Non-Communicable Diseases and ‘Junk Food’
*Focus on Children/Young Adults*

Anoop Misra
Executive Chairman

*Fortis CDOC Centers of Excellence in Diabetes, Metabolic Diseases and Endocrinology*

*Fortis, VK, Chirag Enclave and Gurgaon*

Former Professor, Internal Medicine, AIIMS
Honorary Professor, ILS, Hyderabad
Former Faculty, Endocrinology, The University of Texas
Member, Advisory Board, *British Medical Journal*
Advisor, National Diabetes Control Program
The Tsunami of Diabetes

Real People
Percentages and predictions can mask the enormity of the diabetes problem. Large numbers of people with diabetes are unaware they have the disease because they have not been diagnosed (shown as the shaded ridge in the country bubbles). The imperative for public-health professionals is to diagnose and treat people as soon as possible.
India’s Diabetes Time Bomb is Ignited in The Womb

Moreover, says Fall, the Indian susceptibility starts before birth. Even without poor maternal nutrition, “a lower muscle growth but higher fat growth in utero makes babies more vulnerable,” she says. “This is why we think diabetes hits earlier in India — they are more vulnerable from the start. If babies were well nourished in the womb, it might mean that they were not so biologically susceptible to changes in diet and lifestyle, and therefore more immune to diseases like diabetes.”

INDIA’S DIABETES BOOM
The Western diet and lifestyle that have accompanied India’s growing prosperity has brought an alarming rise in cases of type 2 diabetes. Nationwide, prevalence of T2D is more than 9%. The epidemic is not surprising in urban areas. However, the disease is now also becoming common in rural villages, especially in wealthy southern states.

Comparative prevalence of type 2 diabetes

The rise of type 2 diabetes
Early Start of Diabetes and Heart Disease in Indians
A Case History: How it all begins

MG, 35-y-old Asian Indian Male

- Age: 10-12 yrs: ‘Junk Food’, 3-4 bottles cola per day, Indian junk food (encouraged by mothers), no physical activity
- Childhood obesity, abdominal obesity, high triglycerides, low good cholesterol (syndrome X): Age 15-20 y
- Type 2 diabetes mellitus: 26-y, Blind in one eye-33 y
- Myocardial infarction (Heart Attack): 35-y, Coronary Angiogram: Severe, extensive blockage of all three arteries
Multiple Metabolic Risk factors Steeply Increase after 20 Years Age in Indians

Chi2 for trend: p<0.01 for all
The Ever Widening ‘Insecurity’ Belt
For Whom the Bell Tolls
Early
Progression From to Normal to Diabetes
For Whom the Bell Tolls!

Variation From Normal

The Clock Starts Ticking

- P.P. Insulin
- Fasting Insulin
- CAD Risk
- P.P. Glucose
- F.P. Glucose

IGT NIDDM
The Never-ending Road of Lard
Disease Markers Start in Childhood and Track in Adults Mostly Unchanged

- ~77% of obese children will be obese adults.
- Biomarkers of adverse cardiovascular outcome already present in childhood.
- Multiple cardiovascular risk clustering persists from childhood to adulthood.
- Hyperinsulinemia & insulin resistance in childhood predict cardiovascular risk in adulthood.
Early Devastating Events
The Twisted Diet Ratios and High Trans Fats

“They say kids these days are overweight because we don’t get enough vigorous exercise. Maybe we should chew faster!”
### Indicators of Nutrition in Children/Young Adults: *Imbalance of Beneficial Nutrients*

<table>
<thead>
<tr>
<th>Nutrients (daily consumption)</th>
<th>Total (n=424)</th>
<th>Boys (n=271)</th>
<th>Girls (n=153)</th>
<th>RDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>2185</td>
<td>2380</td>
<td>1841</td>
<td></td>
</tr>
<tr>
<td>Carbohydrates (% energy)</td>
<td>54.3</td>
<td>55.8</td>
<td>51.2</td>
<td>55-65 %</td>
</tr>
<tr>
<td>Protein (% energy)</td>
<td>11.5</td>
<td>11.7</td>
<td>10.9</td>
<td>10-15 %</td>
</tr>
<tr>
<td>Fats (% energy)</td>
<td>33</td>
<td>30.9</td>
<td>36.5</td>
<td>15-30 %</td>
</tr>
<tr>
<td>Saturated fat (SFA) (%energy)</td>
<td>11</td>
<td>11.16</td>
<td>11.8</td>
<td>&lt; 10 %</td>
</tr>
<tr>
<td>MUFA (%energy)</td>
<td>9.8</td>
<td>9.3</td>
<td>10.8</td>
<td>10-15 %</td>
</tr>
<tr>
<td>PUFA (%energy)</td>
<td>8.15</td>
<td>7.23</td>
<td>10.25</td>
<td>&lt; 8 %</td>
</tr>
<tr>
<td>Omega-3 fatty acid (%energy)</td>
<td>1.05</td>
<td>1.07</td>
<td>1.02</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Omega-6 fatty acid (%energy)</td>
<td>7.19</td>
<td>6.26</td>
<td>9.32</td>
<td>3-7%</td>
</tr>
<tr>
<td>Omega-6/Omega-3 ratio</td>
<td>6.79</td>
<td>5.83</td>
<td>9.12</td>
<td>5-10</td>
</tr>
<tr>
<td>PUFA/SFA ratio</td>
<td>0.71</td>
<td>0.64</td>
<td>0.86</td>
<td>0.8-1</td>
</tr>
</tbody>
</table>
Epidemiological Study of Adolescents & Young Adults

