Nutrition Management For PCOS

Unique Challenges For Women With PCOS
- Yo-yo dieters
- Intense cravings
- Impaired levels of ghrelin & leptin
- Increased hunger?
- Hypoglycemia common
- Higher prevalence of eating disorders
- Increased anxiety, depression, bipolar

Medical Nutrition Therapy (MNT)
Long-Term Goals:
- Reduce body weight if overweight
- Maintain weight loss after weight reduction
- Engage in 30 minutes or more of moderate intensity activity most if not all days of the week

Disclosure to Participants
- Retailer of Nordic Naturals fish oil
- Retailer of Ovasitol by Theralogix
- I have not received anything else of value from a commercial party related directly or indirectly to the subject of this presentation.

What Is The Best Eating Plan For PCOS?
MNT Long-Term Goals (Continued):

- Obtain knowledge and skills to support behavior changes
- Resolve metabolic syndrome
- Reduce risk factors for T2D and CVD
- Improve infertility


Dietary Composition In The Treatment Of PCOS: Systematic-Review

- Inclusion criteria: not taking anti-obesity medications
- 6 Studies, 137 women
- Results: “Subtle differences between diets”
- Weight loss improved PCOS regardless of dietary composition.

Potential Eating Plans

- Diet and lifestyle primary treatment approaches
- Eating plans need to be individualized
- Eating plans that have shown favorable effects on weight loss and metabolic parameters in PCOS:
  - Modifying glycemic index (GI) and glycemic load (GL)
  - Modifying carbohydrate, fat or protein amounts


Effects Of Increased Protein-to-Carbohydrate Ratios

- Controlled, 6 mo. trial, 27 PCOS women
- High Protein (HP) (>40% protein, 30% fat) vs. Standard Protein (SP) (<15% pro, 30% fat); no caloric restriction
- Monthly dietary counseling


- Results: HP decreased weight (7.7 vs 3.3 kg), body fat loss (6.4 vs 2.1 kg), waist circumference, glucose.
- No difference in lipids, hormones.

Low GI For PCOS

- Low glycemic index (GI) vs. Conventional Diet (CD)
  - 50% CHO, 23% protein, 27% fat
- 96 Overweight/obese women with PCOS, 12 months
• Results:
  – Low GI had better menstrual regularity (95% vs. 63% on CD), better insulin sensitivity
  – Those with high insulin levels had a 2-fold reduction in body fat (modest weight loss) vs. CD

DASH Diet for PCOS
• Randomized-controlled trial
• 48 women with PCOS, 8 weeks duration
• DASH & control diet consisted of 52% carbohydrates, 18% proteins, 30% total fats

• Results: DASH diet significantly reduced insulin, CRP levels, reductions in waist & hip circumference measurements

PCOS: Helpful Eating Strategies
• Reduce intake of carbohydrates
• Emphasis on low GI carbohydrates
• Avoid sugary and refined foods
• Spread carbohydrates evenly throughout the day
• Increase lean protein; all meals and snacks
• Fats: emphasize omega-3 fats, limit saturated

Supplements With Insulin-Sensitizing Properties
• N-acetyl cysteine (NAC)
• Magnesium
• Vitamin D
• Inositol (DCI & MYO)

N-Acetylcysteine (NAC)
• What is it?
  – Antioxidant and amino acid
  – Derivative of L-cysteine, a precursor to glutathione
• Purported uses:
  – insulin resistance, infertility, inflammation, androgen-lowering, dyslipidemia, bronchitis, immune support
• Recommended dosage: 1.6 to 3 g/day
• Side effects: minimal
NAC & PCOS
• 100 women with PCOS; Prospective trial
• Metformin (500 mg three times daily) or NAC (600 mg three times daily) for 24 weeks
• Both treatments equally resulted in a significant decrease in BMI, hirsutism, fasting insulin, free testosterone and menstrual irregularity
• NAC led to a significant decrease in total cholesterol and LDL levels

D-Chiro-inositol (DCI) & Myo-Inositol
• What is it?
  – Relatives of the B complex vitamins
  – Inositol-phosphoglycan (IPG) mediators “secondary messengers”
• Purposed uses:
  – insulin resistance, dyslipidemia, androgen-lowering, infertility, hypertension, weight loss, reducing gestational diabetes risk, and improving egg quality in PCOS
• Recommended dosage: 2 to 4 g/day

MYO Improves Metabolic Factors In PCOS
• 2 g/day of MYO for 6 months resulted in significant weight loss and improved HDL and LDL levels
• Results of 2, double-blind, placebo-controlled RCTs showed MYO (4 g/day) in PCOS:
  – increased HDL levels & resulted in significant weight loss
  – Decreased insulin, triglycerides, testosterone, and blood pressure

