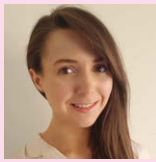
POLYCYSTIC OVARIAN SYNDROME: DIETARY CONSIDERATIONS AND MANAGEMENT



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Polycystic ovarian syndrome (PCOS) remains a key public health burden, as it affects 10-15% of women worldwide.[1] It is a lifelong endocrine dysfunction characterised by polycystic ovaries, ovulatory dysfunction and hyperandrogenism.[2] This article considers the impact of dietary management and medications in treating this condition.

Women with PCOS experience a combination of features:[3,4]

- **Metabolic**: insulin resistance, hyperinsulinaemia, weight gain, obesity, diabetes, hypertension and cardiovascular disease
- **Endocrine**: hyperandrogenism, hirsutism and acne
- **Psychosocial**: depression, anxiety and poor quality of life

These features are accompanied by uncomfortable symptoms such as irregular menstrual cycles and excessive hair growth.[3]

Evidence regarding management of PCOS has generally improved in the past five years, but remains of low to moderate quality. The International Evidence-Based Guideline for the Assessment and Management of PCOS has highlighted the significance of nutrition in PCOS and has recently been updated to emphasise diet and exercise as first-line treatment, regardless of weight.[5]

IMPROVING INSULIN SENSITIVITY

Approximately 75% of women with PCOS have insulin resistance with hyperinsulinaemia, meaning their cells don't respond efficiently to insulin's signals, leading the body to produce more insulin to compensate.[5] This is due to a post-receptor binding defect, with an alteration in the gene expression of some genes involved in insulin signalling pathways.[6] This is regardless of obesity presence, but is exacerbated by excess weight gain.[7,8] Dietetic intervention should therefore emphasise the importance of obtaining or maintaining a healthy body mass index (BMI) to improve insulin sensitivity.[9]

Simultaneously decreasing the saturated fat and glycaemic index (GI) in the diet has been consistently shown to reduce the insulin response.[10] This is echoed by the ability of the Mediterranean and ketogenic diets (which have a low GI by nature) to reduce blood glucose levels, insulin resistance and body weight. Both diets have also been shown to improve a number of cardiometabolic abnormalities and hormonal imbalances, even in PCOS patients with a healthy BMI.[1,11-13]

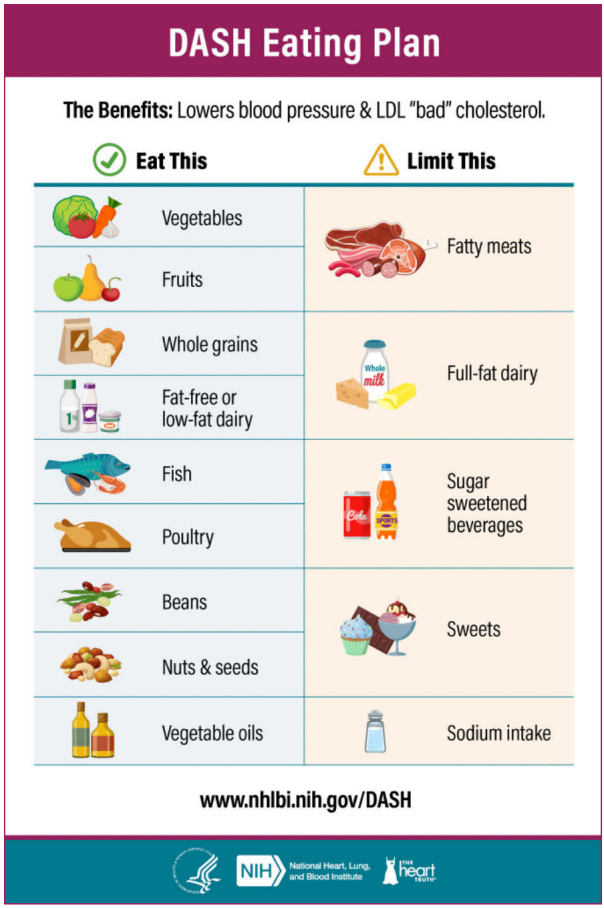
The first study to provide objective evidence for the efficacy of low-GI diets in obese premenopausal women with PCOS found that a hypocaloric, high-protein, low-GI diet increased insulin sensitivity.[14] Interestingly, it was also found to statistically improve menstrual cyclicity, suggesting it may play a role in improving fertility.[14]

