Diabetes in Asian Americans and the Impact of Traditional Asian Diet on physiology

William Hsu, MD
Joslin Diabetes Center
Harvard Medical School

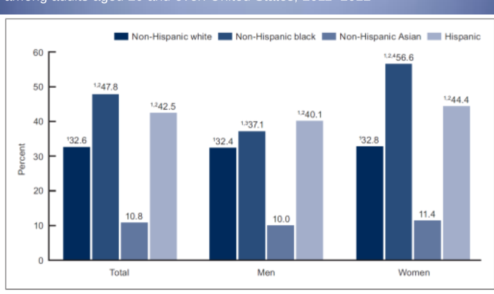
COI Disclosure

Speaker：William C. Hsu

No potential COI to disclose.
The speaker have no financial conflict of interest to disclose concerning the presentation.

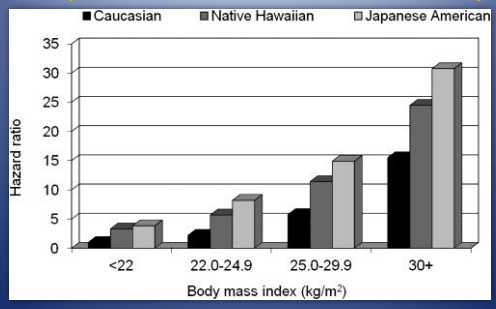
NCHS Data Brief ■ No. 131 ■ October 2013

Age-adjusted prevalence of obesity, by sex and race and Hispanic origin, among adults aged 20 and over: United States, 2011–2012



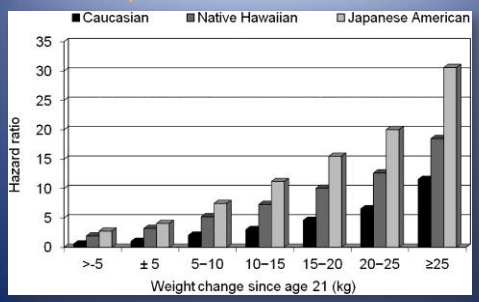
2011- 2012 NHANES

Diabetes Risk by BMI Category in the Hawaii Component of the Multi-Ethnic Cohort Study



Hsu WC, et al. Diabetes Care. 2012;35:1189-1198

Diabetes Risk by Weight Change Category in the Hawaii Component of the Multi-ethnic Cohort Study



Hsu WC et al. Diabetes Care. 2012;35:1189-1198

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Reviews/Consensus Reports/ADA Statements

REVIEW

Understanding and Addressing Unique Needs of Diabetes in Asian Americans, Native Hawaiians, and Pacific Islanders

	Type 1 diabetes		Type 2 diabetes	
	Aged 0–9 years*	Aged 10–19 years*	Aged 0–9 years*	Aged 10–19 years*
Denominator (*N*)	154,899	165,504	154,899	165,504
Cases (*n*)	40	127	2	86
Prevalence per 1,000 (95% CI)	0.26 (0.19–0.35)	0.77 (0.65–0.92)	NP†	0.52 (0.42–0.64)
Denominator (*N*)	753,299	806,921	753,299	806,921
Cases (*n*)	48	59	5	98
Incidence per 100,000 (95% CI)	6.4 (4.8–8.5)	7.4 (5.8–9.6)	NP†	12.1 (9.9–14.8)

Data are derived from Liu et al. (10). *Age at the time of diagnosis for incident cases and age in the year 2001 for prevalent cases. †Rate not presented (NP) due to small numerator size.

King et al. Diabetes Care May 2012

ADA Position Statement

BMI Cut Points to Identify At-Risk Asian Americans for Type 2 Diabetes Screening

William C. Hsu,[1] Maria Rosario G. Araneta,[2] Alka M. Kanaya,[3] Jane L. Chiang,[4] and Wilfred Fujimoto[5]

Diabetes Care 2015;38:150–158 | DOI: 10.2337/dc14-2391

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AANHPI — The Asian American Native Hawaiian & Pacific Islander Diabetes Coalition

American Diabetes Association

Approved by Professional Practice Committee and Executive Committee of the Board of Directors

