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Research Paper

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A Study to Evaluate the Effectiveness of Aerobic Exercise on Prevention of Complications of Polycystic Ovarian Syndrome Among Young Women with PCOS at Selected Hospitals, Jaipur, Rajasthan.

Bhavana Bansal^{1*}, Dr. Rahul Sharma²

^{1*} Ph. D. Scholar (Nursing), Jaipur National University, Jaipur, Rajasthan, India

² Professor, Seedling School of Nursing, Jaipur National University, Jaipur, Rajasthan, India

***Corresponding Author: Bhavana Bansal**

*Ph. D. Scholar (Nursing), Jaipur National University, Jaipur (Rajasthan), Working Place – faculty of nursing, Shahnaj College of Nursing, Jaipur (Rajasthan). E mail – bhawana.bansal589@gmail.com

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ABSTRACT

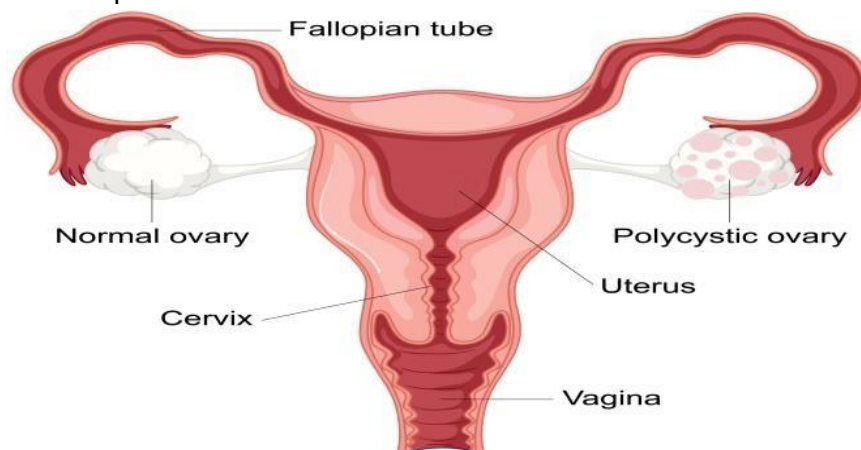
The present paper aims to examine the impact of aerobic exercise in preventing the complications of polycystic ovarian syndrome. A review of published literature will be conducted to determine the prevalence of PCOS and related morbidities in young women in Jaipur hospitals. An aerobic exercise program will be designed, and the participants will undergo the intervention. Afterwards, the results of this approach will be assessed in terms of preventing complications. The background characteristics of young women in Jaipur and how they affect exercise results will also be discussed. The study identifies that PCOS is common in Jaipur, with young women of reproductive age being most affected. It affects hormones, causing ovulation inhibition and several health issues. Aerobic exercise has the following advantages: Enhanced insulin responsiveness, proper hormonal balance, and enhanced heart health. Previous studies indicated that systematic exercise intervention is effective on PCOS symptoms. Measurements of outcomes will include hormonal levels, metabolic rate, reproductive functions, and quality of life indicators. The present research aims to understand how aerobic exercise can be better utilized to treat young women from Jaipur with PCOS. The study outcomes will be helpful in future attempts at offering targeted support to these women, which may positively affect their health.

Keywords: Polycystic Ovarian Syndrome, aerobic exercises, hormonal disorder, life style changes, cardiovascular issues, weight reduction.

Introduction

Polycystic ovary syndrome (PCOS) is a hormonal disorder commonly occurring in young women and might pose certain complications. This research aims to evaluate the role of Aerobic exercises in preventing these complications in Jaipur, Rajasthan. Previous studies indicate that PCOS could lead to several complications; they include menstrual disorders, infertility, insulin resistance, obesity, high cholesterol, anxiety, and clinical depression. Nevertheless, the effects of aerobic exercise in warding off these complications in young women with PCOS in this region are still up to some level of debate. To fill this gap, this study proposes to Determine existing complications, prescribe an aerobic exercise regime, and assess its efficiency in averting further complications.

