Dietary components and nutritional strategies in the prevention and ma nagement of type 2 diabetes

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Conflict of interest disclosure

None

Contents

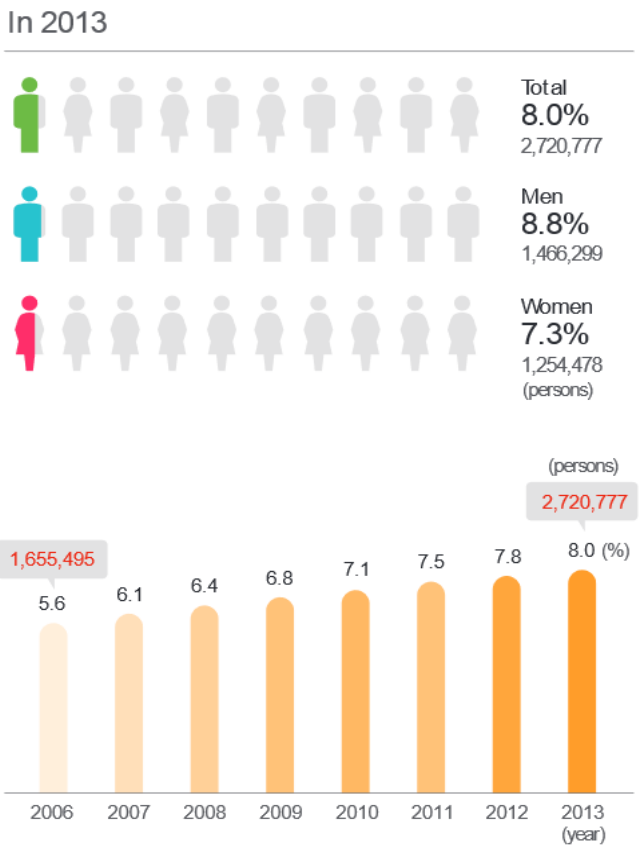
- Diabetes in Korea
- Dietary recommendation
  - ✓ American Diabetes Association
  - ✓ Korean Diabetes Association
- Macronutrient composition in Korean population
  - ✓ Energy, Carbohydrate, Fat, Protein
- Nutritional strategies in Korean population
  - ✓ Health eating patterns

Diabetes in Korea

Korean Diabetes Fact Sheet 2015

Prevalence of diabetes
(≥ 30 yrs old)

The prevalence of diabetes steadily increased from 5.6% in 2006 to 8.0% in 2013.



Prevalence
= [(Patients who had type 2 diabetes based on ICD-10 code and were being treated with antidiabetic agents)/(total subjects visiting hospitals or clinics or having health security service in each year)] X 100 (%).

Asian patients with diabetes

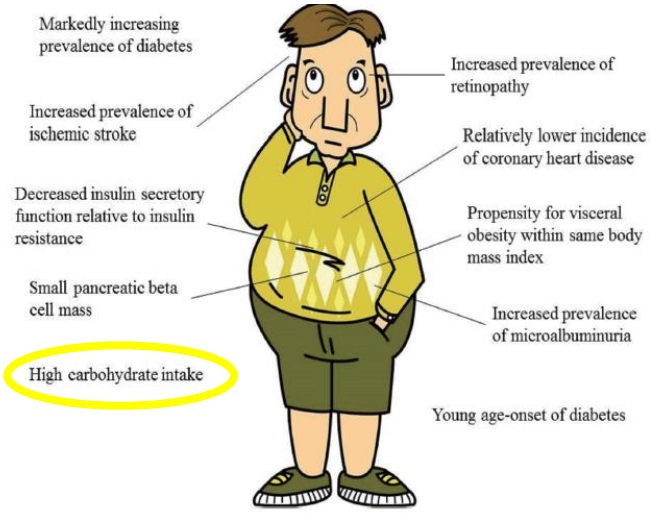


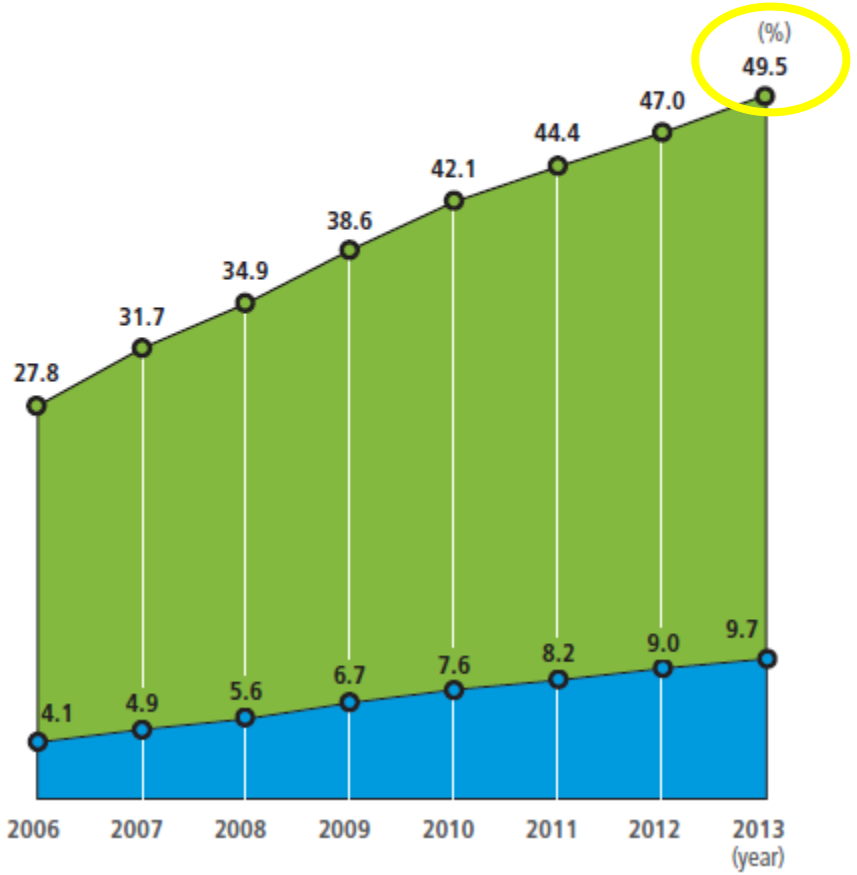
Fig. 1. Characteristics of Asian patients with diabetes.

