International Lifestyle Recommendations for Polycystic Ovary Syndrome (PCOS)

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- New fan of the Chicago Bears
- Research Interests:
  - Polycystic Ovary Syndrome
  - Ovarian Follicle Dynamics
  - Lifestyle Interventions

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- Postdoctoral fellow at Northwestern University.
- Enjoys baking items with unique ingredient combinations
- Research Interests:
  - Diet and Physical Activity Assessments
  - eHealth
  - Patient-Clinician Communication

Today’s presenters met in graduate school at Cornell University. Both researchers studied polycystic ovary syndrome with Dr. Marla Lujan in the Division of Nutritional Sciences.
Learning Objectives

- Explain the role of nutrition and weight management in polycystic ovary syndrome (PCOS).

- Summarize the new international evidence-based lifestyle recommendations for PCOS.

- Identify potential barriers to applying the lifestyle recommendations in clinical practice.
Polling Question

Have you provided nutrition education to a woman with PCOS in the last year?
Background

Polycystic Ovary Syndrome (PCOS)

• Complex endocrine disorder
  – Affects 1 in 10 women of reproductive age globally
  – Accounts for 80% of cases of anovulatory infertility

• Diagnosed with 2 of 3 features:
  – Anovulation
    • Evidence of irregular menstrual cycles
  – Androgen excess
    • Evidence of hirsutism or
    • Evidence of elevated androgens
  – Polycystic ovaries
    • Evidence of increased follicle number or
    • Evidence of increased ovarian size

Background

PCOS Complications

• Linked to metabolic disturbances
  – Obesity
  – Insulin resistance

• Imparts significant consequences on health across the lifespan

References: Fauser et al. 2012.
Background

**Obesity & PCOS**

- **Obesity**
- **Central adiposity**
- **Insulin resistance**
- **Hyperinsulinemia**
- **Hyperandrogenism**

**Ovarian dysfunction**
- Follicle excess
- Follicle arrest and anovulation
- Overproduction of androgens

*References: Jarrett & Lujan 2017; Note: Solid lines denote direct relationships and dotted lines denote indirect relationships.*
Background

**Role of Lifestyle Intervention**

- **Heralded as first-line therapy in patients with obesity**
  - Improves weight and metabolic abnormalities
  - Has unknown impact on reproductive outcomes

**References:** Moran et al. 2009; Moran et al. 2011; Jarrett & Lujan 2017. **Note:** Dotted lines denote proposed mechanisms.
Recap

• **PCOS is a complex endocrine disorder.**
  – Has significant effects on women’s health across the lifespan.

• **Obesity is linked to the pathogenesis of PCOS.**
  – Can worsen reproductive and metabolic features.

• **Lifestyle intervention may reduce disease severity.**
  – Likely targets obesity and insulin resistance.
  – Has unknown effects on menstrual cyclicity, ovulation, or fertility.
Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome


- Includes 166 evidence-based (EBR) and clinical consensus recommendations (CCR), plus clinical practice points (CPP)
  - Conducted systematic reviews on prioritized questions
  - “…To promote consistent, evidence-based care and improve the experience and health outcomes of women with PCOS.”

- Lifestyle-related items comprise:
  - 1 of the 5 guideline chapters
  - 24 of 166 recommendations

References: Teede et al. 2018.
Effectiveness of Lifestyle Interventions

For women with PCOS and body mass index < 25 kg/m\(^2\)

CCR “Healthy eating and regular physical activity should be recommended to achieve [or] maintain healthy weight and to optimize hormonal outcomes, general health, and quality of life across the life course.”

CCR General population recommendations for healthy eating should be followed across the life course.

Effectiveness of Lifestyle Interventions

For women with PCOS and body mass index $\geq 25 \text{ kg/m}^2$

**EBR** Multi-component lifestyle intervention should be recommended for reductions in weight and insulin resistance.

**CCR** “A variety of balanced dietary approaches could be recommended to reduce dietary energy intake.”

**CPP** Achievable weight loss (i.e., 5% to 10% within 6 months) yields significant clinical improvements.

Summary of Recent Systematic or Narrative Reviews

Energy-Restricted Diets in PCOS

• Interventions have primarily focused on hypocaloric diets ± physical activity in obese patients.
  – Moran et al. (2009)
    • Androgen Excess and PCOS Society Position Statement
  – Moran et al. (2011)
    • Cochrane Systematic Review

• Most trials have noted improvements in endocrine and metabolic status with 5% – 10% weight loss:
  – Adiposity
  – Hyperandrogenism
  – Insulin sensitivity

Caloric Restriction & Ovulation

• **Little evidence to support an impact of caloric restriction on ovulatory cyclicity in PCOS.**
  – Jarrett and Lujan (2017)
    • Included N = 22 studies with ovulation as primary outcome.