This hormonal disorder called polycystic ovarian syndrome (PCOS) results in several health issues in young women. Although previous research has proposed that exercise has positive effects on young women with PCOS, the impact of aerobic exercise, in particular on complications in young women with PCOS in Jaipur, Rajasthan, has not been established. PCOS can pose various complications to a lady's health. It is essential to know how exercise interventions can reduce this complication in this population in particular in order to enhance their quality of life. The primary data collected during this study will be questionnaires completed by young women with PCOS in Jaipur before the exercise program to determine whether a structured aerobic exercise program helps prevent these complications.



Aim

The primary aim of this research is to evaluate the effectiveness of aerobic exercise in preventing complications associated with polycystic ovarian syndrome (PCOS) among young women in selected hospitals in Jaipur, Rajasthan.

Research Objectives

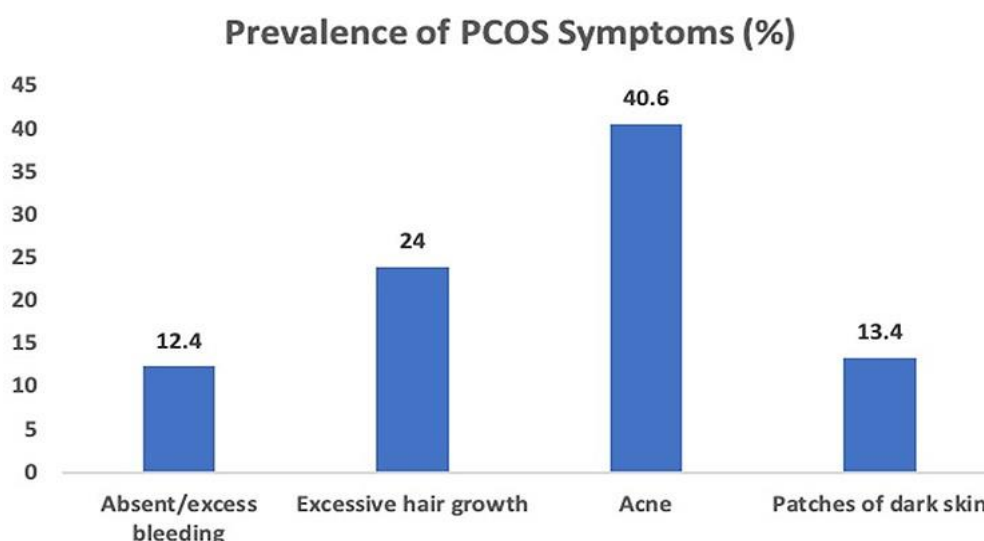
- To assess the complications of polycystic ovarian syndrome among young women before the intervention of aerobic exercise.
- To develop and administer an intervention of aerobic exercise for the prevention of complications of polycystic ovarian syndrome among young women.
- To determine the effectiveness of aerobic exercise in preventing complications of polycystic ovarian syndrome among young women after aerobic exercise intervention.
- To find out the association between post-test scores of aerobic exercises and selected demographic variables.

Main Body

Prevalence and Complications of Polycystic Ovarian Syndrome (PCOS)

Polycystic Ovarian Syndrome (PCOS) is an endocrine disorder that affects between 5–10 % of the female population of reproductive age. Jaipur is no different from other parts of India, and in alliance with this, many young women are affected by this ailment. Clinical and biochemical signs of Hyperandrogenism, Anovulation, and Polycystic Ovary morphology define PCOS. The PCOS complications are complex, and they involve fertility issues, abnormal menstrual cycles, excessive hair growth and acne, and metabolic issues like insulin resistance and cardiovascular disease. PCOS occurrence rates vary significantly and are estimated to affect as few as 2 women—22% to 26% internationally. For a few Asian nations, prevalence rates are as low as 2% to 7.5% in China and 6.3% in Srilanka¹.

