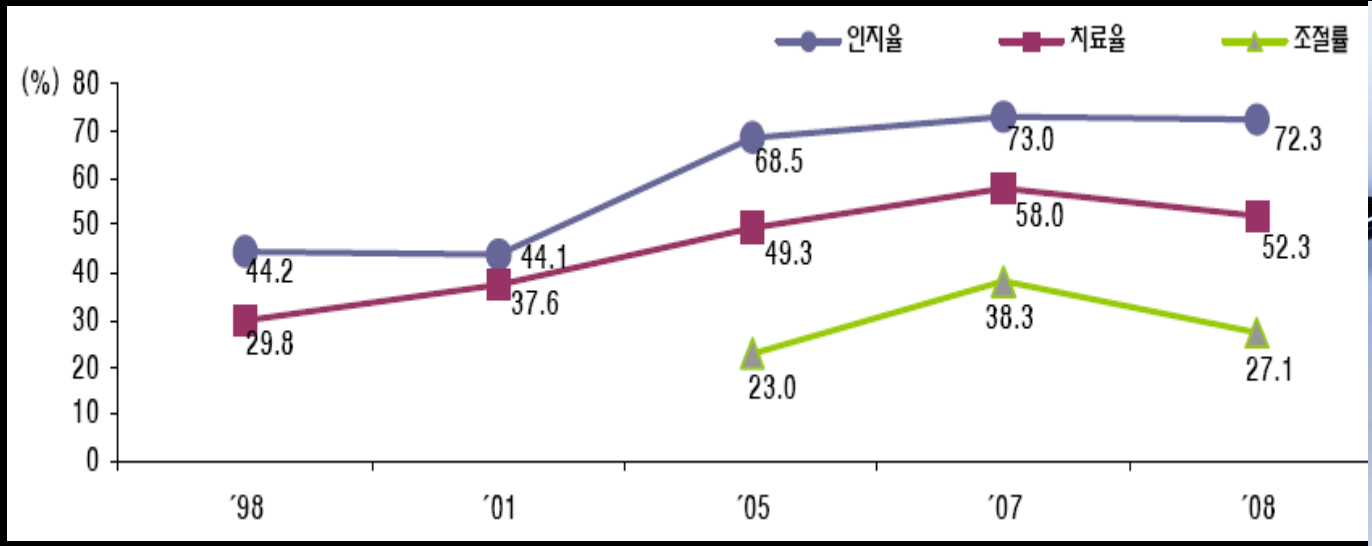
Current status of Management of Diabetes in Elderly





KNHANES, 2008

Current status of Management of Diabetes in Elderly

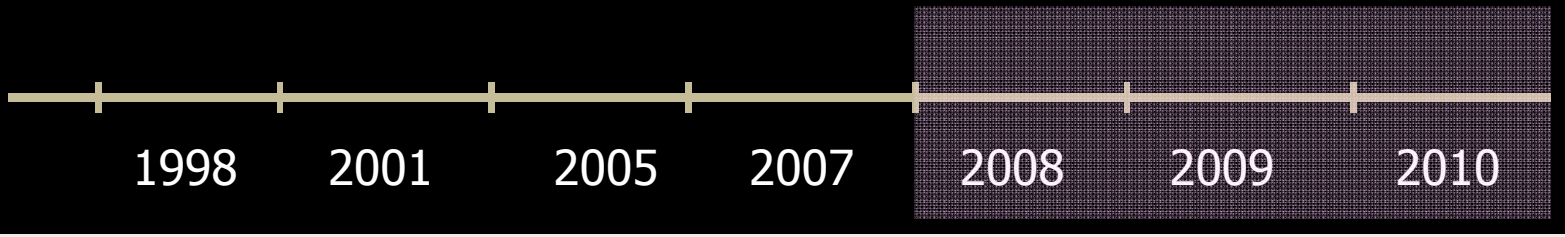




국민건강영양조사 2008 - 2010

Korea National Health and Nutrition Examination Surveys

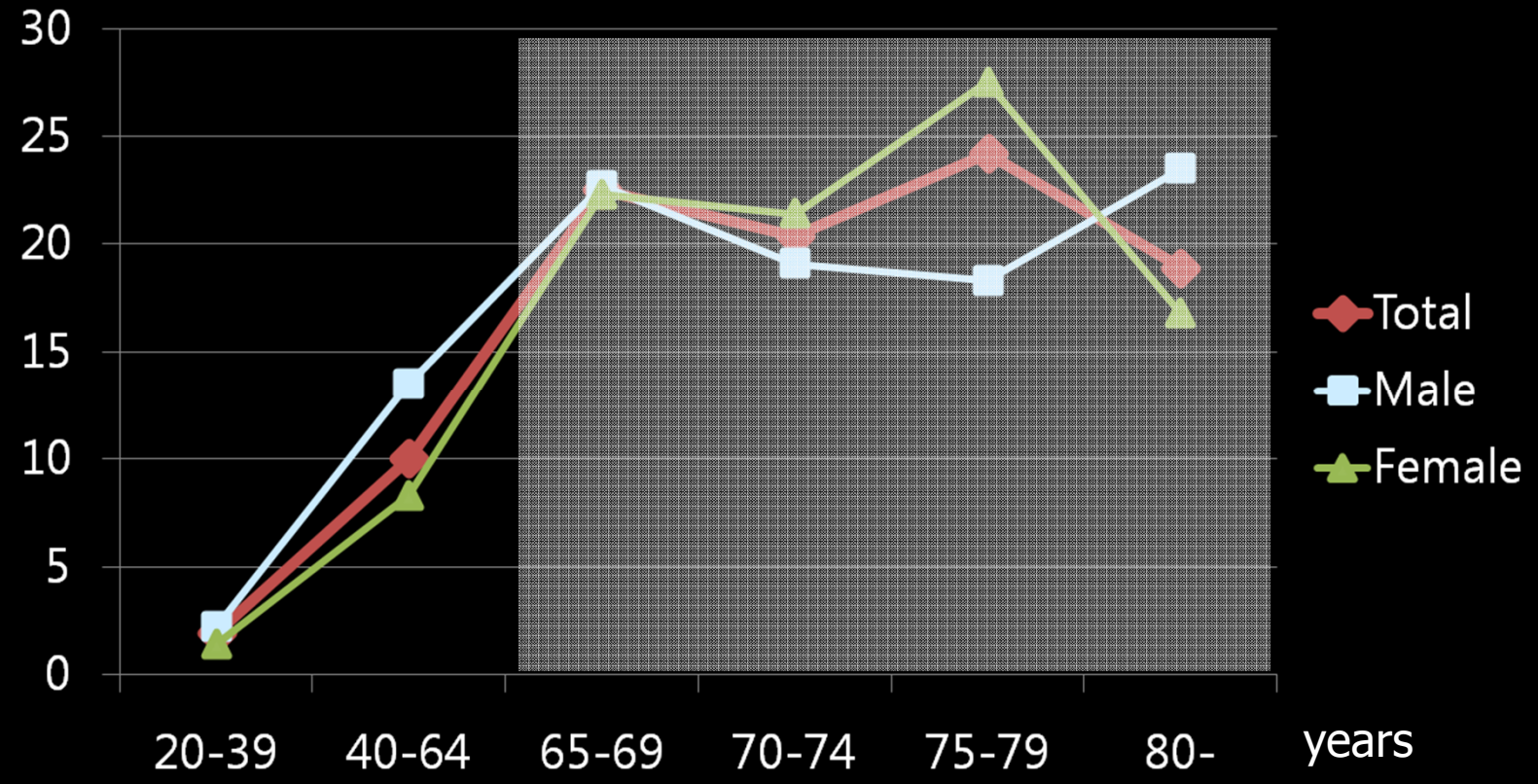
- Nationally representative



- Total population: 21,571(M 9,400, F 9,605)
- ≥ 65 years: 2,652 (M 1,079, F 1,573)
- After exclude missing data:2,352 (M 1,989, F 1,363)

- SPSS 18.0
- For prevalence calculation, we used sampling weights designated by KNHNES

Diabetes Prevalence in Elderly Koreans (2008-2010)



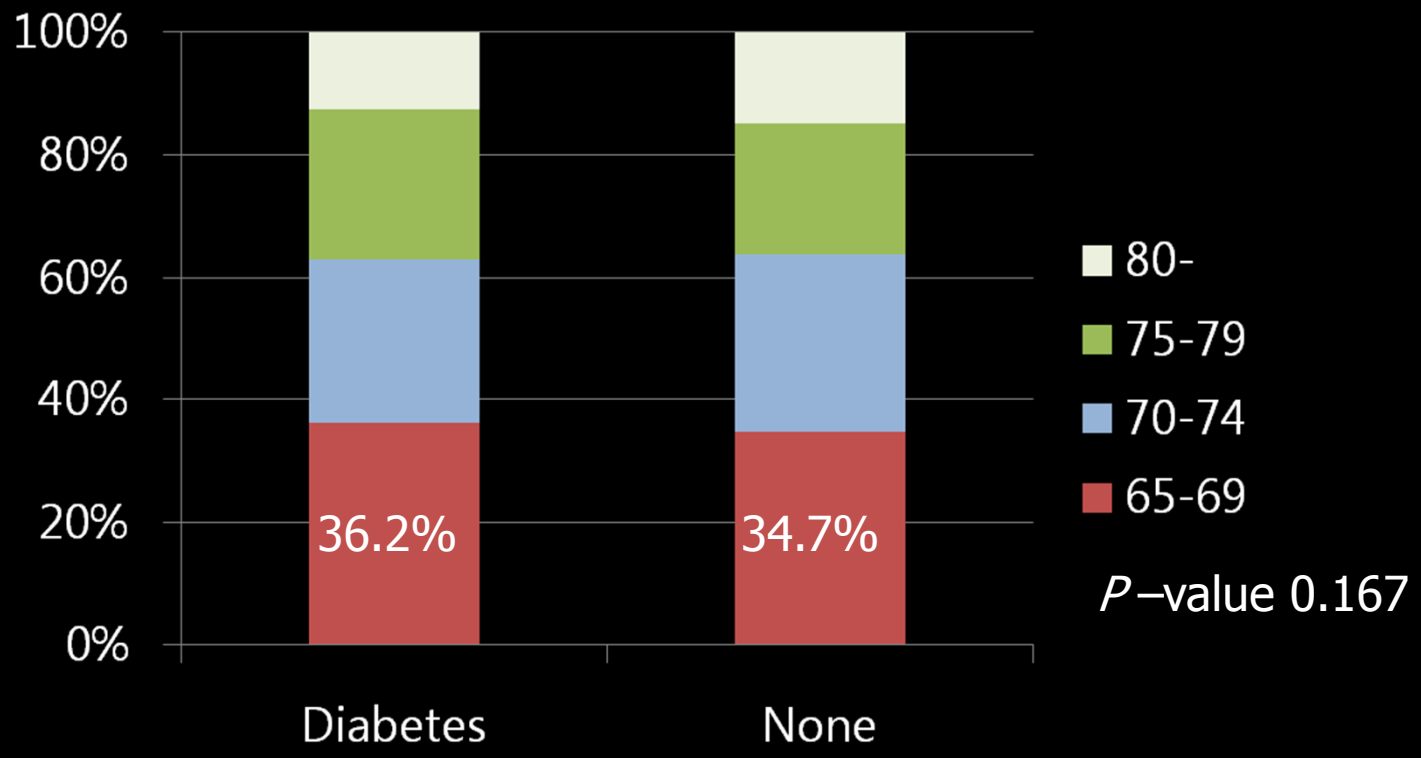
Total 21.83 (95% CI 20.24-23.41)

Male 20.84 (18.40-23.28), Female 22.50 (20.42-24.59)

Diabetes: Known diabetes or FPG ≥ 126 mg/dL

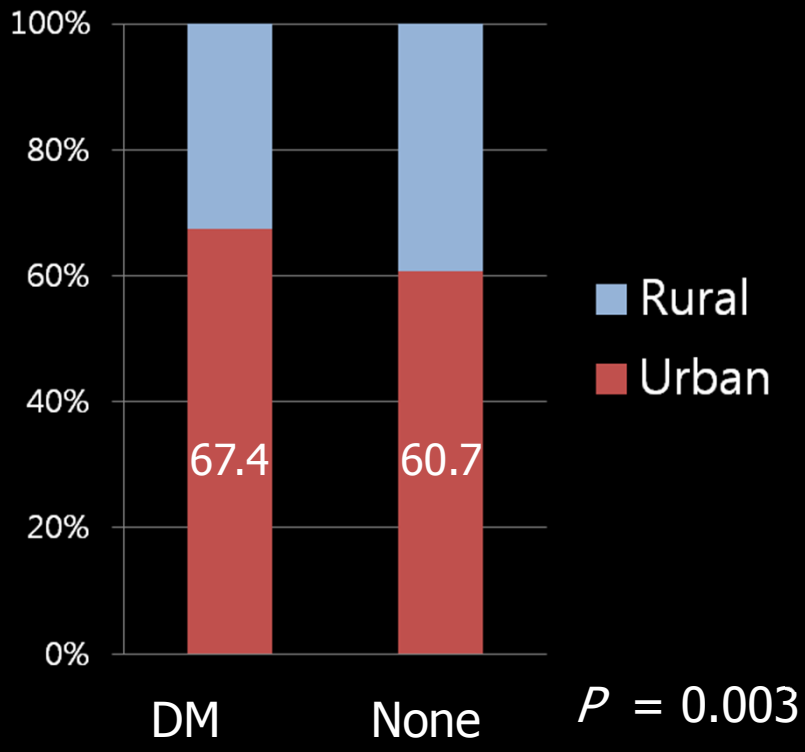
Characteristics of Diabetic Elderly Koreans (KNHANES 2008-2010)

	Diabetes	None	*P*-value
Age (years)	72.94±5.83	72.63±5.60	0.250

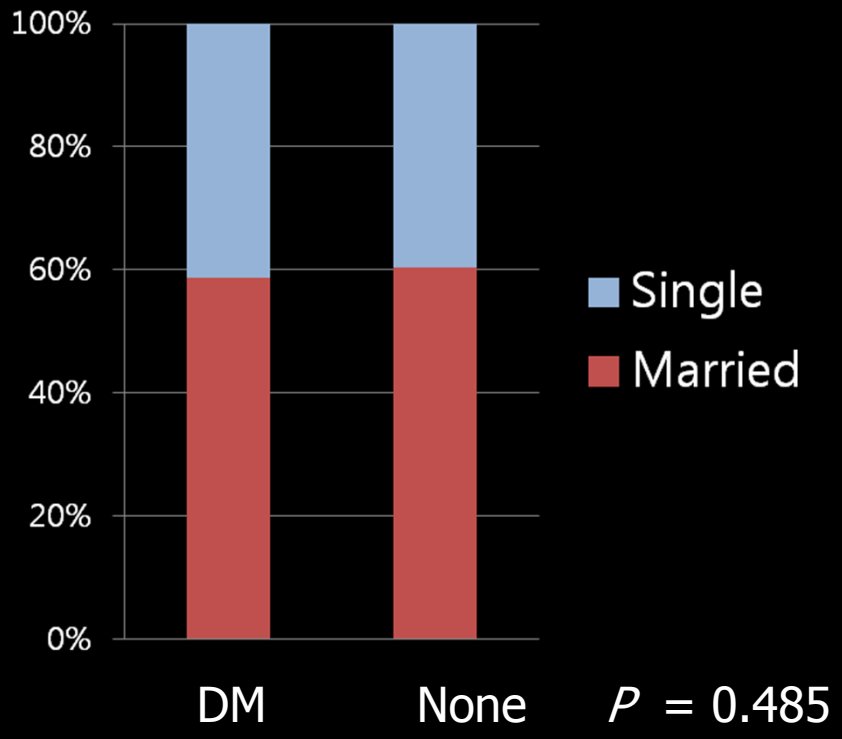


Characteristics of Diabetic Elderly Koreans (KNHANES 2008-2010)

