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Effect of Aerobic Exercise on Polycystic Ovarian Syndrome: A Narrative Review

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***Abstract*: *Purpose:* Polycystic ovarian syndrome is a hormonal disorder that occurs in female during reproductive age. It is characterized by irregular menstrual periods, hyperandrogenism and multiple cyst ovaries. PCOS leads to metabolic, psychological and reproductive risks by increasing obesity. The first line of treatment of PCOS is lifestyle intervention which includes diet, exercise and behavioral management. This review of articles discusses the use and effects of aerobic exercises in polycystic ovarian syndrome to motivate self- management and adherence to exercises. *Methods:* Many electronic databases were searched such as google Scholar, and PubMed. The articles which were showing the effects of exercises especially aerobic on Polycystic ovarian syndrome with other interventions from year 2018 to 2023 were included. The project's prospects for future study are highlighted. *Results:* There is significant evidence that the exercises provided in polycystic ovarian syndrome, seems beneficial in females. The advantages include its convenience and accessibility, health and lifestyle management, adherence and compliance of exercise and quality of life. *Conclusion:* These reviewed articles showed that there are limited studies in India that showed the effect of the exercises, mainly aerobic, approach in treating women with polycystic ovarian syndrome. It promotes self- management and adherence to exercises. So thus, exercises tend to decrease the risks and complications in PCOS.**

***Keywords*: polycystic ovarian syndrome, exercises, aerobic exercise.**

1. Introduction

Polycystic ovary syndrome (PCOS) is the most common disorder that is defined as a combination of signs and symptoms of excess androgen and ovarian dysfunction with the clinical manifestations of oligomenorrhoea (abnormal menstruation), subfertility, hirsutism (unwanted male pattern hair growth in females) and acne. [1] It is the endocrine disorder in females' reproductive age. PCOS affects premenopausal women, and the age of onset is most often perimenarchal; and is associated with clinical, social and psychological problems. [2]. The underlying cause of PCOS is unknown. The genetic basis being suspected are Autosomal dominant – first degree males symptoms, Twin studies, Dysregulation of CYP 11a gene, Upregulation of other enzymes in androgen synthesis pathway, insulin receptor gene on chromosome 19p13.2 and decreased sex hormone binding globulin (SHBG). And there are also predisposing factors such as family history of PCOS, high maternal androgen, onset of type 1 diabetes mellitus before menarche, Insulin resistance, Obesity and Drugs e.g. valproate [3].

The pathophysiology of PCOS in 50-70% cases is due to Insulin resistance with resultant hyperinsulinaemia (caused by obesity) and causes for increased Androgen level is mainly due to increased frequency of GnRH pulses, so LH rises; Insulin stimulates theca cells with LH to produce androgens and Insulin also synergistically act with androgens to decrease hepatic production of SHBG, thus increasing free or active testosterone [4]. Pathology displays Ovaries that are usually 2-5 times the normal size, whitegray with a smooth outer cortex, and covered with subcortical cysts and Multiple cysts (>12) of 2-9 mm size are located peripherally along the surface of the ovary. The clinical features In PC0S are of menstrual dysfunction, Hyperandrogenism (Hirsutism/Acne), endocrine dysfunction (Insulin resistance/diabetes mellitus; Obesity; Acanthosis Nigricans), Infertility and miscarriages, Obstructive sleep apnoea, Metabolic syndrome, Endometrial neoplasia. The secondary complications are hypertension, cardiovascular diseases, depression, endometrial cancer and reduces health-related quality of life [5].

Investigations that help to diagnose PCOS includes ultrasound which allows visualization of any cysts which may be present on the ovaries or if there is any enlargement of one or both ovaries; and Hormonal Blood Tests that includes Hyperandrogenism testing for androgen levels, tests to detect female hormonal levels. Major criteria to diagnose PCOS can be made, if Polycystic Ovaries – 12 or more follicles are seen on one ovary or the size of one or both ovaries have enlarged, hyperandrogenism, and/or menstrual abnormalities [6].

