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The Impact Of Physical Exercise And Lifestyle Changes On Polycystic Ovary Syndrome (Pcos)

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Summary
Objective: *this study aims to evaluate the impact of lifestyle changes on women diagnosed with polycystic ovary syndrome (pcos), investigating whether the level of physical activity is adequate as part of the treatment for this condition.*
Methodology: *this is a qualitative literature review, aimed at analyzing and synthesizing the information available on the clinical aspects of the complex polycystic ovary syndrome, as well as the effects of physical exercise on women's health. The scientific electronic library online (scielo), lilacs, medline, and pubmed databases were consulted.*
Results: *the regular practice of physical exercise has been shown to be effective as part of the treatment for pcos, often dispensing with the need for pharmacological interventions. As well as contributing to improved self-esteem, reduced depression and quality of life, exercise can also help regulate the menstrual cycle, treat infertility, and reduce hirsutism.*
Conclusion: *therefore, the inclusion of structured physical exercise (lasting at least30 minutes a day) or incidental physical activity (such as climbing stairs or walking) can play a significant role in motivating women with pcos to adopt a healthy lifestyle.*
Key words: *physical exercise; polycystic ovary syndrome; lifestyle; treatment.*

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I. Introduction

Polycystic ovary syndrome (PCOS) is one of the most prevalent endocrine-metabolic conditions among womenof reproductive age. It is characterized by a bilateral enlargement of the ovaries, accompanied by the presence of multiple follicular cysts. This endocrine disorder is marked by ovulatory dysfunction, and hyperandrogenism and can be associated with a series of metabolic, cardiovascular, psychological, and reproductive complications, the severity of which varies according to the individual characteristics of each patient. Women with PCOS often develop Metabolic Syndrome (MS) and face an increased risk of psychological complications such as stress, depression, and low self-esteem. In addition, insulin resistance (IR) and infertility are also common challenges associated with this condition, resulting in a significantreduction in quality of life[25-23-22-8].

The clinical manifestations of PCOS can vary throughout the patient's life, making diagnosis challenging, especially during adolescence, when hormonal fluctuations are not yet completely stabilized. To diagnose PCOS, different criteria have been proposed, including those established by the National Institutes of Health (NIH), the Rotterdam criteria,and the Androgen Excess Society (AE) criteria[19].

Although traditional pharmacological treatments are often prescribed, there is a growing appreciation of natural approaches, including lifestyle changes such as a balanced diet and regular exercise. These interventions are effective and are considered first-line treatments for women with PCOS. Adopting a healthy lifestyle, including smoking cessation, moderate alcohol consumption, a balanced diet, and regular physical activity, is

fundamental to managing the condition [24-10].

In addition to improving metabolic comorbidities and reducing the risk of complications related to androgen excess and reproductive changes, lifestyle modification can also be beneficial for women with PCOS who are overweight or obese, helping them to reduce their body weight and control associated metabolic comorbidities[31-2-3].

Although the importance of diagnosis is recognized, there is a significant gap in research into the role of physicalexercise in the treatment of PCOS, with few studies dedicated to this specific area[1].

II. Material And Methods

This is a review article with a qualitative approach aimed at analyzing and synthesizing the literature on the roleof physical exercise and lifestyle changes in polycystic ovary syndrome (PCOS). The articles were researched using the descriptors: "Polycystic ovary syndrome", "Physical activity and PCOS" and "Effect of the absence of physical activity in PCOS sufferers", obtained from the Health Sciences Descriptors (DECs) on the Virtual Health Library Portal. These descriptors were combined using logical operators and searched in the following databases: Scientific Electronic LibraryOnline: Scielo, Lilacs, Medline, and PubMed**.**

The data used in this research was made available in full through websites and electronic journals, so this research does not require an Informed Consent Form (ICF) and ethical appraisal under the terms of CNS Resolution 466/12. The inclusion criteria were: scientific articles made available in full, which were classified as research on human beings witha publication year between 2008 and 2021. The exclusion criteria were: materials other than scientific articles and monographs, as well as studies that were not in line with the selected theme.