William C. Hsu – Chinese American – Boston
Maria Rosario G. Araneta – Filipino American - San Diego
Alka M. Kanaya – Asian Indian American – San Francisco
Jane L. Chiang – Korean American – Alexandria VA
Wilfred Fujimoto – Japanese American - Hawaii

Tasks

- How to use BMI as a simple initial screening tool to identify AA who may have diabetes or be at risk for future diabetes
- The question being considered is the most appropriate BMI Cut Point indicative of elevated risk
- Using only North American data
- Not to refine overweight/obesity

BMI Relationship to DM

- Prospective cohort or longitudinal studies
- BMI and non-diabetes status at baseline
- Followed by periodic re-ascertainment until diagnosis, preferably with OGTT
- Allows capture of BMI data at the earliest time point following DM diagnosis
- Sensitivity, specificity and ROC curve can be calculated

5 Prospective Studies With Incident BMI

- The Women's Health Initiative (24.8 kg/m^2)
- The Distance Study from Northern California (23.9-26.6 kg/m^2)
- The Seattle Japanese-American Community Diabetes Study (24.9-25.4 kg/m^2)
- The Canadian Study (22.6-24.6 kg/m^2)
- The Multiethnic Study in Hawaii (22-24.9 kg/m^2)

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Results

- Very heterogeneous BMI Cut points
- Higher DM Incidence with lower BMI, compared to Caucasians
- BMI of 25 would miss a significant %
- A BMI Cutpoints of 23, 24 seem reasonable


Diabetes Care 1

Optimum BMI Cut Points to Screen Asian Americans for Type 2 Diabetes

DOI: 10.2337/dc14-2071

Maria Rosario G. Araneta,[1] Alka M. Kanaya,[2] William C. Hsu,[3] Healani K. Chang,[4] Andrew Grandinetti,[4] Edward J. Boyko,[5,6,7] Tomoshige Hayashi,[8] Steven E. Kahn,[6,7] Donna L. Leonetti,[9] Marguerite J. McNeely,[7] Yukiko Onishi,[10] Kyoko K. Sato,[8] and Wilfred Y. Fujimoto[7]

- 1663 participants, ages ≥ 45 y.o., 2 hour OGTT
- Mediators of Atherosclerosis in South Asians Living in America study, North Kohala Study, Seattle Japanese American Community Diabetes Study, and the University of California San Diego Filipino Health Study
- without a prior diabetes diagnosis

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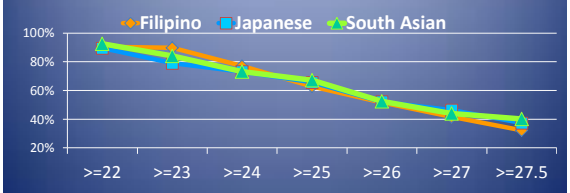
Table 2—Sensitivity, specificity, positive predictive value, and AUROC among Asian American adults, ages ≥45 years without known type 2 diabetes

BMI (kg/m^2)	Diabetes (%)	Sensitivity (%)	Specificity (%)	PPV (%)	Misclassification rate
Total	*N* = 1,663				
≥22	255 (15.3)	90.8	18.4	15.3	0.91
≥23	238 (14.3)	84.7	28.8	19.5	0.87
≥24	208 (12.5)	74.0	40.7	20.3	0.85
≥25	179 (10.8)	63.7	52.8	21.5	0.84
≥26	145 (8.7)	51.6	65.3	23.2	0.83
≥27	122 (7.3)	43.4	73.6	25.1	0.83
≥27.5	102 (6.1)	36.3	77.8	24.9	0.86

Sensitivity at Selected BMI Cut Points, by Asian-American Subgroup



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Optimal BMI Cut Points Based on Targeted Sensitivity of 80%

	BMI kg/m2	Sensitivity (%)	Specificity (%)	AUC
Total	23.5	79.7	34.7	0.572
Men	23.5	80.6	28.1	0.572
Women	23.5	79.2	39.5	0.594
Filipino	23.6	80.5	32.4	0.564
Japanese	22.8	80.6	32.6	0.566
South Asian	23.4	80.5	29.2	0.549

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Summary

- Sensitivity approximated specificity at BMI ≥ 25.4 kg/m^2
- At BMI ≥ 25 kg/m^2 , sensitivity (63.7%), specificity (52.8%) were low
- Limiting screening BMI ≥ 25.4 kg/m^2 would miss 36% of newly diagnosed diabetes
- Lowering BMI to 23 achieved 85% sensitivity and would miss only 15% diagnosis