Management in PCOS generally aims to lower body weight and insulin levels, restore fertility, restore regular menstruation, treat Hirsutism or acne, and prevent complications [7]. There is no such universal treatment available for PCOS, and is therefore individualized based on women's goals and severity of symptoms. For PCOS, there are conservative, medical and surgical treatment options available [8]. Medical treatment includes restoration of ovulation/menstruation by combined Oral Contraceptive pills which suppress gonadotropin release, reduce Androgen levels, induce regular menstrual cycles; Cyclic Progestogens; Intrauterine progestogen device, Insulin sensitizing agents, Insulin resistance/hyperinsulinaemia

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treatment (Metformin, Thiazolidinedione), fertility treatment (Clomiphene Citrate, Gonadotropin alone or with hCG), treatment of hirsutism by aGnRH agonists, antiandrogens. The surgical treatment is rarely done in reserved cases such as medical therapy fails, Hyperstimulation occurs, infertile women and previous pregnancy losses by resection of ovarian wedge, Oophorectomy, Laparoscopic ovarian drilling (laser electrocautery, multiple biopsy). Conservative treatment basically focus on encouraging Weight loss, diet modification, exercise and periodic screening for Dyslipidemia and diabetes mellitus [9].

Exercise training shows great improvement in 50% of the women with PCOS, by targeting menstrual irregularities and promoting ovulation. Weight reduction improves glucose intolerance which in turn could resolve the reproductive and metabolic derangements often associated with PCOS and may also reduce the pulse amplitude of LH thus reducing androgen production. Low back pain, sacral pain, and lower quadrant abdominal pain are also experienced in such women. Physiotherapy interventions seek to decrease the main symptoms of polycystic ovarian syndrome (PCOS) by addressing hormonal imbalances, obesity, and seeking to improve the quality of life for these women [11]. High Intensity Interval Training, Cardiovascular or aerobic training, and Resistance Training help increase heart rate, which have a positive impact on overall physiological effects on cardiovascular health and hormone regulation, including the androgen hormones and insulin sensitivity [13]. Physiotherapy electro modalities can also aid in the reduction of experienced symptoms in PCOS.

High Intensity Interval Training (HIIT) training is a fitness training, which consist of an exercises series which are performed at a fast paced to elicit both an aerobic and anaerobic response. Anaerobic HIIT is a highly desirable workout as it engages all muscle fibers, the fast twitch as well as the slow twitch, making it good for a complete training effect [14]. The benefits include improvements of glycemic control, aerobic capacity, insulin sensitivity, regulation in menstruation and hormonal profiles in females, and has also been shown to decrease stress, anxiety, and depression level. Aerobic training can include running, walking, and bike riding and help to alleviate the severity of PCOS symptoms. It is another effective way to help improve and decrease PCOS symptoms and reduce testosterone levels, waist circumference and increase functional capacity [15]. It has been found that it can also help improve menstrual cyclicity, Ferriman-Gallwey scores (used to score hirsutism), testosterone, sex hormone binding globulin (SHBG) levels and free androgen index score.

These exercise helps in restoring quality of life and improving fertility through inducing hormonal balancing, reducing inflammatory markers, fighting obesity, metabolic syndrome, and increasing immunity [16]. The benefits or the effects of exercises are decreasing the infertility risk; helps in reduction, even elimination, insulin resistivity (common in PCOS); improves basal metabolic rate (BMR); releases Endorphins (happy hormones) which normalize stress levels; aids fat loss and helps in maintenance of a healthy weight and helps bowels and remove toxins.

2. Research Question

- Are exercises effective in polycystic ovarian syndrome, mainly aerobic exercises?
- Does a polycystic ovarian syndrome patient accept exercise methods?
- Does exercises promote and help in self-management among patients with PCOS?
- Are aerobic exercise favours to treat patients with PCOS?

3. Methodology

The Review of the Literature has been made with the help of all those articles containing the words “exercises”, “aerobic exercise” and “Polycystic ovarian syndrome”. Google Scholar, and PubMed databases have been used for the article between 2018 and 2024. The articles drawn focused on the feasibility and different type of technologies used in treatment of PCOS. The use of exercises particularly aerobic, on women with PCOS and articles focusing on how they perceive different exercises for the treatment of PCOS were also taken into consideration.

