The South Asian Indian Women’s Weight Loss Study

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BIRCWH Scholar

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South Asian

Emigrants and second generation from

- India
- Bhutan
- Bangladesh
- Maldives
- Nepal
- Pakistan
- Sri Lanka
Women Age 25-84

Role of Insulin Resistance

- Obesity + Genetic Susceptibility
- Insulin Resistance
- Metabolic Syndrome
- Coronary Heart Disease
- Pancreatic Insufficiency
- Insulin Glucose
- Type 2 Diabetes
- Normal Glucose

- Insulin

Type 2 Diabetes
Ethnicity modifies the interaction between insulin and BMI

Palaniappan, et al., AJC, 2001
Insulin by Ethnicity - Women

Does Obesity operate differently in different ethnic groups?
Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies

WHO expert consultation*

A WHO expert consultation addressed the debate about interpretation of recommended body-mass index (BMI) cut-off points for determining overweight and obesity in Asian populations, and considered whether population-specific cut-off points for BMI are necessary. They reviewed scientific evidence that suggests that Asian populations have different associations between BMI, percentage of body fat, and health risks than do European populations. The consultation concluded that the proportion of Asian people with a high risk of type 2 diabetes and cardiovascular disease is substantial at BMIs lower than the existing WHO cut-off point for overweight (≥25 kg/m²). However, available data do not necessarily indicate a clear BMI cut-off point for all Asians for overweight or obesity. The cut-off point for observed risk varies from 22 kg/m² to 25 kg/m² in different Asian populations; for high risk it varies from 26 kg/m² to 31 kg/m². No attempt was made, therefore, to redefine cut-off points for each population separately. The consultation also agreed that the WHO BMI cut-off points should be retained as international classifications. The consultation identified further potential public health action points (23-0, 27-5, 32-5, and 37-5 kg/m²) along the continuum of BMI, and proposed methods by which countries could make decisions about the definitions of increased risk for their population.
Fasting insulin higher among ethnic minority women than white women at a lower body mass.
Differences not as apparent among men.
Fasting insulin is a strong predictor of diabetes among non-obese (BMI < 30) women.
Are South Asian Indian women more insulin resistant at lower BMI, and does insulin resistance improve with weight loss?
Relationship Between Insulin Resistance (SSPG Concentration) and Fasting Insulin Levels in 490 Nondiabetic Subjects

\[ r = 0.61 \]
\[ P < 0.001 \]
Research Conducted by:

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South Asian Indian Women Weight Loss Study

Quick Jumps to Areas on this Page:
Overview of the Study
Hypothesis
Background and Significance
Study Design and Methods
Screening
Insulin Sensitivity Test
Meal Profile
Dietary Treatment
Time Commitment
Benefits
1. Insulin sensitivity will improve with weight loss in South Asian Indian women.

2. Among overweight and obese subjects, the prevalence of insulin resistance will be higher in South Asian Indian women than whites.

3. At lower levels of body mass index, South Asian Indian women will be more likely to have insulin resistance.
Steady State Plasma Glucose (SSPG)

- 180 min infusion with octreotide (0.27 ug/m\(^2\)·min), insulin (32 mU/m\(^2\)·min), and glucose (237 mg/m\(^2\)·min)
- Suppresses endogenous insulin and every subject receives same insulin concentration based on body surface area
- Blood drawn at 10 min intervals between 150 and 180 min for steady state glucose
- Higher glucose concentration indicates resistance to insulin-mediated glucose disposal
Weight Loss Protocol

- Baseline metabolic measurements
  - SSPG and Meal Profile (hourly blood draws 8am to 4pm with administration of two standardized test meals)
  - Dietary intervention
    40% CHO, 45% fat, 15% protein, -750 kcal/d
Weight Loss Protocol Cont’d

- 3 mo of hypocaloric ethnicity specific diet followed by 2 wks eucaloric diet (same macronutrient composition) followed by metabolic testing (SSPG and Meal Profile)
- Compliance monitored with food diaries/weekly visit with dietitian
- No change in baseline exercise
Patient Recruitment and Retention

150 screened

75 SSPG

41 IR
34 IS

41 Enrolled

22 completed
2 ongoing
17 Dropped Out
## Baseline Laboratory Characteristics*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Insulin Sensitive SSPG &lt; 150 (n= 29)</th>
<th>Insulin Resistant SSPG &gt;=150 (n=24)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening Visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>44 ± 1.8</td>
<td>42 ± 1.9</td>
<td>0.30</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>68 ± 1.8</td>
<td>74 ± 1.5</td>
<td>0.008</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>27 ± 0.6</td>
<td>29 ± 0.8</td>
<td>0.009</td>
</tr>
<tr>
<td>Systolic BP (mm Hg)</td>
<td>117 ± 3.3</td>
<td>112 ± 2.9</td>
<td>0.14</td>
</tr>
<tr>
<td>Diastolic BP (mm Hg)</td>
<td>72 ± 1.6</td>
<td>68 ± 1.8</td>
<td>0.07</td>
</tr>
<tr>
<td>Pulse</td>
<td>67 ± 1.5</td>
<td>68 ± 1.6</td>
<td>0.40</td>
</tr>
</tbody>
</table>