The process of scientific research often begins with an extensive search for relevant information. In the case of this study, 150 scientific publications were initially found through Google Scholar. However, a significant part of this set, 100 publications, was excluded during the initial screening. This was because these publications did not adequately address the specific topic investigated in the study.

After excluding the irrelevant publications, 50 scientific articles were selected for a more detailed analysis. At this stage, the content of these articles was examined in detail to determine their relevance and contribution to the research in question. However, during this more detailed analysis, only 17 publications were considered suitable for the study.

These figures reflect not only the extent of the effort required to find pertinent information in a specific field but also the importance of careful screening and critical analysis during the scientific research process. Only a fraction of the publications initially identified as potentially relevant ended up being considered useful and appropriate for inclusion in the study in question. This rigor in the selection and analysis of scientific publications is fundamental to guaranteeing the quality and reliability of the results of any research.

Articles selected for the study, covering the journal, year of publication, objectives and their respective main results.

WORK	TITLE	YEAR	PERIOD	OBJECTIVE
1	Metabolic abnormalities in women with syndrome - obeseand non-obese	2011	Rey Bras Ginecol Obstet.	To compare the metabolic characteristics of obese and non-obese youngwomen from southeastern Brazil with polycystic ovary syndrome.
2	Effects of high-intensity interval training e detraining on the mental healthof women with polycystic ovary syndrome: randomized clinical trial	2021	UFRN Institutional Repository	To investigate the effects of high-intensity interval training (HIIT) and detraining on the quality of life and mental health of on the quality of life and mental health of women with PCOS, and to describe the psychophysiological responses throughout the sessions.
3	Analysis of the physiological effects of physical exercise in polycystic ovary syndrome	2018	DSpace	To analyze the physiological physiological effects of aerobic andresistance exercise in women with ovarian syndrome. (PCOS).
4	Effects of aerobic exercise on heart rate variability heart ratevariability in women with polycystic ovary syndrome	2013	UFNR Institutional Repository	To analyze the effect of aerobic physical training (ATT) on autonomic modulation heart rate variability (HRV) in women with ovarian syndrome. (PCOS).
5	Exercise to combat clinical manifestations and psychosocialimplications of polycystic ovary syndrome	2019	UFNR Institutional Repository	This literature review aimed to synthesize publications thathave addressed the effects of physical exercise or filister changes on the consequences of clinical (hyperandrogenism) and psychosocial (quality of life, anxiety, or depression) manifestations in adolescents with ovarian syndrome polycystic.

6	Exercise prescription for women with polycystic ovary syndrome: impact on cardiorespiratory fitness and affective response	2012	UFNR Institutional Repository	Analyze the effect of periodized aerobic training on cardiorespiratoryfitness and affective and affective responses in women withpolycystic ovary syndrome (PCOS) and to investigate whether aerobic exercise performed in the pleasure zone for this population in terms of intensity for improved health.
7	Diet and physical activity inthe treatment of polycystic ovary syndrome: an integrative review	2021	REVISA- Journal of Scientific Divulgation SenaAires	To investigate the importance of a healthy diet combined with physicalactivity to help treat polycystic ovary syndrome (PCOS).
8	Exercise therapy in polycysticovary syndrome: a systematic review	2010	Human Reproduction Update	Identify and evaluate interventions that evaluate exercise as a primary treatment in PCOS.
9	Polycystic ovary syndrome:clinical aspects and impacts on women's health	2021	Research, Society, and Development	To describe the clinical aspects of Polycystic Ovary Syndrome (PCOS)and its impact on women's health.
10	Exercise, or exercise and dietfor the management of polycystic ovarysyndrome: a systematic review and meta-analysis	2019	Systematic Reviews	To analyze evidence of physical exercise in the management of PCOS.
11	Structured exercise training Program versus hypocaloric hyper proteic diet in obese polycystic ovary syndrome patients withanovulatory infertility: a 24-week pilotstudy	2008	Human Reproduction	To compare the effectiveness of the reproductive functions of a structured physical training program with a diet program in obese patients with PCOS and tostudy their clinical, hormonal, and metabolic effects to elucidate potentially different mechanisms of action.
12	Exercise Interventions in Polycystic Ovary Syndrome: ASystematic Review and Meta-analysis	2020	Frontiers	To identify characteristics of exercise interventions that provide favorableresults in women with PCOS.
13	A Systematic Review of theEffects of Exercise on Hormones in Women with Polycystic Ovary Syndrome	2020	MDPI	To review the evidence on the impact of various exercise interventionson hormone levels in women with PCOS
14	Exercise for the treatment management of overweight women with polycystic ovary syndrome: a review ofthe literature	2011	Wiley Online Library	Rigorous studies are needed to determine specific exercise guidelinesthat will provide the greatest benefit for these women.
15	Effects of Aerobic Exercise on Rats with Hyperandrogenic Polycystic Ovarian Syndrome	2021	Hindawi	To evaluate aerobic exercise in women with Polycystic Ovary Syndrome.
16	Evaluation of clinical manifestations,health risks, and quality of life among women with polycystic ovary syndrome	2019	Plos One	This study aimed to evaluate the clinical manifestations and health risksassociated with polycystic ovary syndrome (PCOS) and its impact on quality of life (QoL) in Pakistan.
17	Polycystic ovary syndrome: clinicalaspects and impacts on women's health	2021	Research Society and Development	To describe the clinical aspects of Polycystic Ovary Syndrome (PCOS) and itsimpact on women's health.