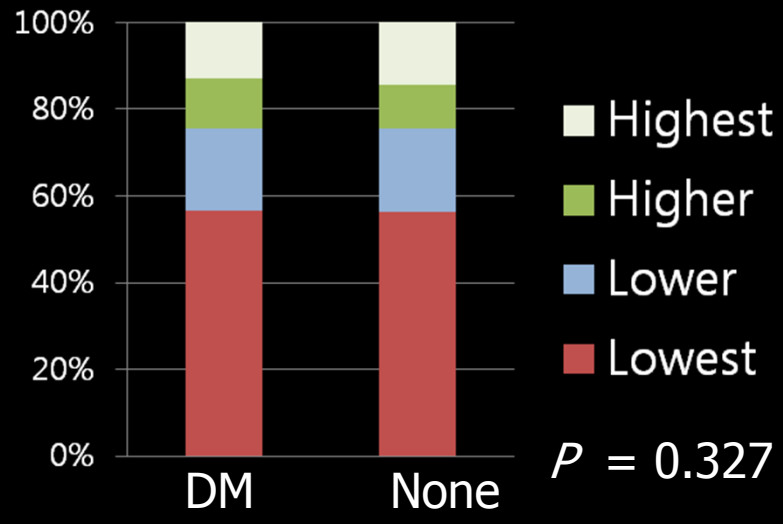
Region



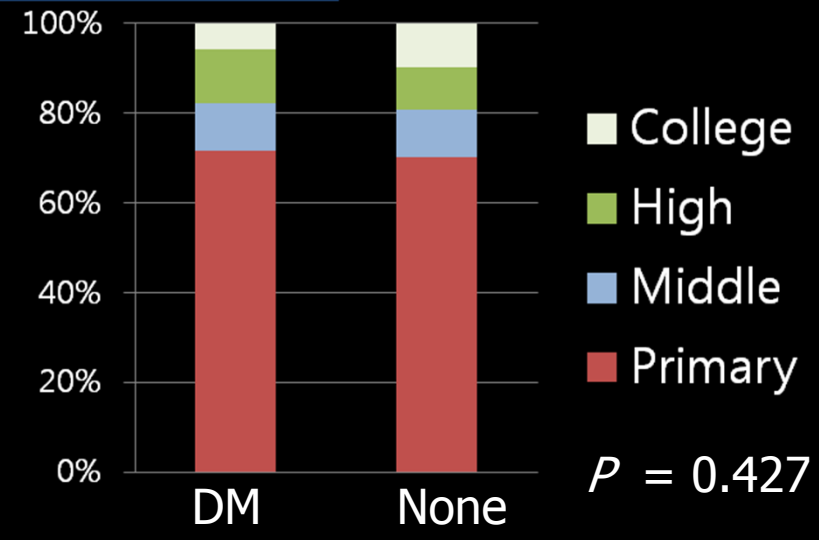
Marital status



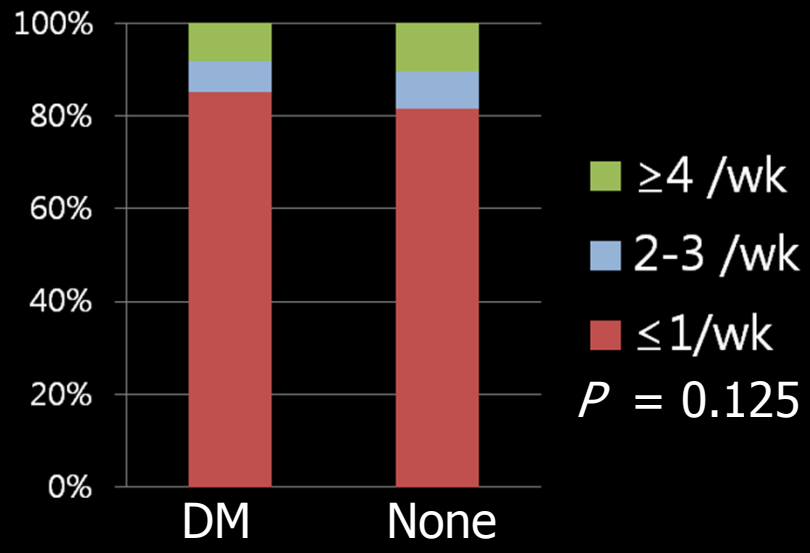
Income



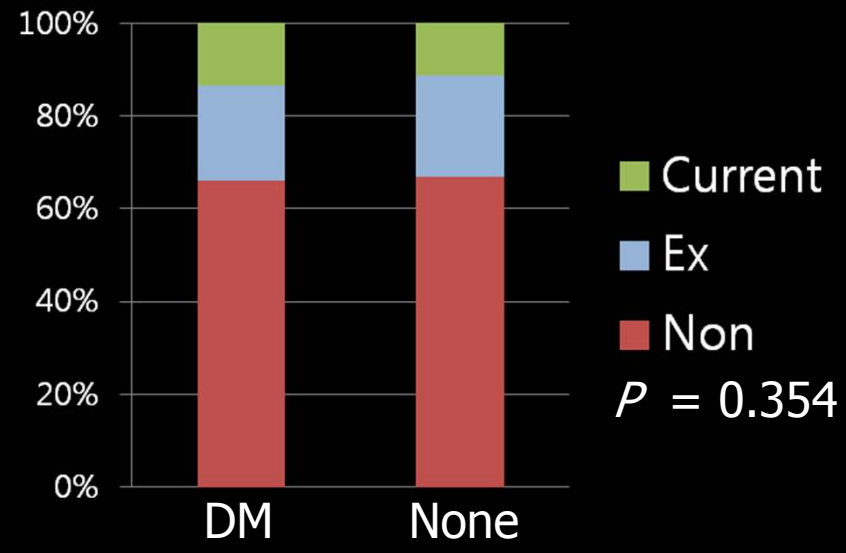
Education



Alcohol



Smoking



Characteristics of Diabetic Elderly Koreans (KNHANES 2008-2010)

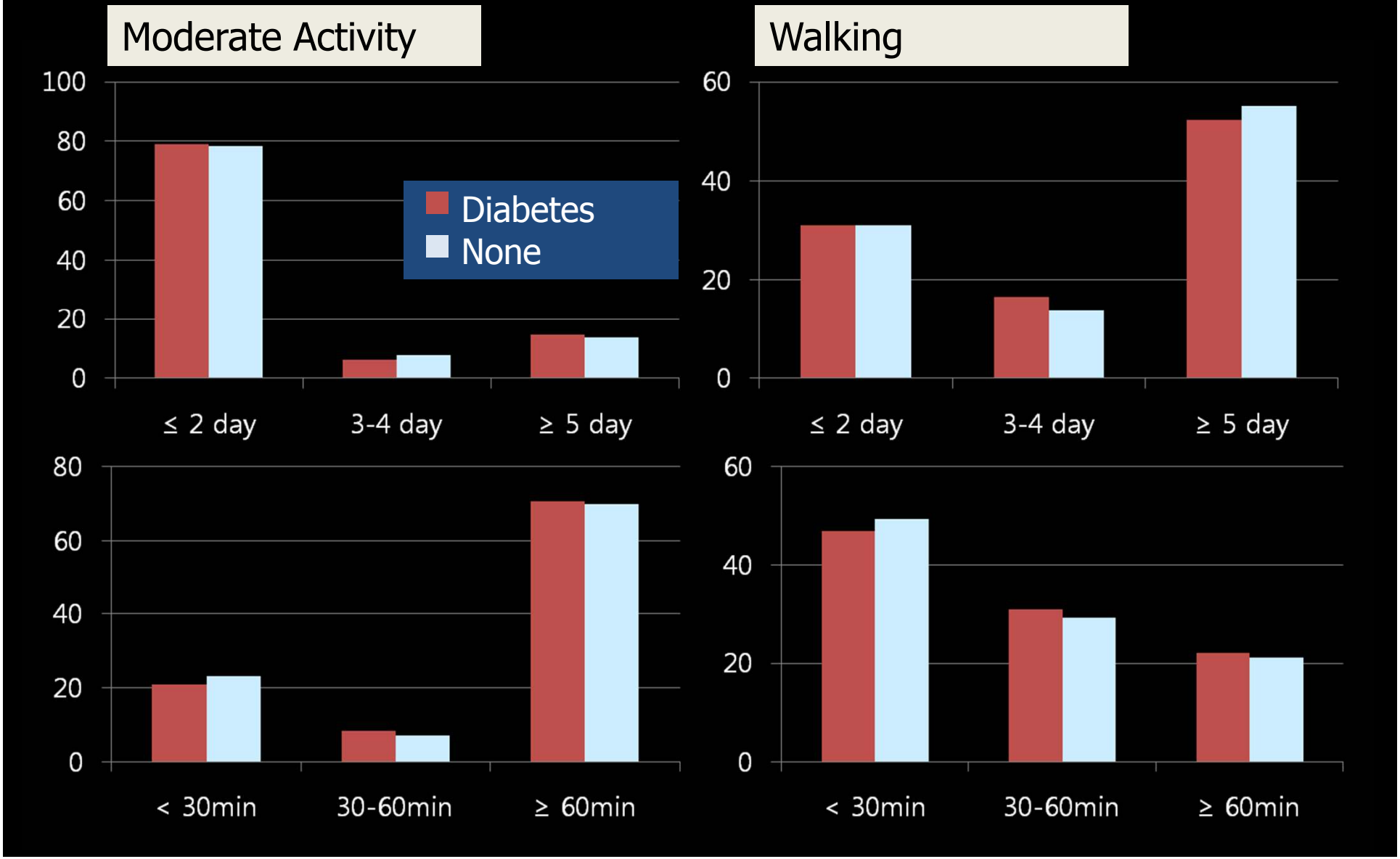
Diaetary Intake (day)

	Diabetes	Non Diabetes	*P*-value
Total energy (kcal/day)	1551.18 ± 633.71	1583.34 ± 643.17	0.287
Protein (g/day)	50.95 ± 26.98	51.44 ± 27.82	0.707
Fat (g/day)	20.87 ± 17.05	20.82 ± 17.90	0.955
Carbohydrate (g/day)	287.73 ± 114.75	290.55 ± 111.31	0.593

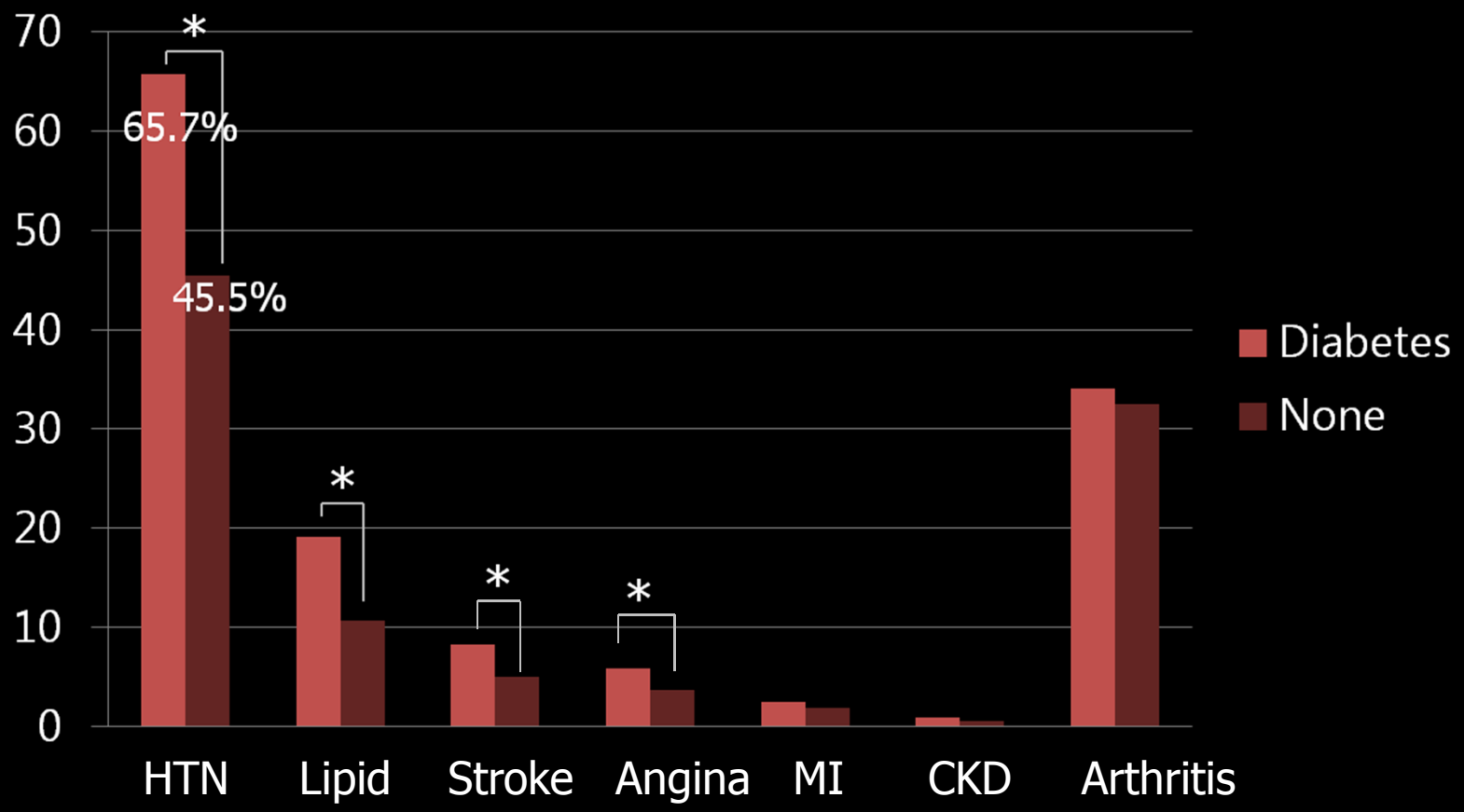
Daily energy and nutrient intakes were assessed using the 24-h recall method of the Nutrition Survey of KNHANES.