4. Review of Literature

(Shele, et al., 2020) Compiled a systematic review of original research that was indexed in PubMed and included reported hormone levels before and after the exercise intervention, as well as the studies that found the exercises’ effect on PCOS-affected women. They defined that long-term, consistent aerobic exercise, when combined with heart rate and/or V02max monitoring, improved insulin measurements; in PCOS, resistance or strength training increased testosterone levels. Although there is little evidence on anti-Müllerian hormone. There have been few studies on yoga that have indicated increases in androgens. They came to the conclusion that one healthy lifestyle prescription for PCOS women is physical exercise [1].

(Helena et al., 2018) Using the best available data, a review of articles was conducted to create guidelines for the recommended examination and treatment of polycystic ovarian syndrome (PCOS). While preceding guidelines lacked patient participation or were out of date, this one offered 66 recommendations and practice points that addressed priority questions to encourage consistent, evidence-based care and improve the health outcomes and experience of PCOS women. In total, 37 societies and 71 nations participated in this process, which included six continental international advisory and project boards, five guideline development groups, and consumer and translation committees. A total of 76 clinical practice points, 59 clinical consensus recommendations, and three evidence-based recommendations are provided by the poor to moderately quality evidence used in the assessment and therapy. The majority involve accurate diagnosis, unnecessary testing, more lifestyle modification, and careful targeted management [2].

(Kim et al., 2022) Created a systematic review of data obtained through systematic search on various databases They

found that the group that changed their lifestyle significantly improved their menstrual periods and reproductive function, when compared to the control group. Fasting insulin levels were improved, when diet and exercise were combined, as opposed to when they were used alone. A lower weight reduction of at least 5% enhanced the metabolic index. They concluded that combination therapy along with lifestyle change is a viable therapeutic method that can be used to address obesity in PCOS patients, and that bigger sample sizes should be used in future research to create optimal treatment protocols [3].

(Shang et al., 2020) Conducted a systematic and meta-analysis on effect of diet on insulin resistance (IR) in PCOS with optimal and exact nutrition advice for clinical practice, and included total 19 articles (1193 participants). This demonstrated a substantial relationship between nutrition and improvements in IR and body composition in PCOS patients. When it came to weight loss (both BMI and weight), diet was just as helpful as metformin in this regard. It also had similar effects on insulin regulation and was correlated with the length of treatment—the longer the period, the better the improvement. According to their findings, nutrition is a safe, effective, and acceptable management for IR, and all PCOS patients should be provided with competent dietary counseling [4].

(Kelly et al., 2019) They compiled data on the impact of various forms of exercise on reproductive function and body composition in women with PCOS, they performed a systematic review and meta-analysis of randomized controlled trials (RCTS). They included ten RCTs (n=533) that tested the following interventions: resistance, aerobic, and mixed (aerobic/resistance) training regimens. They observed that there is moderate certainty evidence that aerobic exercise lowers body mass index (BMI) in PCOS women and low certainty evidence that exercise has little to no effect on reproductive hormones. This is because the majority of the studies were small, had short study span, and had negative effects on reproductive function. They came to the conclusion that there is little information to determine how exercise affects major health or reproductive functions in women with PCOS, and there is enough evidence that aerobic exercise alone can help lower BMI in these individuals [5].

(Hoeger et al., 2020) Created a peer-reviewed article that expanded on new findings in the literature after the 2018 guidelines - publications, with summarizing the key conclusions for diagnosis and treatment. Particular emphasis was placed on diagnosing patients at the extremes of the reproductive range. Topics of debate surrounding diagnosis in adolescence and perimenopause, as well as oral contraceptive kinds, were also mentioned. Reviewers can assist physicians and researchers better understand and guide patients with PCOS by highlighting the remaining obstacles in the PCOS condition's understanding and management [6].