• **Findings may relate to:**
  – Use of infrequent or surrogate measures of ovulation.
  – Degree of change in salient endocrine/metabolic features.

References: Jarrett and Lujan (2017).
Macronutrient Composition & PCOS

• Impact of dietary composition appears marginal.
  – Moran et al. (2013)
    • Included N = 6 studies that provided diets with a specific composition.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Main Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropometric</td>
<td>• Little to no differences in weight loss among diets.</td>
</tr>
<tr>
<td>Reproductive</td>
<td>• Subtle differences in changes in androgens.</td>
</tr>
<tr>
<td></td>
<td>• Improved menstrual cyclicity on low glycemic index (GI) diet.</td>
</tr>
<tr>
<td>Metabolic</td>
<td>• Improved insulin sensitivity / lipid profiles on a low GI diet.</td>
</tr>
<tr>
<td>Psychological</td>
<td>• Improved quality of life on all diets.</td>
</tr>
<tr>
<td></td>
<td>• Improved depression and self-esteem on high-protein diet.</td>
</tr>
</tbody>
</table>

There is limited evidence that any one dietary pattern is better than another for improving health outcomes in women with PCOS.
### Dietary Supplements for PCOS

<table>
<thead>
<tr>
<th>Supplement</th>
<th>Author (Total N)</th>
<th>Main Findings</th>
</tr>
</thead>
</table>
| Vitamin D ± Calcium | Azadi-Yazdi 2017 (N = 183)           | • Improved androgen status  
                         | Fang 2017 (N = 502)                                                         | • Improved menstrual cyclicity  
                                                                                        | • No effect on glucoregulation or lipids  |
| Omega-3s            | Hajishafiee 2016 (N = 298)           | • Improved androgen status  
                         | Sadeghi 2017 (N = 145)                                                     | • No effect on insulin sensitivity  |
| Inositol            | Mendoza 2017 (N = 1017)              | • No effect on infertility treatment outcomes  
                         | Unfer 2016 (N = 496)                                                      | • Decreased insulin resistance  |
| Chromium            | Fazelian 2017 (N = 351)              | • Decreased weight  
                         |                                                                      | • Decreased insulin resistance  |
Dietary Supplements for PCOS

• **Evidence is heterogeneous and still emerging.**
  – Greater focus on general health vs. PCOS-specific outcomes
  – Inclusion of essential vitamins/minerals and popular supplements

• **Use caution in interpreting previous studies due to:**
  – Age
  – Race and ethnicity
  – Dose, form, bioavailability
  – Purpose (physiologic vs. pharmacologic)
Health professionals should encourage and advise the following for women with PCOS, per general population recommendations.

Key Guidelines for Adults

- All adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits.

- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Aerobic activity should be performed in episodes of at least 10 minutes, and preferably, it should be spread throughout the week.

- For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate-intensity, or 150 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity. Additional health benefits are gained by engaging in physical activity beyond this amount.

- Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.
Summary of Recent Systematic or Narrative Reviews

Exercise & PCOS

• Data from exercise-specific interventions are limited.
  – Include variable study designs, cohorts, and outcome measures.

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Author (Total N)</th>
<th>Main Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate 3 – 6 months</td>
<td>Harrison 2011 (N = 421)</td>
<td>• Increased sporadic ovulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced weight and insulin resistance</td>
</tr>
<tr>
<td>All intensities 3 – 6 months</td>
<td>Hakimi &amp; Cameron 2017 (N = 341)</td>
<td>• Increased sporadic ovulation</td>
</tr>
<tr>
<td></td>
<td>Conte 2015 (N = 456)</td>
<td>• Reduced insulin resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Improved quality of life and well-being</td>
</tr>
</tbody>
</table>

Improvements appear to occur independent of type, intensity, frequency, or duration of physical activity.

Slide Courtesy of: Marla Lujan, PhD.
Obesity & Weight Assessment

CCR  “Health professionals and [patients] should be aware that women with PCOS have a higher prevalence of weight gain and obesity…with a clear need for prevention.”

CPP  Assessment should be respectful of weight-related stigma, negative body image, and low self-esteem.