Physical Activity

(KNHANES 2008-2010)

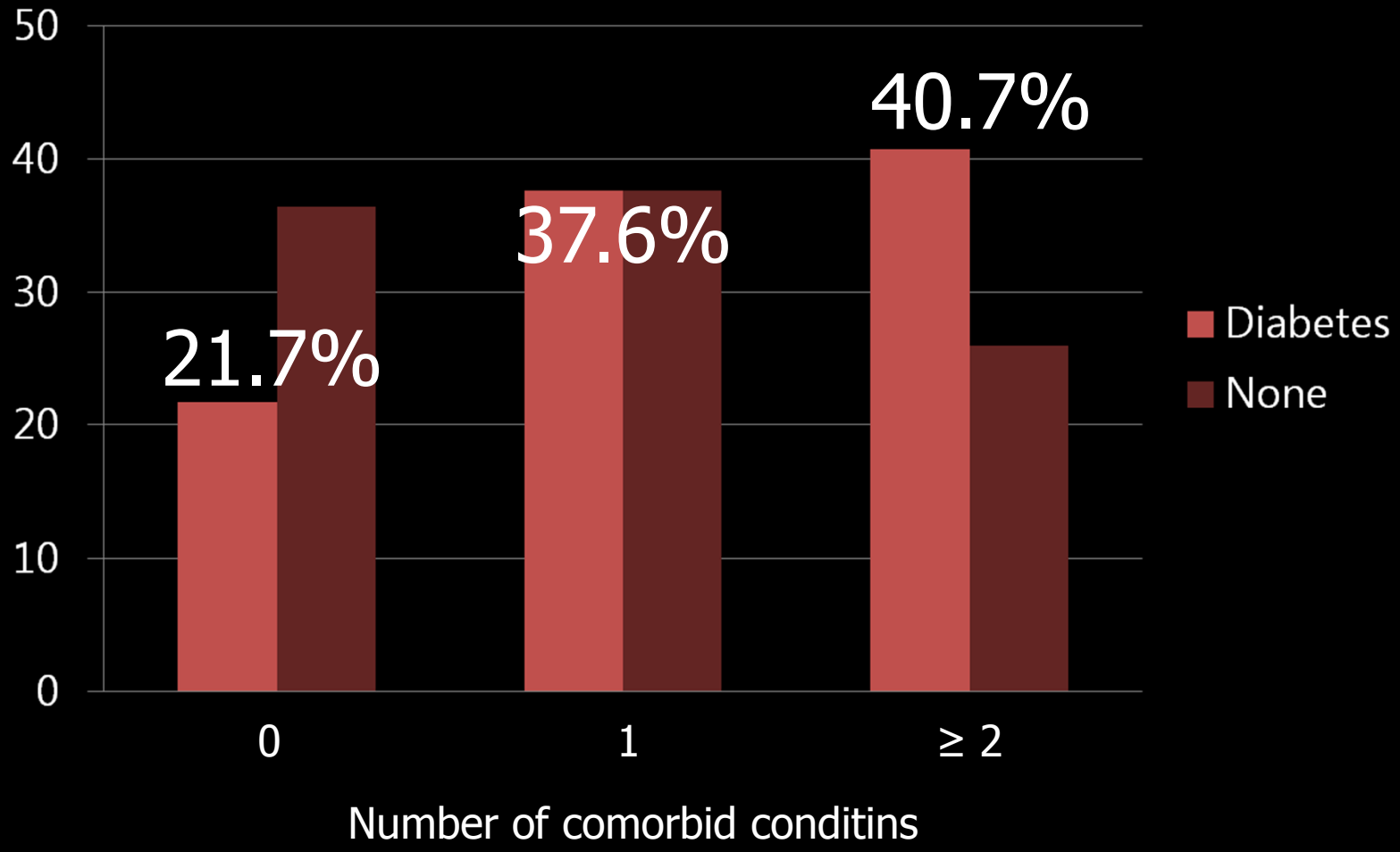


Comorbid Conditions of Diabetic Elderly Koreans (KNHANES 2008-2010)

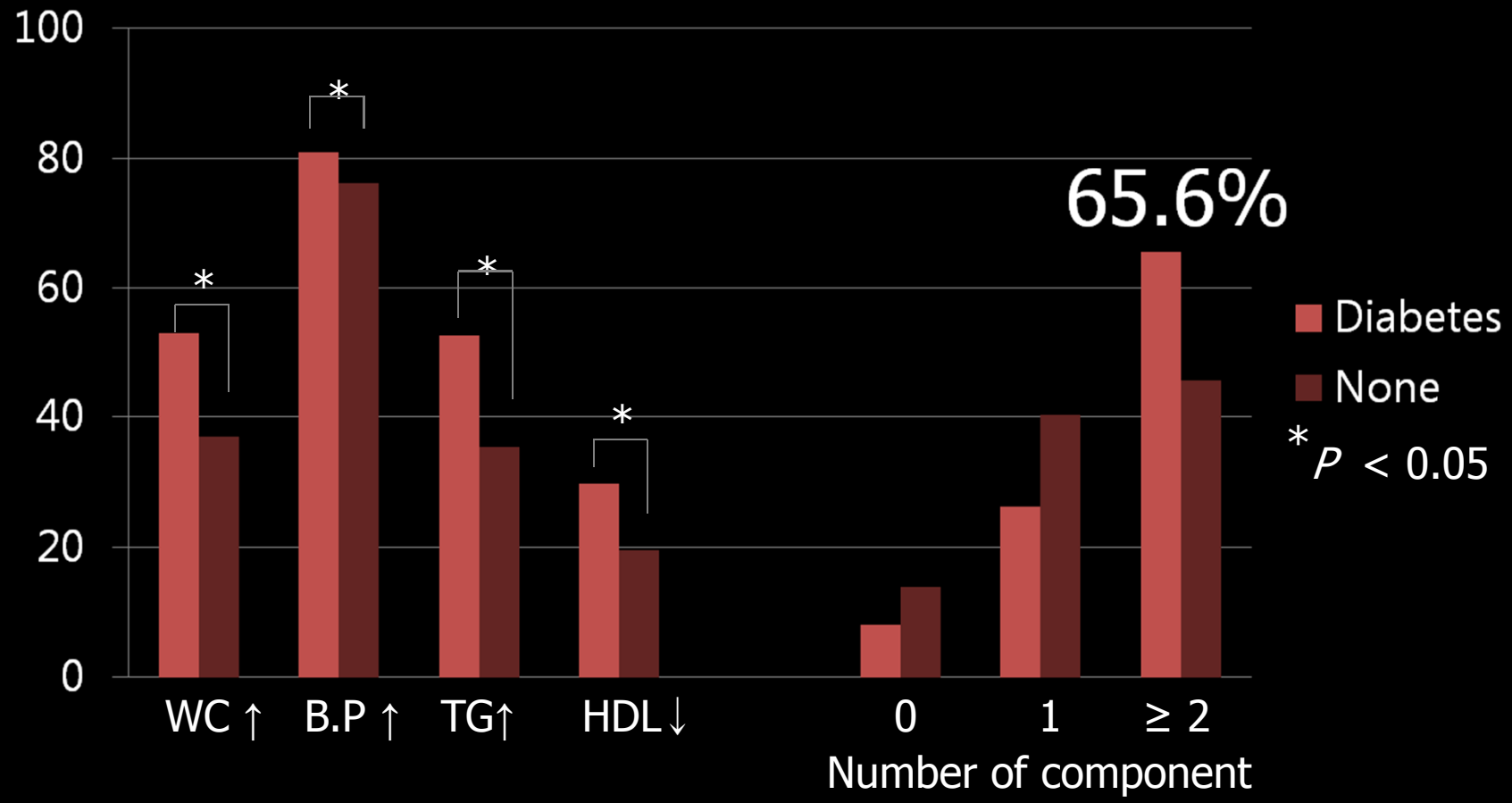


*$P < 0.05$

Comorbid Conditions of Diabetic Elderly Koreans (KNHANES 2008-2010)

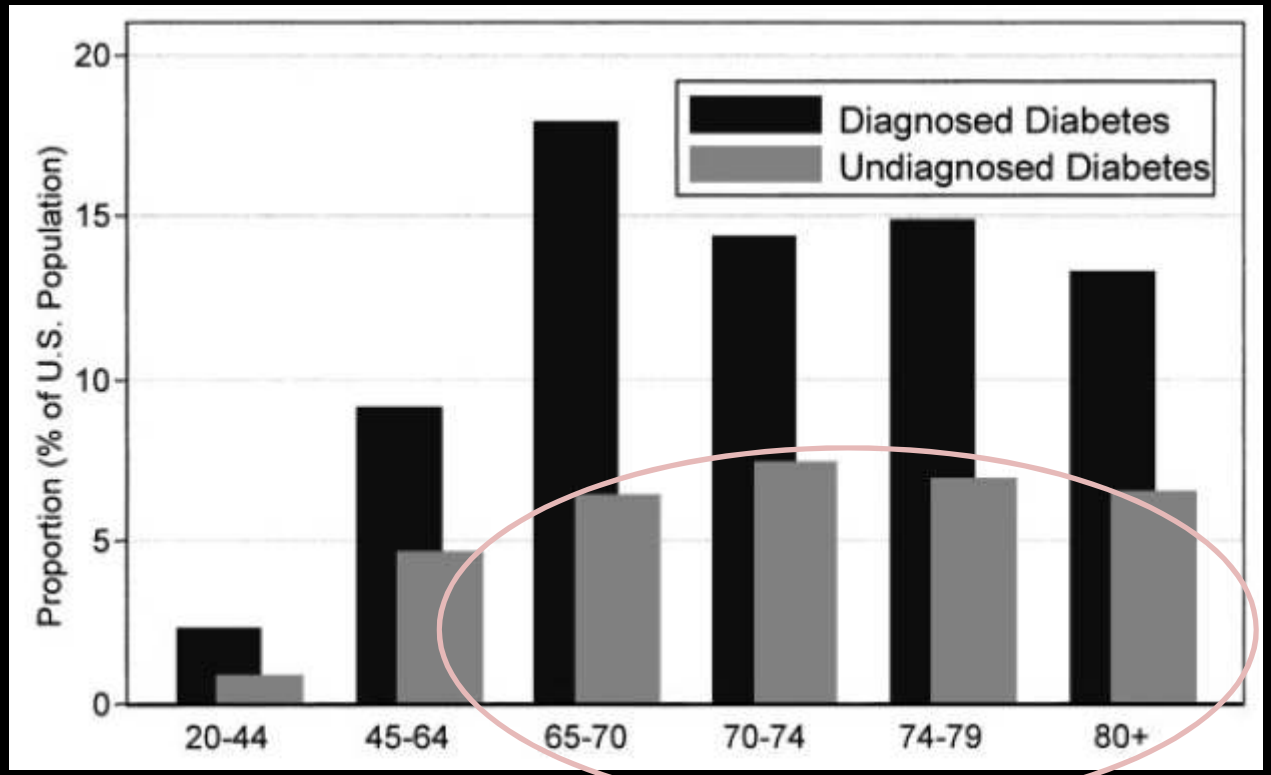


Metabolic syndrome of Diabetic Elderly Koreans (KNHANES 2008-2010)



High waist circumference: M≥90 cm, F ≥85 cm; High B.P: BP ≥130/85 mmHg or med; High TG: TG ≥150 or med; Low HDL: M<40, F<50 or med

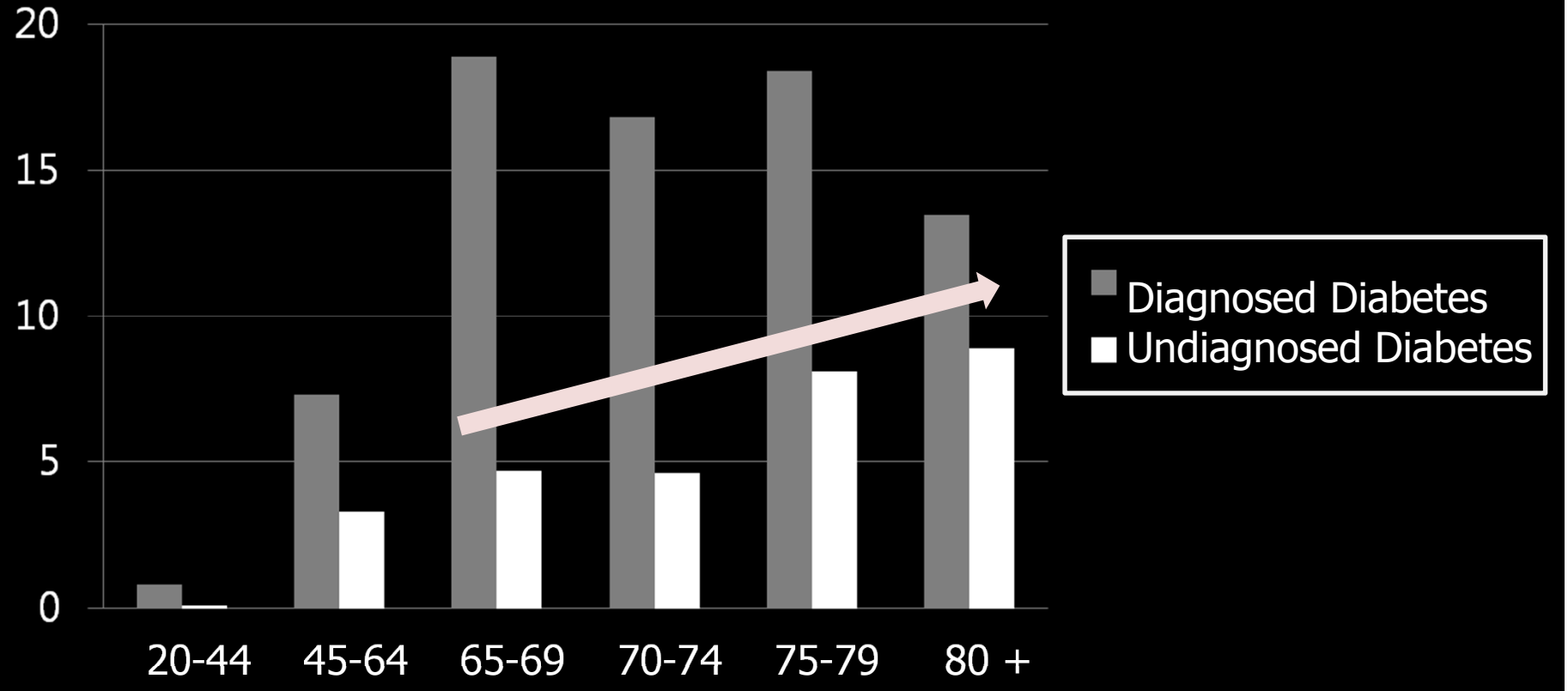
The Diagnosis of Diabetes is More Often Missed in Elderly



Prevalence of undiagnosed and diagnosed diabetes by age-group, U.S. population,1999–2002.