Rhee, Endocrinol Metab 2015

Korean Diabetes Fact Sheet 2015

Dyslipidemia

Type 2 diabetes accompanying dyslipidemia had steadily increased during the last 7 years. In 2013, about half of subjects with diabetes had dyslipidemia, which was about 5-fold higher compared with those without diabetes.

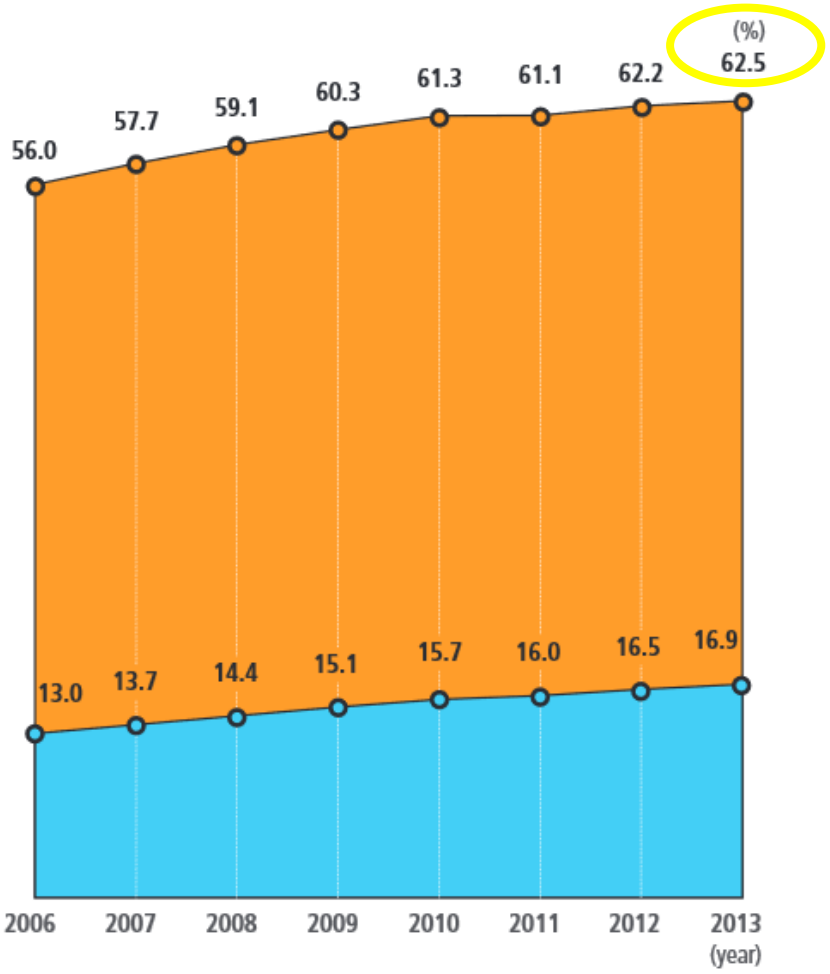


DEFINITION OF DYSLIPIDEMIA:
ICD-10 code (E78) and use of lipid-lowering medication.

Korean Diabetes Fact Sheet 2015

Treatment rate of hypertension

62.5% of subjects with type 2 diabetes had hypertension and were being treated with antihypertensive medication, which is 3.7-fold higher compared with those without diabetes in 2013.



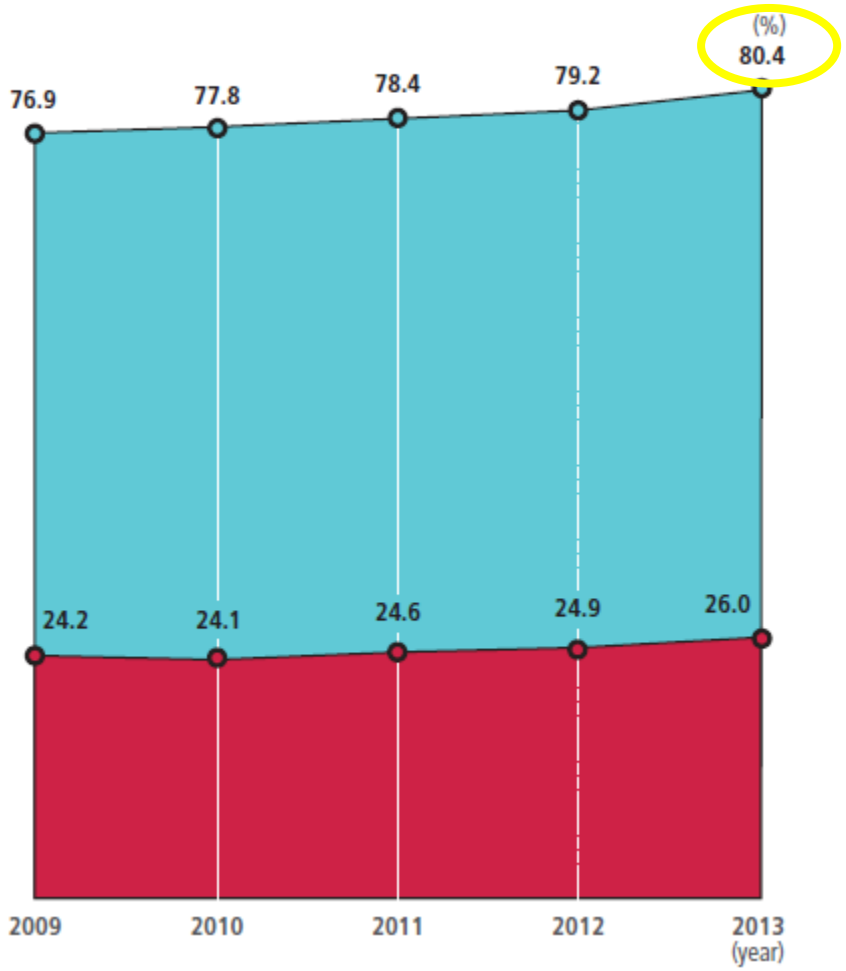
DEFINITION OF HYPERTENSION:
ICD-10 code (I10) & use of antihypertensive medication.

Korean Diabetes Fact Sheet 2015

Metabolic syndrome

Confined to participants in National Health Screening Service.

The prevalence of metabolic syndrome was about 3-fold higher in patients with type 2 diabetes than in those without diabetes.