Comparing with Data from Asia

- Regional Office Western Pacific (WHO)
  - ≥ 23 for overweight , 25 for obesity
  - WHO – 23.0 to 27.5 as action points
- Japan (JASSO) – 25 as obesity
- China – 24 overweight
- India – 23 overweight

ADA RECOMMENDATION

- Testing for diabetes should be considered for all Asian American adults who present with a BMI of ≥ 23 kg/m^2

Nature vs. Nurture

Seattle – 1970's Japanese Americans

Age 45-74 years old
Nisei men 20%
Nisei women 16%
Heavier
Diet similar to American diet

Tokyo – 1970's Japanese

≥ 40 years old
Men 5%, Women 4%
Least heavy

Seattle - 1970's White Americans

Age 45-74 years old
Men 12%
Women 14%
Heaviest

Changing Diet Composition

Traditional Asian Diet (TAD)

- 70% Carbohydrates
- 15% Protein
- 15% Fat
- 15 g Fiber/1000 calories

Typical Western Diet (TWD)

- 50% Carbohydrates
- 16% Protein
- 34% Fat
- 6 g Fiber/1000 calories

Individualized Meal Plan

Improvement of Insulin Sensitivity by Isoenergy High Carbohydrate Traditional Asian Diet: A Randomized Controlled Pilot Feasibility Study

William C. Hsu[1], Ka Hei Karen Lau[1], Motonobu Matsumoto[3], Dalia Moghazy[1], Hillary Keenan[2], George L. King[1,2]*

1 Asian American Diabetes Initiative, Joslin Diabetes Center, Harvard Medical School, Boston, Massachusetts, United States of America, 2 Dianne Nunnally Hoppes Laboratory for Diabetes Complications, Joslin Diabetes Center, Harvard Medical School, Boston, Massachusetts, United States of America, 3 R&D Department, Sunstar Inc., Osaka, Japan

Abstract

The prevalence of diabetes is rising dramatically among Asians, with increased consumption of the typical Western diet as one possible cause. We explored the metabolic responses in East Asian Americans (AA) and Caucasian Americans (CA) when transitioning from a traditional Asian diet (TAD) to a typical Western diet (TWD), which has not been reported before. This 16-week randomized control pilot feasibility study, included 28AA and 22CA who were at risk of developing type 2 diabetes. Eight weeks of TAD were provided to all participants, followed by 8 weeks of isoenergy TWD (intervention) or TAD (control). Anthropometric measures, lipid profile, insulin resistance and inflammatory markers were assessed. While on TAD, both AA and CA improved in insulin AUC (−960.2 μU/mL×h, P = 0.001) and reduced in weight (−1.6 kg; P<0.001), body fat (−1.7%, P<0.001) and trunk fat (−2.2%, P<0.001). Comparing changes from TAD to TWD, AA had a smaller weight gain (−1.8 to 0.3 kg, P<0.001) than CA (−1.4 to 0.9 kg, P = 0.001), but a greater increase in insulin AUC (AA: −1402.4 to 606.2 μU/mL×h, P = 0.015 vs CA: −466.0 to 223.5 μU/mL×h, P = 0.034) and homeostatic static model assessment-insulin resistance (HOMA-IR) (AA: −0.3 to 0.2, P = 0.042 vs CA: −0.1 to 0.0, P = 0.221). Despite efforts to maintain isoenergy state and consumption of similar energy, TAD induced weight loss and improved insulin sensitivity in both groups, while TWD worsened the metabolic profile.

Trial Registration: ClinicalTrials.gov NCT00379548

Citation: Hsu WC, Lau KHK, Matsumoto M, Moghazy D, Keenan H, et al. (2014) Improvement of Insulin Sensitivity by Isoenergy High Carbohydrate Traditional Asian Diet: A Randomized Controlled Pilot Feasibility Study. PLoS ONE 9(9): e106851. doi:10.1371/journal.pone.0106851

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Study Question

Will the transition from a traditional Asian diet (TAD) to a typical western diet (TWD) produce any difference in physiological effects? Will these changes be different for AA vs. CA?