Combined, MYO and DCI in 40:1 ratio was more effective in improving metabolic parameters compared with MYO alone

Vitamin D And PCOS
• Studies in PCOS show an inverse relationship between vitamin D & metabolic risk factors (insulin resistance, BMI, triglycerides, HDL)

Vitamin D: Metabolic Risk Factors in PCOS
• Overweight women with PCOS who were vitamin D deficient & supplemented with vitamin D for 8 weeks saw improvements in insulin, triglycerides, & cholesterol levels
• Supplementing with vitamin D & calcium for 3 months significantly reduced testosterone & blood pressure in women with PCOS.
Benefits of Fish Oil
- Improves:
  - TG levels
  - Non-alcoholic fatty liver disease
  - Fertility
  - Depression
  - Skin and hair health
- Maintains cardiovascular health
- Decreases inflammation
- Supports a healthy pregnancy
- Recommended amount: 1 to 4 g/day

Fish Oil & PCOS
- 45 non-obese women with PCOS:
  - 1,500 mg of omega-3 for 6 months
  - Reductions: BMI, testosterone, & insulin levels; improvements in LH & SHBG levels
- Double-blind RCT overweight PCOS women:
  - 4 g/day of fish oil for 2 months
  - Reductions: glucose, insulin, triglycerides, LDL
  - increased HDL

The Role of Health Professionals in Treating PCOS
- Provide empathetic, supportive, encouraging approach
- Provide education on PCOS and insulin resistance
- Provide education on healthy diet and exercise
- Encourage a healthy approach to eating and exercise rather than focusing on weight loss
- Assess symptom severity (including eating disorder behaviors)

Questions to Ask A Patient
- “Tell me what your periods are like. Are they heavy, irregular, absent, etc.?”
- “What types of foods do you crave and when do you crave them?”
- “Do you ever feel lightheaded, dizzy, or nauseous which improves when you eat?”

Questions to Ask A Suspected Patient Of PCOS:
- “Have you ever been told by your physician or healthcare provider that you have any abnormal lab values?”
- “Can you tell me about any excessive body hair that you’ve dealt with?”
- “Do you have dry/rough elbows, skin tags, or any dark patches that look dirty on your body?”
- “Does anyone in your family have polycystic ovary syndrome?”


Tools
- Food records
- Mindful eating exercises
- Food models and labels
- Educational handouts
- Scale
- Waist circumference measurements
- Lab results
Conclusions About PCOS

• An underdiagnosed and undertreated epidemic
• With age, higher risk for T2D, Metabolic Syndrome, CVD
• Prevention and early diagnosis are key!

To Learn More

• PCOS Nutrition Center
  – www.PCOSnutrition.com
  – FREE PCOS nutrition tips newsletter, articles, PCOS books & cookbook, resources, CEUs
• Androgen Excess & PCOS Society
  – http://www.ae-society.org
• PCOS Challenge
  – www.PCOSchallenge.com
  – Professional podcasts, information, symposium

Disclosure to Participants

• Notice of Requirements For Successful Completion:
  – Please refer to learning goals and objectives
  – Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours
• Conflict of Interest (COI) and Financial Relationship Disclosures:
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THE PCOS-DIABETES CONNECTION: IDENTIFICATION AND MANAGEMENT

Ever heard this???

• “My doctor told my I have a little bit of sugar but he’ll keep an eye on it.”
• I had diabetes when I was pregnant but it went away.”
• “No one in my family has diabetes” in response to a suggestion they may be at risk.

Prediabetes: Why worry?

• Although not yet diabetes, prediabetes starts to affect the circulatory system and increases risk of heart attack, stroke, kidney disease, vascular eye problems, and possibly cognitive decline.

Without lifestyle change, upwards of 30% of people with prediabetes will be diabetic within 5 years (ultimately up to 70%).

What causes prediabetes/diabetes?

• A mismatch “collision” between our Stone-age genetic tendency towards physical self-preservation and our modern day food-infused, sedentary lifestyle.

• “Good gene gone bad” – highly inflammatory diet (refined carbs, sugars, saturated fats, excess calories in general) lacking enough protective phytonutrients, healthy fats, and whole food in general

• Sedentary lifestyle is lighter fluid on the fire!

PCOS and Glucose Metabolism: What’s happening physiologically?

• Believed both insulin resistance and beta cell dysfunction is present in PCOS
• Several indices, such as lipid accumulation product (LAP) and visceral adiposity index (VAI), shown to be associated with an increased risk of insulin resistance, prediabetes and type 2 diabetes mellitus (T2DM) in PCOS as well as in other cohorts. 

