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Review Article

Lifestyle Medicine Encompassing Scientific Exercises and Right Diet-The Key To Prevent And Reverse PCOS/PCOD (Poly Cystic Ovarian Syndrome/Polycystic Ovarian Disease)

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ABSTRACT

Polycystic ovary syndrome (PCOS) is of clinical and public health importance as it is very common, affecting up to one in five women of reproductive age. It has significant and diverse clinical implications including reproductive (infertility, hyperandrogenism, hirsutism), metabolic (insulin resistance, impaired glucose tolerance, type 2 diabetes mellitus, adverse cardiovascular risk profiles) and psychological features (increased anxiety, depression and worsened quality of life). Obesity worsens the presentation of PCOS and weight management (weight loss, maintenance or prevention of excess weight gain) is proposed as an initial treatment strategy, best achieved through lifestyle changes incorporating diet, scientific exercises and behavioral interventions.

INTRODUCTION

With regards to fertility, the estimated cost per birth in overweight Australian women with PCOS is high [1]. Promisingly, lifestyle intervention comprising dietary, exercise and behavioral therapy improve fertility and reduce costs per birth significantly. Genetic and environmental contributors to hormonal disturbances combine with other factors, including obesity, ovarian

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dysfunction and hypothalamic pituitary abnormalities to contribute to the aetiology of PCOS [2].The aetiology of PCOS is unknown although abnormalities in steroidogenesis (the production of steroid hormones such as reproductive hormones) and gonadotrophin action (the action of hormones that control reproductive hormone production) are implicated [3] .Treatment aims in PCOS include optimizing healthy weight, improving underlying hormonal disturbances, prevention of future reproductive and metabolic complications, and improving quality of life. Lifestyle interventions (dietary, exercise, behavioral or combined) are recommended as first-line management in an international evidence-based guideline on PCOS [4]. Despite the high prevalence of PCOS, a strong rationale for lifestyle intervention and the fact that lifestyle intervention is recommended as first-line treatment in women with PCOS who are overweight, the literature in this area is limited and challenging to interpret. There are a large number of small, uncontrolled trials demonstrating that weight loss achieved through lifestyle management decreases abdominal fat, hyperandrogenism and insulin resistance, and improves lipid profiles, menstrual cyclicity, fertility and risk factors for type 2 diabetes and cardiovascular disease in overweight women with PCOS [5].Menstrual regularity (an initiation of menses or significant shortening of cycle length where possible), ovulation (number of ovulatory menstrual cycles where possible)[6]. Endocrine (total testosterone, sex hormone-binding globulin (SHBG), free androgen index (FAI) and clinical hyperandrogenism (hirsutism assessed clinically by Ferriman-Gallwey score) [7].

For dichotomous data, we used the number of events in the control and intervention groups of each study to calculate a Peto odds ratio (OR). For continuous data, we calculated a mean difference (MD) between treatment groups if all studies reported exactly the same outcomes. If similar outcomes were reported on different scales, we calculated the standardized mean difference (SMD). We presented 95% confidence intervals (CI) for all outcomes. The primary analysis was per women randomized. J.P. Higgins*etal.,* reported data that did not allow valid analysis (for example 'per cycle' rather than 'per woman' where women contributed to more than one cycle) in an additional table and did not meta-analyse these data [8].

A variety of balanced dietary approaches to reduce dietary caloric intake and a gradual increase in physical /scientific exercises are recommended to accomplish weight loss. Several previous studies have endeavored to improve the lifestyles of patients with PCOS using various methods, such as diet, exercise therapy, and behavioral therapy. Consequently, a previous review reported that lifestyle modification programs were observed to affect weight loss or BMI among PCOS patients with or without obesity [9]. The lifestyle modification program was divided into two groups: monotherapy with diet or exercise and combination therapy involving diet and exercise (hereinafter referred to as combination therapy). Regarding the type of intervention program used by the studies, more people used monotherapy with diet, few employed monotherapy with exercise, and many members studies used combination therapy [10].

DISCUSSION

" How right diet becomes the medicine for PCOS"

Analysis of the impact of lifestyle modification related to the share of energy from macronutrients (protein, fat, and carbohydrates) showed no significant differences in the levels of the analyzed parameters. However, a significant factor in these changes was the reduction in the caloric content of the diet [11] and the introduction of a reduced-calorie diet with a low GI [12].

