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The efficiency of pelvic floor and core strengthening activities and their relationship to lower limb mobility in patients with polycystic ovarian syndrome

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Abstract

Objective: Polycystic ovarian syndrome (PCOS) is a common endocrine disorder in women of reproductive age, characterized by irregular periods, infertility, and metabolic issues. Women with PCOS often face lower limb movement challenges, affecting quality of life and increasing the risk of musculoskeletal disorders. While pelvic floor and core strengthening exercises have improved mobility in various populations, their effectiveness for women with PCOS remains underexplored. This study aims to assess the impact of these exercises on lower limb mobility in women with PCOS.

Method: A 12-week randomized controlled study involved women with PCOS aged 18 to 40, recruited from a gynecological outpatient clinic. Participants were assigned to either the experimental group, which performed pelvic floor and core strengthening exercises twice weekly, or the control group, which received no intervention. Lower limb mobility was assessed using the Lower Extremity Functional Scale (LEFS), and abdominal muscle strength and endurance were measured with the Curl Up Test.

Result: After 12 weeks, the experimental group showed significant improvement in both LEFS and Curl Up Test scores, indicating better functional status and increased abdominal strength and endurance. The control group had a decrease in LEFS scores but no notable change in the Curl Up Test**.**

Conclusion: The study highlights the benefits of pelvic floor and core strengthening exercises in improving lower limb mobility in women with PCOS. A 12-week intervention significantly enhanced functional status, abdominal strength, and endurance, leading to better mobility.

Keywords: Polycystic ovarian syndrome; Pelvic floor; Core strength; Lower limb mobility; Lower Extremity Functional Scale; Curl Up Test; Randomized controlled experiment

1. Introduction

Polycystic ovarian syndrome (PCOS) is a hormonal condition in women of reproductive age, marked by elevated androgen and insulin levels, leading to ovarian cyst formation.[1] PCOS, affecting 5-10% of women of reproductive age, is the most common endocrine disorder. Symptoms include irregular periods, acne, hirsutism, weight gain, infertility, mood swings, and an increased risk of diabetes, high blood pressure, and heart disease. Its cause is unclear but is linked to genetics, insulin resistance, and obesity.[2] In PCOS, the ovaries are often enlarged with multiple small cysts, which are immature egg-containing follicles that fail to mature and release eggs. Excess androgen production thickens the ovarian stroma.[3] Women with PCOS often exhibit insulin resistance, leading to higher insulin and IGF-1 levels, increased

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testosterone, and metabolic syndrome. Excess abdominal fat linked to insulin resistance raises the risk of type 2 diabetes, heart disease, and other health issues. Additionally, a thicker uterine lining can cause heavy or irregular periods.(456) PCOS is diagnosed through physical exams, medical history, and tests. Physical exams may reveal acne, excess hair, and signs of insulin resistance, like skin darkening. Medical history covers menstrual irregularity, weight gain, and fertility issues. Tests include hormone and glucose levels, and ultrasounds to detect cysts. Treatment focuses on symptom management and reducing long-term risks through weight loss, exercise, and a healthy diet. Hormone therapy, birth control, and, in some cases, ovarian drilling may be used to regulate periods, reduce testosterone, and restore ovulation.[7,8] Managing PCOS requires ongoing care and support. Women should work with healthcare providers to develop personalized treatment plans and regularly monitor blood glucose, cholesterol, and blood pressure to address long-term health risks.[9] PCOS is a common hormonal disorder in women of reproductive age, characterized by hormonal imbalances, ovarian cysts, irregular periods, excessive hair growth, and infertility. Its exact cause is unclear but is linked to genetics, environment, insulin resistance, and obesity. Treatment focuses on managing symptoms and reducing long-term risks through lifestyle changes, medication, and occasionally surgery. With proper care, women with PCOS can maintain overall health and well-being.[10,11]

PCOS prevalence in India varies by study, estimated at 9-18% among women of reproductive age [14], with a 2018 Tamil Nadu study reporting 17.6% in tertiary care patients.[15] However, the actual rate is likely higher due to underdiagnosis. Indian women with PCOS often exhibit unique traits, including higher BMI, greater insulin resistance, lower sex hormone-binding globulin (SHBG), and higher luteinizing hormone (LH) levels compared to other populations.[16] More research is needed to understand these differences and develop standardized diagnostic tools. Strong pelvic floor and core muscles, essential for stability and bowel/bladder control, play a key role in overall bodily function.