III. Results And Discussion

Of the publications found by searching the previously established databases, only seventeen met the inclusioncriteria and could be analyzed for the study. Analyzing the articles selected, it was possible to see that polycystic ovarysyndrome (PCOS) is a very common endocrine disorder in women of reproductive age, with a prevalence of 9 to 18%,varying according to the diagnostic criteria used and the population studied. Although its etiology has not been fully clarified, it is known that environmental factors and genetic predisposition influence[25].

The first publication selected is a study aimed at comparing the metabolic characteristics of obese and non-obese young women from southeastern Brazil with polycystic ovary syndrome. The study showed that physical exerciseimproved several metabolic deficiencies typical of PCOS, including improved adipose tissue lipolysis, insulin resistance, serum lipids, and risk of cardiovascular disease. In addition, improvements in the

menstrual cycle were observed after the exercise intervention in obese and non-obese young women with PCOS.

The authors concluded that both aerobic and resistance exercise are extremely beneficial to health, improving various individual capacities, such as increasing systolic volume, decreasing heart rate at rest and during submaximal work, increasing aerobic power, increasing pulmonary ventilation, decreasing blood pressure, improving lipid profile, improving insulin sensitivity, improving the efficiency of lipid catabolism and metabolism, decreasing body fat, increasing muscle mass, increased muscle strength, increased bone density, strengthened connective tissue, improved joint mobility, improved posture, improved self-esteem, and body image, reduced stress, anxiety, depression, muscle tension and insomnia, improved mood, increased physical and mental disposition, reduced consumption of medication for hypertension and diabetes, insulin and tranquilizers, improved cognitive functions and also improved general organicfunctioning, providing physical fitness for a good quality of life.[12].

Physical exercise also plays an important role in treating the symptoms of PCOS. A common feature in womenwith PCOS is the presence of overweight and high central obesity, a condition that dramatically increases the occurrenceof increased insulin resistance[14]. Studies have shown that after six months of constant dietary exercise, women with obesity obtained a decrease in waist circumference, improved insulin sensitivity, a decrease in basal insulin, and a reduction in luteinizing hormone (LH), even with a low loss of total body mass.

Studies report that dietary changes reducing carbohydrate intake, alone or in combination with exercise, resultsin a 5-10% loss of body weight, a factor that could restore menstrual cycles. Weight reduction is also essential for improving both reproduction and the metabolic characteristics of PCOS. Weight loss normalizes ovulation, improves hyperandrogenism, and improves insulin sensitivity[15]. In another study analyzed it was observed that after 24 weeks ofaerobic exercise intervention, there was a reduction in the waist-to-hip ratio (WHR). This parameter refers to central obesity. In this study, walking was used as a form of exercise. In the first three months, the participants did the proposed activities three times a week, for a total of 20 minutes a day; in the following quarter, there was an improvement in respiratory capacity and an increase in the duration and frequency of the practice, to five times a week, lasting approximately 40 minutes a day. The authors of the study recommend 150 minutes of walking per week for the treatment of PCOS[17].