Diabetes Care 29:2415-2419, 2009

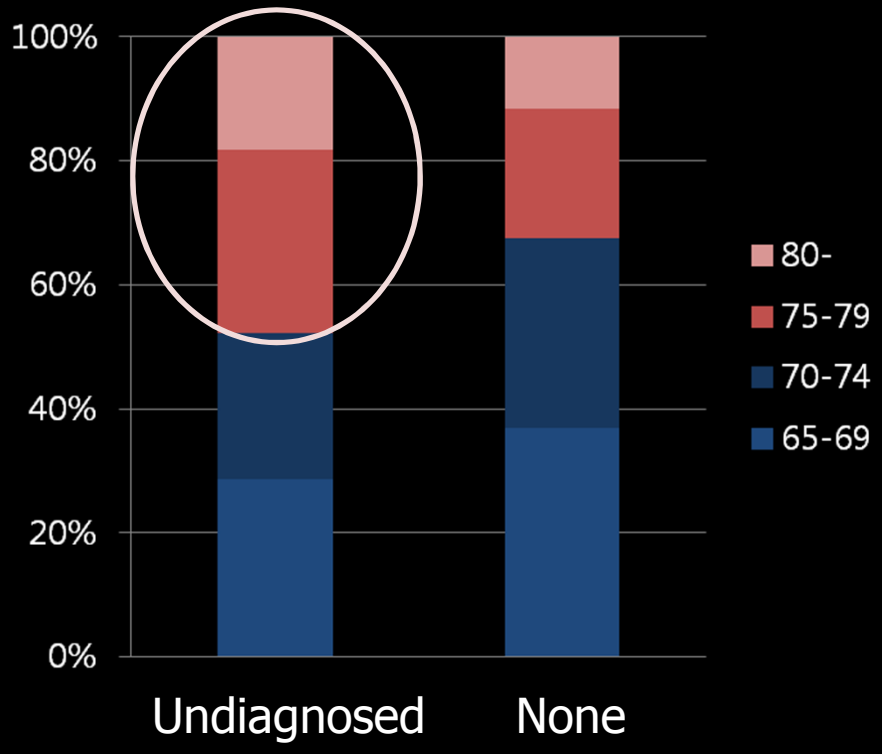
Prevalence of Undiagnosed Diabetes in Elderly Koreans (KNHANES 2008-2010)



Undiagnosed diabetes: FPG ≥ 126 mg/dL

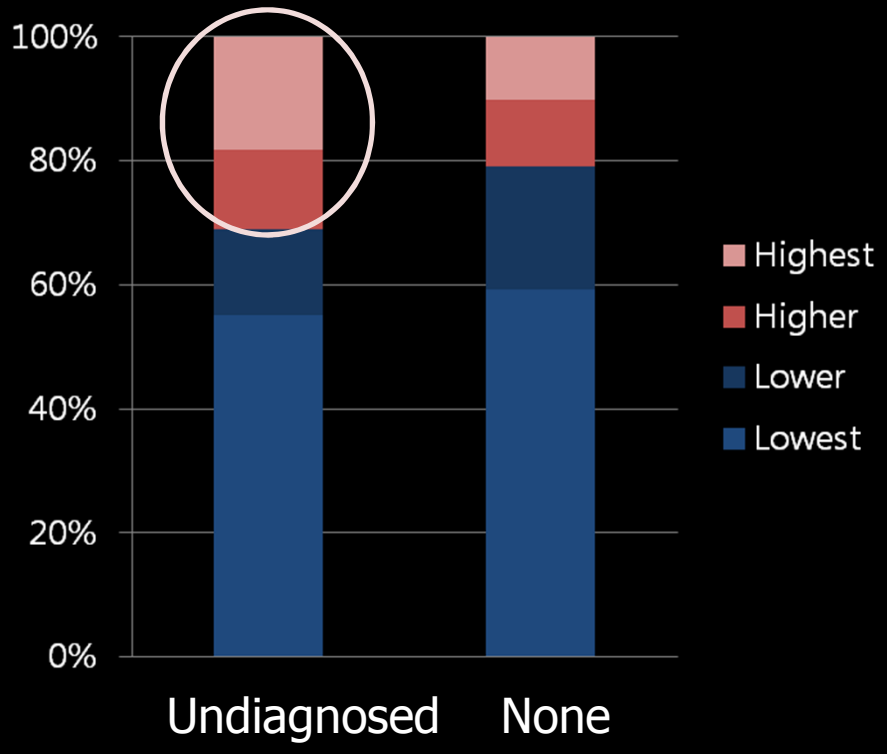
Characteristics of Undiagnosed Diabetes in Elderly (KNHANES 2008-2010)

Age Group



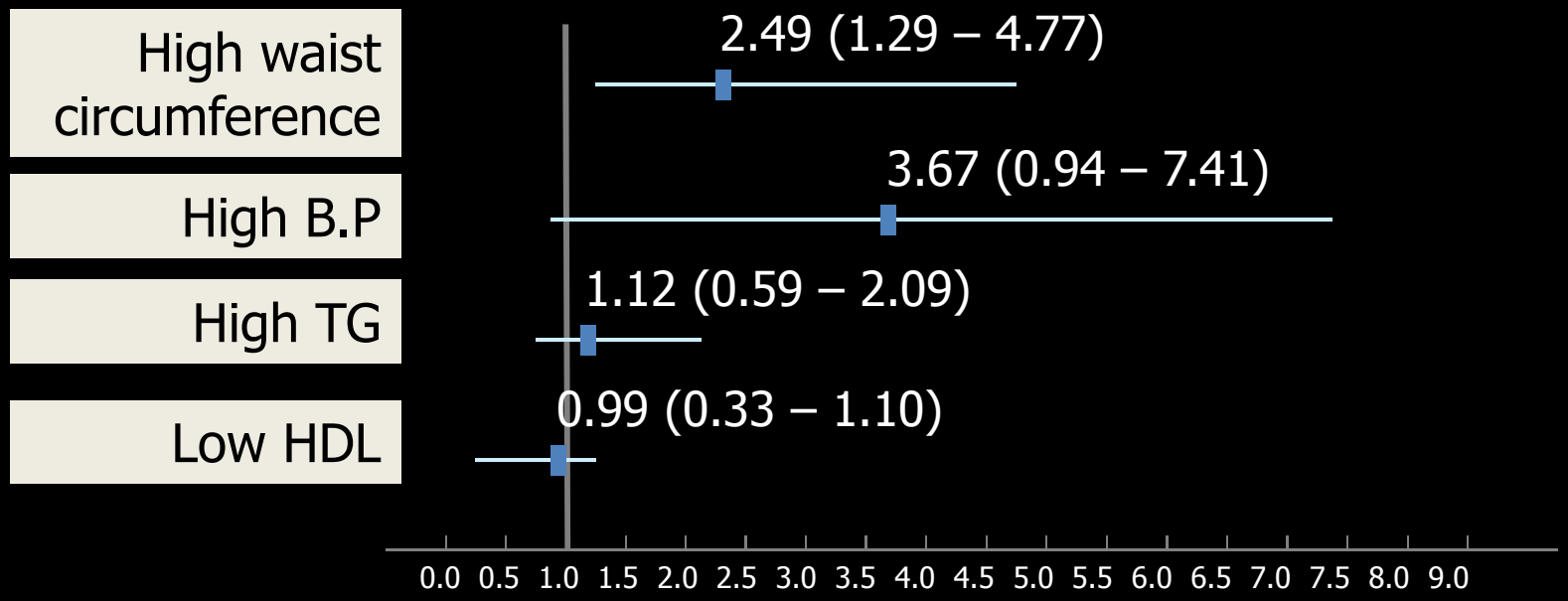
P = 0.008

Income



P = 0.028

Independent Metabolic Syndrome Component associated with Undiagnosed Diabetes in Elderly (KNHANES 2008-2010)



Adjusted for age, sex, education, income, alcohol, smoking, No. of comorbid conditions

High waist circumference: M≥90 cm, F ≥85 cm; High B.P: BP ≥130/85 mmHg or med;
High TG: TG ≥150 or med; Low HDL: M<40, F<50 or med

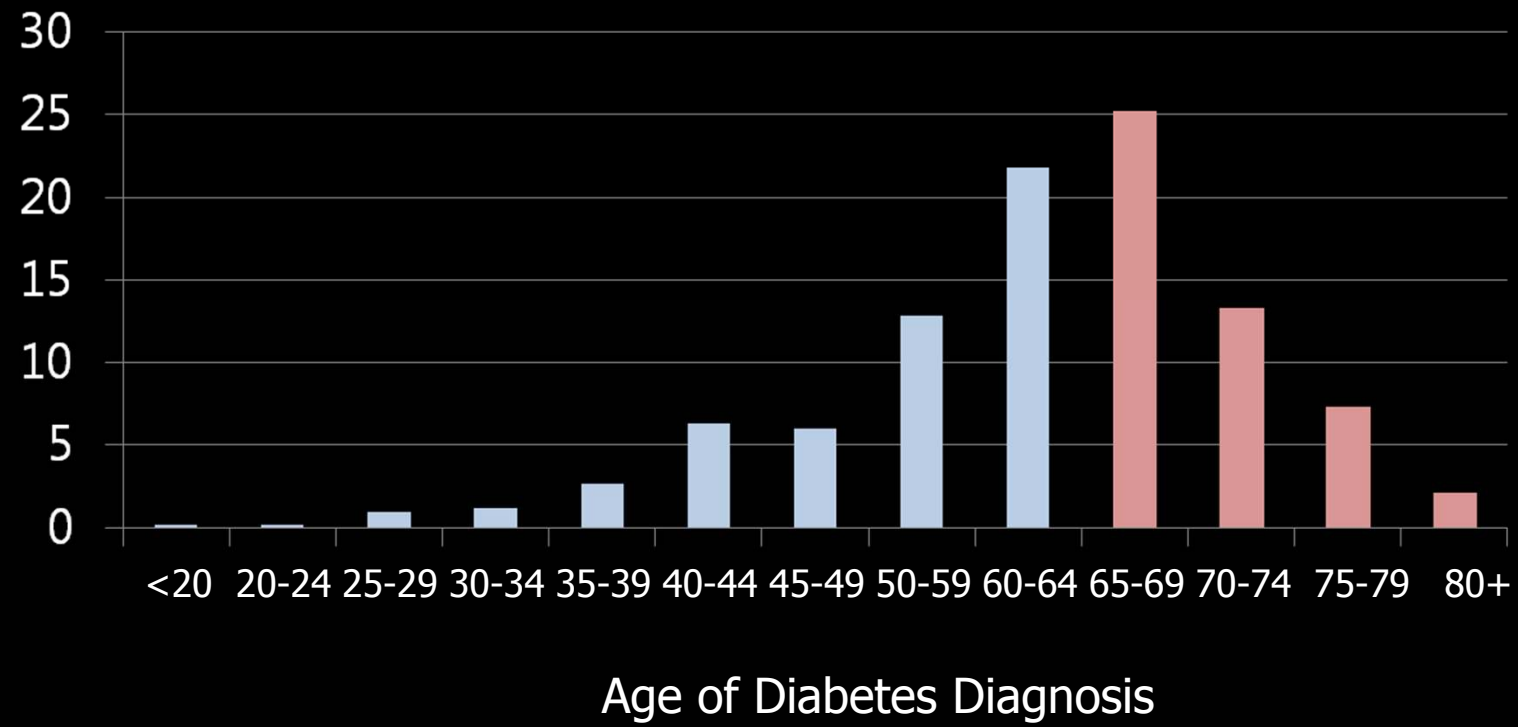
Discordance between HbA1c & Fasting Plasma Glucose

Variable	OR (95% CI)	P-value
Age group		
30–39 years	1.0 (referent)	
40–49 years	2.17 (0.60–7.82)	0.237
50–59 years	5.97 (1.79–19.85)	0.004
60–69 years	9.78 (2.92–32.71)	0.000
≥70 years	14.67 (4.02–53.49)	0.000
BMI		
<23 kg/m^2	1.0 (referent)	
23–24.9 kg/m^2	1.66 (0.92–3.01)	0.092
>25 kg/m^2	2.59 (1.44–4.66)	0.001
Waist circumference		
<90 cm (male), <80 (female)	1.0 (referent)	
≥90 cm (male), ≥80 (female)	0.73 (0.44–1.22)	0.232
Systolic blood pressure		
<120 mm Hg	1.0 (referent)	
120–139 mm Hg	1.04 (0.63–1.74)	0.867
140–159 mm Hg	1.76 (0.89–3.50)	0.105
≥160 mm Hg	0.48 (0.09–2.55)	0.393
Diastolic blood pressure		
<80 mm Hg	1.0 (referent)	
80–89 mm Hg	1.26 (0.76–2.07)	0.366
90–99 mm Hg	0.73 (0.33–1.63)	0.447
≥100 mm Hg	1.38 (0.43–4.49)	0.590
Triglyceride		
<150 mg/dL	1.0 (referent)	
150–199 mg/dL	0.97 (0.52–1.82)	0.929
≥200 mg/dL	1.56 (0.95–2.58)	0.082
HDL cholesterol		
≥40 cm (male), ≥50 (female)	1.0 (referent)	
<40 cm (male), <50 (female)	1.43 (0.92–2.22)	0.114

Kim JH et al. Diabetes Res Clin Pract 4:e27-9, 2011

The Status of Management of Known Diabetes

Distribution of Reported Age of Diabetes (KNHANES 2008-2010)