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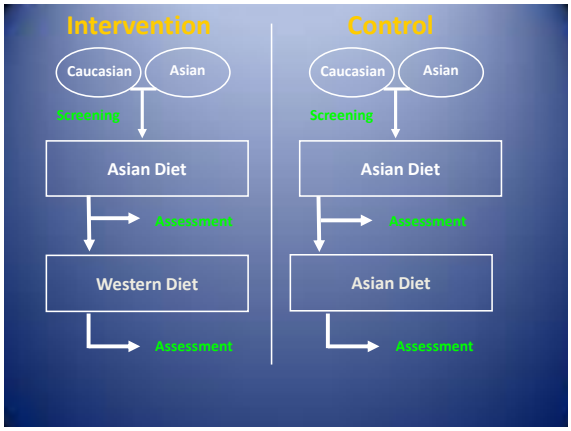


Baseline Profile for all participants enrolled Asian Americans vs Caucasian Americans (N=50)

	Asian Americans (n=28)	Caucasian Americans (n=22)	P-value
Age	34.9 ± 8.7	33.7 ± 8.2	0.550
BMI (kg/m²)	22.9 ± 2.8	23.7 ± 2.3	0.241
HbA_{1c} (%)	5.4 ± 1.1	5.4 ± 0.3	0.179
Insulin AUC (μU/mL x h)	5758.2 ± 3782.7	3557.8 ± 1291.3	0.015
Glucose AUC (mg/dL x h)	15973.0 ± 3526.5	13252.9 ± 3438.5	0.012

PLoS One. 2014 Sep 16;9(9):e106851

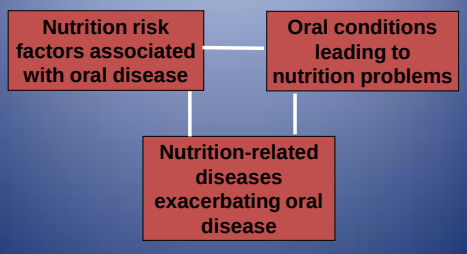
Physiological Responses to Different Diets in Intervention Group, including drop-outs (Intent-to-treat) (N=41)

	TAD[a]	P-value[b]	TWD	P-value[c]	P-value[d]
	ΔVisit 3-Visit 2		ΔVisit 4-Visit 3		
Weight (kg)	-1.6 ± 1.5	<0.001	0.5 ± 1.2	0.009	<0.001
Trunk Fat %	-2.2 ± 1.9	<0.001	1.1 ± 2.0	0.001	<0.001
Insulin AUC (μU/mL x h)	-960.2 ± 1775.5	0.001	438.2 ± 1590.4	0.208	0.001
HOMA-IR	-0.3 ± 0.7	0.022	0.1 ± 0.6	0.339	0.018
Total Cholesterol (mg/dL)	-25.6 ± 23.9	<0.001	20.4 ± 21.1	<0.001	<0.001

Physiological Responses to Different Diets among Asian Americans and Caucasian Americans in Intervention Group, including drop-outs (Intent-to-treat)

	Asian Americans (N=23)			Caucasian Americans (N=18)		
	TAD[a]	TWD	P-value[d]	TAD	TWD	P-value[d]
	ΔVisit 3-Visit 2	ΔVisit 4-Visit 3		ΔVisit 3-Visit 2	ΔVisit 4-Visit 3	
Weight (kg)	-1.8 ± 1.6	0.3 ± 0.9	<0.001	-1.4 ± 1.4	0.9 ± 1.5	0.001
Insulin AUC (μU/mL x h)	-1402.4 ± 2320.8	606.2 ± 1898.9	0.015	-466.0 ± 587.1	223.5 ± 1094.4	0.034
HOMA-IR	-0.3 ± 0.8	0.2 ± 0.7	0.042	-0.1 ± 0.3	0.0 ± 0.3	0.221

Nutrition and Oral Health



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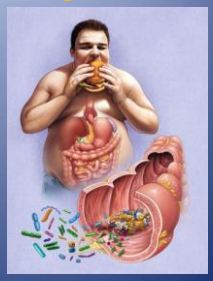
Widening and Deepening our Understanding



The future of personalized medicines? [Pittsburgh Post Gazette http://bit.ly/1qVn3qS]