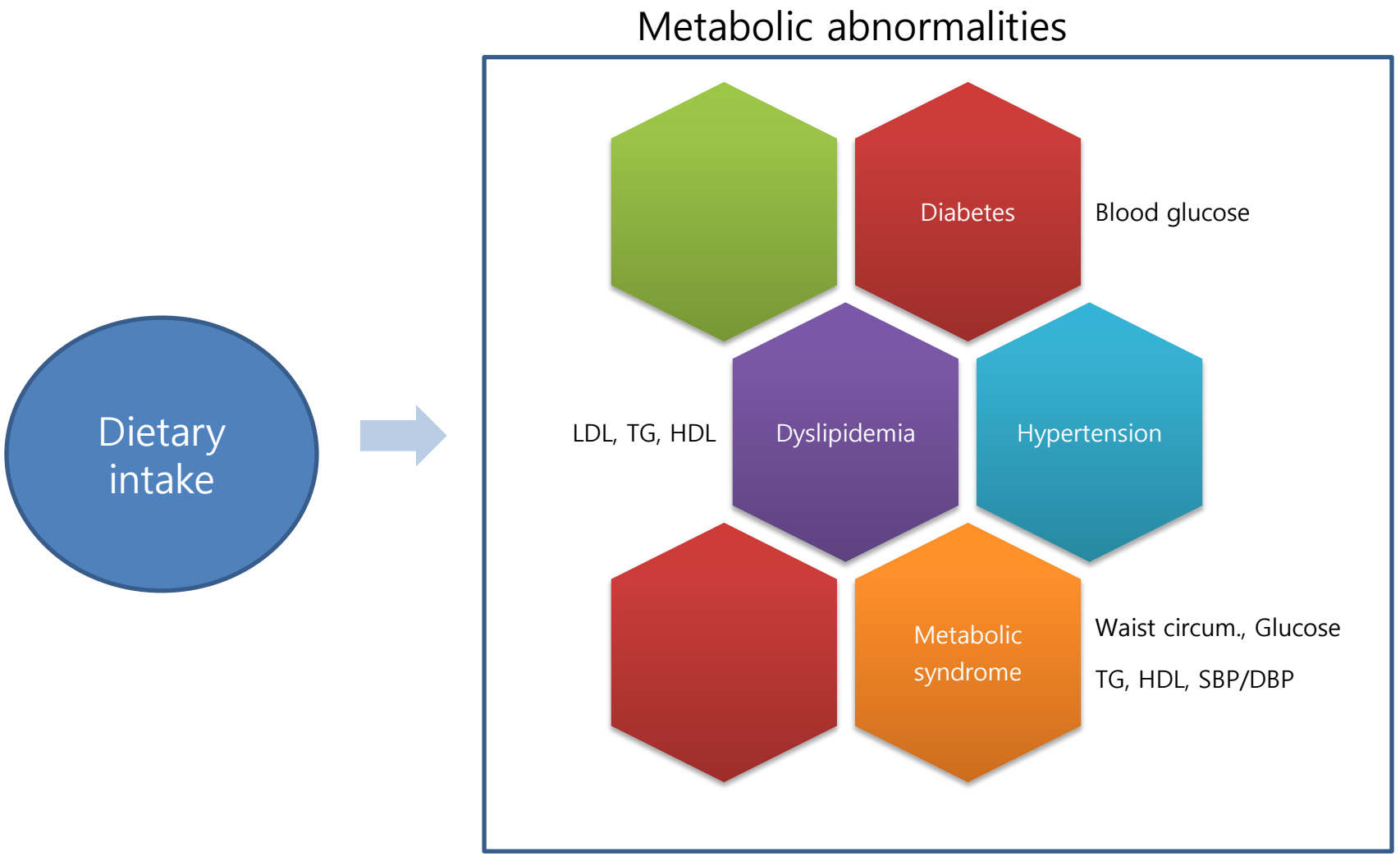


Type 2 diabetes

Non-diabetes

DEFINITION OF METABOLIC SYNDROME: Defined in accordance with the updated National Cholesterol Education Program Adult Treatment Panel (NCEP-ATP) III criteria for Asia. The presence of three or more of the following criteria constituted a diagnosis of metabolic syndrome: (1) waist circumference ≥ 90 cm in men or ≥ 85 cm in women; (2) fasting triglyceride ≥ 150 mg/dL or medication use; (3) HDL-cholesterol < 40 mg/dL in men or < 50 mg/dL in women or medication use; (4) blood pressure ≥ 130/85 mmHg or antihypertensive medication use; and (5) fasting glucose ≥ 100 mg/dL or current anti-diabetes medication.

The effect of diet in the prevention and management of metabolic disease



Dietary recommendation for diabetes

2016 Diabetes Guideline American Diabetes Association

7. Lifestyle Changes

Medical Nutrition Therapy (MNT)
The ADA acknowledges that there is no one-size-fits-all eating pattern for individuals with type 2 diabetes.
MNT is recommended for all individuals with type 1 and type 2 diabetes as part of an overall treatment plan, preferably provided by a registered dietitian skilled in diabetes MNT

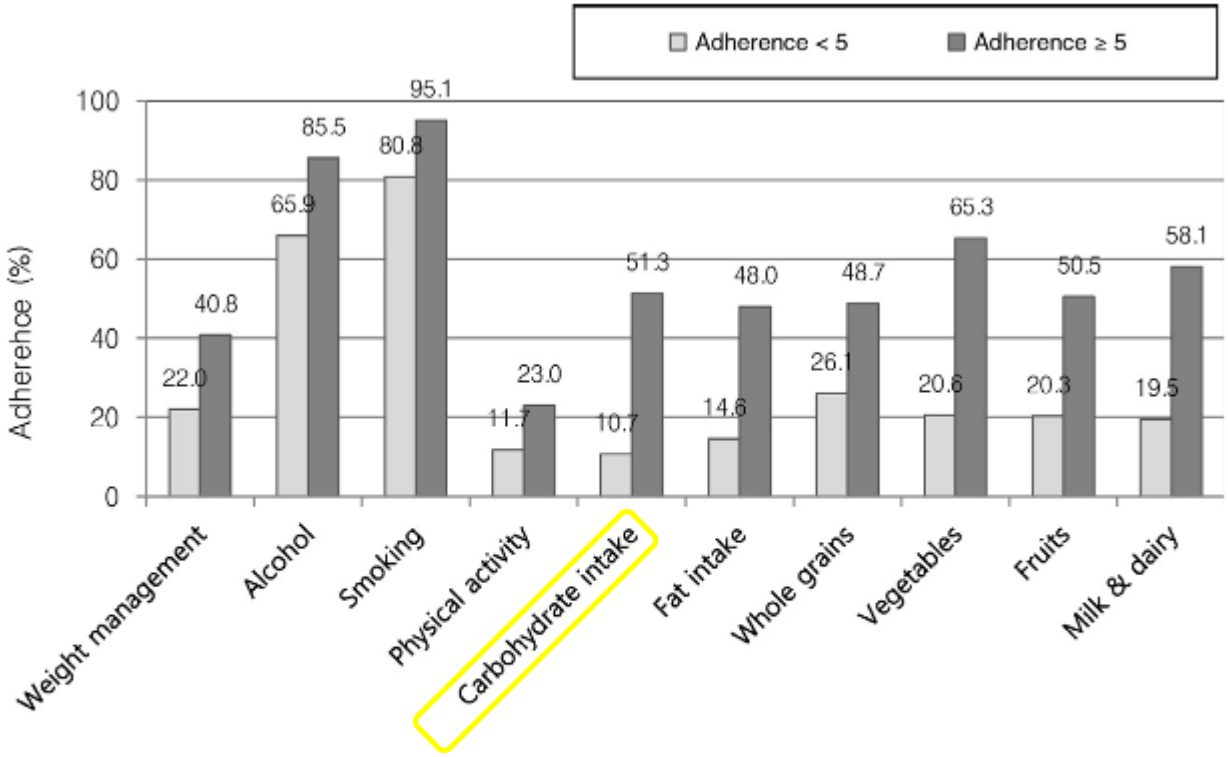
Goals of MNT:
• A healthful eating pattern to improve overall health, specifically:
  • Achievement and maintenance of weight goals
  • Attainment of individualized glycemic, blood pressure, and lipid goals
  • Type 2 diabetes prevention or delay
• Attain individualized glycemic, blood pressure, and lipid goals
• Achieve and maintain body weight goals
• Delay or prevent diabetes complications