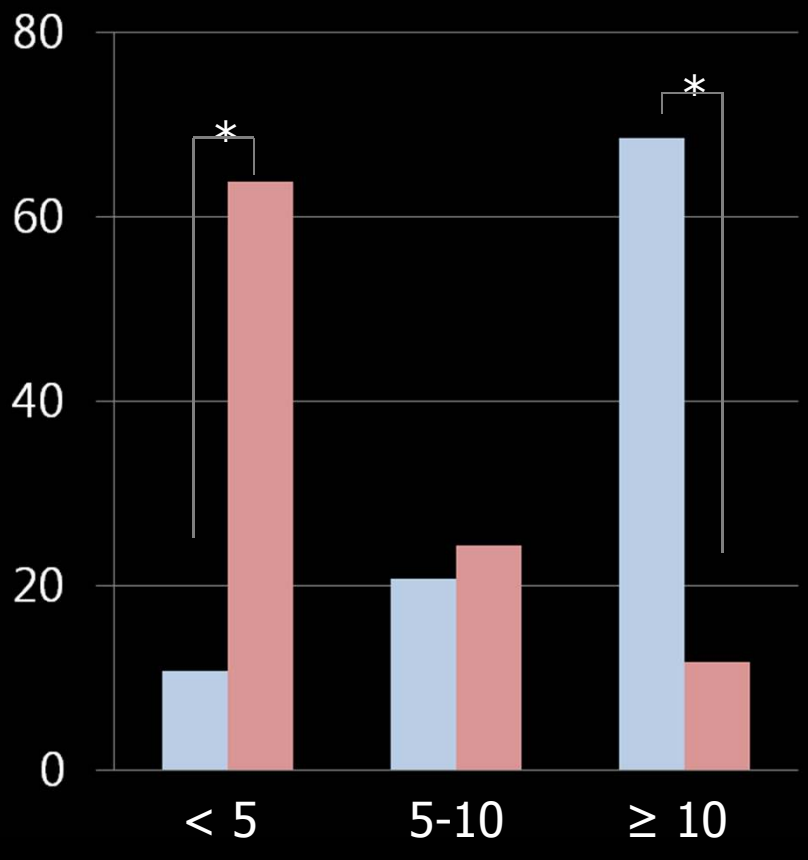


Middle Age-onset Diabetes vs. Elderly onset Diabetes (NHANES 1999-2002)

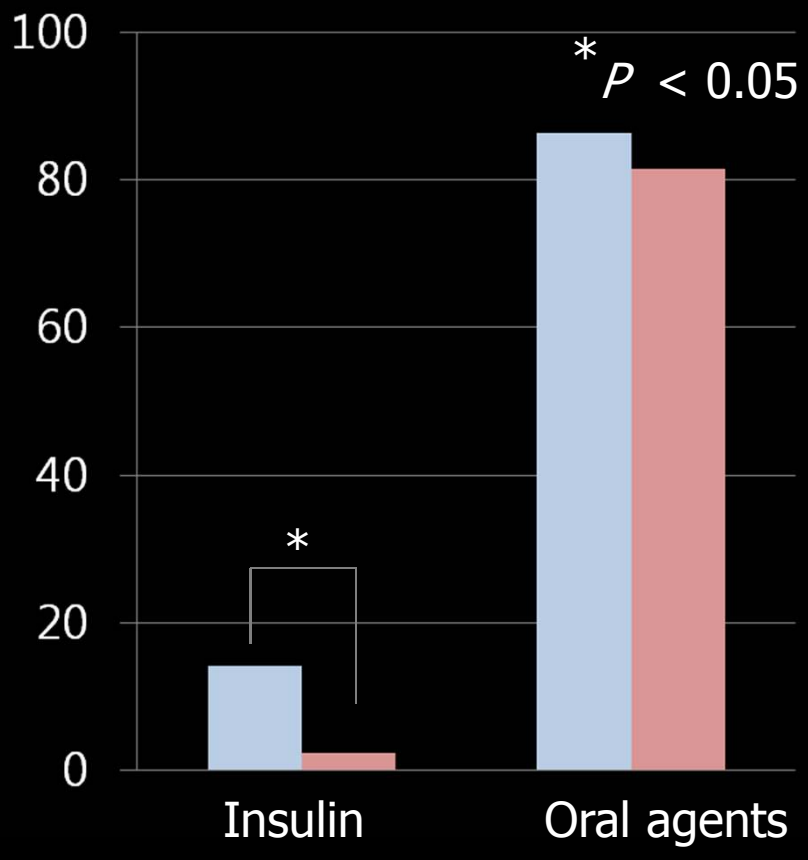
	Elderly (≥65 years)			
	No diabetes	Middle age–onset diabetes	Elderly onset diabetes	*P* value*
n	2,344	272	193	
Mean fasting glucose (mg/dl)	105.4 ± 1.2	172.4 ± 11.1	132.3 ± 6.1	0.001
Mean A1C (%)	5.6 ± 0.02	7.4 ± 0.1	6.9 ± 0.2	0.011
A1C >7%	2.1 ± 0.4	59.9 ± 4.2	41.6 ± 4.5	0.005
A1C >8%	0.9 ± 0.3†	27.9 ± 4.7	20.2 ± 4.6	0.149
Mean age at diagnosis of diabetes (years)‡	—	53.2 ± 0.7	71.8 ± 0.5	<0.001
Years since diagnosis of diabetes‡				
>10 years	—	76.7 ± 3.8	10.9 ± 3.2	<0.0001
5–10 years	—	17.6 ± 3.8	24.1 ± 4.7	0.3490
<5 years	—	5.7 ± 1.8	65.0 ± 5.5	<0.0001
Glucose-lowering medication use‡				
No medication	100	9.0 ± 2.8	22.5 ± 3.8	0.1327
Insulin use	—	31.7 ± 4.7	6.9 ± 1.3	<0.0001
Oral medication use	—	45.6 ± 4.2	67.5 ± 4.6	0.8319
Both insulin and oral	—	13.7 ± 2.7	3.2 ± 1.6	0.0004
History of cardiovascular disease	19.6 ± 1.3	36.1 ± 4.0	34.7 ± 4.5	0.817
History of stroke	7.8 ± 0.8	14.0 ± 3.3	11.4 ± 2.9	0.596
History of coronary heart disease	14.0 ± 1.1	30.1 ± 4.4	28.2 ± 4.4	0.754
Peripheral arterial disease	12.0 ± 1.0	22.4 ± 6.5	18.4 ± 4.1	0.584
Peripheral neuropathy	21.5 ± 1.3	35.5 ± 6.1	37.1 ± 6.0	0.855
History of retinopathy‡	—	39.4 ± 4.3	12.6 ± 3.6†	<0.0001

Diabetes Care 29:2415-2419, 2009

Middle Age-onset Diabetes vs. Elderly onset Diabetes (KNHANES 2008-2010)



Diabetes duration



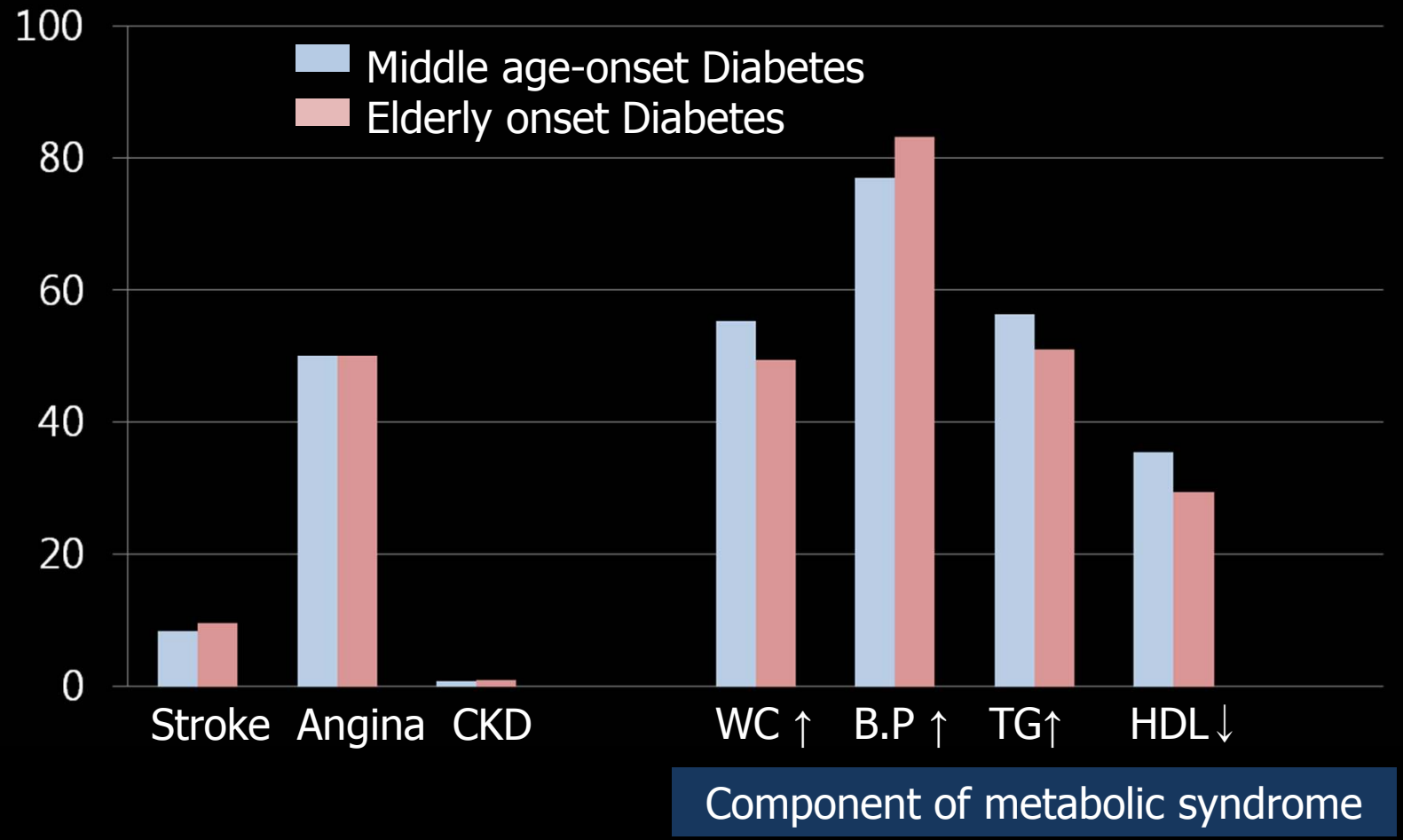
Glucose lowering agents

Middle age-onset Elderly onset

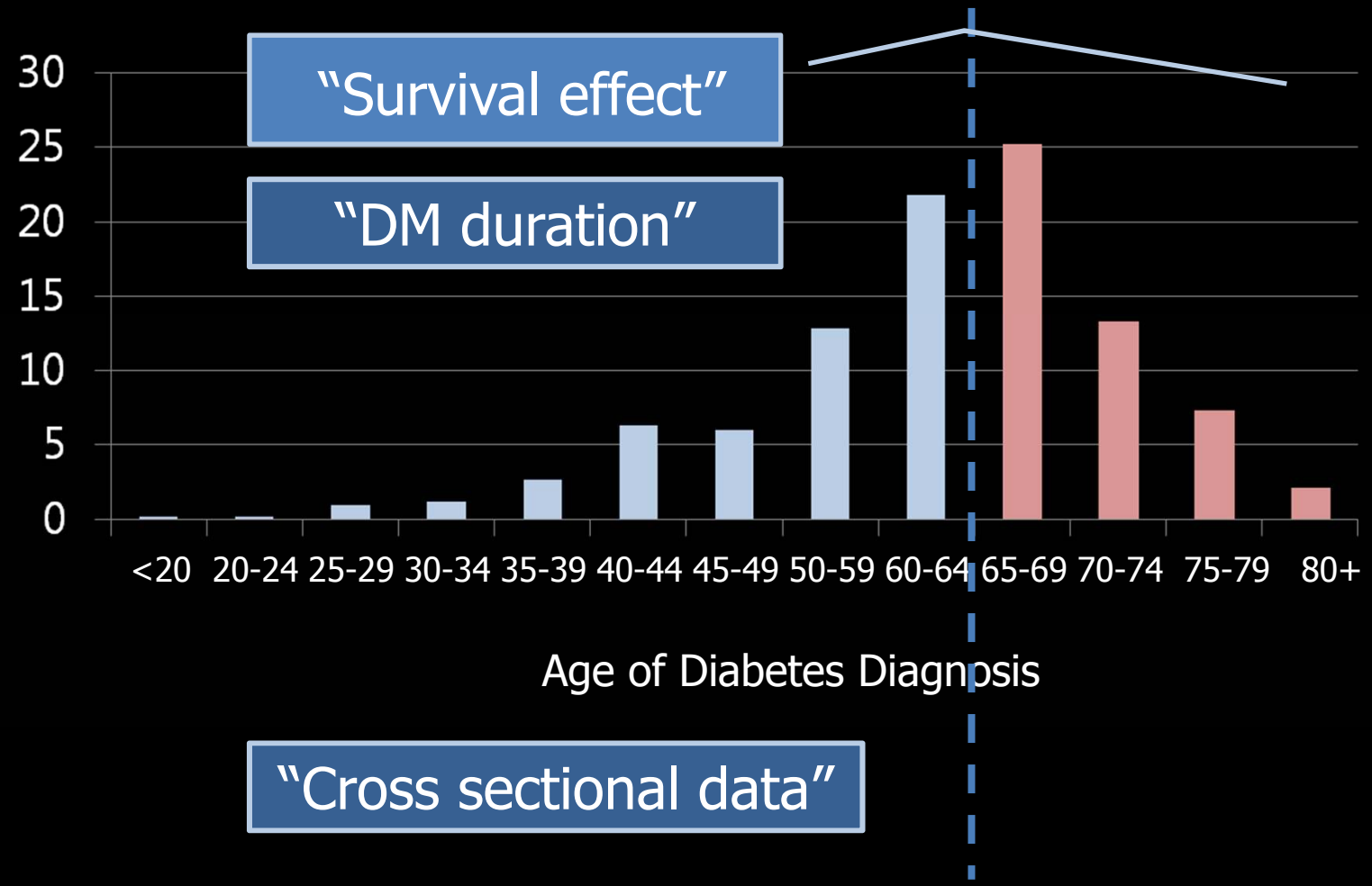
Middle Age-onset Diabetes vs. Elderly onset Diabetes (KNHANES 2008-2010)

	Middle age-onset	Elderly onset	*P*-value
Age (years)	55.24 ± 8.33	70.36 ± 4.71	0.000
Waist circumference	87.20 ± 8.78	86.76 ± 10.48	0.628
BMI (kg/m^2)	24.54 ± 3.29	24.75 ± 3.63	0.526
Fasting plasma glucose	139.78 ± 44.77	129.28 ±47.71	0.022
HbA1c	7.47 ± 1.37	7.01 ± 1.34	0.001
Triglyceride	180.12 ± 122.07	147.91 ± 74.33	0.001
LDL cholesterol	104.90 ± 34.13	111.30 ± 36.37	0.066
HDL cholesterol	46.70 ± 12.44	46.11 ± 11.33	0.618
HbA1c > 7%	57.4%	38.2%	0.000
HbA1c > 8%	28.7%	18.4%	0.019

