CHILDHOOD OBESITY

PEDIATRICIANS ON THE FRONTLINE

A PANDEMIC

LYDIE L. HAZAN, MD
“Obesity is a health hazard that costs MORE THAN $100 BILLION a year in medical expenses.”
National statistics show that 12 to 25% of U.S. children and teens are considered overweight and 15% obese.
Girth of a Nation

In 1991 only 4 states had obesity rates over 14%.

By 1998, 37 States throughout the U.S. had hit that threshold!
The percentage of American kids who are obese has more than doubled since the 1960’s.
Factors Related to the Onset of Obesity

- Altered dietary intake
- Decreased physical activity
- Increased inactivity
Shifts in Food Practices in the United States

- Fast food consumption
- Reduced frequency of family meals
- Consumption of soft drinks-increased from 27 to 44 gal/y from 1972-1992
- 30,000 products in supermarkets
- Increased portion size
### Daily Physical Education Class in Schools (Grades 9-12th)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>42%</td>
</tr>
<tr>
<td>1997</td>
<td>27%</td>
</tr>
</tbody>
</table>
Can we predict which child will become obese?
Risk Associated w/ Parental obesity

Whitaker, Dietz, Seidel et al.

1-2 yr olds (non obese) + One obese parent
=> 28% chance of becoming an obese adult

Efforts should aim at preventing obesity

3-5 yr olds (obese) + One obese parent
=> 62% chance of adult obesity vs. 24% if neither parent is obese
Age Paradigms

Kries et al. BMJ 319:147-150

Newborn period:

- 9357 5-6 yr old German children-
- If BF * 2 mos : 3.8% risk of child. obesity
- If BF *>12 mos. : 0.8% risk

Parental obesity plays a role up to age 10

After 10 yrs of age, the child’s obesity status and NOT the parents leads the decision for or against treatment
The Obesity Epidemic Does Not Discriminate

TERESA
Date: 10-23-01
Age: 17
Weight: 257 lbs.
Height: 5'6"
BMI: 41.5

GLENISHA
Date: 05-24-01
Age: 15
Weight: 395 lbs.
Height: 5'4"
BMI: 68

CLINT
Date: 09-09-01
Age: 9
Weight: 236 lbs.
Height: 5'2"
BMI: 43
Nor for Race or Age...
Our Dilemmas in Pediatrics

- Do Children today outgrow their weight?
- Can we as pediatricians, really make an impact, and in a 15 minute visit?
- What diet if any, do we recommend?
- Is there even a point in raising the issue if the parent is non cooperative, or the environment hostile to change?
- Do medications play a role in the management of childhood obesity? If so, will there be a potential for abuse? What are the risks and benefits involved?
- If we treat obesity, are we really preventing future illness or just delaying the inevitable?
Prevention is Key

A majority of preventable health risk factors are associated with childhood obesity!
1. Type 2 Diabetes

✓ Insulin sensitivity in prepubertal and pubertal children correlates inversely with BMI and % body fat.

✓ Severe obesity in prepubertal children and adolescents associated with IGT (21-25%) and unsuspected type 2 diabetes (4% of teenagers)
Jackeline

09-16-00
Age: 12 yrs.
Height: 5’6”
Weight: 327 lbs.
BMI: 52.1
Dx:
Morbidly Obese
Type 2 Diabetes
Hypertension
2. Hypertension

- Hypertension is 9 times more frequent among obese children than non-obese children.

- Approx. 20-30% of obese children ages 5-11 have hypertension.

- Hyperinsulinemia which affects sodium retention and is a cause of hypertension, is 12.6 times more likely in obese children.

- When both obese and non-obese adolescents were shifted from salt to a low salt diet, a significantly larger decrease in blood pressure was observed among obese compared to a non-significant change among non-obese adolescents.
Alex

- 12-18-02
- Age: 13
- Height: 5’7”
- Weight: 324 lbs.
- BMI: 51
- DX: M.O (Morbid obesity)
- HTN (152/78)
- Fmhx of type 2DM
2B. Hypertension

- New medications are on the rise for the treatment of essential hypertension:

  ACEI, ACE II etc..

  i.e. Altace (Ramipril).

  Fosinopril, Irbesartan etc...
3. Asthma

• The diagnosis of Asthma is significantly more prevalent in children and adolescents who are overweight.

• The studies are clear: If a child has asthma and is overweight, losing weight will decrease his or her frequency of emergency room visits.
4. Abnormal cholesterol levels (dyslipidemia)

- The Bogalusa Heart Study showed that being overweight during adolescence was associated with a 2.4 time increase in the prevalence of total cholesterol values above 240mg/dl.
- A 3-fold risk of increase in LDL values above 160mg/dl.
- An 8-fold risk of decrease in HDL levels below 35mg/dl in adults age 27-31.
09-09-01
Age : 10
Height : 5’0”
Weight : 133 lbs.
BMI : 26.1
DX : Obesity
High Cholesterol
5. Syndrome X

✓ Obese children and adolescents are at a high risk for Syndrome X.

