Contraception for Obese Women

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Summary

- Obese women have lower fertility than do other women, but it is not zero
- Unplanned pregnancies occur and are more dangerous than for other women
- Contraception has added importance for obese women
- Obesity is increasing rapidly
- Hence, obese women are an increasing concern for you

Objectives

- Summarize the scope of the obesity problem in the United States
- Summarize the added health risks associated with obesity
- Suggest good contraceptive options for obese women

Obesity Is an Epidemic:
Obesity Trends Among Adults in the United States

Behavioral Risk Factor Surveillance System (BRFSS)
Telephone surveys, self-reports

Definitions

- Obesity: having a very high amount of body fat in relation to lean body mass, or Body Mass Index (BMI) of 30 or higher.
- Body Mass Index (BMI): a measure of an adult's weight in relation to his or her height, specifically the adult's weight in kilograms divided by the square of his or her height in meters.
- BMI = \(\frac{703 \times Wt\ (pounds)}{Ht\ (inches)^2}\)

Degrees of Obesity

- Underweight: BMI < 18.5
- Healthy weight: BMI between 18.5 and 24.9
- Overweight: BMI between 25 and 29.9
- Obese: BMI \(\geq 30\)
  - Morbidly or extremely obese: BMI \(\geq 40\)
Examples of BMI = 30 (Obese)

<table>
<thead>
<tr>
<th>Height</th>
<th>5'0&quot;</th>
<th>5'2&quot;</th>
<th>5'4&quot;</th>
<th>5'6&quot;</th>
<th>5'8&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>153</td>
<td>164</td>
<td>174</td>
<td>186</td>
<td>197</td>
</tr>
</tbody>
</table>

Percent Obese by State: 1990

Percent Obese by State: 1994

Percent Obese by State: 1998

Percent Obese by State: 2002

(*BMI ≥ 30, or ~ 30 lbs overweight for 5'4" person)
Consequences of Obesity

Consequences of Obesity

Obesity Among Women Ages 20-60
Data from 2003-2004 NHANES

<table>
<thead>
<tr>
<th></th>
<th>Ages 20-39</th>
<th>Ages 40-59</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, non-Hispanic</td>
<td>24%</td>
<td>38%</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>50%</td>
<td>58%</td>
</tr>
<tr>
<td>Mexican-American</td>
<td>36%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Obesity and Fecundity

- Increasing BMI increases infertility among women and men
- Results similar for older and younger men, suggesting that erectile dysfunction in older men does not explain the association
- Significant negative relationship between BMI and the total number of normal-motile sperm

Why Does Obesity Cause Infertility?

- obesity
  - disorders of sex hormone secretion & metabolism
    - hyperandrogenism in women
    - hypotestosteronemia in men

Health Consequences of Obesity

- Increases risk of major causes of death, including cardiovascular disease, numerous cancers, and diabetes
- Markedly reduces life expectancy
- Increases osteoarthritis, gall bladder disease, sleep apnea, respiratory impairment, social stigmatization; decreases mobility

Ogden CL. JAMA 2006;295:1549-55

Lake JK. Int J Obes Relat Metab Disord 1997;21:432-8

Sallmén M. Epidemiology 2006;17:520-3

Kort JI. J Androl 2006;27:450-2

Pasquali R. Maturitas 2006;54:363-71
Health Consequences of Obesity

- Study of 100 consecutive adults receiving injections in the UK
- 12 had a ventrogluteal site depth of more than 35 mm, the maximum depth of a green needle
- 26 had a ventrogluteal depth of more than 25 mm, the maximum depth of a blue needle
- Standard green and blue needles do not reach the gluteal muscles in a considerable number of patients

Nisbit AC. *BMJ*; 332:637-8

Obstetrical Complications of Obesity

- Diabetes
- Hypertension
- Preeclampsia
- Cesarean


Obstetrical Complications of Obesity (Moderate Obesity: 90-120 kg)

Robinson HE. *Obstet Gynecol* 2005;106:1357-64

Obstetrical Complications of Obesity (Severe Obesity: >120 kg)