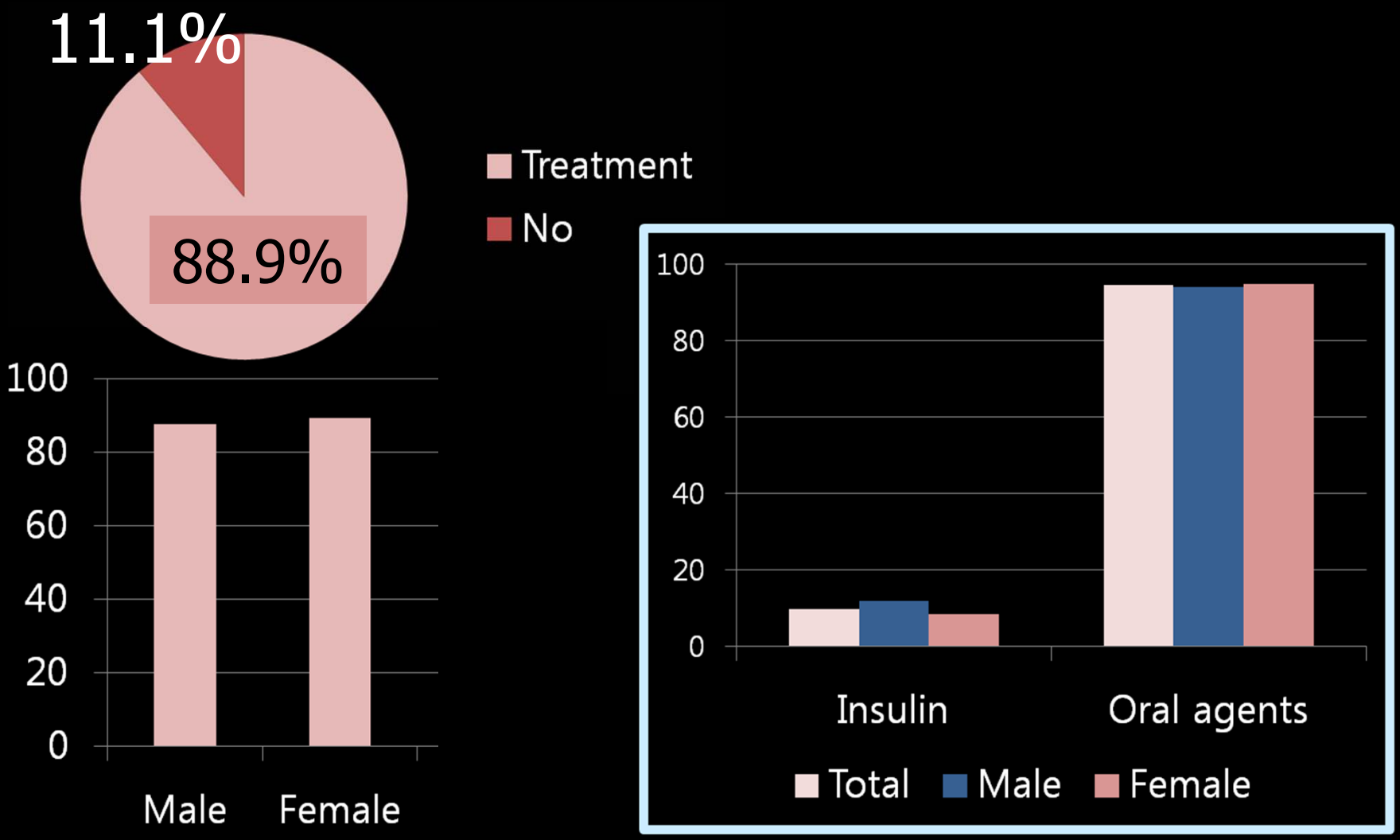
Middle Age-onset Diabetes vs. Elderly onset Diabetes (KNHANES 2008-2010)



Middle Age-onset Diabetes vs. Elderly onset Diabetes



Mode of Treatment in Elderly Koreans with Diabetes



Management in Elderly Koreans with Diabetes

Mode of Treatment

	Insulin	OHA
n	175	353
Age (year)	71.7 ± 4.9	71.5 ± 4.9
Gender (M:F)	74:101	149:204
Duration of DM (years) *	18.1 ± 9.6	10.6 ± 7.9
BMI (kg/m^2)	24.5 ± 3.2	24.3 ± 3.5
Waist circumference (cm)	86.4 ± 17.4	85.5 ± 16.4
Calf circumference (cm)	35.8 ± 7.9	36.8 ± 7.7
Fasting glucose (mg/dl) *	159.1 ± 60.7	135.0 ± 47.4
A1C (%) *	8.5 ± 1.9	7.4 ± 1.5
Admission for severe hypoglycemia (*n*)	1.0 ± 0.2	1.0 ± 0.2

* $P < 0.05$

Noh JH et al. Diabetes Res Clin Pract 77S:S71-S75, 2007

Independent Sociodemographic factors associated with Untreated Diabetes in Elderly

	OR (95% CI)	*P*-value
Age group		
65-69 years	1.0 (referent)	
70-74 years	2.27 (1.01-5.10)	0.047
75-79 years	1.21 (0.45-3.23)	0.699
≥ 80 years	2.01 (0.649-6.22)	0.226
Sex (female)	0.75 (0.24-2.39)	0.639
Region (rural)	1.03 (0.52-2.05)	0.922
Income		
Lowest	1.0 (referent)	
Lower	0.95 (0.40-2.26)	0.915
Higher	0.35 (0.06-1.83)	0.218
Highest	0.79 (0.20-3.02)	0.738

Independent Sociodemographic factors associated with Untreated Diabetes in Elderly

	OR (95% CI)	*P*-value
Education		
Primary	1.0 (referent)	
Middle	0.83 (0.24-2.81)	0.769
High	0.81 (0.25-2.63)	0.734
College	1.57 (0.28-8.85)	0.605
No. of household		
0	1.0 (referent)	
1	1.00 (0.33-3.02)	0.997
≥ 2	0.91 (0.28-2.97)	0.883
Alcohol		
≤ 1 /wk	1.0 (referent)	
2-3 /wk	0.86 (0.20-3.63)	0.844
>4 /wk	1.73 (0.47-6.27)	0.405

Independent Sociodemographic factors associated with Untreated Diabetes in Elderly

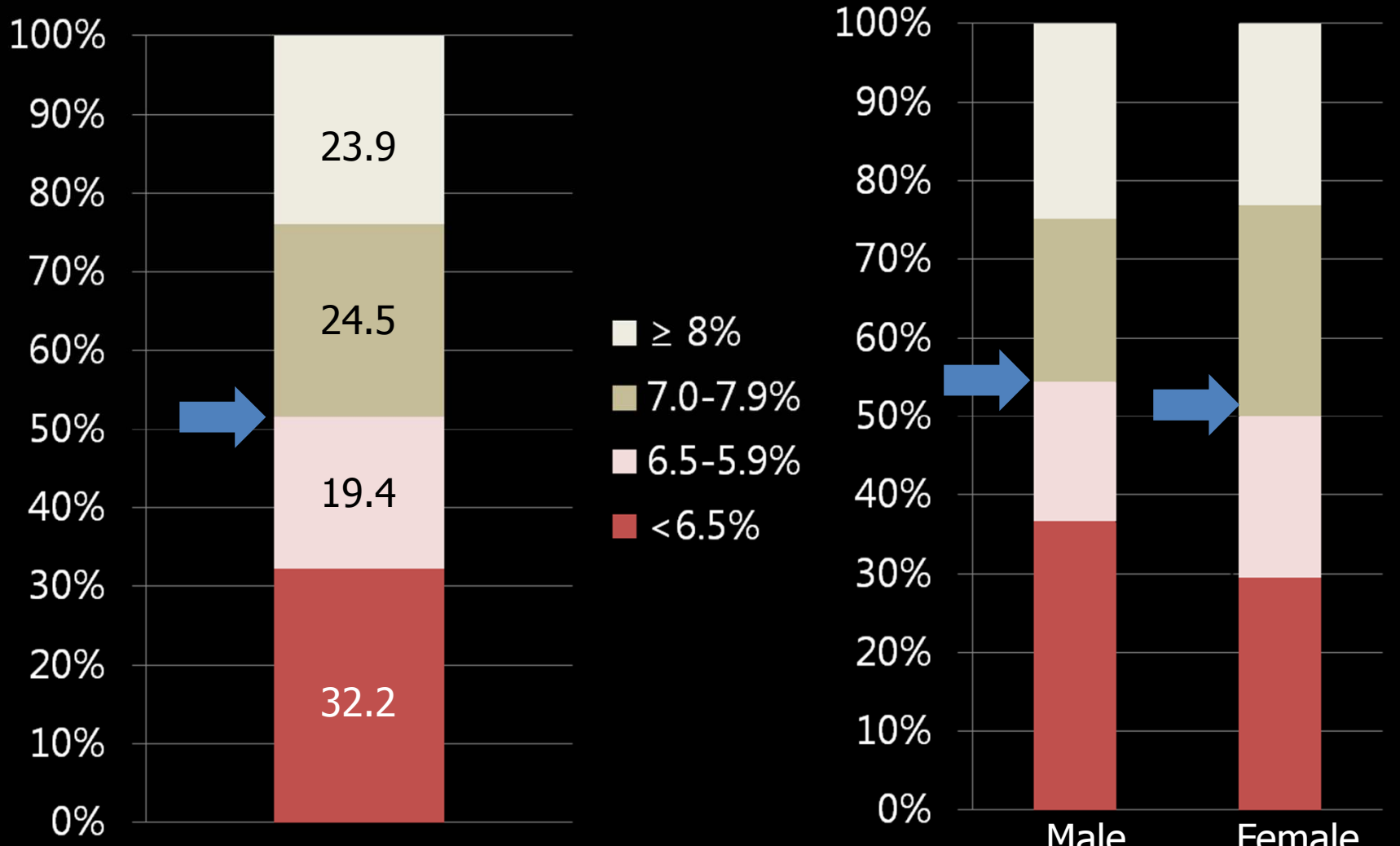
	OR (95% CI)	*P*-value
Smoking		
None	1.0 (referent)	
Ex	1.27 (0.45-3.52)	0.644
Current	1.27 (0.43-3.76)	0.663
Marital status (married)	1.41 (0.55-3.62)	0.464
Depressive symptom	1.59 (0.76-3.35)	0.217
No. of Comorbid conditions		
0	1.0 (referent)	
1	0.29 (0.11-0.74)	0.010
≥ 2	0.64 (0.28-1.45)	0.293

Suggested Goals for Glycemic Treatment in Diabetes

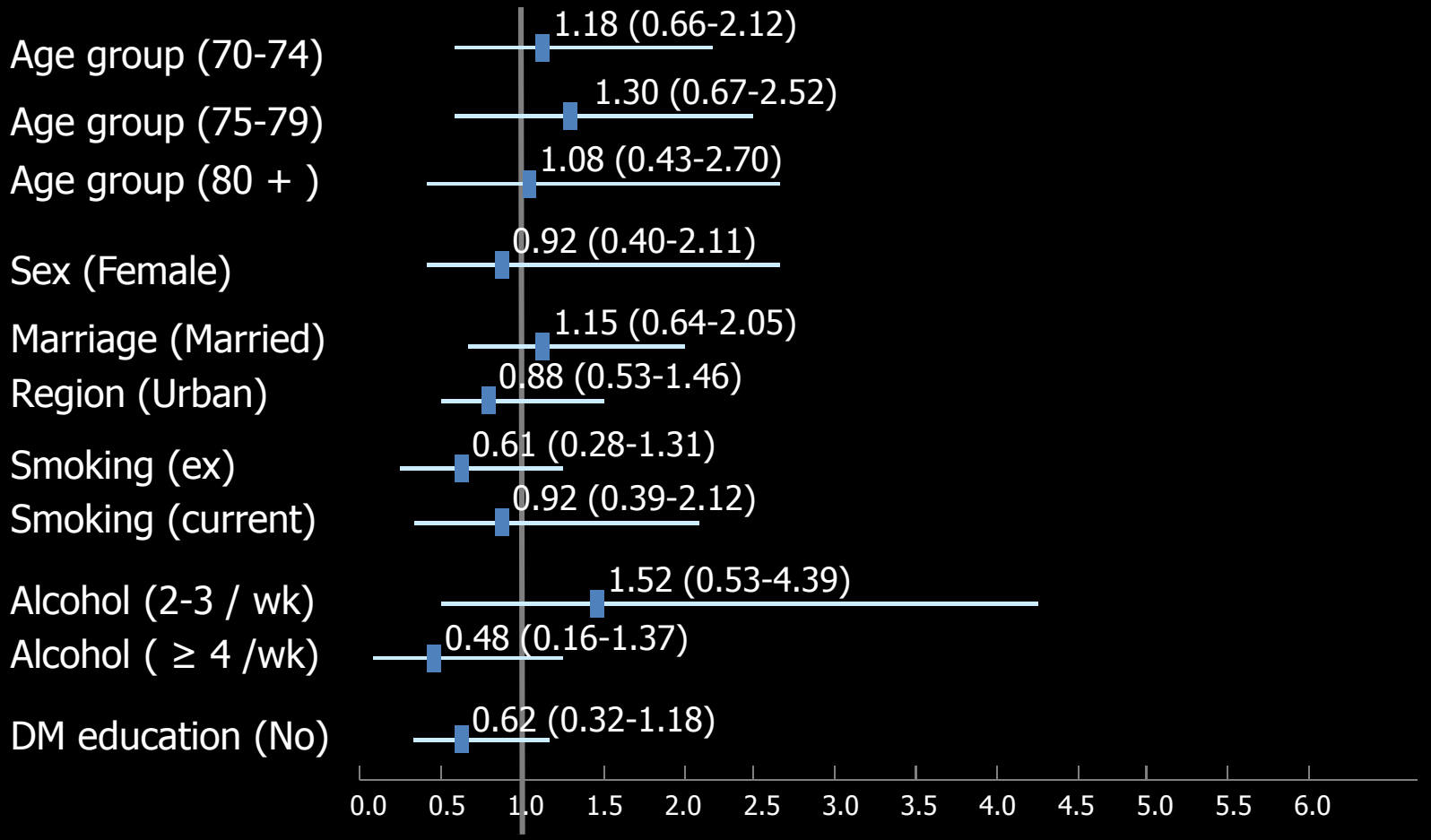
Glycated Hemoglobin Range		
Most Intensive Level, Approximately 6.0%	**Factors**	**Least Intensive Level, Approximately 8.0%**
Highly motivated, adherent, knowledgeable, strong self-care capability	Psychosocial considerations	Less motivated, nonadherent, less knowledge, weak self-care capability
Adequate	Resources or support systems	Inadequate
Low	Risk of hypoglycemia	High
Short	Duration of type 2 diabetes	Long
Long	Life expectancy	Short
None	Microvascular disease	Advanced
None	Cardiovascular disease	Established
None	Coexisting conditions	Multiple, severe, or both

N Engl J Med 2012;366:1319-27

Glucose Control in Known Diabetic Elderly (KNHANES 2008-2010)