Many further studies have explored the efficacy of varying macronutrient composition of a hypocaloric diet to improve insulin resistance. A recent randomised controlled trial found that a two-week isocaloric diet low in GI and saturated fat, with similar total fat and carbohydrate content, reduced liver fat content and lowered the glycaemic response. The results were statistically significant when compared

REFERENCES

Please visit: www.NHDmag.co.uk/article-references.html

Figure 1: The DASH diet eating plan[19]



with a high-GI diet high in saturated fat. This was the case even when total energy content and macronutrient ratio of fat to carbohydrate remained unchanged, increasing the validity of the results.[10] The cohort excluded vegan, vegetarian and premenopausal women, so further research with a broader cohort is required to validate the results. A recent review article supported the findings, as it found low-GI diets improved insulin sensitivity and regulated menstrual cycles across a wide range of studies.[15]

HEART HEALTH

Higher cardiovascular disease risk in those with PCOS is a consequence of elevated triglycerides and decreased high-density lipoprotein cholesterol.[16] This lipid profile is more profound in obese patients.[16] Current NICE guidance encourages a 5% weight loss to improve insulin sensitivity and cardiovascular risk factors.[17] A randomised controlled trial found consumption of the DASH diet for eight weeks led to decreased triglycerides and LDL cholesterol in PCOS patients.[18] Further research in the PCOS population is required; however, following the DASH diet will improve cardiovascular health as a whole and, therefore, is beneficial. The DASH diet is conducive to the low-GI diet and is, therefore, a suitable intervention for PCOS patients (see Figure 1).[19] It will also reduce the risk of type 2 diabetes and cardiovascular disease, complying with current PCOS management guidance.[17]

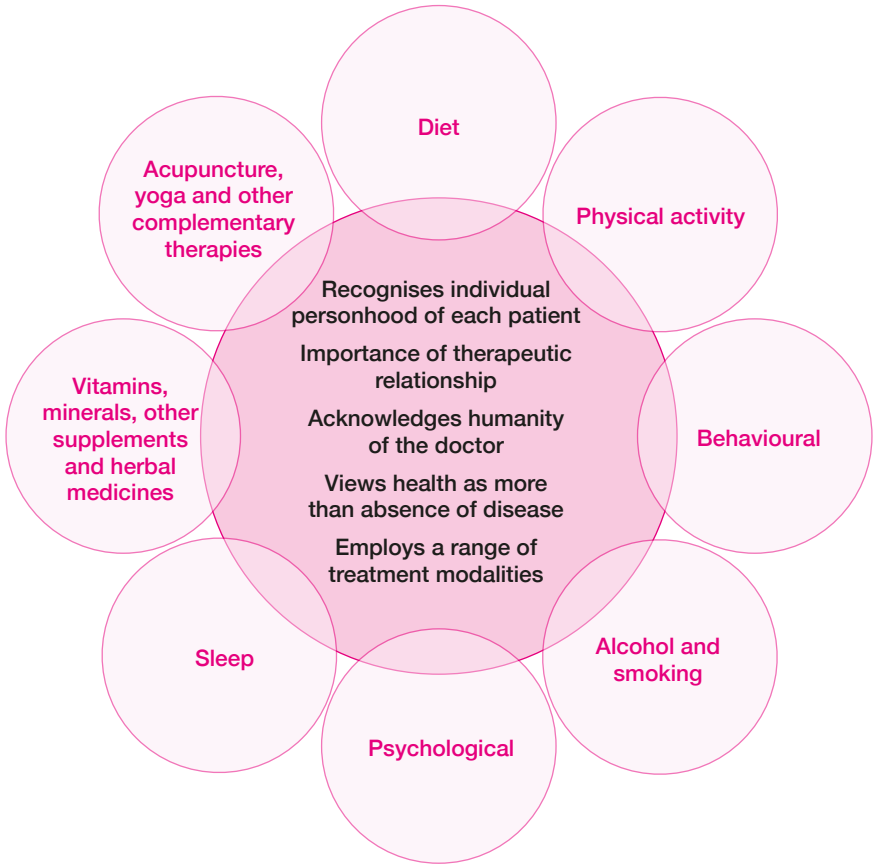
As dietitians, we have a duty of care to ensure PCOS patients are aware of potential long-term health conditions linked to the condition. Often patients receive their diagnosis and do not seem aware of how susceptible they are to other health issues. This is something I have personally witnessed in diabetes clinics, highlighting the importance in our role to educate patients in a holistic manner.

