Editorial

Progressive Resistance Training as Complementary Therapy for Polycystic Ovarian Syndrome

Treinamento de Resistência Progressiva como Terapia Complementar Para Síndrome de Ovário Policístico

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Polycystic ovarian syndrome (PCOS) significantly impacts women, since the broad spectrum of clinical manifestations associated with it are significant and include reproductive dysfunction, menstrual irregularities, and an increased risk of infertility. However, the consequences of PCOS go beyond the reproductive axis, with psychological and social impairments, including stress, depression, anxiety, and sexual dissatisfaction.[1] There is also a high prevalence of dyslipidemia, hyperinsulinemia, obesity, hypertension, and glucose intolerance, which are risk factors that predispose women to cardiovascular disease (CVD) and diabetes mellitus type 2 (DM2).[2] Therefore, PCOS assumes aspects of a chronic disease, as these factors extend throughout life. If not prevented and treated, they can lead to increased morbidity and mortality.[3] The etiology of PCOS has not been fully elucidated, but it is known to be linked to excess androgens.[4,5] Insulin resistance (IR) is a common feature of PCOS,[6] and although it is not considered a diagnostic criterion, it is a key factor in the syndrome's etiology and evolution.[7]

In 2008, the European Society of Human Reproduction and Embryology (ESHRE) and the American Society for Reproductive Medicine (ASRM) published a consensus suggesting lifestyle changes as the first line of treatment for women with PCOS.[8] This consensus was reinforced in 2009 by The Androgen Excess and Polycystic Ovary Syndrome Society,[9] which investigated evidence of lifestyle management (dietary, exercise, or behavioral interventions) for obesity in women with PCOS. Since then, the benefits of lifestyle changes resulting from PCOS therapy have been well documented.[10,11] The rationale for this non-pharmacological therapy is based on regular exercise and a healthy diet, as well as combined interventions that aim to achieve and maintain a healthy weight to minimize hormonal and reproductive complications, reduce the long-term risks of chronic diseases such as CVD and DM2, and consequently improve quality of life. In this way, weight loss has been considered the main goal of PCOS therapy in obese women.

Moderate- to high-intensity aerobic physical exercise[12] has been predominantly recommended as a treatment for PCOS.[13] Preliminary data from our group with an interval aerobic training protocol (exercises alternating in intensity from moderate to heavy effort with low-effort recovery periods) showed a decreased central obesity index measured by anthropometric measures and improved testosterone levels. However, other training programs, such as aerobic exercises, alone or in combination with resistance training, with or without dietary restriction, have also effectively reduced total and abdominal body fat or body fat percentile,[12,14–16] leading to improved menstrual frequency and/or ovulation,[12,17] reduced serum testosterone concentrations and fasting plasma glucose levels,[12] and improved insulin sensitivity.[18,19]

More recently, a review presented evidence that progressive resistance training (PRT), or strength training, may also be beneficial for women with PCOS, promoting changes in body composition and associated factors, especially IR.[20] However, this type of physical exercise has not been well explored in terms of its therapeutic purposes. Faced with the phenotypic characteristics of PCOS, we set out to perform a periodic protocol of resistance exercises in lean, overweight, and obese women with the intention of evaluating the results of this therapy. The PRT improved hyperandrogenism and the menstrual cycle, as well as the functional capacity with increased muscle strength, and resulted in changes in body

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composition with increased lean muscle mass and decreased central obesity, without a reduced total weight.[21] There were also improvements in quality of life and sexual function as complementary benefits.[22,23]

Evidence in the literature suggests that a PRT protocol associated with the practice of calisthenics (exercises that use the body's own weight as the primary tool) promoted significant changes in body composition, even with the increase of total weight and lean muscle strength in overweight and obese individuals. It also promoted improvements in several health-related domains, such as anxiety, depression, and quality of life.[24] There was also a significant improvement in body composition without reductions in the total weight of lean women, regardless of the type of training when high-intensity interval aerobic physical exercise and PRT were compared.[25] These studies are pioneers in the evaluation of PRT alone, in women with PCOS, and attest that strength training can be an excellent and effective exercise option.

The improvement in body composition, with little or no effective change in total body weight, may be related to the concomitance of the increase in lean muscle mass and reduced body fat promoted by this type of exercise.[26] The loss of fat mass is probably mediated by an increase in the basal metabolic rate that results from an increase in lean muscle mass, which is considered a metabolically active tissue that causes the body to increase its caloric expenditure.[27,28] This anabolic action adds to the improved insulin sensitivity,[27,29,30] since the skeletal muscles are predominantly involved in insulin-mediated glucose uptake,[31,32] while muscle contractile activity may stimulate the translocation of glucose transporter type 4 (GLUT4) molecules in the absence of insulin.[33,34] This is a key consideration for women with PCOS, since IR is implicated in the etiology of the disease.[6,7]

The obesity that affects most women with PCOS[35] is associated with reduced muscle strength, difficulties in postural control, and changes in the biomechanical behavior of the lower limbs,[36] and may be a limiting factor for some physical activities. In particular, those physical activities with a great cyclic impact, such as walking, running, and those that require great joint amplitude are affected by obesity, since the excess weight alone puts a significant amount of stress on the joints. In addition, rapid exhaustion due to reduced physical fitness and functional capacity, even with low physical effort, contributes to the non-compliance with this type of exercise. In addition to the aforementioned benefits, as a therapy for obese women, PRT improves daily functional capacity, increases resistance to joint impact, promotes muscle strengthening, reduces the risk of injury, and favors subsequent aerobic exercises[37] within the recommended levels.[12]

Intervention programs with aerobic training or strength training performed exclusively induce favorable adaptations in women with PCOS. Although aerobic exercises are more highly recommended, a consistent training protocol including aerobic and strength exercises, either in the same session or on alternate days, can be both efficient and capable of improving the variables of the components of physical fitness related to health, such as muscle strength, and of preventing loss of lean mass. This protocol can also improve disease-related characteristics, such as central obesity, hyperandrogenism, and insulin sensitivity.

Physical performance depends not only on the factors inherent to the suggested training program, but also on the degree of motivation for certain activities. With the proven effectiveness of the different physical training modalities, the possibility that it will provide personal satisfaction is increased, which can promote better adherence to the training program. Evidently, the positive effects of exercise may vary significantly among lifestyles as well as exercise program levels, such as intensity, frequency, and duration.[38] These should be prescribed individually by a physical educator with a focus on the expectations and motivations of women with PCOS and, above all, the safety of the proposed exercises. It is believed that therapeutic orientations based on non-pharmacological therapy may favor behavioral changes and the adoption of healthy lifestyle habits for women with PCOS.

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