The first attempt to standardize training periodization for women with PCOS involved combining aerobic exercise such as walking and cycling with resistance training. The program was also associated with a comparison between nutritional counseling and nutritional counseling alone. After four months of intervention, the WHR decreasedby 5% and the percentage of body fat decreased by 12% in the group that practiced aerobic and resistance exercises. Also in this study, an important finding was observed about resting metabolic rate (RMR): the control group saw a 1% reduction in this variable, while the exercise group saw a 9% increase[4].

Other studies have looked at different parameters and intensities of aerobic exercise. It was analyzed that after12 weeks of an aerobic exercise program lasting 30 minutes, at an intensity of between 60 and 70% of VO2 max and three times a week, there was a reduction in BMI, waist circumference, WHR, as well as positive changes in fasting insulin levels and the glucose-insulin ratio.[30].

The combination of morphine, diet, and regular exercise has also been shown to be effective in the hormonal aspects of PCOS, reducing plasma testosterone levels caused by hyperandrogenism by around 4.5% and free androgen levels by 15%. Physical exercise also improves the ovulatory profile, due to the increase in insulin sensitivity, which reduces hypothalamic hormone pulses, allowing a decrease in the rate of circulating LH, providing a normal continuation of the menstrual cycle[7]. Physical exercise has been shown to improve several metabolic deficiencies typical of PCOS, including improved adipose tissue lipolysis, insulin resistance, serum lipids, and risk of cardiovascular disease. In addition, improvements in the menstrual cycle have been observed following exercise intervention in women with PCOS. Although some studies show reductions in body weight with exercise, several studies demonstrate that benefits can occur without weight loss and suggest that exercise for PCOS would be recommended even if weight loss was not achieved. Improvements in insulin resistance in this study were measured by euglycemic-hyperinsulinemic clamps. This study also found that 16 weeks of aerobic exercise improved sarcolemma-stimulated basal lipolysis in adipose tissue[18- 4.]

There is a wide variety of exercises that have been tested and suggested mainly to improve metabolic status inwomen with PCOS. A 6-month walking program has been shown to significantly reduce body image discomfort, although no change in BMI was observed in these patients due to the lack of focus on monitoring anthropometric measurements[11]. Most programs include some form of aerobic exercise, which can be walking, running, swimming, or cycling; others combine aerobic and resistance exercises such as weight training, and cross-fit, and some prescribe self-selected physical activities according to the patient's physical state.[11].

Despite the benefits of physical exercise in PCOS, there is still evidence available to demonstrate the isolated effects of aerobic and resistance activities on the psychological well-being of women with PCOS. However, existing research suggests that physical activity is a positive intervention for physical and mental health

for these women, with no results indicating an opposite or harmful impact. More studies are needed to understand the mechanisms that occur between mental health and physical activity for women with PCOS. There is also a need for more in-depth and structuredstudies to compare different types of physical activity, intensity, and frequency of physical activity in women with PCOSto improve the results obtained at the end of these prescriptions, including physical conditioning, well-being, quality of life, and to provide recommendations regarding the prescription of physical activity for these women.[28].

IV. Conclusion

Studies indicate that Polycystic Ovary Syndrome (PCOS) affects approximately one in ten women, increasing the risk of developing cardiovascular diseases, diabetes, psychological imbalances, and even infertility. Due to the complexity of the condition and the lack of consensus on the best pharmacological approach, lifestyle changes are emerging as a treatment option.

Although there is disagreement in the scientific community as to the ideal type, intensity, and frequency of exercise programs for women with PCOS, available studies suggest that regular physical activity should be encouraged and maintained over the long term to obtain effective results. However, more specific research is needed to understand the biochemical and metabolic mechanisms by which physical exercise influences the manifestations of PCOS.

Research into the combination of pharmacological treatment, dietary changes, and physical exercise is crucial fortargeting more specific interventions, to delay or prevent complications associated with PCOS.

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