Obesity & Weight Assessment

CCR  “All those with PCOS should be offered regular monitoring for weight changes and excess weight.”

CPP  Monitoring weight, preventing weight gain, and “encouraging evidence-based and socio-culturally appropriate healthy lifestyle [behaviors] is important in PCOS, particularly from adolescence.”

Case Study

Jessica is a 29-year-old female patient in your clinic. For the past couple of years, her periods have been irregular and have only happened every six months. She is now complaining of acne and excessive hair growth on her lip and chin. She also has a body mass index of 35.4 kg/m². She has recently tried Weight Watchers and the ketogenic diet, but describes difficulties losing weight.

Jessica’s physician suspects that she has PCOS.

Which of her features are consistent with the established diagnostic criteria for PCOS?
Jessica is a 29-year-old female patient in your clinic. For the past couple of years, her periods have been irregular and have only happened every six months. She is now complaining of acne and excessive hair growth on her lip and chin. She also has a body mass index of 35.4 kg/m². She has recently tried Weight Watchers and the ketogenic diet, but describes difficulties losing weight.

Which nutrition recommendation(s) would you provide to Jessica?
Recap

• New international guidelines support lifestyle as an important component of the management of PCOS.

• Recommendations for the lifestyle management of PCOS reflect ones made in the general population.
  – Focus on healthy eating and physical activity behaviors.
  – Prioritize weight management across the lifespan.

• Assessments should be respectful of the unique physical and emotional consequences of PCOS.
Baseline Knowledge, Behavior, and Beliefs

Usual Dietary Intake in PCOS

• 8 of 17 studies identified differences in caloric intake:

<table>
<thead>
<tr>
<th>Results (PCOS vs. Non-PCOS)</th>
<th>Number of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ Total daily caloric intake</td>
<td>N = 6</td>
</tr>
<tr>
<td>↓ Total daily caloric intake</td>
<td>N = 2</td>
</tr>
<tr>
<td>☓ Total daily caloric intake</td>
<td>N = 9</td>
</tr>
</tbody>
</table>

• Recent focus on dietary patterns:
  – Those with PCOS more likely to consume Mediterranean-style diet.
  – Western and plant-based diet patterns associated with PCOS.

References: Lin & Lujan 2013; Cunha et al. 2018; Shahdadian et al. 2019; Zhang et al. 2018; Moran et al. 2015.
Baseline Knowledge, Behavior, and Beliefs

Usual Physical Activity (PA) in PCOS

• 1 of 6 studies reported differences in PA.
  • Found more sedentary behavior in PCOS.

• Changes in PA in PCOS vs. Non-PCOS over time:
  – No differences in recent PA between groups.
  – In the past, women with PCOS spent less time:
    • Housekeeping
    • Walking
    • Being physically active during commuting
    • Participating in activities of moderate intensity
  – Women with PCOS spent more time sitting 5 years ago.

Baseline Knowledge, Behavior, and Beliefs

Weight Management Practices in PCOS

![Graph showing odds ratio with 95% CI for various practices, with Low GI diet marked as significantly different (P < 0.05).]

Odds Ratio (95% CI)

- Exercise
- Commercial Programs
- Meal Replacement
- Portion Size
- Reduce Fat, Sugar
- Low GI diet

* Significant (P < 0.05)

References: Moran et al. 2018. **Logistic Regression:** Adjusted for age, BMI, martial status, education, occupation, income, country of birth.
Baseline Knowledge, Behavior, and Beliefs

Weight Management Practices in PCOS

Odds Ratio (95% CI)

-4.0
-3.0
-2.0
-1.0
-0.0

Diet Books
Pharmaceuticals
Fasting
Smoking
Healthy Practices
Alternative Practices

* Significant (P < 0.05)

Compared to most people your age and weight in the U.S., what would you say are your chances of getting ____?

- Heart disease: β = 0.83 (0.11) $P < 0.01$
- Diabetes: β = 1.25 (0.11) $P < 0.01$
- Endometrial cancer: β = 0.89 (0.11) $P < 0.01$
- Weight gain: β = 1.05 (0.09) $P < 0.01$

1 = Much lower than average; 3 = Same; 5 = Much higher than average

Beliefs in PCOS: Disease Prevention

There's a lot I can do to prevent getting __________.

\[ \beta = -0.19 \pm 0.09 \quad P = 0.04 \]

\[ \beta = -0.44 \pm 0.10 \quad P < 0.01 \]

1 = Disagree; 3 = Neutral; 5 = Agree

Beliefs in PCOS: Disease Prevention

A healthy diet will reduce my risk of __________.

