Obesity and the Metabolic Syndrome in Developing Countries: Focus on South Asians

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Developing countries, particularly South Asian countries, are witnessing a rapid increase in type 2 diabetes mellitus (T2DM) and coronary heart disease (CHD) [1–14]. During the previous three decades, the prevalence of T2DM has doubled in India. Insulin resistance and clustering of other proatherogenic factors (the metabolic syndrome), frequently seen in South Asians, are important contributory factors for T2DM and CHD.

Rapid demographic, nutritional, and economic changes are occurring in South Asians. The life expectancy and the percentage of elderly population have increased. Most importantly, globalization of diets and consumption of non-traditional fast-foods have occurred at a rapid pace in urban areas. Furthermore, these dietary changes are most noticeable in children. In South Asian countries, rapid increase in western fast-food outlets, sale of aerated sweet drinks and increased consumption of fried snacks in school children is being commonly seen. In addition, South Asians are less physically active, and sedentary lifestyle is increasing, particularly in children. Further, migration from villages to cities is increasing. These intra-country migrants become urbanized, mechanised, resulting in nutritional imbalance, physical inactivity, stress, and increased consumption of alcohol and tobacco.

Nationally representative studies regarding the prevalence of the metabolic syndrome are generally not available from any South Asian country. Available data indicate that the prevalence of the metabolic syndrome in Asian Indians varies according to region, extent of urbanization, lifestyle patterns and socioeconomic/cultural factors. Recent data show that about one third of the urban population in large cities in India has the metabolic syndrome. Interaction of various factors, which could contribute to insulin resistance, diabetes, and CHD is shown in figure 1.

The phenotype of obesity and body fat distribution are distinctive in South Asians and are important contributory factors for development
of insulin resistance and the metabolic syndrome. Key points have been summarized below.

1. Average body mass index (BMI) value in South Asians is lower than that seen in white Caucasians, Mexican-Americans and Blacks. However, BMI in Asian Indians increases as they become affluent and urbanized.

2. South Asians have a high percentage of body fat as compared to white Caucasians and Blacks, despite lower average BMI values, which is partly explained by body build (trunk-to-leg length ratio and slenderness), musculature, adaptation to chronic calorie deprivation, and ethnicity. Higher body fat seen in South Asians than Caucasians at similar BMI was clearly demonstrable in Asian Indians based in Singapore who showed BMI to be 3 values lower than white Caucasians at any given percentage of body fat.

3. Importantly, morbidities related to excess adiposity (diabetes, hypertension, dyslipidemia) occur more frequently at lower BMI levels in Asians than in white Caucasians.
35

4 High prevalence of abdominal obesity has been reported in South Asians by several investigators, and is also seen in Asian Indians with BMI <25. Further, although the average waist circumference in South Asians appears to be lower, abdominal adiposity as measured by computerized axial topography is significantly more than in white Caucasians. Based on these data, classification of obesity has been revised for Asian Indians (table 1).

5 Intra-abdominal adipose tissue in South Asians is comparatively greater than that of white Caucasians.

6 Truncal subcutaneous adipose tissue (measured by subscapular and supra-iliac skinfolds) is thicker in South Asians than white Caucasians (in both adults and children), correlating more closely with insulin resistance than intra-abdominal adipose tissue.

7 The fat is deposited in excess in ectopic sites: skeletal muscles, liver, etc.

8 Finally, South Asians appear to be metabolically obese, though BMI levels may fall into the category of non-obese. This phenomenon is partially explained by excess body fat, high intra-abdominal and subcutaneous fat, and ectopic fat deposition in various organs and body sites, which may contribute to insulin resistance, dyslipidemia, hyperglycemia, and excess procoagulant factors in South Asians.

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Table 1. Consensus guidelines for defining obesity, abdominal obesity, and the metabolic syndrome in Asian Indians

<table>
<thead>
<tr>
<th>Generalized obesity (BMI cutoffs)</th>
<th>Abdominal obesity (waist circumference cutoffs)</th>
<th>The metabolic syndrome$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal BMI: 18.0–22.9</td>
<td>Men: ≥90 cm</td>
<td>Abdominal obesity: waist circumference cutoffs as defined in previous column (non-obligatory)</td>
</tr>
<tr>
<td>Overweight: 23.0–24.9</td>
<td>Women: ≥80 cm</td>
<td>Blood glucose: ≥100 mg/dl</td>
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<tr>
<td>Obesity: &gt;25</td>
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<td>Hypertension: ≥130/≥85 mm Hg</td>
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<td></td>
<td></td>
<td>Triglycerides: ≥150 mg/dl</td>
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<td></td>
<td></td>
<td>HDL-C: Males &lt;40 mg/dl,</td>
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<td></td>
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<td>females &lt;50 mg/dl</td>
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</tbody>
</table>

$^1$ No parameter is obligatory; 3 out of 5 need to be present to diagnose the metabolic syndrome.
Prevention and Control of Obesity and the Metabolic Syndrome in South Asians

Prevention of these conditions requires early and aggressive management based on the following key principles:

1. Intensive efforts should be made to make South Asians aware that they are at higher risk for development of T2DM and CHD than other ethnic groups.
2. Preventive measures should be particularly vigorous for those with the family history of T2DM or premature CHD.
3. Adequate nutrition during the intrauterine period should be given to prevent early-life adverse events which may promote insulin resistance in adulthood.
4. Therapeutic lifestyle changes should be encouraged from childhood, with strict advice of regular physical activity and restricted use of television/Internet. According to the recent guidelines for Asian Indians, children should undertake at least 60 min of outdoor physical activity. Screen time (television/computers) should be <2 h a day. Healthy lifestyle should be inculcated in children through rigorous implementation of school health programs.
5. Physicians should strictly monitor growth velocity of children to avoid childhood obesity and catch-up obesity.
6. Bodyweight and anthropometric indexes for adults should be maintained within normal limits based on the recent data. According to recent consensus statement for Asian Indians, BMI should be maintained between 18 and 22.9 and waist circumference should be maintained below 90 cm for men and 80 cm for women.
7. Overweight individuals and those with abdominal obesity should be actively encouraged to lose weight by lifestyle measures.
8. Detection of one component of the metabolic syndrome should lead to search for the other components and their management.
9. In general, a total of 60 min daily of physical activity is recommended for prevention and management of obesity and the metabolic syndrome for Asian Indians according to recently approved guidelines. This includes aerobic activity, work-related activity and muscle-strengthening activity.
10. Diets should be balanced containing carbohydrates (55–65% of calories) with emphasis on complex carbohydrates, restricted total fats and saturated fat (7–10% of the total calories), adequate monounsaturated fatty acids, ω-3 polyunsaturated fatty...
acids (PUFAs) and fiber. Trans fatty acid-containing oils and foods should be strictly avoided.

11 Research on insulin resistance and the metabolic syndrome in South Asians should be targeted on the following:

a  Prevalence of metabolic syndrome in various South Asian countries.

b  Etiological factors for insulin resistance, particularly studies on genetics and gene-environment interaction.

c  Associations of specific macro- and micronutrients in South Asian diet with insulin resistance (e.g. ω-3 PUFAs and dietary fiber).

d  Relationship with novel cardiovascular risk factors (e.g. high-sensitivity C-reactive protein).

e  Intervention with insulin sensitizers and other drugs.

f  Diagnostic criteria of the metabolic syndrome and morbidity correlation in children.

g  Effective health intervention methods of imparting lifestyle and diet-related health messages in children.

References