Blood Test Levels for Diagnosis of Diabetes and Prediabetes:

- Diabetes: A1C (percent) 6.5 or above, Fasting Plasma Glucose (mg/dL) 126 or above, Oral Glucose Tolerance Test (mg/dL) 200 or above
- Prediabetes: A1C 5.7 to 6.4, Fasting Plasma Glucose 100 to 125, Oral Glucose Tolerance Test 140 to 199
- Normal: A1C About 5, Fasting Plasma Glucose 99 or below, Oral Glucose Tolerance Test 130 or below

Definitions: a1c = glycated hemoglobin, fpg = fasting plasma glucose, ogtt = oral glucose tolerance test.

For all three tests, the higher the test result, the greater the risk of diabetes.
PCOS and Glucose Metabolism: What’s happening physiologically? (cont.)

• The prevalence of non-alcoholic fatty liver disease ((NAFLD) is estimated in about 89% of PCOS women with metabolic syndrome (compared to about 68% of women with MS without PCOS)\(^1\)

• Positive family history (FHx) of T2DM, as a reflection of genetic risk, is associated with an increased risk of the development of T2DM in PCOS women\(^2\)

Diabetes and CVD prevention starting early is **frontline treatment** for PCOS

• One study (England) compared 2301 women with PCOS to same age controls over twenty years → prevalence of MI in women age 45-54 was 1.9% for PCOS women compared to 0.2% in women without PCOS\(^3\)

• Insulin resistance – seen in 50-70% of PCOS women, 95% of those who are obese, associated with hypertriglyceridemia, elevated LDL, and low high-density lipoprotein (HDL) cholesterol concentration

PCOS vs. Weight-Matched Controls

• Elevated prevalence of metabolic syndrome

• Higher prevalence of hyperinsulinemia

• 2.5-fold increased prevalence of Impaired Glucose Tolerance (IGT)

• 4-fold increased prevalence of type 2 diabetes (T2D)\(^4\)

PCOS and Diabetes

- Research suggests up to 50% of women with PCOS will have prediabetes or diabetes by age 40; the incidence of T2DM in adolescents with PCOS is comparable to that seen in adults

- In the US, 40.5% of PCOS-related health care spending involves treatment and management of type 2 DM

PCOS: An Independent Risk Factor for T2D

- Higher insulin levels, independent of BMI

- Rapid conversion from normal to IGT to T2D

- Androgen Excess & PCOS Society:
  - Normal glucose = Screen with 2 h OGTT every 2 years
  - Other risk factors/IGT=Screen annually\(^4,5,6\)

Incidence of GDM and T2DM in Women with PCOS

**Gestational Diabetes and Type 2 Diabetes in Reproductive-Aged Women with Polycystic Ovary Syndrome**\(^7\)

- N = 9145 (Australia)

- Prevalence of GDM and T2DM was 11.2% and 5.1% in women with PCOS, and 3.8% and 0.3% in women without PCOS respectively (adjusted for age/BMI/HTN/smoking/Demographics)

- Due to significantly higher risk of GDM, women with PCOS should be **tested before** 24-28 weeks

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Prevalence and predictors of postpartum glucose intolerance in Italian women with gestational diabetes mellitus

Retrospective study of 454 Caucasian Italian women that underwent a 75g OGTT between 6 and 12 weeks postpartum in Calabria (Southern Italy) between 2004 and 2012.

Results:
- 290 women (63.9%) were normal
- 146 (32.1%) had prediabetes
- 18 (4.0%) had T2DM

Prevalence and predictors: continued

Pre-pregnancy BMI, age at pregnancy, fasting plasma glucose (FPG) at gravid OGTT, and week at diagnosis of GDM were all associated with prediabetes and T2DM.

Pre-pregnancy BMI ≥25 and previous diagnosis of PCOS emerged as the strongest predictors of prediabetes.

Complete phenotypic and metabolic profiles of a large consecutive cohort of untreated Korean women with polycystic ovary syndrome

GOAL: Determine metabolic and phenotypic profiles of a large cohort of untreated, Korean women with PCOS to form a registry.

DESIGN: Observational study of 865 women with PCOS using Rotterdam criteria (mean age 24.9; mean BMI 22.4).