“Dense calorie” Food Consumption (n=188)

- Fast food (Pizza, Burger etc.): 80 gm/week (2 slices)
- Fried food (Bread pakoras, Samosas): 215 gm/wk (2-3)
- Sweets (Burfi, Rasgulla, Gulab Jamun): 75 gm/wk (3-4)
- Sweetened aerated drinks (colas): 280 ml/wk

- Frequency of eating out:
  - Daily: 4.25%
  - 6 times/wk: 5.3%
  - 5 times/wk: 6.3%
  - 4 times/wk: 4.8%
  - 3 times/wk: 12.2%

3 or more times a week: 33%
The high-carb diet I put you on 20 years ago gave you diabetes, high blood pressure, and heart disease. Oops.
Trend Line Showing Average Intake of Sugar Globally and Total Sugar intake from Various Sources (‘Traditional Sugars’: jaggery and Khandsari; Sugar and sugar from Sugar Sweetened Beverages) Compiled for India

- average sugar consumption in India
- average Global sugar Consumption
- average sugar and jaggery consumption in India
- average sugar, jaggery and sugar from SSBs consumption in India
Ohh... The Attitudes, The Practices...
Attitude of Children towards Eating Habits

- **50.6%** children consider *home made* food as “old fashioned”
- **42.7%** children consume *Junk Foods* because according to them it is the “in Thing”
- **67.6%** children say *interesting advertisements* “inspire” them to purchase junk foods.
- **72.5%** children *Snack* while “watching television”.
- **60.8%** children *tend to eat more* when they are “lonely”.

Effect of Advertisements on the Purchased Foods

Gulati, S; Misra A. Unpublished Data. 2010
"Hundreds of years of medical progress, and all you can tell me to do is eat less?"

No!
I will not do it!!
Receptivity of Children towards Healthy Living
“Not Ready To Change”

• 71.7% children are *not ready* to cut down or restrict the intake of Junk Foods

• 47% children *unwilling* to restrict TV viewing & take up some physical activity

Gulati S, Misra A. et al Unpublished Data.2010
Sigh...
If only I were more strict
## Obesity among Mothers

<table>
<thead>
<tr>
<th>BMI (Kg/m²)</th>
<th>Mothers of Younger Children (N=600)</th>
<th>Mothers of Older Children (N=1200)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>≤22.9</td>
<td>202</td>
<td>33.7</td>
</tr>
<tr>
<td>23.0-24.9</td>
<td>156</td>
<td>26.0</td>
</tr>
<tr>
<td>25.0-29.9</td>
<td>200</td>
<td>33.3</td>
</tr>
<tr>
<td>≥30</td>
<td>42</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Myths and Perceptions

Statements from Mothers

• Indians are malnourished and not overweight

• Child with chubby cheeks is healthy, not fat. ‘baby fat’ will go away

• Heart Disease /diabetes start at old age

• A child should enjoy, and eat and relax. Such time will not come again later

• Ghee and butter are good for health

• All of us (parents, teachers) teach them correct diet and lifestyle

• There is no time for physical activity…they should study

Body and Metabolism can be Made Better

Toil ye Parents and Teachers!!
Multiple Projects on Childhood Nutrition and Obesity by DFI and NDOC

**Project “MARG” : The Path**
Medical Education for Children / Adolescents for Realistic Prevention of Obesity and Diabetes and for Healthy Aging

“Health Awareness Program for the Prevention of Obesity and Diabetes through Balanced Diet and Physical Activity”
Promoted by: Diabetes Foundation (India)
Funded by: World Diabetes Foundation

**“CHEETNA”**
Children’s Health Education through Nutrition and Health Awareness Program
A Project of Diabetes Foundation (India)
Funded by: Rotary Club South East (Delhi)

**“TEACHER”**
Trends in Childhood Nutrition and Lifestyle Factors in India
A 6 City Countrywide Project of Diabetes Foundation (India)
Improvement in nutrition-related knowledge and behavior of urban Asian Indian school children: findings from Multi-center Collaborative MARG intervention study