The estimated prevalence rate of PCOS has been reported in the range of 8–13% among reproductive-aged women; it is estimated that 65% of women in India suffer from PCOS, out of which the Jaipur region has seen a rise in the past few decades. This syndrome interferes with ovulation and is highly responsible for infertility. PCOS has many associated conditions that affect a woman's wellbeing in various ways. Some of the influencing factors include Metabolic syndrome—This predisposes a person to type 2 diabetes². Heart diseases, high cholesterol levels and other cardiovascular diseases were also found to be more frequent. Some of the psycho-social issues that women with PCOS face include body image dissatisfaction, depression, and anxiety resulting from their symptoms. This study aims to help the understanding of PCOS prevalence and complications related to young women in Jaipur, Rajasthan, to help facilitate its diagnosis and management. This study proposes to focus on the aerobics exercise intervention to address these complications, which may provide an innovative, nonpharmacological approach to enhance the quality of life of women with PCOS in this part of the world. Shree Sumangal Polyclinic and Hospital, Narmada Hospital and Diagnostic Centre, and Jaipur Doorbeen Hospital are some of the clinics for the treatment of women with PCOS, which have been recommended⁷.

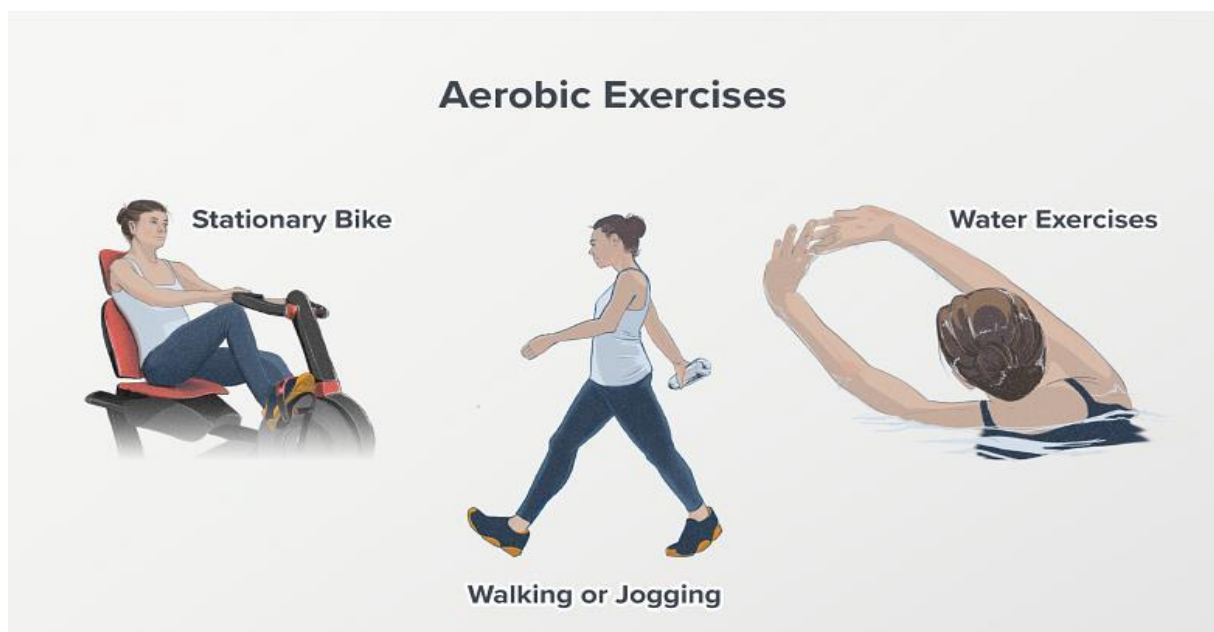


Psychological effects are also severe, with a heightened risk of experiencing anxiety levels, low mood, and a lower quality of life. The sweeping impacts highlighted that PCOS is a significant strain on both the healthcare sector and the subjects' well-being. The need for research on PCOS management is now more critical, given the long-term health risks that may be associated with PCOS if early intervention measures are not considered. The purpose of this research is to find out

the effectiveness of aerobic exercise as a non-pharmacological intervention for managing PCOS and subsequently enhancing the quality of life of young women in Jaipur diagnosed with this syndrome³.

Aerobic Exercise and Its Benefits

Aerobic exercise involves any physical activity that develops cardiovascular fitness by raising heart and breathing rates, including brisk walking, running, cycling and swimming. Evaluations have shown that such activities promote various health-related benefits, such as acceptable changes in cardiorespiratory fitness, lipids, and glycemic profiles. Consequently, these are some of the advantages that matter most to women with PCOS. Another is that increased aerobic exercise was an effective way to treat aspects of insulin resistance, another key feature of PCOS, as it had the potential to reduce androgen levels and encourage regular ovulation.