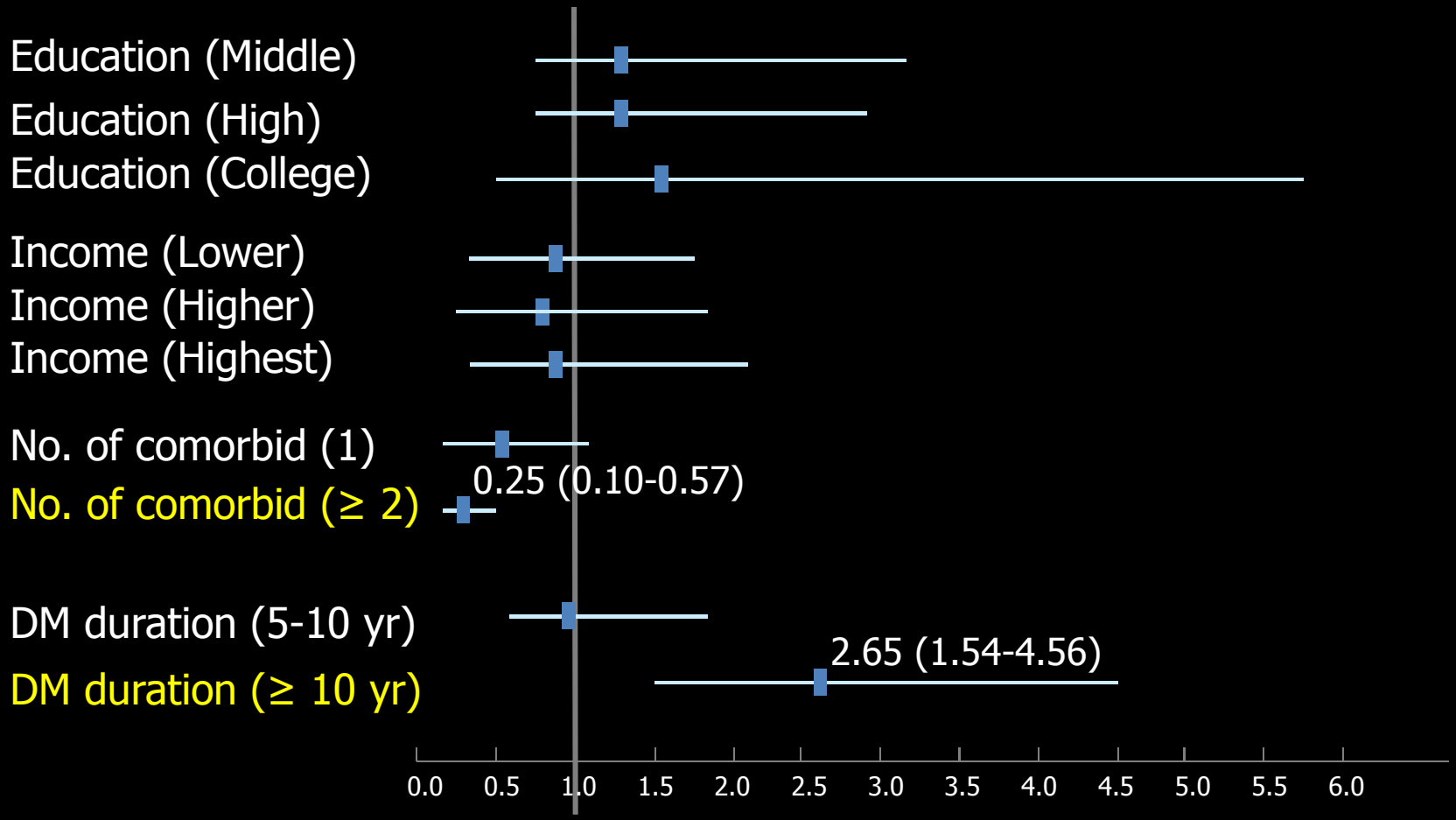


Independent Sociodemographic factors associated with HbA1c ≥ 7%



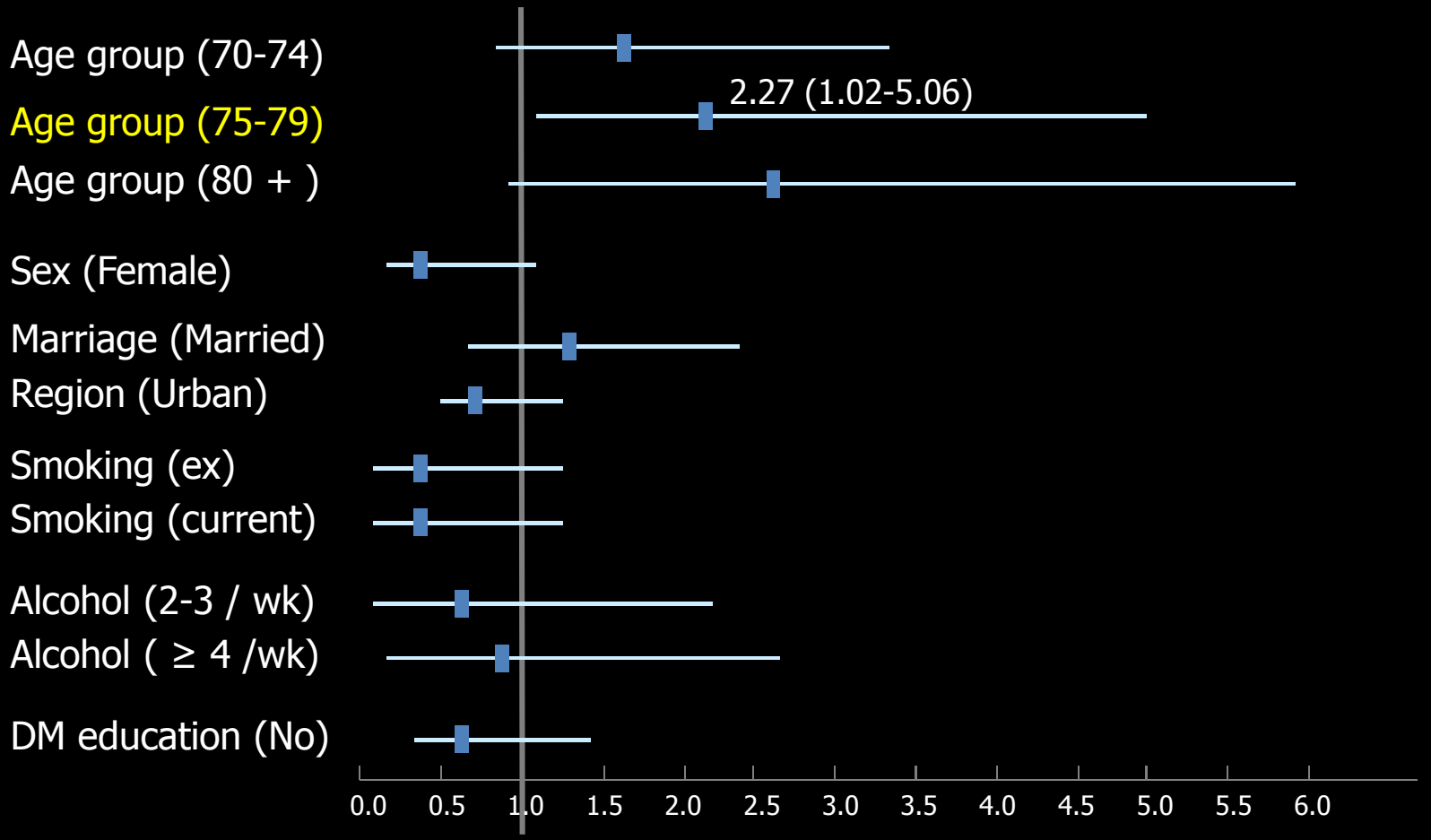
Ref. for each predictor: age group (65-69), sex (male), marriage (single), region (rural) Smoking (none), alcohol (≤ 1 /wk)

Independent Sociodemographic factors associated with HbA1c ≥ 7%



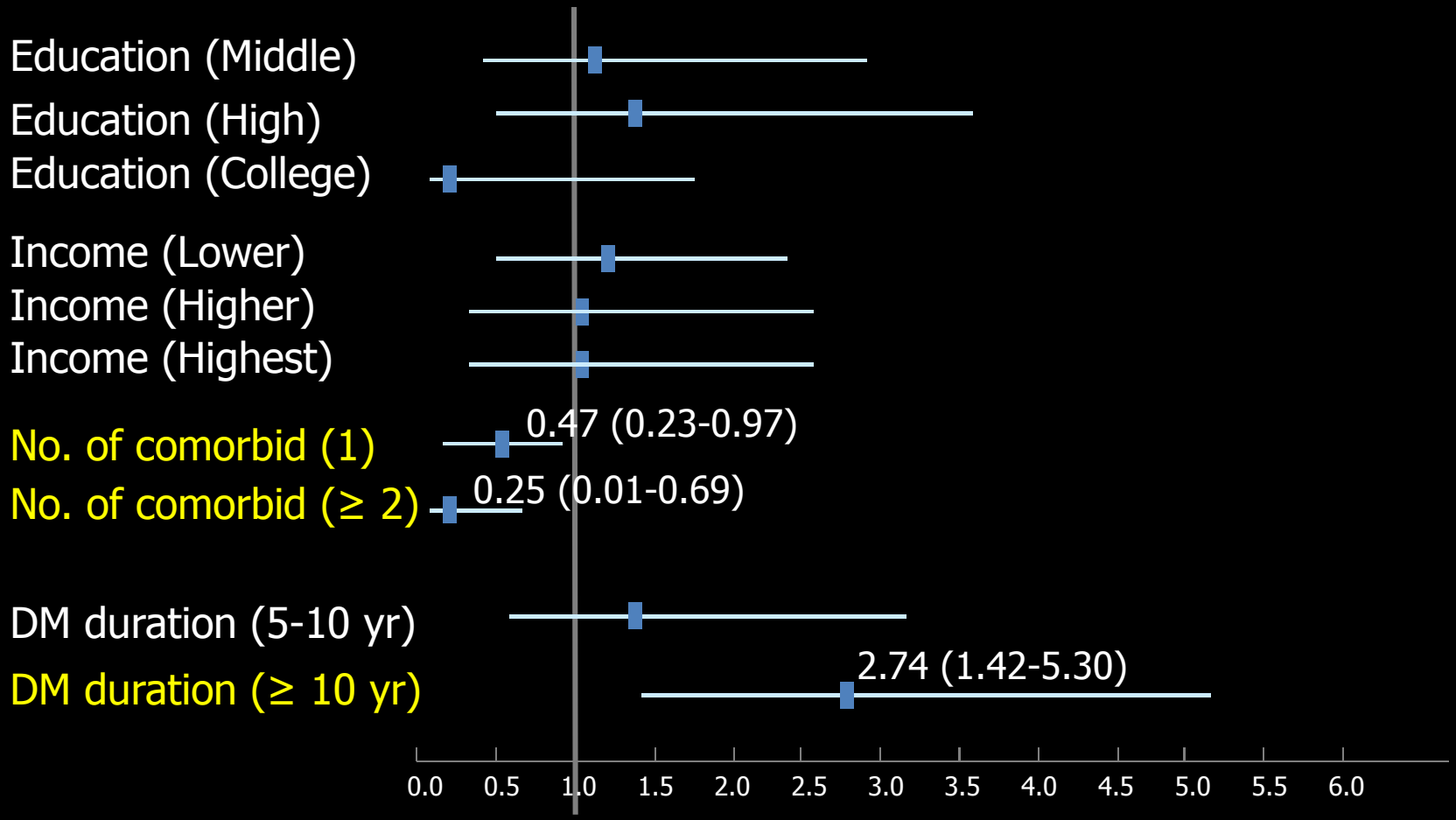
Ref. for each predictor: education (primary), income (lowest), No. of comorbid (0), DM duration (< 5 yr)

Independent Sociodemographic factors associated with HbA1c ≥ 8%



Ref. for each predictor: age group (65-69), sex (male), marriage (single), region (rural) Smoking (none), alcohol (≤ 1 /wk)

Independent Sociodemographic factors associated with HbA1c ≥ 8%



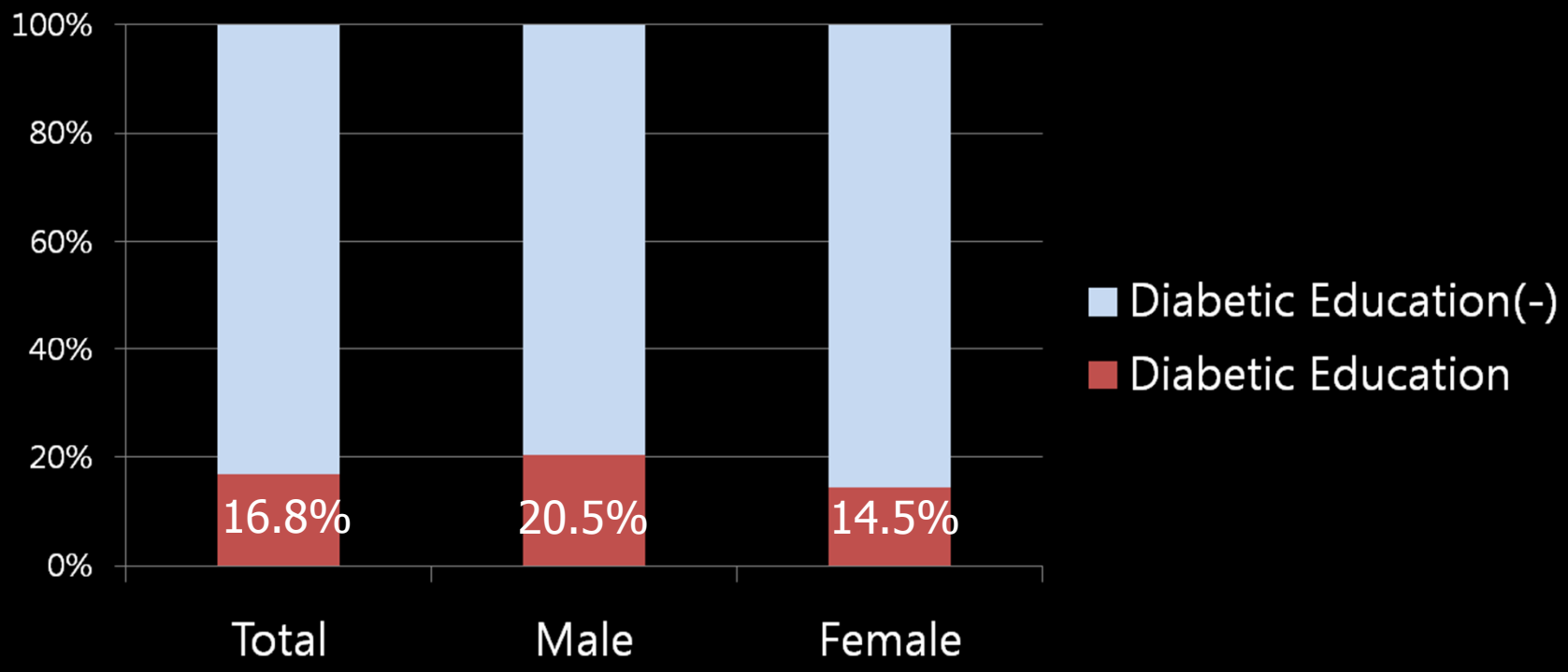
Ref. for each predictor: education (primary), income (lowest), No. of comorbid (0), DM duration (< 5 yr)

Diabetes Education

(KNHANES 2008-2010)

Only 26.2 % of the patients had taken diabetes education.

