

Asian Americans Have Greater Prevalence of Metabolic Syndrome Despite Lower BMI

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BACKGROUND

- Cardiovascular risk factors have a well-known positive relationship with obesity.
- In the U.S., the NHLBI recommends body mass index (BMI) cut points of 25 kg/m² and 30 kg/m² for overweight and obesity respectively.
- There is some evidence from international studies that suggests lower BMI cut point for Asians are warranted.[1]
- There is little population evidence in the United States to evaluate BMI cut points in Asian Americans, particularly for the diverse subgroups (Asian Indian, Chinese, Filipino, Japanese, Korean, and Vietnamese).

OBJECTIVE

To examine the prevalence of metabolic syndrome (MS) in Asian American subgroups (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese) compared to Non-Hispanic Whites (NHW) across body mass index (BMI) levels.

METHODS

- Setting:** The Palo Alto Medical Foundation is a group of multispecialty outpatient clinics in the San Francisco Bay Area, CA, with over 800 physicians serving more than 480,000 active patients.
- Eligibility criteria:**
 - Active patients (at least one clinic visit with primary care during Jan 1, 2006 – Dec 31, 2008).
 - Age 35 years and older by Jan 1, 2006.
 - Self-identified race/ethnicity as: Asian Indian, Chinese, Filipino, Japanese, Korean Vietnamese or Non-Hispanic White.
- Metabolic Syndrome (modified ATP III criteria[2])** defined as ICD-9: 277.7 or when 3+ of following are present:
 - Type 2 diabetes (ICD-9 250.X) or impaired fasting glucose (IFG, ICD-9 790.21), or fasting glucose \geq 100 mg/dL, or using hypoglycemic medications)
 - High blood pressure (ICD-9 401.0, 401.1, 401.9, 796.2 or BP \geq 130/85 mmHg, or using blood pressure medications)
 - Hypertriglyceridemia (triglycerides \geq 150 mg/dL)
 - Low High Density Lipoprotein Cholesterol (HDL-C) ($<$ 40 mg/dL men, $<$ 50 mg/dL women)
 - Overweight or obese (BMI \geq 25 kg/m²) instead of waist circumference
- Statistical Analysis:**
 - Three one-year time cohorts were created, and data sets were stacked.
 - Sex and diagnoses were date-matched to the last available BMI value for each patient in each time cohort.
 - Sex-specific, logistic regression models of metabolic syndrome as a function of age, BMI, ethnic or racial group, interactions (age*group, BMI*group), and time cohort were used.
 - Predicted probability from the logistic model was used as predicted prevalence in graphs.
 - Statistical significance was evaluated at $p < 0.01$.

RESULTS

Table: Demographic Characteristics.

	NHW	Asian (all)	Asian Indian	Chinese	Filipino	Japanese	Korean	Vietnamese
N (Total)	29,284	10,001	2,378	4,774	1,279	766	367	437
Women (%)	58	58	46	60	65	69	68	63
Age (y)	56 (14)	49 (12)	45 (10)	45 (10)	50 (11)	55 (14)	47 (12)	48 (10)
BMI (kg/m²)	27 (5)	25 (4)	26 (4)	24 (3)	26 (4)	24 (4)	24 (4)	24 (3)
BP-Systolic (mmHg)	124 (15)	119 (15)	118 (14)	118 (15)	124 (15)	122 (15)	117 (15)	116 (14)
BP-Diastolic (mmHg)	74 (9)	73 (9)	74 (9)	72 (10)	76 (9)	74 (9)	74 (10)	73 (9)
Fasting Glucose (mg/dL)	97 (17)	97 (17)	98 (19)	96 (14)	101 (22)	96 (12)	98 (17)	94 (12)
Cholesterol (mg/dL)	193 (36)	187 (34)	182 (33)	186 (33)	192 (38)	196 (35)	189 (35)	194 (34)
HDL-C (mg/dL)	57 (16)	53 (14)	46 (12)	55 (14)	53 (13)	61 (17)	57 (15)	54 (13)
LDL-C (mg/dL)	113 (30)	110 (30)	109 (29)	108 (29)	112 (33)	110 (30)	110 (28)	115 (29)
Triglycerides (mg/dL)	110 (67)	126 (78)	134 (79)	119 (74)	135 (80)	128 (91)	118 (77)	131 (83)