Dietetic intervention should be patient-centred with practical food suggestions that are easy for patients to implement. Cooking skills, socioeconomic circumstances and preferences should all be considered. For those with diabetes, continuous glucose monitoring could also be used to potentially aid adherence to low-GI diets.[1] If a patient has pre-existing type 2 diabetes and is taking a mixed insulin regimen, it is important that their meal pattern aligns with their insulin doses also. This will require a thorough review of their current lifestyle, along with practical food suggestions that they can easily implement.

INOSITOL SUPPLEMENTS

Inositol supplements show the most promising findings with improvements in insulin sensitivity and reduced androgen levels.[18,19] Inositol is a naturally occurring sugar that plays a role in many important bodily functions, including insulin sensitivity, cell signalling and hormone production.[20] Many meta-analyses have found improvements in hyperinsulinaemia

Figure 2: Factors influencing symptoms of PCOS[20]



and carbohydrate metabolism after inositol treatment, when compared with placebo.[21,-23] Interestingly, a recent meta-analysis found no significant difference in benefits between myo-inositol supplements and metformin in terms of their effects on BMI, fasting insulin and fasting blood sugar.[24] However, metformin remains the predominant treatment.

Inositol supplements are generally safe and well-tolerated; however, side effects, such as nausea and diarrhoea, may occur, which needs to be considered if a patient decides to take them. It is, therefore, important that patients consult with their GP prior to taking inositol.[20]

PSYCHOLOGICAL

Prior to suggesting lifestyle changes, it is important to note a patient's psychological state, as those with PCOS have higher rates of anxiety and depression.[21] Women with PCOS have a higher prevalence of binge eating disorder (BED) than the general population, ranging from 12% to 39%.[1,25] As a consequence of poor emotional well-being, PCOS patients also have higher rates of clinical and subclinical sleep disturbance. Lack of sleep may subsequently limit their ability to make a positive lifestyle change, as their motivation will likely be reduced. Optimising sleep and emotional well-being through lifestyle changes may aid symptom management for PCOS by improving hormone balance. However, research exploring the efficacy of such interventions is lacking.[20] This should of course be considered alongside other lifestyle factors such as alcohol intake, attitude towards health, socioeconomic circumstances and any vitamin and mineral supplements (see Figure 2).[20]

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MEDICATIONS

Additional pharmacological treatment will likely be required in those with a higher BMI to increase the sustainable efficacy for weight loss. It has previously been suggested that metformin might reduce weight via alterations to appetite regulatory pathways in the brain;[26] however, the mechanism behind this is unknown and requires more research. Nevertheless, metformin's therapeutic benefits underscore its role as a valuable adjunct in the holistic management of PCOS.

A recent systematic review found significant benefits of metformin on anthropometric and metabolic outcomes when compared with placebo.[26] Current guidelines state it should be considered for those with a BMI of $\geq$25kg/m^2.[5] Metformin's multifaceted advantages include improved insulin sensitivity, reduction in hyperinsulinaemia and subsequent mitigation of hyperandrogenism.[26] It has also been shown to regulate menstrual cycles and may aid in ovulation induction in PCOS patients trying to conceive, making it a valuable tool for addressing both metabolic and reproductive aspects of PCOS.[27]

Key knowledge gaps remain regarding metformin's efficacy in this population. It is essential to recognise that this should be used as part of a comprehensive treatment plan tailored to individual patient needs, and potential side effects should be carefully monitored.[28]

CONCLUSION

In conclusion, PCOS-induced hyperinsulinaemia can be effectively managed through dietary modifications that focus on low-GI foods, weight control, and potentially the use of metformin and specific supplements. Dietitians play a crucial role in tailoring nutrition plans that address these factors to improve insulin sensitivity and overall well-being in individuals with PCOS. Exploring factors such as gut microbiota, genetics and lifestyle choices would provide valuable insights into future potential interventions. The longer-term effect of a low-GI diet on hormonal balance, weight management and weight parameters in women with PCOS could also be explored.