Yi Jin Jing is an integral part of TCE, founded on the TCM theory that concerns the balance of the whole body as the fundamental prerequisite of human health. However, there is no evidence of its benign impacts on treating PCOS to the present time. The main aim of this protocol is to compare the outcomes of aerobic exercise and Yi Jin Jing on the reproductive health of overweight/obese young women with PCOS⁹.

Exercise also triggers the production of those hormones known as endorphins that help in enhancing our moods. This can also help in reducing the symptoms of depression and anxiety, which are some of the complications likely to be witnessed in women with PCOS. Managing ovulation is one of the most sensitive tasks in PCOS. Aerobic exercises can also help to enhance the chances of ovulation and increase fertility. Exercise is beneficial, especially in overweight and obese women with PCOS, in that it helps in weight loss since excessive weight counteracts the hormonal balance and metabolism. Therefore, examining the possibility of aerobic exercise in preventing PCOS complications should offer a basis for approving recommendations for lifestyle changes, which could be incorporated into standard PCOS treatment plans⁴.

Impact of Aerobic Exercise on PCOS

Researchers have paid a lot of attention to the effects of aerobic exercise on PCOS. Various research has also shown that aerobic exercise contributes to improved menstrual cycles, ovulation rates and fertility in women with PCOS. Endorphins are released during training, and this has moodenhancing impacts. This can be useful in reducing the statistical prevalence of depression and anxiety in women with PCOS. These positive effects are considered due to alterations in hormonal levels, decrease in androgen anabolic concentrations and enhancements of insulin levels.

Hence, to prevent PCOS among young women in Rajasthan exercises that increase heart rate, which, in other words, makes your blood circulate or pumps, such as jogging, cycling, or swimming, will assist women with PCOS in reducing their insulin resistance and abdominal fat. Resistance training to develop lean muscle mass helps increase metabolism, and the content of muscles becomes more sensitive to insulin. Great bodyweight exercises to help women with PCOS build muscle tissue include weightlifting, push-ups, and lunges¹⁰. It is shown that by attending yoga sessions frequently, one can reduce stress and have a higher level of insulin sensitivity. They all benefit from flexibility, balance, and strength. Tabata is a specific kind of cardiovascular exercise known as High-Intensity Interval Training (HIIT), in which exercise is performed at a fast pace followed by a short rest period. This type of exercise helps reduce weight and improves tolerance to insulin. According to Dr Ashwini Bhalerao Gandhi, Gandhi Consultant Gynecologist at PD Hinduja Hospital and Medical Research Centre in Mumbai, Walking is an efficient low-impact exercise that can be done anywhere at any time without any equipment by walking at least for 30 minutes at a brisk pace five days a week¹⁰.

Intervention Studies and Methodologies

Intervention studies assessing aerobic exercise in PCOS have employed different study designs, such as observational, controlled, and **Randomized controlled trials** (RCTs). This is the gold standard for intervention studies. In the study design, you would select participants diagnosed with PCOS at random and divide them into two factions: the first faction, the intervention group, would undergo an aerobic exercise program, while the second faction, the control group, would receive standard treatment. Such changes being compared between groups would offer valuable evidence for aerobic exercise. These have primarily been based on exercise regimes, although the interventions have ranged from a few weeks to more than a year. The **Cohort study** entails the following approach: intervention and control of two groups at different periods among young women.

These included an evaluation of exercise frequency, the intensity and duration of exercise, the type of exercise, and exercise control for confounder variables. Developing an Exercise Program focuses on creating an aerobic exercise program suitable for young women with PCOS. Some variables include exercise intensity, duration of the exercise, frequency, and type/ kind of exercise, such as brisk walking, swimming, and cycling. Exercise physiologist consultation **Pedometers and exercise logs** should be used. Furthermore, evaluating the impact of the given intervention on extraneous factors such as insulin resistance, irregular periods, and other cardiovascular risks can also be important. They can do blood profiles, hormonal assays, and body composition assessments. Aerobic fitness should be evaluated with the help of a **VO2 max test**, and the program's course changes should be monitored. Outcomes have been varied, including

endocrine assessments, metabolic testing, fecundity and pregnancy research, and quality of life measurements¹¹.