ORIGINAL ARTICLE

Effects of controlled school-based multicomponent model of nutrition and lifestyle interventions on behavior modification, anthropometry and metabolic risk profile of urban Asian-Indian adolescents in North India

N Singhal¹, A Misra¹,², P Shah¹ and S Gulati¹

¹Centre for Diabetes, Obesity and Cholesterol Disorders (C-DOC), Diabetes Foundation (India), New Delhi, India and ²Department of Diabetes and Metabolic Diseases, Fortis Hospital, New Delhi, India
### % Decrease in Consumption Patterns of ‘Energy-Dense Foods’

<table>
<thead>
<tr>
<th>Consumption of Food Articles</th>
<th>Case School</th>
<th>Control School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweetened carbonated drinks &gt; 3 times/w</td>
<td>15.4%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Western ‘energy-dense’ foods (Burgers, pizzas, french fries, noodles) &gt; 3 times/w</td>
<td>9.2%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Chips/ Namkeen/Maggi &gt; 3 times/w</td>
<td>8.3%</td>
<td>No change</td>
</tr>
<tr>
<td>Indian ‘energy-dense’ food &gt; 3 times/w</td>
<td>6.3%</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

All differences are statistically significant

**Consumption of Fruits (brought in Tiffin)**

<table>
<thead>
<tr>
<th></th>
<th><strong>Case School</strong></th>
<th><strong>Control School</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>10.1%</td>
<td>29.8%</td>
</tr>
<tr>
<td><strong>Follow-up</strong></td>
<td>40.4%*</td>
<td>25.9%</td>
</tr>
</tbody>
</table>

*Statistically significant

## % Change in Time Spent in TV Viewing and Physical Activity

<table>
<thead>
<tr>
<th>Variables</th>
<th>Case School</th>
<th>Control School</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Viewing &gt; 2 h/d</td>
<td>5.2% ↓</td>
<td>2.4% ↑</td>
</tr>
<tr>
<td>Physical Activity 30-60 min/d</td>
<td>9.8% ↑</td>
<td>3.7% ↑</td>
</tr>
</tbody>
</table>

All differences are statistically significant

% Change in Anthropometric Parameters

P < 0.05 in Control SAD
P < 0.001 in Case biceps

*Metabolic Syndrome and Related Disorders*, 2010
% Change in Metabolic Parameters

<table>
<thead>
<tr>
<th>Variable</th>
<th>Case School</th>
<th>Control School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting Glucose</td>
<td>-4.9%*</td>
<td>-2.2%</td>
</tr>
<tr>
<td>HDL-C</td>
<td>2.2%</td>
<td>-2.3%</td>
</tr>
</tbody>
</table>

*p < 0.001

Are we Facing Endless Epidemic?
Are all Efforts Wasted?

“When your cholesterol gets too high, a sensor will send out a signal that automatically locks the kitchen door and turns on your treadmill.”
Innovative Ideas

Pokémon Go, Obesity and Diabetes: A Perspective from India

Amrita Ghosh, MBBS, FIDRC, and Anoop Misra, MD

 Pokémon Go could help you lose weight
Number of days to lose a pound of weight based on Pokémon caught per day

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.6 days</td>
<td>35.0 days</td>
</tr>
<tr>
<td>14.8 days</td>
<td>17.5 days</td>
</tr>
<tr>
<td>9.9 days</td>
<td>11.7 days</td>
</tr>
<tr>
<td>7.4 days</td>
<td>8.8 days</td>
</tr>
<tr>
<td>5.9 days</td>
<td>7.0 days</td>
</tr>
<tr>
<td>4.9 days</td>
<td>5.8 days</td>
</tr>
<tr>
<td>4.2 days</td>
<td>5.0 days</td>
</tr>
<tr>
<td>3.7 days</td>
<td>4.4 days</td>
</tr>
<tr>
<td>3.3 days</td>
<td>3.9 days</td>
</tr>
<tr>
<td>3.0 days</td>
<td>3.5 days</td>
</tr>
</tbody>
</table>

* Based on 10 being equivalent to 3500 calories burnt. Also based on 10 Pokémonper mile. Pokémon density may vary.
20% soda tax: Expected reduction of 3% in obesity (or prevent 11.2 million new cases), and a 1.6% decline in diabetes, or prevent 400,000 cases, over the decade 2014–2023.
The Roadmap to Avoid Diabetes, Death and Destruction

- Inadequate Care/Nutrition
  - Low birth weight
  - Over nutrition, childhood obesity, insulin resistance
  - 10-20 years
  - Diabetes
  - Heart attack
  - Death

- Intra-uterine period
- Birth
- Childhood
- Behavioural influences
- Physical inactivity/Imbalanced diet
- Genetic influence

- Adult hood
- ?70
- ?80
- ?100