Source: American Diabetes Association. Standards of medical care in diabetes-2016. Diabetes Care. 2016;39(suppl 1):S1-S106.

2015 Treatment guideline
Korean Diabetes Association

1. 당뇨병 고위험군 또는 당뇨병환자는 임상영양사로부터 개별화된 교육을 받아야 한다. [A], 임상영양요법은 당뇨병의 예후를 개선하며 비용대비 효과적이므로 반복교육이 필요하다. [B]
2. 과체중 또는 비만한 당뇨병환자는 건강한 식습관을 유지하면서 섭취량을 줄여야 한다. [A]
3. 일반적으로 총 에너지의 50~60%를 탄수화물로 섭취하도록 권고하나, 탄수화물, 단백질, 지방 섭취량은 식습관, 기호도, 치료목표 등을 고려하여 개별화 할 수 있다. [C]
4. 당뇨병성신증을 동반한 경우 초기부터 엄격한 단백질 제한은 필요치 않으나[A], 고단백질 섭취(총 에너지의 20% 이상)는 피하는 것이 좋다. [C]
5. 지방 섭취량은 대사적 문제(비만, 이상지질혈증 등)를 고려하여 개별화하며, 포화지방과 콜레스테롤, 트랜스지방의 섭취제한은 정상인과 동일하게 할 수 있다. [C]
6. 1일 나트륨 2,000 mg (소금 5 g) 이내로 제한을 권고한다. [E]
7. 당뇨병환자에게 비타민이나 무기질의 추가보충은 필요하지 않다. 단, 결핍상태이거나 제한적 식이섭취 시에는 별도로 보충한다. [B]
8. 당뇨병 예방을 위하여 식이섬유소는 전곡(whole grain)을 포함한 다양한 공급원을 통해 1일 20-25 g(12 g/1,000 kcal/day)을 섭취한다. [B]
9. 음주는 약물치료 중인 당뇨병환자에서 저혈당 발생 위험을 증가시키므로 혈당조절이 잘 되는 경우에만 1일 1-2잔 범위로 제한하며, 간질환 또는 이상지질혈증을 동반하거나, 비만한 당뇨병환자에서는 금주를 권고한다. [E]

Adherence to the guideline



All distributions were significantly different in both groups after adjusted for age, gender, education, income, diabetes duration, and diabetes treatment ($p<0.01$).

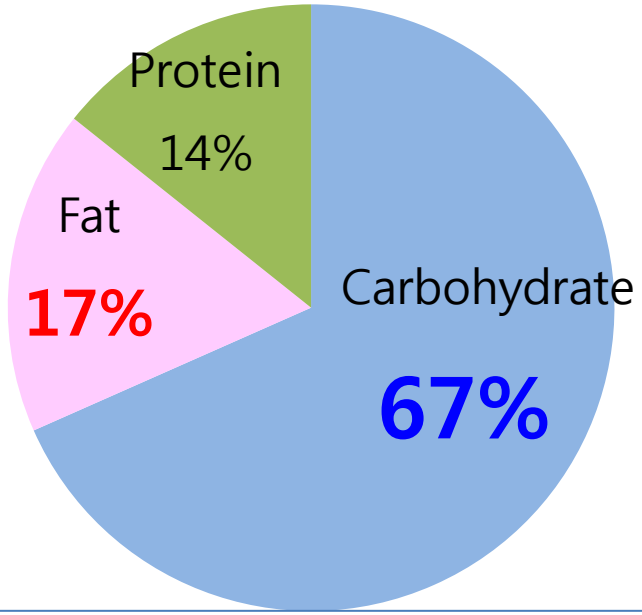
Fig. 1 – Percent adherence to each lifestyle recommendation by degree of adherence.

(Lim et al. Diabetes Research and Clinical Practice 2013)

Macronutrient profile in Korea

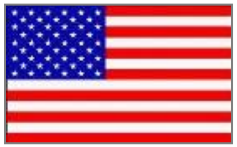
How different macronutrient composition?