Demographic Factors and PCOS Management

Age, SES and cultural background factors were found to be strongly associated with PCOS and its management. Studies have indicated that they affect compliance with exercise schedules, receipt of health facilities, and health statuses. For example, exercise preferences and the constraints on physical activity may vary from young women to older women. The age at which young women are diagnosed should be established, which will help in early identification and improve management results. **BMI (Body Mass Index)** is essential in controlling polycystic ovary syndrome or PCOS, which can help determine the effects of BMI on the responses to the aerobic exercise program.

Likewise, studies have shown that changes in body weight can be influenced by socioeconomic status because people with limited time or financial means or access to exercise equipment may not be able to engage in regular aerobic exercise. Healthcare access may patrol exercise participation and PCOS management regarding healthy food choices and gym membership inclusion. Several factors suggest that the ability to manage PCOS may depend on higher education levels, which may influence health literacy and self-care behavior. Moreover, it is significant to note that knowledge and attitude toward PCOS may be shaped in part by a woman's family history of the disease. Another biosocial characteristic that may affect the readiness of women for physical activity is a culture that defines physical activity and body image. The current research aims to identify the extent to which demographic factors affect aerobic exercise to reduce the effects of PCOS¹³.

Findings

Aerobic exercise impacts endocrine and metabolic function. Thus, hormonal, insulin sensitivity, and lipid variables are of interest. Reproductive health and menstrual function are also important topics for research and development since development in these areas would go a long way in increasing fertility and decreasing the risk of future complications.

It was established that 16% of the women respondents between the ages of 20–29 years have polycystic ovary syndrome⁶. Due to elevating incidences of unhealthy diet and reduced physical activity, polycystic ovary syndrome arises. However, it is necessary to note that the above data and figures are derived from a survey conducted in Chennai, and the prevalence rates of these illnesses in Jaipur may slightly differ. On the contrary Practo (2024), stated that exercise training has consistently been found to result in improved clinical outcomes in women with PCOS⁷. One of the main symptoms of PCOS is irregular or skipped periods, and this symptom can have a severe effect on reproductive function. According to research, PCOS is among the causes of infertility, as it impacts up to 70% of women who have it⁴. This means that carrying out management techniques for PCOS is crucial since it triggers physical and mental disorders. Research indicates that aerobic exercise is a promising intervention as it enhances insulin sensitivity, regularization of female cycles, and overall health status.

On the contrary, Bonab et al. (2023) mentioned that 12 weeks of aerobic exercise at home can reduce prolactin levels among girls with polycystic ovary syndrome ¹⁴. PCOS is diagnosed based on the meeting of the following criteria: oligo/amenorrhea, clinical and biochemical signs of hyperandrogenism, and polycystic ovaries on ultrasound. Some of the clinical symptoms associated with polycystic ovarian syndrome (PCOS), a common endocrine disorder, which is

prevalent among women of reproductive age bracket. Such statistics are also seen in Jaipur, Rajasthan, as a sizable portion of young women here suffer from the disease. Although PCOS is a reproductive disorder, its symptoms affect various aspects of life. It is also evident that women with PCOS have an increased susceptibility to type 2 diabetes mellitus, and insulin resistance is a hallmark of the disorder. Many cardiovascular risks, for example, hypertension, dyslipidemia, and obesity are also dominant in this population.

As stated by Abraham et al. (2022), cardiovascular and respiratory endurance tests are conducted to evaluate the benefits of aerobic exercise on cardiometabolic fitness¹. Body contouring and weight loss are considered to determine how exercise may help improve or prevent weight-related PCOS symptoms. Finally, six psychological and quality-of-life questionnaires are explored to determine how aerobic exercise improves mental health. In conducting the study, secondary data collected from selected hospitals in Jaipur to reveal the efficiency of aerobic exercise as a preventative measure against PCOS complications.

As opined by Woodward et al. (2022), menstrual abnormalities due to polycystic ovary syndrome hinder the normal rhythm of the menstrual cycle, and there are high rates of menstrual abnormalities¹⁵. The study established that infrequent periods, known as *Oligomenorrhea*, have risen to 42.3%, *Amenorrhea*, or the lack of period, has increased to 33.8%, and Amenorrhea, which is the absence of menstruation, has risen. In contrast, Hypermenorrhea, a heavy period, has been established at 23.1%⁵. These results depict an increased rate of menstrual problems because of PCOS in this segment.