Low GI (LGI) diets decreased homeostatic model assessment for insulin resistance (HOMA-IR), fasting insulin, total and low-density lipoprotein (LDL) cholesterol, triglycerides, waist circumference, and total testosterone compared with high GI (HGI) diets without affecting fasting glucose, HDL cholesterol, weight, or the free androgen index [13]. In addition, the inclusion of the LGI diet, punitive restrictions, and/or physical activity, and the supplementation of omega-3 increased HDL, sex hormone binding globulin (SHBG) synthesis, and reduction in body fat [14].

Gonzales et al. found that saturated fat acid (SFA) ingestion stimulates increases in circulating TNF-α and peripheral leukocytic suppressor of cytokine-3 (SOCS-3) expression [15]. Therefore, eliminating SFA from the diets of these patients is imperative. Dietary α-linolenic acid-rich flaxseed oil exerted beneficial effects on polycystic ovary syndrome through the sex steroid hormones–microbiota–inflammation axis in rats, but other sources of α-linolenic acid will probably produce an equally good effect. The effects of soluble dietary fiber on SCFAs were demonstrated. Fermentable fiber has positive metabolic benefits on the gut microbiome with subsequent release of SCFAs [16]. Diets with a low GI may influence appetite-regulating hormones including ghrelin and glucagon [17]. Low-GI meals reduced ghrelin and increased glucagon in women with PCOS [18]. High fructose consumption (HFC) synergistically aggravated endocrine but not metabolic changes in PCOS, suggesting that (HFC) might deteriorate endocrine-related phenotypes in PCOS. A meta-analysis and systematic review showed that the LGI diet is an effective, acceptable, and safe intervention for relieving IR, and professional dietary advice should be offered to all PCOS patients [19].

It seems that another reduced-GI diet modification is the ketogenic diet, which limits the consumption of total carbohydrates in favor of plant-based fat. The ketogenic diet (KD) improves the menstrual cycle, reducing blood glucose and body weight, improving liver function, and treating fatty liver in women with PCOS and liver dysfunction who were obese [20]. Even more interesting results were reported by Paoli et al. after using the KD for 12 weeks in women with PCOS [21]. The anthropometric and body composition measurements revealed a significant reduction in body weight (−9.43 kg), body mass index (BMI; −3.35), and fat-free body mass (8.29 kg). A significant decrease in glucose and insulin blood levels was observed, together with a significant improvement in HOMA-IR scores. A significant decrease of triglycerides, total cholesterol and LDL were observed along with a rise in HDL levels. The LH/FSH ratio, LH total and free testosterone, and DHEAS blood levels were also significantly reduced. Estradiol, progesterone and SHBG increased. The Ferriman Gallwey Score was slightly, although not significantly, reduced [22].

There was no significant association between parameters of hirsutism and the visceral adiposity index (VAI). Hirsutism is unlikely to be due to visceral adipocyte dysfunction [23]. Therefore, in PCOS patients with advanced obesity and/or obesity accompanied by full-blown metabolic syndrome, the introduction of a ketogenic diet may provide even better results than a diet with a LGI. Nonetheless, a general conclusion is that by following the main principles of a healthy diet, the physiological homeostasis can be managed, as well as faster recovery from disease achieved [24].

“How scientific exercises becomes the medicine for PCOS”

1. **Reduces risk of diabetes-**
   Having PCOS can significantly influence your insulin sensitivity. Exercise will improve your response to insulin. Betterment in insulin management helps reduce the risks of diabetes.

2. **Releases endorphins-**
   Having PCOS can make you prone to depression and various other mood disorders due to hormonal imbalances. Exercising regularly results in the release of endorphins and various other happy hormones that lower your risks of developing mood disorders & depression.
3. **Help manage cholesterol-**
   Most women with PCOS have high cholesterol and High cholesterol can significantly affect our metabolism. Exercises will keep your cholesterol under check.
4. **Lowers risk of cardiovascular diseases-**
   Besides high cholesterol, women with PCOS are also at a higher risk of developing high blood pressure and more chronic heart-related diseases. Exercise, in general, improves our heart health and makes us less prone to various heart related diseases.
5. **Promotes weight loss-**
   Weight gain will cause or worsen PCOS. Exercising consistently will help you lose weight and Weight loss will also help you lower your risks of other diseases discussed above.
6. **Helps manage hormones-**
   PCOS cause's hormonal imbalance which can be easily managed and improved through regular exercise. Exercising will help lower insulin and estrogen.