✓ This syndrome is characterized by dyslipidemia, hypertension, hyperinsulinemia and obesity.
Aaron

- 09-09-00
- Age: 12
- Height: 5’0”
- Weight: 228.4 lbs.
- BMI: 43.9
- DX:
  - Morbid Obesity
  - Hypertension
  - Insulin Resistant
  - Hyperlipidemia
6. Sleep Apnea

- Sleep-associated breathing disorders such as apnea, hyponea, excessive nightmare arousal, or abnormalities of gas exchange have been associated with obesity.
- One study reported 30% of obese subjects having sleep-apnea and another 30% showing abnormal sleep patterns.
- Another study found that 94% of obese subjects demonstrated abnormal sleep patterns.
- Preliminary results indicate that obese children with obstructive sleep-apnea have clinically significant deficits in learning and memory compared to obese children without apnea.
7. Menstrual Abnormalities

- Menstrual abnormalities in obese children are common.
- Most obese girls will have their menstrual period at an earlier age.
- Late or absent menstruation is also associated with obesity.
- Approx. 40-60% of adult women with Polycystic Ovarian Syndrome (PCO) are overweight or obese.
8. Gall Bladder Disease

- Obesity accounts for 8-33% of gallstones observed in children.

- Childhood obesity accounts for the majority of gallstones occurring in children without underlying medical conditions such as hemolytic disease, congenital heart disease or prolonged nutritional support.

- Obese individuals have increased biliary excretion of cholesterol resulting in an increased likelihood of gallstone formation.
9. Orthopedic Complications

- Obesity causes many orthopedic complications.

- 30% to 50% of patients with slipped capital epiphyses are obese.

- In a study of Blount’s disease (severe bowing of the legs) approx 80% of the patients were obese.
10a. Eating Disorders

- Emphasis on weight is everywhere in our society.

- As the medical profession takes steps to help obese children it is important to realize and monitor the effect that weight consciousness may be having.
10b. Eating Disorders

- Eating disorders affect 5-10% of our teenagers. Overweightedness and Obesity: 25-30%.

- 80% of Overweight or Obese teenagers become Overweight or more Obese adults.

- 28.6% of girls and 27.8% of boys who met criteria for binge eating syndrome reported attempting suicide.

11. Psychosocial Effects

- Obesity may cause inappropriate expectations and adverse socialization because the children look old for their age.
- The children report negative assumptions made about them by others due to early maturation and height increases. These include the perceptions that they are "inactive or lazy," "strong and tougher than others," and "that they have no feelings and are unclean."
- Body Image Disorder is seen in adolescents, usually speared on by peer and parental criticism about weight.
- This impact lasts long into adulthood!!!!
The Three-fold Paradigm

THE POWER TO:

P - Promote
L - Lean and
A - Active
Y - Youth
POWERPLAY is an intensive 8 week program designed to positively impact the lifestyles of today’s youth.

The program includes:

- Comprehensive medical exam (physical, laboratory evaluations, cholesterol, hypertension)
- Diabetes prevention, asthma and obesity associated.
- Co-morbidities assessment
- Comprehensive consultation by a Licensed Pediatric Dietician, RD and continual progress assessment of both child and parent.
About **POWERPLAY**

- Thorough evaluation of family environment and child by Licensed Child Psychologist, Ph.d. and ongoing follow up sessions.

- Artistic and Musical Therapy to complement behavioral modification education.

This Interactive Internet Website allows children and parents 24 hour access to a pediatrician and specialists; nutritional and healthcare information, and extensive reference data and content focused on childhood obesity.
What to Expect

- The program involves one 2 hour session each week for 8 weeks.
- The first half of each session consists of practical, entertaining educational tools that expose the child to nutritional and behavioral changes he/she can immediately apply to modify their current lifestyle.
- These are taught through art, music therapy as well as improvisation.
What to Expect

• The second half of each session is dedicated to a unique and comprehensive fitness training curriculum.
• Each child will engage in varied physical activities such as yoga, tai-chi, African Brazilian Dance, hip-hop, kickboxing, aerobics etc..
Redesigning the Food Pyramid

THE FOOD GUIDE PYRAMID: The government's 1992 effort to warn us from fat conveyed the sense that all carbs are harmless.

THE AVERAGE AMERICAN DIET: With a cherry on top. Sweets and snacks are a bigger draw than beautiful fruits and vegetables.