PCOS is known to have relations to metabolic disorders; however, this can also severely affect mental state. This type of syndrome leads to higher rates of Depression, anxiety, and eating disorders. The psychological burden is often coupled with physical symptoms of the disease, including hirsutism, acne and obesity, which may cause psychological distress, especially about body image. According to demographics in Jaipur, the rate of this illness is approximately 21.9% of PCOS Among young women⁵. This shows that many young women in Jaipur could be suffering from PCOS based on the large number of cases researched.

As per the view of Patten et al. (2020), the management of PCOS recommend lifestyle intervention, including exercise training and diet, as the first line of therapy to improve general health, hormonal outcomes, and quality of life¹⁶. The aerobic exercise program also improved the cardiovascular and respiratory functions of the women who completed it. Changes in *VO2 max* scores evidenced this; these are indices of the total capacity of the body to use oxygen during vigorous physical activity. Cardiovascular endurance refers to the ability to deliver oxygenated blood to the muscles; thus, one of the elements that can be measured is VO2 max. Other researchers have estimated that an average VO2 max level is sufficient for good aerobic fitness. On the other hand, Low VO2 max indicates a higher risk of cardiovascular disease at an elevated risk for the development of cardiovascular disease, it is even more critical for young women with the condition to focus on improving their cardiovascular fitness²³.

Aerobic Exercise can effectively regulate PCOS among young women. Some exercises are lunges, bicep curls, crunches, and jumping jacks, examples of daily walks on a treadmill or the extreme outside. Join an aerobics class either online or at a nearby gym if available. The following are some examples of aerobic exercise spinning, boxing and dancing. Standard pulmonary function significantly influences aerobic fitness. Several researchers have suggested a relationship between enhanced lung capacity (FEV1) and better aerobic features. Some lung diseases reduce the level of exercise capacity. Conversely, the literature review findings indicate that people with mild asthma

can potentially enhance their aerobic fitness during exercise training. As stated by Purushothama et al. (2024), yoga asana and training related to aerobic exercise can be beneficial for college students with PCOS because they experience an elevated risk of cardiovascular diseases¹⁷.

Another area of focus was the overall impact of aerobic exercise on body composition and weight regulation. This was done by reducing mean BMI and fat percentage and improving lean body mass. These changes are apparent in a healthier body composition, which has been found to help manage symptoms of PCOS. Reduced body weight and BMI, especially with focusing on the fat loss in the abdominal area, is linked with better hormonal regulation and metabolic processes in women with PCOS. In contradiction to Woodward et al. (2020), women with PCOS are likely to have central obesity, which means that they have excess fat around their belly, and supervised exercise training required to control PCOS¹⁸. As for dietary approaches that should be helpful for a woman with PCOS, it should be noted that any diet leading to weight loss is beneficial. However, given the elevated risk of insulin resistance, low-carbohydrate and low glycemic index diets could be particularly effective. Lifestyle modifications, including diet and exercise, are recommended as an initial treatment for all infertile women with PCOS, and these guidelines apply to women between 19 and 37 years¹¹. These intervention plans were indeed working out pretty well for young women in Rajasthan to counter the problem of PCOS. It is not the amount of weight that is important but where that weight is distributed in the body.

It is also important to note that even small amounts of weight loss can confer substantial improvement for women with PCOS. Insulin resistance is common in PCOS, as indicated in secondary studies. Thus, it was posited that weight reduction enhances glycemic control. Losing weight is beneficial since it stabilizes various hormones, including testosterone, which is usually high in women with PCOS. This can, in turn, lead to ameliorating some signs, such as acne and hirsutism. Interestingly, weight loss affects the ovulation cycle and enhances the fertility rate in women experiencing infertility due to PCOS.