The clinical phenotypes can change over the life span with weight gain and can coexist in the same patient. Individualized treatment remains the main approach, but grouping the phenotypes and following therapeutic recommendations may also prove to be clinically suitable [25]. Vitamin D indirectly influences carbohydrate metabolism by normalizing extracellular calcium and parathyroid hormone concentration. It also affects the expression of the genes of the metabolic pathways affecting systemic inflammation by inhibiting the synthesis of pro-inflammatory cytokines, which may contribute to the occurrence of IR [26].

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CONCLUSION

PCOS is often a warning sign that your body is no longer as sensitive to insulin as it should be. And while medication may help this, these come with unwanted side effects and don't really address the root cause – an unhealthy lifestyle causing insulin resistance. Lifestyle changes are the key to reversing & preventing PCOS. Losing weight will not only reduce insulin and androgen levels, it will also restore normal ovulation. Leading a healthy lifestyle that depends on eating a clean, healthy LCHF diet and focuses on getting regular scientific exercises to improve insulin-sensitivity is a long-term fix that will also improve your odds of getting pregnant naturally, counter obesity and also will regulate the periods and help you enjoy hormonal balance permanently. A healthy lifestyle will not only fix insulin resistance, it also improves quality of life, making you feel stronger, fitter, healthier and more at peace, finally helps fight, prevent& reverse PCOS effectively.

REFERENCES

1. Clark, A.M., Thornley, B., Tomlinson, L., Galletley, C. and Norman, R.J., 1998. Weight loss in obese infertile women results in improvement in reproductive outcome for all forms of fertility treatment. Human Reproduction (Oxford, England), 13(6), pp.1502-1505.
2. Legro, R.S. and Strauss III, J.F., 2002. Molecular progress in infertility: polycystic

ovary syndrome. Fertility and sterility, 78(3), pp.569-576
3. Hoeger, K.M., Dokras, A. and Piltonen, T., 2021. Update on PCOS: consequences, challenges, and guiding treatment. The Journal of Clinical Endocrinology & Metabolism, 106(3), pp.e1071-e1083.
4. Teede, Helena J., Marie L. Misso, Jacqueline A. Boyle, Rhonda M. Garad, Veryan McAllister, Linda Downes, Melanie Gibson-Helm et al. "Translation and implementation of the Australian-led PCOS guideline: clinical summary and translation resources from the International Evidence-based Guideline for the Assessment and management of polycystic ovary syndrome." Medical journal of Australia 209 (2018): S3-S8.
5. Goodpaster, B.H., Kelley, D.E., Thaete, F.L., He, J. and Ross, R., 2000. Skeletal muscle attenuation determined by computed tomography is associated with skeletal muscle lipid content. Journal of applied physiology, 89(1), pp.104-110.
6. Marzouk, T.M. and Ahmed, W.A.S., 2015. Effect of dietary weight loss on menstrual regularity in obese young adult women with polycystic ovary syndrome. Journal of pediatric and adolescent gynecology, 28(6), pp.457-461.
7. Sheikh, I.A., Turki, R.F., Abuzenadah, A.M., Damanhouri, G.A. and Beg, M.A., 2016. Endocrine disruption: computational perspectives on human sex hormone-binding globulin and phthalate plasticizers. PloS one, 11(3), p.e0151444.
8. Higgins, J.P., Altman, D.G., Gøtzsche, P.C., Jüni, P., Moher, D., Oxman, A.D., Savović, J., Schulz, K.F., Weeks, L. and Sterne, J.A., 2011. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. Bmj, 343.
9. Lim, S.S., Hutchison, S.K., Van Ryswyk, E., Norman, R.J., Teede, H.J. and Moran, L.J., 2019. Lifestyle changes in women with polycystic ovary syndrome. Cochrane Database of Systematic Reviews, (3).
10. Alqarni, A., Manlapaz, D., Baxter, D., Tumilty, S. and Mani, R., 2018. Test procedures to assess somatosensory abnormalities in individuals with neck pain: a systematic review of psychometric properties. Physical Therapy Reviews, 23(6), pp.301-316
11. Faghfoori, Z., Fazelian, S., Shadnoush, M. and Goodarzi, R., 2017. Nutritional management in women with polycystic ovary syndrome: A review study. Diabetes & metabolic syndrome: Clinical research & reviews, 11, pp.S429-S432.
12. Szczuko, M., Kikut, J., Szczuko, U., Szydłowska, I., Nawrocka-Rutkowska, J., Ziętek, M., Verbanac, D. and Saso, L., 2021. Nutrition strategy and life style in polycystic ovary syndrome—Narrative review. Nutrients, 13(7), p.2452.
13. Szczuko, M., Kikut, J., Szczuko, U., Szydłowska, I., Nawrocka-Rutkowska, J., Ziętek, M., Verbanac, D. and Saso, L., 2021. Nutrition strategy and life style in polycystic ovary syndrome—Narrative review. Nutrients, 13(7), p.2452.
14. Malik. T.H., Ali. H., Hassan. A., Qayyum. J and Naseem.A., 2021. . Pharmacotherapy and Neoteric Dietary Approaches for Polycystic Ovary Syndrome: A Systematic Review. Turkish Journal of Endocrinology & Metabolism, 25(1).
15. González-Becerra, K., Ramos-López, O., Barrón-Cabrera, E., Riezu-Boj, J.I., Milagro, F.I., Martínez-López, E. and Martínez, J.A., 2019. Fatty acids, epigenetic mechanisms and chronic diseases: a systematic review. Lipids in health and disease, 18(1), pp.1-18.