Robinson HE. *Obstet Gynecol* 2005;106:1357-64

Bariatric Cot

- A bariatric cot by Stryker, one of several companies making rescue equipment for obese patients
- Cost = $4,000, versus $1,000 for a regular cot

Cost = $4,000, versus $1,000 for a regular cot
Obstetrical Complications of Obesity

- Meta-analysis to summarize the available epidemiologic evidence on the relationship between maternal overweight and obesity and the risk of stillbirth
- OR of a stillbirth were 1.47 (1.08-1.94) and 2.07 (1.59-2.74) among overweight and obese pregnant women, respectively, compared with normal-weight pregnant women


Abortion Complications of Obesity

- 2nd-trimester surgical abortion
  - Increased procedure difficulty among obese women
  - Obesity may necessitate special instruments and techniques
- Medication abortion may be preferable to surgical abortion among obese women


Contraception and Obesity

Weight and OC Failure-Oxford FPA

- 17,032 married women using OCs, diaphragms or IUDs recruited 1968-1974 and followed until 1994
- No effect of weight on either progestin-only or combined OC failure
- But weight was measured at recruitment and there were very few failures

Vessey M. J Fam Plann Reprod Health Care 2001;27:90-1

Weight and OC Failure: Holt 1

- Retrospective cohort analysis
- RR = 1.6 (1.1, 2.4) for women in the highest weight quartile (≥70.5 kg); higher risk among women on low and very low dose OCS
- No lab confirmation of self-reported pregnancies
- No knowledge of subject’s weight just before becoming pregnant
- No information on OC use patterns
- Duration of use ignored

Holt VL. Obstet Gynecol 2002;99:820-7

Weight and OC Failure: Holt 2

- Case-control study
- OR = 1.4 (0.9, 2.0) among women in the highest weight quartile (>74.8 kg)
- OR = 1.7 (1.1, 2.7) among consistent OC users in the highest weight quartile (>74.8 kg)

Holt VL. Obstet Gynecol 2005;105:46-52
BMI and OC Failure: Holt 2

- Case control study
- OR = 1.6 (1.1, 2.2) among women in the highest BMI quartile (>27.3)
- OR = 2.2 (1.4, 3.4) among consistent OC users in the highest BMI quartile (>27.3)

Problems with the Holt-2 Study

- Retrospective reports of pill-taking at interview on average 7 months after reference month
- Women who missed more than 5 pills in the reference month excluded
- More cases than controls previously pregnant and pregnant while on OCs
- Weight in reference month self-reported
- Duration of use ignored

Weight/BMI and OC Failure: Brunner 1

- Retrospective cohort study based on the 1995 National Survey of Family Growth
- Self reports of height, weight, pregnancies and OC use
- No unadjusted or adjusted increased risk among women in the highest weight category (>190 lb)
- Unadjusted RR = 1.8 (1.01-3.20) among women in the highest BMI group (≥30), but adjusted RR not significant

Problems in Brunner-1 Study

- Height and weight self reported at interview in the 1993 NHIS
- Sample is 2,064 women in the 1993 NHIS using OCs in January 1993; followed up in the 1995 NSFG
- Abortions underreported in the 1995 NSFG
- Duration of use ignored

BMI and Contraceptive Failure: Brunner 2

- Case-control study using data from the 1999 Pregnancy Risk Assessment Monitoring System
- Self reports of height, weight, contraceptive use at the time of pregnancy
- Unintended pregnancy among contraceptors
  - Overweight: OR=1.73 (1.20-2.36)
  - Obese: OR=1.75 (1.21-2.52)
- No association among noncontraceptors

Problems in Brunner-2 Study

- Height, weight and contraceptive use self reported
- Cases were unintended pregnancies leading only to live births
- Controls were intended pregnancies leading to live births
- Type of contraceptive used not reported
- Duration of contraceptive use ignored
BMI and OC Failure: Huber-1
- Case cohort study in South Carolina
- Self reports of height, weight, pregnancies and OC use
- Cases are 179 women delivering infants who reported using OCs at conception; controls are 223 OC users in BRFSS.
- Unadjusted OR = 2.5 (1.2-5.5) for BMI 25-29.9 and OR = 2.8 (1.1-7.6) for BMI ≥ 30; adjusted ORs not significant