As indicated in the previous study, compliance with a low-calorie diet and increasing the amount of physical activity led to an average weight loss in young women with PCOS. This resulted in an enhancement of insulin sensitivity, menstrual cycle regularity, and testosterone concentration in the body. It is a drug that is mainly prescribed for treating type 2 diabetes but can also help women with PCOS lose weight and regulate insulin levels. It is often essential to individualize the type of diet and exercise program to be adopted. As illustrated by Thakur et al. (2021), adopting healthy lifestyles such as exercising and taking proper diets can improve health of women with PCOS and decrease precocious complications related to the disease¹⁹. The study has highlighted that obesity and a sedentary lifestyle compromise the health of young women with PCOS in Jaipur. Self-rated quality of life, anxiety, depression, and general health were also significantly better in the aerobic exercise group. On the contrary, Kiel et al. (2022), the women with lower levels of anxiety, depression and higher self-esteem have positive psychological effects due to changes in brain hormone levels following exercise or people's social interactions when exercising in groups²². The paper also points out that psychological interventions are as important as medical ones in PCOS treatment, and physical activity contributes significantly.

Irregular periods, acne, and excess hair growth can cause significant emotional distress. In addition, PCOS can lead to infertility, causing anxiety and depression. Misconceptions related to PCOS can lead to feelings of isolation and shame. Compared to healthy controls, women with PCOS often report lower scores on standardized QoL (Quality of Life Measures) assessments. Social functioning, emotional well-being, and physical health are usually negatively affected by PCOS.

Measuring depression, anxiety, and body image concerns can provide valuable insights. Tools like the **Beck Depression Inventory** (BDI) and **State-Trait Anxiety Inventory** (STAI) can be used. Standardized Quality of Life Measures assessments can be executed using the **Short Form-36 (SF-36)** to capture the overall impact of PCOS and potential improvements with interventions.

The second paper revealed that **Cognitive-behavioral therapy** CBT has the potential to reduce anxiety and depression symptoms in women with PCOS. Discussing one's experiences with other women going through similar difficulties might be equally beneficial to minimize loneliness. The earlier journal articles and articles found showed that the stress and the emotional state in women with PCOS can be managed with the help of mindfulness-based interventions such as meditation. Physical activity is understood to affect one's mood positively because of endorphin production. Your study can examine whether gains in psychological well-being result from the aerobic exercise programs. On the other hand, dietary changes form the basis of treatment in cases of obesity in PCOS as dietary changes such as reduced food intake, caloric restriction, and increased physical activity are encouraged²¹. Weight reduction and exercise before ovulation induction should address these unfavorable lifestyles.

Multiple cross-sectional studies have been performed on various populations of European, North American and Australian origin to examine the effectiveness of lifestyle modifications in women with PCOS. This was a randomized controlled trial (RCT) conducted on two sites in the USA, where the researchers sought to compare the effectiveness of preconception lifestyle intervention before ovulation induction in PCOS women. In addition, A 5% body weight loss may be considered clinically significant in America, while young women reduce weight and stop smoking or drinking in China³. The calorie-restricted diet, weight loss medication and physical activities were elements of the lifestyle modification, and the treatment duration was 16 weeks. Researchers found weight reduction after a lifestyle modification and better levels of ovulation¹¹.

Conclusion

The research carried out in some of the selected hospitals in Jaipur, Rajasthan, yielded significant findings that advocate incorporating aerobic exercise in managing young women with the symptoms of polycystic ovarian syndrome. Therefore, it is evidenced that a consistent aerobic exercise regime can improve hormonal balances, the number of menstrual cycles per year, sensitivity to insulin, BMI and cardiovascular risk. These outcomes have met the study aims and objectives that focused on examining the impact and efficacy of aerobic exercise as a complementary treatment for (PCOS).

The findings indicated that regular aerobic exercise can contribute significantly among women's lifestyle by managing hormonal imbalances, improving insulin sensitivity, and reducing the risk of cardiovascular issues which are associated with PCOS. By incorporating aerobic exercise into lifestyle interventions has been depicted as valuable strategy for the management of PCOS by enhancing psychological well-being and reducing the impact of periodical complications. These shortcomings suggest the need to conduct research with greater sample size, longer duration, and higher strength to confirm the findings and to analyse the impact of aerobic exercise in combination with dietary changes. The results provide helpful information to the literature on the management of PCOS, arguing that exercise procedures can be claimed to improve the quality of life of affected women.

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