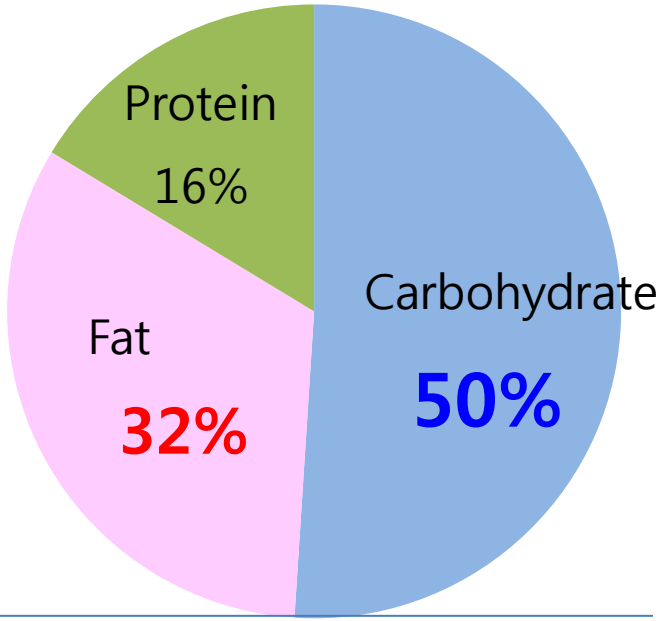
Korea



KNHANES 2007-2012

USA





NHANES 2007-2012

Carbohydrate intake in US & Korea

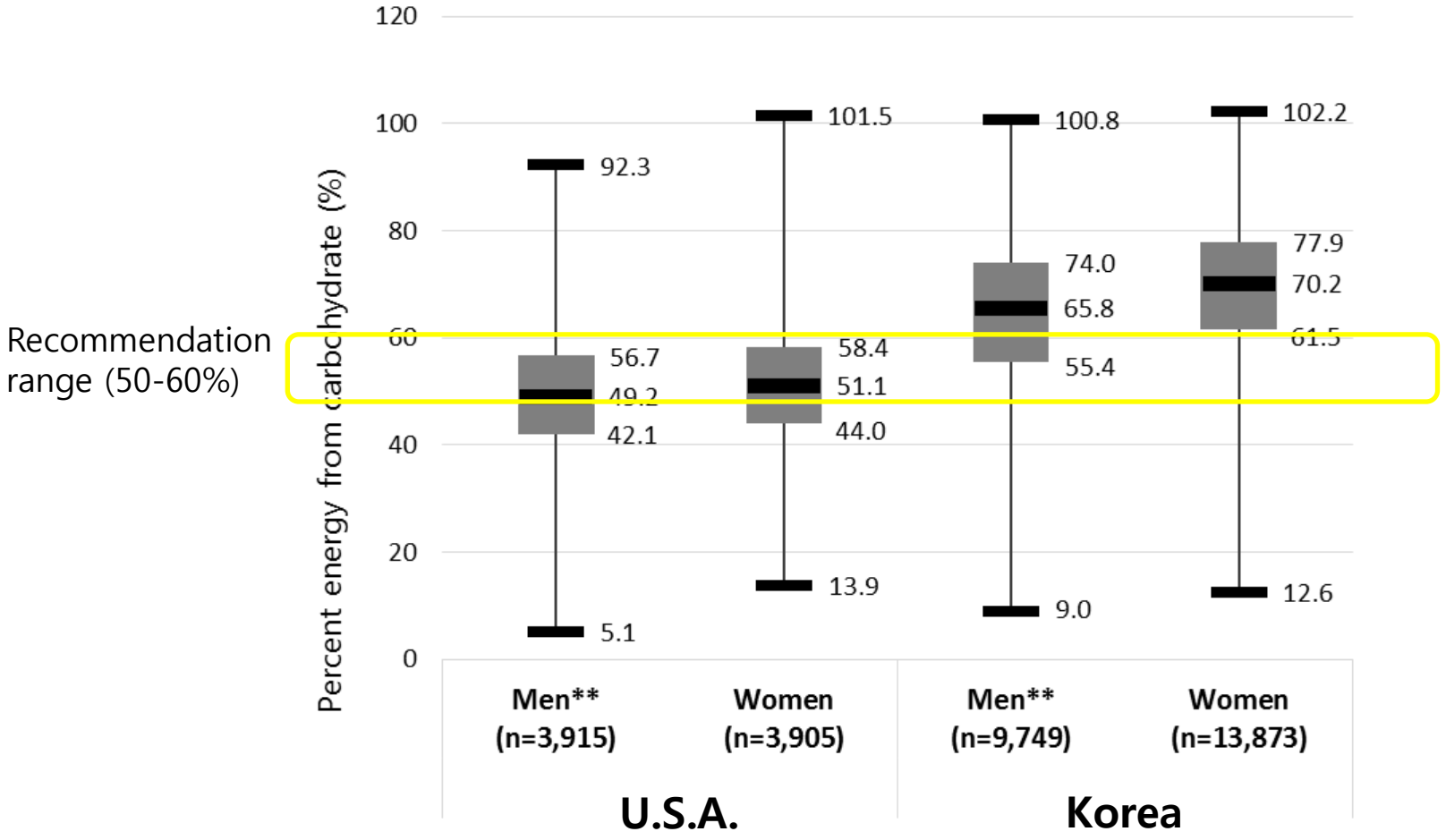


Figure 1. Distribution of carbohydrate intake among participants in the NHANES and KNHANES 2007-2012

Ha et al, under review

Dietary carbohydrate and metabolic abnormalities

Table 5. Metabolic syndrome components by quintiles of dietary carbohydrate intake in men and women in a study examining the relationship between metabolic syndrome prevalence and dietary carbohydrate intake among Korean adults[a]

	Quintiles of Energy from Carbohydrate[b] (%)					*P* for trend[c]
	Q1 (n=526)	Q2 (n=526)	Q3 (n=527)	Q4 (n=526)	Q5 (n=526)	
Men (n=2,631)	← mean±standard error of mean →					
Waist circumference (cm)	83.8±0.4	85.4±0.4	84.0±0.4	83.3±0.4	83.8±0.4	0.066
Triglyceride (mg/dL[d])	146.0±4.4	164.0±7.2	161.0±5.5	153.9±5.3	159.2±6.1	0.028
HDL[e]-cholesterol (mg/dL[f])	46.6±0.5	44.8±0.4	45.2±0.4	45.3±0.5	45.1±0.5	0.048
Fasting blood glucose (mg/dL[g])	94.5±0.7	94.2±0.6	94.8±0.8	97.5±1.1	97.2±0.9	0.004
Systolic blood pressure (mm Hg)	114.9±0.5	116.0±0.6	115.3±0.6	115.9±0.8	116.1±0.7	0.815
Diastolic blood pressure (mm Hg)	78.8±0.5	79.3±0.5	78.0±0.5	77.5±0.6	77.8±0.5	0.044
	Quintiles of White Rice Intake[b] (Servings/Day)					
	Q1 (n=842)	Q2 (n=843)	Q3 (n=843)	Q4 (n=843)	Q5 (n=843)	
Women (n=4,214)	← mean±standard error of mean →					
Waist circumference (cm)	76.5±0.4	77.2±0.4	76.7±0.3	77.2±0.4	79.0±0.4	0.432
Triglyceride (mg/dL[d])	96.9±2.3	102.9±2.4	102.0±2.9	108.6±3.2	109.1±2.6	0.053
HDL cholesterol (mg/dL[f])	52.4±0.5	50.8±0.4	51.1±0.4	50.1±0.4	49.2±0.4	0.002
Fasting blood glucose (mg/dL[g])	91.1±0.4	92.0±0.4	92.5±0.5	92.9±0.5	93.4±0.7	0.059
Systolic blood pressure (mm Hg)	107.6±0.5	108.3±0.5	109.3±0.6	109.4±0.5	112.2±0.6	0.009
Diastolic blood pressure (mm Hg)	71.8±0.4	71.9±0.4	71.9±0.4	72.3±0.4	73.5±0.4	0.105