(Wang et al., 2021) Conducted a randomized controlled experiment to assess the effects of a 6-month lifestyle intervention program on infertile women with PCOS and obesity (N = 87) versus infertile women without PCOS and obesity (N = 172). Aspects of the intervention included dietary adjustments, physical activity, weight effects, dropout rates, quality of life, and cardio-metabolic outcomes. The findings demonstrated that obese non-PCOS controls and infertile women with PCOS reacted to their lifestyle modification essentially equally and saw the same degree of improvement in markers of cardio-metabolism [7].

(Lianhong et al., 2022) Conducted a single-blind, Randomised controlled trial with 122 individuals who were chosen from the gynecological outpatient clinics of the affiliated hospital of Zunyi Medical University in Guizhou. A total of 61 individuals were randomly assigned to the intervention and control groups. Total 51 members of the intervention group enrolled in a TTM-based mobile health application program and got routine care, while 49 members of the control group were given routine care alone and finished the program. As it came to activity and changes in diet among PCOS participants, participants in the intervention group had statistically significant drops in their BMI scores after six and twelve months, respectively, as compared to the control group. It was thus demonstrated that over time, the TTM-based mobile health application program can help PCOS patients with their exercise and food adherence while also lowering their BMI, anxiety, and depressive symptoms [8].

(Chris et al., 2019) Designed a systematic review and meta-analysis in which 2390 articles were searched, out of which 27 papers from 18 trials were included which had an effective charge from baseline fasting insulin, total cholesterol, LDL cholesterol and triglycerides Exercise also improved V02 max, waist circumference and body at percentage when compared with usual care, lower BMI and resting heart rate were also revealed in post intervention analysis. Thus showed, better improvements, if supervised, and aerobic in nature and of short duration [9].

(Cowan et al., 2023) Reviewed the searches that examined the possible advantages of using a variety of traditional, complementary, and integrative medicine (TCIM) techniques, as well as psychological and sleep therapies, for the treatment of PCOS. The article focused new areas of lifestyle management for PCOs by analyzing and disseminating data on behavioral, dietary, and physical activity interventions as well as psychological, sleep, and TCIM strategies. It also helps healthcare providers offer patient-centered care by giving women greater freedom and, consequently, more control over their choice of treatment [10].

(Helena et al., 2023) They modified the 2018 guidelines once more, as the evidence for PCOS care and assessment has generally improved over the last five years, but it is still of poor to intermediate quality. Enhancing the identification of PCOS features (metabolic risk factors, cardiovascular disease, sleep apnea, high prevalence of psychological features, and high-risk status for adverse outcomes during pregnancy), they made significant updates on the optimization of diagnostic criteria, a streamlined algorithm, and the incorporation of anti Müllerian hormone levels as an alternative to ultrasound in adults. They also emphasized the need for increased healthcare professional education, better care models, and a continued emphasis on a healthy lifestyle, emotional well-being, and quality of life, with heightened awareness and emphasis on evidence-based medical

therapy and more affordable and safer fertility [11].

(Lucinda et al., 2019) Since there was little evidence previously available and it was inconsistently failing to fulfill the demands of patients in the healthcare system, a narrative review was created addressing the obstacles and enablers to the adoption of evidence-based lifestyle management with regard to PCOS. In order to effectively inform and implement strategies for the translation of the PCOS guidelines on lifestyle management, it brought attention to the necessity of doing focused study on the practices and expertise of PCOS healthcare practitioners [12].

(Arianna et al., 2020) Created a reviewed article to trace the natural history of glycemic alteration in women with PCOS, with inclusive and exclusive criteria. The prevalence of diseases such as impaired glucose tolerance, impaired fasting glucose, Type 2 Diabetes (T2D), and the progression from impaired glucose tolerance or impaired fasting glucose to T2D were the main foci of the research. A balanced diet and regular exercise stand as the primary treatment for PCOS. Incorporating insulin-sensitizing medications like metformin and inositols, alongside lifestyle changes, could potentially enhance the metabolic health of women with PCOS [13].