* Mean ± SEM
## Baseline Laboratory Characteristics*

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<th>Variable</th>
<th>Insulin Sensitive SSPG &lt; 150 (n=29)</th>
<th>Insulin Resistant SSPG &gt;=150 (n=24)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSPG (mg/dL)</td>
<td>105 ± 6.3</td>
<td>211 ± 10.6</td>
<td>3.6 E -12</td>
</tr>
<tr>
<td>Glucose (mg/dL)</td>
<td>92 ± 1.5</td>
<td>95 ± 2.3</td>
<td>0.09</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>174 ± 6.5</td>
<td>171 ± 4.9</td>
<td>0.37</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>104 ± 12.4</td>
<td>131 ± 11.5</td>
<td>0.059</td>
</tr>
<tr>
<td>HDL-C</td>
<td>52 ± 1.9</td>
<td>43 ± 1.8</td>
<td>0.0003</td>
</tr>
<tr>
<td>LDL-C</td>
<td>107 ± 4.8</td>
<td>104 ± 4.6</td>
<td>0.36</td>
</tr>
</tbody>
</table>

* Mean ± SEM
Typical South Asian Diet

Breakfast
- 4 idlis
- 1 cup sambar (dhal)
- Tea with half cup full fat milk

Lunch
- 4 rotis
- half cup mateer panner (peas and cheese)
- half cup full fat yogurt
- 1 glass juice

Snack
- 2 gulab jamuns

Dinner
- 1 cup cooked rice
- half cup full fat yogurt
- Dhal
- 1 cup potato curry
- 1 cup malai kofta korma

~2600 kcals
12% Protein
56% Carbohydrate  32% fat
Study South Asian Diet
40% CHO, Lacto-Ovo Veg

- **Breakfast**
  - 2 slices whole grain bread
  - ½ banana
  - 1 cup milk (skim or lowfat)
  - 12 almonds

- **Lunch**
  - 2/3 cup cooked basmati rice
  - 1/3 cup dal
  - 1-2 cup vegetables
  - ½ cup yogurt *or* Raitha

- **Snack**
  - ½ mango
  - 20 peanuts

- **Dinner**
  - 1 small Roti *plus* 1/3 cup cooked Rice
  - 1 egg
  - 1.5 cups vegetables
  - ½ cup yogurt-1% lowfat *or* nonfat
  - 2-3 teaspoons olive oil *or* canola oil

1400 Kcal, 40% CHO, 30% fat, 30% protein
# Actual Macronutrient Composition

Food Diary Data Analyzed with USDA Nutrient Database

*data missing for remaining 7% of kcals from fat

<table>
<thead>
<tr>
<th></th>
<th>South Asian Indian N=15</th>
<th>Caucasian N=27</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHO %</td>
<td>48</td>
<td>41</td>
</tr>
<tr>
<td>Protein %</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Total Fat %</td>
<td>35</td>
<td>39</td>
</tr>
<tr>
<td>Saturated Fat %</td>
<td>*8</td>
<td>8</td>
</tr>
<tr>
<td>Polyunsaturated %</td>
<td>*7</td>
<td>15</td>
</tr>
<tr>
<td>Monounsaturated %</td>
<td>*14</td>
<td>17</td>
</tr>
</tbody>
</table>
Change in Weight (kg)

Weight

P < 0.0001, N=22
Change in SSPG (mg/dL)

SSPG

P < 0.0001, N=22
Change in Fasting Glucose

Fasting Glucose

(mg/dL)

P = 0.004, N=22
Change in Cholesterol

Cholesterol
mg/dl

Pre
Post

P = 0.2, N=22
Change in LDL-C

P = 0.37, N=22
Change in Triglycerides

P = 0.003, N=22

Triglycerides

mg/dl

0 50 100 150 200
Change in HDL-C

HDL-C

mg/dl

P = 0.36, N=22

Pre
Post
Correlation of Weight Loss and Change in SSPG

N = 22
r = 0.24

Change in SSPG
Pre - Post SSPG

Weight Loss in Kilograms
Pre - Post
Correlation of Weight Loss and Change in HDL-C

N = 22
r = -0.08
Correlation in Weight Loss and Change in Triglycerides

Weight Loss in Kilograms

Pre - Post

N = 22
r = 0.38
Correlation of Weight Loss and Change in TG:HDL Ratio

N = 22
r = 0.5
Thanks!

- Dr. Gerald Reaven
- Dr. Tracey McLaughlin
- Cindy Lamendola, NP & Dr. Fahim Abbassi
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- Dr. Marcia Stefanick for support and mentorship