[a]All analyses accounted for the complex sampling design effect and appropriate sampling weights of the national survey.
[b]All dietary carbohydrate intake variables were energy adjusted using residual method and were categorized into quintiles.
[c]*P* for trend was obtained from a multivariate linear regression analysis after adjustment for age (continuous), living area (urban or rural), education (elementary, junior high, senior high, or college or more), smoking status (current, ex-, or nonsmokers), current alcohol intake (never or rarely, <1 time/mo, 1 time/mo, 2 to 4 times/mo, 2 to 3 times/wk, or ≥4 times/wk), vigorous physical activity (never or rarely, 1 to 2 days/wk, 3 to 4 days/wk, ≥5 days/wk), total energy intake (continuous), and body mass index (continuous, exception for waist circumference).

Men

TG ↑ & HDL ↓
Glucose ↑
DBP ↓

46% Metabolic syndrome

Women

TG ↑ & HDL ↓
Glucose ↑
SBP ↓

74% Metabolic syndrome

(Song et al. Journal of the Academy of Nutrition and Dietetics 2014)

Dietary carbohydrate and Atherogenic Dyslipidemia in Korean men

Adults aged 30 or more with normal LDL levels using 2008-2012 KNAHENS

	Q1	Q2	Q3	Q4	Q5	P for Trend
CHO	1.00	0.90 (0.63-1.29)	1.26 (0.91-1.76)	1.33 (0.96-1.85)	**1.70** (1.20-2.41)	**0.0001**
% CHO	1.00	1.03 (0.73-1.44)	1.10 (0.79-1.54)	1.50 (1.07-2.11)	**1.38** (0.96-2.00)	**0.014**
DGL	1.00	1.16 (0.83-1.62)	1.36 (0.99-1.86)	1.44 (1.03-2.02)	**1.57** (1.10-2.25)	**0.004**
Fat	1.00	1.15 (0.82-1.62)	1.10 (0.80-1.52)	0.99 (0.70-1.41)	0.85 (0.60-1.20)	0.164
% Fat	1.00	1.12 (0.81-1.53)	0.92 (0.66-1.30)	0.83 (0.58-1.19)	0.86 (0.61-1.21)	0.124

CHO: energy-adjusted total carbohydrate intake
DGL: Dietary Glycemic Load
Fat: energy-adjusted total fat intake

(Song et al, under review)

Dietary carbohydrate and Atherogenic Dyslipidemia in Korean women

Adults aged 30 or more with normal LDL levels using 2008-2012 KNAHENS

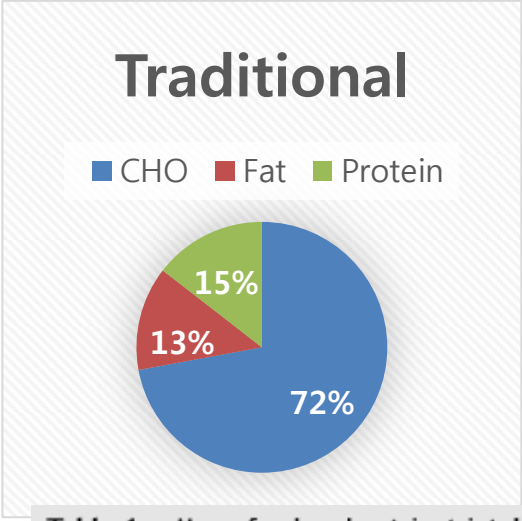
	Q1	Q2	Q3	Q4	Q5	P for Trend
CHO	1.00	1.09 (0.78-1.53)	1.26 (0.90-1.76)	0.92 (0.67-1.27)	**1.61** (1.17-2.23)	**0.025**
% CHO	1.00	1.05 (0.75-1.47)	0.99 (0.70-1.38)	1.13 (0.82-1.57)	**1.43** (1.04-1.99)	**0.036**
DGL	1.00	1.15 (0.82-1.59)	1.14 (0.81-1.59)	1.11 (0.79-1.56)	**1.56** (1.12-2.17)	**0.028**
Fat	1.00	0.68 (0.51-0.90)	0.70 (0.51-0.96)	0.76 (0.56-1.05)	0.71 (0.52-0.98)	0.112
% Fat	1.00	0.81 (0.59-1.10)	0.69 (0.50-0.96)	0.79 (0.57-1.09)	0.74 (0.52-1.05)	0.106

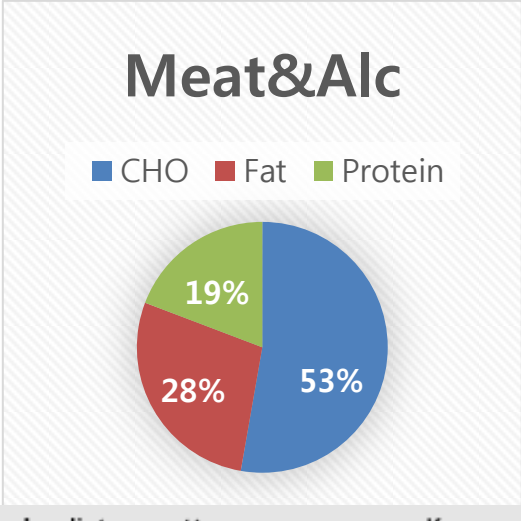
CHO: energy-adjusted total carbohydrate intake
DGL: Dietary Glycemic Load
Fat: energy-adjusted total fat intake

(Song et al, under review)

What is a healthy eating pattern in Korea?