Problems in Huber-1 Study
- Height, weight and OC use self reported
- Cases were pregnancies leading only to live births
- Duration of use ignored

BMI and OC Failure: Huber-2
- Retrospective population study based on the 2002 National Survey of Family Growth
- Sample is women using OCs in January 1999
- Self reports of height, weight, pregnancies and OC use
- No unadjusted or adjusted increased risk among women in the highest BMI category (≥30)

Problems in Huber-2 Study
- Height, weight and OC use self reported
- Underreporting of abortion
- Duration of use incorrectly controlled

Weight/BMI and Tri-Cyclen Lo
- Ortho Tri-Cyclen Lo not associated with elevated pregnancy risk among higher weight women
- N=1,673; weight range 90-240 lb; not many obese women

OC Failure in Recent Clinical Trials
- Since 1999, 5 multicenter trials evaluated the efficacy of 4 different OCs
- 15.5% of 6465 women weighed >90kg
- 4.4% had a BMI >40
- Crude perfect-use pregnancy rate
  - 0.7% among women weighing >90kg
  - 1.0% among women weighing <90kg
Summary: Weight/BMI and OC Failure

- No convincing evidence that very heavy or obese women have a higher risk of OC failure during perfect use, even on the lowest dose formulations.
- Possible that OCs are less forgiving of imperfect use among very heavy or obese women.
- Even if real, the absolute risk of failure is still likely to be modest: a 60% increase in risk implies an increase from 7% to 11% in the first year of typical use of OCs in the United States.

Summary: OCs and Weight/BMI

- Obesity is a risk factor for venous thromboembolism; among those <40
  - RR = 5.2 (5.1, 5.3) for pulmonary embolism
  - RR = 5.2 (5.1, 5.3) for deep venous thrombosis
- OCs further increase the effect of obesity on deep venous thrombosis; synergistic effect of OC use and BMI ≥ 25.

Obesity and Combined Hormonal Contraceptive Safety

<table>
<thead>
<tr>
<th>MEC</th>
<th>&lt;30</th>
<th>30-34</th>
<th>35-39</th>
<th>≥40</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>UK</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>


Obesity and Combined Hormonal Contraceptive Safety

- The UK MEC recommendations with respect to CHC use and obesity are inconsistent with those for age and smoking.
- Use of CHCs among women with a BMI of 35-39 is generally safe and should be changed from a UK MEC 3 to a UK MEC 2.
- There are no data on the safety of use of CHCs among women with a BMI ≥ 40.

Weight and Patch Failure

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>pregnancies</th>
<th>Weight (kg)</th>
<th>pregnancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;52</td>
<td>1</td>
<td>63-65</td>
<td>0</td>
</tr>
<tr>
<td>52-54</td>
<td>2</td>
<td>66-68</td>
<td>1</td>
</tr>
<tr>
<td>55-57</td>
<td>0</td>
<td>69-73</td>
<td>0</td>
</tr>
<tr>
<td>58-59</td>
<td>0</td>
<td>74-79</td>
<td>2</td>
</tr>
<tr>
<td>≥60</td>
<td>2</td>
<td>≥80</td>
<td>7</td>
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</table>

Contraception for Obese Women
Trussell

BMI and Failure of Implanon and DMPA

- No pregnancies in clinical trials of Implanon or DMPA-SC, even among obese users
- In DMPA-SQ trial, 11% of women were obese
- In Implanon trials, women could be no heavier than 130% of ideal body weight

Croxatto HB. Contraception. 1998;58:91S-7S
Croxatto HB. Hum Reprod 1999;14:976-81
Funk S. Contraception 2005;71:319-26
Jain J. Contraception 2004;70:269-75

BMI and Failure of NuvaRing

- Only mean BMI reported in published papers
- BMIs of women experiencing failures not reported
- Secondary analysis of phase III efficacy trials showed higher weight does not reduce efficacy; no pregnancies in 74 women weighing 189-272 lbs