THE HEALTHY EATING PYRAMID: Breaks up the old food groups to separate carbs, fats and proteins by quality. Red meat and white flour are out, whole grains and vegetable oils are in.

Alcohol
In moderation
Controls hypertension

Daily exercise and weight control

White rice, white bread, potatoes, pasta, sweets
Use sparingly

Multiple vitamins
For meat

Red meat, butter
Use sparingly

Fish, poultry, eggs
0 to 2 times a day

Dairy or calcium supplement
1 to 2 times a day

A102202

The New Food Pyramid
Glycemic Index

“Low GI foods may prove an effective method for reducing calorie intake and achieving long term weight control”

Shauna D. Ball et al., Pediatrics March 2003
Countering society’s barriers

- Meal Replacements for low-income children at risk - No cost for patients selected ex: Denisha
- Medications (Meridia, Xenical.. FDA approved for 16 yrs old and up) for teens
- Weekly phone calls for kids w/ no social support
- Patient transportation
- One on One w/ Personal Trainer / Art Therapist / RD
- PowerBall competitions - Self esteem asset
- DDR machine and circuit training equipment
- Summer Camp, weekend hikes and activities
- Scholarships and stipends available for children w/ HTN, DM2, No insurance
## Characteristics of Children Participants Over an 8-week Period of Power Play

<table>
<thead>
<tr>
<th></th>
<th>Males (n=34)</th>
<th>Females (n=53)</th>
<th>Total (n=87)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age + SD</td>
<td>12.1±2</td>
<td>10.9±2.4</td>
<td>11.4±2.3</td>
</tr>
<tr>
<td>Mean Height (inches) + SD</td>
<td>62.3±4.2</td>
<td>58.4±5.2</td>
<td>59.9±5.2</td>
</tr>
<tr>
<td>Mean Initial Weight (lbs) + SD</td>
<td>186.7±41.9</td>
<td>163.5±53.3</td>
<td>172.5±50.2</td>
</tr>
<tr>
<td>Mean Final Weight (lbs) + SD</td>
<td>175.5±40.5</td>
<td>154.95±49.8</td>
<td>163.7±46.9</td>
</tr>
<tr>
<td>Mean Initial BMI + SD</td>
<td>32.9±5.2</td>
<td>32.3±6.6</td>
<td>32.6±6.1</td>
</tr>
<tr>
<td>Mean Final BMI + SD</td>
<td>30.6±5.6</td>
<td>30.5±6.3</td>
<td>30.5±6.0</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>47.1%</td>
<td>24.5%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>41.2%</td>
<td>60.4%</td>
<td>52.9%</td>
</tr>
<tr>
<td>African American</td>
<td>11.8%</td>
<td>15.1%</td>
<td>13.8%</td>
</tr>
</tbody>
</table>
Graph 1a - Mean Weight Loss in Children Over 8-week Period vs. Age Groups

Age Groups (Years)
- 7-8
- 9-10
- 11-12
- 13-14
- 15+

Mean Weight Loss (lbs)
- 8.7
- 10.5
- 13
- 13.3
- 16.4

p=NS
Graph 2a-Mean Weight Loss in Children Over 8-Week Period vs. Age Group, Among Males and Females
Graph 3a - Mean Weight Loss in Children Over Weeks 1-4 vs. Age Groups

- 7-8: 4.8 lbs
- 9-10: 5.5 lbs
- 11-12: 6.5 lbs
- 13-14: 5.9 lbs
- 15+: 11.2 lbs

p = 0.05
Graph 4a-Mean Weight Loss in Children Over Weeks 5-8 vs. Age Groups

- 7-8: 3.1 lbs
- 9-10: 2.9 lbs
- 11-12: 4.6 lbs
- 13-14: 4.2 lbs
- 15+: 4.1 lbs

p=NS
Graph 5a-Mean Weight Loss in Children Over Weeks 1-4 vs. Age Groups, Among Males and Females

<table>
<thead>
<tr>
<th>Age Groups (Years)</th>
<th>Mean Weight Loss (lbs)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8</td>
<td>5.6</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>9-10</td>
<td>7.9</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>11-12</td>
<td>6.6</td>
<td>6.25</td>
<td></td>
</tr>
<tr>
<td>13-14</td>
<td>6.9</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>15+</td>
<td>7.1</td>
<td>14.3</td>
<td></td>
</tr>
</tbody>
</table>

p=0.04 (female)
Graph 6a-Mean Weight Loss in Children Over Weeks 5-8 vs. Age Groups, by Males and Females

![Graph 6a](image)

- **Male**
  - 7-8: 5 lbs
  - 9-10: 2.8 lbs
  - 11-12: 4.5 lbs
  - 13-14: 4.9 lbs
  - 15+: 4.7 lbs