16. Diao, P., Wang, X., Jia, F., Kimura, T., Hu, X., Shirotori, S., Nakamura, I., Sato, Y., Nakayama, J., Moriya, K. and Koike, K., 2020. A saturated fatty acid-rich diet enhances hepatic lipogenesis and tumorigenesis in HCV core gene transgenic mice. The Journal of Nutritional Biochemistry, 85, p.108460.
17. Hoover, S.E., Gower, B.A., Cedillo, Y.E., Chandler-Laney, P.C., Deemer, S.E. and Goss, A.M., 2021. Changes in Ghrelin and Glucagon following a Low Glycemic Load Diet in Women with PCOS. The Journal of Clinical Endocrinology & Metabolism, 106(5), pp.e2151-e2161.
18. Dougkas, A. and Östman, E., 2016. Protein-enriched liquid preloads varying in macronutrient content modulate appetite and appetite-regulating hormones in healthy adults. The Journal of nutrition, 146(3), pp.637-645.
19. Shang, Y., Zhou, H., Hu, M. and Feng, H., 2020. Effect of diet on insulin resistance in polycystic ovary syndrome. The Journal of Clinical Endocrinology & Metabolism, 105(10), pp.3346-3360.
20. Li, J., Bai, W.P., Jiang, B., Bai, L.R., Gu, B., Yan, S.X., Li, F.Y. and Huang, B., 2021. Ketogenic diet in women with polycystic ovary syndrome and liver dysfunction who are obese: A randomized, open-label, parallel-group, controlled pilot trial. Journal of Obstetrics and Gynaecology Research, 47(3), pp.1145-1152.
21. Paoli, A., Mancin, L., Giacona, M.C., Bianco, A. and Caprio, M., 2020. Effects of a ketogenic diet in overweight women with polycystic ovary syndrome. Journal of translational medicine, 18(1), pp.1-11.
22. Singh, S., Singh, K. and Singh, M., 2010. Anthropometric measurements, body composition and somatotyping of high jumpers. Brazilian Journal of Biomotricity, 4(4), pp.266-271.
23. Mooney, S.J., Baecker, A. and Rundle, A.G., 2013. Comparison of anthropometric and body composition measures as predictors of components of the metabolic syndrome in a clinical setting. Obesity research & clinical practice, 7(1), pp.e55-e66.
24. Szczuko, M., Kikut, J., Szczuko, U., Szydłowska, I., Nawrocka-Rutkowska, J., Ziętek, M., Verbanac, D. and Saso, L., 2021. Nutrition strategy and life style in polycystic ovary syndrome—Narrative review. Nutrients, 13(7), p.2452.
25. Lobo, R.A. and Carmina, E., 2000. The importance of diagnosing the polycystic ovary syndrome. Annals of internal medicine, 132(12), pp.989-993.
26. Dokras, A., 2008, January. Cardiovascular disease risk factors in polycystic ovary syndrome.In Seminars in reproductive medicine (Vol. 26, No. 01, pp. 039-044).© Thieme Medical Publishers.
27. Szczuko, M., Zapałowska-Chwyć, M., Drozd, A., Maciejewska, D., Starczewski, A., Wysokiński, P. and Stachowska, E., 2018. Changes in the IGF-1 and TNF-α synthesis pathways before and after three-month reduction diet with low glicemic index in women with PCOS. Ginekologiapolska, 89(6), pp.295-303.

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