Traditional Korean dietary pattern





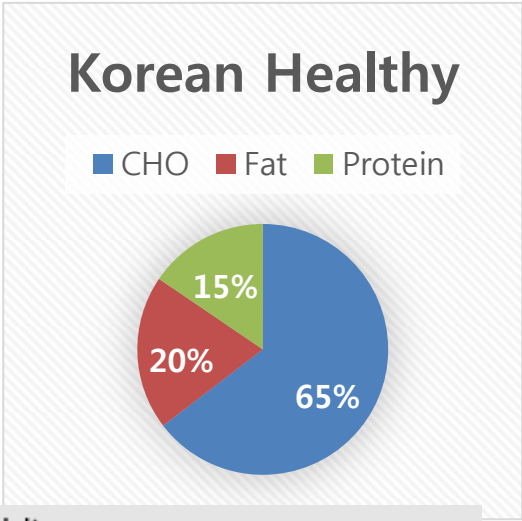


Table 1 Mean food and nutrient intakes by dietary pattern groups among Korean adults.

	Traditional ($n = 2384$)		Meat & Alcohol ($n = 748$)		Korean Healthy ($n = 1599$)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Food groups (% energy)						
White rice	60.3	12.5	27.1	11.3	27.0	11.6
Other grain	3.9	5.8	3.8	6.1	9.7	13.2
Noodle & dumpling	0.9	4.1	2.1	5.7	14.1	16.8
Flour & bread	1.5	3.7	3.0	5.3	6.9	9.2
Vegetables	3.5	2.7	3.2	2.0	3.2	2.4
Legumes	2.7	3.6	1.8	2.8	2.8	4.1
Kimchi	1.7	1.5	1.2	1.1	1.2	1.1
Fruits	1.2	3.2	1.6	3.6	2.5	4.8
Meat & its products	3.9	5.6	21.7	13.1	4.0	5.0
Eggs	1.3	2.7	1.7	2.8	2.2	3.2
Fishes	4.7	5.7	4.2	4.9	5.7	6.9
Milk & dairy products	1.6	3.9	1.9	4.3	3.3	6.3
Oils	3.2	3.1	3.9	3.4	4.2	3.8
Beverages	1.8	3.0	2.4	3.5	2.6	4.5
Alcohols	0.9	3.5	11.1	15.6	1.3	4.3

(Song & Joung, Nutrition, Metabolism & Cardiovascular Disease 2012)

Fruit and dairy pattern in Korea

Table 2 – Factor-loading matrix for the 4 major dietary patterns according to the percentage of energy derived from food or food groups

Food or food groups [a]	Dietary patterns			
	Korean traditional	Alcohol and meat	Sweets and fast foods	Fruit and dairy
Soy sauce	0.697	–	–	
Refined grains	0.594	–	–	−0.331
Onion and garlic	0.582	0.400	–	–
Vegetable oil	0.552	0.363	–	–
Soy products	0.516	−0.424	–	–
Red pepper and soybean paste	0.453	–	–	–
Starch syrup and sugar	0.452	–	–	–
Kimchi	0.440	–	–	−0.315
Seaweed	0.433	–	–	–
Fish	0.393	0.261	–	–
Whole grains	0.320	–	–	–
Vegetables	0.284	–	–	–
Alcohol	–	0.651	–	–
Processed meat	–	0.503	–	–
Poultry and eggs	–	0.460	–	–
Beef	–	0.418	–	0.255
Boiled fish paste	–	0.400	–	–
Animal fat	–	0.336	–	–
Organ meat	–	0.306	–	–
Coffee	–	0.270	–	–
Fruits juice and canned fruits	–	–	0.619	–
Chocolate and ice cream	–	–	0.557	–
Pizza and hamburgers	–	–	0.533	–
Spaghetti	–	–	0.489	–
Carbonated beverages	–	–	0.438	–
Sauce	–	0.268	0.414	–
Fruits	–	–	–	0.496
Pork	0.267	–	–	−0.493
Ramen (instant noodles)	–	–	0.273	−0.487
Dairy products	–	–	0.274	0.477
Rice cakes	–	–	–	0.432
Nuts	–	–	–	0.327
Cereal	–	–	–	–
Variance of intake explained (%)	9.341	7.197	6.598	5.656

[a] Factor loadings that were −0.20 and +0.20 are not shown.

- Study outline
  - ✓ 406 Koreans aged 22 to 78 years
  - ✓ 3-day food record
- Dietary patterns
  - ✓ Korean traditional
  - ✓ Alcohol and meat
  - ✓ Sweets and fast foods
  - ✓ Fruit and dairy
    - Low consumption of refined grains, kimchi, but high consumption of fruit, dairy, nuts

(Hong et al. Metabolism 2012)

Fruit and dairy pattern in Korea

Table 4 – Odds ratios for metabolic syndrome and its components by quartile based on scores for dietary patterns

	Q1	Q2	Q3	Q4	P[b] for trend
Korean traditional					
Impaired fasting glucose	1	0.97 (0.51-1.84)	1.40 (0.75-2.59)	1.46 (0.79-2.70)	.146
Elevated blood pressure	1	1.42 (0.76-2.65)	1.88 (1.00-3.51)	1.17 (0.63-2.18)	.342
Low HDL cholesterol	1	1.41 (0.77-2.57)	1.53 (0.84-2.80)	1.75 (0.96-3.20)	.075
Hypertriglyceridemia	1	1.59 (0.87-2.89)	1.37 (0.76-2.49)	1.30 (0.72-2.37)	.493
Abdominal obesity	1	1.59 (0.76-3.29)	1.07 (0.53-2.18)	0.94 (0.47-1.88)	.650
Metabolic syndrome[a]	1	2.09 (1.07-4.07)	2.02 (1.06-3.88)	**2.03 (1.05-3.92)**	**.047**
Alcohol and meat					
Impaired fasting glucose	1	0.80 (0.43-1.47)	0.71 (0.38-1.33)	**0.46 (0.23-0.92)**	.030
Elevated blood pressure	1	0.68 (0.36-1.28)	0.72 (0.38-1.39)	0.95 (0.47-1.90)	.924
Low HDL cholesterol	1	1.56 (0.86-2.81)	1.13 (0.61-2.09)	1.09 (0.56-2.09)	.950
Hypertriglyceridemia	1	1.05 (0.57-1.92)	1.22 (0.66-2.26)	1.51 (0.79-2.91)	.194
Abdominal obesity	1	1.46 (0.70-3.05)	0.91 (0.45-1.88)	1.13 (0.53-2.41)	.955
Metabolic syndrome	1	1.21 (0.63-2.33)	0.90 (0.46-1.74)	1.16 (0.58-2.34)	.945
Sweets and fast foods					
Impaired fasting glucose	1	1.42 (0.80-2.65)	1.02 (0.55-1.90)	0.70 (0.36-1.36)	.223
Elevated blood pressure	1	0.76 (0.40-1.46)	0.67 (0.35-1.26)	0.98 (0.50-1.90)	.829
Low HDL cholesterol	1	1.01 (0.56-1.84)	1.37 (0.75-2.50)	0.72 (0.38-1.37)	.571
Hypertriglyceridemia	1	0.65 (0.36-1.19)	0.61 (0.33-1.12)	0.57 (0.30-1.06)	.087
Abdominal obesity	1	0.93 (0.47-1.88)	1.43 (0.69-2.93)	1.16 (0.55-2.44)	.543
Metabolic syndrome	1	1.08 (0.56-2.08)	1.07 (0.56-2.07)	0.81 (0.41-1.61)	.687
Fruit and dairy					
Impaired fasting glucose	1	0.90 (0.49-1.66)	0.64 (0.34-1.20)	0.42 (0.20-0.84)	.010
Elevated blood pressure	1	1.01 (0.53-1.93)	0.67 (0.34-1.30)	0.72 (0.36-1.43)	.180
Low HDL cholesterol	1	1.07 (0.58-1.96)	0.94 (0.50-1.77)	0.97 (0.50-1.87)	.844
Hypertriglyceridemia	1	0.55 (0.30-1.02)	0.58 (0.31-1.10)	0.39 (0.20-0.76)	.009
Abdominal obesity	1	1.19 (0.58-2.43)	1.13 (0.54-2.37)	1.68 (0.78-3.59)	.233
Metabolic syndrome	1	0.74 (0.38-1.42)	0.55 (0.28-1.10)	0.46 (0.22-0.95)	.025