RESULTS:
- Primary symptom - menstrual disturbance/infertility (avg menses every 2 months)
- PCO morphology = 96.5%
- Hirsutism = 33.9% (60-80% in American women)
- 47.4% = biochemical hyperandrogenism
- 20.1% = generalized obesity (33.2% central obesity)
- Dyslipidemia = 35.7%; Metabolic syndrome = 13.7% (more with central obesity)
- Diabetes = 3.5%
- Prediabetes = 20.8% (mostly via hgb A1C)

Influence of a positive family history of both type 2 diabetes and PCOS on metabolic and endocrine parameters in a large cohort of PCOS women

Goal: Study the metabolic and endocrine characteristics of PCOS women with and without a family history of T2DM and PCOS.

Design: Cross-sectional analysis of the association of T2DM FHx and PCOS FHx with metabolic and endocrine parameters in 714 PCOS women (mean BMI 24.2) from central Europe.

Results:
- 36 % of the women had a positive FH for T2DM and 21% a positive FH for PCOS (? accuracy)
- 35% of PCOS women with normal glucose tolerance had a positive FHx of T2DM, whereas 49% of PCOS women with prediabetes had a positive FHx of T2DM
- 44% of PCOS women with T2DM had a positive FHx of T2DM.
Results: Continued

- Positive FHx of T2DM was independently associated with metabolic disturbances such as central fat accumulation, obesity, prediabetes, MS, insulin resistance, dyslipidemia and high BP.
- Positive FHx of PCOS was independently associated with clinical and biochemical hyperandrogenism and prediabetes.
- PCOS women with a positive FHx of both T2DM and PCOS had the highest prevalence of metabolic disturbances and hyperandrogenism.

Conclusions:

Both obese and non-obese PCOS women with a positive T2DM FHx were more likely to have a positive PCOS FHx, suggesting a common genetic background.

Prediabetes and metabolic syndrome are more common in both obese and non-obese PCOS women with a positive FHx of type 2 DM supports Androgen Excess Society’s recommendation that all PCOS women with a FH of T2DM have a 2 hour OGTT.

Assessment of glucose metabolism in PCOS: HbA1c or FG compared w/ OGTT as a screening method

Goal: If HbA1c and fasting glucose (FG) useful in predicting the presence of prediabetes and type 2 diabetes (T2DM) in women with polycystic ovary syndrome (PCOS).

Design: Cross-sectional study of 671 women with PCOS conducted from 2006 to 2012.

Methods: 75 g 2-h OGTTs and measured HbA1c and FG in 671 women with PCOS aged 16-45 years with a median BMI of 24.2 (21.3-30.1 – 56% of women were overweight/obese). PCOS defined using Rotterdam, preDM/DM using ADA criteria.

Results:

- Using OGTT, prediabetes and T2DM in 12.8% and 1.5% of PCOS women, respectively.
- Using elevated HbA1c (5.7-6.4%), 3.2% of all PCOS women had prediabetes.
- Using elevated FG (100-125 mg/dl), 5.2% of all the PCOS women had prediabetes.
- HbA1c and FG both correlated well with OGTT to dx T2DM.

Findings:

- PCOS women with prediabetes or T2DM had a higher prevalence of (central) obesity, higher blood pressure and an adverse lipid profile compared with PCOS women with normal glucose tolerance.
- More prediabetes in overweight/obese women compared with normal weight women; no normal weight had T2DM.
- PCOS women with T2DM had significantly higher free androgen index (FAI) and free testosterone levels and lower SHBG levels than women with normal glucose tolerance or prediabetes.

Conclusion:

Data strongly supports 2 h OGTT be performed in all women with PCOS, in line with the 2007 AES recommendation (consistent with results from previous smaller PCOS cohorts) relying on hgbA1C and FG may miss many at risk women.

A 2010 consensus statement by the AES recommended that a 2-h OGTT should be performed in PCOS women with a BMI of 30, or alternatively in lean or overweight PCOS women with advanced age (40 years), a personal history of GDM or a family history of T2DM.
Assessment of glucose metabolism in polycystic ovary syndrome: Continued

- This study reports 30% of PCOS women with prediabetes and 25% of PCOS women with T2DM had none of the suggested risk factors, suggesting that screening only women with at least one risk factor as suggested by the AES 2010 would lead to an underestimation of the prevalence of prediabetes and T2DM.
- Of note, this study found prediabetes in 7% of normal weight PCOS women, many clinicians fail to consider that PCOS women can be thin and insulin resistant.

Additional considerations: Continued

- Very important to dx abnormal glucose metabolism early to prevent the progression to T2DM in these young women.
- HbA1c suggested as a screening tool by the ADA (American Diabetes Association, 2013) due to its advantages over FG and OGTT (greater convenience and less day-to-day variability).
- Several studies report normal FG levels despite elevated postprandial glucose in PCOS women, supporting previous research suggesting PCOS carries insulin secretory defect.