RESULTS

Asians have higher risk of metabolic syndrome than NHWs at lower BMIs

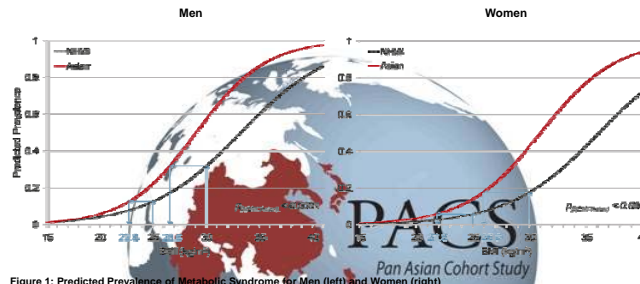


Figure 1: Predicted Prevalence of Metabolic Syndrome for Men (left) and Women (right). Compared to NHWs with BMI of 25 kg/m², comparable prevalence was seen at BMI = 23.6 for Asian men and BMI = 23.1 for Asian women. At a BMI of 25 kg/m², Asians had 75% (men) and 140% (women) increased predicted prevalence of MS compared to NHW. Compared to NHWs with BMI of 30 kg/m², comparable prevalence was seen at BMI = 26.6 for Asian men and BMI = 25.9 for Asian women. In logistic models, the interaction term BMI*Asian is a statistically significant predictor ($p < 0.0001$) after adjusting for age, BMI, age*Asian, and time cohort.

Asian subgroups have higher risk of metabolic syndrome than NHWs at lower BMIs

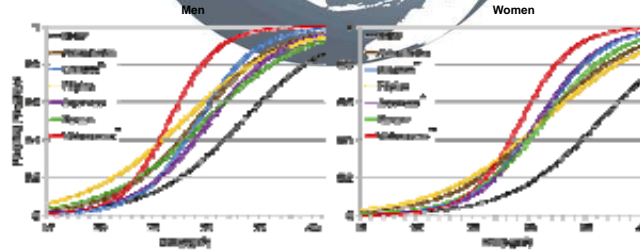


Figure 2: Predicted Prevalence of Metabolic Syndrome for Men (left) and Women (right). In logistic models, the association between BMI and metabolic syndrome is significantly different for the ethnic group compared to NHWs, at the $p < 0.01$ level. Most groups demonstrate higher predicted prevalence of metabolic syndrome at lower BMI values.

Asian subgroups have higher risk of hypertriglyceridemia than NHWs at lower BMIs

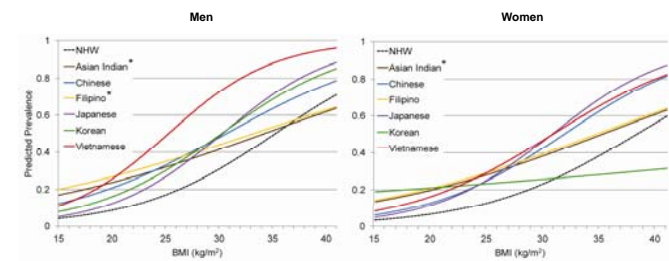


Figure 3: Predicted Prevalence of Hypertriglyceridemia for Men (left) and Women (right). In logistic models, the association between BMI and hypertriglyceridemia is significantly different for the ethnic group compared to NHWs, at the $p < 0.01$ level. Most groups demonstrate higher predicted prevalence of hypertriglyceridemia at lower BMI values.

ADDITIONAL RESULTS

- Average BMI is lower in Asians when compared to NHWs (Table).
- Other components of metabolic syndrome (high blood pressure, low HDL, diabetes or IFG) exhibit similar patterns to triglycerides (Figure 3) where Asians as a group and disaggregated have elevated predicted prevalence compared to NHWs at similar levels of obesity.
- For high blood pressure, the BMI effect was significantly different for Chinese (men, women) compared to NHW.
- For low HDL, the BMI effect was significantly different for Filipino (men, women) and Filipino (women) compared to NHW.
- For diabetes or IFG, the BMI effect was significantly different for Filipino (women) and Japanese (women) compared to NHW.

CONCLUSIONS

- Although Asian Americans have lower average BMI, their risk of metabolic syndrome is higher than NHWs with the same BMI.
- Asians are at higher risk than NHWs for each of the 5 specific components of the metabolic syndrome at similar levels of obesity.
- There is heterogeneity among Asian groups when they are disaggregated, with some groups exhibiting greater risk for specific components of metabolic syndrome compared to other groups and to NHWs with the same BMI.
- Screening Asians for metabolic syndrome at lower BMI may be warranted.
- Lower obesity action cut points for Asians, as suggested by the WHO, may be useful in the U.S.
- Further research is needed to define high and low risk within Asian subgroups, and to understand why risk differs for Asian Americans at a given BMI level.

REFERENCES

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