Noh JH et al. Diabetes Res Clin Pract 77S:S71-S75, 2007



Independent factors associated with HbA1c ≥ 7% (KNHAES 2007-2009)

Variable	OR(95% CI)	*P*-value
식생활지침 인지		
Yes	1.0(referent)	
No	1.25(0.54-2.86)	0.600
1) 다양한 식품을 섭취하자		
실천	1.0(referent)	
실천하려고 노력	0.94(0.44-1.97)	0.863
실천못함	1.50(0.60-3.73)	0.383
2) 짠음식을 피하고, 싱겁게 먹자		
실천	1.0(referent)	
실천하려고 노력	0.94(0.48-1.98)	0.973
실천못함	0.60(0.45-1.59)	0.845

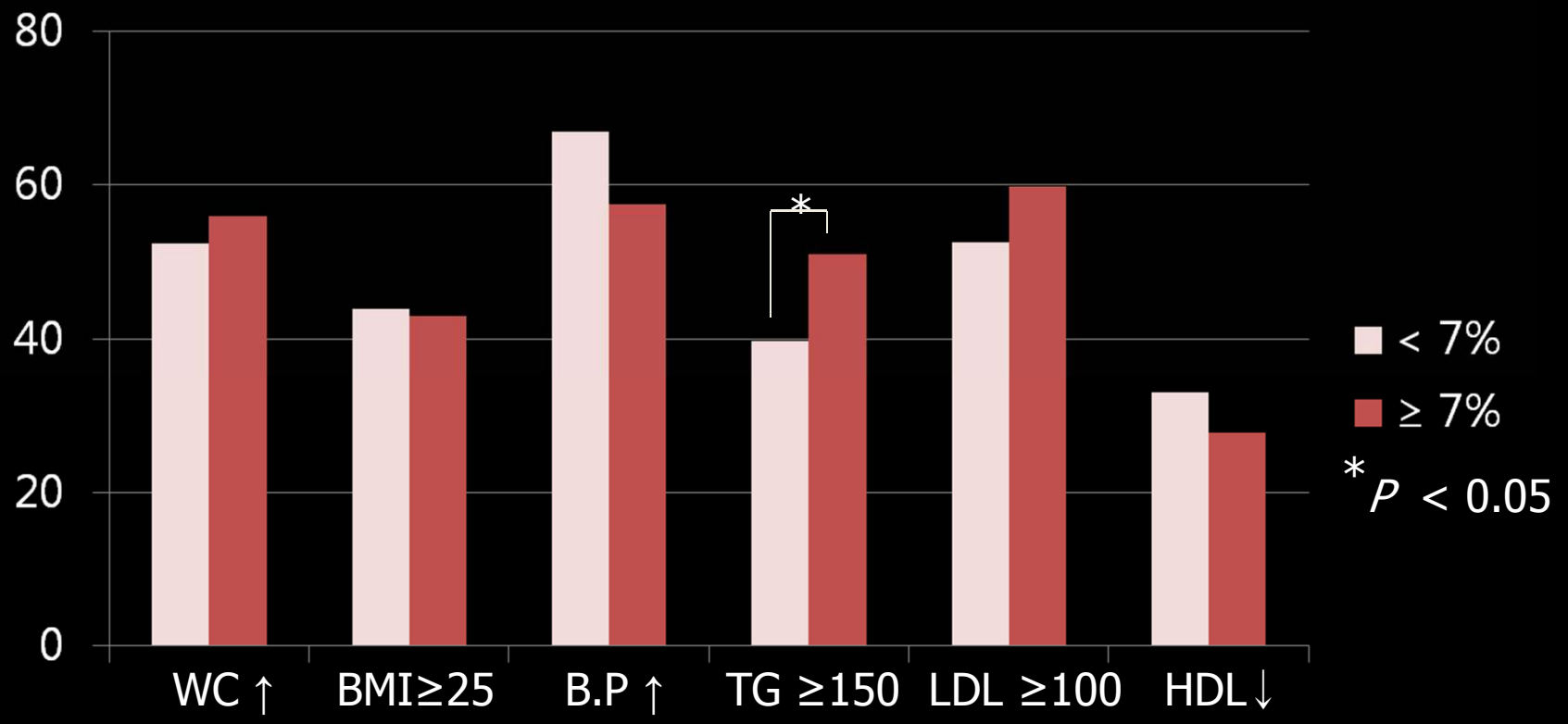
Adjusted for age, sex, education, income, duration of diabetes

Independent factors associated with HbA1c ≥ 7% (KNHAES 2007-2009)

Variable	OR(95% CI)	*P*-value
3) 알맞게 섭취하자		
실천	1.0(referent)	
실천하려고 노력	0.32(0.12-0.87)	0.026
실천못함	1.30(0.61-2.77)	0.492
4) 식사는 즐겁게, 아침을 먹자		
실천	1.0(referent)	
실천하려고 노력	0.87(0.05-15.24)	0.872
실천못함	1.04(0.19-5.43)	1.038

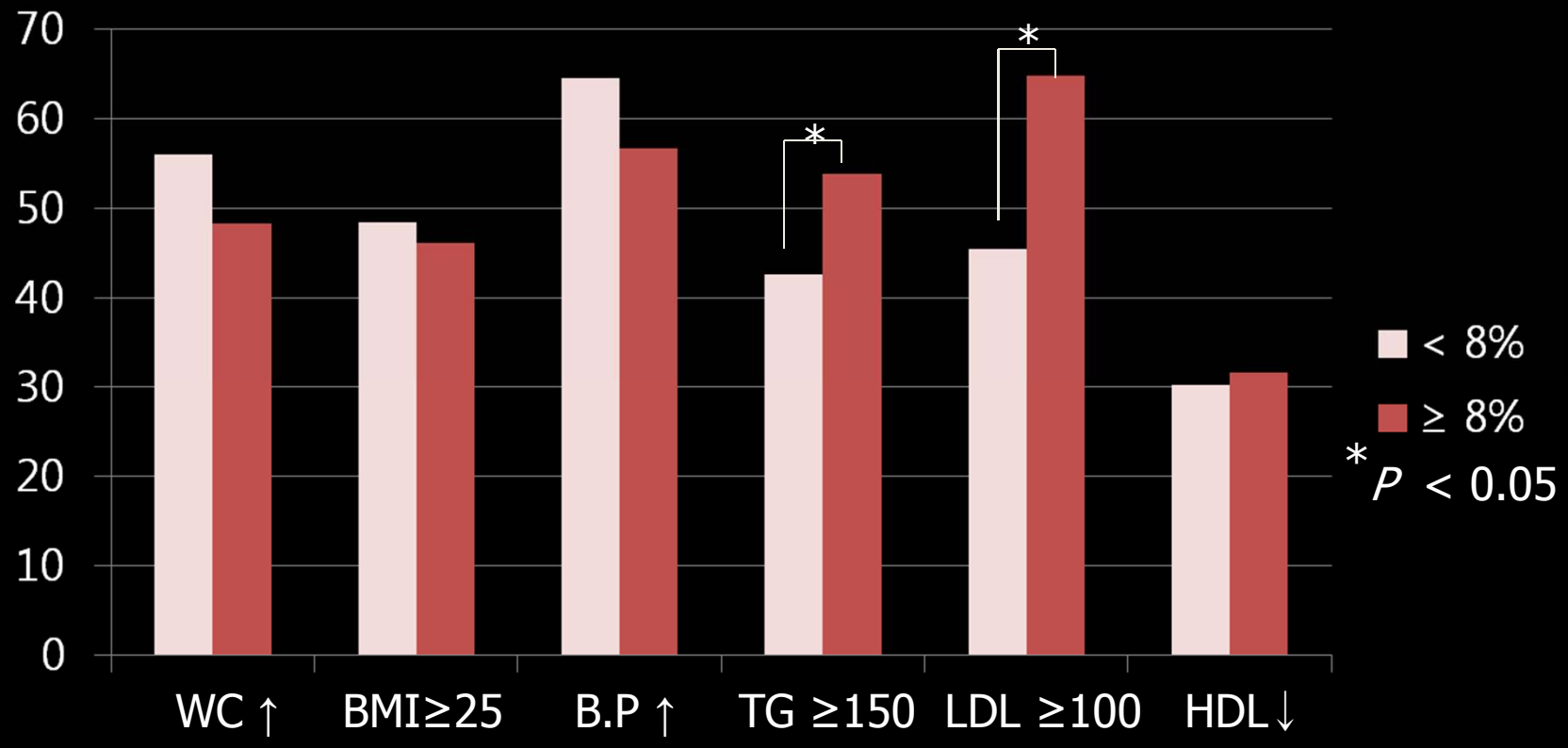
Adjusted for age, sex, education, income, duration of diabetes

HbA1c < 7% vs. HbA1c ≥ 7% (KNHANES 2008-2010)



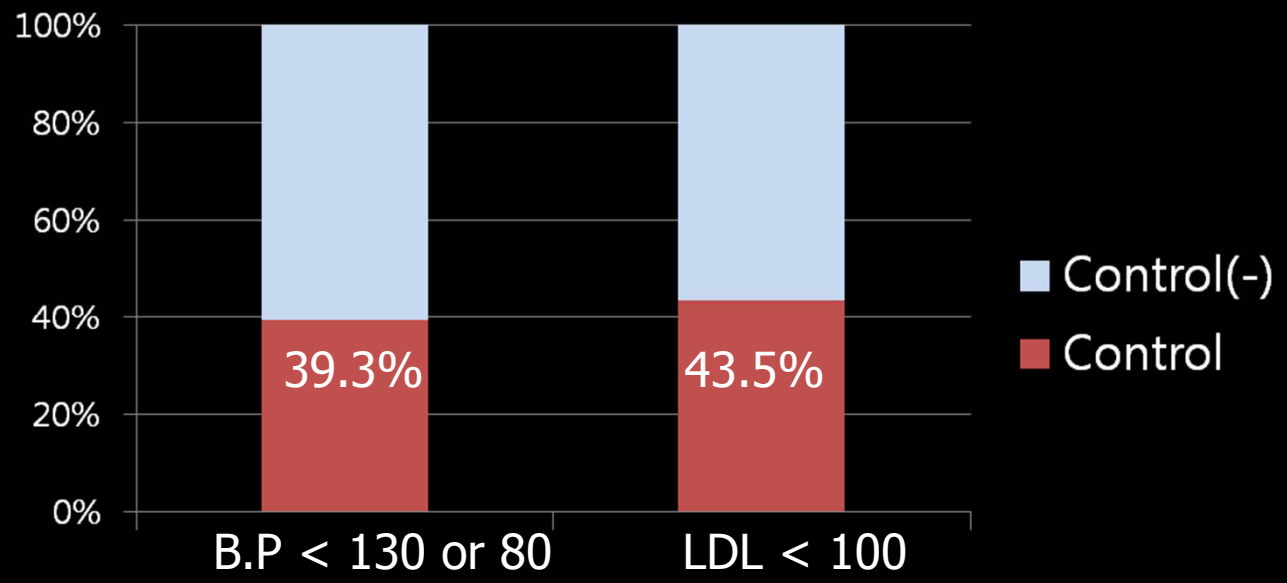
High waist circumference: M≥90 cm, F ≥85 cm; High B.P: BP ≥130/80 mmHg;
Low HDL: M<40, F<50

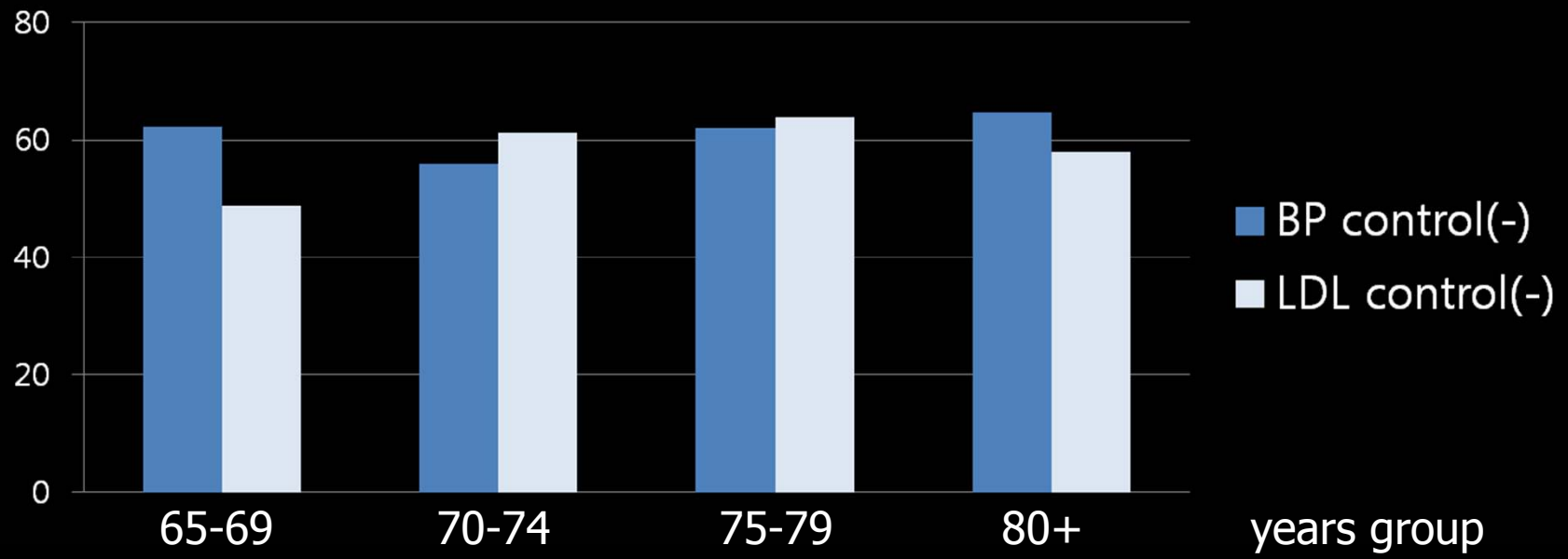
HbA1c < 8% vs. HbA1c ≥ 8% (KNHANES 2008-2010)



High waist circumference: M≥90 cm, F ≥85 cm; High B.P: BP ≥130/80 mmHg;
Low HDL: M<40, F<50

Known Diabetic Elderly Korean (KNHANES 2008-2010)









Thank You.