Additional Considerations: Continued

- Previous study among OB/GYNs/reproductive endocrinologists suggests 57–71% of PCOS women are screened for T2DM, 68% used OGTT, 8–22% used FG and 19–20% used HbA1c.
- Primary care screening likely lower
- Bottom line: Best practice may be AES 2007 recs that PCOS women with normal glucose tolerance should be rescreened every 2 years or sooner if additional risk factors are identified, and those with prediabetes should be screened annually for developing T2DM.

Diabetes Prevention Program (DPP)

Followed on the heels of the 1986 Da Qing study (677 subjects) and the 1993-2001 Finnish Diabetes Prevention Program (522 subjects)

- DPP 3234 non-diabetic patients with prediabetes from 27 US clinical centers
- Average age 51, mean BMI 34
- 45% from minority groups at higher risk of DM
- Treatment arms:
  - Lifestyle recommendations plus metformin
  - Lifestyle recommendations plus placebo
  - Intensive lifestyle intervention in diet, activity and behavioral modification

DPP continued...

- Goal of the lifestyle intervention was 7% weight loss through low cal, low fat diet; exercise 150 minutes per week taught through a 16 week curriculum spread over 24 weeks followed by monthly follow up
- Program designed to be flexible and individualized
- Average fu 2.8 years

DPP Findings

- DM was 58% lower in the intensive lifestyle intervention group
- Diabetes 31% lower in the metformin group
- Over the almost 3 year period:
  - 28.9% of the placebo group and 21.7% of the metformin group developed diabetes, compared to only 14.4% of intensive lifestyle group
  - Weight loss was primary influence
  - For those 65 and older, DM down by 71%
  - Additional f/u 5 & 10 years later showed continued benefits
Diabetes Prevention Program Outcomes Study (DPPOS)
Post-10 year follow up, intensive lifestyle changes aimed at modest weight loss:
- reduced rate of T2DM by 34 percent compared with placebo (metformin 18%)
- DM rate down 49 percent in those age 60 and older compared with placebo.
- delayed T2DM by ~ 4 years compared with placebo (metformin 2 yrs)
- reduced CVD risk factors.

Common Complaints r/t Insulin Resistance/Glucose Fluctuations:
- Fluctuations in energy level throughout the day
- Frequent hunger/not feeling satiated for long after eating
- Binge eating, particularly in the evening
- Constant cravings for sweets and other refined carbohydrates (often describe themselves as being “addicted to sweets”)
- Irritability if go too long without eating
- Severe intolerance to very low calorie diets, particularly very low carb diets

Strategies for Counseling Patients with Insulin Resistance
- Meet them where they are
- Understand they’re very susceptible to fads and over-restrictive diets
- Educating them on exactly what’s going on in their body when they have IR/PCOS can help them visualize why specific diet and lifestyle strategies are being recommended (many are emotionally scarred from many unsuccessful weight loss efforts and years of “you’re too fat” talk from healthcare providers)

“Balanced plate” with emphasis on spreading carbs over smaller meals and snacks

Diet and lifestyle factors work synergistically to support health!
Managing IR in PCOS: What the research suggests

• Dietary glycemic index (GI) higher in women with classic PCOS phenotype and a/w less favorable anthropometric and metabolic profiles. 15
• Low glycemic index (GI) carbs/higher protein (30%) a/w improved insulin sensitivity and less inflammation based on CRP. 16
• Greater weight loss may be achieved with higher protein/low GI but sx of PCOS improve with weight loss regardless of how it’s achieved. 17

Exercise and Insulin Resistance

- Exercise enhances muscle absorption of glucose by increasing intracellular glucose transporter 4 (GLUT-4) protein production → increases cellular glucose uptake
- Exercise helps increase muscle mass/quell inflammation 21
- DPP → intensive lifestyle intervention decreased both sedentary and television watching time compared to metformin or placebo groups. 22
- Stress management!

What the research suggests: continued

• Omega-3 fatty acids may reduce glucose levels and improve insulin sensitivity in PCOS patients. 18
• Vitamin D may improve androgens, blood pressure, glucose metabolism and menstrual frequency in women with PCOS. 19, 20
• May be a role for Mg++ and chromium if low

Summary

- Women with PCOS are at increased risk of prediabetes and T2DM independent of weight, but risk significantly exacerbated by obesity/sedentary lifestyle
- Two hour OGTT is the preferred means of screening for prediabetes → early dx critical for intervention to prevent early onset T2DM
- Weight management is key; diet and lifestyle intervention is more effective than metformin at preventing DM

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