(Danielle Hiam' et al., 2019). In order to perform a three-arm, parallel-group, randomised controlled trial, sixty women with PCOS who were between the ages of 18 and 45 and had a BMI of more than 25 kg/m² were recruited. Women were randomly assigned to receive normal care or one of two 12-week supervised programs (HIIT or moderate intensity exercise). Measuring the gains in metabolic health—more especially, the variations in insulin sensitivity in response to varying levels of exercise intensity—was the main goal of this study. Greater metabolic benefits are shown by HIIT in PCOS, and it has been shown to be safe and acceptable. It may also be able to treat both general and particular PCOS hurdles [14].

(Rhiannon et al., 2021) Conducted a study to assess the impact of exercise interventions on the mental health or health-related quality of life outcomes of women with PCOS in their reproductive age. Primary outcomes included health-related quality of life and symptoms of anxiety and depression. After identifying and deeming 15 articles from 11 studies appropriate for inclusion, it was shown that exercise improved, health-related quality of life. Noticable reductions in symptoms of anxiety and depression were also observed by half of them [15].

(Jafari et al., 2019) Conducted a Quasi Experimental study to investigate the effects of a three-month aerobic exercised training course on inflammatory markers in women with PCOS. In 2018, a total of 24 Iranian women with PCOS diagnoses were randomized into two groups: 12 were placed in the experimental group and 12 were placed in the control group. The experimental group trained in aerobic activity for a duration of 12 weeks and the control group was only followed in the study Biochemical markers, including fasting blood glucose, insulin, interleukin-6 (IL-6), C-reactive protein (CRP) tumor necrosis factor-a (TNF-a) were measured in the two groups. Their findings showed that aerobic exercise is useful in management of PCOS and is highly recommended to perform as an appropriate modality to control PCOS and reduce its diverse effects [16].

(Elbandrawy et al., 2022) Conducted a Randomised controlled trial on the potential effects of aerobic exercise on Interleukin-6 (|L6), tumor necrosis factor (TNF), and C-reactive Protein (CRP) in PCOS women. They included 40 females aged 25-35 years diagnosed with PCOS and were divided into two groups equal in number: the aerobic exercise group (AEM), and the metformin group (M), for 12 weeks. They concluded that aerobic exercise is effective in lowering IL-6, TNF-a, and CRP in polycystic ovarian women [17].

(Ribeiro et al., 2019) Conducted a randomized controlled trial study to assess how two aerobic exercise regimens affected the quality of life of women with polycystic ovarian syndrome. Three groups of women were assigned in this study: the control group (n=30) received no training, the intermittent aerobic training group (n=29), and the continuous aerobic training group (n= 28). Testosterone levels, quality of life, and body composition indices were measured both before and after the 6-week intervention. They discovered that both protocols were successful in raising polycystic ovarian syndrome (PCOS) patients' testosterone levels, anthropometric indices, and quality of life. They also suggested that these protocols be used in clinical settings to enhance PCOS patients' psychological, biological, and social well-being [18].

5. Result

There is remarkable evidence that the exercises provided in treatment and rehabilitation of polycystic ovarian syndrome, are effective and are accepted among women with PCOS. Advantages include its efficacy, accessibility, adherence, and compliance, problem solving (symptoms relieving), preventing complications, increasing physical quality of life, of such patients. Physical exercises are well encouraged and accepted by women with PCOS alone or with other interventions too, such as diet, lifestyle modifications. This shows that aerobic exercises have the potential to address general and specific PCOS symptoms and seems beneficial if undergone in great supervision and advice according to the individual needs. Thus, women with PCOS should consistently perform different types of training exercise with appropriate time of duration.

6. Conclusion

This review article showed that there are limited studies in India which showed the effect of the aerobic exercise in treating individuals with Polycystic ovarian syndrome. It includes all the significant evidence-based practices and guidelines that helps to aid the problems and complications by maintaining hormonal imbalances, improvements in glycemic control, lowering body weight, restoring fertility and regular menstruation, treating Hirsutism or acne. Overall, it appears that aerobic exercises are particularly beneficial in raising the quality of life for women with polycystic ovarian syndrome. Lifestyle changes are essential for managing PCOS, improving overall health outcomes. Tailored exercise programs, combined with education, healthcare support, and technology, improve adherence. Adding pharmacological treatments helps in severe

cases, highlighting the need for a personalized, multidisciplinary approach.

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