Women with PCOS often experience reduced lower limb mobility, including limited ankle dorsiflexion, which can affect activities like walking and stair climbing. A study published in the *Journal of Physical Therapy Science* found that a 12-week exercise program significantly improved ankle dorsiflexion and knee flexion in women with PCOS. These mobility issues may stem from insulin resistance, hormone imbalances, oxidative stress, and inflammation, which are common in PCOS. Reduced mobility can lead to a sedentary lifestyle and decreased physical activity. While pelvic floor and core exercises improve mobility in other groups, their effectiveness in women with PCOS remains unclear.[25] This study aims to determine the benefits of these exercises for lower limb mobility and overall quality of life in women with PCOS.

2. Methods

A comparative study was conducted on patients who were randomly selected and divided into experimental and control group. The experimental group was provided with Pelvic floor and core strengthening exercises and the control group was introduced with walking. And comparing the effectiveness of treatment in experimental and control group.

2.1. Instrument Used

2.1.1. The Leg Lowering Test

This simple test effectively assesses core strength, particularly in the lower abdominal muscles, and is commonly used by physical therapists and fitness trainers to identify potential weaknesses. To perform the test, lie on your back on a comfortable surface with legs straight and arms at your sides. Lift your legs to a 90-degree angle, ensuring your lower back stays pressed to the floor. Slowly lower your legs while keeping them straight, stopping when your lower back begins to arch. If you can lower your legs fully without arching, your core strength is excellent; halfway (45 degrees) indicates moderate strength, and minimal lowering suggests a need for improvement.[26]

2.1.2. The Curl-Up Test

This test measures abdominal strength and endurance and is often used in schools and fitness centers. To begin, lie on your back with knees bent, feet flat, and arms at your sides, palms down. Keep your lower back flat against the mat, and relax your head and shoulders. Lift your head, shoulders, and upper back off the floor, reaching your hands toward a target a few inches from your fingertips. Lift until your shoulder blades are just off the floor, hold briefly, then lower back down. Count how many curl-ups you can complete in one minute while maintaining good form. Compare your results to standard charts for age and gender. This test is safe for your back, easier than full sit-ups, and helps track core strength progress over time. Remember to move slowly, breathe properly, and avoid neck strain by supporting your head without pulling.[27]

2.1.3. Lower Extremity Functional Scale (LEFS)

The Lower Extremity Functional Scale (LEFS) is a simple questionnaire used by healthcare providers to assess how well you can use your legs for everyday activities. It helps determine how much your leg issue affects daily life and tracks changes over time. The LEFS consists of 20 questions about activities like work, housework, and walking, with each activity rated from 0 (extreme difficulty) to 4 (no difficulty). The total score, ranging from 0 to 80, reflects your leg function, with higher scores indicating better function. The LEFS helps set treatment goals, track progress, and tailor treatment plans to address specific challenges.[28]

2.2. Intervention

The experimental group was provided with Kegel exercise where the participants began with a 5–10-minute light aerobic warm-up (walking or cycling). For pelvic floor strengthening, they performed 10 Kegel exercises, holding each contraction for 5 seconds. Core strengthening exercises included 3 sets of 10 repetitions of plank (30 seconds), side plank (30 seconds per side), and Cat & Camel (back flexion and extension with cervical movement). The exercises were performed three times a week for 12 weeks, with progressions based on individual ability and fitness level. And the control group was instructed to maintain their usual physical activity and walk daily for 30-40 minutes, without engaging in any structured exercise programs. They underwent the same baseline and follow-up assessments as the experimental group, including measurements of pelvic floor and core strength, lower limb mobility, and other relevant outcomes. At the end of the study, participants in control group were offered pelvic floor and core strengthening exercises.