[a] Components of metabolic syndrome were defined as abdominal adiposity (waist circumference ≥80 cm for women or ≥ 90 cm for men); low serum HDL cholesterol <50 mg/dL for women or <40 mg/dL for men; hypertriglyceridemia ≥150 mg/dL; elevated blood pressure (≥130/85 mm Hg); and abnormal glucose homeostasis: fasting blood glucose ≥110 mg/dL.

[b] All models were adjusted for age, sex, taking medications, smoking, physical activity, and BMI.

2 times more risk of Metabolic Syndrome

54% reduction of Metabolic Syndrome

Balanced vs Rice-oriented pattern

Table 4. Multivariate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for diabetes and dyslipidemia across quintiles of dietary pattern scores

	Men (n = 3,795)			*P* for trend[1)]	Women (n = 5,930)			*P* for trend[1)]
	Q1	Q3	Q5		Q1	Q3	Q5	
Balanced pattern								
Diabetes								
100 ≤ FBG < 126 mg/dL	1.00	1.15 (0.90 - 1.49)	1.12 (0.87 - 1.46)	0.7450	1.00	1.20 (0.95 - 1.53)	0.99 (0.77 - 1.27)	0.9794
FBG ≥ 126 mg/dL	1.00	0.96 (0.51 - 1.82)	0.55 (0.26 - 1.20)	0.1360	1.00	0.87 (0.39 - 1.93)	1.33 (0.63 - 2.78)	0.3988
Dyslipidemia								
Chol. ≥ 240 mg/dL	1.00	1.00 (0.66 - 1.52)	0.92 (0.60 - 1.42)	0.8229	1.00	1.14 (0.83 - 1.56)	0.98 (0.70 - 1.37)	0.6940
TG ≥ 200 mg/dL	1.00	1.13 (0.87 - 1.47)	0.89 (0.68 - 1.17)	0.8165	1.00	0.80 (0.59 - 1.10)	0.91 (0.66 - 1.24)	0.2569
HDL-chol. < 40 mg/dL in men and < 50 mg/dL in women	1.00	1.05 (0.84 - 1.31)	1.04 (0.83 - 1.31)	0.2588	1.00	0.95 (0.80 - 1.13)	0.99 (0.83 - 1.17)	0.4002
Rice-oriented pattern								
Diabetes								
100 ≤ FBG < 126 mg/dL	1.00	1.12 (0.86 - 1.45)	1.00 (0.76 - 1.32)	0.7383	1.00	0.84 (0.65 - 1.08)	0.85 (0.66 - 1.11)	0.4050
FBG ≥ 126 mg/dL	1.00	1.09 (0.56 - 2.13)	1.28 (0.65 - 2.52)	0.2291	1.00	0.87 (0.34 - 2.21)	0.79 (0.32 - 1.95)	0.2782
Dyslipidemia								
Chol. ≥ 240 mg/dL	1.00	0.75 (0.49 - 1.16)	1.00 (0.65 - 1.54)	0.5391	1.00	1.16 (0.80 - 1.66)	0.76 (0.52 - 1.12)	0.0220
TG ≥ 200 mg/dL	1.00	1.33 (1.01 - 1.73)	1.58 (1.20 - 2.09)	0.0042	1.00	1.23 (0.89 - 1.70)	1.10 (0.78 - 1.55)	0.5806
HDL-chol. < 40 mg/dL in men and < 50 mg/dL in women	1.00	1.26 (1.00 - 1.58)	1.43 (1.12 - 1.82)	0.0015	1.00	1.04 (0.88 - 1.23)	1.29 (1.08 - 1.55)	0.0020

Q, quintiles of dietary pattern scores; FBG, fasting blood glucose; Chol., cholesterol; TG, triglycerides; HDL-chol., high density lipoprotein-cholesterol

[1)] *P* for trend from logistic regression analysis across quintiles of dietary pattern scores; adjusted for age (continuous), income (low, medium, or high), education (elementary, secondary, or college or more), body mass index (continuous), smoking (never, past, or current), alcohol use (yes or no), physical activity (yes or no), and dietary pattern scores (continuous).

(Song et al. Nutrition Research Practice 2012)

Healthy eating pattern for Korean population

Based on the previous studies for Korean population,

- ✓ Staple: **Moderate** amount of rice intake including whole grains or mixed grains (avoid white-rice oriented pattern)
- ✓ Side dishes: **Sufficient** amounts as well as **various** kinds of foods such as beans, eggs, mushroom, and fish
- ✓ Snack: fresh fruit and dairy products (avoid sugar-sweeted beverage)

Summary

- Diabetes in Korea shows different characteristics compared to those in the Western countries, which might be explained by difference in their diet.
- Korean adults have different dietary practices especially in terms of carbohydrate intake. Very high carbohydrate diet was associated with metabolic abnormalities, particularly in atherogenic dyslipidemia.
- Korean healthy eating patterns are proposed with whole grains and variety of sides dishes along with fruits and dairy products.