- **Female**
  - 7-8: 3.1 lbs
  - 9-10: 3.1 lbs
  - 11-12: 4.6 lbs
  - 13-14: 3.4 lbs
  - 15+: 3.6 lbs

*p=NS*
Graph 7a-Mean Weight Loss in Children Over 8-Week Period vs. Ethnicity, by Age Groups

- Ages 6-12 years
- Ages 13-18 years

Mean Weight Loss (lbs)

- Caucasian:
  - Ages 6-12: 11.2 lbs
  - Ages 13-18: 11.6 lbs
- Hispanic:
  - Ages 6-12: 11.8 lbs
  - Ages 13-18: 14.7 lbs
- African American:
  - Ages 6-12: 11.2 lbs
  - Ages 13-18: 10.2 lbs

p=NS
Graph 11-Mean BMI values for Children Over an 8-week Period vs. Race

![Graph showing mean BMI values for Caucasian, Hispanic, and African American races.](image)

- Caucasian: 2.8
- Hispanic: 2.4
- African American: 1.7

p=NS
Graph 13-Mean Weight Loss Among Children vs. Week, Among Race

p=0.0194 (week 3-4)
Our Kids

THE POWER TO...

P

Promote

L

Lean and

A

Active

Y

Youth
Alex

12-18-02
Age: 13
Height: 5’7”
Weight: 324 lbs.
BMI: 51
DX: M.O
(Morbid obesity)
HTN (152/78)
Fmhx of Type 2DM

12-22-03
Age: 14
Height: 5’7” in.
Weight: 227 lbs.
BMI: 35.6
DX: Obesity
HTN
Channing

BEFORE
04-10-00
Age: 16 yrs
Height: 5’9”
Weight: 326 lbs.
BMI: 48.2
DX: M.O.
HTN
H. CHOL.

AFTER
3-19-03
Age: 19 yrs.
Height: 5’9”
Weight: 277 lbs.
BMI: 40.9
DX: M.O.
Yale

BEFORE
09-09-01
Age : 10
Ht. : 5’0”
Wt. : 133 lbs.
BMI : 26.1
DX : Obesity
   High
   Cholesterol

AFTER
01-27-03
Age : 12
Ht. : 5’1” in.
Wt. : 119 lbs.
BMI : 22.2
Christian

BEFORE

06-25-01
Age: 12
Height: 5’6”
Weight: 292 lbs.
BMI: 47-
DX: DM2/ Insulin

AFTER

03-04-02
Age: 12
Height: 5’6”
Weight: 192 lbs.
BMI: 31.6-
DX: DM2/
Glucovance
Adwoa

BEFORE
09-08-00
Age : 13
Height : 5’4”
Weight : 180 lbs.
BMI : 30.9

AFTER
08-26-01
Age : 14
Height : 5’4”
Weight : 138 lbs.
BMI : 23.7
BEFORE

06-30-00
Age: 14 yrs.
Height: 5’0”
Weight: 182
BMI: 35.7

BEFORE

08-28-01
Age: 15 yrs.
Height: 5’0”
Weight: 151
BMI: 29

AFTER
DECREASE FOOD INTAKE

- Glucose (140, 149)
- Lactate (150, 151)
- Pyruvate (150, 151)
- 3-Hydroxybutyrate (150, 151)
- 3,4-Dihydroxybutanoate (143)
- 2-Buten-4-oxide (143)
- 5-Hydroxytryptophan (152)
- B2-Adrenergic Agonists (152)
- B3-Adrenergic Agonists (153-155)
- Serotonin (156, 157)
- Propylgallate (158)
- Simmondsin (159)
- Apoprotein IV (160)
- Bombesin (161, 162)
- Cholecystokinin (CCK) (163-167)
- Enterostatin (168-170)
- Glucagon (GLP-1) (171-175)
- Gastrin releasing peptide (176)
- Insulin (177)

INCREASE FOOD INTAKE

- Monoamines and metabolites
  - 2-deoxy-D-Glucose (138)
  - 2,5-Anhydromannitol (139, 140)
  - Glucosamine (140)
  - N-acetylglucosamine (140)
  - 1,5-anhydroglucitol (140)
  - 2-mercaptoacetate (141)
  - Methylpalmoxirate (142)
  - 2,4,5-trihydroxypentanoate (143)
- Peptides
  - Insulin (144, 145)
  - B-Casomorphin (146)
First and Always: Definite Family Strategies to Prevent Childhood Obesity

Division of responsibility re: feeding

- Do Not encourage eating
- Reduce parental control of quantity
- Educate on quality
- Eliminate forbidden foods/ Offer substitutes
- Control television time
- Increase physical activity
- Encourage a Positive and Nurturing environment