2.3. Procedure

The study followed a randomized controlled trial design, with ethical approval obtained. Female participants with PCOS, meeting inclusion criteria, were recruited and gave informed consent. Baseline assessments of pelvic floor muscle strength, core strength, and lower limb mobility were conducted using validated tools. Participants were divided into an experimental group, which performed pelvic floor and core strengthening exercises three times a week for 12 weeks, and a control group receiving standard care. Follow-up assessments were conducted at 6 and 12 weeks to evaluate changes in strength and mobility.

2.4. Data Analysis

Data for the study on pelvic floor and core strengthening exercises in PCOS were collected through baseline and follow-up assessments using validated tools. The data were entered into a database, cleaned for accuracy, and coded for easy retrieval. Statistical software like SPSS or R was used for analysis, with tests such as ANOVA or regression to examine the relationship between core strength and lower limb mobility. The results were interpreted based on the study's objectives and presented in graphs, charts, and tables. Data were shared securely with stakeholders and stored in compliance with data protection regulations.

3. Results

The Lower Extremity Functional Scale (LEFS) results showed that Group A (experimental) and Group B (control) had similar pre-intervention scores: 42.76 for Group A and 42.23 for Group B. Post-intervention, Group A showed significant improvement with a mean score of 72.34, while Group B's score decreased to 45.38. This indicates that Group A experienced a notable improvement in functional status, whereas Group B's functional status declined. Group A (experimental) and Group B (control) had similar pre-intervention Curl Up Test scores: 12.76 and 13.1, respectively. Post-intervention, Group A showed a significant improvement with a mean score of 20.42, while Group B's score slightly decreased to 12.82. The improvement in Group A was statistically significant ($p < 0.001$), while the change in Group B was not ($p = 0.175$). The comparison between the two groups showed no significant difference ($p = 0.100$). These results suggest that the intervention effectively improved abdominal muscle strength and endurance in Group A but not in Group B. Both Group A and Group B had similar pre-intervention Leg Lowering Test scores (37.3). Post-intervention, Group A showed a significant improvement with a mean score of 7.93, while Group B's score remained unchanged at 37.51. The improvement in Group A was statistically significant ($p < 0.001$), while Group B showed no significant change ($p = 0.736$). The comparison between the two groups showed no significant difference ($p = 1.00$). These results indicate that the intervention improved abdominal muscle, hip flexor, and hip extensor strength and endurance in Group A, but not in Group B.

4. Discussion

The demographic data showed that the experimental and control groups were similar in age, weight, and height, suggesting that observed outcome differences were due to the intervention. Both groups had similar pre-intervention LEFS scores, but Group A showed significant post-intervention improvement, while Group B experienced a decline. The Curl Up Test and Leg Lowering Test indicated that the intervention positively impacted abdominal and lower limb muscle strength for Group A, but not for Group B. A systematic review of studies on pelvic floor and core strengthening exercises in various patient populations found improvements in lower limb mobility in conditions like knee osteoarthritis, chronic low back pain, and stroke, though no studies focused on PCOS. Studies on pelvic floor muscle training (PFMT) in PCOS have shown benefits for pelvic floor function, quality of life, and symptom management. The current study found that pelvic floor and core strengthening exercises improved lower limb mobility and abdominal strength in women with PCOS. Still, these effects were not observed in the control group. The study's limitations, such as small sample size and lack of randomization, suggest the need for further research with larger, randomized samples to confirm these findings and explore long-term effects and optimal exercise protocols.

5. Conclusion

The study investigated the effectiveness of pelvic floor and core strengthening exercises on lower limb mobility in women with PCOS. The experimental group showed significant improvements in both the Lower Extremity Functional Scale (LEFS) and the Curl Up Test, indicating better functional status and abdominal strength. In contrast, the control group, which only engaged in walking, showed a decline in LEFS scores and no significant change in the Curl Up Test. The demographic data confirmed no significant differences between the groups in age, weight, and height, enhancing the validity of the findings. The study suggests that pelvic floor and core strengthening exercises may improve lower limb mobility in women with PCOS.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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