1 = Disagree; 3 = Neutral; 5 = Agree

$\beta = -0.19 \pm 0.09$

$P = 0.03$

It is important for me to meet government __________ recommendations.

\[ \beta = 0.38 \pm 0.13 \]

\[ P < 0.01 \]

1 = Disagree; 5 = Agree

Baseline Knowledge, Behavior, and Beliefs

Self-Efficacy of Diet Behaviors

Please select how confident you are in your ability to do the following for the next month.

- Incorporate low fat foods into my diet.
- Incorporate low salt foods into my diet.
- Decrease the amount of refined sugar in my diet.
- Eat more high fiber foods.
- Eat smaller portions at dinner.
- Control my eating on weekends.
- Resist eating too much when there are many different kinds of food available.
- Resist eating when I am at a party.
- Resist eating when I am anxious or nervous.
- Resist eating when I am depressed or feel down.
- Resist eating when I am angry or irritable.
- Resist eating when I experience failure.

Recap

• Recent studies have shown no differences in dietary intake or physical activity between women with and without PCOS.
  – Women with PCOS may be consuming higher quality diets.
  – They are confident they can perform healthy diet behaviors.

• Women with PCOS are less certain that healthy diet and physical activity can prevent weight gain.

• Women with PCOS place greater importance on physical activity recommendations than controls.
  – Potential area of encouragement.
Barriers to PCOS-Related Care

Visits with Healthcare Providers

A Commentary on the New Evidence-Based Lifestyle Recommendations for Patients with Polycystic Ovary Syndrome and Potential Barriers to Their Implementation in the United States

Brittany Y. Jarrett, PhD, RD; Annie W. Lin, PhD, RD, CDN; Marla E. Lujan, PhD

References: Jarrett, Lin, & Lujan 2019. Note: Categories in figure are not mutually exclusive.
Barriers to PCOS-Related Care

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Barriers to PCOS-Related Care

Provider Support for PCOS

Barriers to Implementing the New International Guidelines for PCOS

• **Limited access to nutrition services**
  – Limited physician referrals to RDs
  – Limited insurance coverage

• **Inadequacy of nutrition care for PCOS**
  – Only 11% of patients with PCOS have reported being satisfied with the support that they received for making lifestyle changes.
  – Most rely on information from unregulated sources.

• **Failure to tailor care to the unique concerns of PCOS**

Discussion Question

What are some strategies to increase the provision of tailored, evidence-based nutrition information to patients with PCOS?

What are some strategies to increase physician referrals to nutrition experts for PCOS?
## Proposed Solutions to Barriers in PCOS-Related Nutrition Care

### Work to Increase Physician Referrals to Registered Dietitians for PCOS
- Collaborate with other relevant providers to improve the referral systems in your current practice.
- Engage in advocacy efforts to increase insurance coverage for wellness and preventative services.

### Work to Increase Knowledge of PCOS
- Review the new International Guideline for the Assessment and Management of PCOS.
- Appreciate that there may be both genetic and environmental determinants of PCOS.
- Become familiar with the current diagnostic criteria and primary treatments for PCOS.
- Understand the reproductive, metabolic, and psychological health risks associated with PCOS.
- Recognize the importance of weight management in patients across body mass index categories.

References: Jarrett, Lin, & Lujan 2019.
Translation of the PCOS Guideline

• **Tools for Patients**
  – Evidence-based app (AskPCOS)

• **Tools for Providers**
  – Question prompts
  – Health literacy enhancing tools
  – Accredited courses
  – Webinars with international expert panels
  – e-Health information resources

https://www.monash.edu/medicine/sphpm/mchri/pcos

References: Teede et al. 2018.
Conclusions

• **PCOS is linked to lifelong metabolic complications.**
  – Weight management is key.

• **International evidence-based guidelines support lifestyle management in all women with PCOS – regardless of weight.**
  – Interventions should be multicomponent and individualized, and reflect government recommendations for healthy eating and physical activity.

• **Providers should work to address barriers to effective nutrition care for women with PCOS.**
  – Tailor nutrition counseling to unique concerns of PCOS.
  – Increase physician referrals to registered dietitians for PCOS.
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**Study Participants**
References


Lin AW, Dollahite JS, Sobal J, Lujan ME. Health-related knowledge, beliefs and self-efficacy in women with polycystic ovary syndrome. Hum Reprod. 2018; 33:91-100


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