Roumen FJME. Hum Reprod 2001;16:469-75
Dieben TOM. Obstet Gynecol 2002;100:585-93
Oddsson K. Contraception 2005;71:176-82
Ahrendt H-J. Contraception 2006;74:451-7

Interlude: Hormonal Contraceptives and Weight Gain

- Excellent Cochrane Review summarizing three placebo-controlled randomized trials of combined hormonal contraceptives
- No evidence of a causal association between combined OC or patch use and weight gain
- One randomized trial demonstrated that DMPA does not cause short-term weight gain

Gallo MF. Cochrane Database Syst Rev 2006
Pelkman CL. Am J Clin Nutr 2001;73:19-26

Tubal Sterilization

- Collaborative Review of Sterilization
- 9,475 women underwent interval laparoscopic tubal sterilization.
- Complication rate 16 per 1,000 procedures
- Higher complication rate among obese women
- Obesity OR = 1.7 (1.2, 2.6)


IUD: Terrific Choice for Obese Women

- Copper (and plastic) IUDs decrease risk of endometrial cancer
- LNG-IUS reduces menstrual blood loss (decreases anemia), reduces menorrhagia, reduces dysfunctional uterine bleeding

Hubacher D. Obstet Gynecol Survey 2002;87:120-8
Jensen JT. Obstet Gynecol Survey 2005;60:604-12
Blumenthal P. Contraception 2006;74:249-58
Vasectomy: Best Choice for Obese Women

Contraception after Bariatric Surgery

- Pregnancy should be avoided for at least 12 months after surgery because of fetal and maternal complications
- The decreased gastrointestinal absorption resulting from bariatric surgery is believed to reduce absorption of orally ingested hormones required for contraceptive efficacy
- Ideal contraceptives are the same as those for obese women: IUD, vasectomy

Westhoff CL. Dialogues Contraception 2007; 11:8-9
Merhi ZO. Gynecol Obstet Invest 2007; 64:100-2

Treatment of Obesity & Causes of Increasing Obesity

Treating Obesity

- Counseling: modest (3-5kg) sustained (1-2 years) weight loss
- Weight Watchers: modest (1.9kg) sustained (2 years) weight loss: better than counseling alone
- Pharmacotherapy: modest (3-5.5kg) potentially prolonged weight loss
- Surgical options: substantial (10-159kg) weight loss over 1-5 years

McTigue KM. Ann Intern Med 2003; 139:933-49
Heshka S. JAMA 2003; 289:1792-8

Why Have We Become More Obese?

- People get heavier if they consume more or expend fewer calories
- On average 3,500 calories = 1 pound
- The 10-12 pound increase in median weight over the past two decades requires a net caloric increase of only 150 calories per day
- 150 calories = 3 Oreo cookies or one can of Pepsi = 1.5 miles of walking

Cutler DM. J Econ Perspect 2003; 17:93-118

Calories In versus Calories Out

- No decrease in caloric expenditure since 1975
- No increase in caloric intake during meals
- All caloric increase is from snacks!

Cutler DM. J Econ Perspect 2003; 17:93-118
Food for Thought

• Before WW II, Americans ate massive amounts of potatoes, largely baked, boiled, or mashed
• French fries were rare, both at home and in restaurants because preparation required significant peeling, cutting, and cooking time
• Today the French fry is America’s favorite vegetable
• From 1977 to 1995, total potato consumption increased 30% due to FF and potato chips

More Food for Thought

• Does weight gain in one person affect weight gain in his or her friends, siblings, spouse, or neighbours?
• Answer obtained from an interconnected social network of 12,067 people who were assessed repeatedly from 1971 to 2003 in the Framingham Heart Study

Social Spread of Obesity

• A person’s chance of becoming obese increased by
  – 171% if a mutual friend became obese
  – 57% if a friend became obese
  – 40% if a sibling became obese
  – 37% if a spouse became obese
  – 0% if a neighbour became obese